

A dictionary of practical medicine: comprising general pathology, the nature and treatment of diseases, morbid structures, and the disorders especially incidental to climates, to the sex, and to the different forms of life : with numerous prescriptions for the medicines recommended, a classification of diseases according to pathological principles, a copious bibliography, with references, and an appendix of approved formulae : the whole forming a library of pathology and practical medicine and a digest of medical literature (Volume 2).

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Copland, James, 1791-1870.
Lee, Charles A. 1801-1872.
Channing, Walter, 1786-1876
Page, Calvin Gates, 1829-1869
Boston Public Library
National Library of Medicine (U.S.)

Publication/Creation

Boston : Lilly, Wait, Colman, and Holden, 1834-59.

Persistent URL

<https://wellcomecollection.org/works/c9x9jh5g>

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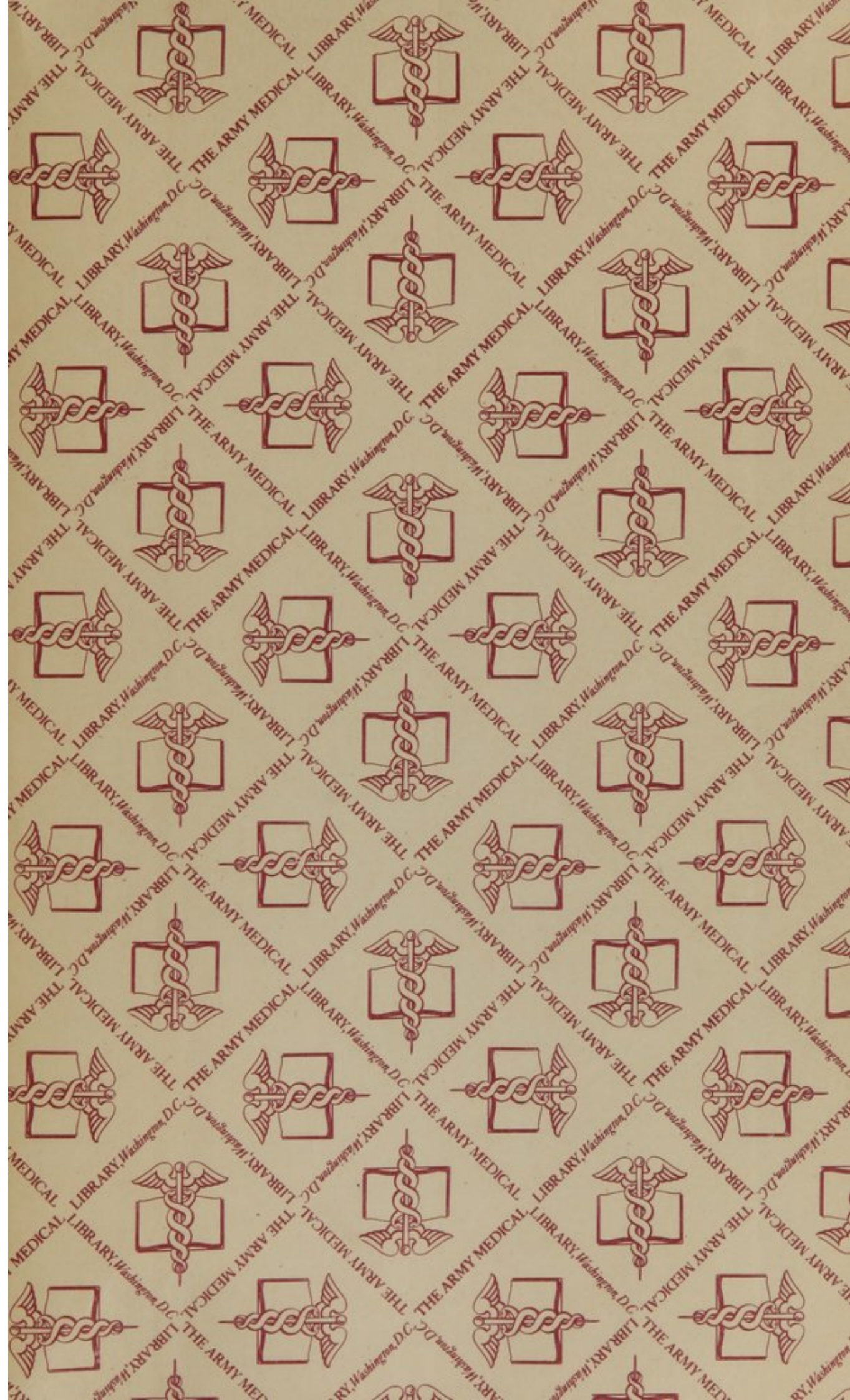
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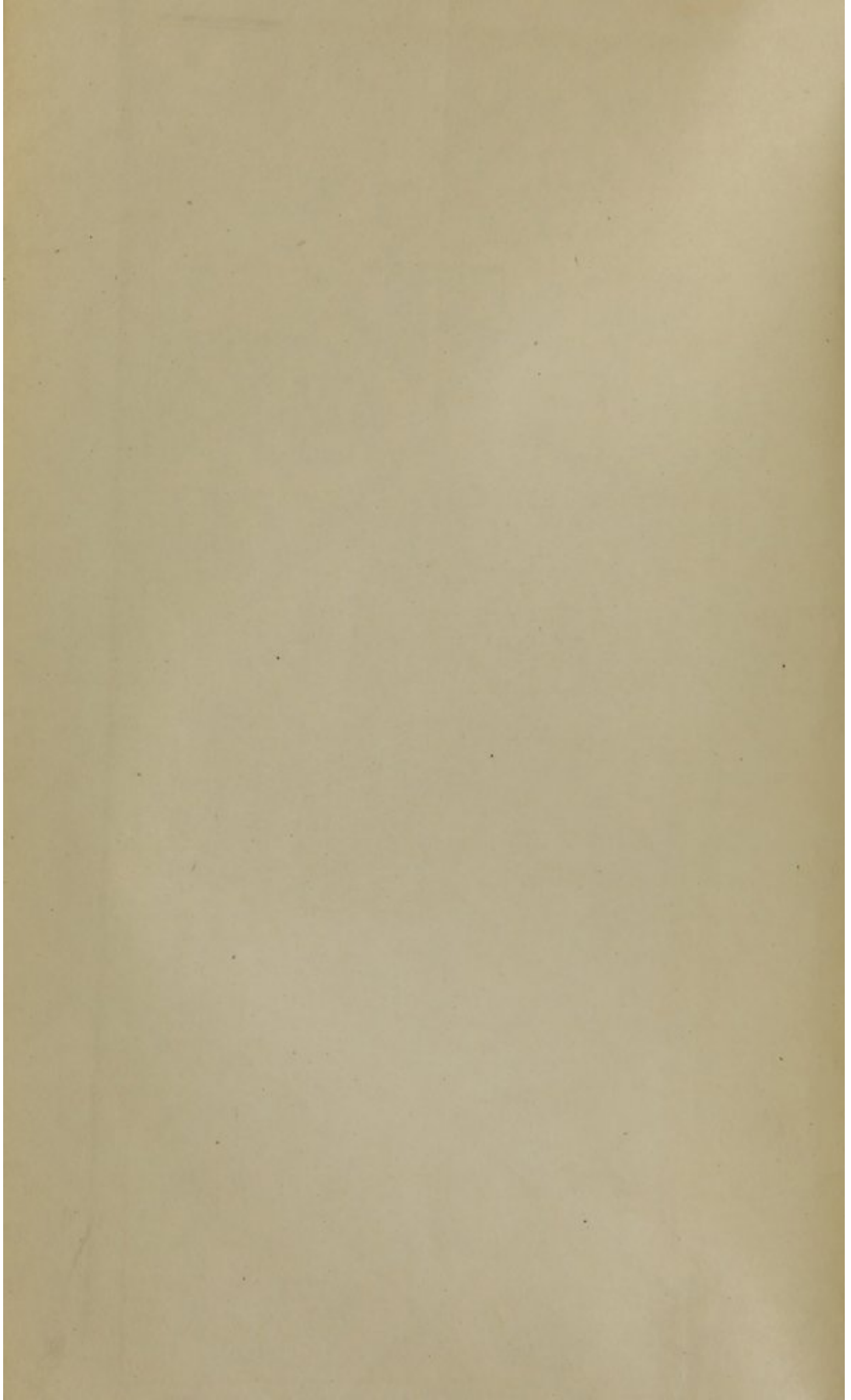
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A
DICTIONARY
OF
PRACTICAL MEDICINE:

COMPRISING

GENERAL PATHOLOGY,
THE NATURE AND TREATMENT OF DISEASES, MORBID STRUCTURES,
AND THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX,
AND TO THE DIFFERENT EPOCHS OF LIFE;

WITH

NUMEROUS PRESCRIPTIONS FOR THE MEDICINES RECOMMENDED,
A CLASSIFICATION OF DISEASES ACCORDING TO PATHOLOGICAL PRIN-
CIPLES, A COPIOUS BIBLIOGRAPHY, WITH REFERENCES;

AND AN

Appendix of Approved Formulæ:

THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE,
AND A DIGEST OF MEDICAL LITERATURE.

BY JAMES COPLAND, M. D.

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of the Medical and Chirurgical Societies of London and Berlin, etc.

VOL. II.

CAMBRIDGE:
FOLSOM, WELLS, AND THURSTON.
1838.



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throat, as recommended by some writers ; and, in very young and delicate children, it will be better not to place them over leech-bites. In the latter periods, I prefer to blisters, the use of warm poultices, on the surfaces of which Cayenne pepper and scraped camphor are sprinkled in quantity sufficient to produce redness of the cuticle ; or the application of warm cloths, moistened with either of the liniments, F. 300, 307, 308. These are particularly useful upon the removal of the patient from a warm bath, especially in the complications of the disease. *Sinapisms* have been directed by many to be applied to the extremities ; but I have seen more harm than benefit produced by them, from the distress and crying they occasioned.

63. *Internal and external emollients* are sometimes useful auxiliaries, particularly in the first stage. The decoctum althææ, the mist. amygdal. dulcis, the inspissated juice of the sambucus niger, mucilages, with liquor ammoniæ acetatis, vinum ipecacuanhæ, and syrup (see F. 47. 389.), may be used internally ; whilst warm fomentations, with decoction of chamomile flowers and poppy-heads, are applied about the throat, and frequently renewed, upon the occurrence of hoarseness, cough, and difficult respiration. These have the effect of retarding the approach of the latter and more dangerous states of the malady, even when they fail of rendering more efficient aid. LENTIN advises camphor to be applied to the chest ; but it will be more beneficial to employ it along with the fomentations, which may extend over both the throat and the upper part of the chest ; or it may be placed upon warm poultices, as advised above, particularly in the more spasmodic and complicated states of the disease.

64. *Cold epithems* on the throat have been employed by some writers, and particularly by FIELD. They appear to have been of little service in his cases. I am unable to give any opinion respecting them from my own experience. They seem not to be equal to warm fomentations. GOELIS states, that they are dangerous means to resort to ; and alludes to cases where they were injurious.

65. *Semicupium and pediluvium* are useful modes of derivation, in the first and second stages especially. But salt, mustard, and, in some cases, a little of either of the fixed alkalies, or of the sulphurets, should be added to the water, and its temperature gradually increased as immersion is prolonged. Great care is requisite in removing the patient from the bath, to prevent any chill. In many cases, it will be preferable to wring as dry as possible large pieces of flannel out of warm water prepared as above, and to wrap them round the lower limbs of the patient, changing them frequently, or prolonging the use of them, according to circumstances, and preserving the bed-clothes from moisture.

66. *Tepid and warm bathing* are of service—the former in the early stages, the latter in the advanced periods, of the disease. GOELIS advises the tepid bath of about 23° or 24° of Reaum. ; and to be rendered antispasmodic by using a decoction of chamomile flowers and poppy-heads ; or irritant, by adding some caustic alkali ; or both antispasmodic and derivative, by a combination of these substances, according to the circumstances of the case. I have, in a few instances, used these baths, upon the recommendation of this

writer, and certainly with marked advantage, but I have increased their temperature in the latter stages of the disease, rendering them, at the same time, more irritating by the addition of an alkali. In the early periods, however, the emollient and antispasmodic form of bath seems preferable, particularly when the patient breathes the vapour rising from it. The duration of immersion should seldom be shorter than twenty minutes, unless circumstances should prevent it ; and I am convinced that it may be prolonged to two hours, with advantage, in some instances. In a case despaired of, I caused, upon the recommendation of GOELIS, the child to be put in a bath consisting of a decoction of chamomile flowers and poppies, to which some caustic alkali was added. It was kept there for twenty-five, and on a second occasion forty, minutes. It ultimately recovered. Care must be taken that the temperature of the bath does not fall during its continuance. As soon as the patient is removed, and the skin dried, he should be placed in warm flannel or in a blanket ; and perspiration encouraged by diaphoretics suited to the nature of the case and stage of the disease : in the early stage by antimony or ipecacuanha, so as to excite slight nausea, or occasionally vomiting, if requisite ; in the latter periods, with liquor ammoniæ acetatis, given in sufficient quantity to produce the same effects ; or, if sinking be apprehended, with camphor, ammonia, &c.

67. *Purgatives* have been given with different intentions ;—either as mere evacuants of retained secretions and excretions ; or as active derivatives from the seat of disease. HOME, DESESSARTZ, and MICHAËLIS, seem to have resorted to them with the former intention ; HAMILTON, PINEL, and AUTENREITH, with the latter view ; CRAWFORD, THOMPSON, and others, prescribing also enemata. My own experience is decidedly in favor of this class of medicines ; and of employing calomel, jalap, scammony, &c., and extract of colocynth, with assafoetida, &c., in enemata (§ 51, 52.).

68. *Sudorifics* are of use only in the early periods of croup. James's powder, and the other preparations of antimony, subsequently ipecacuanha, and liquor ammoniæ acetatis, or the one combined with the other, and given to the extent of exciting nausea, in conjunction with emollients (§ 63.), are important auxiliaries. GOELIS remarks, that DOVER's powder is seldom productive of any benefit ; and that sudorifics are never of service in the last stages. Gentle diaphoresis, early in the disease, is undoubtedly beneficial, when the patient drinks freely of emollients ; but he with justice adds, that very copious sweats only increase the disposition to form false membranes of a firm and adherent kind, owing to the evacuation of too large a proportion of the watery parts of the blood. In these opinions, TREBER, HIRSCHFIELD, and most of the Vienna physicians, agree.

69. *Expectorants*.—Under this head may be ranked an important part of the remedies prescribed in croup. The inhalation of vapours has already been noticed. The experienced GOELIS places much confidence in them during the first and third stages ; in the latter of which they often increase the cough, but they favour the discharge of false membranes, by increasing the mucous secretion by aid of which they are thrown off. I have mentioned (§ 47.) the expectorants in which

my experience has led me to confide. There are very few which have been more generally recommended than *senega*. ARCHER, BARKER, VALENTIN, ROYER-COLLARD, LENTIN, MAERCKER, CARRON, &c. recommend it after bleeding. Dr. ARCHER, who attributes the greatest virtues to this medicine, advises it to be given at the same time as calomel, in frequent doses, until it excites vomiting or purging. GOELIS and TREBER remark, that, although a good remedy in the third stage, it is by no means possessed of those specific virtues attributed to it by Dr. ARCHER; and in this I agree with them. It is a useful medicine in the complications of the disease with malignant sore-throat or scarlatina. *Squills* are chiefly trusted to by HUFELAND, RUMSEY, and MAERCKER, in the latter periods. They should not be exhibited in the more inflammatory states of the malady, until after depletions have been carried sufficiently far, and we wish to procure the expulsion of the concrete exudations formed in the air-passages. They ought to be exhibited in small doses in the remissions, and pushed to the extent of producing vomiting when paroxysms of suffocation occur. After the membranous substances are removed, squills should be altogether laid aside. The *sulphuret of potash* has been recommended by Professors SERF, CHAUSSIER, MERCIER, and HECKER, in doses of about four grains, given every three or four hours. It is sometimes of much service after depletions. It may be combined with camphor, or small doses of *ipeacacuanha*.

70. 2. *Antispasmodics* have been very generally prescribed and particularly by MICHAËLIS, PINEL, SCHWILGUE, VIEUSSEUX, &c., after the decided use of antiphlogistic remedies. HOME, CHEYNE, and GOELIS, consider that these medicines are of little use in common and inflammatory croup. I am, however, convinced, from extensive experience, that, when the inflammatory symptoms are altogether, or even nearly, removed by antiphlogistic medicines, when the disease passes into a spasmodic state, or presents from the commencement a predominance of such symptoms, and when increased irritability becomes manifest, a judicious exhibition of antispasmodic medicines is often attended with benefit. *Musk*, either alone or with other medicines, with calomel (MICHAËLIS and WIGAND), with squills, sulphuret of potash, or other expectorants, and with camphor or ammonia, in the last stage of the malady; * *valerian* and its preparations,

* The chief danger in croup often proceeds from the spasm with which the respiratory passage is affected in the progress of the disease. The obstruction of the tube by the false membrane and effused matter, seldom of itself causes suffocation; but rather this lesion, combined with spasm of the muscles of the larynx and membranous portion of the trachea; and, in many cases, exhaustion is superadded, or even constitutes the most important change. Depletions alone will not overcome this disposition to spasmodic action, which is generally observed to supervene at intervals; the periods elapsing between the paroxysms varying according to the strength and constitution of the child, and the severity of the disease. But, in many cases, the spasmodic action is more frequent and more dangerous, and the more likely to become associated with convulsions, the weaker the constitution and powers of life, and the more those powers have been reduced by copious depletions. After moderate depletion, therefore, and in many cases even previously to any, such medicines as possess an antispasmodic power, by first acting as nauseants, are of great benefit. M. KIMBELI seems to have partly adopted this view of the disease and of its treatment; but I am confident he has carried it much too far. If his success had been equal to what he conceives it

and *assafatida*, or any of the other medicines of this class mentioned above, may be employed, either alone, or with expectorants and opiates, particularly when the energies of the system begin to be depressed, or the complaint assumes from the first a spasmodic character.

71. Of those medicines which are *antispasmodic* from their *sedative* operation, the most important are colchicum, opium, hyoscyamus, prussic acid, digitalis, and tobacco. *Colchicum* may be given combined with calomel, in the early and inflammatory states of the disease, or with ammonia or camphor, at a later period; but it ought, in young children especially, to be exhibited with extreme caution,—in very small doses, and carefully watched. It came into fashion in this and other diseases of the air-passages a few years since, and was, for a time, much employed; I then saw some cases of croup in which it had been very injuriously employed, from having been given in too large doses for the age of the child, or too long continued, or combined with other depriments, as antimony, &c., or exhibited after very large depletions. I can most truly assert, that I have seen at least two cases of croup, in which death was to be imputed to this substance, rather than to the effects of the disease; and yet it is sometimes of use when combined as I have now advised. Of *digitalis* I have had no experience in this complaint; if exhibited at all, it should be conjoined with calomel. *Prussic acid* has been employed in some cases which I have seen; but the same objections I have urged against colchicum apply to it, when prescribed for young children. In older patients it is sometimes of benefit, combined with camphor, or oxyde of zinc, or other stimulating antispasmodics, in combating the irritability and disposition to spasmodic paroxysms in the latter stages. *Opium* was much

to have been, the cases which he has met with have been unusually slight. There is no doubt of bleeding, blistering, purging by calomel, &c. &c., having been pushed to hurtful lengths in many cases, or inappropriately applied; and the same may be said as to other means, which have tended more to exhaust the vital energies than to cure the disease; and there can be no doubt of the disposition to spasm becoming greater, and of its consequences being more to be dreaded, the lower the powers of life sink; for, with such sinking, the general sensibility and irritability of the frame increase. But I cannot conclude that those means could have been dispensed with in any considerable number of the cases which have fallen under my observation, and in which I have never omitted also to employ antispasmodics of the most active nature, from a conviction that the disease partly depends upon spasm. Mr. K.'s observations as to the treatment of the disease, are to the following effect:—"I never bleed or blister a child in croup; I have never thought it requisite to do so, since I have adopted the plan alluded to; although such auxiliary practice would be in no other respect incompatible, than as tending to invalidate the general strength. The treatment I allude to consists in confining the child to a uniform and rather warm temperature, giving an emetic of *ipeacacuanha*, and, in an hour after, commencing the following mixture:—

No. 164. R Pulv. *Valerianæ* ʒij.; Oxy mel. Scillæ ʒj.; Tinct. Opii gtt. xx.; Aquæ Destillatæ ʒj. Misce.

I administer a teaspoonful every hour, if the child is from two to five years old; if from five to eight, every five and forty minutes, so as to maintain the anodyne effect of opium, and the sub-nauseant expectorant, antispasmodic effects of the squill and valerian, until the symptoms are removed; which commonly happens in ten or twelve hours, and which I have never seen protracted beyond eight and forty. On their subsidence, I have, in general, given a brisk dose of calomel and jalap."

Mr. K. likewise recommends the above treatment in hooping cough and in catarrh; and in those cases which are unconnected with inflammatory action, it is not inappropriate. In the slight and more spasmodic states of croup, it also will prove very beneficial.

employed, after depletions, by KENDRICK and HUGGANS. It may be used both externally and internally (as may the preparations of *morphine*), with aromatics, camphor, or assafoetida, musk, &c., in the states of the disease now mentioned. *Henbane*, and *extract of poppy*, may also be employed under similar circumstances and forms of combination. *Tobacco* has been prescribed in croup, in various modes. Dr. VANDERBURGH and Dr. GODMAN recommended a plaster covered with Scotch snuff to be applied across the top of the sternum; and myself and others have employed this substance, with the view of detaching the false membrane by exciting sneezing and an increased secretion of mucus. The *smoke* of tobacco has also been directed to be inhaled, in order to remove spasm, and promote expectoration, by its direct operation in the air-passages; and others have advised the patient to smoke a cigar, with the intention of producing nausea, as well as the other effects last enumerated. After depletion, and when the disease is about its acmé, the powers of life not being materially exhausted, a cautious use of this means may be serviceable. In the case of children who cannot use a cigar, the smoke of one may be blown around them, and in this way it will have a sufficient effect. Cloth moistened with an infusion of tobacco may, under some circumstances, be applied over the throat, and its effects carefully watched; but this measure is not without hazard, particularly after lowering remedies have been used, or in an advanced stage of the malady.

72. *μ.* The preparations of ammonia have been much employed in all the states of croup. *Cautic ammonia*, in doses of three or four drops, given every hour; ammoniacal liniments being at the same time applied about the throat; has been advised by some writers, in order to promote the excretion of the concrete exudations in the third stage of the disease. The *carbonate of ammonia* has been more generally employed. M. RECHOU prescribed it both internally, and externally in ointments to the throat. In the latter stages, as a useful antispasmodic stimulant, it may be sometimes of service; it is very advantageously combined with camphor, or even with calomel, in the complications of croup with angina maligna, or with any of the eruptive fevers. M. CHAMERLAT has recommended the *muriate of ammonia* to be taken internally, and applied to the fauces, when the disease is associated with inflammation of the throat. The *cuprum ammoniatum*, and the *hydro-sulphuret of ammonia*, have also been prescribed in doses suitable to the age of the patient. They may be sometimes of service in the more spasmodic states; but I have had no experience of their effects in this complaint.

73. *ν.* M. VALENTIN has recommended the application of the *actual cautery* upon each side of the throat, in the most severe forms of the disease, when it is at its acmé. *Moxas* seem to be preferable to the actual cautery; and, if this practice should be adopted, it might, perhaps, be advantageous to follow it by fomentations placed over the trachea. M. DUPUYTREN employed in one case, referred to by GUERSENT, a small rod of whalebone covered by pieces of sponge, which was introduced into the pharynx in order to remove the partially separated portions of false membrane lodged in that situation, or partly thrown out from the larynx. In the advanced

stage of croup complicated with angina pharyngea, this contrivance is calculated to succeed.

74. *ξ.* *Tracheotomy*.—There does not seem to be a chance of success from this operation in any case wherein the treatment developed above has failed. The practitioner, however, may be called to a case so late in the disease, and where the suffocation is so imminent, that the propriety of having recourse to it may be admitted: but, even in these, the chances are infinitely greater against than in favour of its success; and if benefit can be obtained from any measure, it is as likely to accrue from the energetic exhibition of suitable emetics as from tracheotomy. Cases have doubtless been recorded of the success of the operation in croup; but these are so very few, compared to the number in which it has failed, that I perfectly agree with GOELIS, CHEYNE, ROYER-COLLARD, PORTER, WOOD, and many others, in concluding that it should seldom or never be attempted in this disease. Of the propriety of having recourse to it in certain states of laryngitis, &c. there can be no doubt; and it may, with some slight grounds of hope, be resorted to when croup is chiefly confined to the larynx and upper portion of the trachea; also, perhaps, in some cases of its consecutive occurrence upon inflammation of the throat with membranous exudation; and when we infer, from the general symptoms and the signs furnished by the stethoscope, that the bronchi and lungs are unaffected; but in that period of the simple as well as of most of the complicated forms of the disease, in which only it should be attempted, and when internal treatment has failed, I believe that the superinduced lesions in the bronchi, lungs, circulating fluid, and nervous system, are such as to preclude hopes of its success. Moreover, the feelings of the parents regarding it, and the reputation of the physician and operator, are not to be kept out of view. "Ad tracheotomiam," says GOELIS, "omnium remediorum incertissimum confugere res ardua est; parentes abhorrent, aversantur agnati et periclitatur medici fama, quem, infausta si fuerit operatio ac votis illudens, lacrymis multis velut homicidam prolis amata detestantur parentes."

75. *ii.* PROPHYLACTIC TREATMENT, &c.—

A. GOELIS states, that he never saw a child with porrigio and other chronic cutaneous affections attacked by croup whilst they remained fully developed, even when this disease was most prevalent. He therefore advises the having recourse to any form of issue, when an attack is desired. To resort, however, to emetics, to antimonial medicines, to counter-irritants, to depletions, to confinement in-doors one half of the year, and other measures which have been advised, is attended with greater mischief than to allow the child to run the slight risk there is of his having the disease. The case, however, is different in respect of a child who has once suffered an attack. The liability of croup to recur, even several times, after intervals of various duration, renders precautions, under such circumstances, very requisite. The chief of such measures are—removal from the predisposing and exciting causes (§ 24—31.); change of air and locality; the use of the shower or cold bath every morning, the skin being well rubbed with a hard or coarse cloth afterwards; the wearing of flannel next the skin, and of a neckcloth in winter and spring; light nourishing diet, with

strict attention to the secretions and excretions; immediate recourse to medicine upon the appearance of catarrhal or croupal symptoms; and a careful avoidance of exposure to cold and moisture. When croup occurs in one child of a family residing in situations where it prevails, more will probably be attacked. In such cases, removal to a healthier air is requisite. When it is prevalent either in a simple or complicated form, and particularly when the locality also increases the risk of seizure or relapse, the occasional exhibition of small doses of calomel and James's powder, or of hydrarg. cum creta with the sub-carbonate of soda, or the having recourse to either of them every second or third night, may be tried. In this country, care should be taken not to expose children to the north-east winds of spring, particularly when they follow heavy rains, &c.

76. *B. The Diet and Regimen*, in the more acute and inflammatory forms of croup, should be strictly antiphlogistic; and all food should be withheld until the stage of exhaustion supervene, when, if light nourishment can be taken, or be desired, it should be given. In the more spasmodic or prolonged forms, light food may be taken in small quantity. The best beverage of which the patient can drink, is a very weak decoction of marsh-mallows and liquorice root, to which a little candy and sub-borate of soda are added. The temperature of the room should be moderately and equably warm.

77. *C. During Convalescence*, change of air, as soon as it can be safely permitted, is especially beneficial; and strict attention ought to be paid to the prophylactic means stated above (§ 75.), in order to prevent a relapse or recurrence of the malady. These precautions are required during, and for some time after, recovery from the complications and consecutive affections of croup, as well as from its simple forms. In the winter and spring months especially, the convalescent should be kept in apartments moderately and as equably warm as possible.

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CYANOSIS. See BLUE DISEASE.

CYNANTHE MALIGNA. See FEVER, SCARLET; FAUCES; and PHARYNX, *Inflammations of*.

CYNANCHE PAROTIDÆA. See PAROTID, *Inflammation of*.

CYNANCHE PHARYNGEA. See PHARYNX, *Inflammations of*.

CYNANCHE TONSILLARIS. See TONSILS, *Inflammations of*.

CYNANCHE TRACHEALIS. See CROUP.

CYSTITIS. See URINARY BLADDER, *Inflammations of*.

DEAFNESS. See EAR, *Diseases of*; and HEARING, *Disorders of*.

DEBILITY.—SYN. *Adynamia, Asthenia, Atonia, Debilitas*, Lat. *Die Schwäche, Schwachheit*, Ger. *Débilité, Asthénie*, Fr. *Debolezza*, Ital. *Vital Depression, Diminished Vital Power or Energy*.

CLASSIF.—GENERAL PATHOLOGY; *Pathogeny*.—SPECIAL PATHOLOGY. I. CLASS.

1. DEFIN.—*That departure from the healthy condition of the frame, which consists of a diminution of its vital energies—of an enfeebling of its powers, manifested in numerous conditions and grades throughout the whole frame, or more or less remarkably in particular systems or organs.*

2. *Debility* is a state of vital manifestation intimately connected with the nature of disease; and, in whatever acceptation it has been understood, it has been admitted by every physician who has looked beyond the grosser and more palpable changes superinduced in the economy, as not only a most important pathological condition, but as often constituting what is, in the common language of medicine, disease itself. It often performs a principal part in the commencement, and towards the close, of the most severe maladies; and its modifications are amongst the most difficult in pathology to detect and to interpret aright. Several of the appellations it has received have been more or less restricted to certain of its conditions; as *adynamia*, to want of muscular or animal power; *atonia*, to deficient vital tension and tone of circulating and exhaling vessels; *asthenia*, to depressed energy of organs essentially vital, &c.: but as the distinctions between them have never been made with sufficient precision, and have seldom been preserved, and as they have all been used synonymously by the best modern writers, they will be thus received at this place.

3. It might appear interesting to ascertain the varieties and grades of debility; but this is a matter of no easy accomplishment, if not entirely beyond the reach of our powers. Debility is, besides, a relative term; and of its extent or degree of departure from that condition of vital power requisite to the perfect performance and continuance of the functions, we can form no very precise idea, even were we agreed upon the standard of power by which the comparison should be made. Of its numerous grades and manifestations, from the slightest departure from health to the utmost consistent with existence, there can be no question; and therefore they cannot be otherwise than arbitrarily appreciated. This will appear obvious to any one who will refer to the numerous varieties into which VOGEL and SAUVAGES have divided *asthenia*.

4. DIVISIONS OF.—It will be preferable, therefore, to consider debility in respect merely of its principal conditions relatively to the operation of the chief causes which induce it; and, in order to elucidate its morbid relations, and its influence in producing and perpetuating further disease, to enquire into its manifestations and effects on the various general systems and organs of the body. The majority of pathological writers have found great difficulty in considering this subject, and scarcely any two have agreed as to the manner of discussing it, or as to its nature. Some have viewed it as the negative of excitation, or a minor degree of that state of excitement induced in the system by the agents surrounding and acting upon it,—by privation, or change of the factors of life (HARTMANN.) This opinion, which may be traced to the *Strictum* and *Laxum* of THEMISON; but which was first insisted on, in a manner at all accordant with the doctrine of solidism, by BROWN, and variously modified and illustrated by his contemporaries and followers; led to the division of this grand pathological state into two forms,—*direct* and *indirect* debility. This division was adopted by DARWIN; and RUSH followed the same track, denominating the former *debility from abstraction*, the latter *debility from action*. RASORI and TOMMASINI hardly even modified the doctrine of BROWN, when they divided it into *primary* and *secondary*; the former arising from contra-stimulating, the latter from stimulating, impressions. BROUSSAIS followed a similar arrangement; but considered that it is primary in very few instances, and only from the abstraction of stimuli. The simplicity of these divisions is their chief recommendation; but it is carried so far as to be inconsistent with the complexity of those derangements to which the human frame is subject. This feeling seems to have induced BOISSEAU to impute it to three sources: 1. To a complete or prolonged abstraction of the accustomed stimulus; 2. A diminution of the reciprocal stimulating influence of the organs; and 3. To the inordinate excitation of a part, rendering the others incapable of acting with energy. M. BRACHET, adopting similar views to my own, but several years after mine were published, both in the *London Medical Repository* and in my *Physiological Notes*, refers debility either to diminution of the action of the cerebro-spinal system, enfeebling the functions over which it presides, or to depression of the functions dependent upon the influence of the organic or ganglial nerves; the weakness of the nervous system arising, as he thinks, either from deleterious states of the blood, or diminution of its quantity. HUFELAND divides it into *true*, and apparent or *false*; the one from change of the nervous sensibility, the other from oppression of the vital powers. Dr. GEDDINGS, the most recent writer on the subject, considers debility, 1st, as *direct*, when arising from the abstraction of stimuli, or the operation of contra-stimuli, or such substances as “directly enfeeble the organization;” 2dly, as *indirect*, or that resulting from exhaustion, and “from deterioration of the nutritive molecules of the blood;” and, 3dly, as *metastatic*, or that form proceeding from inordinate irritation of one organ leaving the others in a minor state of excitation. It is impossible to examine the conditions of debility with any degree of precision abstractedly

from their principal causes. I shall, therefore, with due regard to this connection, consider, 1st, The primary or direct states of debility; 2dly, Its consecutive or secondary conditions; and, 3dly, Those forms, consisting not only of depressed, but of otherwise morbid or vitiated, vital manifestation—or complicated debility. After having discussed these topics, with reference to *general debility*, the *more special or partial states of debility*, and *its consequences*, will be brought into view; and the subject pursued in its relation to general and special pathology.

5. I. CONDITIONS OF DEBILITY.—I. PRIMARY DEBILITY (*Direct*, BROWN; *True*, HUFELAND; from *Abstraction of Stimuli*, RUSH and BOISSEAU.) This state of debility is not so frequent as is commonly supposed, although by no means so rare as BROUSSAIS and his followers contend. Many of the cases commonly imputed to it strictly belong to the other conditions specified above (§ 4.). Primary debility may be, (a) *Original*, or congenital; and (b) *Acquired*.—A. The former of these is observed in the children of exhausted, dissipated, or aged parents,—especially the male parent,—and is familiar to every common observer. It also presents itself in the infants of those who are of a strumous diathesis, although generally in a slighter grade, and more frequently obscured by concurrent disease of particular organs. This form of debility seldom continues long without being followed by some specific malady, which it either remarkably favours, or even more directly produces,—causes, which are innocuous as respects infants of originally sound stamina, variously affecting, and ultimately blighting the debilitated offspring.

6. B. *Acquired* debility presents itself to our notice in every stage of life. If it supervene in infancy and childhood, it may be, to a certain extent, perpetuated in the constitution through life. But, in whatever period it may occur, it is most frequently the consequence of the *abstraction of stimuli* necessary to the excitation and perpetuation of the vital manifestations to a requisite extent.—(a) The infant that is not *sufficiently*, or is injudiciously, or *unnaturally*, *nourished*, if it escape any of the maladies to which it is thereby disposed, becomes pale, languid, soft, and enfeebled, or altogether diseased: it wastes; its flesh is flabby; its growth is impeded; and it at last is the subject of anæmia, or of tubercles, or of worms, or of disease of the digestive canal, of the mesenteric and other glands, or of the joints and bones. But insufficient or inappropriate nourishment affects all periods of life in nearly a similar manner. A fish diet through life gives rise to a weaker conformation of body than food of a mixed kind. This was proved by PERON in respect of the natives of Van Diemen's Land. Similar effects follow an exclusively vegetable diet, although not to so manifest a degree. It should, however, be admitted that those who are obliged to live on one kind of food alone, are more liable to experience insufficient supplies of it.—(b.) The abstraction of the *animal warmth* is another cause, occasioning a modified, and, as it were, an acute form of debility, followed by peculiar effects, which are fully described in the article COLD.—(c) The *privation of solar light* has a marked influence

on the vegetable creation; plants being pale, sickly, and imperfectly developed, and their proper juices scantily and insufficiently elaborated. An analogous effect is produced by the same cause on the animal creation, and particularly on man—the body becoming pale, sickly, and etiolated; the senses remarkably acute; the general sensibility and muscular irritability much heightened; the organic actions readily influenced by the slightest external agents;* and the circulating fluids thin, watery, and deficient in albuminous constituents and red globules, and in quantity. Facts illustrative of this occurrence are adduced in the article on anæmia, which is thereby produced. (See BLOOD, *Deficiency of*, § 41.) The physical and mental debility resulting from confinement in dungeons and dark cells is to be attributed to the exclusion of light, restricted diet, want of exercise and of free air, and to moral causes combining with these in depressing the vital

* The remarkable and authentic history of CASPER HAUSER, by the President VON FEUERBUCH, furnishes striking illustrations of the above. The accounts which have been recently published of this person should be attentively perused by every pathologist and philosopher, as being most singular and instructive. Casper Hauser was kept, from infancy until he was eighteen years of age, in a perfectly dark cage, without leaving it; and where he neither saw a living creature, nor heard the voice of man. He was restricted from using his limbs, his voice, his hands, or senses; and his food consisted of bread and water only, which he found placed by him when waking from sleep. * When exposed in Nuremberg, in 1828, he was consequently, at eighteen years, as if just come into the world; and as incapable of walking, discerning objects, or conveying his impressions, as a newly born infant. These faculties he, however, soon acquired; and he was placed under an able instructor, who has recorded his history. Darkness had been to him twilight. The light of day at first was insupportable, inflamed his eyes, and brought on spasms. Substances, the odour of which could not be perceived by others, produced severe effects in him. The smell of a glass of wine, even at a distance, occasioned headache; of fresh meat, sickness, &c.; and of flowers, painful sensations. Passing by a churchyard with Dr. DAUMER, the smell of the dead bodies, although altogether imperceptible to Dr. D., affected him so powerfully as to occasion shudderings, followed by feverish heat, terminating in a violent perspiration. He retained a great aversion, owing to their disagreeable taste and smell, to all kinds of food excepting bread and water. When the north pole of a small magnet was held towards him, he described a drawing sensation proceeding outwards from the epigastrium, and as if a current of air went from him. The south pole affected him less; and he said it blew upon him. Professors DAUMER and HERRMANN made several experiments of this kind, and calculated to deceive him; and, even although the magnet was held at a considerable distance from him, his feelings always told him very correctly. These experiments always occasioned perspiration, and a feeling of indisposition. He could detect metals placed under oil-cloths, paper, &c., by the sensations they occasioned. He described these sensations as a drawing, accompanied with a chill, which ascended, according to the metal, more or less up the arm; and were attended with other distinctive feelings, the veins of the hand exposed to the metal becoming visibly swollen. The variety and multitude of objects which at once came rushing upon his attention when he thus suddenly came into existence—the unaccustomed impressions of light, free air, and of sense—and his anxiety to comprehend them—were too much for his weak frame and acute senses: he became dejected and enfeebled, and his nervous system morbidly elevated. He was subject to spasms and tremors; so that a partial exclusion from external excitements became for a time requisite. After he had learned regularly to eat meat, his mental activity was diminished; his eyes lost their brilliancy and expression; the intense application and activity of his mind gave way to absence and indifference; and the quickness of apprehension became diminished. Whether this change proceeded from the change of diet, or from the painful excess of excitement which preceded it, may be questioned. My limits admit not of my adding more. The whole account is most important—the more so, as the physiological facts stated in it may be relied on.

powers, and ultimately producing disease of a low and dangerous form. — (d) Intimately connected with this cause and its effects, is the *privation of fresh air and exercise*. When muscular action cannot be performed under favourable circumstances, particularly as respects the requisite renewal of air, the circulation languishes, and suffers deterioration; the development of the locomotive organs is either impeded or prevented, and they are no longer in a fit state for the execution of the acts of volition. By a want, also, of a requisite *renewal of air*, the stimulating constituent of it becomes diminished, and replaced by directly sedative gases, and by vapours loaded with the effluvia of the system that respires it, or of those which may respire it in the same place; the extent of the stagnation or confinement of air, and of the causes of deterioration, proportionately heightening and accelerating the depressing effects thereby produced upon the frame. — (e) It is extremely probable, that whatever, in its passage through the digestive canal, or circulation through the body, *abstracts oxygen from the system*, will be also, to a certain extent, a cause of debility, as supposed by HUMBOLDT. The causes of scurvy may be partly of this description; as well as those of several other diseases. — (f) A not uncommon cause of depressed vital power is *the young sleeping with the aged*. This fact, however explained, has been long remarked, and is well known to every unprejudiced observer. But it has been most unaccountably overlooked in medicine. I have, on several occasions, met with the counterpart of the following case:—I was, a few years since, consulted about a pale, sickly, and thin boy of about five or six years of age. He appeared to have no specific ailment; but there was a slow and remarkable decline of flesh and strength, and of the energy of all the functions—what his mother very aptly termed a gradual blight. After inquiry into the history of the case, it came out that he had been a very robust and plethoric child up to his third year, when his grandmother, a very aged person, took him to sleep with her; that he soon afterwards lost his good looks; and that he had continued to decline progressively ever since, notwithstanding medical treatment. I directed him to sleep apart from his aged parent; and prescribed gentle tonics, change of air, &c. The recovery was rapid. But it is not in children only that debility is induced by this mode of abstracting vital power. Young females married to very old men suffer in a similar manner, although seldom to so great an extent; and instances have come to my knowledge, where they have suspected the cause of their debilitated state. These facts are often well known to the aged themselves, who considered the indulgence favourable to longevity, and thereby often illustrate the selfishness which, in some persons, increases with their years.—(g) It is extremely possible that whatever *conducts the electricity* of the body from it, will occasion direct debility. With this view I have long been in the habit of causing females who used steel supports to their stays, to lay them altogether aside. The experiments on CASPER HAUSER confirm this supposition.—(h) Intimately related to the causes consisting of abstraction of requisite stimuli, and to the effects resulting therefrom, seem to be the

privation of those excitants to which the frame has been long habituated; although these, as well as their effects, may be considered as falling more strictly under a different section of this subject. The privation, by whatever cause, of those states of electrical tension which exist in healthy conditions of the body, and fright, or prolonged fear, may also occasion primary debility.

7. C. But the vital power is enfeebled by another class of causes—by agents which seem *directly* to depress it below its healthy standard. These agents have been called *contra-stimulants* by the Italian physicians of the school of RASORI. — (a) Several of those, however, when employed in sufficiently small quantities, actually excite the parts to which they are applied; and it is only when they are used in large doses that an opposite effect—violent depression and even annihilation of life—is produced. A minute quantity of prussic acid, or of tobacco, excites the organic functions; a large quantity instantly destroys life: and the remark applies, to a certain extent, to nearly all the more energetic narcotics; although many of them, as well as several other agents, whilst they depress the vital manifestations generally, also excite or irritate particular organs or tissues. Tartar emetic, acetate of lead, oxalic acid, colchicum, stramonium, belladonna, &c. furnish illustrations of this fact. — (b) The primary effects of *terrestrial effluvia* or malaria, and of the *infectious emanations* proceeding from the diseased, as from those affected by plague, yellow fever, typhus, and pestilential cholera, are evidently most acutely debilitating, even although these causes may also, and at the same time, act by irritating certain organs or tissues. — (c) Various mental emotions are also very powerful depressants of vital power, such as *fear, anxiety, grief*, longings after objects of affection, *nostalgia*, &c., particularly if they be of long continuance: they retard all the organic functions, and at last wither the whole organization. — (d) Whatever impedes respiration, owing to the effects of this function upon the circulation, and on the blood itself, and consecutively upon the organic and cerebro-spinal nervous systems, also depresses the vital power in a very remarkable manner. Among the causes of primary debility, Dr. GEDDINGS has included *anæmia*. There can be no doubt of the existence of debility, when the blood is deficient or impure; but, instead of being the cause, anæmia is the effect of debility.

8. ii. CONSECUTIVE OR SECONDARY DEBILITY may arise in two ways: (a) from increased excitation of an organ, occasioning proportionate diminution of the energy of others—Sympathetic debility, or Debility from an irregular distribution of the vital endowment; and (b) from the exhaustion occasioned by previous excitement.—A. *Sympathetic Debility* (*Debilitas Spuria*, HUFELAND; *Metastatic Debility*, Dr. GEDDINGS.) When it is considered that the organic or ganglionic nerves alone supply the blood-vessels, and the secreting organs and surfaces; that they communicate very freely with each other, and with their chief centre, the semilunar ganglion; that they are formed into numerous plexuses, rendering thereby the connection between them still more close; and that they are intimately related to the cerebro-spinal system, through the medium of communicating nerves; the mutual dependence of action between

the various organs of the body may be easily explained. If, moreover, it be granted, as I have endeavoured to prove in another work, that the most important vital phenomena,—as digestion, assimilation, circulation, secretion, animal heat, generation, &c.—in short, that life itself, with all those manifestations of it now particularised, and which have usually been called organic—result from the influence exerted by the ganglial nervous system, through the instrumentality, of the vessels and structures, upon the circulating fluid they contain, and reciprocally by this fluid upon the nerves ramified in the parietes of the vessels, and upon the ganglia themselves, through which it must necessarily circulate,—the agency of this system in the production of the numerous phenomena of debility must be evident. From this view of the subject, and taking into account the various functions of dissimilar textures, and, under certain circumstances, the combined influence and reaction of the cerebro-spinal system and sensorium, the numerous relations of disordered actions, as respects the manifestations not merely of debility, but of disease generally, may be more satisfactorily traced.

9. When one organ or general system is simply excited, without being otherwise diseased, the functions of other organs, with which it is more or less intimately related by means of the ganglial nerves, undergo a relative degree of change; for as we exalt the vital manifestations in one or more parts of the series, we diminish them in equal proportion throughout the remainder. These views were first stated in the *London Medical Repository*, for May, 1822, and fully illustrated in my *Physiological Notes*, published in 1824; and have since been adopted by BOISSEAU and GEDDINGS. A due application of them is of the utmost importance in pathology and therapeutics, as well as in ascertaining a large proportion of the forms of debility, particularly those presented to us in the course of many acute and chronic diseases: thus irritation of the mucous surface of the stomach or bowels enfeebles the rest of the frame; and inordinate excitation of any other secreting organ diminishes the nutritive and animal functions in an equal degree, and so on as respects various other viscera and structures, as more fully explained when describing the states of vital energy connected with the nature of disease. (See art. DISEASE.)

10. *B. The Debility of Exhaustion*, or from excitement of a part, or of the body generally (*Indirect Debility*, of BROWN.)—This form of debility arises from all agents, mental or physical, which excite the actions of a part, or of the system, above its normal state. Many of these causes act with great rapidity and intensity, others very slowly and insidiously; and whilst some simply change the *grade* of vital action, others seem to alter it in *kind*. Their effects vary remarkably with the susceptibility of the organ and constitution on which they act, and the frequency of their repetition; each successive application being generally less efficient than the preceding, if it be delayed until the action of the previous one has terminated. The circumstance of stimuli being productive of exhaustion, or indirect depression of vital power, to as great extent below the standard of health, as the previous excitement rises above it,

as fully shown by BROWN, DARWIN, and RUSH; and that stimuli must be repeated in larger quantity to produce the same effects, although presenting certain exceptions, are important facts as respects this pathological condition in particular, and disease in general: as long, also, as the repetition of the stimulus follows so quickly and regularly as to anticipate the appearance of the consecutive debility, the unavoidable consequences of its abstraction will not appear, at least for a very long time. But they ultimately will supervene in a most severe, and often dangerous, form, when such an event takes place; and if it does not occur soon, the prolonged excitement will ultimately terminate in organic change. Drunkards and opium-eaters often furnish proofs of the latter fact; and persons who indulge in an occasional debauch only, or who undergo great physical or mental exertions, feel the truth of the preceding positions. There is one cause, however, which requires to be particularised on account of its mode of operation and consequences: this is excessive sexual indulgence. It occasions a loss of vital power through the medium of the discharges, independently of the exhaustion consequent upon the previous nervous excitement. Its depressing effects are, moreover, experienced by all the organs, but especially in the ganglial and cerebro-spinal nervous systems; and are often followed by the most serious results in both male and female.

11. *iii. COMPLICATED DEBILITY.*—I have contended, in the article DISEASE, that the vital manifestations of an organ, or of the frame generally, may be modified, not only in *grade*, but also in *kind*. If this be admitted, it follows that debility, originating in either of the ways now shown, may be either *simple*, or *associated* with an otherwise morbid state of vital action. Upon a review of practical facts, we shall find that the more simple states of debility most frequently occur either primarily—especially from agents abstracting vital power—or indirectly, from causes which over-excite the nervous influence, or which abstract as well as exhaust vital power; such as the one last adduced. But the condition now under consideration is more generally the result of causes which either irritate in a slow and continued manner some particular tissue or viscus, or modify the sensibility of an organ, or change its secreting or nutritive actions, or even vitiate the condition of the circulating fluids. Whilst the preceding forms of debility are mostly met with in the commencement of diseases, or constitute the early stages of those ailments consisting almost entirely of simple asthenia, but, which are often mistaken for structural maladies, this condition is observed chiefly in the progress, or towards the close, of many acute and chronic complaints, some of which are of a specific or malignant character; and it may arise out of either of the foregoing varieties of debility, especially when much prolonged. That which becomes so remarkable in the course of typhus, or yellow fever, of plague, or of syphilis, cancer, scrofula, &c., consists not of a simple depression or exhaustion of vital power merely; for this power is also specifically modified even from the commencement of these diseases;—the sensibility and organic contractility are changed; the secretions and nutrition are interrupted, or much affected; and although the debility may be the same as to grade in several

or all of them at certain of their stages, yet is the vital endowment otherwise modified in each, and in such a manner as to present specific characters whereby they may be severally known and distinguished, without taking the grade of vital manifestations into the account. It is this form of debility which may be imputed to what has been called, in general terms, by BRERA, the evolution of matters injurious to life: and it very often arises from causes, which, by the nature of their impression upon the living frame, not merely depress, but also otherwise vitiate, the conditions of life in all the systems and organs of the body, as shown by the effects produced by the morbid effluvia of typhus, yellow fever, and other malignant diseases.

12. II. THE SPECIAL MANIFESTATIONS AND EFFECTS OF DEBILITY. — I have hitherto been considering asthenia in its *general conditions*; I have now to view it in its *specific* or *partial states*. In doing this, I shall only attempt an imperfect outline of its relations to the principal general systems and organs of the body, and endeavour to show that one or more of them may manifest this state in a greater degree than the rest, or in a modified form; and that in this manner much of the varied phenomena of disease may arise; but that neither of them can experience it to a great extent, or for a long time, without either a similar state of disease extending more generally, or some other morbid condition springing out of it, — consequences which must necessarily result from the intimate union of the different organs by the organic nervous and vascular systems, as well as from the mutual dependence of their functions, and the reciprocity of vital influence.

13. i. *Debility of the general systems.* — A. The close connection of the *organic* or *ganglionic nervous system* with the manifestations of life has been in several places insisted upon; and conformably with this opinion, and with intimate views of the origin and nature of morbid actions, debility cannot exist in a marked degree without this system being primarily affected. But of the extent of this affection we can form no estimate, excepting from the effects upon the functions of those organs which it influences. I have long considered, and on various occasions endeavoured to show, that the ganglionic and the vascular systems, by their resulting and reciprocal actions, are the factors of life; and that the part which the former consequently and necessarily performs in the causation and removal of morbid phenomena is most immediate and important. If we examine closely the manner in which causes invade the frame, we shall find, a great proportion of those which produce any of the states of vital depression already noticed, make their impression in such a manner as to leave no doubt of their action being primarily exerted upon this system, thereby proving its very close connection with life. It is, however, evident that the impression made in this quarter will not remain for any time limited to it; but will extend in the first instance to those parts which are most intimately associated with it, and dependent upon it for the regular performance of their functions. This *a priori* inference is actually demonstrated by observation; for we find the circulating, the digestive, and the assimilative functions, immediately enfeebled by causes which can operate in no other way, and

through no other channel than the nervous system of organic life. Such of those causes as are of an intense kind, and are most injurious to life, — which modify while they depress its manifestations, — have their impression rapidly propagated throughout this system, and to the structures and organs which it actuates; whilst those of a slighter kind, or slower operation, may exert their effects in parts of it only, or chiefly, and more or less partially in other viscera. Viewing this system, therefore, as that upon which the greater number of causes depressing the vital manifestations first exert their action, and consequently as the point whence the depressing effects proceed, I shall briefly consider these effects in each of the principal functions, organs, and structures.

14. B. *The circulating systems and fluids* are affected according to the intensity of the depressing causes relatively to the energy of the system at the time; and the ultimate results vary with the successive changes that supervene in it, and the associated nervous systems, and secreting and eliminating organs. — (a) In simple debility, the heart's action is languid, or slow; but readily excited by stimuli. If the debility be chronic, the parietes of its cavities may ultimately become wasted or thinned; or even softened, and the cavities themselves dilated. In the advanced stages of acute or complicated debility, the heart's action is generally very quick, soft, weak, small, and unequal or irregular; and in chronic cases, its substance softened, flaccid, or even dilated. — (b) The *arterial* vessels lose some portion of their tone; but, excepting in as far as they convey the impulse of the heart on the blood, they are not otherwise affected until debility arrives at an advanced stage, or is acute or complicated. When this occurs, arterial action may even become very much increased, particularly as respects the frequency of the pulsation communicated by the heart's contractions, whilst the vital power of the system generally is remarkably depressed. In such cases, the pulsations are broad, open, quick, and very easily compressed; or they are small, weak, soft, and thready. Acute and complicated debility, thus presenting the apparent incongruity of great depression of vital power, with morbidly excited vascular action, is not infrequently observed in the advanced stages of those diseases in which the circulating fluid becomes contaminated by injurious matters introduced into it from without, or generated in it, in the manner explained in the article BLOOD (§ 110 — 144.). In these, although the general manifestations of life are enfeebled to the utmost, yet the action of the heart and arterial system is excited by the irritation produced by the contaminated blood circulating through them, and the low grade of vitality still existing is thereby soon exhausted. — (c) The manifestations of debility on the *blood* itself, — in occasioning *plethora* when the vital depression is so slight as not to diminish digestion and assimilation, — in favouring irregular distributions, or *determination of blood*, in its more chronic states, — in producing *anæmia*, when its grade is still lower, or when it is more prolonged, and the assimilative functions, especially affected, — and in giving rise to *contamination* of this fluid, when it impedes the secreting, eliminating, or excreting functions, — will be found discussed in that article. — (d) De-

bility seldom exists long, or in a marked form, without the *venous* circulation becoming thereby affected. The depressing agents, indeed, which act most severely upon the frame, give rise to impeded circulation or congestions of blood through the veins as one of their more immediate effects upon the economy, as shown in the article CONGESTION OF BLOOD.—(e) The *lymphatic* and *absorbent vessels* even escape not the consequences of debility, particularly when it arises from original conformation, or deficient and unwholesome food. This is shown by scrofulous diseases of the glands, in the mesenteric consumption of children, and some states of dropsy. (See LYMPHATIC SYSTEM.)

15. ii. *Debility of the Functions of associated Organs.*—The functions about to be particularised are depressed by, (a) Causes which lower the vital actions of the foregoing systems in a general and severe manner; and (b) by such as operate immediately upon these organs themselves. The former, being more general, and more intense in their operation, are immediately followed by arrest, or remarkable disturbance, of the functions in question; whilst the latter causes usually, but not always, over-excite and thereby exhaust these functions, and, by the frequency of their repetition rather than by their intensity, produce their effects more slowly and partially.

A. *The digestive and secreting organs* are amongst the first to experience debility, however induced. This may arise from the evident dependence of their functions upon the ganglial system of nerves. But they may be especially affected, and may continue so for some time, without other parts of the frame evincing much disorder, particularly when the debility has been slowly and indirectly produced. The more special manifestations of debility in the *stomach*, the *liver*, the *duodenum*, and *bowels*, usually begin in this way; and they have severally obtained, according to the forms they assume, the names of indigestion, torpor of the liver, flatulence, constipation, colic, &c.—these being the more common effects, although several others may be adduced. When debility, either of an acute or chronic form, affects chiefly the digestive organs, the abdominal *secretions and excretions* are more or less disordered—are usually in smaller quantity and vitiated quality. But this is not the only result; they are generally retained on the surfaces and situations where they are secreted, until they undergo various changes, and acquire irritating properties. This is well illustrated by many of the functional diseases of the *liver*, and *bowels*. (See CÆCUM, COLON, CONCRETIONS, CONSTIPATION, LIVER, WORMS, &c.)

16. B. *The respiratory and assimilating functions* manifest debility in various ways; the respiratory by frequency, shortness and quickness of action, and diminution of the changes usually produced upon the blood and air respired; the assimilating function by the thin and watery state of the blood, by the deficiency of its quantity, or of its red particles, as in *anæmia*, and, in slighter cases, by the milky or oleaginous condition of the serum. When debility is slight or recent, or when it has been gradually induced by stimulating agents, *nutrition* is not very materially affected; it may even be partially increased, owing to impeded or imperfect secretion and assimilation,

the consequent abundance of fatty matter in the circulation, and its deposition in the adipose structure, thereby increasing the bulk of the body. But when the vital energies are more remarkably depressed, either in acute, chronic, or complicated cases, the nutrition of all the structures and organs, particularly of adipose, cellular, and muscular parts, is more or less arrested.

17. C. *The vital manifestations of the cerebro-spinal nervous system, and organs of sense*, may be remarkably enfeebled, without the rest of the frame being materially affected: but they may also be uncommonly active, although all the other functions of the body are debilitated. *Idiotcy* and certain states of *insanity* are often met with unconnected with any marked depression of the physical powers; and, on the other hand, particularly in chronic debility attended by emaciation and quickened circulation, the powers of mind are frequently very acute. The slightest change in the freedom, activity, or quickness of the circulation in the brain and spinal cord, and in the purity of the blood, will materially affect the character of the phenomena associated with debility of these organs, or of the body generally. As long as the circulation is unimpeded, and the blood sufficiently purified by the emunctories, debility will be attended by great activity of all the senses, and increased irritability of all the muscles. Hence arise various of its forms, familiar to every observer of disease,—that *with increased sensibility* (the *Debilitas ad Sensum* of some writers,) and that *with augmented irritability* (the *Irritable Debility* of HUFELAND and other German authors,—the “*Mobility*” of Dr. CULLEN;) both which forms constitute increased susceptibility, or excitability, of the cerebro-spinal system, and of the organs they influence. When, however, retarded circulation occurs in this system, or if the blood itself be rendered inappropriate to its state and functions, by the superabundance of unassimilated materials, or if it be insufficiently purified by the emunctories, debility, whether thus limited or universal, will be attended by a proportionate degree of *torpor* (the *Torpid Debility* of HUFELAND,) as well as by *adynamia* of all the organs dependent upon this system; instances of which are sufficiently common in many acute diseases. In this way the various manifestations of debility in the mental faculties, the general sensibility, and the mobility of the frame, in different cases and complications of disease, may be explained,—particularly if the various organic changes which so often supervene or become associated with this state of vital power, and with either of the conditions of the cerebral and general circulation now alluded to, be called into aid. The *causes* also, the nature of their impression, and their mode of operation, will remarkably modify the state and duration of cerebral asthenia. These are chiefly, (a) Such as act immediately on this system,—as inordinate mental exertions, the depressing passions and emotions, excessive fatigue, and narcotic poisons. (b) Those which act indirectly or mediately,—as the intense or prolonged impression of cold on the surfaces, terrestrial and infectious miasms, the actions of various sedative or contra-stimulant agents, and the abuse of the sexual organs; all which occasion modified or even different effects. The *organs of sense*, as

well as other parts immediately controlled by the cerebro-spinal system, have their functions enfeebled and impaired in proportion to the debility it experiences. But they may also be individually affected, and in various degrees, without this system being materially disordered. Such occurrences generally arise from the operation of local causes,—as over excitement of the organ, and exhaustion of its sensibility by its peculiar stimuli; as weakness or loss of sight from over-exertion, or the intense or prolonged action of light; and loss of hearing from great noises, &c.

18. *D. The muscular structures*, from their connection with the ganglial and cerebro-spinal systems, necessarily experience the effects of depression of the energies of these systems, varying, according to its acute and chronic form, its degree, its simple or complicated state, and the progress it has made. But debility seldom originates in, or is limited to, these structures. Its earliest and simplest manifestations in them are diminished tone, flaccidity, wasting, particularly of voluntary muscles; lowered, or, in some cases, morbidly increased irritability, according as the nervous systems experience a diminution or increase of their susceptibility (§ 17.); occasioning, in some cases, irregular and tremulous motions, and a disposition to spasmodic or convulsive action, but more frequently defective energy of contraction, or power of continuing and repeating it, in both the involuntary and voluntary classes of muscles. In the more acute, or the more advanced and complicated states of adynamia, the insensible tonic contractility of muscular fibres are in a great measure lost; their vital cohesion is also so much diminished as to admit of their being more easily torn; they are incapable of performing even a portion of their functions; and their contractions are feeble, vibratory, or oscillating, productive of the utmost fatigue, sometimes of death; and the least exertion, even that requisite to preserve the body recumbent upon one side, cannot be sustained for a few minutes. These extreme states of debility occur in the most dangerous and severe cases of disease, as in adynamic fevers, scurvy, &c., and when the circulating and secreted fluids have become sensibly changed from their healthy condition.

19. *E. The sexual organs*, whilst they participate in the vital depression of the general systems, are often themselves chiefly affected. It is by no means uncommon to meet with instances, particularly in the male sex, of the most complete debility of these organs, amounting sometimes to entire loss of function, from precocious and inordinate excitement and indulgence; there being little or no other disorder, excepting enfeebled mental manifestation, in some cases. In others, however, all the organic and cerebro-spinal functions have become remarkably weakened, although not to the extent experienced by the organs in question. (See IMPOTENCY.)

20. *iii. The Manifestations of Debility in particular Tissues* are less evident than in the general systems and associated organs; and they are later in becoming evident. It is usually not until they are extreme, long-continued, or complicated, that they are remarkable.—(a) *The cellular tissue* at first evinces deficient firmness and elas-

ticity, with softness, and, as debility increases, loss of its vital cohesion: it at last presents a tendency to oedematous or serous infiltration, and even to hæmorrhage, owing to weakness of the extreme vessels terminating and originating in it, and the insufficient support it yields them. When it is thus changed, the spread of other diseases through it is thereby remarkably promoted, and an unfavourable termination hastened,—as in cases of diffusive inflammation, erysipelas, punctured or poisoned wounds, &c.; its vessels having lost their power to limit the extension of inflammation by forming coagulable lymph.—(b) *Mucous membranes* are amongst the earliest of the particular tissues to experience the effects of debility, thereby increasing and perpetuating many of its phenomena. At first their functions merely are impeded; their secretions either diminished, or imperfectly excreted, or increased from relaxation of their vessels, or in other respects vitiated. As debility, whether of them especially, or of the frame in general, advances, vital cohesion becomes impaired, and they yield not the requisite support to their vessels; whence result softening, hæmorrhage from their surface, ecchymosis, asthenic ulceration, atrophy, &c.—(c) *The serous tissues* undergo a partial diminution of their cohesion, and permit an aqueous or serous fluid, in some extreme cases tinged with blood, to escape through their exhaling pores.—(d) *The erectile textures* at first evince greater susceptibility, particularly when debility has been induced by inordinate excitement of the sexual organs; but as it increases, they lose their peculiar functions.—(e) *The fibrous tissue* also experiences relaxation, becomes less elastic, and more readily yields than in health, giving rise to almost spontaneous dislocations,—results which have occurred in the chronic debility caused by masturbation, as remarked by Sir ASTLEY COOPER and Mr. COPLAND HUTCHISON, and by myself in one case.—(f) *The osseous texture* occasionally experiences, in children, an imperfect deposition of ossific matter, or even absorption of a great part of that already secreted; and, in aged persons, the removal of the animal matter which gives due cohesion to this structure: and, (g) *The corneous tissues* are often variously changed; the hair either falling out, or becoming thin, weak, or gray; the epidermis inclined to exfoliate, and rough or scaly; and the nails thin, long, crooked, or irregular.

21. III. DEBILITY OF THE WHOLE FRAME.

—Debility seems, as already stated, most frequently to originate in the ganglial and vascular systems, which I have viewed as the chief factors of life; the digestive, assimilative, excretory, and cerebro-spinal organs being subsequently affected. But it may also commence in, and continue for a considerable time limited to, either of these, or even, although rarely, to one or more of the individual tissues. When existing thus locally, it usually springs from local and indirect causes, and is at first of a slight grade, the functions of the part merely being impeded; but, as it continues, the rest of the economy becomes implicated in various degrees, owing to the reciprocity of vital action and function existing throughout the frame. With this universal diffusion of asthenia, the part primarily disordered may still continue affected in a greater degree, exhibiting the changes of func-

tion, and even of structure, now briefly sketched in respect of the principal systems, organs, and tissues, according as they may be implicated; but, in many instances, the debility becomes co-ordinate throughout; and in rare cases, the part originally affected even partially recovers its powers upon some other organ having its vital energies more remarkably depressed.

22. IV. CHARACTERISTIC SIGNS, &c. — When asthenia is thus general and fully developed, the external aspect of the body, and all the vital functions, are affected; the extent and specific characters of ailment furnishing important pathological as well as therapeutical indications to the practitioner:—The countenance is pale, thin, or collapsed, sometimes bloated and discoloured: the eyes lose their animation, and sink in the sockets, and they are surrounded either by a dark or bluish, or by a tumid and œdematous, circle; the expression of the features is languid and depressed; the lips are pale; the tongue watery, moist, soft, broad, and sometimes tremulous, and the papillæ depressed and wasted; the voice and speech are weak, or nearly lost; the voluntary muscles lose their powers, and hence, in extreme cases, the continued supine posture, the inability to retain a position on either side, the sinking down in bed, and the falling of the head on the breast or on either shoulder. The surface of the body has its temperature diminished, is sometimes partially covered with a cold or clammy perspiration, becomes soft and flabby, occasionally of a more lurid or dirty hue, or pale and waxy, particularly in complicated debility; the firmness and elasticity of the soft solids are lost, and they either present a leucophlegmatic appearance, or they are remarkably emaciated,—the latter being particularly the case when the circulation is accelerated. The functions of the stomach and bowels are impaired, or altogether suppressed; and hence the want of appetite, the constipation, and emaciation, — which last effects first the adipose tissue, and next the cellular and least vitalised structures. When the depression is very great, the vital attraction requisite to the nutrition and healthy cohesion, especially of the more remote and superficial parts, being necessarily diminished, the function of absorption gains the ascendancy; and the less perfectly animalised constituents, particularly the adipose substance and the effete elements, are carried back into the circulation; and thus, in some states of disease, the body continues to live upon itself, until the functions are restored, or life extinguished; the external soft solids, attached to, or covering, the bones, meanwhile become remarkably extenuated. In general, the pulse is frequent, soft, small, and easily compressed; the action of the heart is weak, and leipothymia or syncope occur upon exertion, or on quickly assuming the erect posture. Respiration is frequent, imperfect, or anxious or difficult, and the motions of the thorax are slight and confined. The functions of the cerebro-spinal system are more or less enfeebled; and, with the changes described above (§ 17.) present the following phenomena:—Loss of memory; inability to prosecute a lengthened chain of discussion, or to fix the attention long on one subject; sometimes weakness, with hebetude of all the faculties; an unpleasant feeling of languor, and exhaustion, with a sense of anxiety referrible to the præcordia and pit of the stomach;

vertigo or headach; noises in the ears, either with or without impaired hearing; weakness of the limbs, and relaxation of the ligaments of the joints, with tremors, occasionally convulsive movements, or local paralysis; and ultimately low or quiet delirium.

23. V. DIAGNOSIS.—A distinction has usually been made between *real* and *spurious debility*. The latter term, however, implies a contradiction. But as it is the morbid condition, and not the name imposed upon it, that requires notice, I may briefly allude to it. The state of system, to which this name has been applied, would be better expressed by denominating it *oppression of vital power*; this, or nearly similar appellations ("*oppressio virium*," "*debilitas ab oppressione*,") having been employed by several modern pathologists. The vital manifestations may be generally or partially *oppressed* by whatever impedes their free reaction in removing the impression produced by injurious agents, or by whatever arrests the function of an important secreting organ, or vital emunctory, whereby the vascular system becomes overloaded, and consequently oppressed throughout, as well as in the organ whose functions have been interrupted. The distinction will be more easily understood by a reference to facts. —During pneumonia, the lungs perform their functions in respect of the blood imperfectly, and the various secretions and excretions are diminished. Hence the quantity of the circulating fluid is increased; the circulation through the inflamed lung rendered difficult; the functions of this organ impeded, and the vessels generally distended beyond their power of reaction upon their contents, so as to restore the suspended functions. In such cases, the pulse is suppressed, and not much accelerated; but it conveys the sensation of a confined limit of pulsation, thereby suggesting the idea of a sustained state either of tonicity which the systole of the ventricle cannot much affect, or of distension upon which the elasticity of the vessel reacts imperfectly in the intermissions between the systoles. That this state actually obtains, is shown by the effects of blood-letting in changing the character of the pulse, in removing the feeling of oppression, and in partly restoring the strength. Inflammations of other organs — as the liver, brain, &c. — also furnish instances of oppression of vital power. In all these, however, the state of the surface of the body, and other symptoms above noticed as characterising true debility (§ 22.), do not exist. In fevers, also, the reaction following the impression of the exciting causes is very generally attended by oppression of the powers of life, owing, in some cases, to an overloaded state of the circulation from interrupted secretion, &c.; and, in other cases, partly to this circumstance, and partly to the depressing influence produced by these causes still continuing, and, jointly with the increase in the quantity of the circulating fluid, favouring congestion of internal secreting and vital organs. Hence, in several forms of these diseases, a complicated pathological state is the result; viz. *depressed*, followed by *oppressed*, vital power, as soon as attempts at reaction begin to be made, in order to overcome the injurious impressions and changes occasioned by the exciting causes. This suppression of power may arise out of true

debility, may be associated with it, and terminate in it, in its worst and complicated states.

24. The DURATION of debility is extremely various. It may, particularly when acquired and slight, be remarkably long, or continue through life, which it may not even abridge. When rapidly and *primarily* produced, or general and intense, or complicated, it is usually *acute* as respects its continuance; but when *consecutive*, or partial, or the result of irritation of particular textures, it is prolonged into the *chronic* state; its duration depending greatly upon its degree, and both being extremely various.

25. VI. PATHOLOGICAL RELATIONS.—i. The CONSEQUENCES AND TERMINATIONS of debility are, (a) Impeded or interrupted secretion; (b) Changes of the circulating fluids; (c) Various states of irritation, or inflammatory action, in particular organs or tissues; (d) General reaction of the vascular system, associated with various grades of vital power, from the lowest, or most asthenic, to its highest, or most sthenic form, with their modifications; (e) Changes in the firmness, elasticity, nutrition, colour, form, and vital cohesion of the soft solids, and, in some instances, ultimately in the hard solids also; (f) Effusions of fluids (aqueous, serous, sanguineous, &c.) from mucous or serous surfaces, or in cellular or parenchymatous structures; (g) The production of numerous forms of organic change; (h) The formation of new or adventitious tissues or productions, as tubercles, tumours, melanosis, cancer, hydatids, worms, gangrene, &c.; and, (i) lastly, Death, which may occur directly from the intense action of the depressing cause, but more commonly through the medium of one or more of the changes now enumerated, the first and greater part of which often taking place consecutively.

26. ii. ASSOCIATIONS OF DEBILITY.—Asthenia is very frequently connected with some other morbid condition, implicating either particular parts, or the system generally. Amongst these are the *consequences* now enumerated (§ 25.); but the most important are, (a) The association of depressed with otherwise modified or morbid states of the vitality of the system; (b) with a vitiated condition of the blood and secreted fluids, either or both of which constitute the complicated debility already mentioned (§ 11.); (c) with a disposition to solution of the textures generally, or of a part merely, as in malignant fevers; (d) with congestions, and chronic or acute inflammations of particular organs or structures, as in complicated forms of fever, erysipelas, diffusive inflammations, dysentery, &c.; (e) with intestinal worms, hydatids, and various malignant and adventitious formations.

27. A knowledge of the pathological relations of this most important and singularly overlooked condition of vital power is necessary to the practitioner, inasmuch as it enables him to entertain enlarged and connected views of disease, by the aid of which he may the better comprehend such states of disordered action as cannot be readily assigned to any particular type or specific form, owing to their imperfectly marked characters, the associated disturbance of different organs and structures, and the want of prominent symptoms, whereby they may be ascertained. Debility not only constitutes, in its more intense forms, dis-

ease itself, and a most serious part of many of the most dangerous maladies, but it also *predisposes* the body to be affected by the numerous injurious agents to which it is constantly exposed.

28. iii. The PREDISPOSITION to be affected by the exciting causes of disease, arising out of debility, will necessarily vary with the form and grade it assumes, and the circumstances in which it has originated. This proposition is too evident to require illustration. But when the debility proceeds from irritation of one or more structures abstracting vital power from the rest (§ 9.), it may not increase, but may in some cases diminish, predisposition, particularly when it is attended by exalted sensibility and accelerated circulation. Thus the debility attending irritation in any part of the respiratory organs even diminishes the disposition to be affected by malaria, and infectious or epidemic agents. So much, however, of what constitutes liability to diseases is owing to the temperament, diathesis, the modes of life, and habit of body, as well as to general or local debility, that the exact share of each can rarely be ascertained. General debility either in its direct or primary form, or as consecutive of over-excitement, disposes the system to be affected by terrestrial emanations, vicissitudes of season and weather, and infectious effluvia. The more local or partial states of debility, particularly when existing in secreting organs and the associated structures, render them liable to congestions, inflammatory irritation, to disordered secretion and excretion, to spasmodic or convulsive movements, to effusions, to various states of inflammation, and organic change, with the other *consequences* and *associations* of debility above enumerated (§ 25, 26.), upon exposure to causes which disturb the *balance* of vital manifestation throughout the frame in a sudden or violent manner, or which impede the assimilating and depuratory functions, and thereby disorder the vascular actions and the circulating fluid. (See DISEASE — Causes of.)

29. VII. TREATMENT.—In attempting to remove debility, our means should be directed with a strict reference to its form, grade, and complication. These, however, are so numerous, that precise rules of treatment cannot be laid down; the only attempts of this kind that can be made, falling more appropriately under those diseases of which depressed vital power forms an essential part. (See especially the FIRST CLASS of the author's classification.) In the treatment of debility, in either its simple or associated states, there is a particular class of remedies, viz. *tonics*, which are more beneficial than any other; although many articles belonging to other classes, as diffusive stimulants and antispasmodics, may often be prescribed, and with great advantage. Tonics, which have derived their name from their influence in augmenting the tone of contractile parts, owe the principal part of their good effects to their elevating, in a gradual manner, depressed vital power, hardly up to, and seldom or never above, the healthy standard; and to the permanency of their action. By their repetition before the effects of the previous dose have subsided, the beneficial influence ultimately is propagated throughout; and as soon as one or more important functions are restored, the rest participate in the change, and the whole assume

a regular discharge of their offices, owing to the reciprocity of vital influence and function existing throughout the economy. Much, indeed, if not more, is also due to the partial absorption into the circulation of their active constituents; and to their direct action on the vessels, the different tissues, and on the blood itself. Although various diffusive stimulants and antispasmodics produce beneficial effects in several states of debility, yet they are generally much less serviceable than tonics, and in many instances are even injurious, chiefly from the quickness and little permanency of their action, from their proneness to over-excite and over-heat the system, and consequently to indirectly depress its energies. Hence, in order to perpetuate their restorative effects, it becomes requisite to repeat them more frequently; and thus a habit and desire of excitation is generated, which, if not gratified, is followed by insupportable exhaustion. However, in many states of disease, they are beneficial from the rapidity of their action, and are useful adjuncts to more appropriate means. As all the agents which restore the vital energies vary not only in the grade, the rapidity, and the permanency of their action, but also in respect of the organ, or the system, or tissue, on which their influence is chiefly exerted, it becomes a most important object in practice to ascertain the part primarily and chiefly affected, and to prescribe them according to our knowledge of their mode of operation.

30. Before adopting measures to remove debility, we should ascertain, 1st, The *causes* in which it has originated; 2dly, Whether or no it may not be apparent merely,—the consequence of *oppressed*, and not of *depressed*, vital power; 3dly, If it proceed or not, from *irritation* of a particular part, abstracting the due energy from others; 3dly, Whether it be *simple* or *complicated*; and, 4thly, If it be *associated* with any local mischief or *change of structure*. Having ascertained these important points, the next object is the choice of agents, and appropriation of them to the states of debility presumed to exist. It is chiefly to the neglect of a pathological analysis similar to the above, of the cases which occur in practice, that the abuse of tonics in diseases of debility is chiefly to be attributed.

31. i. *Primary Debility* should be treated, conformably with the injunction now given, with strict reference to its cause, to the particular form it has assumed, and the organs or parts chiefly affected. If it have arisen from abstraction of the stimuli necessary to health, these should be restored; if from depressing agents, whether physical or moral, these should be counteracted as far as may be.—(a) When debility is manifested more especially in the viscera immediately influenced by the *ganglial* and *vascular systems*, it very generally proceeds from one or other of these classes of causes; and, besides their removal or counteraction, requires, according to the rapidity and the intensity of their operation, the most carefully selected remedies. If the vital depression be rapidly progressive or very great, diffusive stimuli, as camphor, ammonia, the æthers, serpentaria, arnica, &c., will be requisite in the first instance, until it is arrested, when tonics will be more serviceable; but, with the first indication of reaction, stimuli of every

kind should be laid aside, lest the consequent excitement should be carried to an inordinate height by their means. The propriety of prescribing tonics appropriately to the states and grades of debility, as insisted on by HOFFMANN and THOMANN, cannot be doubted; but opinions will differ widely as to those which are more suitable to certain conditions. When the vital depression affects the action of the heart more particularly, after momentarily exciting the olfactory and respiratory nerves, as well as those of the stomach, by means of the volatile and diffusive stimulants, as the æthers, ammonia, and aromatic spirits, &c., the more permanent tonics should be employed. If there appear to be a deficiency of blood in cases of this description, the preparations of iron will be most serviceable, and will be advantageously combined with myrrh, cinchona, gentian, willow bark, cascarrilla, and the sub-carbonate of potassa. If the organic nervous influence be depressed, without any manifest deficiency of blood, either of these vegetable tonics may be taken, with the fixed alkalies or their sub-carbonates, or with the mineral acids, according as it may be desirable to promote the secretions, or to impart tone to the extreme vessels. When we wish to excite the functions of the viscera generally, and particularly when the blood does not undergo the requisite changes as it circulates through the different assimilating and depuratory organs, the chlorates of potass and soda (the oxymuriates) will be found of much use. I have employed them for several years with much benefit, at the Infirmary for Children, in diseases of debility affecting chiefly these organs, as well as the preparations of iodine, especially the hydriodate of potass. The bitter tonics, combined with aperients, will also prove of great service in similar cases. The marked advantages of associating individual medicines from each of these two classes,—first made known to me by the writings of HOFFMANN, and confirmed by repeated observation,—are brought about both by their increasing the action of the secreting and excreting viscera when thus conjoined, and by their improving thereby the condition of the circulating fluids, as well as permanently exciting the vital influence. In some cases, the combination of small doses of the extract of nux vomica, or of strychnine, with aloes and myrrh, has proved equally beneficial. It was in pathological states similar to those now under consideration, that phosphorus was prescribed by CONRADI and others, that the inhalation of oxygen gas was strenuously advised by BEDDOES, and that electricity and galvanism were generally recommended by Continental writers. But I perfectly agree with GRAPENGEISSER, in viewing these as calculated to be injurious where there exists any increase of irritability, either locally or generally, or where any vital organ is congested.

32. When debility is the consequence of the injurious impression of some powerful agent, as terrestrial or infectious effluvia, it will often be most advantageous to interrupt the succession of morbid phenomena by the exhibition of the most active tonics in large doses, and in conjunction with warm cordials. All the more intense states of primary debility proceed from impressions

made by sedative causes upon the ganglial system, and may be removed by counter-agents directed to the same system, before consecutive changes have advanced far, or the functions of the emunctories and the state of the circulating fluid have been disordered to the extent of giving rise to the early phenomena of febrile reaction. Thus, the more stimulating emetics, immediately followed by powerful tonics, or cathartics preceded by or combined with warm tonics, will often prevent the accession of fevers, when exhibited before the cold stage, or rigor, has commenced; and, in some cases, although it have commenced, if it have not terminated in excitement. But, in these cases, the tonics and other excitants prescribed should be of such kind, and in such quantity, as will make a powerful impression on the nervous system of organic life, and as are calculated to restore the suspended secretions. The preparations of cinchona, or the sulphate of quinine, combined with the hot spices, as capsicum, or with camphor, or with ammonia, and prescribed in large doses after an emetic, and followed by a purgative conjoined with the same stimulants, are the most eligible in such cases. The preparations of arsenic, the sulphates of zinc and iron, piperine, the muriate of ammonia, the chlorates, and various other tonics, are also appropriate in cases of primary debility, especially when assisted by the cardiacs now mentioned; but they are less efficient than the foregoing in removing the vital depression primarily induced by the exciting causes of fevers.

33. When asthenia affects especially the capillary vessels, and the crisis of the blood is deficient, or when hæmorrhages take place untended by vascular excitement, the more astringent tonics should be given with sulphuric acid; and if the loss of tone be excessive, these should be associated with cardiacs and aromatics, and alternated with moderate or full doses of the more energetic terebinthines, and balsams; morbid secretions being duly evacuated by the preparations of rhubarb.

34. (b) Debility manifested chiefly in the *associated organs of digestion*, can never be permanently removed, unless the secretions and excretions be duly promoted; and, for this purpose, the combination of tonics and aperients alluded to above is the most efficacious. But this practice should not be resorted to whilst irritation, or active congestion of, or determination of blood to, any of these viscera exists, lest we thereby convert such disorder into inflammatory action. In such circumstances, the more heating tonics, or those which contain most of resinous or oleaginous constituents, are the least appropriate. Where irritation of the digestive mucous surface is complicated with debility of these organs, mild tonic infusions may, notwithstanding, be exhibited with benefit, especially those of calumba, gentian, cinchona, quassia, &c.; and may be combined with acids, or with small or moderate doses of the nitrate of potass, or the sub-carbonates of potass or of soda, or with both the nitrate and sub-carbonate. It is chiefly in cases of this description that diffusive stimuli and heating tonics, so much and justly inveighed against by BROUSSAIS, OTTO, and PHILIPS, are injurious. When asthenia is associated with a somewhat lax state of the

bowels, not proceeding from inflammatory irritation of their mucous surface, muriate of lime, or cusparia, calumba, quassia, or cascarrilla, with the alkaline sub-carbonates, &c., are generally of service. When the debility of these organs is attended by torpor of the liver, or accumulations of bile in the gall-bladder and hepatic ducts deobstruent purgatives should precede the exhibition of tonics and stomachics. If it be associated with *worms*, purgatives, and afterwards chalybeate tonics, are required.

35. ii. *Treatment of Consecutive or secondary Debility.*—A. It will generally be found, when the debility arises from irritation of some organ or secreting surface, that tonics or stimulants, unless such as are mild, and contain but little of an essential oil or other heating constituents, combined with deobstruents and anodynes, will prove either of no service, or injurious, from favouring the supervention of inflammatory action and organic change. Similar effects are also apt to follow the exhibition of tonics, when debility is attended with congestion of some internal viscus or obstruction of secreting organs: and they will seldom be of any benefit until these affections are in some measure removed; unless the powers of life are incapable of themselves of restoring the tone of the circulation and the suspended secretions, by developing a healthy reaction. In such cases, local depletions, and remedies calculated to excite secretion and excretion, should precede, or even in some instances accompany, the exhibition of gentle tonics, which ought to be prescribed in conjunction with deobstruents, assisted by a change of air and a light nutritious and farinaceous diet.

36. B. The debility which follows over-excitement, or which consists of exhaustion of power, requires means proportionate to its degree and form. The most intense grade of exhaustion occurs in the last stages of adynamic or malignant fevers, and of some other acute diseases; and often demands not merely permanent excitants, but the more active stimuli, as camphor, ammonia, serpentaria, arnica, wine, spirits, æthers, &c., to prevent the rapid extinction of life: whilst other states of exhaustion, especially such as are slower in their accession, or follow local inflammations, spasmodic or hæmorrhagic diseases, and the less severe forms of fever, admit only of the more gentle tonics; and even these, particularly if they be not cautiously prescribed, may reproduce the disease which occasioned the debility, especially if it was inflammatory or hæmorrhagic. It is not uncommon to find acute inflammations rekindled, or chronic inflammations follow the acute; and relapses of fevers, or visceral engorgements, or obstructions, supervene, when the exhaustion has been treated by heating tonics or stimulants, or by a premature use of a too full or stimulating diet. On the other hand, too strict exemption from all restorative means has been not infrequently followed by permanent general or local debility, or by very slow recovery; and it has often favoured the accession of other acute or chronic diseases; exhaustion predisposing the system to be impressed by their exciting causes. In the more difficult and doubtful circumstances of this form of debility, it will be, upon the whole, judicious to trust chiefly to wholesome air and suitable diet; and, if tonics or stimulants are

necessary, to select those which are the least heating, and to exhibit them along, or alternately, with such medicines as will promote the secretions and excretions most requiring aid, and with internal and external derivatives from the principal seat of disease. In cases of this description, particularly in the young, and in those who previously enjoyed a sound constitution, the returning energies of life generally stand but little in need of a spur; they require rather a judicious guidance, especially in respect of the digestive, the secreting, and excreting functions.

37. iii. *Complicated Debility*, or that condition of the frame which consists not merely of a depressed, but of an otherwise morbid state of vital power, has been ascribed above—1st, to unwholesome food, and to imperfect assimilation; 2dly, to an impure or altered state of the circulating fluid, occasioned by impeded or disordered secretion and excretion; and, 3dly, to the absorption of morbid matters into the blood, either from some one of the mucous surfaces, or from parts of the body in which they have been generated. The operation and effects of these sources of contamination have been fully insisted on in the articles *Absorption*, and *Blood* (§ 110—151.). The indications of removing them may be resolved into the following:—1st, To cut off the supply from the sources of contamination; 2d, To raise the powers of life, as expressed chiefly in the *ganglial* and *circulating systems*, by the means pointed out under that head (§ 31.); 3d, To promote the depuratory actions of the emunctories.

38. A. The propriety of endeavouring to accomplish the *first* of these intentions cannot be questioned; but, when the contaminating matters are formed in some part of the system, as in various malignant diseases, apparently local at their commencement, it frequently cannot be put in practice, or the period at which it might have been attempted with any prospect of success may have passed, and the other intentions are our only resort.—B. The *second* indication is to be fulfilled by the remedies already noticed (§ 31.), and the treatment recommended in the article *Blood* (§ 157.); particularly by the alkaline chlorates; the preparations of bark, of iodine, of iron, of arsenic, or of zinc; by astringents and antiseptics, as the acetic and citric acids, &c.; by the preparations of the bitter roots and woods, or of the aromatic and tonic barks, with liquor potassa, or the alkaline sub-carbonates, in the more chronic diseases, and with the sulphuric, the muriatic, or nitric acids, in the more acute maladies, and with warm spices, &c.; and by the gum-resins, the balsams, the terebinthines and camphor, prescribed according to the circumstances of the case. C. But whilst we are endeavouring to elevate vital energy by those and other means, we should also fulfil the *third* intention, by associating, or alternating, them with the more tonic and stomachic purgatives, or with warm and stimulating diaphoretics, as the abdominal or the cutaneous secretions may require to be promoted.

39. iv. *Debility affecting chiefly associated organs, or particular textures*, requires nearly similar means to those already advised, according to the grade and form it may assume. The treat-

ment of its manifestations in the *ganglial* and *vascular systems*, and in the *digestive viscera*, has been already noticed; and is still more particularly discussed in the articles *Blood*, *Colon*, *Indigestion*, &c.—A. Debility of the *cerebro-spinal organs* must be treated according to the causes that have occasioned it, and the characters it presents. The causes, whether moral or physical, should be removed or counteracted as far as possible; and if it have arisen from mental excitement, repose and agreeable amusement should be inculcated. (a) When it is characterised by increased *sensibility*, the bitter infusions with liquor potassæ or the sub-carbonates of soda or potash, with conium or hyoscyamus; the preparations of iron; chalybeates; vegetable tonics and aromatics, with small doses of opium or the preparations of morphine; cold or shower baths; sea-bathing, change of air, &c., mental tranquillity, and agreeable employment; are amongst the most efficacious means. (b) If it be attended by increased *irritability* or *mobility*, the mineral acids, alone or with bitter infusions; the preparations of cinchona; the acetic acid; HOFFMANN'S anodyne, valerian, assafœtida, musk, or vegetable tonics, with opiates or anodynes, the prussic acid, the Iceland moss, ass-milk, alkaline or tepid baths, &c., are suitable remedies. (c) If the debility be great, and particularly if it be attended by *torpor* or depression of the sensibility depending neither upon cerebral congestion, nor upon a plethoric state of the vascular system, the warm or diffusible stimulants, combined with permanent tonics; aromatics and cardiacs; iodine, strychnine, or the extract of nux vomica in small doses; coffee; camphor or phosphorus in minute quantities; warm salt water bathing; the shower bath; chlorine fumigating baths; the use of astringent and camphorated washes to the head and surface of the body; the nitro-muriatic acid bath, or sponging the surface of the trunk, or even the head itself, with a tepid wash containing these acids, may be tried and associated with the foregoing, or other internal remedies, according to the peculiarities of the case.

40. B. The *sexual organs* are debilitated—(a) from imperfect developement, depending upon their interrupted evolution, or upon general asthenia; and (b) from over-excitement. The *first* of these causes seldom occurs in the male, but not infrequently in the female (See *Chlorosis*, and *Menstruation*), and in such cases requires the constitutional treatment there described. The *second* cause is common to both sexes, although perhaps more so in the male than female. When it has thus originated, and exists merely in a slight degree, without amounting to impotency, the organs will recover their energies soon after marriage, if regular and abstemious habits be adopted. In other circumstances, and in severer cases, attention should be paid to the general health: the mind ought to be occupied by interesting pursuits; the patient should rise early in the morning, and use the shower bath, or local aspersion or affusion, and live regularly. If the causes in which it originated be relinquished, the sexual function will soon be restored. The tonics which are the most efficacious in cases of this description are, the muriated tincture of iron, taken in the infusion of quassia, or of chamomile flowers; the tincture of iodine; coffee; and the extract of conium,

with the preparations of cinchona, cascarilla, or iron, &c. (See IMPOTENCY and STERILITY.)

41. C. The manifestations of debility in the cellular, the mucous, and other tissues, must be treated according to the principles already stated. When asthenia in any of its various forms affects the digestive mucous surface, the treatment already noticed (§ 34.) is applicable. If it be attended by hæmatemesis, melæna, or intestinal hæmorrhage, the terebinthines, and sulphuric acid, either alone or with tonic decoctions, or the superacetate of lead with acetic acid and opium, are the most energetic. If it manifest itself chiefly in the respiratory mucous membrane, the astringent tonics, the mineral or vegetable acids, the inhalation of the fumes of astringent and tonic substances (see BRONCHI, § 100.), sponging the chest daily with tepid or cold astringent lotions, change of air, sea-voyaging, and horse exercise, are amongst the most salutary measures.

42. v. Of the various constitutional and local diseases with which debility is commonly associated (§ 25, 26.), little or no mention need be made at this place, as they are particularly noticed elsewhere. I may, however, remark that inflammations occurring in a debilitated and cachectic state of the frame, more especially if the debility be of that complicated kind described above (§ 11.), are characterised by deficient energy of all the functions actuated by the organic nervous system, and by imperfect tone of the vascular and capillary system itself (see INFLAMMATIONS—*Asthenic Forms of*;) and that they seldom admit of the large depletions which are indispensable in the healthy or sthenic states of those diseases. The inflammations which not infrequently supervene in the course of adynamic fevers, and certain forms of erysipelas, as well as various other associations of the pathological conditions now under consideration, fully illustrate this position. Such asthenic forms of complicated disease, however greatly increased the general vascular action attending them may be, require the powers of life to be supported, and, in many cases, powerful tonics and stimulants to be exhibited, even at the time that it may be necessary to resort to local or derivative bleedings in order to prevent the disorganization of the viscus especially affected. In all such maladies, the pulse is remarkably quick, often full, but soft and compressible—a state which, although resulting from depressed vital energy, is too generally viewed as evincing a very different condition; and depletions, often the very cause of the great frequency of the pulse, are resorted to, in order to render it slower—to perform an impossibility: the important pathological facts, that great quickness of pulse is the consequence of debility, and that the most tumultuous and morbidly increased vascular action is very frequently associated with the utmost depression of vital power, being either unknown or overlooked.

43. vii. The treatment of the debility attending convalescence from disease has been partly anticipated, particularly at § 36.; but I may here offer a few additional remarks on this important subject.—a. The great susceptibility of the system to impressions from external agents or mental emotions, attending the debility of the early stage of convalescence, should make the practitioner cautious as to its management. Exposure to cold, the premature exhibition of stimulants or of too

heating tonics, to great indulgence of the appetite, and inappropriate food, may occasion relapses, may favor the supervention of other diseases, and may thereby superinduce dangerous or irremediable organic change. This is no infrequent occurrence after fevers, particularly the exanthematous, and after inflammations of the viscera. Such unfavourable results proceed not merely from the above causes, but also from inattention to the secretions and excretions; the patient often relinquishing too soon the use of those means which are still requisite to enable the weak powers of life to perform their various functions. The laying aside the use of medicines too soon is even still more frequently productive of mischief in convalescence from chronic diseases, particularly those of the bowels and liver, and dropsies. In these, the use even of the same means that removed the complaint is often necessary for a considerable time afterwards, either in different doses or in modified forms. During the whole period of recovery, the causes which produced the malady ought to be carefully avoided; and the physician should prescribe the diet and regimen of the patient, and such other measures as may seem to him calculated to ensure the object proposed. The articles of diet should at first be bland, digestible, and in small quantity, which may afterwards be gradually increased; and, with the returning powers, the farinaceous food first adopted may be added to weak animal decoctions,—or to milk, particularly asses' milk. Subsequently white fish, boiled; or chicken, rabbit, game, or the lean of well-fed mutton, may be taken, at first in small quantity and without heating condiments. Although white fish or flesh may not be more readily digested than game, venison, or mutton, yet they are generally not so heating as the last-mentioned article, or as beef. Before wine, or any other exciting beverage, be allowed, the effects of the gentle and tonic bitters, in the form of infusion, should be first observed; and if these occasion no febrile excitement, nor accelerate the pulse, a little old wine, particularly Hermitage, sherry, or East India Madeira, may be taken in water with the principal meal.

44. b. The temperature of the room, and the bed and body clothing of the patient, ought to be duly regulated according to his habits, and the peculiarities of the case, and with strict regard to ventilation. Subsequently, change of air and suitable exercise should be prescribed; at first in a close or open carriage, according to the season, and afterwards on foot, or on horseback; the last of which, and sea-voyaging, being the best suited to convalescents from pulmonary diseases.

45. vii. Moral Regimen, and other means.—

A. There are various other remedies that may be resorted to in the more urgent cases of debility; but these are pointed out in the articles on the specific diseases, of which debility forms an important part.—a. The internal use of tar water, once so inordinately lauded, and subsequently so very undeservedly neglected, and medicated baths, may, however, be here noticed. I have had several opportunities of observing the good effects of a course of tar water, or of an infusion or decoction of pine tops and shoots, in simple debility, and in complaints chiefly to be referred to this state of vital endowment.—b. The idea that the skin is entirely incapable of absorbing fluids in

which it may be immersed, has led to the neglect of *medicated baths*. But it should be recollected that, independently of any power of absorption this structure may possess,—and which I believe it possesses under some circumstances, and in respect of various agents,—it is a living, an active, a finely sensible, and, as to the nature and extent of its functions, an important organ; and that it is very susceptible of impressions by which not only its own functions are modified or altogether changed, but the actions of other organs are variously affected in consequence of the nervous and vascular connections and functional relations, which bind the different parts of the economy into one indivisible whole. Entertaining such views, I believe that cold, tepid, warm, or medicated baths; that lotions or washes, or stimulating liniments and frictions applied to the surface,—the former in slighter cases, the latter in the more urgent; are not infrequently beneficial in diseases of debility, when judiciously employed, and with due reference to antecedent or existing visceral disorder. Sea or salt water bathing; shower baths; camphor and chalybeate baths; warm, tepid, or cold baths, either general or local, of iodine, or of iodine and sub-carbonate of potassa; baths of decoctions of willow or oak bark, sometimes with the addition of an alkaline sub-carbonate; washes with camphor water, rose water, and vinegar, applied to the trunk; or sponging the surface daily with a mixture of these, at a temperature of about 60°; or with a small proportion of the nitric and muriatic acids in water at a temperature of 70° to 80°; are respectively of much service, when suitably prescribed.

46. *B. Moral treatment*, or attention to such mental impressions and emotions as are calculated to promote the physical means resorted to, is particularly beneficial in restoring the vital powers, especially when the nervous systems manifest a more than ordinary share of depression and its attendant disorders. The manner and bearing of the physician, when calculated to inspire confidence, will of themselves do much in fulfilling the intentions of his prescriptions. The faith reposed in the remedies resorted to will often accomplish as much as they are physically capable of performing, and not infrequently much more. In order to inspire this feeling, the physician should himself evince a calm, and, in cases of great danger and depression of the vital energies, a cheerful confidence. Hope, in whatever form it may be excited, and in every degree to which it can be elevated, is a most powerful agent in combating diseases of debility; whilst its opposite, despondency,—the consequence and the cause of debility,—is one of the greatest evils we have to guard against in these maladies. Every practitioner whose range of observation has comprised the malignant diseases of warm climates, or of temperate countries, must have remarked, that when the patient dreads, and still more if he entertains a sentiment of, an unfavourable issue, or if he be apathetic and careless of the event, the very worst sign of depressed vital power has appeared, and the most active moral and physical stimulants are then required; whilst, on the other hand, a firm confidence in the physician, and ardent desire of recovery, are the best aids by which his endeavours can be seconded.

47. *C. Travelling*,—owing to the exercise, the

change of air, the continued succession of novel and exciting objects presented to the senses, the agreeable occupation, without exhaustion of the mind which attends it, and the amusing and exhilarating matters incidental to it,—is one of the most efficacious means of restoring the depressed or exhausted powers of the frame, especially the enfeebled functions of the digestive organs and of the nervous system; and nearly allied to it, are *pleasant society*, *rational amusements*, and varied, interesting, but not fatiguing, bodily and mental employments.

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DEGLUTITION, DIFFICULT.—*SYN.* *Dysphagia* (from δύσ, difficulty, and φάγω, I eat or swallow). *Deglutitio difficilis vel impedita*, Auct. *Schweres Schlingen*, Ger. *Dysphagie*, Fr. *Dysphagie*. *Difficulty of Swallowing*.

CLASSIF.—1. Class, Diseases of the Digestive Function; 1. Order, Affecting the Alimentary Canal (Good). SPECIAL

AND GENERAL PATHOLOGY; *Symptomatology.* (Author, &c.).

1. Difficult or obstructed deglutition is an occasional symptom of several diseases, and a constant concomitant of a great variety of organic changes, affecting the *fauces*, the *pharynx*, the *œsophagus*, or parts in their immediate vicinity; and which are discussed under these heads, particularly in the article on the *ŒSOPHAGUS*. After having noticed the only *idiopathic form* in which dysphagy can strictly be said to occur, I shall arrange those pathological states of which it is an important phenomenon, and with reference to the places in which they are more appropriately described, and to the principles and means of cure.

I. PRIMARY OR IDIOPATHIC DYSPHAGY. *Nervous Quinsey*, HEBERDEN.

CLASSIF.—II. CLASS, I. ORDER (Author).

2. DEFIN.—*Difficulty of swallowing, occurring suddenly, and accompanied by a choking sensation.*

3. i. This form of dysphagy is not infrequently observed. It generally takes place when the patient is apparently in good health; and chiefly in irritable, nervous, or weak constitutions. It is usually induced by violent gusts of temper, or mental emotions, or by dread of its accession; and is occasionally so severe as to threaten suffocation. When it affects the *œsophagus*, it gives rise to a sensation resembling that occasioned by the retention of an extraneous body; and matters attempted to be swallowed are either retained for some time, or rejected. When the *pharynx* is principally affected, deglutition is generally attended by a sense of choking. It may continue only for a minute or two, or it may be prolonged for several days, or even months, difficulty being present in various degrees upon each attempt at receiving substances into the stomach; or it may be remittent. It is often accompanied by the retention of flatus in the *œsophagus*, probably by spasm; the difficulty of deglutition being increased by the flatulent distention, but removed upon the discharge of flatus. It resembles in this the *globus hystericus*; but it differs from hysteria in the circumstance of its occurrence in males as well as in females, and independently of any of the other characteristic symptoms of that affection.

4. ii. The TREATMENT of primary or idiopathic dysphagy should be directed with the view, 1st, of relieving the existing difficulty; and, 2dly, of preventing its recurrence.—(a) The first object may be attained by swallowing slowly cold or iced fluids; by cold applications to the neck or throat; by cathartic, anodyne, and antispasmodic enemata; and by camphorated liniments, or antispasmodic and anodyne plasters placed on the sternum or throat. (b) The recurrence of the affection will be prevented by the internal use of vegetable bitters and tonics, with the alkaline sub-carbonates; by narcotics or antispasmodics combined with ipecacuanha; and by a free action kept up for some time on the lower bowels, by means of the resinous or other purgatives conjoined with vegetable bitters, and promoted by clysters. The other means, mentioned hereafter (§ 16.) will also prove useful adjuvants.

II. SYMPTOMATIC AND COMPLICATED DYSPHAGY. CLASSIF.—GENERAL PATHOLOGY; *Therapeutics*, &c.

5. Difficult or obstructed deglutition is an occasional or constant attendant upon a variety of functional disorders, and of organic changes. 1st. It is often symptomatic of hysterical, hypochondriacal, flatulent, and asthmatic affections. 2d. It is constantly attendant upon tetanus and rabidity. 3d. It is sometimes produced by organic change seated in parts about the base of the brain or cranium, the medulla oblongata, or upper part of the spinal cord. In all these symptomatic states, the parts immediately concerned in the function of deglutition are seldom, and not necessarily, affected organically; but in the following there always exists either inflammatory action, or its consequences, or some structural change, in the parts by which food is conveyed into the stomach, or in their immediate vicinity. The preceding may be called *symptomatic forms* of dysphagy; those which are to follow, *complicated states* of this affection. Under this latter may be arranged, 1st, Dysphagy from congenital malformations; 2dly, From inflammation, or structural lesions of the mouth, tongue, fauces, pharynx, or tonsils; 3dly, From diseases of the epiglottis or larynx; 4thly, From inflammations or structural lesions of the *œsophagus*, or of the cardiac orifice of the stomach; 5thly, From tumours pressing upon the pharynx, or on the *œsophagus*. On each of these I shall add but few remarks.

6. i. SYMPTOMATIC OR SYMPATHETIC DYSPHAGY.—A. *Of spasmodic or flatulent diseases.* Difficulty of swallowing occasioned by hysteria, hypochondriasis, spasmodic asthma, dyspepsia, and even rabidity, is in a great measure to be ascribed to a flatulent distension of a portion of the *œsophagus*, with spasmodic constriction of other parts of this tube, and disposition to convulsive or spasmodic action of the muscles of the pharynx, either upon certain occasions of their being excited by the mind, as in hydrophobia, or upon attempts at performing their usual functions. In many instances, particularly those connected with asthma, indigestion, or flatulence of the digestive canal, the difficulty is attributable rather to the ascent of flatus in the *œsophagus*, preventing the transmission of food into the stomach than to spasmodic action of the muscular parts concerned in the process. In these cases, the patient feels much pain, with a sense of distension or pressure under the sternum, and in the course of the *œsophagus* after swallowing.

7. A. *Dysphagy may be occasioned by structural lesion about the base of the brain or cervical portion of the spinal cord*, or about the base of the cranium. In such cases, the paralysis may be more or less complete; and it may be limited to the muscles of the pharynx and upper part of the *œsophagus* (BONET, PORTAL, BALDINGER, and myself), or it may have extended to them from other parts. Numerous cases illustrating these positions have been recorded. The participation of the muscles of deglutition in either general or partial paralysis is very commonly observed in apoplexy, &c.; and the occurrence of this form of dysphagy, independently of organic change, or rather from congestion about the base of the brain, is shown by its occasional accession in the advanced stages of fevers. Paralysis of the muscles concerned in this function may also be produced by wounds of the nerves of the face (PALLETTI), by light-

ning (PATERSON), and by severe cold (BLEULAND). It is, however, most frequently caused by the slow development of tumours, or cysts, or other structural changes about the base of the cranium, whereby either the nerves supplying these muscles are compressed at their origin or in their course, or a portion of the brain or of the upper part of the spinal cord is injured.

8. ii. **COMPLICATED DYSPHAGY**, or difficult deglutition from structural change affecting the parts immediately concerned in this function, comprises a great variety of lesions. I shall merely enumerate them with reference to their seat; their nature, morbid relations, and treatment, being fully discussed under more appropriate heads.

9. *A. Dysphagy from congenital malformation.* — Extreme smallness or enlargement of the tongue; the termination of the pharynx, or of the œsophagus, in a cul de sac, or obliteration of the œsophagus; the division of this part into two canals, and its communication with the trachea; are the chief malformations which interrupt deglutition; and are of very rare occurrence in otherwise well-formed infants. Cases, however, have been recorded by BLAES, VAN CUYCH, MICHEL, BILLARD, MARTIN, A. COOPER, and ANDRAL. In these, death, necessarily resulting from inanition, took place in from three to nine days. A slight interruption to deglutition very frequently arises from congenital fissures of the soft and hard palates.

10. *B. From diseases of the mouth and throat.* — (a) Inflammation or chronic enlargement of the tongue; ranula; sublingual calculus (GUENTHER); and aphthæ, ulceration, tumours, and excrescences about the base of the organ (REIDLIN, VAN SWIETEN, TODE, and INGLIS); are not infrequent causes of dysphagy. Cases of chronic enlargement of the tongue, impeding deglutition, unconnected with malignant disease, and continuing for many years, are recorded by several writers. I have seen an instance of this kind, that had existed from infancy to nearly middle age. These and other affections, with the treatment appropriate to them, are particularly noticed in the article upon the *Diseases of*, and the *Indications furnished by*, the TONGUE. — (b) The fauces and tonsils not uncommonly occasion dysphagy. Inflammation, suppuration, ulceration, or destruction of the soft palate, or of the uvula; great relaxation of the latter part; inflammation, abscess, chronic enlargement, and ulceration, of the tonsils; fungous and other tumours and polypi of the maxillary sinus, or posterior nares; various tumours or excrescences attached to the palate or tonsils (SCHMIDT, THILENIUS, &c.); and the severe effects of mercury, or the sudden arrest of salivation; are generally attended by more or less of dysphagy. — (c) When the pharynx is the seat of inflammation or of its consequences, or of the lesions now enumerated, or of malignant disease (KERGAREDEC, and myself), deglutition is commonly much more impeded than when only the fauces are affected; and in some instances it is extremely difficult or nearly impossible. In such cases, the epiglottis and larynx are more or less irritated, and, by the consequent disorder of the respiratory actions, the dysphagy is still further increased. Foreign, and particularly pointed or sharp, bodies

lodged in the pharynx, are also sometimes causes of dysphagy.

11. *C. Dysphagy from disease of the epiglottis and larynx.* — (a) Inflammation, ulceration, and entire destruction of the epiglottis, or induration, incurvation, and the removal of it by wounds, will occasion difficult deglutition, as in the cases recorded by MAYNWARING, SCHURIG, BONET, DESGRANGES, TONANNI, and LARREY. (b) Also inflammation and ulceration of the larynx, ossification of its ligaments, and displacement of the *os hyoides*, are generally attended by dysphagy. The possibility of the occurrence of this last cause, although observed by VALSALVA, and MOLLINELLI, has been doubted; but the instance of it noticed by Sir C. BELL (*Surg. Observ.* p. 160.), and the case wherein it was caused by swallowing a large hard substance, recorded by Dr. MUGNA (*Annali Univers. di Med.* Nov. 1828.), put the matter at rest. Fracture of this bone by external violence has produced not only an impossibility of deglutition, but even more serious consequences, as shown in the cases published by Dr. MARCINKOWSKI and M. LALESQUE (*Journ. Hebdom. &c.*). — (See LARYNX — *Diseases of*.)

12. *D. Diseases of the œsophagus, and cardiac orifice of the stomach*, will impede or altogether obstruct deglutition. Inflammations and their consequences, as softening and ulceration, induration, thickening, stricture, and purulent collections between the coats of these parts; also partial dilatations, sacs and diverticula, or even large pouches, either with or without thickening and stricture of the part of the œsophagus immediately below the dilatation (BLASIUS, HALLER, MECKEL, MONRO, LUDLOW, C. BELL, ODIER); polypous or fungous excrescences or tumours of various kinds in some portion of this canal, or in the cardiac orifice of the stomach; or serofulous, callous, cartilaginous, osseous, carcinomatous, or scirrhus degeneration of these parts; or merely enlargement or ulceration of their mucous glands; and spasm, rupture, or perforation of the œsophagus, or the lodgment of foreign bodies in it; are severally causes of dysphagy; and are fully described in the articles on the *Pathological Anatomy of the DIGESTIVE CANAL*; and on the *Diseases of the CÆSOPHAGUS*, as well as in those of the STOMACH.

13. *E. Tumours pressing upon the pharynx, or upon the œsophagus*, — as bronchocele, or other tumours or abscesses near the throat and in the neck; tumefaction of the lymphatic and secreting glands below the jaw, and at the top of the sternum; aneurism of the subclavian or carotid arteries, or of the aorta before it passes into the abdomen; enlarged bronchial glands, tumours of various kinds, and abscesses in the posterior mediastinum; exostoses or other diseases of the cervical vertebræ, and purulent collections between them and the œsophagus (CARMICHAEL, myself, and others); also abscesses formed between, or involving, the trachea and œsophagus (HAY and myself); dropsy of the pericardium (BANG); and enlargement of the liver; have severally been observed to occasion dysphagy.

14. iii. The **DIAGNOSIS** of dysphagy requires a few observations merely. — (a) In *idiopathic*, as well as in the *sympathetic* dysphagy, the difficulty takes place suddenly, disappears as suddenly, re-

mits or intermits, and is generally attended either by convulsive efforts, by choking sensations, or by flatulence, dyspepsy, or various nervous symptoms, particularly when it is connected with hysteria, hypochondriasis, &c.—(b) In cases of atonic or *paralytic* dysphagia, solids are more easily swallowed than liquids; but the process is often very slow, and the difficulty great.—(c) When it proceeds from disease of the *fauces*, the cause is obvious to the sight; and frequently also when it is induced by the state of the *pharynx*. In this latter case, as well as in dysphagia from lesions of the *epiglottis* and *larynx*, or from tumours or fungous excrescences developed in, or pressing upon, the *pharynx*, or from inflammatory diseases of it, or of the upper part of the *œsophagus*, substances are often forcibly ejected into or through the nostrils, upon attempts at deglutition, owing to the spasmodic action of the muscles of the *pharynx*.—(d) When dysphagia is caused by a diminution of the canal of the *œsophagus*, either from thickening of its parietes, or from tumours pressing upon it, &c., difficulty of swallowing solids is first felt, and this at last is followed by a difficulty of swallowing fluids; the interruption to this function proceeding gradually and slowly. When the obstruction is seated low in this tube or about the cardiac orifice of the stomach, pain is usually felt under the sternum after swallowing; and the matters are afterwards regurgitated into the mouth, owing either to a sudden reaction of the parietes of the canal, or more commonly to their inverted peristaltic action. (See art. *Æsophagus—Diseases of*.)

15. iv. TREATMENT.—It must be evident that the treatment of sympathetic and complicated dysphagia should be conducted strictly according to the pathological state on which it depends, as far as that may be ascertained. Hence a tolerable knowledge of the means applicable to it, in every circumstance in which it presents itself, is to be acquired only by a reference to the articles where the various lesions occasioning it are described, in respect of their nature and cure.

16. A. Sympathetic dysphagia.—(a) of *spasmodic* or *flatulent* disorders, requires very nearly the same treatment as already recommended in the idiopathic form of the disease. If it accompany *hysteria*, swallowing, slowly, cold or iced fluids, and cold applications to the neck, will soon afford relief; but it will afterwards be necessary to have recourse to tonics and cooling aperients, with other means suited to the peculiarities of the case. The instances in which TODE and WICHMANN found quassia so beneficial, were probably of this kind, or the idiopathic form already noticed.—(b) When dysphagia is connected with *flatulent dysphagia*, or with *asthma*, or *palpitations* of the heart, relief will generally be obtained from anodynes or antispasmodics combined with refrigerants, or from vegetable tonics with alkaline sub-carbonates and aperients. Blisters, or rubefacient plasters, or either of the ammoniacal, the compound galbanum, or the cummin plasters, with opium or the extract of belladonna, applied over the sternum or throat, will also materially assist the internal remedies. HEINECKEN advises the preparations of *zinc*, which, as well as the oxide of *bismuth*, may be tried in this form of dysphagia. He also recommends the distilled water of the *laurocerasus*, for which the *hydrocyanic acid* may

be substituted with advantage. Besides these, the *cuprum ammoniatum*, the preparations of camphor with those of henbane or conium, may also be exhibited. In every form of dysphagia not depending upon organic change, purgatives, and cathartic and antispasmodic enemata, will be productive of more or less benefit.

17. (c) Dysphagia from *paralysis* or atony of the muscles of deglutition should be treated according to the principles stated in the article PALSY. If it be occasioned by congestion about the base of the brain or spinal cord, general or local bleedings, active cathartics, and external derivatives, must be employed. Congestion having been removed, large doses of camphor, as advised by HOFFMANN; stimulating linctuses and gargles; sialagogues; electricity and galvanism; exciting liniments or blisters to the neck or throat, as suggested by LOEFFLER; as well as moxas and issues; may be severally employed. Dr. BARTON recommends the *zanthoxylum* in cases of this description. THUNBERG and BALDINGER advise the cajeput oil to be rubbed on the neck; GARDANNE, *sinapisms* to be applied on the same part; and FRÄNCK, the *actual cautery*.

18. B. Dysphagia from organic change of the parts directly concerned in the function of deglutition requires means the most diversified, according to the nature of the lesions to which it is attributable.—(a) When it is *congenital*, but little can be done excepting in the slighter forms occasioned by cleft palate, or by adhesion of parts within the mouth. In these, the expert surgeon may afford complete relief.—(b) Difficult deglutition from diseases of the *tongue*, *fauces*, *tonsils*, or *larynx*, is of itself of minor importance; but as respects the primary lesion, of the utmost moment, requiring the most energetic measures pointed out in their treatment. (See these articles.)—(c) Dysphagia from *inflammations*, or their usual consequences, whether seated in the *pharynx*, the *œsophagus*, or the *cardiac* orifice of the stomach, should be treated according to the sthenic or asthenic form they may assume. After general or local depletions, especially cupping between the shoulders or over the sternum, emollient, cooling, and febrifuge linctuses ought to be taken at short intervals. I have prescribed, with advantage in such cases, especially when ulceration has been suspected to exist, linctuses containing the nitrate of potash, or the muriate of ammonia, or the subborate of soda, or the sub-carbonates of the fixed alkalies with the nitrate of potash and ipecacuanha, in addition to the other means described in the articles on the diseases of these organs. When foreign bodies are lodged in the *pharynx* or *œsophagus*, appropriate measures should be resorted to, either for extracting them, or for pushing them onwards into the stomach.—(d) When dysphagia is occasioned by *tumours developed in, or pressing upon, the œsophagus* or *cardia*, it is not always that their nature, or even their existence, can be fully ascertained. If their presence be inferred, or when they are developed in external parts, or if the diathesis be scrofulous, then iodine may be prescribed internally as well as externally, with potash, conium, &c.* If *abscesses* have

* I was consulted, in 1826, in the case of a young lady born in India, but who had resided some years in London. The glands in the neck, and underneath the sternal ends of the clavicle and sterno-mastoid muscles as well as in various

formed between the upper part of the œsophagus and cervical vertebræ, or between the former and the trachea, or about the pharynx, an unfavourable issue might possibly be averted by incisions made into them. If *aneurisms* press upon the gullet, the treatment recommended when discussing *Diseases of the ARTERIES* should be put in practice. — (e) When *thickening of the parietes* of a portion of the œsophagus, with more or less of *stricture* or *scirrh* of this canal, or of the *cardia* of the stomach, is the cause of dysphagia, cupping, or leeches applied over the sternum; issues and moxas in the same situation, or in each side of the neck; the linctuses recommended above (§ 18. c.); mercurial and other alteratives, with conium, hyoscyamus, camphor, &c.; the iodide of mercury, or the hydriodate of potash, internally and externally; the sub-carbonates of the alkalies, or the liquor potassæ in emollients, &c., with various other means noticed in the article on the *ŒSOPHAGUS*, may be employed. If these fail, a careful trial may be made of the bougie; but the utmost attention should be paid not only to the manner of using it, but to the effects produced by it; for if the stricture be connected with sacs, pouches, or diverticula, or hernia of the inner coats through the muscular, or even with simple ulceration, — changes which not infrequently take place in the part immediately above the strictures — much mischief may result from even a cautious introduction of a bougie. The frequent and obvious connection of dysphagia with scrofula shows the propriety of prescribing the medicines found most serviceable in that disease, particularly when occurring in the scrofulous diathesis: and in such cases, the muriate of lime or of barytes, conium, liquor potassæ, and especially the preparations of iodine, should be fully tried.

19. C. The treatment advised by the best writers on this and its related affections consists of much that has been now stated; in addition to which, however, I may briefly add, that, the *muriate of baryta* has been recommended by KERKSIG; *cold and iced fluids*, by TODE and MONTAT; *conium*, by WICHMANN, COLLOMB, HUFELAND, and JOHNSTON; *hyoscyamus*, by WITHERING; *opiates*, by FERREIN and CONRADI; the *liquor potassæ*, by HALLER; *emetics*, by FERREIN; and *local bleedings*, by FRANCK and BANG. *Calomel* and some other preparations of *mercury* have been prescribed by SEQUIRA, STEVENSON, ENGELHARD, BRANDIS, and others, — to the extent of producing salivation, by KRAMP, MUNCKLEY, BRISBANE, and FARQUHARSON — in the form of mercurial ointment, either alone or with the volatile liniment, rubbed over the sternum and throat, by DOBSON, PATTEN, KERKSIG, and WATHEN — internally, with antimony, by VAN GEUN — and with aloe and camphor, by HALLER, PATTEN, BANG, and BRANDIS, who contend strenuously for the occasional origin of dysphagia in suppressed rheumatism and repelled eruptions,

other parts of the body), were so greatly enlarged as to impede deglutition and respiration. She had been treated by several eminent practitioners; but the tumours had increased. In consultation with Mr. ANNESLEY, who had requested me to see her, a course of iodine was recommended; and the hydriodate of potash was employed, chiefly internally, for eight or nine months, with occasional intervals not exceeding a fortnight each. The glandular enlargements gradually subsided, the catamenia appeared, and she perfectly recovered. She is now well, and married.

and also recommend external derivatives and irritants, as sinapisms, issues, setons, blisters, repeated or kept open, &c. The *surgical measures* to be resorted to in various circumstances of the disease are fully discussed in the writings of J. HUNTER (*Trans. of a Soc. for the Imp. of Med. and Chirurg. Knowledge*, vol. i. art. 10.), DESAULT (*Surgical Works*, &c.), RICHTER (*Chirurg. Biblioth. b. xii. p. 11.*), C. BELL (*Surgical Observ. &c.*), and S. COOPER (*Surgical Dictionary*, &c.).

20. D. The diet should be chiefly farinaceous, excepting in the nervous and spasmodic forms of the disease; and it ought always to be easy of digestion, and taken without any heating condiments. All substances which irritate or excite by their direct or indirect action, are injurious. The stomach also should never be loaded; and, in every circumstance, the secretions and excretions ought to be carefully regulated and promoted by gentle and appropriate means.

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DELIRIUM. — *Syn.* *Paraphrosyne*, *Paraphronia* (from *para*, erroneously, and *φρονία*, I understand), Auct. var. *Paracope*, Swediaur. *Irvereden*, *Aberwitz*, Germ. *Délire*, Fr. *Delirio*, Ital.

CLASSIF. — *PATHOLOGY*; *Symptomatology*.

1. Delirium has been defined: — *Disorder of the intellectual powers, with or without derangement of the moral sentiments.* But this definition is

too extended and vague, and embraces the whole circle of mental diseases. J. FRANCK, and some other pathologists, have restricted it by adding — *this disorder assuming an acute form*. Several writers, retaining the preceding extended definition, have divided delirium into the *acute*, and the *chronic*; the former consisting of various morbid states of the brain, attended by mental disturbance and fever — the latter of mental alienation, unattended by fever or active bodily disorder. *Chronic delirium*, therefore, comprises all those states of disordered mental manifestation treated of in the article INSANITY. *Acute, or febrile delirium* refers to those morbid affections of mind supervening in the course of febrile, inflammatory, and some chronic diseases, and which have been denominated *symptomatic*, or *sympathetic delirium*; and those which are produced by acute diseases, or injuries of the brain or its membranes, and by intoxicating or narcotic substances; and which have been termed *idiopathic delirium* by some writers. The common acceptance of the word delirium, and that in which it has been used by the best authors, accords with the acute form as occurring in the manner now stated; and in this light I shall also view it. But it is more doubtful in how far it is ever an idiopathic affection. Indeed, in many of the diseases in which it is admitted by all to be a symptomatic or sympathetic disorder, its more immediate dependence upon a morbid state of vital endowment and circulation in the encephalon is as manifest as in some of those which have been viewed as idiopathic. The distinction, therefore, cannot be maintained, especially as it appears to have been founded upon a mistaken idea, viz. upon the supposed existence, in the reputedly idiopathic form, of inflammatory irritation or action of the brain or its membranes; which action does not obtain in the other. That delirium is most frequently occasioned by such a pathological state, cannot be doubted; but it is equally certain that it sometimes also proceeds from a different condition; and that either of them — either inflammatory action, or simple disturbance of the cerebral functions without inflammation — may exist in each of the divisions thus distinguished, — in the idiopathic, as well as in the sympathetic form. If the distinction in question be still retained, it would be more accordant with the generally admitted acceptance of the word idiopathic, to consider, as J. FRANCK has done, all the manifestations of delirium as symptomatic, excepting when it is occasioned by intoxicating and narcotic substances: but, when it proceeds from inflammation of the brain or its membranes, whether primarily or consecutively induced, to view it merely as a symptom, but by no means a constant, although a very general symptom, of this state of disease.

2. Delirium, as well as other cerebral affections, has been too generally imputed to inflammatory action; and the state of the ganglionic or organic nervous power, which evidently influences both the functions and the circulation of the brain, has been entirely overlooked, particularly as respects this affection. There can be no doubt of the difficulty of appreciating correctly the nature or extent of the disorder which this part of the system experiences. But this circumstance surely does not preclude us from tracing ultimate phenomena to their true origin, instead of stop-

ping at intermediate effects; nor from inferring, from the nature of these phenomena, and of the causes which increase or remove them — from the *juvantia* and *ladantia* — certain general conclusions respecting the condition of that power whence morbid conditions primarily emanate; each successive effect being the cause of further change, until organic lesion, and ultimately death, result. Believing, therefore, on physiological grounds, that delirium is often the consequence of changes in the state of organic nervous power — of the functions of that part of the organic or ganglionic system supplying the encephalic organs — influencing, in some cases, one or more of the mental manifestations, without any appreciable change of vascular action or of structure; in others, both function and circulation; and in many, not only function and circulation, but organization also; and that our knowledge of these changes, of their signs, and of their various related circumstances, are too imperfect to enable us to come to accurate conclusions; but that we should proceed nevertheless with the aid of the dawn of knowledge now opening upon us; I shall briefly consider, first, the phenomena and diagnosis of delirium — afterwards, its pathology and treatment conformably to the doctrine now alluded to.

3. I. PHENOMENA.—A. The *invasion* of delirium is generally preceded by sleeplessness, headache, vertigo, heaviness of the head, noises in the ears, change of voice, absence of mind, forgetfulness of pain, by an air of surprise, and acuteness of the senses; the eyes are brilliant, and intolerant of light; the head is often hot, the face flushed, and the circulation of the brain more or less increased. In some cases, however, these symptoms are either altogether absent, or inappreciable; and in others the countenance is collapsed, pale, and cool, and the eyes sunk. To the foregoing phenomena succeed those which constitute delirium, and which vary remarkably in character and intensity. In many cases, particularly when there are few or no signs of augmented determination of blood to the head, a simple agitation or merely absence of the mind, or reverie, or wandering from the objects before it, or a slight incoherence in the ideas, is all that is observed; but, from this slight state of affection, we meet with every grade and form of mental disorder — sometimes with fright, visions or *illusions*, often connected with present objects; occasionally with *hallucinations*, or the reproduction, in confused or unconnected forms, of previous impressions; — in certain cases, with the most furious mental and physical agitation; in others, with the greatest depression and the most sombre taciturnity; — in one case, with tears and signs of great mental distress; in another, with a lively but incongruous current of ideas, or even with laughter and gaiety.

4. B. Delirium is frequently *present* at first only during the intermediate states between sleeping and waking, which patients in acute diseases experience; the mind still perceiving objects, but imperfectly. In this state the patient appears to dream aloud; and when fully awakened, returns rational answers to questions put to him; but he soon lapses into a state of dreamy incoherence, or into that of more complete delirium. This condition nearly approaches that of *coma vigil*, into which it often passes. In some instances, this state is characterised by a loss of recollection of

all objects observed, and of all ideas with which the mind had been stored during the greater period of life, and by the recovery of the memory of languages and of ideas acquired at a very early age, and long forgotten. Thus old persons, when delirious, although their minds are blanks as respects every thing present, or which have become known to them from youth or manhood, will talk of matters which had interested them previously to such periods, and sometimes in a language which they had then spoken, but of which objects and language they had no recollection long before their delirium, nor retained any after their recovery. Here, again, the remarkable similarity between several manifestations of delirium and dreams is strongly evinced; the objects and ideas about which the unconscious mind is engaged in the states of both delirium and dreaming being frequently those which had made a vivid impression in youth, which had become erased by the cares and employments of life, but which are recalled during certain conditions of the brain. The production of these in incongruous forms, and the giving utterance to the morbid conceptions formed of them, constitute *hallucinations*; whilst, owing to the nearly unconscious state of the mind, the imperfect and erroneous impressions made by surrounding objects on the senses of the patient, give rise to inconclusive and unconnected conceptions, in consequence of the morbid condition of the brain, and occasion the *illusions* characterising the delirious affection.

5. In addition to disorder of the mental powers, the organs of locomotion are remarkably affected. In the low or quiet delirium, and in the less dangerous states, in which the brain is only functionally deranged, the muscles are either somewhat agitated, or very much enfeebled, and the voice is very weak or nearly lost. In more severe cases, the voice and the muscular force are greatly increased; the patient, however, sinking into a state of profound collapse after a few violent efforts. In the most dangerous form of delirium, particularly when it proceeds from organic disease of the brain or its membranes, it is attended, but more frequently followed, by general convulsions, by spastic contractions of one or more of the voluntary muscles, by entire loss of consciousness and sensibility, or by paralysis.

6. C. Delirium, as M. GEORGET has remarked, may be *continued* or *intermittent*, even in the continued affections of the brain. When it is intermittent, it usually returns with the exacerbation of fever that takes place in the evening and night. When the patient recovers his reason, he is generally weak and exhausted; his senses are readily and painfully impressed by their respective stimuli; and he complains of thirst, and pains of the head and limbs. If the delirium has been slight, and consciousness has not been entirely abolished, he retains more or less recollection of what had passed during its continuance. But when it has been intense, or of some duration, he has no knowledge of what has occurred. The epidemic appearance of delirium mentioned by QUELMALZ (*De Epidem. Mentis Alienatione*. Lips. 1752.) and MICHAELIS (*Med. Pract. Biblioth. b. i. st. 1.*) is to be imputed to the prevalence of those diseases in which delirium is apt to supervene, and especially in that form on which it is most frequently an attendant. The

duration of the paroxysm of *intermittent* delirium varies from one to several hours; but the *continued* form, particularly when occasioned by disease within the head, may last several days, or even many weeks. Sometimes, as in the more severe cerebral cases, it alternates with profound coma. When it terminates fatally, it generally passes into coma; but in some instances the patient recovers his reason for a few hours before dissolution.

7. ii. DIAGNOSIS. — It is of the utmost importance that delirium should not be mistaken for *insanity*, and especially that the delirious patient should not be removed to an asylum for the insane. On two occasions I have seen such a mistake made, and about to be acted upon, when my opinion was requested. But these cases recovered perfectly: to one of them — a professional man — the removal to an asylum, or the supposition even of being insane, might have been ruinous. There can be no doubt that delirium often passes into insanity, especially when it has been caused by inflammatory states of the brain, and by fevers with determination to the part; or when it occurs in persons hereditarily predisposed to insanity; but until it has assumed the features of that form of mental disorder, it certainly in no respect should be viewed and treated as such.

8. The causes and circumstances originating *delirium* are often of themselves sufficient to show its difference from *insanity*. Its occurrence in the advanced stages of acute diseases, or of chronic maladies when the powers of life have become exhausted and febrile action of an acute kind has supervened, is especially characteristic of delirium. The *insane* patient has all his senses, as well as his digestive, assimilative, and locomotive powers, but little or not at all impaired. His mental faculties and intelligence are also but partially deranged. M. GEORGET has very justly remarked that the mental disorder of the insane is often confined to a single faculty; and even in the most extended, or maniacal affections, the faculties are rather perverted, or insulated, and without the bond of association, rather than extinguished. The most maniacally insane person wills and reasons, and is not always absurd in his actions. But in the delirious, all the cerebral functions are severely affected. His sensations are imperfect and incorrect, his ideas unconnected, his passions disordered, his voluntary motions irregular, feeble, and defective; his intelligence and recollection nearly abolished; and he is impassive to all that surrounds him. Whilst the *delirious* patient presents many of the physical signs of exhausted vital energy, or of the gravest state of disease, the *insane* has all the appearances of unimpaired health, particularly in the early stages of insanity, and before consecutive organic change has taken place. In the former, the sensations and perceptions are more or less abolished; in the latter, they are but little or not at all impaired, — the judgment only, or conviction of the understanding respecting them, being erroneous. The false conviction of the insane is too strong to be removed by the evidence of the senses: the sensations and perceptions of the delirious are always too weak, even when consciousness is partially present, to become the basis of sound

conclusions. Hence the insane person cannot be convinced by objects seen, heard, and understood by him, in opposition to his perverted judgment respecting them; and the delirious patient perceives objects so faintly, if he perceives them at all, as to be unable to distinguish between such as are in any respect similar, or to recognise one person from another. Besides the circumstance, also, of delirium being generally an *acute*, and insanity a *chronic* affection, it may be remarked, that in the former, when occurring from inflammatory states of the encephalon, or from fevers complicated with such states, the return to the healthy function is often so slow as to occasion fears of the supervention of the latter. In some instances, however, the restoration from febrile delirium has been quick, and the mental manifestations have become even more active than previously to the seizure.

9. *iii. PATHOLOGY.*—It is of the utmost practical importance to distinguish the different forms of delirium, particularly in respect of the grade of vascular excitement and vital power, and the existence or non-existence of inflammatory action, for, without such a step is previously taken, no rational method of cure can be adopted. I shall therefore attempt to make this distinction.

10. *A. Delirium attended by exhausted nervous and vital influence* is sometimes occasioned by excessive hæmorrhages or venæsection, by inanition, prolonged lactation, and profuse seminal or other discharges, by old age, hysteria, fear, &c. It also occasionally supervenes from exhaustion in the last stages of some acute and chronic diseases, or from whatever directly or indirectly depresses the powers of life, as shown in the article *DEBILITY*. In many such cases, however, although the vital energies are sunk, yet the brain is more or less excited relatively to the other parts of the body; and in some, the state of delirium is connected with an impure or contaminated condition of the circulating fluids, particularly when it occurs in the advanced course of malignant diseases. The delirium, also, which is caused by excessive pain, by capital operations, by the suppression of the appearances of pain or suffering, or by the apprehension of the consequences of operations, and which M. DUPUYTREN has very appropriately denominated *nervous delirium*, chiefly falls under this form of the affection; and to it may be added many of the instances of delirium caused by excessive irritation in remote but related organs or parts, as consumption, ulcerations of the bowels, worms, &c. Although it is often obvious that a relatively increased determination of blood to the head exists in some cases of this form of delirium, yet it may be inferred, with equal justice, that a deficient supply of blood to the brain obtains in others. This conclusion may be legitimately drawn from the pale, cool, shrunk features, sunk eyes, the weak and small pulsation of the carotids, the effects of various kinds of treatment, and the absence of increased or even common vascularity of the brain upon examination after death, in some cases of this form of delirium. This opinion has been supported by M. GEORGET and several other pathologists, without having been imputed by them to its obvious source, viz. exhausted power of

the organic nerves supplying the vessels of the brain.

11. *B. Delirium characterised by depressed or exhausted vital power, and morbidly excited vascular action*, is by far the most common form; and is very frequently observed in the advanced progress of continued, remittent, intermittent, malignant, and exanthematous fevers; of acute inflammations; and of several chronic diseases, particularly when they pass into the acute form. It may also be occasioned by any of the narcotic or acro-narcotic poisons, or from their exhibition in enemata; and in some temperaments and constitutions, by a small quantity of those in common use,—as by opium, stramonium, belladonna, &c. I have more than once seen it produced even by the preparations of hop and hyoscyamus taken in moderate doses. Its occurrence from the medicinal exhibition of various narcotic and poisonous substances is noticed by various writers;—from cicuta, by WEPFER and SMETIUS (*Miscell.* p. 569); from belladonna, by PELARGUS and VALENTINI (*De Maniacis ab Usu Bellad. &c.*); and even by the superacetate of lead, by STOLL (*Rat. Med.* par. vii. p. 317.) and KNIGHT (*Lond. Med. and Phys. Journ.* vol. iv. p. 286.).—DIOSCORIDES (*Mat. Med.* l. iv. cap. 63.), WESTPHAL (*Pathol. Dæmoniaca*, p. 33—36.), and HORN (*Archiv.* Nov. 1811, p. 540.), have noticed the occurrence of delirium from hyoscyamus exhibited in clysters. Poisoning by various substances, as the *Lolium temulentum*, and some of the narcotics just mentioned, generally occasions delirium. It may also arise from indigestible substances taken into the stomach. In all these cases, in addition to the states of the system connected with the appearance of this affection, there is generally increased excitement of the circulation in the brain, relatively to that in the rest of the body; and not infrequently an impure or altered state of the circulating fluid. The delirium occasioned by the protracted use, and the sudden disuse, of narcotics or spirituous liquors, by erysipelas, and retrocedent exanthemata, is of this kind, between which and *delirium tremens* there is often a close resemblance.

12. *C. Delirium occasioned by inflammatory action of the brain or its membranes*, when the inflammation takes place primarily, is seldom attended by very manifest exhaustion of vital power, at least to the extent of the preceding forms. When, however, the inflammatory action is very general throughout the brain or its membranes, or when it supervenes on continued fevers or erysipelas, and is attended with serious effusion, vital depression is more apparent, and its termination in, or alternation with, coma, more common. This state of delirium, particularly when it proceeds from concussion or external injuries, is often phrenitic or maniacal—the *Delirium ferox* of authors—as respects the exaltation of muscular force. It is occasioned by all the causes stated to produce inflammation of the brain, particularly suppression of critical or accustomed evacuations, eruptions, or discharges; anger; the exciting passions; metastasis of specific inflammations; the ingestion of spirituous liquors, &c. Whilst the protracted use of intoxicating beverages, &c. occasions delirium tremens, unaccustomed intoxication sometimes produces the delir-

ium now being noticed, by inflaming the brain. This form of the affection is often complicated with convulsions, contractions of the limbs, paralysis, &c., particularly when the substance of the brain is organically changed; and is, when thus attended, very much more dangerous. (See *BRAIN — Inflammations of*, § 164.)

13. iv. LESIONS OBSERVED IN FATAL CASES.—In the *first* form of this affection, scarcely any, or no evident change, is found in the brain or its membranes, beyond either a somewhat increased or diminished vascularity, occasionally with a slight increase of the consistence of the cerebral substance, or of the fluid in the ventricles. In many cases, all the parts within the cranium are apparently sound. In the *second* variety, and wherever delirium is unattended by marked disorder of the muscular actions—when it is without extreme prostration, or convulsions, or paralysis—the chief changes are, increase of the consistence of the brain, and of the fluid contained in the ventricles, injection of the pia mater, sometimes with infiltration of serosity, and occasionally a somewhat deeper shade of colour in parts or the whole of the cerebral substance. M. GEORGET remarks that pathological investigations do not confirm the opinions of some authors, who impute the cause of delirium and convulsions to inflammation of the arachnoid; and that even epileptics and the insane seldom present the appearances usually caused by arachnitis. They have probably confounded inflammation of the membranes and periphery of the brain with the usual manifestations of delirium; and thus imputed the changes observed in the former, to the latter. In the *third* form of this affection, or when it is attended by the lesions of muscular action noticed above, the appearances observed are more completely those usually found after inflammation. Indeed, delirium frequently occurs, but not uniformly, or even generally, in nearly all the inflammatory diseases of the brain or of its membranes, and occasionally in the advanced stages of the organic changes limited to parts of this organ. (See art. *BRAIN*.)

14. v. PROGNOSIS.—The great diversity of the results furnished by *post mortem* investigations will show the difficulty of appreciating aright the conditions of the brain in delirium, and of coming to a correct conclusion as to its issue. When it is sympathetic of disease of remote organs, the worst opinion should be formed of the result. Delirium occurring in the advanced stages of diseases of the lungs, stomach, or bowels, is a most dangerous symptom; and when it supervenes in slow and consumptive maladies, it rarely remits, and death is not far distant. It seldom appears as a sympathetic affection, until the powers of life are greatly depressed, and the pulse is very much increased in frequency and diminished in tone. Dr. GILBERT (*Krankheiten der Franzos. Arm.* p. 48.) observes, that delirium prevailed in the fevers which accompanied the French wars in Germany, in proportion to the frequency and weakness of the pulse,—a fact fully supporting the inference at which I had long ago arrived. On the other hand, when it appears in an intermittent or slight form, or from the operation of the less intense causes upon delicate and nervous constitutions, and without other grave symptoms, although evincing the se-

verity of affection, it is not, in itself, a dangerous occurrence. When it follows capital operations, or severe injuries of any kind, it very often indicates the developement of inflammatory action of the brain of a most dangerous or rapidly fatal form. Delirium is most frequent in females, in the nervous temperament, and in young persons above the age of eight or ten years; but it is, in such cases, a less unfavourable symptom. It is seldom observed previously to the fourth or fifth year,—convulsions usurping its place at an earlier age: but, when it occurs thus early in life, it is a sign of great febrile excitement, with either determination to, or acute inflammation of, the membranes or periphery of the brain. If it be continued, or alternate with coma; or if it be complicated, with extreme prostration of muscular power, or with convulsions, spastic contractions, paralysis; the existence of inflammation of the brain, to the extent of producing organic change and extreme danger, may be inferred. PERERUS, PISO, and many other writers, have contended that furious and sad or fretful delirium is more unfavourable than that which is tranquil or lively; and the observation seems to be nearly correct. The prognosis of sympathetic delirium should, however, not be founded so much upon its form, and the other symptoms referrible to the cerebro-spinal system, as upon the nature of the primary malady; for it is not the delirium which is in itself dangerous, but the disease upon which it supervenes; the circumstance of its occurrence evincing the very sinking condition of vital power. M. GEORGET truly states, that the sudden cessation of delirium and agitation, attended by want of recollection of the previous state, by great debility, irregularity of the action of the heart, and loss of temperature in the extremities, nose, and ears, is a most unfavourable omen; and often accompanies the termination, by gangrene, of inflammation of some important organ, always indicating approaching dissolution. When delirium accompanies fevers, particularly those with determination of blood to the encephalon, or inflammations of the brain or of its membranes, it often yields favourably to epistaxis, copious alvine discharges, and other critical evacuations. (See art. *CRISES*.)

15. vi. TREATMENT.—When the inexperienced practitioner, in his endeavours to obtain information as to the treatment of this affection, finds remedies of the most opposite kind very confidently recommended by writers,—venesection by one, bark and stimulants by another, emetics or purgatives by a third, and digitalis, antimonials, &c. by a fourth,—he is at a loss how to act; and arrives at the conclusion, that if one be right, the others must necessarily be wrong. The fact, however, is, that all of them are partly right, but also partly wrong. The circumstance of this affection having been hitherto viewed without reference to the very different states or grades of vital energy with which it is often associated, or to the condition of circulation in the brain, and its division into idiopathic and symptomatic,—either of these divisions presenting the different forms I have endeavoured to distinguish,—has led to, and perpetuated, the empirical manner in which it has been treated. It is necessary to ascertain not only the origin and morbid relations of this affection, but the

phenomena attendant upon it at the time of investigation; more especially the condition of the secretions and excretions, the temperature of the head, the state of the pulse in the carotids and temples, the appearance of the countenance, and the state of muscular power and motion. These will at once indicate to the observing practitioner the existing pathological condition causing the affection,—will enable him to assign it to one or other of the forms above distinguished, and thereby to prescribe for it appropriate remedies.

16. *A.* The first form of this affection (§ 10.) will be most benefited by quietude, gentle restoratives, and nourishment; by a moderately cool, pure, and frequently renewed air; by the tepid affusion on, or cooling applications to, the head, if their be any increase of its temperature; by warm pediluvia; by camphor conjoined with refrigerants and cardiacs, or with sedatives; and, if the vital depression be very great, the head cool, and the carotids pulsating weakly, by the preparations of quinine or bark, of assafoetida, valerian, musk, camphor in large doses, with those of ammonia, opium, &c., exhibited by the mouth, and in clysters: or by small quantities of mulled wine or negus. In the more purely nervous delirium, or when it occurs from operations, anxiety, fear, and injuries of parts at a distance from the head, opium, given by the mouth, or in enemata, as recommended by M. DUPUYTREN, will be most beneficial. If it be attended by much agitation, narcotics—as opium or hyoscyamus—in full doses, either alone, or with camphor, assafoetida, soda, or ammonia, &c.; the acetate or muriate of morphine, with aromatics and cardiacs; quietude, in a cool, well-ventilated, and darkened apartment; the tepid affusion on, or cold-sponging, the head, if its temperature be increased; and warmth to the lower extremities; are the chief remedies.

17. *B.* In the second form of this affection (§ 11.), if there exist signs of determination of blood to, or of congestion in, the head, bleeding by cupping, or leeches applied behind the ears and below the occiput, the affusion of a stream of cold water on the vertex, and purging, are amongst the most efficient means that can be employed. If the delirium be attended by stupor, or tendency to coma, or by *subsultus tendinum*, picking of the bed-cloths, &c., blisters to the nape of the neck, and the treatment advised in the article COMA, will be requisite. If the delirious stupor be not removed by the more usual remedies, and if it have arisen from erysipelas of the head, incisions of the scalp of the occiput, as recommended by COPLAND HUTCHISON, may be practised. When there is no very considerable heat of the head, or when the extremities are cool, and the morbid secretions have been purged off, full doses of camphor (F. 494. 496. 903. 906.) may be exhibited. If the pulse be very weak, and the prostration of strength very great, the preparations of quinine or of bark, or of ammonia, camphor, assafoetida, valerian, musk, &c., with aromatics and cardiacs, or even wine in the form of negus, should be resorted to. When, with the vital depression and increased vascular action characterising this form of delirium, there are appearances of a morbid state of the circulating fluid, we should endeavour to rouse the vital energies at the same time that we excite the secreting and depurating organs, by exhibiting

camphor with the chlorates (the oxymuriates) of the alkalies (see F. 439. 845. 847. 928.), and the resinous purgatives with bitter tonics and stimulants (F. 492. 504. 572.). In such cases, the treatment recommended in the articles BLOOD (§ 156, *et seq.*), and FEVER, will also be appropriate. As soon as stupor and a tendency to coma appear, in addition to the medicines now suggested, cathartic and stimulant enemata (F. 139. 149.), or an active purgative draught (F. 216.), should be exhibited, and repeated according to circumstances; and if these fail, blisters, sinapisms, rubefacient cataplasms or liniments, may be resorted to. The terebinthines have been employed by me since 1819, with great benefit, in this and some other forms of febrile delirium. The practice has lately been favourably noticed by Dr. GRAVES (*Med. and Surg. Journ.* vol. ii. p. 782.). If the head be cool, and the pulse, particularly in the carotids, be weak, small, and very frequent, either in this or the preceding form, all revulsants from the head, even the keeping it elevated, or warm pediluvia, will be injurious; and may convert, as Dr. E. GILCHRIST (*Edin. Med. Essays and Observ.* vol. iv. p. 358, *et seq.*) long ago remarked, a tranquil, into a most violent, delirium, which may soon terminate in fatal exhaustion. In both the first and second forms of this affection, the practitioner should not be induced to resort to lowering measures, merely because the muscular force is momentarily increased, and the patient is violent, restless, and agitated. If, with this state, the pulse is very frequent, small, weak, or irregular, and the head not very hot, a restorative and soothing treatment will be more beneficial. I have repeatedly observed, that this form of the affection, when supervening on protracted and exhausting disease, has been almost immediately subdued by small quantities of warm spiced negus; by camphor, with capsicum and opium or hyoscyamus; and by frequently sponging the head with cold or tepid water, when its temperature has been increased, or by the tepid affusion.

18. *C.* The third or inflammatory form of delirium should be treated in every respect as described when discussing inflammation of the brain or its membranes. (See art. BRAIN.) General and local bleedings, cold affusions and applications to the head, &c., are indispensable in it. If the delirium be complicated with stupor, or coma, convulsions, contractions or paralysis of muscles, &c., vascular depletions and active alvine evacuation should be followed by external derivatives of a permanent kind; by incisions of the scalp; by issues, open blisters, moxas, the use of the tartar emetic ointment, dry-cupping, &c.; whilst the secretions, &c. should be promoted by mercurial and other alteratives, and the bowels fully evacuated from time to time by a cathartic draught (F. 216.), and enema (F. 149). In every form of the affection, the patient should be irritated as little as possible by opposition, but indulged as much as is consistent with safety.

19. *D.* I shall conclude by noticing the treatment recommended by some authors.—(a) The topical application of cold has been advised by every writer on this affection, particularly since BARTHOLINUS so strenuously recommended it (*De Usu Nivis Medico*, cap. 25.). It may be

prescribed in the form of cold affusion, pounded ice, cold epithems, evaporating lotions on the head, or simple sponging. If, however, it be continued too long, or after the morbid heat has been subdued, and the features have shrunk, it will be injurious, by depressing the nervous energies too low, and favouring the supervention of coma, or violent agitations, terminating in fatal exhaustion. It is required chiefly in the *third* form of the disease; but in the *first* and *second* forms, when the temperature of the head is increased, it should be cautiously employed, or the tepid affusion substituted for it. In these, however, I have preferred that the scalp should be sponged with a tepid and very weak solution of the nitro-muriatic acid. — (b) *Camphor* has been nearly as universally prescribed. BÜCHNER (*De Præstantia Camphoræ in Deliriis*. Halæ, 1763.), and TODE (in *Soc. Med. Hann. Coll. ii. No. 34.*) especially recommended it, — the latter with mineral acids. It is a most excellent remedy when judiciously exhibited. If given at all in the *third* form of the affection, it should be in small doses, with nitre and antimony, or with digitalis. In the *first* form, it may be prescribed in larger quantity; and in the *second*, especially if there be stupor or coma, or a morbid state of the blood, in still larger doses, with tonics, antiseptics, aromatics, and cordials. — (c) *Opium* or *hyoscyamus* is noticed by PERCIVAL (*Lond. Med. and Phys. Journ.* vol. i. p. 443.), GOUBIER (*Journ. de Méd.* t. lxxxv. p. 244.), DUPUYTREN, and KORTUM (*Beiträge zur Pract. Arzneiwiss.* No. 9.). In some states of the *first* and *second* forms of the affection, when it is purely nervous, or is attended by much agitation, watchfulness, &c., either of these medicines may be employed. In the more doubtful cases, either of them may be safely exhibited with camphor and James's powder. In the *third* form, particularly when it assumes a *maniacal* or violent character, and after depletions have been carried as far as may be thought prudent, and the bowels have been freely evacuated, I have repeatedly seen a full dose of opium or hyoscyamus, given either alone, or with antimony, or James's powder, and camphor, produce the happiest effect. Any unpleasant symptom that may result either from too large doses of these narcotics, or from their inappropriate use, will readily be removed by the cold or tepid affusion on the head. The acetate or muriate of morphine, taken in a full dose of the spirits of pimenta, or in any other aromatic spirit, has proved equally beneficial with opium, in my practice. The *external* employment of opium has been found very successful in delirium, by V. CHIRURGI (*Sull' Uso Esterno dell' Opio*, 8vo. Flor. 1797.), WARD (*Lond. Med. and Phys. Journ.* vol. i. p. 441.) and PERCIVAL (*Ibid.* p. 444.) who have used it in the form of liniment (3j. triturated with 3j. of adip. præp.), either with or without camphor. — (d) *Purgatives* have been justly praised by all writers on this affection. The ancients prescribed them in very large doses, and preferred the hellebores, which, with calomel and those I have already particularised, should be actively exhibited, according to the strength of the patient. When the debility is great, they must be associated with a tonic and stimulant treatment. — (e) *Emetics* have been mentioned by several writers; and when delirium proceeds from

the ingestion of narcotic, indigestible, irritating, or poisonous substances, or is connected with the accumulation of saburra in the upper portions of the digestive tube, they are then requisite. — (f) *Antispasmodics* and *cordials*, particularly valerian (WARBURG, *Med. Beobacht.* No. 16.) assafoetida (WANTERS, *Journ. de Méd.* t. lvi. p. 115.), musk (KORTUM, *loc. cit.*), warm negus, and similar medicines, have been recommended; and are often of service, when the powers of life are much depressed. — (g) *Blisters* have been applied to the head much too indiscriminately: I have seen them prove most injurious in this situation. Dr. E. GILCHRIST, one of the best writers of his time, directs them both to the head and to the insides of the legs. I believe that they will prove beneficial in the former situation, only when the powers of life are sinking fast, and the delirium is attended by stupor, a cool head, and sunk or collapsed features, as in cases of low or adynamic fevers. When this affection is consequent upon febrile determination of blood to the head, blisters on the insides of the legs, &c. may be useful derivatives; but they often occasion so much pain and irritation in this situation, as to thereby counteract, particularly in the turbulent state of delirium, any good they might otherwise produce. — (h) Of the *sedatives* or *contra-stimulants* prescribed by writers, the preparations of antimony, particularly James's powder—digitalis, and the nitrate of potash, are the most deserving of notice. Wherever the delirium is connected with increased vascular action in, or determination to, the head, these medicines are of more or less service when judiciously combined with other appropriate remedies. WITHERING (*On Digitalis*, p. 33.) and PATTERSON (*Med. and Phys. Journ.* vol. v. p. 442.) strenuously advise the preparations of digitalis; but they, as well as those of antimony, require much caution, if ventured upon in the delirium attendant on low or malignant fevers. It is chiefly in the *maniacal* or *third* form of this affection that they are most beneficial, and in it they should be exhibited in a decided manner; but in the *first* and *second*, particularly in the delirium of typhus, they are generally injurious. — (i) The *actual cautery* on the nape of the neck, and *moxas*, have been advised by M. VALENTIN (*Med. and Phys. Journ.* vol. xix. p. 432.), and several other Continental writers. — (k) Dr. GRANT (*On Fevers*, 8vo. 1771.) recommends the patient to be allowed to dress and sit up when he feels anxious to do so; but this, and several judicious observations of this writer, are more fully adverted to in the article on FEVER. The observations made on convalescence from *Inflammations of the BRAIN*, and from FEVER, are perfectly applicable to the management of convalescence from delirium. (See these articles.)

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DELIRIUM WITH TREMOR. — SYN. *Delirium Tremens*, Sutton. *Brain Fever*, Pearson. *Brain Fever of Drunkards*, Armstrong. *Mania à Temulentia*, Klapp. *Mania à Potu*, Snowden and Carter. *Delirium Ebriositatis*, Blake. *Idiopathic Delirium*; *Delirium Tremefaciens*, Author. *La Folie des Ivrognes*, *Dé-lire Tremblant*, Fr.

CLASSIF. — 4. Class, Nervous Diseases;

1. Order, Affecting the Intellect (*Good*).

I. CLASS, IV. ORDER (*Author*).

1. DEFIN. — *Delirious illusions, with constant tremor of the hands and limbs, watchfulness, and great frequency of pulse.*

2. This form of delirium is variously modified, according to the causes in which it originates, and the habits and constitution of the patient. Although it is here divided into two species; the one being evidently connected with inflammatory irritation of the arachnoid, or with excited vascular action in the membranes of the brain, and associated with great irritability — the other consisting chiefly of this last state, attended by exhausted nervous energy; yet it often presents intermediate forms or modifications, which cannot be referred to the one species more than to the other. Nevertheless a distinction should be made, inasmuch as the predominance of the characters of either species will indicate the propriety of employing more or less of that treatment which is appropriate to it; for, owing to the want of such a distinction, the delirium which arises chiefly from intoxicating liquors has been too generally treated after one fashion, and in too empirical a manner, merely because it has presented one or two characteristic symptoms, — its numerous other phenomena being entirely overlooked. Thus, when the disease arises, as it commonly does, from the abuse of intoxicating liquors, it may assume more or less of the features of either species, according as it is directly or indirectly produced by this cause; but if it be viewed as a consequence of inflammatory action only, or as proceeding from nervous exhaustion exclusively, the conclusion, will in either case be only partially correct, and the practice founded upon it frequently injurious.

3. I. DELIRIUM WITH TREMOR AND EXCITED VASCULAR ACTION IN THE MEMBRANES OF THE BRAIN (*Encephalitis Tremefaciens* of J. FRANK).

4. DEFIN. — *With great terror and irritability of temper, and violence upon being opposed; a frequent, full, or hard pulse; countenance often wild or flushed, and the head hot.*

5. This species of delirium forms the connecting link between that which is purely nervous, and that depending upon inflammatory action of the membranes and periphery of the encephalon. That it may run into, or form a slight grade, or modification, of inflammation of these parts, in some cases, I will not dispute; but that it always is strictly inflammatory, is opposed by the fact that it will often subside spontaneously, in a

short time after its cause has ceased to act. The "*Delirium Ebriosum*" of DARWIN and some other writers, or the delirious affection which is immediately consequent upon intoxication, is an example of this; it sometimes subsiding in a few hours, or in a day or two, when not injudiciously interfered with; but this is only an occasional occurrence, and cannot be trusted to. This state of delirium, when directly produced, as it commonly is, by intoxication, is not always characterised by tremors at the commencement; but, when thus accompanied, it is often mistaken for the true form of delirium tremens, into which, however, it not infrequently passes, chiefly owing to the cause in which it had originated. It is generally attended by extreme irritability, often by great violence, and sometimes by general spasms and constant vomiting. The head is usually hot, and the face flushed. This species of idiopathic, or primary delirium, is caused, not only by the use of intoxicating liquors, opium, &c., but also by the excitement of the cerebral organs by intense or prolonged study, particularly when prosecuted under the influence of depressing causes. Dr. J. JOHNSON states, that he has seen delirium tremens in young ladies, whose mental powers had been exhausted by this cause; and most probably it was this species of disease that he had observed, as the treatment which he found successful in it is essentially the same as that which is most beneficial in this affection. Delirium with tremors is also, in some rare instances, chiefly occasioned by excessive venereal indulgences, or masturbation; most probably, however, assisted by various concurrent causes.

6. II. DELIRIUM WITH TREMOR FROM EXHAUSTED NERVOUS POWER (the *True Delirium Tremens* of modern writers, and *D. Traumaticum*, or *D. Nervosum*, DUPUYTREN).

7. DEFIN. — *With a morbid recurrence of the patient's ideas to his avocations; a frequent, weak, or small pulse; cool, humid, or perspiring surface; and loaded, but moist tongue.*

8. This disease was very generally confounded with phrenitis, until Dr. SUTTON directed attention to it as a specific affection, requiring a peculiar treatment. As Dr. RYAN has remarked, it most probably constituted a large proportion of the cases named "*Demonomania*" by the writers of the 16th and 17th centuries. It had not, however, altogether escaped attention, previously to the notice taken of it by Dr. SUTTON. Dr. PEARSON, of Newcastle, had written, for private circulation, a small tract respecting it; and cases illustrative of its nature and appropriate treatment had been shortly before published by Dr. M'WHIRTER (*Med. and Phys. Journ.* vol. xviii. p. 153.): Dr. SAUNDERS had also mentioned it in his lectures, delivered at GUY'S Hospital, about the close of the last century; and that manifestation of it observed after external injuries is stated by Dr. BLAKE to have been noticed in Dr. COLLES'S Lectures on Surgery, with an accurate reference to its chief, although apparently the predisposing cause, and to the means of cure which repeated observation has shown to be most successful.

9. i. CAUSES, &c. — Whilst the former state of delirium is often *directly* occasioned by drunkenness, this is as frequently *indirectly* produced by the same cause; the one being immediately

consequent upon or accompanying intoxication, the other commonly resulting from the abstraction of the accustomed stimulus, after an habitual or continued indulgence in it, or after a protracted fit of ebriety. A slight form of it, or merely tremors of the hands or limbs, with deficient nervous power, and occasional illusions, will sometimes appear after habitual tipping, without intoxication having once been produced. The use of intoxicating liquors, and the neglect of sufficient food; a protracted debauch, followed by sudden privation, or by depressing causes; large or repeated depletions employed to remove the headach or stupor of drunkards, or the first species of this delirium; the treatment indicated by the diseases with which such persons may be affected; the debility caused by the diarrhoea or cholera sometimes consequent on intemperance; the shock arising out of severe injuries, particularly fractures; exposure to cold, a course of mercury, and the puerperal state;* are principally concerned in the production of this affection. That the delirium which has been called "*D. Traumaticum*" by British writers, and "*D. Nervosum*" by DUFUYTREN, is in every respect the same as that now being considered, is proved by the fact of its appearance chiefly in persons of intemperate habits, by identity of phenomena, and by the effects of various modes of treatment upon both being alike.

10. Although the chief cause of delirium tremens is evidently the abuse of intoxicating, especially spirituous, liquors, yet this is not the only cause. It may also be occasioned by the drugged beverages prepared in Eastern countries, particularly in the East Indies, when too freely indulged in; and by the excessive use of opium. But it is chiefly when sobriety has followed a protracted debauch; and when, during the first days of the abstraction of the accustomed stimulus, the additional causes mentioned above, come in aid of the efficient cause, — when the habits and indulgences of the patient have produced that state of the nervous system which readily passes into serious disease upon its being influenced by depressing agents; that true delirium tremens takes place. Inattention to this fact, by nearly all the writers on the disease, excepting Dr. BLAKE, has led to serious misapprehensions. Practitioners have too generally concluded that the delirium of drunkards is always of the same kind; and have overlooked differences very generally subsisting between that immediately produced by intoxication — the *first* species of this affection; and that indirectly occasioned by it — the *second* species, or true delirium tremens. An occasional, or even a single indulgence in intoxicating liquors to excess will sometimes give rise to the former; a repeated, habitual, or protracted indulgence is requisite to the appearance of the latter. The frequency of this affection, particularly in the lower classes, justifies the attention recently paid to it; and I believe that it is more common now than formerly, owing to the cheapness, and facilities of procuring spirituous liquors. Between 1820 and 1832, I treated 19 cases, about two-thirds of which were in consultation with Mr. HOULTON, Mr. BARNWELL,

Mr. WINSTONE, and Mr. PAINTER; the others in dispensary and private practice. In some manufacturing and trading towns, it is of frequent occurrence. In the United States of America, it is, however, much more common than in this country. Dr. S. JACKSON states, that he has treated upwards of 200 cases; Dr. CARTER, of Philadelphia, mentions nearly the same number; Dr. WARE says, that he has seen more than 100; and Dr. WRIGHT, that he has received, in the institution at Baltimore, from 60 to 70 cases annually. But it is evident, from the details they have furnished, in the works referred to at the end of this article, that they have included under the same head delirious affections immediately consequent upon intoxication; and that, owing to this circumstance, has arisen much of the contrariety of opinion respecting the nature and treatment of the disease, which is as remarkable amongst physicians on the other, as on this, side of the Atlantic.

11. ii. SYMPTOMS. — The phenomena of delirium tremens vary remarkably, from the slightest forms of nervous tremor with spectral illusions, and accelerated pulse, to the most alarming state of vital depression, muscular agitation, and mental alienation, about to be noticed. Dr. BLAKE has marked out three stages into which the disease may with propriety be divided. It should, however, be recollected, that they are not always obvious or clearly defined; that they exist only in those cases which supervene on the abstraction of the intoxicating stimulus; that the first stage is wanting in those that more immediately follow intoxication, and consequently in most, if not all, the *first* species here described; and that, in the species now being considered, it is but seldom brought under the cognizance of the physician, — medical aid being seldom required until the second period is developed. As the treatment may be more precisely stated when the disease admits of a division into stages, I shall adopt that suggested by Dr. BLAKE, and which differs but little from that which has been followed by Dr. LYON, Dr. RYAN, and Dr. BARKHAUSEN.

12. The *first* stage of true delirium tremens frequently appears from two to eight or nine days after a protracted debauch, or a prolonged fit of intoxication; and is commonly attended by slight febrile action, and gastric derangement, often aggravated by some accidental cause, external injury, or contingent ailment (§ 9.), generally the immediate effect of excesses; but the length of time which elapses between the abstraction of the accustomed stimulus, and the commencement of the symptoms, is often uncertain. The first indications of the disease are, according to Dr. BLAKE, a peculiar slowness of the pulse, coldness and clamminess of the hands and feet, general debility, and diminution of the animal temperature. In addition to these, nausea and occasional vomiting, particularly in the morning; much diminution of appetite, and aversion from animal food; excessive perspiration from trivial exertion; frightful dreams; vertigo, and sometimes cramps of the extremities, are complained of. The bowels are often constipated, but sometimes open, or even relaxed, and the tongue is tremulous, furred, and moist. In most cases, the peculiar tremor of the hands is

* I have only seen two cases in females, and these were habitual drunkards; the disease appearing a few days after delivery.

present in this stage ; but in a few it is not remarked until the next. The spirits are much depressed ; the patient sighs frequently ; his countenance is anxious and dejected ; he complains of oppression of the præcordia ; is anxious about his affairs ; and is either restless and watchful, or has short and broken slumbers. This state seldom continues longer than a few days. It is generally of longer duration in the old or worn-out drunkard, than in the younger and more robust, in whom it may be followed by increased vascular action in one or two days.

13. The *second stage* commences with restlessness, a peculiar wildness of the countenance, and a hurried anxious manner ; marked susceptibility of the nervous system, and irritability of the muscular system ; great excitability of temper, acceleration and smallness of the pulse, and various mental illusions and alienations. The heat of the surface of the trunk increases, but the hands and feet retain the same coldness and clamminess already noticed. The mental delusion becomes more constant as this stage is developed, and is generally of a low or melancholic kind, with continued reference to the patient's ruling passions and occupations, and anxiety respecting them. He sees objects where their presence is physically impossible ; is continually haunted by frightful creatures, or occupied with most extravagant ideas, and is constantly endeavoring to avoid them. He now becomes altogether deprived of sleep ; the restlessness and quickness of manner increase ; the countenance is more anxious ; the tongue is more deeply furred ; the tremor of the hands and tongue continue, without remission ; the bowels are either constipated, or, if relaxed, the evacuations are very dark and offensive ; the urine is scanty ; the pulse is soft, or small, and ranges between 100 and 120 ; the pupils are contracted, but the eyes are not intolerant of light ; and the patient is talkative, constantly occupied with the objects of his delusions ; he cannot be kept in one place ; and, when opposed, is violent and noisy. This stage usually continues from one to three or four days ; when it terminates, either in a general mitigation of symptoms, or in more profound collapse of the vital powers, thereby constituting the third stage.

14. The *third period*, in the slighter or more favourable cases, is ushered in with mitigation of the foregoing symptoms ; yawning, drowsiness, and profound sleep, which generally terminate the disease ; but in the more dangerous cases, the preceding phenomena become more severe, and accompanied by more complete depression of vital power, and increased irritability of mind. The patient makes violent and excessive struggles, which are attended by very copious perspiration. As the malady advances, and the energies sink, the coldness and clamminess of the hands and feet, which had been extending upwards during the second stage, spread over the whole surface ; and the pulse becomes still more frequent, small, weak, or thready, and sometimes can hardly be counted : the tremor increases in the hands, and often invades the whole frame ; and is rather a constant trembling, more nearly resembling that occasioned by severe cold, than the subsultus tendinum of typhus, or the nervous

rigors of some other affections. The perspiration becomes more and more cold, and exhales a peculiar smell, which is, as Dr. HODGKINS has remarked, between a vinous and alliaceous odour. The countenance is commonly pale and anxious ; the pupils very contracted ; the tongue loaded, furred, and often brownish at the centre and root, and occasionally red at the point and edges ; the patient talks incessantly, and with great rapidity ; the delirium increases in violence ; and the mind is excessively irritable, and continues so until shortly before death, when a calm takes place. In some cases, instead of this calm occurring, the patient is carried off in a convulsion.

15. *Modifications, &c.*—Such is the more common form of true delirium tremens ; but whilst it sometimes occurs in slighter grades, in which the symptoms differ but little from simple nervous tremor, excepting that they are associated with mental illusions, great restlessness, and talkativeness, it also presents more severe forms, in which the phenomena approach those characterising the former species, or the delirium ebriosum, in which the vascular excitement generally, and that of the brain in particular, is greater, and relatively of a more sthenic kind. At the commencement and *second stage* of this state of the disease, the pulse is tenser and harder or fuller, the skin drier on the trunk, the delirium more violent, and comprehension less quick, than in the other cases. The eyes, also, are injected ; the temperature of the head is somewhat increased ; and the tongue is often dry or cracked, and red at its edges. In the *last stage*, the skin is bedewed with a cold clammy perspiration ; the pupils are contracted ; the pulse very small and frequent, often scarcely perceptible ; the stomach is irritable, and the delirium becomes low and muttering. The tremors are constant, but the watchfulness is sometimes interrupted by short restless slumbers, which afford no relief ; or it ends, in some cases, in a condition approaching to coma, passing at last into fatal convulsions. Thus some cases of the *second form* of the disease very nearly approach the *first*, and differ from it chiefly in being caused indirectly, instead of directly, by intoxication. The second species is, however, sometimes consequent upon the first, particularly when treated by too copious depletions ; the vascular excitement of the one passing insensibly, but often rapidly, into the profound collapse marking the latter stages of the other ; and this may even occur, although the delirium at the commencement was not attended by tremors. It should also be recollected, that the three stages into which true delirium tremens has been divided, are not always separated by any obvious limits, or even so distinctly defined as generally observed and stated above ; the phenomena often supervening in so gradual and continuous a manner, as to render it difficult to determine the end or commencement of each, without much attention to all the symptoms and to the history of the case.

16. *iii. DIAGNOSIS.*—This disease, which is so difficult to describe, when once seen, can never be forgotten. It may, however, be mistaken for the first species, for phrenitis or inflammation of the membranes and periphery of the brain, for the delirium of fever, and for confirmed mania or insanity.—(a) It is to be distinguished from the

first species (the *encephalitis tremefaciens*) of this kind of delirium, by its coming on a short time after a protracted intoxication, instead of immediately upon it; by its being caused *indirectly*, instead of *directly*, by the abuse of intoxicating liquors; and by the pulse being stronger and fuller, the head hotter, the face more flushed, the surface of the trunk warmer, the delirium more violent, and the patient more irritable, the tongue drier and redder, and the vascular excitement comparatively greater and more sthenic, in the first species, (§ 3.), than in the second; although occasionally a few cases of the latter approach these characters of the former. — (b) The same differences, but in greater degree, exist between delirium tremens and *phrenitis*, in which are wanting the cold, copious, clammy and peculiar perspiration, the soft pulse, and the moist tremulous tongue and hands. The impatience of light, and fulness of the vessels of the eyes, which accompany the latter, are not present in the former. The illusions, also, of delirium tremens are peculiar, and are accompanied with an anxious, fearful, and constant reference to concerns which had previously interested the patient in a particular manner. He can recognise his friends, and return a rational answer to some questions; and he is more tractable and manageable, when not irritated or opposed, than in *phrenitis*. — (c) This affection may be readily distinguished from the *delirium of fever or typhus*, by the history of the case — it being the primary and the most prominent ailment; delirium generally supervening late in fever. In this disease, the patient is quick in his movements; is agitated and talkative; is desirous to be up; walks about, when permitted, in a hurried manner; is anxious to follow his occupation, or to avoid, or to find out or to chase away, some spectral illusion that haunts him; and is violent when opposed: in the delirium of fever, the patient is prostrate, his countenance less wild, his delirium is lower and quieter, and seldom attended by attempts to get out of bed, &c. (See DELIRIUM, § 3. 7. 10.) In the former, there is a marked tremor of the hands, &c. from the beginning, and the patient in the last stage seems to search after objects which he thinks he sees creeping over his bed, or floating before him; in the latter, the peculiar tremors are wanting; but there are subsultus tendinum, and picking at the bedclothes, or floccitation. — (d) From *maniacal insanity* it is to be distinguished chiefly, as stated above (b), by the great frequency and softness of pulse; by the copious, cold, and peculiar perspiration; the tremulousness; by the history of the case, — this being an acute, the other a chronic malady. When, however, it occurs in the puerperal state, in which I have seen it, the difficulty of distinguishing it from the mania sometimes supervening at that period may be considerable: the tremors, the greater frequency of pulse, and more copious and colder perspirations, will point out the nature of the affection, and will lead the physician to treat it according as the symptoms indicate a greater or less predominance of nervous exhaustion over vascular excitement.

17. iv. PROGNOSIS. — A first attack, in a constitution not yet much injured by the cause of the disease, generally terminates favourably. I have seen even a third attack end so; but its

more frequent recurrence, particularly if it be attended by signs of vascular irritation or erethism of the encephalon (§ 5. 15.), or by dryness of the tongue, and its complication with some other disease, are circumstances indicating great danger. A want of correspondence in the pupils, and the supervention of subsultus tendinum or convulsions, or of low and muttering delirium, the pulse becoming quicker and smaller, are generally fatal signs. It is also more dangerous when caused by opium, than when proceeding from intoxication. On the other hand, a general mitigation of the symptoms, less frequency of pulse, with quiet or sound sleep, are indications of a favourable termination being at hand. In all cases, however, a cautious prognosis should be given, particularly in broken down constitutions; for success may elude our best efforts, even when most anticipated; and recovery may take place in the most apparently desperate circumstances.

18. v. PATHOLOGY. — A. The appearances on dissection have furnished only negative information as to the nature of the disease. In the true delirium tremens, the membranes of the brain evince but little change; the chief lesion consisting of slight opacity of the arachnoid, especially at the base of the brain and vicinity. The pia mater is somewhat injected, and a slight effusion of serum is occasionally observed in the ventricles. These appearances are, however, not constant; but they are more marked, and more manifestly inflammatory, in those cases which have accompanied or directly followed intoxication (§ 3.). In these, the vessels are often much congested, particularly those of the velum interpositum, the arachnoid thickened, and the serum more abundant, and occasionally even sanguineous. The stomach generally presents appearances of chronic gastritis, the villous membrane being either thickened or softened, or both, and the villi effaced. The liver is variously diseased, — often enlarged, granulated, of a yellow or fawn colour, or presenting the fatty degeneration. The lesions, however, of the stomach and liver, are coincidences only, or changes contingent on the habits of the patient, and not necessarily connected with the pathology of this disease.

19. B. The nature of this disease has been a subject of much discussion with modern writers, in consequence of no clear distinction having been made between that form of delirium with tremor, which is the result of vital, and particularly nervous, exhaustion; and that which depends chiefly upon excited circulation, vascular erethism, or inflammatory action, within the head. Although numerous instances will present themselves in which the former as well as the latter pathological state exists, the one, however, predominating over the other; yet the fact of either being present, almost solely, if not altogether so, perhaps, in a still greater number of cases, should not be overlooked, as it has been fully demonstrated, both by the post mortem appearances, and by the juvenia and lœdantia during life. It is most probably in consequence of having noted the changes observed principally in the first species, or in such instances of the second as approach it the nearest, that Dr. CLUTTERBUCK and Dr. BRIGHT have viewed this latter as the consequence of inflammatory action in the arachnoid and pia mater.

I believe, however, that inflammatory irritation, although sometimes an attendant on this affection, is not necessarily connected with it, and certainly is not the pathological state which produces it; and that, when present, it is not the only condition which is requisite to the development of its pathognomonic characters; exhaustion or depression of both the nervous and sensorial powers being equally necessary to its supervention. It is probable, also, that the vital and nervous depression is increased by the morbid impression produced by accumulated secretions of a vitiated kind in the biliary system, and on the digestive mucous surface. This conclusion is deduced from a careful comparison instituted between the symptoms, the agents controlling them, and the morbid appearances observed upon dissection. From this it may be inferred that the pathological states in true delirium tremens, and in the delirium of typhus, are not widely different. It is probable that the state of the blood, the presence of congestion, and the greater affection of the substance of the brain, and of the organic functions, in the latter than in the former, may occasion all the differences of symptoms which exist between them; the vital exhaustion being nearly the same in both, or perhaps greater in typhus, and the nervous disturbance being more prominent in delirium tremens.

20. VI. TREATMENT. — Very opposite means of cure have been resorted to in delirium with tremor, owing to the circumstances above stated (§ 2.), and to the evidences of general as well as of local vascular excitement in some cases, or of nervous and sensorial exhaustion in others, or even of their co-existence with more or less predominance of either pathological condition. When it is considered that the inability to distinguish between such manifestations of the disease as depend in a great measure upon vascular excitement within the head, and those which result almost or altogether exclusively from exhausted nervous and sensorial power, must, in some cases, lead to an unsuccessful if not an injurious treatment, the necessity of investigating these points, of enquiring into the history of each case, and of arriving thereby at a correct diagnosis — which can be reached only by a strict reference to the existing pathological condition causing the morbid phenomena — before entering upon the treatment, will be evident. Having pointed out the means most beneficial in each of the species of this delirium above distinguished, the practitioner may apply them accordingly, and adopt more or less of either method, in order to meet the predominating characters which intermediate or more anomalous cases may present.

21. A. *Of the first species, or that with increased vascular excitement.* — This form of the disease requires moderate depletion, preferably by cupping, or leeches applied behind the ears, and below the occiput; cold washes or lotions, or the tepid or cold affusion, to the head, whenever its temperature rises above the natural standard; the tepid bath, or the surface of the body to be sponged with tepid water; purgatives combined with cordials, &c., if the nervous power be much depressed, or if the attack be occasioned by intoxication, particularly calomel with camphor or ammonia, or with both; aperient and antispasmodic enemata (F. 134. 149.); and the liquor

ammoniae acetatis with excess of ammonia, and camphor julap. Purgatives are well borne: they may be given energetically, and be often repeated, in this state of the disease; but they should always be associated with stimulants and restoratives, and their action promoted by enemata containing assafoetida, the terebinthines, &c. When the affection is caused by spirituous liquors, we should be extremely cautious not to carry the depletion, although local, too far; and upon the first indication of the subsidence of vascular excitement about the head, we should endeavour to anticipate, and prevent the consequent depression which will otherwise ensue, by exhibiting, in addition to the ammonia-camphorated medicine now recommended, moderate doses of opium, or of laudanum, with the view of quieting the perturbation of the frame, and inducing sleep.

22. In the cases of this form of the disease, in which the vascular excitement either is not so great as to require bleeding, or has been somewhat reduced by this practice, emetics may be immediately exhibited. Dr. KLAPP, and other American writers, prescribe tartar emetic in frequent doses, in those cases which are referrible to the present species of affection, until it either has an emetic action, or nauseates and purges the patient; and Dr. BLAKE confirms the result of my experience, as now stated, in recommending emetics of sulphate of zinc, assisted by the administration of antispasmodics and stimulants, such as ather, camphor mixture, coffee, &c., with the application of cold to the head, while the surface of the body and extremities are sponged with tepid water; and, in some cases, bleeding, without being pushed so far as to increase debility. This treatment is, however, most appropriate when the affection is the direct result of intoxication; but when it arises from other causes (§ 5.), vascular depletions, purgatives, cold applications to the head, and a more sparing use of stimulants, are most appropriate.

23. B. *Treatment of the second species, or true delirium tremens.* — a. *During the first stage* we should endeavour to cut short the disease, by exhibiting, every hour, very small doses of laudanum in effervescing draughts, with the carbonate of ammonia, in camphor mixture; or the opium with full doses of camphor and ammonia; and by administering clysters, with assafoetida, camphor, and tinct. opii. Dr. CARTER, of Philadelphia, advises the *mistura assafoetidae* with *tinctura opii* to be taken every hour or two. Dr. BLAKE recommends the accustomed stimulus in moderate quantity, and at short intervals; but it may occasion a too violent reaction, unless the head be guarded by having frequent recourse to the tepid or cold affusion on it. In some cases, however, warm spiced negus or punch may be allowed, especially in exhausted and old drunkards. This is the only period in which blisters should be employed — if employed at all. The nape of the neck, or the epigastrium, is the preferable place on which to apply them. Anodyne and stimulating liniments (F. 297. 308.) rubbed over the epigastrium are, however, more efficacious. In some cases, a warm bath will precede the use of liniments with marked benefit.

24. Of all the cases of the disease I have seen, there has not been one that has not indicated the

propriety of prescribing cathartics, in order to remove accumulated secretions. From the quantity of very dark, offensive, bilious evacuations which they have procured,—often not until after their repeated exhibition, and even in cases where the bowels had been open or relaxed,—I have concluded that collections of vitiated bile in the gall-bladder and hepatic ducts have favoured the supervention of this peculiar affection. Under this conviction, I have always exhibited, as early as circumstances would permit, an active chologogue purgative, generally a bolus consisting of about ten grains of calomel, with as much camphor, and a grain of opium, in conserve of roses; and, in a few hours afterwards, a warm stomachic and aperient draught, followed in an hour or two by an enema (F. 135.). The advantages arising from conjoining camphor, or large doses of ammonia, or capsicum, or other stimulants, with purgatives in this disease, are manifest; for, by these or similar means, we shall succeed either in arresting its progress, or in preventing the depression which might follow copious evacuations—fears of which have paralysed the treatment of it. In all cases, but especially in diseases accompanied by low or melancholic delirium, accumulations of vitiated bile or other secretions should be suspected, and be removed: nor should we infer, from having at first failed in procuring their discharge, that no such disorder exists; for the most active, and even the most judiciously selected, cathartics may long fail in evacuating the thickened and morbid contents of the gall-bladder and hepatic ducts, particularly when their excitability has become exhausted by spirituous potations.

25. *b.* In the *second stage*—if it supervene notwithstanding the above means, or if the patient be not seen until it has appeared—the treatment should be commenced by the exhibition of the calomel, camphor, &c., as prescribed above (§ 24.), if they have not been already exhibited, or if they have not procured copious, dark, and offensive stools; and evacuations ought to be promoted by warm and stimulating aperient draughts, and by purgative enemata containing assafœtida, camphor, &c., or consisting of F. 130. 149. The greater number of the cases I have seen had been treated by able practitioners, according to the plan advised by the best writers, but without success—although purgatives had been given where the bowels had not been sufficiently open. In all these, this treatment was immediately put in practice, and assisted by cordial draughts containing some one of the ammoniated spirits, and æthers, &c., and by the enemata already alluded to. As soon as alvine evacuations were procured by these means, *opium*, either alone, or with ammonia or camphor, or with both, was prescribed in full doses, and repeated according to its effects; and although they were all severe cases, one only terminated fatally.

26. At this period of the disease, the *warm bath*, at a temperature of about 90°, will assist materially in tranquillising the patient, and promoting the effects of opium. Dr. WRIGHT, of Baltimore, strongly recommends it; but it is not a new practice in delirium tremens, as he supposes; and he is favorable to the use of Dover's powder, which, however, is more suitable to the

preceding species. Although opium should be given in full or decided doses, combined as stated above,—(in from one to three or four grains—the smaller quantity being repeated twice or thrice, the larger not oftener than once, and after a longer interval, it should not be persisted in, unless sufficient time be allowed to elapse after each dose; for, as Dr. PEARSON has observed, if it does not succeed after its exhibition at first in a decided manner, it increases the intellectual confusion and danger. Some of the American physicians have recommended enormous doses of this medicine. Dr. S. BROWN gives from 5j. to 3ss., or even more, of laudanum for a dose. Dr. S. JACKSON prescribes from ten to fifteen or even twenty grains of solid opium every two hours; and states, that four ounces of good laudanum having been given in twelve hours, partly by mistake, a sound sleep of twenty-four hours' duration, and perfect recovery, were the result. I only am surprised that the sleep was not that of death. These are not solitary instances of the extravagance, if not rashness, of some American practitioners; nor, indeed, has the practice of giving excessive doses of laudanum in this affection been limited to them. When we find thirty or forty leeches ordered to be applied to the throat of a child five or six years old in croup, and repeated oftener even than once, and the bleeding promoted, should we wonder that death ensues? Feats of hardihood in medicine are too often the consequence of clinical and practical ignorance; and they may be allowed to meet their own reward, as long as they are not obtruded into the annals of our science, and thereby set forth to the inexperienced as examples to be followed. But when this distinction is conferred on them, it becomes the duty of those who record the progress of medicine, to note also, and to oppose, its backslidings by the severest reprehensions.

27. I believe that large and frequently repeated doses of opium in this disease, as Dr. WRIGHT, of Baltimore, has remarked, favour the supervention of coma, convulsions, or paralysis; and that the effects of an excessive quantity of this drug very nearly resemble the phenomena of the last stage of the disease, particularly towards its fatal close. This fact should not be overlooked, and should lead us to distinguish between the consequences of an injudicious treatment, and the worst features of the malady. It is the abuse of opium that is here argued against; its truly medicinal exhibition that is contended for,—in a quantity which sound sense will dictate, and after accumulated and morbid secretions and excretions have been removed, the discharge of which might be impeded or interfered with by the immediate employment of this valuable remedy. I consider opium as necessary to the cure of this disease, as bark and analogous medicines are to the cure of ague; but, as in their case, the morbid colluvies, which has at least disposed the system to be affected, and aggravated the malady, should be removed, in order that recovery may be ensured and be permanent.

28. In this stage of the disease, particularly when the delirium is attended by much agitation or violence, it is necessary to obtain an influence over the patient's mind by moral means. All irritating contentions, however, should be avoided;

and the patient's wishes, when not likely to prove injurious to him, be indulged. By thus granting what is less material, he will more readily submit to what is important; but he ought not to be left a moment without an attendant. Coercive measures will generally be found unnecessary, if soothing and indulgent but firm treatment be adopted, and the warm bath be occasionally resorted to. In a majority of instances, the above means will be followed by a remission of the symptoms, and a disposition to sleep will manifest itself,—sometimes, however, accompanied by nervous rigors. Opium should now be left off, or its dose much diminished; and the patient kept as quiet as possible. His first slumbers are often short, broken or interrupted by startings, or terminated by fright. If he awakes alarmed, his distress should be soothed, and a moderate dose of opium with warm spiced negus, or punch may be given him; these will generally secure a sound sleep, from which he will awaken in a rational state of mind. Afterwards it will only be necessary to support the strength by light and nutritious diet, and gradually diminish the quantities of the restoratives that have been prescribed.

29. In cases characterised by much vital depression, very frequent pulse and cold surface occurring in old and habitual drunkards and broken constitutions, a liberal use of cordials, and even a moderate quantity of the accustomed stimulus, in addition to the opium, should be administered from time to time; particularly if the head be cool, the face pale, and the action of the carotids not strong. On the other hand, in those cases which were described (§ 15.) as approaching the first species of the disease, cupping, or the application of leeches on the occiput, or nape of the neck, or behind the ears, will be requisite early in this stage; and full doses of calomel, and the rest of the *purgative* treatment, with cold applications, or tepid affusions on the head, should be more actively employed, and precede the exhibition of opium. In this state of the disease, opium often aggravates the symptoms, unless it follow a judicious use of these remedies; and other excitants are equally injurious. In these cases, James's powder, or antimony, either previously to, or conjoined with, camphor and opium, will also be productive of much benefit.

30. That state of the disease which comes on after external injuries or operations (§ 9.), I have imputed chiefly to the previously intemperate habits of the patient. It requires the same treatment as the more nervous or vitally depressed cases now alluded to (§ 29.); and, as well as these, will be remarkably benefited by small clysters containing moderate doses of laudanum, administered after the bowels have been sufficiently evacuated, and repeated according to circumstances. This treatment has been much relied upon by M. DUPUYTREN; but if it remove not the disorder, after sufficient time has been allowed for its operation, camphor may be added to it; and ammonia, musk, ether, &c. be given in suitable vehicles; or a moderate quantity of the patient's favourite beverage allowed him, as suggested by Dr. COLLES. Of two cases recently reported (*Med. Gazette*, vol. vii. p. 287.), which confirm the view I have taken of the origin of traumatic delirium in that state of constitution which intemperance induces, opium failed in

one; and *prussic acid*, which was tried in the other, was equally unsuccessful.

31. *c.* If the *third stage* appear notwithstanding the above treatment, little hope of recovery can be entertained, as most likely serous effusion has become superadded to exhausted vital and nervous influence. Nevertheless, medical aid should not be withheld, especially if the patient have not received it in the earlier periods, or have been treated injudiciously. The hair should be removed from the head, and either a blister applied, or one of the liniments (F. 299. 308.) rubbed upon it. A blister, sinapism, or other rubefacient, should also be applied over the epigastrium; and camphor, ammonia, musk, capsicum, &c. liberally administered; restoratives and stimulants being also exhibited in clysters. Mercurial liniments containing camphor may likewise be rubbed upon the inside of the thighs, and the warm bath resorted to.

32. *d.* Certain *modes of practice* have been employed, to which a brief reference may be made. Dr. KLAPP, and some other physicians of the United States, have recommended *tartar emetic* in frequent doses, until it nauseates and purges the patient; but this treatment is more appropriate in the first species, or in such cases of the second as approach it most nearly (§ 15.). Dr. SPERANZA, of Parma (*Bullet. des Scien. Méd.* Sept. 1830.), directs leeches to the head and anus, applies ice to the scalp, and gives calomel and jalap, and subsequently *prussic acid*. This method is obviously suited only to the first species, and would be injurious in most instances of the second. From the preference he has given to the appellation adopted by J. FRANK, — *Encephalis tremefaciens*, — I would infer that he has never prescribed it in the true delirium tremens. Dr. A. L. PEIRSON (*N. Eng. Journ. of Med. and Surg.* vol. ix. No. 2. Ap. 1820.) states, that he gave very large doses of *digitalis* (sixty drops every three hours) after bleeding, and the patient recovered; but this was evidently a case of this first form of the disease. Dr. PAULI informs us that he has prescribed from three to six drachms of fresh ox-gall, in aromatic water, half a glass of brandy each morning, and two grains of the watery extract of opium at night, in forty-three cases, and has lost only one (*Med. Gazette*, vol. ix. p. 776.). The propriety of having recourse to moderate quantities of the stimulus to which the patient has habituated himself, in the depressed periods of the disease, and especially in those cases which present the more marked signs of exhausted nervous and vital power, has been insisted on by Dr. BLAKE, Dr. RYAN, &c., and admitted above, as well as by others; and quinine, capsicum, the preparations of hop, and various aromatics and cordials, may be also used as adjuvants of opium.

33. *e.* During the treatment, little or no *nourishment* is desired, or even required: arrow-root and sago, with a little brandy or white wine, may however, be given from time to time, particularly if the patient wish it. When he becomes convalescent, the *diet* should be very light, but nutritious; and a suitable beverage, in moderate quantity, be allowed. During recovery, the state of the digestive functions ought to be attended to, and promoted by tonics, and by aperients whenever the bowels are torpid. I have never

known or heard of an instance wherein the state from which the patient has escaped, or the representations of the medical attendant or friends, has effected a reformation of the habits which produced the disease. However, the physician should discharge his duty, by stating to him the consequences that will accrue from persisting in them.

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DENTITION, DIFFICULT.—SVN. *Dentitio difficilis*, *Odontio Dentitionis*, Good. *Dysodontiasis*, Ploucquet. *Difficult Teething*.

CLASSIF.—I. Class. 1. Order (Good).

II. CLASS, 1. ORDER (Author).

1. DEFIN.—*Slow or delayed evolution of the teeth, with signs of local irritation, and constitutional disturbance, often with disorder manifested especially in the digestive organs and nervous systems, occurring chiefly in weak or over-fed children.*

2. A general view of the pathological relations of dentition was exhibited in the article AGE (§ 10.); and, therefore, only that morbid condition of the process which is unattended by disease of an important organ, and is referrible chiefly to this process itself, although often causing disease, or being accidentally associated with it, will be here noticed.

3. i. Dentition, in the most favorable cases, is preceded by slight salivation, by heat and fulness of the gums, occasional flushings, increased thirst, restlessness or fretfulness, and frequent endeavours to thrust things into the mouth, evidently to allay irritation or itching. These symptoms generally appear about the third or fourth month, and precede the appearance of the teeth sometimes by several weeks; and occasionally subside, and reappear shortly before the tooth makes its way through the surface. These signs of disturbance are merely the necessary attendants on the formative processes going on in the gum. But very commonly in children of deficient vital power, and occasionally in those which are apparently robust, or rather plethoric from overfeeding, dentition is either delayed, or is attended by more serious disorder, particularly while the canine teeth are being protruded. In delicate children, particularly those living in crowded towns, and low and ill-ventilated localities, this process is both late and slow in taking place, and is often

attended by signs of increased irritation, as redness or tumefaction of the gums; by various cutaneous eruptions; by greater fretfulness, sometimes sickness and feverishness towards night, with restlessness, fits of crying, and sudden startings from sleep. These may be the only ailments, which may subside either partially or altogether as soon as the tooth has passed the surface, and return shortly before others come in sight; but not infrequently, particularly in this class of patients, disorders of the prima via, particularly chronic diarrhœa, slight dysenteric affections, or slow remitting forms of fever, obstruction or enlargement of the mesenteric glands, obstinate and recurring coughs, tubercula degeneration in the lungs or digestive tube, marasmus, &c., supervene more or less rapidly.

4. ii. In children who are of a plethoric rather than of a robust habit of body, and which Dr. J. CLARKE has, with much justice, ascribed to overfeeding, the gums are often swollen and painful, the face flushed, the head hot and pained; and all the symptoms of inflammation of the membranes of the brain, or of inflammatory fever with determination to the encephalon, frequently supervene. In them, the symptomatic fever is generally high, and attended by great thirst, nausea, vomitings, constipation, and occasionally by drowsiness or stupor, or by great irritability and restlessness, or by both states of disorder alternately; sometimes by short broken slumbers, from which the child awakens in a state of alarm, or in a fit of crying; or by convulsions, diminished secretion of urine, and other signs of cerebral affection. These are the usual concomitants and symptoms, or consequences, of difficult dentition; but they do not always stop here; for they often run on into more serious disease,—such disease, however, occasionally appearing more abruptly and without these precursory ailments, at least in such degree or duration, as to become objects of attention to the attendants, or to lead them to resort to medical aid. These maladies, although often occasioned either partly or chiefly by dentition, when occurring in children at that epoch; and whether affecting the cerebral, the thoracic, or the abdominal organs, or the skin; are still more frequently independent of this process, and therefore cannot be further alluded to in connection with it, than they have already been in another place (see AGE, § 10.);—and, indeed, in most instances in which a close connection between them and difficult or morbid dentition is observed, it is that of concurrent effects of constitutional predisposition and of anterior changes in the organic functions; the local irritation and sympathetic febrile disturbance either exciting morbid action in such organs or tissues as, from hereditary conformation or vice, are disposed to it; or aggravating previously existing disorder, and rendering evident what was before latent, or unobserved. In these cases, therefore, dentition is to be looked upon either as a principal, or as a concurrent exciting cause of many of those diseases which occur at the period of dentition,—but a cause most frequently concurrent with improper feeding and clothing.

5. iii. A natural or slightly difficult dentition may be converted into serious disease, by the not uncommon habit of giving the infant food when-ever it cries from the irritation attending upon the

process, and thereby overloading and further dis-ordering the digestive processes, which are already disordered by the febrile disturbance generally accompanying it; whilst determination of the circulation to the head is favored by the practice of covering the head in-doors or when asleep, and by wearing thick felt hats during mild or warm weather. BRANDIS believes that difficult dentition is the consequence of obstruction of the salivation which accompanies, and is salutary in, this process: HECKER, that it results from a morbid state of this secretion: MYLIUS, that it is the effect of disorder sympathetically induced in the liver: THOM, that dentition often occasions an acrimony of the abdominal secretions, which react upon the original seat of disorder, and upon the system generally; thereby rendering it difficult or morbid: WIGAND, that the affections attending, delaying, and otherwise disordering, this process, are accidental complications merely; and JOHN CLARKE, that all such disorders are commonly the consequences of plethora arising from over-feeding. Now, in all these opinions, there is much truth; and one or other, or several of them, obtain in many instances, more, however, as contingent and related effects of the local irritation, than as causes of the difficulty of the process,—which irritation is the chief or concurrent cause of febrile disturbance, of disordered function, and at last of more palpable disease, according to the condition of particular organs at the time, and constitutional or acquired predisposition.

6. iv. The *irruption* of the *second* or permanent teeth may also be delayed or attended by sympathetic disorders, particularly in persons whose *maxilla* are insufficiently developed, and when the *dentes sapientes*, and the canine teeth, are appearing. In delicate, nervous, and irritable subjects, swelling of the parotid and sub-maxillary glands, painful and sometimes periodic affections of the ear or face, slight or recurring ophthalmia, irregular convulsions, or epilepsy, and chorea, have, in some instances, been excited by this cause; and have disappeared upon the eruption of the teeth, or the removal of the local irritation.

7. v. The *TREATMENT* of difficult dentition should be directed with the intention—1st, of removing the local irritation; and, 2d, of subduing the sympathetic disorders associated with it.—*A.* The local irritation requires scarification of the gums whenever they are at all swollen or red; and particularly in the second stage of the process, when the tooth has reached the surface, whether there be redness and swelling, or not. The propriety of this operation has been, however, called in question, particularly by STERNBERG, STORCH, THOM, and BRANDIS, on the plea of its inutility, of it occasioning ulceration or disease of the capsules of the teeth, and of the cicatrix which is soon afterwards formed being absorbed with greater difficulty than the other parts. But these are by no means valid objections—for its utility has been proved by the experience of HARRIS, COWPER (*Anat. of the Hum. Body, &c.*), BROMFIELD (*Observations, &c.* v. ii. p. 17.), BERDMORE (*Treatise on the Teeth, &c.* 8vo. Lond. 1770.), HURLOCK RIEDLIN, WEDEKIND, KENNEDY, MARLEY, myself, and most modern writers of experience: and, as to the contingent ulceration of the gums, it seldom or never occurs when the operation is judiciously performed; when the lancet is clean,

not carried too deep into the gum, if lancing be performed early in the process; and when its edge is directed rather outwards, as recommended by Mr. MARLEY. That the cicatrix may oppose the passage of the tooth is certainly not proved; but this, if it did, is no objection, as a repetition of the operation, is often necessary, and generally beneficial. M. BROUZET (*Sur l'Educat. Médic. des Enfants*, t. i. p. 234.) advises the surface of the gum to be divided, from time to time, by the point of the nail,—a practice which possesses the advantage of not alarming the child, of being easily and readily performed, and of delaying the closing of the divided part. But care should be taken not to perform it until the nails have been well cleaned.

8. The propriety of allowing the infant to rub the gums with hard substances has been questioned by AUZERI, MARLEY, and others, from an idea that they will hereby become more callous, and absorbed with greater difficulty. But the truth of this is questionable. I believe that substances pressed frequently between the gums, materially lessen the irritation and distressing itching felt in them, and promote the flow of saliva,—results of no mean importance in preventing the supervention of sympathetic disturbance. These results will be ensured, in cases of existing irritation, by frequently moistening whatever substance is thus employed with borax mixed in a little syrup of senna.

9. Besides the above, various other means have been recommended in order to subdue the local irritation: the chief of these are—a preservation of a lax state of the secretions and bowels; leeches, particularly behind the ears (SYDENHAM, KORTUM, STOLL, LEROY, *Journ. de Paris*, 1784.); internal emollients (PAULUS ÆGINATA, l. i. cap. 9., and BEKKER, *Hermet. Rediviv.* p. 705.); various derivatives (HUFELAND); calomel (MYLIUS and others); the alkalies (HECKER); cold applied to the face (WIGAND); opium (WEDEKIND); and active purging (VANDERMONDE and PORTAL, *Anat. Médicale*, t. i. p. 211.). The best means of promoting the secretions and alvine evacuations are, small doses of hydrarg. cum creta, conjoined with the dried sub-carbonate of soda, and, if the state of the bowels requires it, with the pulv. jalapæ, given every night. Leeches behind the ears, and cold applied to the head, should never be neglected whenever the temperature of this part is increased, and other signs of determination of the circulation to it are observed. In such cases, active cathartics, calomel with James's powder, and the rest of the treatment recommended for cerebral diseases, are necessary. Blisters applied also behind the ears are the best external derivatives; but they should be removed as soon as redness is produced. Opium is very seldom admissible; but, if much irritation exist, the tepid bath and syrup of poppies, with small doses of the sub-borate or the sub-carbonate of soda, may be prescribed. If the gums become ulcerated, borax, or sulphate of alumina, or the boracic acid, in honey or syrup of roses, should be employed.

10. *B.* The *sympathetic disorders* should be subdued as soon as they appear.—(a) If the head indicate vascular excitement, the means already specified (§ 6. 8.) should be directed; and if the symptomatic fever, with or without determination to this quarter, be considerable, cooling

aperients, and saline and antiphlogistic diaphoretics, are requisite, with the cold affusion on the head, the tepid bath, &c.—(b) Constipation, or colicky affections, which are not infrequent during this epoch, should receive immediate attention; and aperients, emollient laxatives,—as castor oil with two or three drops of oleum anisi, hydrarg. cum creta with sub-carbonate of soda,—and, if requisite, purgative and antispasmodic enemata, ought to be prescribed.—(c) Care ought to be taken not to check a slight diarrhoea; but if it passes beyond this, emollients, demulcents, refrigerants, diaphoretics, alteratives, tonics, absorbents, &c. should be prescribed, according to the circumstances of the case, and be assisted by the semicupium, warm clothing on the lower part of the body, and occasional doses of rhubarb with magnesia and hydrarg. cum creta.—(d) In some cases, both vomiting and purging, or a slight form of cholera, or of choleric fever, supervene; the stools being greenish, spinach-like, and offensive, sometimes terminating in a gelatiniform softening of the mucous surface of the stomach and bowels, as described by M. CRUVEILHIER; but more frequently without such disorganization, as M. GUERSENT has remarked. The classes of remedies just now particularized are also admissible in this affection. (See CHOLERIC FEVER OF INFANTS, and DIARRHOEA.)—(e) Watchfulness, irritability, frequent startings from sleep, with crying, &c. should always be dreaded, especially when the canine or anterior molar teeth are about to appear, as not infrequently being the precursors of convulsions, and indicating much sympathetic irritation of the nervous system with disorder of the digestive organs, and excited circulation in the encephalon. On the other hand, somnolency, particularly in plethoric children, evinces congestion within the head, which may be readily converted into inflammatory action; or it may terminate in effusion of serum: and either condition may usher in *convulsive spasm of the larynx*, the nature and morbid relations of which have been so little understood. In all these varying states and relations of disease, leeches applied behind the ears, lancing the gums, purgatives, emollients, refrigerants, a cautious exhibition of narcotics, laxative and antispasmodic enemata, the tepid bath, cold or tepid affusion on the head, rubefacient and anodyne liniments (F. 298, 308, 311.) rubbed along the spine, and, in delicate children, gentle tonics, are requisite, and should be modified according to the habit of body, and the particular features of the case. (See CONVULSIONS in children; and LARYNX—*Convulsive spasm of*.)—(f) The occurrence of obstinate coughs at this period should suggest attention to the state of the gums, with the use of demulcents and emollients, conjoined with laxatives, external derivatives, and diaphoretics. Leeches, also, ought to be resorted to, if the cough be attended by heat of skin, quick pulse, accelerated respiration, or if the child be plethoric.—(g) *Eruptions*, also, on the head, behind the ears, or on any part of the surface, ought not to be suppressed by external applications; but the functions of the abdominal and depuratory organs ought to be promoted by alteratives and gentle aperients, and the utmost cleanliness of the skin preserved.

11. C.—(a) During dentition, the head should be washed with cold water night and morning; and no other covering than that with which nature has provided this part should be put upon it when within doors or asleep; and on no occasion should warm felt hats be worn, thin straw or white hats being lighter and cooler.—(b) The diet should be carefully attended to, and that only allowed which is easily digested; and even it ought to be taken in moderate quantity. The child ought also to be much in the open air; and, if the process threaten much constitutional or local disease, an entire change of air will often be advantageous.

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DIABETES. *Excessive Secretion of Urine.*—SYN. *Αιματισμός* (a siphon; or from διαβαίνω, transeo). *Lienteria Urinalis, Tabes Urinalis, Diarrhoea Urinosa, Hydrops ad Matulam, Profluvium vel Nimia Profusio Urinae, Cito Emissio Rerum quæ bibuntur*, Auct. Vet. *Polyuria*, Seidel. *Diabetes Anglicus*, Mead and Sauvages. *Phthisuria Saccharina, Diabetes Saccharina*, Nicolas, Gueudeville, Hufeland. *Diabetes Mellitus*, Cullen and Sagar. *Dipsacus*, Hecker. *Phthisuria*, Reil. *Harnfluss, Honigartige Harnruhr*, Germ. *Urinflod*, Dan. *Diabète*, Fr. *Flosso d'Orina*, Ital. *Urine-Flux*.

CLASSIF.—2. Class, Nervous Diseases; 3. Order, Spasmodic Disorders (Cullen.) 6. Class, Disease of the Excreting Function; 2. Order, Affecting Internal Surfaces (Good). I. CLASS, II. ORDER (Author, in Preface).

1. DEFIN.—Urine secreted of a sweet taste and violet smell, generally in large quantity, with great thirst, dryness of skin, debility, and emaciation.

2. This disease was but slightly alluded to by CELSUS. ARETÆUS gave a tolerably complete history of it, which the majority of his followers merely copied. ALEXANDER OF TRALLES added

nothing to either its pathology or treatment, excepting the drawing of a comparison between it and leucæmia; and Aërius, taking up the same idea, states, that the one affection differs from the other in as far as that the undigested ailments pass off, in the former by the urine, in the latter by the stools; an opinion which was afterwards adopted by FERNEL, DURET, ZACUTUS-LUSITANUS, and others. But WILLIS was the first who advanced a rational theory of the disease. Since his time, opinions as to its pathology have been various, and the remedies recommended still more diversified.

3. Even up to the present day, the term *diabetes* has been applied to various states of disease:—1st. To that consisting chiefly of *diuresis*, or morbidly increased flow of urine, without reference to its quality; 2d. To that in which the urine is voided not only more frequently, and in larger quantity than natural, but also of changed quality, as respects certain of its constituents, viz. albumen and urea, either of which may be in excess; and, 3d. to that in which a saccharine matter is either superadded to the other ingredients contained in the urine, or in part replaces them. To the last of these morbid states I shall limit the term diabetes, conformably with the views of Dr. PROUT and M. RENAULDIN. The other morbid conditions of the urine will be noticed when treating of the pathology of this secretion. (See URINE.) Restricting, therefore, the term diabetes to that state of the urine characterised by the presence of saccharine matter, I have defined it accordingly. In consequence of the very vague ideas which have but too generally been entertained both as to the phenomena requisite to constitute this malady, and as to its various morbid relations, diabetes has generally been considered with reference to the quantity of the fluid secreted, without regard to the circumstance alluded to by Dr. PARR and others, and judiciously insisted on by Dr. PROUT, that the disease may exist for a long time, and the urine be extremely saccharine, without much, or even any, increase of its quantity; and, when the urinary discharge is augmented much beyond natural, that it is much easier to reduce it even to the usual quantity, than to restore it altogether to its natural quality.

4. SYMPTOMS.—A. The *urine* of diabetic patients is generally of a pale straw or greenish color; of a faint and peculiar odour, sometimes resembling that of sweet whey or milk, or of violets. Its taste is always more or less saccharine; and its specific gravity usually varies from 1.025 to 1.052. The quantity of urea is generally much diminished in diabetic urine: Dr. PROUT and Dr. HENRY have never observed it altogether absent; and there is little or no lithic acid. The usual saline ingredients in healthy urine exist in the urine of diabetes, but in diminished quantity, whilst their relative proportions continue nearly the same. Dr. WATT has found a little blood in it; but this is a rare occurrence: it much more frequently contains albuminous matter analogous to that of chyle. Dr. HENRY has given a useful table, showing the quantity of solid extract in a wine pint of urine of different specific gravities from 1.020 to 1.050. The following abstract of this table will enable the reader to ascertain the quantity of solid matter diabetic urine may contain:—

Specific gravity compared with 1000 parts of water at 60°.	Quantity of solid extract in a wine pint.	Quantity of solid extract in a wine pint, in
	grains.	oz. dr. scr. grs.
1.020	382.4	0 6 1 2
1.021	401.6	0 6 2 1
1.022	420.8	0 7 0 0
1.023	440.0	0 7 1 0
1.024	459.2	0 7 1 19
1.025	478.4	0 7 2 18
1.026	497.6	1 0 0 17
1.027	516.8	1 0 1 16
1.028	536.0	1 0 2 16
1.029	555.2	1 1 0 15
1.030	574.4	1 1 1 14
1.031	593.6	1 1 2 13
1.032	612.8	1 2 0 12
1.033	632.0	1 2 1 12
1.034	651.2	1 2 2 11
1.035	670.4	1 3 0 10
1.036	689.6	1 3 1 9
1.037	708.8	1 3 2 8
1.038	728.0	1 4 0 8
1.039	747.2	1 4 1 7
1.040	766.4	1 4 2 6
1.041	785.6	1 5 0 5
1.042	804.8	1 5 1 4
1.043	824.0	1 5 2 3
1.044	843.2	1 6 0 3
1.045	862.4	1 6 1 2
1.046	881.6	1 6 2 1
1.047	900.8	1 7 0 0
1.048	920.0	1 7 1 0
1.049	939.2	1 7 1 19
1.050	958.4	1 7 2 18

This table enables us to ascertain with considerable precision the quantity of solid matter voided by a diabetic patient in a given time. Thus, suppose 10 pints are passed in 24 hours, of the average specific gravity 1.040, it is evident that this will contain $10 \times 1.4 \dots 6 = 15 \dots 7 \dots 2$, or upwards of a pound and a quarter of solid extract.

5. Besides the *saccharine* condition of the urine, the next most striking and constant symptom is its *increased* quantity. Sometimes the quantity voided is enormous. J. P. FRANK details a case in which 52 lbs. were passed in twenty-four hours; and instances are by no means uncommon of from twenty-five to thirty-five pints having been discharged in the same time for weeks, or even months together. In some cases the urine has been said to have been nearly double the quantity of the whole ingesta,—a circumstance which has puzzled physiologists to explain, and has induced some to believe that, in addition to the colligation of the solids of the body, absorption of moisture from the air actually takes place during the disease in some cases, either through the medium of the respiratory organs or cutaneous surface, or both. I believe, however, that so great a difference between the quantity of the ingesta and urine, as here stated, is extremely rare; although a considerable excess has been proved by Dr. BARDSLEY; and the experiments of modern physiologists have shown that the lungs may absorb moisture from the atmosphere, although the skin may be incapable of doing so.

6. B. The *constitutional symptoms* are often ushered in by weariness and aversion from any exertion; by dryness and disagreeable taste in the mouth, the saliva becoming white and frothy; and by a sense of weight, heat, or pain, in the epigastrium, accompanied with alternate chills and flushings, or burnings of the palms of the hands and soles of the feet. To these supervene dryness of the skin, much thirst, costiveness; a saccharine state of the urine, with, and sometimes

without, an increased secretion of it; a craving appetite, and all the symptoms constituting the disease. In many cases, the urine has evidently been saccharine, without much increase in its quantity, long before the attention of either the patient or practitioner had been directed to this secretion. In other cases, the disease attacks more suddenly, generally with dryness of the mouth and throat; dry skin; a feeling of heat and pain in the epigastrium, occasionally with headach, commonly with aching of the back and loins, and pain in the course of the urinary passages; sometimes, as mentioned by BALLONIUS, a sense of cold in the loins is complained of. The urine generally, now much increased in quantity, presents the appearances already described, and deposits no sediment. The breathing is short, sometimes difficult or oppressed, with a short tickling cough; sometimes muco-puriform expectoration, and flying pains through the chest. The desire for drink and food increases; the skin becomes rough or scaly; the tongue either loaded with a dark-coloured fur, particularly at its base, or unnaturally clean, and of a dark red, or purplish red hue; the mouth foul, dry, and clammy; the bowels constipated, the evacuations being difficult, painful, dry, and often without their natural odour. A hay-scent sometimes issues from the body, as first noticed by Dr. LATHAM, and a similar halitus occasionally from the lungs. As the secretion of urine increases, the thirst and hunger become intolerant, and, in some cases, the latter amounts to complete pica, as stated by SPRENGEL. The sense of heat and burning at the epigastrium is exasperated, and extends in the direction of the urinary passages, frequently with phymosis, and some degree of uneasiness or inflammation about the external orifice of the urethra. The secretion of the prostate—but not the semen, as loosely stated by some writers—is sometimes voided after the discharge of urine; and the patient loses his sexual propensities and powers. To these symptoms are generally, added chilliness, and great sensibility of cold; cold extremities, often alternating with burning of the soles of the feet, and slight œdema; acid eructations, flatulence; painful muddy eyes; indistinct vision; headach or vertigo; dyspnœa or cough, and weariness on the least exertion; a sense of sinking at the epigastrium; weight and tenderness about the præcordia; frequent sighing; listlessness; a weak, forgetful, distrusting, anxious, wavering, and peevish state of mind; and great depression of spirits. As the disease advances, the debility and emaciation increase. The skin becomes rugous and scaly, particularly over the abdomen; and the veins large and distended. The fauces and tongue now assume a dark red tint, and are unnaturally clean; the gums spongy or partially absorbed; the teeth loose, and the breath fetid. In some cases, aphthæ appear in the mouth, and the gums ulcerate. The pulse is at first but little affected. Occasionally it is somewhat hard or frequent, particularly after a meal, or during the febrile exacerbations which usually occur in the advanced state of the malady. In the last stages, the pulse is often quick, sharp; or weak, small, and compressible. It is, however, very variable in different cases, or even in the same case.

7. C. The blood taken in the progress of the

disease generally separates into a loose, dark crassamentum, containing a smaller proportion of fibrine than the clot of healthy blood; and a whitish or light-coloured serum, resembling whey. Its analysis has been made by several eminent chemists, with the view of detecting saccharine matter in it. NICOLAS and GUEDEVILLE considered it less animalised, and to contain a smaller quantity of fibrine, than healthy blood; but they found no saccharine matter. WOLLASTON, MARCET, HENRY, and PROUT, also failed in finding any of this matter in the serum; whilst RICHTER conceived that he could detect it by the taste, and, with many other pathologists, believes that it exists in small quantity in the blood, from which it is so constantly eliminated by the action of the kidneys, as never to accumulate to the extent of being detected by chemical agents; or that it is concealed by its combination or admixture with albumen.

8. ii. COMPLICATIONS.—I have scarcely met with a case of this disease which was entirely uncomplicated with pulmonic symptoms; and a similar remark has been made by Dr. BARDSLEY. On this account I conceive that the appellation given to the disease by NICOLAS and GUEDEVILLE, of *Phthisiæ Sucrée* to be extremely appropriate. It should, however, be conceded, that, in many cases, other organs participate in functional, and even in organic disease, particularly the digestive mucous surfaces, and the liver. Indeed, it may be often looked upon as a result of a breaking down of the system, often in consequence of intemperance and illicit indulgences, and exhaustion of the vital energies and assimilative functions, whereby several, or even all, of the organs concerned in the perpetuation of life suffer more or less.

9. iii. TERMINATIONS.—If unchecked by treatment, the debility increases, and pulmonic symptoms, with hectic fever, if they have not already existed, seldom fail of appearing. Occasionally the disease passes into incurable dropsy. Not infrequently the discharge is much diminished, and more urinous, for a short time before death; and, in some instances, the patient is suddenly cut off either by apoplexy, or, as observed by Dr. PROUT, by a peculiar affection of the stomach occasioned by improper food, or by overdistension of this viscus from the excessive quantity of solid and fluid ingesta.

10. iv. DURATION.—Diabetes generally continues for an indefinite time, according to the suddenness or acuteness of the attack, the previous health of the patient, the nature of the exciting cause, the form of the complication, the diet and regimen prescribed, and the means of cure employed. It is always exasperated during cold and moist weather. FRANK states, that it is also worse in autumn. HECKER, THENARD, and DUPUYTREN, have known it to continue, with intervals of improvement, for many years; and OOSTERDYCK states that he treated a case that terminated unfavourably in a few days. When the issue is fatal, it commonly runs its course in a few months, and is seldom of shorter duration than several weeks. I believe that the disease not infrequently exists, for a considerable time at least, without any very sensible increase of the quantity of the urinary discharge, and that it is hence often far advanced before it comes before the

physician; and that many cases which have been believed or stated to have been cured, have experienced merely a temporary benefit,—the malady returning in all its severity from the slightest exposure to its more common exciting causes, or the least want of attention to the requisite diet and regimen.

11. V. ORGANIC CHANGES are by no means constantly observed after diabetes, even in the *urinary organs*; and, when present in them, are not such as may account for the disease; but, as HECKER has justly contended, are rather its effects than its causes. RUTHERFORD, HOME, DUPUYTREN, SEGALAS, and DEZEIMERIS, have found the *kidneys* somewhat enlarged and vascular. BONET, MORGAGNI, MONRO, HERTZOG, CAWLEY, DESAULT, and HECKER, have observed them only more flaccid than natural; and CRUICKSHANKS, REIL, RUTHERFORD, DUNCAN, and BAILLIE, have remarked merely a more turgid state of their blood-vessels; which FRANK and VETTER have stated to have been more lacerable than in the healthy state. In rarer instances, one or even both kidneys have been observed much smaller than usual (P. FRANK, MÜLLER.) Hydatids have been found, by BEER, filling and distending them enormously; and calculi have been detected in their pelvis by BAILLOU. RUYSCH and HECKER met with cartilaginous induration of their envelopes and cortical substance; and BRODIE found their structure hard and gristly. MÜLLER mentions enlargement of their nerves; and DUNCAN states that the splanchnic nerves were all enlarged to three or four times their natural size, in a case he has recorded. CONRADI observed the pelvis of the kidneys enlarged so as to contain a small orange; and RUYSCH, RUTHERFORD, REIL, HECKER, and CLARKE, remarked considerable dilatation of the ureters. Increased size of either the pelvis of the kidneys, or of the ureters, or urinary bladder, or even of them all, is not infrequent. In some instances, the bladder is thickened, or contracted, and slightly inflamed, and the prostate enlarged. All the urinary organs, however, have been found as frequently natural, even by the authors now mentioned, as presenting the above changes.

12. Next in frequency to enlargement and flaccidity of the *kidneys*, the *mesenteric glands* have presented morbid appearances. MASCAGNI, JUNCKER, HINLY, REIL, HOME, CAWLEY, and HECKER, have found them enlarged, obstructed, and otherwise changed; but they also have been met with perfectly natural, by the same authors, as well as by others. RUTHERFORD and MONRO have observed enlargement, softening, and increased vascularity of the absorbent glands generally. The thoracic duct has, in a few instances, been found greatly enlarged and dilated. The *lungs* are, perhaps, as frequently diseased as any other organ. I have never seen a case examined in which they were perfectly healthy. LUROTH, SEGALAS, DUPUYTREN, and HORN, have severally observed tubercles in every stage of their progress; ulcerations, tubercular excavations, hepatisations, and purulent collections or disseminated vomices, in the lungs, as well as inflammation of the pleura, and its consequences—adhesions of the pleura, &c. of the pericardium and pleura, serous effusion into the pleural cavity, &c. M. LUROTH detected, in addition to hepatisation of, and ex-

cavations in, the lungs, aneurism of the pulmonary artery, the kidneys being sound. Similar states of the pulmonary artery, lungs, and kidneys, were found in a case recorded by M. LORSTEIN; the lungs being extensively tuberculated, hepatised, and adherent to the thorax, without any manifest thoracic symptoms during life. The *digestive organs* have been next most frequently diseased. DUPUYTREN and SEGALAS have observed a more vascular state than natural of the digestive mucous surface, but without any organic change of the stomach, or intestines, beyond dilatation of the former, and of the duodenum. RUTHERFORD and BAILLIE always found the stomach healthy. The *liver* is more frequently diseased. MEAD states that it was always altered in structure; whilst CULLEN, FRANCK, and HOME, generally observed it natural. CAWLEY and HECKER have commonly detected organic change of this viscus. The *spleen* and *pancreas* have seldom presented any lesion. MICHAËLIS, CONRADI, and HECKER, detected chyle imperfectly mixed with the blood in the large vessels and cavities of the heart; and the same authors, and MARSHALL, remarked a chocolate appearance of the blood in all the vessels. Dr. RUTHERFORD states that the blood was black and fluid in all the cases he inspected. In the cases I have seen examined, the mucous surface of the stomach, and of the upper parts of the small intestines, was rugous and vascular. The lungs were congested or hepatised, or tuberculated and excavated, or their pleuræ adherent. The heart was flaccid, soft, and small; the blood dark and semi-fluid; the kidneys congested with dark blood, and somewhat large; the super-renal capsules somewhat indurated; and the renal ganglia more than usually large. But these changes were not uniformly observed; several of them were wanting; and in one or two instances, no decidedly morbid change was detected. Upon the whole, therefore, *post mortem* research has thrown but little light on the nature of diabetes, further than showing that it is the result of a morbid condition of several, if not all, of the assimilating and excreting viscera, and not of any one of them.

13. II. PROGNOSIS and DIAGNOSIS.—A. Although patients whose constitutional powers are not greatly reduced, may sometimes live for many years, under judicious treatment, in this disease, yet should the *prognosis* be upon the whole very unfavorable: a cure may, however, be effected by appropriate means adopted early; but this result is comparatively rare, and should never be considered as perfect, unless the healthy quality, as well as quantity, of the urine be altogether recovered, and the strength and bulk of the body be restored. Partial, or even very great, relief is often afforded; but the malady after a while returns, and may proceed without admitting of relief to a fatal issue, or be again and again checked by treatment. Much depends upon the patients themselves, and the strictness with which the prescribed regimen is followed; for, as the disease often originates in excesses, a return to them upon partial, or tolerable, recovery, will bring back the disease. When we find it complicated, as it most commonly is, with organic disease of the lungs, liver, or lymphatic system, a favorable issue cannot be expected. Out of from twelve

to fifteen cases I have treated, I know of two only at the present time that have perfectly recovered. One of these, a married woman, who had previously been attended by an eminent writer on the disease, has continued perfectly well for six or seven years; but although not yet thirty-five, the catamenia, which had disappeared before the development of diabetes, has not returned. The chances may, perhaps, be estimated at about five or six, or even higher, against the patient; but much will depend upon the quantity and quality of the urine, the progress of the disease, the age, visceral complications, constitutional powers, the state and functions of the skin, the degree of emaciation, and circumstances and character of the patient. I believe that the prognosis should be much more unfavourable where the urine is mellitic, than when it is not so changed, however abundant it may be.

14. *B. The Diagnosis* of diabetes mellitus is very readily formed from the sensible properties of the urine. (See the *Symptoms*, § 4.; and art. URINE.)

15. III. CAUSES. — *A. Predisposing.* Hereditary predisposition to this disease has been remarked by several authors. Dr. PROUT has observed it in four instances. ISENFLAMM states that he knew of seven of the descendants of a diabetic patient, who died of the malady. MORTON, BRISBANE, ROLLO, BLUMENBACH, FRANK, STORER, and CLARKE, also furnish similar facts. Diabetes is more frequently met with in the male, than in the female sex; and in persons who either are past the period of puberty, or are advanced in years. The true diabetes mellitus is rare in children, whilst albuminous urine and enuresis are frequent complaints in them. It is much more common in cold and moist countries, particularly those in which the inhabitants live chiefly on rye, or any other vegetable food, or are imperfectly nourished, than in warm and dry climates; and is hence oftener met with in Great Britain, Ireland, Holland, Denmark, and Sweden, than in France and Germany; and in the western, than in the eastern side of this island. J. FRANK states that he saw a greater number of cases of it in Italy, than in any part of Germany. Dr. CHRISTIE observed it more frequently amongst the inhabitants of Ceylon, than in any part of continental India; and imputes it to the moist state of the atmosphere, and their poor vegetable diet. The scrofulous diathesis also predisposes to it.

16. *B. The Exciting Causes* are not so precisely ascertained as the predisposing, and their connection with the origin of the disease not so obvious as could be desired; but the following, acting either individually or in conjunction, particularly in the latter mode, may be considered as most commonly productive of diabetes, where a predisposition to it exists, either hereditarily, or from visceral disease:—Continued or repeated exposure to cold and moisture; drinking cold fluids when the body is over-heated; suppression of an habitual perspiration, by whatever means; acidulous or fermented liquors, particularly in malt liquors, cyder, &c.; the exhaustion arising from excessive evacuations and morbid discharges, or from undue sexual intercourse; great bodily and mental exertions; the depressing passions, such as anxiety, disappointment, &c.: and

whatever occasions great exhaustion of the powers of life, and of assimilation, is sometimes productive of this malady. Besides these, authors have adduced others as its occasional causes. AUTENREITH mentions the use of acids and acidulous fluids; BOERHAAVE, LISTER, STEDMAN, and FRANK, the abuse of diuretics and diluents; SYDENHAM and SENAC, excessive horse exercise; RUYSCH, CHESELDEN, and LATHAM, the existence of chronic abscesses and carbuncles; FRANK, the carrying of heavy weights; BENNEWITZ (*Ossan's Jahresbericht*, &c. July, 1828.) relates the case of a female who was affected by the disease during two successive pregnancies; PLOUCQUET and others, have observed it result from falls, and injuries on the back, loins, and hips; and BAILLOU, BRENDL, WEBER, LANZONI, and FRANK, the drying up of chronic eruptions, exanthemes, fluor albus, &c., or the suppression of hæmorrhages. It may be suspected, however, of the last named phenomena, that, instead of being causes of the disease, they are actually the effects resulting from the internal changes constituting its early stages — diabetes, or the internal changes leading to it, having commenced previously to the disappearance of the external disorders — for it has been often remarked that sores heal rapidly during the disease. Diabetes may, indeed, be frequently considered a remote effect in the chain of morbid causation; functional or even structural change of the assimilating viscera, particularly the lungs and digestive organs, existing for many months, or even years, before the increase, or the saccharine state, of the urine has attracted attention.

17. *C. The proximate cause* of diabetes is still extremely obscure, although several authors of deserved reputation have endeavored to explain it. — 1st. It has been ascribed to a morbid condition of the kidneys. This is the oldest opinion that has been entertained respecting its nature. The Greek writers considered diabetes to be owing to relaxation, debility, and increased irritability of these viscera; the irritability being, as they supposed, the cause of their morbid activity; and the relaxation and debility allowing the more liquid parts of the blood to pass through the excretories without restraint or change, and, consequently, in a crude state, like the food in lientery. The supporters of this doctrine adduce, in proof of it, those morbid changes that have been observed in the kidneys, without agreeing amongst themselves as to the particular changes which really constitute the disease. Some consider that they are essentially inflammatory. But they overlook the facts, that decided and unequivocal marks of inflammation of the kidneys are seldom found in diabetes; and that when these marks are observed in other diseases, they have uniformly been accompanied by a diminished, or an entirely suppressed, instead of a more profuse, secretion of urine. Others, who conceive that diabetes is a disease seated in the kidneys, ascribe it to spasm, without stating in what tissues, or vessels, this spasm exists; and even without mentioning precisely whether the spasm is in the vessels of the kidneys, or of other parts. CAMERARIUS first proposed this doctrine, in which he was followed by CULLEN, who afterwards abandoned it, and ascribed it to "some

fault in the assimilatory powers." GUEDEVILLE, likewise, partially adopted this opinion, but conjoined it with another which I shall have to examine in the sequel, and stated that this disease "is a consumption arising from a continual spasmodic deviation of the unassimilated nutritive juices to the urinary organs." Here, however, the spasm is not ascribed to the tissues of the kidneys, and we are left quite in the dark as to the parts thus spasmodically affected. But amongst the various supporters of the doctrine that the kidneys are the seat of diabetes, there is not one who has attempted to name the specific affection or state of those organs which constitutes the disease. RUYSC, RITTER, STOELLER, CRUICKSHANKS, RICHTER, and GOOD, have considered it as resulting from a morbid affection of the kidneys; and several of them, besides others whom it is unnecessary to adduce, have contented themselves merely with stating this very vague opinion. STOELLER and RICHTER, however, conjoin this undefined "morbid affection" with depraved function of the skin; and GOOD considers that the morbid state is one of excitement. He remarks that the whole of the phenomena, observed during the progress of diabetes, are consequent upon the renal mischief, and that it is a much less complicated disease than has hitherto been imagined. How far this is correct, the experienced practitioner may decide for himself; but it is certainly not in accordance with my observations, nor with the closest attention I have been able to give the subject. It is certainly indisputed, and the observation of the most experienced physicians have placed the matter beyond a doubt, that other organs and parts manifest disease very early in diabetes, and that the assimilative viscera and circulating fluids are very evidently affected. Now, the kidneys, being strictly eliminating organs, or emunctories, removing matters which are hurtful to the system from the blood, how can we conceive that excitement of these organs, the proximate cause of diabetes according to Dr. GOOD and others, can occasion a diseased state of other organs, diminished assimilating function, and especially a morbid condition of the blood itself, the morbidity of which it is the chief office of these organs to prevent, or to remove if in any way produced? Dr. WOLLASTON attributes diabetes to a change in the animal electricity of the kidneys; and M. DUPUYTREN, to their perverted, equally with their increased action. But the remarks now offered are also applicable to these opinions; for the cause of these morbid states must be sought after either in the kidneys themselves, or in some other quarter. If the kidneys be primarily affected, how can the early disorder of other viscera be explained?

18. 2d. The disease has been imputed to a morbid action of the stomach, or some of the assistant chylopoietic viscera. This opinion has derived support from the feeling of heat, pain, and sinking, which is so generally and so early complained of in this disease; as well as from the morbidly increased action of these viscera, particularly of the stomach. Dr. MEAD ascribed it to the liver, from observing the disease most frequently in those who were addicted to the intemperate use of spirituous and fermented liquors. Dr. ROLLO confines it chiefly to the stomach; and

states that it proceeds from "an increased action and secretion, with a vitiation of the gastric juice, and probably too active a state of the lacteal absorbents,—while the kidneys and other parts of the system are affected only secondarily." According to this hypothesis, the chyle is imperfectly formed, and exists in the blood either in a saccharine state, or in such a condition as to be readily converted into a saccharine fluid during its circulation, and its passage through the kidneys. That it is not at once converted into a sweetish fluid, and therefore that the morbid secretion is not elaborated in the stomach and other digestive viscera, seem to be proved by the fact, that no saccharine matter has been satisfactorily detected in the blood, although WOLLASTON, MARCET, BOSTOCK, DUPUYTREN, and THENARD, and more recently MM. HENRY, SOUBEIRAN, VAUQUELIN, SEGALAS, and Mr. KANE have endeavoured to ascertain its existence. It may, however, be admitted, that the saccharine matter may exist already formed in the blood, as is sometimes evidently the case in respect of urea, as has been demonstrated by MM. PREVOST and DUMAS, and be so rapidly eliminated by the action of the kidneys, as never to accumulate it so as to admit of detection by analysis; or it may be granted, that the first part of the morbid process commences in the digestive viscera, and that it is afterwards fully perfected in the kidneys. But these are merely probable suppositions, which scarcely admit of proof.

19. 3d. It has been supposed that a saccharine and imperfectly elaborated chyle, instead of being conveyed into the blood, is carried to the kidneys and urinary bladder, by a retrograde action of the absorbents. This hypothesis was first proposed by Dr. C. DARWIN, who conceived, that when a greater quantity of inebriating fluid than usual is drunk, at the same time that the lacteals are quickened in their power of absorbing it, the urinary branches of the absorbents, which are connected with the lacteals by many anastomoses, have their action inverted, and a large quantity of pale, unanimalised urine is hereby discharged. Where the ingurgitation of fermented or other exciting liquors is continued, or occurs often, the urinary absorbents at length gain a habit of inverted action whenever the lacteals are stimulated; and a whole or great part of the chyle is then carried to the bladder without entering the circulation, and the body becomes emaciated; and the urine is necessarily sweet, and the colour of whey. Numerous objections may be offered to this hypothesis. It is altogether founded on postulata; and, moreover, it proceeds on the gratuitous idea, that the chyle is generally a saccharine fluid, nearly, if not altogether, resembling the diabetic discharge. Now, such is not the case; for chyle contains but little saccharine matter. Besides, the structure of the lymphatics, and their connection with the vascular system, is completely opposed to their retrograde action. P. FRANK has very materially moulded this hypothesis, and into a more plausible form, by relinquishing the untenable idea of a retrograde action of the absorbents. He conceives that diabetes is a disease of the lymphatic system, conjoined with excitement of the urinary organs; that it proceeds from stimulation of both these by some virus formed within, or introduced from

without, and producing a reverse effect to that occasioned by the virus of the rabies canina; so that, while the latter produces a dread of liquids, the former excites a constant desire for them. In support of this doctrine, he adduces the opinion of the ancients, that diabetes is occasioned by the virus of a serpent called *dipsas*, and hence the common name generally given by them to this malady. That it may be excited by the bite of reptiles, or even higher animals, is not impossible. Dr. LATHAM mentions a case produced by the bite of a rat; and it not infrequently arises, as remarked by CHESELDEN and LATHAM, from carbuncles, or chronic abscesses, where it may be presumed that a partial absorption of morbid matter takes place. FRANK supposes that the morbid matter occasioning the disease acts by inducing a morbid irritability of the lymphatic system, owing to which every other part of the frame is exhausted of its nutrition; that the fluids, thus morbidly absorbed, are rapidly conveyed into the circulation, particularly the chyle to the kidneys, which concur in the morbid action; that the cutaneous and other exhalations are hence completely arrested; and that the flux of saccharine urine is thus produced. This is certainly a more plausible doctrine than that on which it is evidently founded; but, even conceding the morbid excitement of the lymphatic system and of the kidneys, the origin of this excitement in a morbid virus or matter is much more gratuitous, and the cause of the saccharine properties of the urine is wholly unexplained.

20. 4th. Dr. CLARKE, and more recently Dr. MARSH, impute the disease, in a more especial manner than has been done by other pathologists, to the cutaneous surface, which, indeed, may be viewed as an important organ of the animal economy; and they consider it "as a sweat driven in upon the kidneys, where this morbid determination keeps up a profuse discharge." This opinion seems to have been partially entertained by RITTER, STOELLER, and RICHTER, who, whilst they ascribed diabetes, as we have seen, in part to a morbid state of the kidneys, conceived that a depraved function of the skin was also concerned in its production. There can be no doubt that suppression of the cutaneous functions is an early change, and that it contributes to the perpetuation and aggravation of the malady.

21. 5th. One of the most plausible theories which have been advanced, is that which refers diabetes to a dyscrasy or morbid condition of the blood, arising from a diseased state of the assimilating powers of the frame. This doctrine is not materially different from that which was proposed by WILLIS and SYDENHAM, and more recently by PLACE, DESAULT, and LATHAM; and, as well as being more accordant with the procession of morbid phenomena, has a more obvious relation to the exciting causes, terminations, and morbid appearances in fatal cases, than any of the theories now reviewed. According to this doctrine, diabetes is not to be imputed to the derangement of a single organ or system of vessels merely, but rather to defective energy of the whole frame, particularly impeding the advanced stages of the processes of digestion and assimilation. That the blood is not in a healthy state, and the chyle imperfectly assimilated to it, as well as the crisis of the whole circulating mass

deficient, is sufficiently manifested in the appearances which the blood presents when taken from the patient during life, and when observed in the vessels after death. Upon examining specimens of the blood taken from diabetic patients, MM. HENRY and SOUBEIRAN found the quantity of its fibrine and albumen one fourth less than is assigned to healthy blood by BERZELIUS and DARCET; and BACHETONI remarked that oil of almonds passed off with the urine, unchanged in its passage through the digestive and assimilating organs. The state of the blood, also, in the veins and cavities of the heart, is somewhat peculiar—generally being semi-fluid, sometimes resembling treacle, and very dark-coloured. That this state is not primary, but is a consequence of deficient vital energy of the organic nerves, and of the assimilating organs, in connection with impeded exhalation and secretion from all surfaces and organs excepting the kidneys, seems most probable. HUFELAND supposes, that, owing to the changed action of the kidneys, and the unassimilated state of the chyle with the blood, the former of these fluids, with the nutritious parts of the latter, containing the saccharine principles, are excreted with the urine, and occasion the phenomena of the disease. This opinion, in its general bearing, comes as near the truth, perhaps, as any that has been offered; but still it admits of reference to antecedent disorder.

22. 6th. I should, therefore, conclude, from what I have seen of, and thought respecting, this malady, that, owing to deficient or exhausted influence of the nerves supplying the assimilating viscera and vascular system, the chyle is not readily or perfectly changed into blood, nor are the nutritious parts of the blood attracted by, and identified with, the various structures: that this imperfect performance of the assimilating functions must necessarily be attended by deficiency of all the secretions and excretions excepting the urinary, particularly the cutaneous, the pulmonary, the intestinal, and the hepatic, as both classes of functions are under the influence of the organic system of nerves. Thus a redundancy of imperfectly elaborated blood must be the result, a portion of which will be carried off by the kidneys, as in ordinary circumstances; for as long as these emunctories retain their powers, they are the appropriated safety-valves of the vascular system, by eliminating both the watery, the saline, and other elements of the blood, when they become excessive. These states and changes account for the simple excess of urine; the more watery parts of the blood being carried off by the kidneys, instead of being secreted from the cutaneous, the respiratory, and intestinal surfaces; and the action of the kidneys, being once excited in the manner now stated, becomes excessive, from the superabundance of the imperfectly elaborated and stimulating matters contained in the blood circulating through them. The saccharine matter in the urine evidently arises from the morbid condition of the blood originating in the manner now explained; the unassimilated elements readily assuming the mellitic combination, probably in consequence of the state of vital action exerted by the kidneys during their excretion. What the precise nature of this action may be, cannot be easily ascertained; but it probably is, as DUPUYTREN and others have supposed, a per-

verted as well as an excited action: the morbid condition of the organic nervous influence, and of the blood, changing the vital functions of the kidneys, in addition to simply exciting them. That a morbid state of organic nervous influence throughout the tissues, and of the blood, exists in this disease, is shown by its principal phenomena, and by the fact that diffusive inflammation followed bleeding in two instances recorded by Dr. DUNCAN.

23. IV. TREATMENT.—The means of cure employed in this disease have been varied exceedingly, according to the opinions entertained respecting its nature. Many remedies have also been resorted to empirically, without reference either to their mode of operation, or to the presumed pathology of the malady. As it will be useful to the practitioner, I will first exhibit a succinct view of the different modes of treatment which have been recommended, venturing such remarks as my experience enables me to suggest; and afterwards I shall proceed to state the plan which has seemed most successful in my practice.

24. i. *View of the Treatment proposed by Authors.*—In estimating the degree of success which writers state they have derived from various remedies, it should be kept in recollection that other morbid states of the urine, besides that which is characterised by the presence of saccharine matter, particularly those consisting of excess of albumen and urea in, conjoined with augmented discharge of, the urine, have been considered as constituting a variety of diabetes,—the *diabetes insipidus*; and that, owing to this circumstance, many of the methods of treatment which have been stated to have cured diabetes, have been successful only so far as respects a less difficult and dangerous form of disease, and one which is frequently no closer related to true diabetes than as respects the increased quantity of the urinary secretion.

25. A. *Astringents* have been recommended by many writers, and various remedies belonging to this class have received approbation. The greater number of the mineral, and some of the vegetable acids have been used, either alone or in combination with other medicines.—a. GILBY, EARNEST, SCOTT, and BRERA have employed *nitric acid*, sometimes with much benefit. BRERA recommends the internal use of this acid to be conjoined with mercurial inunction. I have given it combined with *opium*, the patient at the same time using the warm bath and animal diet. Some advantage was derived from this treatment for a considerable time; but the disease returned. I have likewise conjoined the *nitric* with the *muriatic acid*, in equal quantities, and employed it internally combined with *opium*, and externally in the form of the *nitro-muriatic lotion* applied warm over the epigastrium and loins. This has certainly appeared a very beneficial treatment; but as it was not confided to alone, but conjoined with other means which I shall adduce in the sequel, it is difficult to determine the degree of benefit derived from it.

26. *phosphoric acid*, both alone, and in combination with, or neutralised by, other substances, has been recommended by NICOLAS, GUEUDEVILLE, LATHAM, SHARKEY, and VENABLES. Dr. SHARKEY speaks favorably of the *phosphate of soda*. It has the advantage of

preserving a free state of the bowels, whilst it tends, in a very marked manner, to diminish the flow of urine: but I believe that more advantage will be derived from it, as well as from the *phosphate of iron*, which has been strenuously recommended by Dr. VENABLES, in the excessive discharge of albuminous urine,—an affection frequently observed in young subjects,—than in the disease under consideration.

27. *γ. The sulphuric acid and its salts* have received the sanction of numerous writers, who have generally prescribed them in combination with preparations of *cinchona*, *aromatics*, *opium*, &c. I have exhibited the acid with the *sulphate of zinc*, and with the *sulphate of quinine*, as one part of the treatment adopted in the cases which have occurred to me; and, as from a large proportion of the means employed, benefit was derived from it for some time. The *sulphate of alumina* has been prescribed in a variety of forms, but most frequently dissolved in whey, by DOVER, BROCKLESBY, HERZ, LINDT, and many others. But its want of efficacy has been satisfactorily shown by BRISBANE, OOSTERDYK, and FRANK; the last of whom carried the use of it to a large extent, in order to test its effects. Dr. WINTRINGHAM applied the *sulphate of alumina*, dissolved in vinegar, as an epithem on the loins. The *sulphate of iron* and the *super-sulphate of potash* have likewise been employed in this disease. The latter of these possesses the advantage of acting as a deobstruent aperient, and is hence often of much service. Dr. FRASER entertains a favourable opinion of the former.

28. *δ. Several other astringents*, as *sumach*, *kino*, *catechu*, in the form both of tincture and decoction, *lime-water*, &c., have been recommended; but they seem to have been of no further service than auxiliaries to other means. The *aqua calcis*, used as common drink, either alone or with milk, has been praised by WILLIS, SCHUTZ, JARROLD, FOTHERGILL, WATT, and FRANK. Although astringents have been very generally employed, some doubts have been thrown upon their utility by AMATUS LUSITANUS, and others. SYDENHAM, however, expresses himself favourably respecting them when conjoined with aromatics and opiates,—a mode of exhibiting them which is certainly the most preferable, and the only way in which I have employed those now enumerated (§ 42.) in this disease.

29. B. *Tonic astringents* have received much attention, particularly from STOELLER, FERRIAR, MORTON, FAHNER, FRANK, and others. Amongst those, *cinchona*, in decoction with the *elixir of vitriol* or with *simarouba*, or in powder with the *ura ursi*, in doses of a scruple or half a drachm of each, with half a grain or a grain of *opium*, and repeated every four or five hours; and the *preparations of iron*, either alone or with *cinchona* or *cascarilla*, deserve a particular notice. Tonics with *catechu*, *kino*, &c., and the vegetable bitters, as well as the mineral tonics, in conjunction with *opium*, have severally been employed, particularly by SHEE, ABRAHAMSON, ROEBER, &c. Under this head, I may notice the use of astringent wine, as having been recommended by CELSUS, and, in modern times, by WILLIS and MORTON.

30. C. *Diaphoretics* have been very generally recommended, and particularly by ROEBER,

STOELLER, WERNER, M'CORMICK, and MARSH, with the view of restoring the suppressed functions of the skin, and diminishing the determination towards the kidneys. Amongst the various medicines which have been exhibited with this intention, the *putvis ipecacuanha comp.* and *opium with antimonials* deserve a particular notice. I have prescribed these with full doses of *camphor* on several occasions with much benefit. This last named substance has been much praised by SHEE and RICHTER, who recommended it to be exhibited in large doses in mucilaginous emulsions. Of this class of remedies, there is certainly none more decidedly useful than the *warm and vapor baths*. SALZBURGER, RITTER, WERNER, RICHTER, HEINEKEN, and MARSH justly place much reliance on them. To these may, perhaps, be added the *sulphur baths*; but I have had no experience of them. The promotion of a free and even copious *perspiration* by the constant use of woollen clothing next the skin, and active exercise, has been noticed by several writers; and, I am enabled to add, forms a most important part of the regimen to which diabetic patients should be subjected.

31. *D. Alvine evacuations.*—*a. Emetics* have been employed with advantage in some cases by ETTMULLER, RIVERIUS, BRENDAL, MICHAËLIS, ROLLO, WINTRINGHAM, WATT, and RICHTER, particularly early in the disease. It is chiefly at this period, or in subjects whose constitutions still retain some degree of vigour, that they are admissible. *b. Purgatives* have received less attention from writers on diabetes than they deserve. TRNKA, however, has passed very just encomiums on them; and they have likewise received some notice from Dr. MARSH and a few other recent authors. I believe them to be very generally beneficial, not only in as far as their occasional exhibition may remove morbid accumulations, and obviate constipation, which is so frequently an attendant on the disease, but also as regards a continued and decided use of them, so as daily to procure two or three copious evacuations. With this view, full doses of *rhubarb*, or of the *infusion of senna*, with compound infusion of gentian, or of the *phosphas soda*, should be exhibited daily. There are few remedies that deserve a more favourable notice in diabetes than *rhubarb*. It received the warm approbation of BAGLIVI and LISTER, who recommended it in conjunction with *aromatics*, and of BROCKLESBY, MORTON, BUCHWALD, and HARRIS. Dr. BAILLIE prescribed it with *laudanum*. I have employed it frequently as an aperient, both in powder and infusion; and combined it with vegetable tonics, *aromatics*, and *opium*, with the intention of promoting the digestive and assimilating powers. It is one of the best medicines that can be used in this disease.

23. *E.*—*a. Sulphur* and the *alkaline sulphurets* have received a deservedly favourable notice from AUTENREITH, REDFEARN, BANG, ROLLO, and MICHAËLIS. The *hepatized ammonia* was particularly noticed by Dr. ROLLO, with the view of furnishing to the system, along with a liberal animal diet, the elements which seemed to be wanting to the chyle and to the urinary secretion. The free use of *sulphur*, so as to produce an aperient effect, is often beneficial. I have seen much advantage derived from it; and

I conceive that the *sulphurets* are often serviceable as adjuvants to the general plan of treatment. Dr. CHRISTIE mentions them with approbation in his interesting details of cases treated by him in Ceylon. *b. Cantharides*, either in the form of powder or tincture, exhibited alone or combined with *camphor*, have received a favourable notice from MORGAN, WERNER, HERZ, STOELLER, &c. WOLFF combined them with *cinchona*; but BRISBANE, BUSCH, and FRANK derived no advantage from them.

33. *F. Opium*, either in substance or tincture, alone, or combined with tonics and aromatics, or with astringents or with diaphoretics, with *camphor*, *valerian*, or with *assafetida*, or even with the *sulphurets*, according to the varying features of particular cases, is, perhaps, the most generally applicable and beneficial remedy that has been employed. But it should be given in large doses, and its use persisted in, and so managed as not to prevent a free and continued action on the bowels. If the dose be sufficiently large, it will seldom constipate the bowels in this disease, or impede the action of purgatives and aperients; and it will determine more sensibly to the skin, while it will more decidedly diminish the urinary flux than when prescribed in small doses. It is chiefly to ARCHIGENES, SYDENHAM, BUCKWALD, and WARREN, and afterwards to GUEUDEVILLE, HEINEKEN, MONEY, MARSH, CARTER, and others, that we are indebted for proofs of the great advantage to be derived from this medicine in diabetes.

34. *G. a. Mercurial inunction* has been recommended by SCOTT, LUBBOCK, and others. BRERA prescribed it at the same time with the internal use of nitric acid; and FRANK, with tonics; he even advised it to be carried so far as to produce salivation. When diabetes is complicated with hepatic disease, this treatment will be requisite. I have seen it employed with some advantage, alternated with the *nitro-muriatic* lotion applied on the hypochondria and loins, in a case of this description. When biliary derangement exists, the occasional exhibition of a full dose of calomel with *rhubarb*, or the compound extract of *colocynth* at bed-time, and followed, in the morning, by an active purgative medicine, will be found of service. — *b. Medicines that act as diuretics* may be supposed to be contra-indicated in diabetes. But they are not necessarily injurious; for, if they have a beneficial effect on the body generally, or on the visceral disorders with which diabetes is associated, they may even be of benefit; and if the action of such medicines on the kidneys be energetic, they may change the morbid action induced in these organs by the disordered state of organic nervous influence and of the circulating fluid, and in this way prove beneficial. Among the different substances that have a diuretic effect, *colchicum* may be mentioned as having lately been sometimes prescribed in this disease, but chiefly on account of its sedative operation. It may be of some service in promoting the biliary secretion, in increasing the quantity of urea and uric acid in the urine, and in diminishing the irritability of the frame. Its good effects, however, require confirmation, and may probably be ensured by combining it with ammonia or its preparations, or with *camphor*.

35. *H. Nutrients* in various forms have been

strenuously recommended by HOME, ROLLO, DUPUYTREN, NICOLAS, OSWALD, FRANK, CHRISTIE, and many others. Dr. ROLLO particularly insisted upon the nearly exclusive use of animal food, with the view of resisting the secretion of saccharine matter, and furnishing the elements of urea and the animal salts to the blood. There can be no doubt that the greatest benefit has been derived from this treatment. It should, however, be admitted, that it often fails; and that, when it is too freely indulged in, it sometimes occasions a diarrhoea, which exhausts or even carries off the patient. With a knowledge of these occasional effects, Dr. PROUT recommends it with very judicious restrictions, and to be taken with a moderate proportion of farinaceous food; and FRANK advises, in addition to it, the decoction of Iceland moss, or of the *althæa officinalis* with milk.

36. *I.* Besides the foregoing, various other remedies have been prescribed. The *cuprum ammoniatum* (in doses of half a grain to a grain twice or thrice a day,) *myrrh*, and *valerian*, have received the commendations of FRANK and RICHTER. *Assafetida* has been favourably noticed by WOLFF; and *tartar emetic* combined with *valerian* has been directed by RICHTER. A combination of *assafetida* with *myrrh* and *valerian* has also been very generally used by Continental physicians. Dr. WATT has employed the *volatile alkali*; and it will certainly often prove an useful adjuvant, combined with other medicines, particularly with opium, or with tonics or diaphoretics; and be serviceable in combating such nervous or sinking symptoms, as sometimes occur in the course of the disease. It may, moreover, counteract the tendency to the formation of saccharine matter, and promote the animalisation and assimilation of the chyle, as well as the formation of urea. Even *urea* itself has been recently tried as a remedy in this disease by SEGALAS, but instead of changing the mellitic urine, it was found to increase its quantity. HUFELAND, and some other physicians in Germany, have prescribed recent *ox-gall* in as large doses as the stomach will bear, and frequently with the effect of causing the disappearance of the saccharine state of the urine during its use; the disease, however, has generally returned upon discontinuing the medicine.

37. *K.* *Blood-letting* in diabetes had been mentioned as far back as the Commentaries of ARCHIGENES on AETIUS; and it was noticed as an occasional measure by LE FEVRE and ROLLO. But it is to Dr. WATT that we are indebted for the introduction of this practice in a most decided form. This physician advises full and often-repeated blood-lettings, with the view of arresting the inflammatory determination to the kidneys. This plan has been adopted by Dr. SATTERLY and others with manifest advantage, whilst it has failed with some. Drs. PROUT and HUFELAND consider it beneficial only in the early and acute stage of the disease. Dr. MARSH offers a similar opinion. And my own experience would lead me to employ it, only when the disease is recent, the strength of the patient not much exhausted, and the pulse remains of good strength and volume. When the patient feels much pain in the loins, an additional indication is thereby furnished for resorting to it. Sir DAVID BARRY

has advised frequent cupping on the loins in the course of the disease,—a practice which is deserving of adoption in cases of the above description, or when much pain is complained of in that situation. I have found advantage from the application of a number of leeches on the epigastrium, and cupping on the hypochondria, both in relieving the sense of pain and heat complained of in the stomach, and in lessening the quantity of the urine, and of the saccharine matter contained in it. Depletion, as Dr. WATT first observed, certainly improves the state of the blood, and renders the weak and imperfect crassamentum more firm.

38. *L.* *Blisters and external applications* of a derivative and irritating nature have been recommended by RITTER, DESAULT, VAN SWIETEN, WHYT, and REIDLIN, to be applied chiefly to the loins and epigastrium. FRANK and WEIZ advise repeated blistering of the *sacrum*. *Setons*, *issues*, and *moxas* have likewise been employed in the latter situation; but I believe without any permanent benefit. The most efficacious modes of derivation are the vapour bath, warm alkaline baths, and thick woollen clothing worn next the skin. *Topical applications* of a tonic and an astringent nature have also been directed to be kept constantly applied to the loins by WHYT, REIDLIN, and VAN SWIETEN. Of these, however, I have had no experience. I have, however, prescribed liniments to this situation, as well as to the epigastrium, generally composed as follows:—

No. 165. R. Liniment. Camphoræ, Olei Terebinth., Linimen. Saponis Comp. ʒss. j.; Pulv. Opii Puri ʒj.; Pulv. Capsici Annui ʒss.; Olei Limonis ℥xxx. M. Fiat Linimentum, cum quo assidue illinantur regio lumbalis et spina dorsi mane nocteque.

I have found this application extremely useful in the excessive discharge of albuminous urine, which is not infrequently met with in young subjects. I have likewise employed it with other means in the mellitic state of urine; but it was difficult to determine what share of the temporary benefit derived was owing to it.

39. *ii.* *The Treatment in which the Author is most disposed to confide.*—It is not easy to form to ourselves precise and rational indications of cure in this disease, particularly as opinions respecting its nature are not supported by a sufficient number of accurately recorded facts; nor are those which have been observed so constantly present, or so uniformly grouped, as to permit us to draw indisputable pathological inferences, for the basis of therapeutical indications. I shall therefore state succinctly the method of cure, which is sanctioned by my own observation, and by experienced physicians. The remark which has been made by Dr. PARR, Dr. PROUT, and others, that this disease should be viewed in a two-fold light—namely, 1st, as respects its saccharine state independently of the increase of its quantity; and, 2d, as regards this state in connection with an augmented secretion—should be kept constantly in recollection; and, although the discharge of an increased quantity of urine, in addition to its saccharine condition, generally indicates either a more advanced or a more severe state of disease, yet we should be aware that the saccharine change is the more important of the two; and that it is much more easy to diminish the quantity than to improve the quality of this

secretion. Dr. PROUT justly remarks, that it is exceedingly doubtful if there be any remedy that exerts a specific action in improving the quality of the urine—at least, there is none at present known. The improvement can therefore be attempted only by those agents that have a tendency—1st, to restore the general health and assimilative energies of the frame; and, 2d, to diminish the quantity of the secretion.

40. These ends are generally all that we can reach; and, by attaining them, we sometimes advance still further, and thereby improve the quality also of the discharge. There are, however, other subordinate objects, which, although they might be accomplished with the fulfilment of the chief ends now proposed, yet often require an immediate regard; and the more especially as their attainment very frequently promotes the chief intentions of treatment. These are—*a.* To remove a congested, loaded, or oppressed state of the vascular system, and reduce the quantity of the circulating fluid more nearly to a level with the amount of vital power and assimilative function. *b.* To promote and improve the secretions employed in digestion, and excite the exhalations and secretions from the respiratory and intestinal surfaces. *c.* To remove the unsupportable and harsh state of the cutaneous surface, to increase perspiration; and thereby to lessen the determination to the kidneys. *d.* To diminish the morbid sensibility and irritability of the frame, with the other morbid phenomena allied to them. The means which we employ in attaining both the principal and the subordinate objects which I have now stated, will, of course, vary exceedingly, according to the particular features of individual cases, and the constitutional powers of the patient. The previous duration of the disease—the degree of activity it may present—the age of the patient—the state of the circulation—and the particular condition of the urine, as respects both its density and quantity, should individually and collectively be considered by the practitioner as circumstances calculated greatly to modify the means of cure; and should weigh so entirely with the judicious, as to lead them to consider even the best practical suggestions which can be offered as applicable merely to some cases, and as requiring to be varied, and rendered appropriate to others. It must be obvious that we cannot endeavour to attain, *seriatim*, the ends now proposed; for a judicious and an active treatment will often fulfil two or more of them contemporaneously.

41. I have already noticed the opinions of Dr. WATT and others (§ 37.) as to blood-letting. In cases of recent occurrence, with an active state of the circulation, and pain in the loins, with much heat and pain in the epigastrium, or where congestion or oppression of the vascular system exists (§ 40. *a.*), I consider general blood-letting, repeated as often as the circumstances may require, as requisite to fulfil the intention stated above (§ 40. *a.*). The frequency of, or even the propriety of repeating, the operation will depend much upon the appearances of the blood drawn, and the effects produced by it. If the crasis of the blood be weak—the coagulum being loose, and dark—I have seen no benefit derived from it until the vital energies have been somewhat excited by appro-

priate means. If, however, doubts respecting the propriety of its repetition be entertained, cupping upon the loins, or upon the hypochondria, or the application of leeches on the epigastrium, according as the sensations of the patient may direct the practice, should be substituted, and carried to an extent, as respects quantity and frequency of repetition, on which the observation of the practitioner will enable him to decide. In protracted cases, when the disease occurs in old subjects, when the debility is great, and the pulse quick, small, or weak, general blood-letting is not productive of benefit. If, even in these cases, much pain, tenderness, or fulness be complained of about the epigastrium, local depletion, as now recommended, may be employed in its vicinity. It will often happen that blood-letting—especially general blood-letting—will, at first, either be inadmissible, or of little or no service; and yet it will subsequently prove of very great benefit, after the other parts of the treatment have prepared the system for it. This fact should not be overlooked at any period of the disease, even in the most unpromising cases.

42. Immediately after depletion, a complete evacuation of the bowels, either by a dose of castor oil, or by the following pill, repeated according to circumstances, will generally be directed with advantage:—

No. 166. R Extr. Colocynth. Co. ʒ ss.; Pulv. Ipecacuanhæ gr. iij.; Saponis Castil. gr. viij.; Olei Crotonis Tiglii ℥ ij. M. Fiat Pilulæ xij. Capiat binas statim, et repetantur binæ quartâ quâque horâ donec plenè dejectit alvus.

The bowels being freely evacuated by the above means, assisted in more obstinate cases by enemata, of which I believe those with from one to two ounces of turpentine to be the most efficacious, a full dose of opium should be exhibited, or of the pulvis ipecacuanhæ compositus, or the following:—

No. 167. R Camphoræ rasæ gr. v.; Pulv. Ipecacuanhæ gr. j.; Pulv. Opii gr. ij.; Pulv. Myrrhæ gr. vi.; Mucilag. Acaciæ, vel Conserv. Rosar., q. s. ut fiat Bolus, statim sumendus.

After having taken this, the patient may have recourse either to a warm or to a vapour bath, have the surface always well rubbed with the flesh-brush on leaving it, and clothe himself in a warm dress with flannel next the whole of the skin. The opium, or the Dover's powder, or the bolus above directed, and the warm bath, may be repeated at intervals varying according to the circumstances of the case. The effect of this treatment is manifested in the state of the skin, and urine, as well as in the feelings of the patient. But, in cases characterised by much debility and irritability, we must vary the means. Here the sulphate or ammonio-tartrate of iron, or the sulphate of zinc, or the sulphate of quinine, combined with opium and capsicum or camphor, and exhibited either in the form of pill or of draught, will often prove of advantage.

No. 168. R Infus. Rosar. Co. ʒ jss.; Quininæ Sulphatis gr. ij.; Zinci Sulphatis gr. ss. ad ʒ.; Acidi Sulph. Arom. ℥ xx.; Tinct. Opii ℥ xx.—xxx.; Tinct. Aurantii. Co. ʒ j.; Tinct. Capsici ℥ xx. M. Fiat Haustus, ter quaterve in die capiendus.

In cases of the same description, Dr. PROUT recommends an electuary with the *carbonas ferri*, and *opium*, and *albumen ovi*. I have given the carbonate of iron in the form of electuary, with confection of senna, &c. (see F. 79. 86. 93.),

in order to preserve a freely open state of the bowels. The combination of tonics and astringents, or even of astringents with aperients, is sometimes useful. I have obtained advantage from the following :—

No. 169. R Pulv. Cinchonæ, Pulv. Rhei, ʒā, ʒ ss.; Magnes. Carbon ʒj; Aquæ Cinnamom. ʒ jss.; Confect. Arom. gr. x. M. Fiat Haustus, bis in die sumendus. *Vel*,

No. 170 R Pulv. Rhei, Pulv. Uvæ Ursi, ʒā ʒ jss.; Aquæ Cinnamom. ʒ jss.; Confect. Aromat. gr. xij. M. Fiat Haustus, bis terve quotidie sumendus.

The above may also be taken with a full dose of laudanum, when the bowels have been sufficiently acted upon, and the irritability of the system is considerable. In order to counteract this symptom, I have on some occasions had recourse to the *hydrocyanic acid* in doses of from one to three minims, in a mucilaginous mixture, or employed it in combination with iron or with zinc, in the state of a *prussiate of iron* and *prussiate of zinc*. The following was lately prescribed, and continued for several days, with advantage :—

No. 171. R Camphoræ rasæ et subactæ gr. xv.; Oxydi Zinci ʒ ss.; tere cum Mucilag. Acaciæ vel Tragacanth. ʒ ss.; Aquæ Cinnamom. ʒ ivss.; Acidi Hydrocyanici ʒj xv. Misce. Fiat Mist, cujus capiat cochlear. j. vel ij. large, ter quotidie, prius agitata phialâ.

43. Whilst tonics or astringents are employed, either of the kind now noticed, or of any other description, the bowels ought to be kept open, not less than two or three satisfactory evacuations being daily procured; and this action should be maintained perseveringly for a long time, either by purgatives given in the intervals between the exhibition of the tonics; or, what is preferable, in conjunction with them as in Form, 266., or as follows :—

No. 172. R Infus. Gentianæ Comp. ʒj.; Infus. Sennæ Comp. ʒss.; Tinct. Rhei ʒ ij.; Spirit. Ammon. Arom. ʒ ss. M. Fiat Haustus, bis terve quotidie sumendus.

No. 173 R Decocti Cinchonæ, Infus. Rhei, ʒā ʒvi.; Tinct. Cinnamom. ʒjss.; Ammoniz. Carbon. gr. vj. M. Fiat Haustus, bis terve quotidie sumendus.

As the difficulty of preserving an open state of the bowels is great in this disease, the quantity of purgative ingredients in the above medicines may be increased, or others added, according to circumstances. Care should always be taken never to employ for this purpose saline medicines, excepting the phosphates in large doses, which are sometimes of service. Even calomel should be avoided, unless conjoined with opium, or when we find it requisite to act decidedly on the biliary secretions, and then a single full dose of it may be given. If the biliary organs require the use of deobstruent remedies, the *hydrargyrum cum creta* is the most suitable preparation in this disease; or the internal or external use of the nitro-muriatic acids (§ 34.), or mercurial inunction. I have seen benefit derived from *iodine*, and *nux vomica*, or strychnine, in several cases of diuresis, but I have had no experience of them in diabetes.

44. In addition to the foregoing, and contemporaneously with the use of purgatives, diaphoretics, opiates, &c., external irritation, and derivation may be resorted to. For this purpose repeated vesication on the loins or epigastrium, or the excitement of artificial eruptions on these parts by croton oil rubbed upon them, seem to be the preferable means. But, to be productive of any service, the external irritation should be kept up for a very considerable time, or frequently repeated. If the above measures fail, we must have

recourse to such of the other medicines as have been noticed (§ 24—38.), as may seem most appropriate to the person under treatment; and we should not be content with trying the various remedies in succession; but so associate, and contemporaneously prescribe them, as to bring their combined action to bear upon the morbid conditions which seem to exist in particular cases.

45. Whilst these means are being employed, the *diet and regimen* of the patient should be regulated, and consist chiefly of animal food, with a small proportion of farinaceous substances. He should abstain from vegetables, particularly those which are sweet and acescent, and from fruits. Animal and farinaceous food are much more easily digested and assimilated than the more bulky vegetables; and, partly on this account, are more suitable to the patient. For, although the demand for food is urgent, owing to the call made upon the digestive organs to supply the waste arising from the nature of the discharge, and to the erethismal state of their mucous surface, yet the digestive and assimilative energies of the frame are defective, and insufficient for those articles which require much change to be effected in them during the process. Beside, animal food furnishes fewer of the constituents of saccharine matter. Much attention should also be paid to the quantity as well as the quality of both the solid and fluid ingesta. Dr. PROUT has very judiciously remarked, that the constant and pressing desire for food generally induces the patient to take by far too much at one time, the consequences of which are not only unfavourable to his recovery, but sometimes dangerous and even fatal: and he refers the greater number of sudden deaths, which is not an infrequent termination of this disease, to errors either in the quality or quantity of the food, or to both, the patient having been frequently cut off after what is commonly called a hearty meal. The diet, therefore, as to its quantity and description, should be strictly regulated by the physician, be chiefly of a solid form, and not taken at longer intervals than four or five, nor at shorter than three, hours. The patient ought also to abstain, to the utmost of his power, from all drink for an hour or to after his meal. Animal food ought not to be taken oftener than twice in the day; and beef-steaks or mutton chops, under-done and plainly cooked, are perhaps the preferable kind. The other meals may consist of any of the farinaceous articles with milk, or occasionally of eggs.

46. The drink also should receive particular attention. Dr. PROUT expresses himself favourable to the use of distilled water. Of this, however, I have had no experience. Lime-water, either alone or with milk, alum whey, and the Bristol Hotwell and Bath waters, have been long celebrated in this disease, and are certainly amongst the most quenching drinks that can be employed in it. I have prescribed the mineral acids, and particularly the nitric and muriatic acids, with seeming advantage. In a case which lately occurred to me, I employed a weak solution of the boracic acid, and afterwards of the sub-borate of soda, with much benefit. In order that the patient may not be induced to drink too largely, the beverages prescribed should be taken in a tepid state, and his resolution be fortified against the seduction of his appetites. In ad-

dition to this diet and regimen, he should remove to a dry and warm situation, should constantly wear woollen next his skin, and keep up a free cutaneous discharge by suitable exercise. Even when he is convalescent, or apparently recovered, this regimen ought not to be abandoned; and the bowels should be constantly kept open by the tonic aperients already recommended, or by an electuary composed of sulphur, magnesia, and confection of senna. Sulphur, in full and frequent doses, is one of the best remedies we can resort to either in the disease or during recovery, as it acts both on the bowels and skin. Errors in diet, or in the use of beverages, and even a single irregularity as to fruit and vegetables, will hazard a return of the disease.

47. iii. *Treatment in the dark-skinned varieties of the species.*—I have had occasion to see two cases of this disease in negroes; and Dr. CHRISTIE has given the particulars of ten or twelve cases which he treated among the natives of Ceylon. In all his cases, as well as in mine, the disease was evidently owing to a very poor vegetable diet, and a moist state of the air. Dr. C.'s cases terminated favourably from the use of animal food, the sulphuret of potass, lime-water, and purgatives. The cases which occurred to me were treated with tonics, purgatives, the warm bath, and diaphoretics and narcotics they derived some benefit, but circumstances occurred which prevented me from knowing the ultimate results.

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DIAGNOSIS. See SYMPTOMATOLOGY.

DIAPHRAGM (from διαφράσσω, I separate).—

SYN. *Υπόφυλλον*, Aristotle. *Διφραγμα*, *Φυρσις*. *Septum transversum*, Lat. *Der Zwergmuskul*, Ger. *Diaphragme*, Fr. *Midriff*, Eng.

1. When we consider the musculo-tendinous structure, and varied connections of the diaphragm,—that it is situated between three serous membranes, and attached to the vertebral column, the ribs and their cartilages,—that it is traversed by the most remarkable nerves and blood-vessels of the body, and itself provided with important vessels and nerves,—that it is in more or less direct contact with the lungs, the heart, the liver, stomach, pancreas, kidneys, and spleen; and intimately associated by its nerves, its vessels, and its functions, not only with the mucous surface of the respiratory organs, as well as with these organs themselves, but also with the digestive and large secreting viscera,—its importance in a pathological point of view must be apparent. The extent of its organic and functional relations are such, that agents acting on either the external or internal surfaces of the body must necessarily influence its actions. It cannot, therefore, be a matter of surprise to find it frequently subject to disorder; but I am at a loss to conceive the reason for the very general neglect with which even its most serious diseases have been treated. This can be owing only to the circumstance of their being imperfectly understood, or referred to some one of the

adjoining organs, and viewed as merely symptomatic or secondary affections.

I. INFLAMMATION OF THE DIAPHRAGM.—

SYN. *Diaphragmitis* (Hildenbrand, J. Frank, &c.); *Paraphrenitis*, *Paraphrosynis* (Rufus Ephesus, et Auct. Vet.); *Diaphragmite*, *Paraphrénisie*, Fr.; *Zwerghmuskell-Entzündung*, Ger.

CLASSIF. III. CLASS, I. ORDER (Author).

2. DEFIN. — *Acute pain and constriction of the lower part of the thorax, extending to the back and loins, increased upon respiration and raising the body erect, with singultus, convulsive distortion of the angles of the mouth, and very acute inflammatory fever.*

3. i. SEAT.—Inflammation of only the musculo-tendinous structure of the diaphragm is a very rare disease, particularly in its primary form; and I believe it is very seldom met with, excepting upon the disappearance of rheumatism from some external part, or after penetrating wounds and other external injuries. As a consecutive or secondary affection, and especially in conjunction with inflammation of one or more of its serous membranes, it frequently occurs, although often either entirely overlooked, or mistaken for inflammation of some one of the adjoining viscera. The advantages of being able to distinguish it in practice are not diminished on this account; and it often becomes of great importance to ascertain its existence, whether as a primary or as a consecutive disease.

4. I believe that inflammation may originate in the cellular tissue connecting the serous membranes reflected over the diaphragm to its musculo-tendinous structure, in which case the disease will extend chiefly to either one or both of those surfaces; but that, in the more frequent states of diaphragmitis, — particularly its consecutive form, — the inflammation commences in one of the serous surfaces, and extends thence, through the medium of the sub-serous cellular tissue, more or less to the other structures of the organ.

5. ii. The CAUSES of diaphragmitis, particularly in its consecutive forms, are generally those which are productive of pleurisy, pneumonia, hepatitis, or peritonitis. In addition to those, I may adduce others, which have a more evident influence in producing this disease, viz. punctured and other wounds; external injuries and fractures of the lower ribs; concussions of the trunk, particularly from missing steps on descending stairs, or from falling upon the hips, immoderate laughter; violent retchings; continued crying and weeping; obstinate singultus; currents of cold air, when the body is perspiring; the incautious use of cold drinks, ices, &c.; the suppression of painful emotions; violent efforts of any description; the repression or metastasis of rheumatism; the stoppage of accustomed discharges; and the drying up of old eruptions or ulcers by external applications. Instances of the occurrence of inflammation of the diaphragm from the repression of rheumatism have been recorded by PATERSON (*Mem. of Med. Society of London*, vol. v. No. 32.) and PORTAL (*Anat. Méd.* t. ii. p. 444.); and from healing up old sores, suppressing gout, &c., by AASKOW (*Act. Reg. Soc. Med. Hafn.* t. i. p. 205.), BOISSEAU (*Nosographie Organ.* t. xi. p. 620.), WENDT, SELLE, and others. HILDENBRAND

considers the habit of wearing tightly laced corsets a cause of the disease. I doubt not that it is, at least, a predisposing cause.

6. iii. SYMPTOMS, COMPLICATIONS, &c. — *A.* Either after rigors, chills, horripilations, &c., or consequent upon disease of some one of the abdominal or thoracic viscera, the patient experiences violent, sharp, burning pain, tension, and cord-like constriction, at the lower part of the thorax, particularly beneath the sternum and hypochondria, and stretching to the loins, — increased and descending lower during inspiration — diminished and ascending during expiration, — augmented by coughing, sneezing, fulness of stomach, and pressure on the abdomen; likewise by vomiting, by the expulsion of the feces or urine, and by bending the trunk of the body in any direction. The breathing is short, frequent, anxious, small, and performed entirely by the intercostal muscles, the abdomen being nearly motionless. The hypochondria fall inwards, or are retracted, and, with the precordia, are sensible to pressure. There are frequently painful and difficult deglutition, referrible to the lower part of the œsophagus and cardia; great anxiety, with occasional interrupted sighs; singultus, particularly towards the close of the disease; involuntary retraction of the angles of the mouth, or risus sardonius; delirium, which is sometimes furious; spasms, or great feebleness of the muscles of the abdomen and extremities; irritable, porraceous vomiting; leipthy-mia or sinking, &c. The pulse is always frequent — at first strong and hard, afterwards small, more quick, wiry, &c. The bowels are constipated and urine in small quantity; thirst is at first urgent, afterwards not felt; and restlessness, particularly as the disease advances, is extreme.

7. *B. Complicated Forms.* — *a.* The symptoms vary considerably with the surface of the organ chiefly affected, and according as inflammation of an adjoining viscus may have preceded, accompanied, or followed that of the diaphragm. When inflammation implicates the diaphragmatic pleura, or extends to the lungs, mediastinum, or pericardium, we must expect to observe many of the symptoms of those diseases; particularly those consisting of lesion of the function of respiration. Percussion will give out a somewhat duller sound than natural; cough will be more or less complained of, and be frequently attended with a watery mucous expectoration.

8. When the inferior surface of the diaphragm is inflamed, the stomach and liver seldom escape participation in the disease. In this case the pain and sensibility of the hypochondria are increased, and the stomach is more severely disordered. When the muscular or tendinous structures are chiefly implicated, the complaint assumes its most violent forms; and, owing to the nerves of the organ being then more seriously affected, the sympathetic effects of the disease, as delirium, the sardonic spasm of the muscles of the countenance, singultus, dysphagia, anxiety, retraction of the hypochondria, spasm of the abdominal muscles, &c. are more constant and severe.

9. Diaphragmitis is sometimes complicated with, at other times consequent upon, acute rheumatism; and I believe that it may be associated both with inflammation of the convex and

posterior part of the liver, and with acute rheumatism, in the same case and at the same time. I am at present attending a patient, in whom there is every reason to infer the existence of this very complicated malady; and am of opinion that similar associations of the disease would have been more frequently remarked in practice, if the severity of the rheumatic pains, and of the remote symptoms caused by inflammation of the diaphragm, had not masked those more directly connected with the affected organ, and thereby misled the practitioner.

10. There are several symptoms which have been adduced by authors as pathognomonic of this malady, but which are not uniformly observed: thus, STOLL, AASKOW, and BOISSEAU have found delirium frequently wanting altogether: and, in several cases, in which I have seen the disease complicated with hepatitis and pleuritis,—particularly the former,—neither delirium, nor the cynic spasm, was present. I agree, however, with J. P. FRANK (*De Curand. Morb. Hom. t. ii. p. 193.*), in considering these symptoms as being more frequently met with in this disease, than in any other affecting the viscera of the large cavities, and particularly when the tendinous part of the organ is affected.

11. *C. Course and Termination.*—The course and progress of this disease are generally acute. If it terminate not in resolution within a few days, it produces either adhesion to the adjoining viscera, or disorganization, followed rapidly by death. When adhesions form, signs of chronic disease of this and the adjoining viscera continue after the subsidence of the acute symptoms; but when disorganization and gangrene supervene, the patient experiences, after a very few days, a sense of suffocation, sinking, with singultus, extreme frequency and smallness of pulse, faintings, &c., speedily followed by dissolution.

12. *D. The morbid Appearances* most frequently found after diaphragmitis are, effusions of coagulable lymph, or of sero-albuminous fluid, or of both, on either of the surfaces of the organ, generally with adhesions, more or less extensive, to the adjoining viscera; increased redness and vascularity, or deepness of colour, of one or more of the different structures composing the organ; false membranes upon its surfaces; portions of it ulcerated, or of a dark colour, softened, and nearly disorganized; and, more rarely, sphacelated in parts, infiltrated with pus, or containing one or more distinct purulent collections.

13. *iv. Prognosis.*—Recovery from this malady should be considered as very doubtful, until we have very unequivocal symptoms of resolution, without any sign of the extension of disease to the organs situated on either side of the diaphragm. *a.* The circumstance of diaphragmitis arising from external injury, or the extension of inflammation from the pleura and pericardium; the early accession of urgent anxiety, followed by delirium; singultus, and sobbing; depressed, collapsed, and anxious countenance, with spasms of the muscles of the face; irregularity, intermission, and smallness of pulse; coldness of the extremities; leipothymia; difficult deglutition; frequent and irritable vomiting, and restlessness; absence of thirst; convulsions; convulsive, frequent, and laborious respiration, &c.; are very unfavourable symptoms. *b.* The subsidence of the urgent symptoms; and improved

state of the pulse, and appearance of the countenance; the occurrence of any of the critical evacuations, or restoration of the suspended secretions, or a sound and refreshing sleep; a more natural respiration, and the absence of serious disease of the collatitious viscera; are the most favourable circumstances.

14. *v. Treatment.*—The intentions of cure are the same in this as in other acute inflammations. The antiphlogistic treatment promises us the principal aid; but to be successful, it must be employed early in a decided manner. Full blood-letting from the arm, the patient being in a semi-recumbent posture, until a decided effect ensues—until syncope approaches, but is not induced—as recommended in another place (see BLOOD, § 64.); afterwards cupping on the loins and back, on each side of the spine: leeches applied near the interior insertion of the diaphragm; purgatives; refrigerating diaphoretics; febrifuge diluents; external fomentations and cataplasms; tepid baths; purgative, and subsequently emollient enemata, with complete stillness and silence; should be employed according to the exigencies of the case. The practitioner ought not to be deceived by the presence of singultus, and the great depression of the powers of life so frequently attendant on the disease; and thus be led to the exhibition of antispasmodics and stimulants, when opposite measures are requisite. Nor should he be induced by the state of the stomach, and of the matters discharged from it, to exhibit emetics. When vomiting is present, it should be allayed; and, for this purpose, as well as to prevent the formation of coagulable lymph and adhesion between the surfaces of the organ and the adjoining viscera, large doses of calomel and opium—from ten to twenty grains of the former, and from one to three of the latter, either with or without from one to three grains of camphor—should be exhibited, and repeated at intervals of six or seven hours; the first dose being given immediately after the first blood-letting. The danger of the disease requires prompt and powerful agents; and, after depletions, the combination of calomel, opium, and camphor, is particularly serviceable.

15. When the disease is associated with inflammation in the adjoining viscera, the calomel should be carried so far as to affect the mouth; and if the pleura or pericardium be also diseased, antimonials and diuretics ought to be added. If the convex or posterior parts of the liver and peritoneum be also inflamed, the use of mercurials are also required, and with nearly the same intentions, viz. to prevent adhesions, and procure the absorption of effused fluids. If the disease be associated with rheumatism, or gout, then, after local depletions, active mercurial cathartics, and derivatives applied to the joints, colchicum, with large doses of soda or potash, or with magnesia, ammonia, or camphor, may be exhibited.

16. It often happens, that after the inflammation in this organ and its collatitious viscera is subdued, considerable irritability, evinced by the occurrence of singultus upon taking substances into the stomach, continues for some time. To remove this, the use of gentle tonics, combined with anodynes and antispasmodics, as the infusion of calumba, with opium, sub-carbonate of

soda, hyoseyamus, or camphor, is generally required, or of the infusion of valerian, or of the oxides of zinc, or the sub-nitrate of bismuth, or musk, &c. *Convalescence*, and the *regimen* of the patient, are to be managed precisely as in other inflammatory diseases.

17. II. DIAPHRAGM, ORGANIC LESIONS OF.

—i. PERFORATION of the diaphragm is not an uncommon consequence of abscess of the liver, pointing up towards the thorax. In the great majority of such cases, adhesion of the adjoining surfaces of the liver and diaphragm has preceded the perforation; and, when this has been accomplished by the disorganising process following the inflammation excited in the diaphragm, the contents of the abscess pass either into the cavity of the thorax, or, adhesion of the inflamed diaphragm to the lungs having also taken place, into the lungs, whence it may be expectorated, and the patient even recover. (See LIVER—*Abscess of the.*) Instances have even occurred of the abscess having thus traversed the diaphragm, and opened into the pericardium.

18. Perforation of the diaphragm has likewise taken place from abscess of the spleen, and from ulcerations of the stomach, which had adhered to the diaphragm. It has very seldom been observed that the perforation of this organ has occurred in an opposite direction, namely, from the thorax downwards. But PORTAL (*Anat. Méd.*) met with a case, in which an imposthume of the lungs opened through the diaphragm, and burst into the abdominal cavity. The diaphragm may likewise be perforated in this direction by aneurism of the aorta. MECKEL also found ulceration of the diaphragm, apparently resulting from chronic inflammation, in the dissection of a maniacal patient.

19. ii. RUPTURE of the diaphragm sometimes occurs from falls; violent succussions of the trunk; vomiting, or severe retchings; blows on the abdomen, back, hypochondrium, or epigastrium; suppressed efforts, and sudden muscular exertions. M. PERCY states, that a young female, suppressing the pains of child-birth, uttered a plaintive cry, had her mouth hideously distorted, and shortly afterwards expired, giving birth to a child. On dissection, the diaphragm was torn obliquely in the fleshy part of the left side. Two thirds of the stomach, with a portion of the omentum and colon, had passed through the rupture into the thorax. On another occasion, M. PERCY found, after a fall, the ribs of the patient very prominent; the abdomen, at its upper part, sunk inwards; and the countenance presenting the risus sardonius. He prognosticated a rupture of the diaphragm, which was found after death. (PERCY, *Dict. de Scien. Méd.* t. ix. p. 214.) Rupture of the diaphragm is not necessarily immediately fatal. BOISSEAU (*Nosog. Organ.* t. ii. p. 623.) mentions a case, where a patient lived six months, and followed his occupations, after the occurrence. A person having taken an emetic, died soon afterwards with convulsions, the cynic spasm of the muscles of the face, &c. On examination, the tendinous part of the diaphragm was found torn near the part where the intercostal nerve passes through it.

20. iii. VARIOUS MORBID PRODUCTIONS have been found more or less intimately connected with the diaphragm, in persons who had experienced

disorder of the respiratory function. These have consisted of *tumours*, of various descriptions, encysted or unencysted; *cartilaginous* or *osseous formations*, and *earthy concretions*, in its surfaces (SCHREIBER, LEVEILLÉ, VOIGTEL); fleshy tumours; and large *fibrous cysts* containing hydatids (PORTAL), or merely an aqueous or serous fluid. It is not infrequently found partially displaced in aneurism of the heart and aorta. Cases of this description are recorded by VETTER and BLANCARD. It is also pressed high into the thorax by enlarged or suppurated liver.

21. iv. SPASMODIC ACTIONS. The diaphragm contracts forcibly in crying, coughing, vomiting, during the expulsion of the excretions, child-birth, and tenesmus. It contracts slowly, but forcibly, and is rapidly followed by relaxation, in sighing. It contracts for a longer time, and is relaxed more quickly in yawning. The contraction is more rapid, forcible, and interrupted by closure of the glottis, in hiccup, sobbing, &c.; and sneezing is owing to convulsive contraction of the diaphragm, followed soon afterwards by convulsive action of the expiratory muscles. In all these, the other inspiratory muscles co-operate more or less energetically.

22. The motion of the diaphragm is generally more frequent, irregular, and unequal, than natural, in convulsive diseases, particularly when the irritation is propagated to this part, or influences the functions of the paravagum, by being extended to the top of the spinal cord, &c. This is evinced in epilepsy, hysteria, pertussis, &c. The contractions of the organ are still more disordered in tetanus, they being nearly permanent about the fatal close of the disease. Death is occasioned by this, rather than by any other circumstance; the permanent spasm of the diaphragm and other respiratory muscles preventing the expulsion of the inspired air, and consequently producing a variety of asphyxy. (See art. HICUP.)

23. v. PARALYSIS of the diaphragm is incompatible with the duration of life, and can occur only during the last moments of existence. It may be induced by the inhalation of noxious gases into the lungs, and from virulent poisons, thus constituting another form of asphyxy: and it is produced by injuries of the medulla oblongata, or in its vicinity, or by whatever may interrupt the functions or injure the paravagum. I have met with a case where it followed, at a remote period, fracture by muscular action of the dentated cervical vertebra, as verified on dissection by Professor R. QUAIN and myself.

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DIARRHŒA.—**SYN.** (*Διάρροια*, from *διαρρέω*, I flow through, *ῥοή* and *ῥέω*). *Diarrhœa Cæcatoria*, *Rheuma Gastro*, Galen. *Rheumatismus*, Alexander of Tralles. *Defluxio*, Cælius Aurelius. *Alvi Fluxus*, *Ventris Profluvium*, Auct. Lat. *Cours de Ventre*, *Dévoiyement*, Fr. *Der Durchfall*, *Bauchfluss*, *Durchlauf*, Germ. *Diarrœa*, Ital. *A Purging*, *Looseness*, &c.

CLASSIF.—2. *Class*, Nervous Diseases; 3. *Order*, Spasmodic Affections (Cullen).

1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting the Digestive Canal (Good).

1. **DEFIN.**—*Frequent, loose or fluid alvine evacuations, without tormina or tenesmus.*

2. Although diarrhœa may occur as an independent or unassociated complaint, yet may it supervene as an occasional or even common symptom, in several maladies. Dr. CULLEN, whilst he admitted diarrhœa as a specific disease, yet viewed it as always symptomatic of other pathological states. That it is so in most cases, cannot be doubted; but that it also is, in some instances, an *idiopathic* disorder, in respect both of its primary manifestation, and of its independence of inflammatory action of the intestinal mucous surface, or of disease of immediately related organs, is equally certain; and fully demonstrated by its causes and progress,—by the effects of treatment, and the appearances observed in fatal cases.

3. **I. SYMPTOMS AND VARIETIES OF DIARRHŒA.**—This disease is usually preceded by various dyspeptic symptoms, sometimes by slight nausea, frequently by uneasiness in different parts of the abdomen, by flatulence, and by pain, particularly before an evacuation takes place. In severe cases, the abdomen is somewhat distended, and tender to the touch, and its temperature increased; and occasionally the stools are preceded by much pain in the tract of the intestines, and accompanied with vomiting, or with fainting or leipthymia; they are always without effort, but are rarely involuntary. Each evacuation relieves for a time the patient's uneasiness, which, however soon returns. The discharges are usually copious, offensive, and feculent at first; but they soon become more scanty, watery, or mucous—often in proportion to the frequency of the calls to evacuation, after each of which the patient feels more and more weakened. Their number varies from three or four to twenty or thirty in the twenty-four hours, but they are not so often voided in the night as in the day. At the commencement of the attack, and in slight cases, the pulse is generally not materially affected; but when vomiting or much griping pain is present, it is often increased in frequency. At an advanced period it is usually small, weak, and somewhat accelerated; the countenance being pale, the body somewhat emaciated, the strength diminished, and the skin dry and very sensible of cold. The tongue is often loaded from the commencement in the middle and at the root, and sometimes is red at the point and edges. The urine is generally scanty throughout the complaint. The evacuations vary remarkably as to the nature of the matters composing them, their colour, consistence, smell, and other appearances, not only in different cases, but even in the same case, at different periods. Nosologists have generally

divided the disease into varieties or species, founded on the different states of the discharges. But this is not a satisfactory basis of classification, as the appearances of the evacuations do not depend upon definite pathological conditions, although furnishing important indications of the seat and state of disease. The most common of these appearances are, the *feculent*, which usually precedes the others; the *bilious*; the *mucous*; the *serous*; the *chylous*, or *white*; and the *lienteric*. But every practitioner must have observed that not only will these discharges present themselves during different periods of the disease, but that two or more of them may co-exist; thus, the evacuations are not infrequently, at the same time, bilious, mucous, and serous; or feculent, bilious, and mucous; or watery and bilious.

i. **IDIOPATHIC DIARRHŒA.**—**CLASSIF.** II. **CLASS**, I. **ORDER** (Author).

4. **DEFIN.**—*Copious, feculent, and frequent evacuations, sometimes preceded by griping, and unattended by fever.*

5. **A. Diarrhœa of Irritation.**—This form of the disease comprises most of the cases denominated feculent by authors, and termed *D. Stercoræa* by SAUVAGES, *D. Crapulosa* by CULLEN, and *D. Fusa* by GOOD. (a) It is usually caused by any stimulating or irritating substance received into the stomach; by too great a variety or quantity of food or drink, or even by a small quantity of that which is unwholesome, or which may disagree with the patient's diathesis, or with the existing state of the digestive organs; by indigestible vegetables, particularly cucumbers, melons, salads, &c.; by various acid fruits, particularly plums, pine-apples, &c.; by acidities generated in the *prima viæ*, and the quality of the nurse's milk; and by dentition in infants.—(b) The *symptoms* in this variety are frequently nausea; severe griping pains before each evacuation; foul, or loaded tongue; copious feculent stools, afterwards becoming frothy, watery, or mucous, and exhaling an offensive or sour odour; the pulse and temperature of the surface being but little affected.—(c) This form generally ceases spontaneously, owing to the evacuation of the offending substances; and the digestive functions are soon afterwards restored, if its cause be subsequently avoided. It may, however, excite some of the other pathological states to which this disease has been ascribed, and be thereby prolonged; or it may terminate in organic change.

6. **B. Diarrhœa of Relaxation associated with Irritation** (*Diarrhœa à Cibis corruptis*, SENNERT)—(a) may be caused by whatever relaxes the tone of the intestinal mucous surface, or of its vessels, by its septic influence, whilst it excites the peristaltic actions of the tube, as stale fish, high game, or any animal food approaching to putridity, over-ripe or decayed fruit, stale vegetables, &c., and putrid, stagnant, marsh, or running waters containing animal matters or exuvia, or vegetable substances in a state of decomposition, or of minute division or solution, &c.—(b) The *symptoms* are, copious, feculent, offensive, and, in some instances, involuntary motions, becoming scanty, watery, and frothy, and preceded by borborygmi or gurglings in the abdomen— seldom by gripings or nausea; a natural or slightly foul, mucous, slimy, or clammy tongue; diminished temperature of the surface;

and a soft, weak or a natural, or but little accelerated pulse.—(c) This variety either ceases as soon as the matters which occasioned it are expelled, or it assumes more severe characters. When it has been produced by unwholesome water, and particularly if this cause continues to operate, it frequently passes into the mucous variety, or into dysentery, or into a chronic state; and sometimes a low remittent form of fever supervenes, terminating in disease of the mucous follicles, and ulceration of the bowels, &c.

II. SYMPTOMATIC DIARRHŒA.—CLASSIF.

III. CLASS, I. ORDER (Author).

7 DEFIN.—*Frequent, and generally morbid, alvine evacuations, from disease of the bowels or collatitious viscera, often attended by fever.*

8. A. *Diarrhœa from acrid, or an increased secretion of, Bile* (the *D. Biliosa*, of authors).—

a. Bilious diarrhœa is a very common variety, particularly during summer and autumn, and amongst Europeans who have recently migrated to warm or intertropical countries. It also frequently occurs in persons who live intemperately, in respect either of eating or drinking; and in those who are harassed by anxieties or the depressing passions, especially if they be of the melancholic temperament. It may be induced also by violent fits of anger, or other intense emotions: an aperient or purgative medicine may even excite it, if the biliary organs be loaded at the time with morbid or acrid bile, and the liver be in an excited state. It appears probable that irritation of the duodenum, in the vicinity of the common duct, may be propagated to the liver and pancreas, occasioning an increased secretion both of bile and of pancreatic fluid; and that, whilst such irritation augments the vermicular action of the upper part of the intestinal tube, thereby accelerating the passage of the chyme along it, the quantity or quality of the secretions poured into the duodenum excites the internal surface of the bowels, increasing both their secreting and contractile functions.—(b) The *evacuations* in this form of diarrhœa are at first feculent, and commonly of a green or greenish yellow, or even bright yellow colour: they afterwards become more fluid and watery, vary in color, and are mixed with thin feculent matter. If the diarrhœa continues, they frequently contain yellowish or greenish yellow mucus, either in large thick masses, or in thin, glairy, or gelatinous pieces, which fall to the bottom of the pan, and admit of being drawn into long filaments; or they consist chiefly of a serous fluid, coloured by the bile, and presenting either a glairy mucus or albuminous flocculi, evidently owing to the irritation caused by the acrid bile having been followed by increased vascular action in the intestinal mucous surface, and an excited state of its follicles.—(c) In this case, *bilious* may pass into *inflammatory* diarrhœa, in either of its forms, as constituting the two following varieties; or into dysentery.

9. B. *Diarrhœa from Determination to, or increased vascular Action in, the intestinal mucous Coat—Inflammatory Diarrhœa* (the *D. Serosa* of SAUVAGES, GOOD, &c.; *D. Aquosa*, of HOFFMANN).—(a) This variety is caused by whatever occasions a greater flux of blood to the intestinal mucous surface, and a freer exhalation and secretion than are natural, by obstructing these functions on other surfaces: as the application of

cold, in any form, to the cutaneous or pulmonary surface, or to both at once; various mental emotions, as anxiety, fright, surprise, &c.; or even the slightest agitation of mind in some constitutions; cold acid beverages, or ices, taken when the body is overheated or perspiring; the suppression of chronic eruptions, or copious or accustomed perspirations or discharges; the disappearance of abscesses, drying up of old sores, and checked menstruation or lochial discharge.—

(b) The *evacuations* are watery or serous, mixed with thin feculent matter, and exhibit every shade, from a dark brownish, or greenish brown, to a pale, greyish, or whitish colour; and they contain, in some cases, pieces of thick gelatinous mucus, or a thin, glairy and stringy mucus; in others, whitish albuminous flocculi; and, in a few instances, large membranous or albuminous shreds or flakes, moulded on the internal surface of the intestine, constituting the *D. Tubularis* of Dr. GOOD. The discharges in this variety are often preceded by sickness or vomiting; by severe griping pains in the abdomen; and are attended by a dry, harsh skin; increased temperature of the trunk; a flatulent state of the bowels; a small, frequent, constricted, but soft pulse; a furred or loaded tongue, particularly towards the root, with red edges and point; and scanty, high-coloured urine. The patient also often complains of an aching, dull pain in the abdomen, sometimes increased by heavy pressure.—(c) Inflammatory action may not exist in every case of this variety; or it may not supervene until after simple determination of blood to, or irritation of, the mucous surface has continued for some time; and, even when present, it does not necessarily occasion the diarrhœa. This variety occurring in *infants*, constitutes what is usually called the *watery gripes* (§ 15.), and sometimes gives rise to one or more intus-susceptions; or it passes into chronic-diarrhœa, with disease of the mucous and mesenteric glands; or into slow remittent fever, marasmus, and fatal exhaustion.

10. C. *Diarrhœa from excited or inflammatory Action of the mucous Follicles* (*Catarrhus Intestinorum*, of various authors; *D. Catarrhalis*, of BOERHAAVE; *D. Mucosa*, of CULLEN, GOOD, &c.; *Caliaca Mucosa*, SAUVAGES).—(a) This form generally appears in the course of functional disorder of the digestive organs, particularly indigestion, hypochondriasis, costiveness, and colicky affections; which may be viewed as predisposing to it, by favouring the accumulation of mucous sordes in the follicles and on the internal surface of the bowels; and is excited by the causes already enumerated, especially those of the preceding variety (§ 9.). It occurs most frequently in old persons, or in those who have suffered from chronic disorders of the digestive organs; and in *children*, particularly during the period of first dentition.—(b) The *stools* often consist entirely of thin gelatinous mucus; frequently, also, of thick mucus, and a considerable quantity of watery or serous fluid; sometimes the mucus is mixed with this fluid and thin feculent matter, or is accompanied with small pellets of feces; and occasionally it has the appearance of a semi-transparent mucilage, passing into a muco-puriform matter. The consistence of the motions varies much; and in some cases they are very offensive, but in others without any odour.

In many instances they have a greenish or yellowish green colour; in others, an orange or yellow tint: in a few cases, they are nearly colourless, or white, and thin, constituting the *D. Alba* of HILLARY; the *Fluxus Coliacus* of some writers; the *Album Alvi Profluvium* of PISO; the *D. Pituitosa* of SAUVAGES; the *D. Coliaca* of CULLEN; the *D. Chylosa*, or *Lactea*, of several authors. These appearances are chiefly attributable to the morbid action of the mucous follicles in some part of the digestive tube, most probably in the colon; to the presence or absence of the biliary and pancreatic secretions; and to the states of these secretions. This, as well as the preceding variety, may or may not be attended by febrile symptoms, may assume the acute character, and may pass into the chronic form, the mucous discharges in this latter case often presenting a light, whitish, or muco-puriform appearance.—(c) When mucous diarrhœa continues for some time, or becomes chronic, it occasions emaciation; a dry, harsh, or foul skin; and, in children, gives rise to marasmus, disease of the mesenteric glands, &c. When it becomes chronic, the stools sometimes assume a whitish, or mucilage-like, or greyish appearance, evincing the absence of bile; or they pass into a muco-puriform state, occasionally streaked with blood; or they contain long whitish shreds, or threads; and consist either altogether of these matters, particularly if the disease be seated low in the large intestines, or of an admixture of thin feculent matter with them, particularly when the upper portions of the colon and termination of the ilium are affected. In some cases of this form, occurring during difficult dentition, or after the use of calomel or mercurials, or upon the suppression of ptyalism, the stools have consisted of a thin, ropy mucus, of a translucent hue, and have seemed to be chiefly augmented pancreatic secretion. In children especially, when mucous diarrhœa has assumed the chronic form, the evacuations often present the *chylosa* or milky appearance just noticed,—the *Chylous Diarrhœa* of DEWEES and others. This state is attributed by them to the presence of chyme, or imperfectly elaborated chyle, which the lacteals refuse to absorb; and to the absence of bile: to which causes it is very probably partly owing, as well as partly to the morbid secretions of the mucous surface and follicles. Whatever appearance this variety may assume, it is frequently followed by the next.

11. *D. Diarrhœa from Ulceration of the mucous Follicles*—(a) occurs either consecutively of the two foregoing varieties, or in the course of several febrile or chronic diseases; in which cases, however, it is very often preceded by serous or mucous evacuations, or by both. But ulceration may take place without any such indication, and without the bowels being much, or even at all, relaxed.—(b) The stools are usually muco-puriform, streaked with blood; sometimes containing shreds or threads of albuminous matter; and mixed with thin, watery feces, particularly when the disease is seated in the small intestines or cæcum. When the large intestines are chiefly affected, the muco-puriform discharges may contain little or no feculent matters; or these matters may form distinct portions of the stools, or may consist of detached pellets. In

some instances, the stools have been very dark, grumous, watery, and fetid; and, occasionally, merely thin, serous, or mucous, or both, varying in colour, and more or less feculent and offensive; and yet ulceration has nevertheless existed. In rarer cases, they have been quite black, grumous, and melanoid; or resembling ink, probably from the admixture of blood exuded in the small intestines, and changed by the action of the secretions—whether healthy or morbid.—(c) In this variety of diarrhœa, the emaciation becomes extreme, and the skin assumes a dry, harsh, foul, or lurid appearance. The pulse, in its latter stages, is quick, small, and weak. Aphthæ sometimes appear on the lips and tongue; and hectic fever, with exhaustion, prevails.

12. *E. Diarrhœa with the Discharge of unaltered Ingesta; Lientery* (*Auritia*, Gr.; *Lubricitas*, vel *Levitas Intestinorum*, Lat.; *D. Lienterica*, of CULLEN; the *Lienteria* of SAUVAGES and others)—(a) occurs more frequently, in children, before the period of the second dentition, than at later epochs; and it is generally the consequence or sequela of inflammatory irritation of the digestive mucous surface, and disease of the mesenteric glands—of the advanced stages of these pathological states. It is most common during the first dentition, particularly when the canine and molar teeth are about to appear; and, in this class of patients, as well as in adults (in which latter it is comparatively rare), it either follows dysentery, or is a concomitant of the last stages, or chronic states, of one of the preceding varieties—commonly of the *serous* or *mucous*—than a primary form of the disease. It is caused by the same remote agents which induce these its primary conditions; and it evidently depends upon a similar state of increased peristaltic action, and deficient vital function, of the stomach and duodenum, to that which obtains in the intestines; the food being thereby propelled onwards before it has undergone the changes usually produced by these organs, and discharge from the bowels but little altered from the condition in which it passed into the stomach.—(b) The appetite is usually voracious in this variety, particularly in children, although the emaciation and debility may be extreme. The biliary secretion is also deficient or vitiated; and, in some cases, it appears nearly or altogether wanting in the stools, owing rather to the weak or imperfect action of the liver, than to obstruction.—(c) It usually terminates in stupor, and death from exhaustion; although recovery sometimes takes place when it is early and judiciously treated.

13. II. OF CERTAIN RELATIONS AND MANIFESTATIONS OF DIARRHŒA.—I. The Causes of this disease have been noticed in the description of its different varieties.—(a) Diarrhœa is most frequent in childhood, particularly during dentition, and in persons of a weak constitution and lax fibre; and in those addicted to spirituous liquors. I have observed a tendency to it in some families—sometimes in all the children of a family, one of the parents being possessed of the same liability.—(b) It is endemic in some places, evidently owing either to their humid, close, and miasmatic situation, or to an impure state of the water, especially in large cities or towns; or to the nature of the food in common use.—(c) The epidemic prevalence of diarrhœa

has been noticed by BARTHOLINUS (*Hist. Anat.* cent. ii. his. 65.), SYDENHAM (*Opera*, p. 160. 209.), and LEICHNER (*De Diarrh. quadam Epid.* Erf. 1676.); and, in some summers and autumns, its frequency has been so great, within my own experience, especially in children, as to justify me in stating that it sometimes assumes this form.—(d) It has also occasionally put on a *periodic* character, particularly when it has arisen from endemic causes, and been connected with a masked or latent intermittent. It has appeared monthly, in females whose menstrual discharges have been suppressed,—and thus constituted a substituted evacuation.

14. ii. *Puerperal Diarrhœa* may occur either very soon, or a few days, after delivery. It is occasioned by a neglected state of the bowels previously—by the irritation of collected feces, or by the irruption of morbid secretions into the intestines. When it proceeds from the former cause, the evacuations are feculent, lumpy, offensive, and attended by some degree of tenesmus; when from the latter, it is often accompanied with sickness, or vomiting, and sometimes with cramps of the lower extremities; the stools being fetid, bilious, dark green, or greenish yellow, with whitish flakes floating in them. It may be connected with suppression of the lochia, or of the milk; but, in such cases, it is rather the cause than the effect of the suppression. It commonly originates in one of the states of disorder now mentioned, or in both. When, however, such a degree of irritation of the bowels is produced, as will be followed by excited vascular action, suppression of either the milk or lochia, or both, may follow, with more or less febrile commotion. Cases of this description usually do not supervene until a few days after parturition; and are attended by the phenomena of serous or inflammatory diarrhœa, with disordered biliary secretions, offensive dark stools, with albuminous whitish flakes or flocculi, quick pulse, and symptomatic disorder of various functions, favoured by the puerperal state. The more strongly marked cases of this form of disease pass into and constitute what has been termed *Intestinal Fever* by BURNS and others. (See *FEVERS of the Puerperal State*.) The slighter cases even not infrequently terminate in chronic inflammation of the intestinal mucous surface, with all the symptoms of mucous diarrhœa, or of ulceration of the follicles, or of dysentery.

15. iii. In *Infants and Children*, diarrhœa is remarkably frequent,—especially from the commencement of dentition, or the time of weaning, to the third year of age; and is, in respect both of its phenomena and of its contingent effects, a most important disease. These states of it which are identical with those generally observed in the adult, have already been noticed, particularly the *serous*, *mucous*, and *lienteric*.—a. The first of these, in the form of *watery gripes*, may appear previously to the period of dentition; and then it is connected with the state of the nurse's milk, or too early or over feeding, which induces acidity of the prima via; with either inflammatory excitement of, with augmented secretion from, the mucous surface, or increased and irregular action of the muscular coat, or both. In either case, the disease may be very *acute*—may run on to unequivocal inflammatory action, and may occa-

sion intus-susceptions, with scanty, dark, watery, or mucous and bloody stools, terminating in convulsions and death; or it may be prolonged into the *chronic* state, owing either to neglect, to the continuance of the causes, or to injudicious treatment. When it lapses into this state, the evacuations become very offensive, watery, of a dark green, brown, or curdly appearance; are preceded by severe griping; and are voided suddenly and violently, frequently with much flatus and straining. In these cases, there are also more or less febrile symptoms; and, in its advanced stage, often a raw or aphthous state of the mouth; the disease assuming the *lienteric* form, or occasioning rapid exhaustion. In such cases, morbid secretions, and knotty or curdly feces, frequently are retained about the sigmoid flexure of the colon; and fatal cases generally present the termination of the ilium, the cæcum, and lower part of the colon, more or less changed in structure; or exhibit, along the greater part of the digestive canal, the appearances usually consequent upon inflammatory action of the mucous surface.

16. β. Diarrhœa is also very common in delicate children, at the *period of weaning*; and, in many cases, is connected also—although not necessarily—with the irritation of difficult dentition. It usually assumes a *chronic* form; and is most severe and most rapid in its progress in infants who have been much too early or abruptly weaned, and improperly fed at the time, or afterwards. This form of diarrhœa was described very minutely by Dr. CHEYNE, under the term "*Atrophia Ablactatorium*," or "*Weaning-brash*;" and afterwards by CRUVEILHIER, ANDRAL, and others. The evacuations are usually greenish, watery, or slimy; sometimes ash-coloured and *lienteric*; and attended by griping pains, often by retchings and vomiting, with symptomatic fever. The appearance of the stools, however, varies very remarkably; but they generally partake more of the serous, bilious, or *lienteric* characters, than of any others: thereby indicating, what, indeed, is displayed on dissection, namely, the inflammatory nature of the disease, and its extension along the alimentary canal, and even to the liver. It usually occurs during summer and autumn, particularly when the seasons are moist and hot; and is seldom of shorter duration than four or five weeks, or longer than three or four months. It is evidently a milder grade of the same pathological states which give rise to the disease I have described under the name of *Choleric Fever of Infants*: and, although it is connected in its advanced stages with inflammatory action, yet it is very probable that the inflammation is of an *asthenic* kind; and that it originates in irritation produced by acrid and morbid secretions, and by imperfectly digested and improper food, or by an unhealthy state of the nurse's milk. It is attended by great emaciation and debility, and frequently terminates in fatal intus-susceptions, convulsions, or coma from exhaustion, or serous effusion within the head, or from both.

17. γ. In rarer instances, a *peculiar form* of diarrhœa occurs after weaning, in which the stools are not so very frequent or abundant, but they are pulpy or semifluid, of a clayey colour, and very offensive; and accompanied with an abun-

dant secretion of pale, ammoniacal, albuminous, and fœtid urine,—both the stools and urine emitting a nearly similar smell. The abdomen is full and soft; the skin generally cool; the mouth, lips, tongue, and fauces are red; and the debility great: emaciation rapidly follows; and, in some cases, the bones yield from the absorption of the phosphates which are probably carried off by the urine; the disease partaking as much of the characters of diuresis, or *albuminous diabetes*, as of diarrhœa. A bilious form of diarrhœa may also occur as a symptom of incipient disease of the membranes of, or effusion into, the ventricles; or irritation about the origin of the nerves.

18. iv. The *Dark Races* of our species, particularly the *negro*, are much more liable to diarrhœa than the white; and in them it usually assumes a chronic state, and frequently the mucous form. It also very commonly presents *asthenic* characters, is often *complicated* with intestinal worms, and is prone to pass into dysentery, or to be followed by rapid depression of vital power.

19. III. ASSOCIATIONS OF DIARRHŒA.—(a) This affection may attend the *commencement* of dangerous maladies, particularly fever, dysentery, pestilential cholera, hepatitis, meningitis, &c., owing to irritation of the mucous coat of the intestines, to the flow of morbid or acrid secretions into them, &c., the evacuations being feculent, bilious, mucous, or serous.—(b) Its occasional association with gout has been noticed by SYDENHAM, BAGLIVI, MUSGRAVE (*De Arthrit. Anom.* cap. 4.), and LORENZ; and has given rise to the *D. Arthritica* of SAUVAGES. In *children* it is very often complicated with bronchitis, especially during dentition. It may constitute a serious, or even dangerous, *complication* in low remittent or continued fevers, in scarlatina, small-pox, measles, hepatitis, &c.; and may proceed either from determination of vascular excitement to the abdominal viscera, particularly the intestines; or from inflammation, ulceration, &c. of the mucous coat in some part of the canal, especially after retrocession, or repulsion of the eruption in the exanthemata; the stools being serous, dark-coloured, with whitish flocculi or flakes, or mucous, and sometimes bilious. It is also often associated, in its chronic states, with mesenteric disease and worms.—(c) It may be *critical* in several febrile and inflammatory diseases; the discharges being bilious, homogeneous, &c. (See *CRISES*, § 8.)—(d) It is also frequently *colliquative*, or the result of exhaustion of the constitutional powers from protracted disorganizing disease—as pulmonary consumption, chronic abscesses, diseased joints, hectic fever, and morbid states of the blood, caused by the absorption into it of purulent or other matters generated in any part of the body. In such cases, it more directly depends upon disease affecting particularly the mucous follicles, the tone or vital cohesion of the mucous surface and vessels supplying it being diminished; and the evacuations being mucous or muco-puriform, or serous and grumous, or sero-puriform and partly feculent. Colliquative diarrhœa is also frequently dependent upon ulceration, apparently commencing in the follicles, and often without any evidence of antecedent inflammatory action, at least of a sthenic kind.

20. IV. DURATION, TERMINATION, AND APPEARANCES ON DISSECTION.—A. Diarrhœa, particularly in its idiopathic state, is generally of short *duration*; but bilious and mucous diarrhœa may be much longer protracted. I have seen the former continue, in a warm climate, for several months; and, in this country, nearly as long, sometimes with short remissions. The *serous* and *mucous* varieties often assume an *acute* character, in respect both of intensity and duration; but they frequently also, particularly the latter, degenerate into the *chronic* form; either retaining their specific distinctions, or assuming those of ulceration or lenteria. When the disease has even been cured, there generally remains during life a liability to its return, particularly when it has passed into the chronic state, and has possessed the *mucous* character. A slight diarrhœa may continue the greater part of life, and at last pass into dysentery.*

21. B. Diarrhœa may *terminate*—(a) in *dysentery*, from an increased affection of the large bowels, frequently connected with inflammatory action or ulceration of their mucous surface and follicles, and spasmodic action of the lower part of the colon: (b) or it may run into *enteritis*, or even *peritonitis*, particularly when it commences in the serous form, owing to the extension of inflammation from the internal to the more external coats of the intestines; or to the perforation of them by ulcers; and it may end in abdominal dropsy: (c) or it may give rise to *convulsions*, to intus-susceptions, particularly in children: and (d) it may assume the *chronic* form, varying in severity and duration, and occasioning mesenteric disease, emaciation, and exhaustion; and it may be prolonged even for years, with irregular remissions and intermissions.

22. C. The *appearances* on dissection can be ascertained only in severe or chronic cases, or in those who have died of its complicated states; or of some other disease on which diarrhœa had supervened, or with which it was associated. In some recent or slight cases, the *mucous coat of the intestines* has been found quite pale and bloodless; and the follicles, only, more developed than usual. In others, it has been somewhat softened, or merely injected; occasionally it has been congested and discoloured, the injection or congestion generally existing in patches or streaks, between which it has been quite pale. In more chronic and severe cases, it has likewise been pale, anæmic, and softened; in some, inflamed, congested, and of every shade, from a rose tint to a brownish or purplish colour—commonly in streaks or patches. In some instances, either without, or in addition to, these and other appearances about to be no-

* Some years ago, I was consulted by a well-known and eminent person past the middle age, of the sanguine temperament and plethoric habit of body, and a rigid water-drinker, who had always had diarrhœa—at least for twenty years. He was directed to be blooded; and the diarrhœa was moderated merely, without being checked, when it became unusually troublesome, as apoplexy was dreaded, and as he was otherwise in excellent health. Soon afterwards, he went to South America, where the diarrhœa passed into acute, and, afterwards, chronic dysentery, which reduced him, from a full and almost corpulent habit to a state of extreme emaciation. In this state he met with a dangerous accident, from which he lost so much blood that he rallied with difficulty. He recovered, nevertheless: the dysentery was cured; and the diarrhœa, upon my seeing him again in London some years afterwards, had not returned.

ticed, the mucous and *submucous* tissues have been œdematous, thickened, and very much softened. Inspissated mucus, or even coagulable lymph, and more frequently a thin, brownish or greyish, or puriform mucus, have been found covering the diseased surface. In some cases of children, the intestines have become soft, white, almost diaphanous, and easily torn; and have contained a purulent, custard-like matter. Their calibre, in a few instances, has been greater than usual; but much more frequently diminished, or even much and irregularly contracted, particularly in the part chiefly affected. In some instances, small pustules containing purulent matter have been observed, apparently unconnected with the follicles; and, upon breaking, have left merely a slight, superficial, and reddish ulceration, or excoriated-like surface (BRIGHT and myself). Both the small and large intestines have occasionally presented one or more intussusceptions — sometimes a number, especially in infants and children; and, in fatal cases, soon after weaning, softening, with or without inflammatory appearances, has often also existed in the *stomach* and *liver*. The intestines have been, in some instances, of a darker hue than natural, externally as well as internally; either in large portions, or throughout, and occasionally in thickly disseminated dots or points. The *mucous glands*, particularly in severe or chronic cases, and those belonging to the mucous and *lienteric* varieties, have been very generally found either prominent, enlarged, inflamed, or the seat of ulceration, or of a dark or blackish colour, by BRUNNER, STARK, LIEUTAUD, BANG, ABERCROMBIE, BRIGHT, ANDRAL, ANNESLEY, and myself. Fungoid ulcers in the situation of the follicles, often with prominent and inflamed bases, have likewise been observed by these writers. BRUNNER (*De Gland. Duodeni*, &c.) noticed their prominent and enlarged state in the duodenum; and STARK (*Klin. Bemerk.* &c. p. 7.) principally in the large bowels. I have often observed them enlarged, or otherwise diseased, in the former of these situations, in cases of the *lienteric* and *atrophy* of children; but those of the *cæcum*, of the termination of the *ilium*, and of the *colon*, are more frequently affected in this class of patients. The *mesenteric glands* are often inflamed, or enlarged, or indurated, particularly in young subjects, and in chronic and *lienteric* cases. The *gall-bladder* sometimes contains greenish bile; and the *liver* is occasionally more vascular than natural. The parts most commonly or most severely diseased are the *ilium*, especially its lowest third, and the *cæcum*. The absence of any appreciable lesion in some cases, and the slight nature of those observed in others, militate against the doctrine of BROUSSAIS as to the universal dependence of diarrhœa on inflammation of the intestinal mucous surface. He, however, contends that the blood had retired, in such cases, from the inflamed capillaries into the veins, at the time of, or after, death; thereby leaving no traces of inflammation observable on dissection. This change may occur in vessels that are simply excited, or after *erethism* merely of the mucous coat (states most frequently attendant upon slight diarrhœa); but not when inflammation has actually existed. (See DIGESTIVE CANAL — Pathology of.)

23. V. DIAGNOSIS. — (a) Diarrhœa is dis-

tinguished from *dysentery* by the *tormina* and *tenesmus*; the scanty, mucous, and bloody evacuations; and the more early and marked febrile symptoms, of the latter. In it, the calls to stool are almost incessant and abortive, and the motions are nearly destitute of feces, or sometimes contain *scybalæ*. In the former, the gripping pains, even when most severe, never equal the *tormina* of dysentery; of which the distressing *tenesmus*, the quick pulse, the increased frequency of the calls to evacuation during the night, the presence of *strangury*, are also pathognomonic. — (b) Diarrhœa differs from *cholera*, in the much less severity of attack; by the absence of spasms of the extremities; by the entire absence, or occasional occurrence merely, of nausea or vomiting; and by the milder character and less rapid progress of the former. Bilious diarrhœa, however, is sometimes merely a slighter form of bilious cholera; the existence of spasms in the latter constituting the chief difference, excepting as to grade: and *pestilential* cholera very frequently commences in some one of the common forms of diarrhœa. — (c) Diarrhœa differs, in certain of its varieties — especially the fourth, fifth, &c. — but little from inflammation of the internal surface of the intestines, excepting as respects the activity or acuteness of the affection, and the extent to which the constitution sympathises with the local disease. Put although certain states of diarrhœa are chiefly owing to inflammatory action, still this action is attended by increased exhalation and secretion from the mucous surface, whilst inflammation, either limited in extent, or of a low grade, may exist in this situation, and particularly in the follicles, without the alvine evacuations being either frequent or increased, and even in some instances they may be constipated. It is chiefly from the quickness of the pulse, and the evening accessions or exacerbations of fever; from the sensations of the patient on pressing and examining the abdomen; from the temperature and state of the skin, particularly in this situation; and from the whitish, furred, or reddish appearances of the tongue, and the state of the discharges; that the existence of inflammation of the mucous surface or follicles of the intestines, in diarrhœa, or independently of diarrhœa, can be inferred.

24. The PROGNOSIS. — (a) of *idiopathic* diarrhœa is generally favourable: it is usually slight, and soon subsides after the removal of the offending cause. There are, however, few disorders that will be more readily aggravated, or converted into a more serious disease, by injudicious treatment. — (b) The *symptomatic* varieties of the complaint are to be viewed entirely as respects the pathological states which occasion them. The *serous* and *mucous* forms, especially when they assume the *chronic* state, or occur in children after weaning, should always be considered as serious affections, and a cautious prognosis ought to be given. The varieties referred to ulceration, and to the appearance of undigested substances in the stools, are very dangerous diseases, requiring the most judicious medical treatment and regimen; and, even with these advantages, the larger proportion will terminate fatally. — (c) The *complicated* states of diarrhœa, unless those attending the commencement, or marking the crisis, of diseases, are all more or less serious or unfavourable, espe-

cially colliquative diarrhœa. The degree of danger they portend is particularly noticed in the articles on the maladies with which they are most commonly associated. In all the forms and states of this complaint, the causes, the effects of previous treatment, and the constitution, the habits, and existing state of the patient, ought to be carefully considered before we form an opinion of the ultimate issue.

25. VI. TREATMENT. — I. Of IDIOPATHIC DIARRHŒA. — A. The *Feculent form*, or *Diarrhœa of Irritation*, when recent, requires demulcents or diluents merely, in order to facilitate the discharge of acrid or accumulated matters. This having been accomplished, disorder soon ceases. But the irritating substances may be partly retained, and keep up a prolonged, or remitting, state of disease, with griping pains and scanty stools, which may be partly feculent, mucous, or serous — the latter predominating when the irritation is considerable. In this case, much discrimination is requisite in selecting the aperient which is obviously required; for, if it be insufficient, the disorder will be prolonged; if it be too active, either superpurgation or inflammation will be occasioned. In such cases, a moderate dose of fresh castor oil; or the compound infusion of senna with manna, tartrate of potash, and an aromatic, sometimes with tincture of hyoscyamus; or, when the stomach is not irritable, rhubarb with magnesia and a grain of ipecacuanha, in aqua pimentæ, &c., will generally have the desired effect. In some circumstances, five or six drops of the tinct. opii, in the aperient draught, will both moderate its operation, and render it more effectual. If hyper-catharsis be occasioned by the purgative, a full dose of laudanum, or from one to two drachms of the old paregoric elixir, with external warmth, &c., will soon calm the irritation. When the bowels have been previously constipated, and there is any tension, or hardness, or fulness of the abdomen; or when the stools are partly fecal and partly mucous, or dark-coloured, serous, and muddy; a mild purgative, such as already advised, will be necessary. The practitioner should take into consideration the habits of the patient as to exercise and modes of living, and every argument for or against the existence of accumulated feces in the bowels, and be thereby guided in his practice. When he observes sufficient indications to warrant the exhibition of a purgative, the effects produced by it, the persistence of the irritation, and the state of the abdomen and of the evacuations, will influence him as to the propriety of repeating it, or of prescribing other medicines. If the first purgative have not produced a satisfactory effect, if there be no tenesmus, and if the stools are not very mucous, it will generally be advisable to give a full dose of calomel and of James's powder at bed-time, and either of the purgative doses already noticed early in the morning. When this form of diarrhœa appears to have arisen from acidity in the *prima via*, particularly in *children*, with green, spinach-like, or knotty or scybalous evacuations, a full dose of calomel, or hydrarg. cum creta with magnesia, or magnesia only in anise-seed water, followed by castor oil, will generally be effectual.

26. B. *Diarrhœa from Relaxation*, or from the septic and irritating operation of the injurious ingesta, either solid or fluid, mentioned above (§ 6.), requires demulcents combined with aromatics,

particularly the confect. aromatica, capsicum, and other hot spices. If the action produced by the offending substances on the bowels have been sufficient to have procured their complete discharge, this may be all that is necessary. But if we suspect, from the associated phenomena, that a part of them has been retained, the treatment now advised for the removal of fecal matters should be adopted, with the addition of the aromatics and restoratives just mentioned, in quantity proportionate to the urgency of the case. In cases of diarrhœa arising from putrid matters, capsicum is almost a specific, especially when it is occasioned by fish: burnt brandy is also beneficial in these, after the offending matters have been expelled. When either of the foregoing varieties passes into the *chronic* state, the same treatment will be requisite that is recommended for the chronic mucous form of the disease (§ 30, 31.).

27. II. Of SYMPTOMATIC DIARRHŒA. — A. The *Bilious variety* should be treated with strict reference to the presence of griping pains, and the colour of the stools. In this disorder, calomel has been much too indiscriminately prescribed. In every case of it, the existence of pain or of heat about the region of the liver, about the shoulder blades, &c., or of fulness in the epigastrium, should be ascertained; and, if these exist in any degree, the treatment should be commenced with blood-letting, or cupping, or leeches on the præcordia or hypochondria. An excited state of the substance of the liver may be present, without any increased frequency of pulse or heat of skin; therefore the absence of fever should not prevent the adoption of depletion, which may even be repeated. Next in importance to depletion, is the use of demulcents, lubricating infusions, or diluents with nitre and sub-carbonate of soda, and small doses of antimony, or of camphor, particularly if the papillæ of the tongue be erect, and the stools are not offensive, nor dark or greenish coloured. If they be either, or both, and if the tongue be foul, a full dose of blue pill, or hydrarg. cum creta, may be given, and followed by castor oil, or any other purgative already mentioned, or by the medicines of this kind in the Appendix (F. 96. 205. 430.). When the bile, from either its acidity or its quantity, occasions much irritation, the rectum becomes often excited to spastic constriction, thereby preventing the discharge of fecal and more consistent matters, occasioning tenesmus, or superinducing dysentery. In order to prevent this, or to remedy it at its commencement, the refrigerating demulcents just noticed may be associated, or alternated, with cooling laxatives, and the retention of the morbid secretions in the colon guarded against, and their irritating properties diminished by emollient enemata. The too early exhibition of astringents or opiates is often injurious in this variety; for, although they may afford relief for a few days, and the patient may think himself cured, yet he will soon afterwards complain of uneasiness in the abdomen and region of the liver, with fever, foul or furred tongue, and all the symptoms of hepatic disease, which may be soon followed by inflammation of the substance of the liver, or dysentery. When we suspect that the diarrhœa has been induced or kept up by irritation in the duodenum, the treatment above recommended is quite appro-

priate; and the refrigerants already prescribed, with demulcents and a mild and low diet, should be continued sufficiently long to take effect. Bilious diarrhœa may accompany *difficult dentition*; and in this case, lancing the gums, and the treatment advised in that article, should be adopted.

28. *B. Diarrhœa from Vascular Excitement*, or *Serous diarrhœa*, should be treated with reference to the cause which produced it. — (a) If it have arisen from the irritation of morbid matters, and if the symptoms indicate their partial retention, laxatives or mild purgatives are requisite; but it will not always be safe to exhibit them until general or local depletions, especially leeches applied to the anus, warm baths or fomentations, and demulcents with refrigerants, have been employed. Any of the *mild* purgatives recommended above, or F. 790., may be afterwards exhibited, and their action promoted by demulcent and aperient enemata. — (b) When, however, neither fecal nor other injurious matters are retained, depletions should be accompanied with, and followed by, the internal exhibition of the nitrate of potash, with sub-carbonate of soda, and tincture of hyoscyamus (F. 838.), or tinct. opii comp. (F. 729.), or the paregoric elixir, in demulcent vehicles (F. 728. 866.); and, if nausea be not present, with vinum ipecacuanhæ. — (c) When this form of affection arises from checked perspiration, diaphoretics, diluents, the warm bath, a warm bed, and mild, demulcent or farinaceous diet in small quantity, will generally remove the disorder in a very short time. If it be attended by any heat of skin, or acceleration of pulse, the liquor ammoniæ acetatis, nitrate of potash, and camphor julap (F. 865. 871.), will be of much service. — (d) If the motions be frothy, or emit a sour smell, the chalk mixture with ipecacuanha and opiate, or aromatic confection, will be requisite; and if griping pains with tenesmus be complained of, the pulv. ipecacuanhæ comp. with sub-carb. of soda, mucilage, oleum anisi, and aqua pimentæ, may be given; or the old paregoric elixir (F. 728.) in chalk mixture, and assisted by small emollient and anodyne clysters. — (e) These will generally soon remove the complaint; but when it has become more *chronic*, or is very severe at the outset, or is attended with tenesmus, or seems inclined to pass into dysentery, from eight to twelve leeches, in addition to the previous depletion, should be applied close to the anus, and repeated if necessary, the medicines now recommended (d) being also exhibited in a more decided manner.* In this form of diarrhœa especially, little or no food should be allowed, excepting the

lighter farinaceous articles, as sago, arrow-root, rice-gruel, tapioca, &c. When the complaint has subsided, and the appetite become craving, or when much irritation of the lower bowels exists, chicken, veal, or mutton broth, may be taken; and the same articles, after having been strained, may also be exhibited in clysters.

29. *C. Diarrhœa from Disease of the Mucous Follicles — Mucous Diarrhœa.* — (a) Emetics have been recommended in diarrhœa by HIPPOCRATES, CELSUS (lib. iv. cap. 19.), PICHONET, FONTAINE, SYDENHAM, BANG, and VOGEL; but it is in this variety that they are most serviceable, particularly in its more recent states. In it, also, *purgatives* are required more than in any other. Ipecacuanha is the most appropriate emetic, and small doses of it will likewise be advantageously conjoined with the purgatives or other medicines prescribed. I have usually directed, if the disorder was not removed by two or three doses of the more common purgatives, equal quantities of the oleum ricini and ol. terebinthinæ to be taken on the surface of a suitable vehicle, each alternate morning; a dose of calomel or hydrarg. cum creta, sometimes with Dover's powder, having been given the preceding night, if tenesmus was not complained of; and although this practice has been pursued by me in some hundred instances in the Infirmary for Children, besides occasionally in adults and in private practice, I have never been disappointed in its effects. If, however, it does not very soon remove the disorder, we should suspect the existence of inflammatory action, and have recourse to local depletions, particularly from the anus, to warm baths, fomentations, rubefacient cataplasms or blisters on the abdomen, and a repetition of the alteratives and refrigerants already advised. After morbid or accumulated matters have been removed, and the mucous follicles excited by these medicines to a more healthy action, aromatics, cretaceous powders or mixtures, and the pulvis ipecacuanhæ compositus, or small doses of opium or the paregoric elixir, may be prescribed. Care should be taken not to exhibit astringents or opiates before morbid secretions have been discharged, nor to allow the bowels to become constipated, otherwise a chronic state of the disease or dysentery may supervene.

30. (b) The *chronic* form of this variety usually arises either from a neglected or injudiciously treated acute stage, or as a sequela of dysentery; it is also very common in children; and often occasions, as well as attends, obstructed mesenteric glands. There is no ailment, particularly when existing in children, that requires more discrimination than this. If, after an attentive enquiry into the history and previous treatment of the case, as well as into its existing state, we find the abdomen hot, the skin dry and harsh, the tongue red at its edges, or its papillæ erect, and the pulse excited but not weak, local depletions are required, and should be followed by the tepid or warm bath, or by fomentations,

dulcis ʒ ij.; Spirit. Lavandul. Comp. ʒ j. M. Fiat Haustus quater die sumendus.

The purging ceased; the motions became feculent, and of a healthier colour; the severe paroxysms of pain, and the tenderness complained of in the region of the duodenum, and ducts subsided; and the catamenia became, after a few doses of the borax, copious and more natural.

* This form of diarrhœa is very common in persons addicted to the use of spirituous liquors; and it is, in them, frequently attended by vomiting, and severe inflammatory symptoms referable to the duodenum, and by chronic disease of the biliary apparatus. A case of this description, in a married female of good circumstances, was seen by me, in consultation with an able practitioner, whilst this sheet was in the press. She had, in addition to the above complication, long complained of difficult and very scanty menstruation; this evacuation being watery, and of a greenish colour. She had been bled locally, and very judiciously treated. As the return of this discharge was expected, and taking into account the previous treatment, the following were prescribed; the borax chiefly on account of the scanty catamenia: —

No. 174. R Hydrag. cum Creta gr. iv. Pilul. Saponis cum Opio gr. v. Syrup. Simp. q. s. Fiant Pilulæ ij. omni nocte capiendæ.

No. 175. R Sodæ Sub-boratis ʒ j.; Aquæ Fœniculi

and by moderate doses of the purgatives last recommended. As soon as the stools are improved by these means, aromatics with opiates, or absorbents, or both (F. 623. 633.), may be prescribed; and warm clothing, with light farinaceous food, allowed. If these means be insufficient, a blister, or rubefacients, &c. applied over the abdomen, and the hydrargyrum cum creta, with the pulvis ipecacuanhæ comp. (F. 653.), and small doses of rhubarb, given night and morning, or even oftener, will be of much service. I have frequently prescribed, with the greatest benefit, in chronic cases both of this and the preceding variety, the sub-borate of soda, with honey, and the compound powder of tragacanth and capsicum.

31. (c) Chronic mucous diarrhœa, with whitish, greyish, or mucilage-like stools, arising from the absence of bile, the imperfect absorption of the chyle, and the morbid state of the mucous secretion, requires low diet, consisting entirely of farinaceous substances. At the same time, the hydrarg. cum creta ought to be exhibited twice or thrice daily, with the sub-carbonate of soda or potash, and minute doses of opium. A tonic or stomachic powder or mixture should also be prescribed, with the warm bath, and frictions of the surface upon coming out of it. If these means fail, there is probably disease of the mesenteric glands, — the liquor potassæ may be given in beef-tea, the mild mercurial continued every night, and the purgative draught already directed (§ 29.) also be tried. In some obstinate cases of this kind, I have resorted to the chlorates of the fixed alkalies or of lime, conjoined with the compound tragacanth powder, and aromatics (F. 283.), with great benefit. It will generally be necessary in this state of the disease to rouse the digestive and assimilative functions by tonics, and the action of the liver by mild mercurials; and to combine these remedies with antacids, or with demulcents and aromatics, or with balsams or the terebinthines. The infusions of calumba, or cascarrilla, or cinchona, or cusparia, with carbonate of ammonia, and confectio aromatica, may be first employed; and afterwards the balsams, or vegetable and mineral astringents. In more obstinate cases, the warm salt-water bath, or a tonic, stimulating, or gently rubefacient plaster to the abdomen or loins, or both, may be prescribed, and the trunk surrounded by a flannel roller; a light farinaceous diet being allowed. The treatment now described is requisite equally in children as in adults. This form of chronic diarrhœa is most common in the former; and when it is connected with dentition, requires constant attention to the state of the gums.

32. D. *Diarrhœa from Ulceration* requires very nearly the same treatment that was recommended for chronic mucous diarrhœa (§ 31.), of which it is generally only a modification or consequence. When the evacuations in this variety are fluid, or muddy and fetid, and without tenesmus, the disease is most probably seated in the small intestines; and when arrested by opiates and astringents, uneasiness at the stomach, with nausea and sickness, are usually produced. Besides the means noticed in the preceding paragraph, the terebinthines and balsams may be given, with small doses of rhubarb,

magnesia, tragacanth, &c. The *mistura cretæ*, with tinct. camphoræ comp. and mucilage; the decoction of logwood, with laudanum; the hydrarg. cum creta, with pulv. ipecacuanhæ comp., and either an aromatic or an absorbent; the nitro-muriatic acid, with tinct. opii, in tonic infusions; a decoction of cusparia, with nitric acid and laudanum; the infusion of catechu, with aromatics; sulphur, with carbonate or sub-borate of soda and opium; camphor, with nitrate of potash, or chlorate of soda, and tragacanth; the chlorates, with demulcents or emollients; the nitrate of silver, with tonic extracts, &c.; the sulphates of copper, or of iron, or of zinc, or the nitrate of bismuth, either alone or with opium; lime-water; blisters and rubefacients; demulcent, emollient, and opiate clysters; tepid salt-water bathing, followed by frictions with rubefacient liniments (F. 296. 305.), and tonic plasters, with flannel rollers round the abdomen; are the means which are most to be depended upon, in this unfavourable state of the disease. Animal food generally increases the disorder, and farinaceous articles of diet should be in moderate quantity, or taken after short intervals.

33. E. *Diarrhœa with indigested Matters in the Stools*.—The treatment in this variety should be directed principally with the intention of promoting the functions of the stomach and duodenum. These may, particularly in children, and during the period of dentition, be disturbed by inflammatory irritation of the mucous surface, associated with increased action of the muscular coats (§ 12.); whenever, therefore, this condition is presumed, leeches should be applied over the epigastric region, and be followed by a sinapism, or a blister, with tissue paper interposed between it and the skin, or by a rubefacient cataplasm or liniment. As the biliary functions are usually torpid or otherwise morbid in this variety, and the mesenteric glands often diseased, hydrarg. cum creta, with sub-carbonate of potash, ought to be given at bed-time. The digestive functions will be most permanently promoted by the infusion of cinchona, or catechu, or cascarrilla, or calumba, or of cusparia and rhubarb, with liquor potassæ, or sub-carbonate of ammonia, and small doses of opium (see F. 413. 623. 788. 870.); or by chalybeate preparations, particularly the ammonia-tartrate of iron, with laudanum, or extract of syrup of poppy, or tincture or extract of hop. The use of recent ox-gall, as recommended by HORN (*Archiv. Mar. 1810. p. 335.*), or F. 481., is appropriate in this and the two preceding varieties, and will be very beneficial when it can be exhibited. In addition to these, and other internal and external remedies already noticed, the tepid or salt-water bath or semicupium, will also be productive of much advantage, particularly when followed by frictions of the abdomen or spine with stimulating embrocations or liniments.

34. iii.—(a) *Diarrhœa in the Puerperal State* (§ 14.), when it arises from accumulations of fecal matters and morbid secretions, requires the use of gentle laxatives and mild purgatives, assisted by emollient and aperient clysters, with strictly regulated diet. After the offending matters are evacuated, opiates should be exhibited. When bilious vomiting accompanies diarrhœa, or when the stools are bilious, demulcents, di-

luents, and mild laxatives are requisite, until the morbid secretions are evacuated; but if spasms with much irritability of stomach be present, opiates must be immediately exhibited, with magnesia, and nitrate of potash, which will generally remain upon the stomach; but if these be vomited, small opiate clysters or suppositories should be administered. As long, however, as the stools continue offensive, or otherwise morbid, mild laxatives, and an occasional dose of calomel or blue pill, should be prescribed. In other respects the treatment is to be conducted according to the principles already sketched. —

(b) When, in addition to the accumulation of morbid secretions, slight or chronic inflammation of the mucous surface of the bowels, with serous dark-coloured and offensive evacuations supervene, an emetic of ipecacuanha, if given sufficiently early, will be of service. After its operation, or independently of it, three or four grains of calomel, or five or six of hydrarg. cum creta, with a little magnesia, may be exhibited, and in a few hours afterwards either a dose of fresh castor oil, or any other mild purgative. If griping be present, an emollient and opiate enema should be administered. If the lochia be suppressed, the sub-borate of soda, in doses of from ten grains to a scruple, may be given three or four times daily, in emollient decoctions or infusions (F. 209. 630. 867.), or the liquor ammoniæ acetatis, with spirit. ammon. aromat. and camphor mixture, may be prescribed; mild purgatives or laxatives being repeated occasionally, until the tongue becomes clean and the stools natural. If the disease be not relieved by these means, and if pain be felt in any part of the abdomen upon well-directed pressure, or if a sense of heat or the symptoms of serious diarrhœa be present, general or local bleeding, with the rest of the treatment recommended in that variety (§ 28.), should be put in practice. Having removed morbid matters, or inflammatory irritation, where either or both exist, demulcents, absorbents, gentle restoratives, and tonic or astringent infusions, with mild diet, may be prescribed.

35. iv. In Infants and Children, diarrhœa assumes the bilious, serous, mucous, and lenteric characters: the former two more frequently before weaning, and in an acute form, or at a more advanced age in connection with irritation in the brain; the latter more usually after weaning, and in the chronic states (§ 16.). — (a) In slight diarrhœa, with fluid feculent motions, small doses of rhubarb with magnesia (F. 623. 633.), a grain or two of hydrarg. cum creta at night, and the tepid bath, are all that is required; care being taken that the bowels shall not become costive. If the disorder be occasioned by improper ingesta, or over-feeding, or if it be attended by fever, an ipecacuanha emetic should precede the above means, which ought to be followed by a dose of castor oil; and a grain or two of calomel ought to be given at bed-time, as advised by Dr. CLARKE (*Mem. of Irish Acad.* vol. vi.). When the stools are slimy or serous, and ejected forcibly, with tenderness on pressure, leeches and fomentations should be applied to the abdomen, and small anodyne and emollient clysters thrown up. If the evacuations emit a sour smell, and if they be greenish, or curdled, or frothy, cretaceous substances and magnesia, or ammonia, with aro-

matics, and occasionally with opium or syrup of poppies, ought to be exhibited: after the more urgent irritation is subdued, mild purgatives will still be required, and should be repeated, whenever the evacuations are morbid. Great caution is necessary in exhibiting opiates to infants, either by the mouth, or in clysters, and they ought not to be given when the symptoms indicate the retention of morbid matters in the bowels. In order to evacuate these matters, the following may be prescribed: —

No. 176. R Spirit. Ammon. Aromat. ʒjss.; Olei Ricini, Syrup. Rosæ, et Mannæ Opt., aa ʒ ss.; Aquæ Pimentæ et Aq. Com. aa ʒj. Fiat Emulsio, de qua sumatur Coch. unum minimum vel mediocre, pro re natâ. Vel.

No. 177. R Potassæ Tartar. ʒ ij.; Infus. Sennæ Comp. et Aq. Fœniculi Dul. aa ʒj.; Syrup. Sennæ ʒ ss.; Olei Anisi ʒj. Fiat Mist., cujus capiat Coch. unum mediocre vel amplum pro dosi.

No. 178. R Hydrarg. cum Creta gr. xij.; Sodæ Sub-carbon. exsic. ʒ ss.; Camphoræ rasæ gr. ij.; Pulv. Ipecacuanhæ, Pulv. Opii, aa gr. j. Pulv. Cinnamon. gr. xvij.; Sacchari Albi ʒj.; Olei Anisi ʒj. iv. Tere probe simul, et divide in Cartulas xij., quarum omni nocte, vel mane nocteque, capiatur una.

36. When the diarrhœa proceeds from weaning, either prematurely or at the proper time, the treatment now advised, or that recommended for the mucous variety (§ 30. 31.), should be employed. Dr. CHEYNE directs small and repeated doses of calomel; but, unless morbid matters are accumulated in the *prima via*, — when it should be given in a full dose, and be followed either by castor oil, or the mild purgatives already prescribed, — the hydrarg. cum creta, with magnesia and Dover's powder, or F. 923., is preferable. When the stools are slimy or bloody, or squirted out forcibly, leeches should be applied to the abdomen, and these medicines be also given in small but frequent doses; fomentations, demulcent clysters containing olive and castor oil, the tepid bath, and warm clothing, being also prescribed. If it assume the acute character, or at the commencement of the attack, the treatment prescribed in the article on the CHOLERIC FEVER OF INFANTS (§ 11. 15.), of which it is merely a modification, is in every respect appropriate. When it passes into the chronic form, the means recommended with reference to chronic mucous diarrhœa, or the ammonia-tartrate of iron, with confectio aromatica and compound tragacanth powder, should be employed; the hydrarg. cum creta and Dover's powder being exhibited every night. The abdomen or spine ought also to be rubbed night and morning with either of the liniments (F. 296. 300. 311.), upon coming out of the tepid or warm bath, and be rolled in flannel. When the patient's strength is not much reduced, and if there be fever, and offensive evacuations, much benefit will result from a dose of calomel, with a grain of James's powder, at bed-time, and from one to two drachms of castor oil, with half a drachm of the spirits of turpentine, taken on the surface of fennel water the following morning. Clysters of beef-tea, or of strained mutton or veal broth, well salted, may also be thrown up; and the chlorates of the alkalies or of lime, or lime-water; the sulphate of iron in small doses, with the sulphate of potash; the liquor potassæ, or the sub-carbon. of ammonia, with infusion of cinchona, or of catechu, or F. 183. 536. 363. &c., may be prescribed. With a light nutritious (chiefly farinaceous) diet, a sufficient quan-

tity of salt should be taken; and if the vital powers be much depressed, warm spiced port wine negus may be allowed in small quantities. In the variety attended by copious, pale, albuminous urine, &c. (§ 17.), strong jellies and soups, animal food, fresh eggs very lightly boiled, the chlorates, with small doses of rhubarb, vegetable and mineral tonics and astringents, the preparations of iron, warm salt-water baths, and frictions with stimulating liniments, are the most beneficial. If the bowels become constipated, the mildest laxatives should be prescribed. If the urine be much diminished in the more common form of the disease after weaning, the spirit. atheris nitrici ought to be given; and if drowsiness or *coma* supervene, blisters may be applied behind the ears. These last symptoms are more frequently the consequence of exhaustion than of effusion, when they occur late in the disease: or if effusion take place, it is the result rather of the physical state of the brain, a serous fluid poured out from the vessels filling the vacuum that would otherwise have been left by the anæmic and atrophied encephalon, and requires tonic and restorative remedies. In such cases, more advantage will accrue from measures calculated to support the vital powers, to allay irritation in the *prima via*, and to determine the circulation to the external surface, than from those which depress the energies of life, although they may act beneficially in other respects. It is necessary to watch carefully the state of the gums throughout this serious and obstinate form of diarrhœa, and to lance them whenever they indicate the propriety of the operation.—(d) If the diarrhœa, either in infants or older children, be symptomatic of cerebral congestion, irritation, or inflammation (§ 35.), leeches behind the ears, calomel with James's powder, the semicupium, cold affusions on, and cold applications to, the head, with cooling diaphoretics, diuretics, and external derivatives, are the chief remedies.

37. v. *Diarrhœa in the Dark Races* requires a much more general and liberal use of aromatics, absorbents, and warm astringents, than are admissible in the white variety of our species. In them, capsicum and the other hot spices, with cretaceous powders and mixtures, the preparations of catechu, of kino, of iron, &c., are almost indispensable. When symptoms of retained fecal matters are present, purgatives are requisite, but they should be of a warm and tonic kind, or be combined with substances of this description. Although diarrhœa is only occasionally complicated with intestinal worms in Europeans, and then chiefly in children, or in the inhabitants of low, moist, warm, imperfectly ventilated and unhealthy places, it is very often thus associated in the dark races, and at every age. This circumstance, therefore, should suggest the employment of anthelmintics, especially those which are tonic and astringent, as the decoction of the pomegranate root, or the pink-root, or the male fern, in preference to other medicines, particularly when these parasites are suspected to be present. In this class of subjects, whether diarrhœa be thus associated, or simple, a sufficient quantity of salt with aromatics should be allowed, and the patient's strength be kept up by suitable nourishment, and by vegetable and mineral tonics.

38. vi. *The Associations of diarrhœa* (§ 19.) require the greatest discrimination.—(a) When it accompanies the invasion of fevers, it generally proceeds from the irritation of retained excretions and acrid secretions in the *prima via*. These should be evacuated by an ipecacuanha emetic, and by diluents and demulcents, followed by a full dose of calomel, and this latter by a mild purgative and oleaginous enema. If signs of vital depression exist, warm diaphoretics with ammonia, and occasional doses of rhubarb with magnesia, and the warm bath, should be afterwards prescribed; but if febrile excitement accompany the diarrhœa, saline refrigerants, and the rest of the treatment recommended in the serous variety, will be necessary. (See *FEVERS*.)—(b) When the disorder accompanies *gout*, or occurs in the gouty habit, it should not be checked. Mild purgatives may be first prescribed in conjunction with preparations of ammonia, or one of the fixed alkalies; and when morbid secretions and fecal matters are evacuated, full doses of magnesia, or of potash or soda with the spirit. colchici ammoniatus, and afterwards mild tonics, will generally restore the digestive functions.—(c) When diarrhœa is complicated with *bronchitis* (§ 19.), as often occurs during dentition, local depletions, lancing the gums, and calomel or hydrarg. cum creta, followed by a mild purgative, and these by diaphoretics, demulcents, emollients, the tepid or warm bath or semicupium, and attention to diet and warm clothing, are the means to be chiefly depended upon. In many of such cases, ipecacuanha emetics, and in others, camphorated refrigerants, will be productive of great benefit: the former when the bronchi are much loaded, and the stools are mucous and offensive; the latter when there is much heat of skin, and serous or watery evacuations.—(d) Diarrhœa complicated with *scarlatina*, *measles*, or *small-pox*, must be treated with strict reference to the state of vital power, the appearance of the eruption, and the character of the evacuations. These important complications are particularly noticed in the articles on these diseases; but I may here remark, that a sudden arrest of the evacuations may be followed by effusion within the head, and *coma*, whilst their unrestrained continuance may occasion exhaustion, or fatal disorganization of the intestinal mucous coat. The treatment should therefore be directed, in such cases, with the intentions of diminishing inflammatory action in this part by moderate local depletions, of equalising the circulation and secretions by external derivatives and relaxants, and by diaphoretics and diuretics, and of supporting the powers of life, whenever they become depressed, by diffusible and permanent stimulants. I may state as the result of experience, that, when this complication follows an imperfect development, or retrocession, of the cutaneous eruption, even moderate depletions are not well borne, unless they be accompanied by warm diaphoretics and diffusible stimulants; and that, of the latter medicines (which are very generally appropriate), full doses of ammonia, or of camphor, or of both, in some instances combined with nitrate of potash, in others with alkaline carbonates or magnesia, in most with demulcents and emollient diluents, in several with laxatives, and in many

with aromatics, or tonics and antiseptics, have proved the most beneficial.—(e) When a diarrhœa that is not critical *accompanies or follows remittent, continued, or adynamic fevers*, the evacuations being watery, muddy, dark-coloured, or otherwise morbid, the hydrarg. cum creta, with ipecacuanha, camphor, and cretaceous substances; or the terebinthines and the balsams, with vegetable or mineral astringents; also tonics and antiseptics, the nitric and muriatic acids, or both; or rhubarb with magnesia; the chlorates with demulcents; external derivatives with warm rubefacient and stimulating liniments, &c., are the chief remedies, and the most likely to prevent the extensive sloughy ulcerations that sometimes attend the diarrhœa that supervenes either during, or subsequently to, these diseases.

39. *Colliquative diarrhœa* is sometimes not easily controlled; and even when most readily repressed, the constitutional disturbance may be thereby increased. It is most benefited by small doses of the sulphates of copper and of zinc (F. 577. 587.), by the mineral astringents generally, and by the cretaceous and demulcent preparations, combined with camphor, aromatics, and opiates, or with tonic and astringent infusions and decoctions, which, at the same time that they alleviate the symptoms, also support the vital energies. But the adoption and combination of these, or the choice of other remedies already or about to be noticed, should depend mainly upon the nature of the primary disease, of which the diarrhœa is, in this state, merely an advanced symptom.

40. *Cautions, &c.*—The critical manifestation of diarrhœa should never be interfered with, unless it either proceed so far as to depress the vital energies, or be attended by signs of inflammatory disease of the mucous surface and follicles, in which case the treatment recommended for the varieties indicative of such disease and its consequences should be prescribed. When diarrhœa occurs in gouty or asthmatic persons, or in those of a plethoric habit of body, or who have a tendency to, or have suffered from, cerebral affections, or hepatic disorders; or in the leucopneumatic and hydropic diathesis; it ought to be treated with much caution; and should be only at first moderated, if very severe, by mild purgatives or laxatives; by depletions, diaphoretics, and diuretics; by a regulated diet; and by warm clothing, according to the circumstances of the case, because the sudden arrest of the evacuations by opiates and astringents may be attended by some risk.

41. VII. NOTICES OF PARTICULAR REMEDIES RECOMMENDED BY AUTHORS, &c.—*A. Bleeding* has been advised by COTUGNUS (*De Venæsect. in Diarrh.* Rom. 1604.); by HORSTIUS (*Opp.* iii. p. 68.); by ZACUTUS LUSITANUS (*Med. Pr. Hist.* l. ii. p. 734.); in the bilious variety, and by SYDENHAM. It is obviously requisite in the inflammatory states of the disease, whether acute or chronic, and preferably by leeches applied to the abdomen, to the sacrum, or to the verge of the anus, particularly when tenesmus is present.

42. *B. Refrigerants* are always beneficial in the serous and mucous varieties, and when the complaint is attended by increased heat or excited circulation, and erect papillæ of the tongue; and they may be combined with demulcents and opiates

(F. 36. 821. 838. 886.) according to the circumstances of the case. Of this class of medicines the *nitrate of potash* or of *soda*, *camphor* (F. 431.), the *muriate of ammonia* (F. 352. 431.), *borax* (F. 209. 630. 867.), variously combined, and the *tepid bath*, are the most appropriate. RECAMIER (*Annuaire M'd. Chirurg.* vol. i. p. 113.) recommends nitre with the *oxyde of bismuth*, and opiated aromatics. HUFELAND prefers the *muriate of ammonia* (STARCK, *Archiv.* b. i. st. 3. p. 93.) in the inflammatory states, and when it accompanies fevers; and ZADIG combines it with mucilaginous substances (*Journ. der Erfind.* st. xxi. p. 57.).

43. *C. Laxatives and mild purgatives* have already been sufficiently noticed. Those of an irritating nature are not unfrequent causes of the complaint, and ought never to be prescribed. Even castor, olive, or almond oil, if they be in the least acrid or rancid, will be productive of much mischief. I have seen enteritis supervene on diarrhœa from this cause. In the chronic states of the disease, *sulphur*, with cream of tartar and sub-borate of soda, in the form of electuary (F. 790.), and conjoined with aromatics, is often the best laxative that can be employed. It has been preferred by LANGE (*Miscell. Verit.* p. 29.), and it possesses the advantage of relaxing the skin.

44. *D. Diaphoretics* are of much benefit in all the febrile states of the disorder, particularly the serous variety, and are advantageously combined with refrigerants. They have been adopted by SYDENHAM, DIEMERBROECK (*Observat. et Curat.* No. 64.), LENTIN (*Beyträge*, b. iv. p. 332.), OSIANDER (*Denkwürdigkeiten*, b. ii. p. 179.), &c. The chief of this class are James's powder, ipecacuanha, camphor, carbonate and acetate of ammonia; *spiritus ætheris nitrici* (F. 394. 840.), &c. *Ipecacuanha*, particularly when associated with nitrate of potash, camphor, and opium, is one of the most certain and efficient remedies we can prescribe in all the acute forms of the disease; and it is also a very useful adjuvant of other medicines (see F. 39. 495. 642. 744. 924.). It has been very generally used, and particularly by LINNÆUS (*Amæn. Acad. Upsal.* vol. viii. p. 246.), FOTHERGILL (*Med. Observat. and Inquir.* vol. vi. art. 18.), BALDINGER (*N. Magazin.* b. xix. p. 404.), STARK, LOEFFLER (*Beyträge*, b. i.), and BROUSSAIS (*Loc. cit. in Bibli.*), either in the combinations now noticed, or in those constituting the old and new Dover's powder. It may also be given with the nitrate of soda, and opium; or with the *tormentil*, as formerly directed by me (*Lond. Med. Repos.* vol. xviii. p. 329.).

45. *E. Demulcents and emollients* are of service in all the varieties of diarrhœa; those of an oleaginous kind, in the form of an *emulsion*, when a laxative is required, as the castor, olive, or almond oil, with ammonia, or the fixed alkalies, &c.; and those of a mucilaginous description, when a constipating effect is desired, as the compound powder of tragacanth (F. 389.), or mucilage of acacia, and decoction of Iceland moss (LIND. HERBER, in HORN, *Archiv.* Nov. 1810, p. 289.); and they may be combined with refrigerants, or opiates, aromatics, absorbents, or astringents,—also with *sedatives*, as the hydrocyanic acid, the preparations of morphine, or of hyoscyamus, or of hop, or those of ipecacuanha, according to circumstances. (See the *EMULSIONS*, in the *Appendix*.) They are often of great ser-

vice when administered in the form of small *clysters*, conjoined with opium, as advised by SYDENHAM (*Opp.* p. 87.), HILDENBRAND (HUFELAND, *Journ. der Pr. Heilk.* b. xiii. st. 1. p. 148.), and HUFELAND (in *Ibid.* b. xxvi. st. 3. p. 155.).

46. *F. Absorbents* are especially indicated when the complaint is connected with acidity in the *prima via*; and the cretaceous, magnesian, and ammoniacal substances, combined with opiates, aromatics and astringents (F. 37. 347. 354. 384. 442. 648.), are the most serviceable when relaxation of the mucous surface and debility exists; and the sub-carbonates of the fixed alkalies, associated with refrigerants (F. 838.), when inflammatory action is present in this surface.

47. *G. Aromatics* (F. 348. 363.) are particularly requisite in asthenic cases, and if the patient has been in the habit of using hot condiments and spices with his meals; or when the diarrhœa arises from unwholesome water, from stale animal food, and from endemic causes; in which circumstances, *charcoal*, in large doses, as recommended by Dr. JACKSON, and some American physicians, may also be given. Aromatics are best combined with absorbents and vegetable tonics or astringents.

48. *H. Tonics*, particularly *calumba* (F. 51. 869.), *cascarilla* (F. 870.), and *cinchona* (F. 380. 381.), are often requisite, especially in conjunction with the alkaline and other absorbents, and with aromatics, opiates, &c.; and in the idiopathic, the asthenic, and chronic states of the disease. In such cases, and thus combined, *calumba* has been recommended by PERCIVAL (*Essays*, vol. ii. p. 3.), STARK (*Klin. und Anat. Bemerk.* p. 7.), THOMANN (*Annalen.* ad 1800, &c.), FRANK (*Acta Inst. Clin. Vind. Ann.* ii. p. 79.), FISCHER (in HUFELAND, *Journ. d. Pr. Heilk.* b. xvi. st. i. p. 123.), and LICHTENSTEIN (*Ibid.* b. xix. st. i. p. 180.); *quassia*, by LETTSOM (*Mem. of Med. Soc. of Lond.* vol. i. p. .); *cascarilla*, by BANG (*Act. Reg. Soc. Med. Haun.* vol. i. p. 241.) and others; the *willow bark* (F. 414.), by WHITE (*On the broad-leaved Willow Bark.* Bath, 1798.); and the *cinchona* with opium, by PICQUE (*Journ. de Méd.* t. xlii. p. 433.) and SCHMIDT (HORN, *Archiv.* b. v. p. 236.), chiefly when the complaint assumes a periodic form, or is connected with remittents or intermittents. *Nux vomica* and *strychnine* have also been prescribed in atonic diarrhœa: the extract of the former, by THEUSSINK, OSWALD (*Archiv. der Pr. Heilk. f. Schlesien*, b. ii. st. 4. art. i.), HORN (*Archiv.* Nov. 1810, p. 258.), and RUMMEL; the latter, by RECAMIER and GRAVES (see *Bibl.*) who gave the twelfth part of a grain of it twice or thrice a day, with complete success, in an obstinate case of white mucous diarrhœa. Dr. RUMMEL considers it particularly efficient in removing this very obstinate form of the complaint, when seated in the lower bowels.

49. *I. Astringents* are requisite in similar states of combination as tonics, and in the same forms of the disease. They are not admissible in the bilious variety, or where fecal collections or acrid matters are retained, or in the inflammatory states of the complaint, until after depletions, refrigerants, and diaphoretics have been employed; but they are seldom of use whilst the temperature of the surface is increased, and the

pulse accelerated, although M. BALLY's experiments indicate the contrary.—*a.* Of the *vegetable substances* belonging to this class, the most serviceable are catechu, kino, the *pomegranate bark* or *root*, the *cusparia* or *angustura bark*, *logwood*, &c., and some mineral substances. The preparations of *catechu* with those of chalk and opiate confection, or F. 30. 183. 788., are very generally employed, as well as those of *kino* (F. 34. 536.). Some doubts exist as to whether catechu or kino is most serviceable. Dr. PEMBERTON preferred the latter; and M. BALLY (*Gazette de Santé*, &c. 1829, and *Med. Gaz.* vol. v. p. 700.) found, from an extensive trial of it, that it generally arrested chronic diarrhœa, without fever, in four or five days, when taken to the extent of from twelve to twenty grains daily; and that, even in diarrhœa with fever, and tenderness of the abdomen on pressure, it was equally successful. The bark of the root of the *pomegranate*, as well as its flowers, and the exterior of the fruit, have been long employed in diarrhœa in Eastern countries. They were much prescribed by MEAD, STRANDBERG, and CULLEN. MEAD gave them in the form of decoction with cinnamon and red roses. They are very beneficial when the diarrhœa is complicated with worms. The *cusparia* or *angustura bark* was much praised by LETTSOM (*Mem. of Med. Soc. of Lond.* vol. vi. art. 15.) and THEUSSINK; and is an excellent medicine, either in substance, tincture, or infusion (see F. 201. 413.). The *krameria*, or *rhatany root*, first employed in diarrhœa by the Spanish physicians, Dr. RUIZ (*Mém. de l'Acad. Roy. de Madrid*, 1796, p. 364.) and Dr. HURTADO (*Journ. de Méd. &c.* t. xxxvii. p. 216.), has since been used with advantage in this country (F. 734.). The *simarouba bark* was recommended by JUSSIEU, CAPET, FRIZE (*Annalen*, i. p. 59.) and WERLHOF (*Observat. de Febr.* sect. iii. § 6.), but chiefly in the diarrhœa attendant on fevers; and the *mahogany bark*, by HUGHES (*Med. Facts and Observ.* vol. vi. art. 10.). These may be prescribed in the form of infusion with the *arnica*, the root of which has been much used by THEUSSINK in this complaint. The *logwood* is an excellent astringent, and, in the form of decoction, a suitable vehicle for other remedies. The *bistort*, the *uva ursi* (F. 217. 396.), and *tormentil*, are also of much service, particularly when associated with *ipeca-cuanha*. The root of *comfrey*, the *consolida major*, is recommended by HUFELAND (*Journ. der Pr. Heilk.* 1809.); and the *lythrum salicaria*, by BLOM, BANG (*Op. cit.*), DE HAEN (*Rat. Med.* par. iii. par. 195., p. iv. p. 250.), and HERZ (*Briefe*, st. i. art. i.). They are much employed in the north of Europe.

50. *b.* The *mineral astringents* are very beneficial in several of the forms of diarrhœa, particularly the chronic. *Lime* in various forms,—in cretaceous powders and mixtures, chiefly as absorbents; and in the state of *chlorate* (F. 283.), or recent *lime water*, as powerful astringents,—are very serviceable, especially when associated with demulcents, mucilages and aromatics. I have used the chlorate of lime on many occasions with advantage; and *lime water*, with boiled milk, or with the other medicines just referred to, is in very general use. *Alum*, also, variously combined, or in the form of *Alum whey*, has been

praised by ADAIR (*Edin. Med. Comment.* vol. ix. p. 21.) and HARRISON (*New Lond. Med. Journ.* vol. ii.). It may likewise be given with other astringents, or with aromatics and opiates. The *superacetate of lead* was prescribed by Dr. ARCHER (*N. Y. Med. Repos.* vol. iii. No. 3.), with opium; but HORN (*Archiv.* b. vi. p. 144.) states that he found it of no use. I have seen benefit derived from it in the diarrhœa attending the advanced stages of phthisis. The *sulphate of copper* has been tried successfully by Dr. ELLIOTSON, in doses of from half a grain to two grains, given twice or thrice a day, with opium; and the *ammoniated copper* has been prescribed by BIANCHI (BRERA, *Comment. Medici.* Dec. i. vol. ii. art. 2.). The *sulphate and oxide of zinc* are also useful, especially when combined with rhubarb, or myrrh, or the balsams, or terebinthines (F. 578. 587. 666. 875.). The *nitrate of silver*, triturated with a tonic or astringent extract, and in small doses, has been employed by me on various occasions with advantage, particularly in the mucous variety, and in very chronic cases. The mineral astringents are often the most efficacious in colliquative diarrhœa.

51. *K.* Besides the above, there are other remedies which may be noticed. These are, the *tussilage* (PERCIVAL, *Essays*, vol. ii. p. 224., and FRIBORG, in *Todes Biblioth.* b. i. p. 118.); large doses of *almond oil*, as an emollient and laxative (VALLISNERI, *Opp.* iii. p. 278.); the infusion of the *diosma crenata* (F. 231. 396.); the *plantain* in demulcent broths; unripe *medlars* (FORESTUS, *Opp.* vol. iii. p. 47.); the root of the *geum urbanum* (DE MEZA, in *Acta Reg. Soc. Med. Haun.* vol. ii. No. 4. p. 28., and RANOE, in *Ibid.* vol. iii. p. 369.); the *Peruvian, Canadian*, and other balsams (F. 369.); the *briony* (ARNAUD, in *Journ. de Méd.* t. lxxvi. p. 257.); the *decoction of elm-bark* (COLLINGWOOD, in *Edin. Med. Comment.* vol. xvi. p. 58.); and *camphor* (THOMANN, *Annalen* ad 1800, p. 355.); which latter I have already recommended, from a frequent experience of its good effects when judiciously prescribed. *Sarsaparilla* will also be found useful in chronic states of the complaint, and may be associated with the decoctions of elm-bark or of Iceland moss, or with lime-water or liquor potassæ; small doses of hydrarg. cum creta, with Dover's powder, being exhibited at bed-time. BANG advises *salivation* in obstinate cases; and in rare instances it may be advisable to resort to it. Dr. A. STOUT (*Phil. Med. Journ.* May, 1823.) states that he cured a case of diarrhœa from suspended menstruation by the *ergot of rye*, given in doses of six grains three times a day.

52. *L.* The administration of most of the medicines noticed in the course of this article, in the form of *clyster*, will prove of much benefit, whenever signs of disorder in the course of the colon can be traced, or when the complaint has been preceded by dysentery. In these, HORN (*Archiv.* b. vi. p. 139.) advises the infusion of valerian to be administered in this way. An infusion of *ipecacuanha* may likewise be thus prescribed. When the diarrhœa assumes a chronic form, *warm or tepid salt-water bathing*, or *artificial irritations and eruptions* induced on the abdomen, and kept up for some time, will be generally serviceable. When this practice can-

not be adopted, either warm, tonic, and deobstruent plasters should be placed on the abdomen or loins, or a flannel belt or roller be worn around the lower part of the trunk. I have found a large plaster consisting of equal proportions of the emplastr. picis comp., the emplastr. ammoniaci cum hydrargyro, and the emplastr. galban. comp., extremely useful, particularly when the complaint has been connected with hepatic disease. These means, in the most severe and obstinate cases, will be much promoted by slow and frequent or constant travelling, or sea voyaging.

53. *M.* The diet should be strictly regulated, not only in the course of the disease, but also during convalescence, and after recovery. Whilst the complaint continues, especially in the acute form, the food ought to be farinaceous, very mild, and in small quantity. In the chronic states, also, this injunction should be followed in many cases; the lighter kinds only of animal food, in small quantity, being allowed when the patient's strength requires it. Malt liquors, acid wines, and acid or over-ripe fruit, or pastry, particularly its crust, ought to be entirely relinquished. Good old port wine, however, or old sherry, will frequently agree with the patient, and is often even requisite. In cases requiring astringents and tonics, not only may wine be allowed, but also a substantial, but light, diet of well-seasoned and simply dressed animal food. The diet, during convalescence and recovery, ought never to be continued on so restricted a scale as to lower the patient's vital energies, without making trial of the effects of that which is more nutritious.

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DIGESTIVE CANAL—ITS LESIONS. — **SYN.**
Digestive Tube, Alimentary Canal, Prima Via, Gastro-intestinal Canal or Tube. Canal Gastro-intestinal, Fr.

CLASSIF.—GENERAL PATHOLOGY; Morbid Structures.

1. The several morbid changes to which the *digestive canal below the diaphragm* is subject, will be noticed here, in a general and connected manner, its principal diseases being described individually in separate articles. The changes experienced by that part of the tube which is placed above the diaphragm, are detailed in the articles **FAUCES, OESOPHAGUS, and PHARYNX.**

2. *Of certain appearances in the digestive tube, that cannot be imputed to disease of any part of it, but which have often been mistaken for disease.* — The internal surface of the stomach or intestines of a living animal, whose circulation is not disturbed, is of a red tint, somewhat deeper than that of the mucous membrane of the cheek of a healthy person. During the period of digestion the tint is much deeper, evidently owing to increased flux of blood; and its secretions and exhalations are much increased. The red tint of health, however, disappears after death; and the digestive surface generally becomes uniformly pale, or slightly rose-colored in places, at the period when *post mortem* examinations are usually performed. There are, however, certain circumstances which modify its appearances upon dissection, totally independent of disease of any part of the digestive canal. Some of these circumstances have operated shortly before death; others during the last moments only; and several either soon, or a considerable time, after the extinction of life.

3. (a) the *causes* which operate before death, are, 1st. The performance of the digestive processes, the increased redness of the villous surface attending them generally continuing after the cessation of life. 2d. The free return of the venous blood from the gastro-intestinal tube, to the right cavities of the heart, causing, in the first degree, simple congestion of the venous trunks; in a higher degree, along or continuous with this congestion, an injection of the small vessels in streaks, stripes, patches, or points, with opacity of the injected parts; and, in the highest degree, a partial effusion of blood into the sub-mucous cellular tissue, forming ecchymoses, or into the cavity of the part, colouring red the matters contained therein. It is evident, not only that the disease of remote or related organs will thus affect the color and state of injection of the vessels of the digestive tube, according as it may impede or facilitate the return of blood from them, but that the kind, the mode, and

phenomena of dissolution will have the same effect. Thus, death by asphyxia generally presents a congested and deep-coloured tint of the digestive mucous surface. These facts, which seem to have been not unknown to **MORGAGNI**, to have been proved by experiment by **BOERHAAVE**, to have been observed in the cases of strangulation examined by **Dr. YELLOLY**, and to have been demonstrated in cases of asphyxia, and by experiment, by the French pathologists, especially **BILLARD, ANDRAL, &c.**, are most important, and evidently indicate that disease has been incorrectly imputed to the digestive canal, when the appearances whence the inferences were drawn, arose either from lesions of other organs, or from the mode in which death was produced.

4. (b) The *causes* of redness and injection of the digestive mucous surface operating *after death*, are 1st. The gravitation of the blood; and, 2d. Its transudation through the parietes of the vessels. The *first* of these begins to act immediately after death, and whilst the blood is still fluid, as shown by the researches and experiments of **MM. TROUSSEAU and RIGOT**. The injection and redness of the intestinal parietes produced by gravitation, or injection from *hypostasis*, generally acquires its highest degree at the end of some hours from the extinction of life, and ceases to increase as soon as the fallen temperature of the internal parts allows the blood to coagulate. Hence, the longer the blood continues fluid, and the more abundant it is in the vessels of the digestive canal, the more marked will be the injection of depending parts from hypostasis. The *second* of these *post mortem* causes of redness takes place at a remoter period—usually after twenty-four hours in summer, and after thirty-six or forty hours in winter; but the period varies with the nature of the disease, and the state of the blood at the time of dissolution. This change commences first with red spots in the course of the vessels, isolated, grouped together, or running into one another, giving rise to coloured streaks, and evidently proceeds from the exudation of the blood through the vessels containing it. At a later period, the redness is not limited to the course and situation of vessels; but the whole surface becomes more and more uniformly tinged, until it is equally red, approaching the appearance existing in the internal surface of the blood-vessels under similar circumstances. The following is a summary of the causes modifying the appearance of the gastro-intestinal canal; and which, in some respects, and with some additions, is the same as given by **M. ANDRAL**.

5. The digestive mucous membrane is seldom of the same color in the healthy state. It may be—(a) perfectly *white* or *whitish*, although this state does not imply that functional disorder did not exist during life.—(b.) It may present various tints or *degrees of colour*, without ceasing to be sound, depending, 1. on the performance of the digestive processes, shortly before or at the time of death; 2. on the congestion to which internal vascular parts are liable at the last agony or moments of life; 3. on mechanical obstacles to the return of blood in the veins existing a longer or shorter period before dissolution; 4. on the gravitation of the blood to depending parts; 5. on the exudation of blood through the parietes of the vessels; 6. on the exudation of this fluid

through the capsulæ of the spleen; 7. on the gases existing in the canal at the time of death; 8. on the developement of other gases at a remoter period, when putrefaction commences; 9. on the combination of the colouring matter of the bile present in the digestive tube, with parts of its mucous surface; and, 10. on the medicinal or other ingesta, which may change its colour so as to resemble the morbid state. Some of the colours produced by these causes cannot be confounded with that resulting from inflammation; others very nearly resemble it, especially those occasioned by the 1. 2. and 4. and certain varieties of 3. and 5. Those states of the digestive surface that most nearly resemble inflammation, may in respect of it be denominated *passive*. M. BILLARD has given the following *diagnosis* between *passive* and active or *inflammatory* redness of the villous or digestive mucous coat. —

<i>Inflammatory.</i>	<i>Passive.</i>
a. With or without manifest thickening of the membrane.	a. The same.
b. Indifferently in a depending or elevated part.	b. Almost always in a depending part.
c. Without general injection of the abdominal vessels, and without any obstacle to the course of the blood; sometimes consisting in only a slight local injection.	c. With general injection of the abdominal vessels, and with an obstacle to the course of the blood; rarely being an isolated local injection, but frequently occupying a fold of the intestine, or the whole intestine.
d. With considerable tenderness of the sub mucous tissue, and a capability of raising the mucous coat in large patches.	d. A power of raising the mucous membrane in shreds only, which is the case in health.
e. With thickening and abundance of the intestinal mucus; and sometimes with sanguineous exhalation.	e. Without abundance or thickening of the intestinal mucus; but sometimes with sanguineous exudation.

6. This diagnosis refers merely to the differences between *redness* from inflammatory irritation and redness from passive congestion. The various *results* of inflammation of the mucous membrane are entirely left out of the question. This tissue seldom experiences any change in *density* within the period which usually elapses between death and the examination. Therefore, *softening* can very seldom be justly considered a *post mortem* change. In respect, however, of the stomach, the case has been supposed to be otherwise, and upon good grounds. The observations of J. HUNTER and ALLAN BURNS on the human subject; of CARLISLE, COOPER, and WILSON PHILIP, on rabbits; of ADAMS, BRETONNEAU, and TROUSSEAU, on dogs; and of SPALLANZANI on fishes; show that the solvent action of the juices of the stomach may be exerted upon itself, within twenty-four hours from death, so as not only to soften its villous coat, but to dissolve both it and the coats exterior to it, until the organ is perforated or destroyed in one or more places. The possibility of this occurrence is shown by the experiments of STEVENS, LOVELL, and others, demonstrating the solvent power of these juices; and that it actually takes place, is established by the experiments of Drs. CAMERER and CARSWELL, as well as by the sound health of the subjects of it at the time of death, and the absence of inflammatory appearances around the destroyed part, or in the peri-

toneal coat. The healthy state of the other tissues composing the parietes of the digestive canal, and the natural capacity and position of its different parts, require no remark.

7. I. FUNCTIONAL DISORDERS.—The disposition, which has prevailed for many years, and which is still so manifest in medical literature and practice, to impute every morbid condition to inflammatory action, and changes of structure, has been displayed more in this branch of pathology than in any other. Since the appearance of the writings of MARCUS, and especially since the promulgation of the doctrine of BROUSSAIS, all the states of disorder referrible, directly or sympathetically, to the digestive organs, have been considered by many to arise from inflammatory irritation and action, or their consequences, in various grades or states of activity; and even those who have not adopted the views of this very zealous writer, have too generally overlooked the primary and controlling influence of the vital endowment in the origin and removal, not only of the diseases of the alimentary canal, but of its related viscera, and, indeed, of those of all other organs. The pathologist who observes closely the action of the numerous agents which either merely change the conditions of life, as manifested in the sensitive and contractile systems, or which produce alterations of structure cognisable by the senses, and who notes the manner in which primary impressions affect related and even remote parts, must have often remarked, that some connection subsists between the nature of the agent, the particular system acted upon, and the effect produced; that the more obvious and palpable lesions are generally remote and often only contingent results; and that alterations apparently identical are often associated with, even when they are not the consequences of, very different states of sensibility and contractility, as well as of the other manifestations of vital power. It is necessary to our enquiries into the morbid states of a part, which, with reference to the formative and vegetative processes especially, is primarily and essentially vital, and which, from its intimate connection with the organic system of nerves, powerfully influences, whilst it is itself influenced by, the vital endowment or appropriate influence of this system,—of a part especially devoted to the preparation of the materials for the reparation of the structures, and the support and perpetuation of life,—to view its changes of function and of structure accordingly, and with strict reference to the foregoing considerations.

8. i. *Changes in the Desire for Food and Drink.*—If the alimentary canal be admitted to be, of all parts of the economy, that in which identity of lesion the least infers identity of symptoms, the same admission should be extended to the causes whence its lesions arise. *Morbid states of hunger and thirst* have, with other disorders of the digestive tube, been imputed either to inflammatory irritation or action, or to organic changes. That they proceed, in many cases, from those lesions, must be admitted; but that they uniformly or necessarily thus originate, cannot be maintained.—(a) *Anorexia*, or loss of appetite, although a very general attendant on all the organic changes observed in the stomach, is not uniformly present; for circumscribed lesions

have been sometimes found in this viscus, without this symptom having been observed. And, on the other hand, it often exists entirely unconnected with any change of texture. Both M. LOUIS and M. ANDRAL have found, in persons who had long evinced the greatest aversion from every kind of food, the stomach perfectly sound. Anorexia appears frequently, independently of the evidence of *post mortem* research, to depend upon a change in the state of the nervous power, as shown by the influence of moral emotions, and mental and physical fatigue in producing it. Its occurrence as a symptom of all acute or serious diseases of related, as well as of remote organs, and of idiopathic and exanthematous fevers, is well known.—(b) The frequent connection of *bulimia* with irritation and organic diseases of the stomach, and even of the bowels, is admitted; but it is also dependent upon a temporary activity in the nutritive processes, as in convalescence from acute diseases; and is then referrible to the condition of vital endowment, as manifested in the digestive and reparative functions.—(c) *Pica*, whilst it also often arises from chronic irritation of the stomach, is as frequently a symptom of disorder in the organic nervous system, and even of a morbid state of the blood, and it sometimes depends upon functional or organic change in some remote organ, as the uterus or ovaria. (See APPETITE, MORBID; and CHLOROSIS.)—(d) *Thirst* has also been imputed to irritation or inflammatory action; but, although it is certainly a symptom of this and other diseases of the stomach, and the rest of the digestive tube, it likewise arises from diminished exhalation and secretion in the pharynx and fauces; from the rapid discharge of the aqueous parts of the blood by the surfaces or kidneys; and from the superabundance of saline particles in the serum.

9. ii. *Disorders of the Functions of Chymification, Chylification, and Fæcation*.—That the numerous phenomena attendant upon indigestion may, and very often do, arise from various states of irritation or structural change in the digestive canal, particularly in its villous surface, is unquestionable; and M. BROUSSAIS, although he has pushed the doctrine extravagantly far, has drawn attention to important and too frequently neglected facts. I must, however, contend that disorders of the digestive processes frequently cannot be referred, after the most patient investigation, to such sources; but must be imputed to altered states of the vital or nervous power imparted to the viscera which perform these processes; and that those pathological states generally are more or less intimately associated with debility and altered sensibility, or even wholly consist of these states, affecting either the alimentary canal and related organs, or the œconomy throughout. (See DEBILITY, § 15.)

10. A. In respect of *chymification*, or digestion in the stomach, the above positions cannot be disputed. For disorders of this function often depend upon causes which observation has proved incapable of directly influencing the organization, or of acting otherwise than upon the sensibility or the other manifestations of life displayed by this viscus, or even by organs affecting it sympathetically. The influence of moral emotions not only upon chymification, but also upon chylification and fæcation, is well known. Moreover, the stomach

has often presented after death no lesion to account for the total deprivation of function long experienced during life; and even when organic changes have been observed, they have not always been such as usually arise from inflammatory irritation or action: for it should not be forgotten, that structural lesions may also proceed from *sub-action*, or from conditions of vital power, and of vascular action, diminished as to grade, and modified in kind from the healthy standard. Indigestion may therefore arise—(a) from depression or modification of the nervous influence; giving rise, 1st, to imperfect or disordered action of the muscular coats of the stomach; 2d, to a diminished or modified secretion of the gastric juices; (b) from a morbid state of the mucus secreted by the follicular glands of the stomach, either connected with, or independently of, irritation (*Embarras Gastrique* of the French); (c) from inflammatory irritation and various organic changes; and, (d) sympathetically, from functional or structural disease of adjoining or remote organs.

11. B. The observations now offered apply equally to the function of *chylification*, which, whilst it is often disturbed by inflammatory irritation and organic changes, is as frequently disordered from modifications of the vital or the organic nervous influence supplying the duodenum, the small intestines, and their related organs, particularly the biliary and pancreatic apparatus. When this influence is depressed, exhausted, or in other respects modified, then imperfect and irregular action of the coats of the duodenum and small intestines; deficient, or insufficiently elaborated, or otherwise morbid secretions from their internal surface, and from the liver and pancreas; and alterations of sensibility, as well as of tonic contractility must be the result; whether organic change be superinduced or not;—such change most commonly being the remote consequences of neglected and long continued functional disorder, or of its repeated reproduction by the numerous agents which occasion it. As respects chylification, the result must be an imperfectly formed chyle, which undergoes the further process of assimilation either with difficulty or insufficiently, occasioning various disturbances or diseases, expressed chiefly in the secreting or depurative viscera, as well as in the body generally. Also, when the vital influence is insufficiently exerted on the organs of chylification, the materials on which they act, more readily assume those combinations to which their chemical affinities, assisted by warmth and moisture, dispose them. But when their vital energy is duly exerted, the secretions poured out by the glands and surfaces, and intimately mixed with the ingesta from the commencement of mastication, are so far imbued with that influence which pervades the œconomy, and converts other substances into those structures, with which it is itself so intimately associated, as to withstand purely chemical affinities, or to change them into such as are strictly vital. And as this controlling and self-perpetuating power is more and more weakened, so are the purely chemical forces more strongly exerted, until various new combinations, either of a gaseous or of an acid or acrid nature, are formed, whereby the digestive tube is inordinately distended, irritated, and, ultimately, permanently changed in structure, capacity, and even in position.

12. *C.* The processes of *fecation*, although obviously and most severely disturbed by inflammatory irritation and organic changes, are also impeded or otherwise disordered without any such lesions. A deficient exertion of the vital endowment, through the medium of the organic nerves supplying them, or alteration of their sensibility, and the resulting modifications in the tonic and insensible contractility of their muscular coats, and in their exhaled and secreted fluids, are even more frequently the causes of disorders in the functions of defæcation than appreciable organic change; and even when this latter becomes developed, in this part of the canal as well as in others, it is still more frequently the consequence of neglected and continued functional disorder. (See CONSTIPATION.)

13. *iii. Morbid States of Sensibility of the Digestive Canal.*—These states consist chiefly of pain in various grades and modifications. Acute, lancinating, dull or heavy, gnawing, burning, pungent, remittent, periodic, &c.; and, whilst they are often attendant upon,—particularly burning or gnawing pain,—rather than occasioned by, organic lesions, especially of the external tunics of the canal, they are still more frequently unaccompanied by any appreciable change. Indeed, the numerous alterations of texture found in the gastro-intestinal mucous and sub-mucous tissues are seldom attended by severe pain. M. ANDRAL very justly remarks that the mucous coat may be acutely, or chronically diseased—may be inflamed, thickened, softened, or deeply ulcerated—without any uneasy sensation, or, at most, with griping pains on going to stool. The abdomen of persons, whose intestines are ulcerated during adynamic fevers, may be even pressed in all directions, without the sensibility being painfully excited, unless the ulcers extend in depth to the peritoneal surface. On the other hand, the alimentary canal is frequently the seat of the most severe, or even excruciating pain, without its texture being at all affected, as proved not only by *post mortem* examinations, but also by its causes, its sudden accession and departure, and by the *juvantia* and *lædantia*.

14. *A.* The *stomach* is the most prone of any part of the digestive canal to experience changes of sensibility, probably owing to the numerous agents, chiefly *ingesta*—solid and fluid—hot and cold—bland and relaxing—exciting or irritating—depressing or inflaming—indigestible or unwholesome—to which it is subjected during life; and often to all these, in hurtful variety and inordinate quantity, producing opposite impressions on, with extraordinary distension of, its coats. Add to the above, the various passions and emotions which disturb the nervous and circulating systems, and the reasons wherefore the stomach manifests not only the simpler states of indigestion, but also the severe and complicated forms characterised by altered sensibility, disordered action of the muscular coats, and morbid secretion—as *cardialgia*, *flatulency*, acid and acrid eructations, *pyrosis*, *rumination*, *bulimia*, *gastrodynia*, and *cramp* or *spasm*, will be apparent. These, although sometimes associated with organic change, rather than occasioned by it, are most commonly referrible merely to modifications of vital and nervous power and altered sensibility—pathological states, however, which

will often superinduce organic changes when prolonged, or aggravated by injudicious treatment and diet.

15. *B.* The *small* and *large intestines* also experience very remarkable changes of sensibility, often without any manifest lesion of structure, but generally in connection with irregular action of the muscular tunics, diminished secretion and exhalation, and an increased production of flatus. The different forms of *colic*—the flatulent, hysterical, lead, Madrid, bilious, or the dry belly-ach, &c.—are the most marked examples of this state of functional disorder, which may, however, terminate in, or be complicated with, various alterations of texture, or of position and capacity.

16. *iv. Disorders of Secretion and Excretion.*—The secretions and excretions of the digestive tube are disordered in various ways, and often to a very considerable extent, without much general disturbance being the result.—*A.* When the nervous influence of the *stomach*, and occasionally also of the *duodenum*, is suddenly impressed or seriously disturbed, *nausea* and *vomiting*, with increase of the secretions of these viscera, are often, although not always, or even generally, produced. Such disorder may depend on the state of the stomach; on disease of the small intestines, especially of the *duodenum*; on obstructions in some part of the canal; on affections of distant organs, as the nervous centres, the kidneys, the uterus, &c.; on intense impressions made upon any part of the frame, or on severe affections of the whole system. Even when vomiting is occasioned by a morbid state of the stomach itself, it is as often the result of an altered condition of nervous influence, as of structural change; although in many cases both pathological states co-exist. This act may arise not only from irritating or injurious substances taken into the stomach, but also from similar matters absorbed or introduced into the circulating current, and from morbid secretions poured out from its own villous surface, or regurgitated into it from the *duodenum*. *Ingesta* of the most opposite kinds—whether highly stimulating and irritating, or depressing and septic, or simply relaxant—may occasion it; the stomach evincing in either case the disposition to eject whatever is injurious to the frame; the retching often continuing long after the noxious matter is thrown off, apparently in consequence of the morbid impression made by it upon the nerves supplying the organ, and through their channel upon the vital manifestations of the body. Vomiting from irritating or injurious matters in the circulation, arises most probably as much from the effect produced by them on the vital endowment, especially as manifested in the organic nervous system, as from their effect upon the stomach itself through the medium of the blood circulating in it. Indeed, MAJENDIE has shown, that attempts at vomiting will follow from this cause, even when the stomach has been removed from the body. In delicate persons, the sight even of certain substances, or the odour of others, particularly if they at any time had overloaded, or disagreed with, the stomach, will produce nausea and vomiting. The repeated retchings supervening with the collapse consequent upon excesses is probably favoured by the morbid and accumulated secretions generated

during the excitement and the nausea following it. In this case, the vomiting is attributable chiefly to the exhaustion of the nervous influence of the organ, and to the affection of the nervous centres; a moderate repetition of the stimulus, or of some analogous excitant, removing the disorder. *Sea-sickness* is, however, the most conclusive illustration of the frequent origin of vomiting in modifications of the nervous influence. These facts, as well as the effects of irritation of the uvula or pharynx, and of inflammatory affections of the brain, and other remote viscera, warrant the conclusion that vomiting is chiefly a nervous affection; and that, although it is frequently attendant upon, it is often also entirely independent of, change of structure, either of the stomach, or even of any other part. (See *VOMITING*.)

17. *B.* Owing to the superabundance, or the irritating nature of the secretions formed by the intestinal villous surface, or to the quantity or quality of the biliary and pancreatic secretions, or to both pathological states conjoined, *diarrhœa*, *lientery*, or *dysentery*, may take place, independently of organic lesions and even when such lesions exist, it is generally to the co-existence with them of increased or morbid secretions proceeding from one or more of these sources, that these diseases are to be imputed. Even in *cholera*, in which the eruption of an increased quantity of morbid secretions into the duodenum occasions copious discharges from the stomach and bowels, with cramps, &c., we are not justified in concluding that any organic change is present beyond simple irritation, of a temporary kind, excited in the villous surface by the acrid state of the secretions passing along it.

18. II. LESIONS OF THE TISSUES COMPOSING THE DIGESTIVE CANAL.—The difficulty of distinguishing between the slighter lesions of structure, and changes occurring shortly before and after death, as well as states of the villous membrane connected with the conformation and diathesis of the individual, has already been pointed out. More frequently, however, no such difficulty exists, the change being of a kind that will not admit of a doubt as to its nature. But in judging of very many of these more palpable lesions, we shall fall into numerous errors, if their more prominent appearances merely be considered, without reference to their causes, and to the state of vascular action which occasioned them, and to the conditions of vital power with which the vascular action was associated. For various changes of a remarkable description, closely resembling each other, may arise from very different states of vascular action and of vital power—either from sthenic inflammation, or increased organic action of the tissue, or from sub-action or diminished organic action, or from perverted nutrition of the part. To ascertain the nature of the morbid process, therefore, which gives rise to very manifest lesions, from even the closest examination of these lesions themselves, is frequently a matter of difficulty, and often of impossibility, in the present state of our knowledge; and it is chiefly by connecting them, as far as we may be enabled, with their causes, and with the conditions of vital power and of vascular action, that we can approach to accurate views of their nature. This I have

attempted to do more fully and appropriately in the article *INFLAMMATION*; and have only referred to these important and too much neglected pathological states, when the nature of the changes required that they should be briefly noticed.

19. It should be understood that the several lesions about to be noticed, may exist either separately, or variously associated the one with the other; in some cases, in the same part of the canal, and holding the relation of cause and effect; in others, in distinct or remote parts, and without any such connection. As it will, however, be impossible to describe the changes observed in this part, in their numerous states of association, they will be considered separately, but with reference to such of these states as are most common. I shall, conformably with this plan, notice—*first*, changes of vascularity; *second*, lesions of the tissues composing the canal; *third*, lesions of internal secretion, comprising adventitious productions; and, *fourth*, changes of capacity and position.

20. i. *Changes of Vascularity, or Lesions of Circulation.*—*A. Anæmia*, or diminished vascularity of the digestive canal is sometimes observed; extreme paleness, existing either throughout, or in parts only. It is usually attended by more or less attenuation of the gastro-intestinal parietes; and is most frequently met with in subjects that have died from the exhaustion of chronic diseases, or after severe fevers. In these cases, ulcers are often found co-existent with it, that are as pale and bloodless as the surrounding tissue. This association of anæmia with asthenic ulceration is not infrequent in children who have suffered from chronic diarrhœa and lenteria, with or without mesenteric disease, and who have died comatose. Anæmia of the digestive canal is also observed in cases of fatal hæmorrhage from other organs.

21. *B. Increased vascularity*, not arising from the causes stated above (§ 3, 4.), but from excited organic action, is of extremely frequent occurrence. As it is generally confined to the villous membrane, the canal externally will often exhibit no appearance of it, or will even be unusually pale; for sometimes, when this membrane is intensely red, the subjacent cellular tissue even, and the rest of the tunics, are quite devoid of colour. It is owing to this circumstance chiefly, that the existence of increased vascular action in cases of bowel complaints has been, until recently, so much overlooked amongst pathologists. This connection of inflammatory injection of the villous coat with disorders of the digestive tube had not, however, entirely escaped the observation of GLISSON, BAGLIVI, MORGAGNI, L. BANG, and C. SMYTH, and was afterwards placed in its true light by PINEL, BAILLIE, MARCUS, HILDBRAND, ABERCROMBIE, LATHAM, ANDRAL, GENDRIN, BILLARD, and others [See *Refer.*]; whilst BROUSSAIS and his followers made it the basis of a pathological doctrine, and stretched it beyond its legitimate limits.

22. Increased vascularity may be seated chiefly or separately in the villous membrane itself, or in its villi, or in the follicles either disseminated through or aggregated in it, or it may affect two or all of these anatomical elements

simultaneously.—(a) When the *membrane* itself is injected or inflamed, the appearances are diversified; but at first the light can still be partially seen through the coats, the vessels being disposed in a finely arborescent form. Somewhat later, the opacity is complete; the *redness* being at the commencement in spots, stars, patches, streaks, or bands; and of a rose or florid colour; but afterwards more deep, and dark or purplish; and terminating either insensibly or abruptly.—(b) When the *villi* are inflamed, the internal surface presents a number of red points, which are often closely crowded together, rendering the membrane opaque. Upon a close inspection, these points are found to consist of the villi; their injection occasioning the change of colour, which is either limited to their summits, or is extended from thence to their bases. In some instances, the injection is altogether confined to the villi; in others, the membrane itself is also more or less affected. In many cases, the villi are of a brownish or even blackish colour, particularly in persons that have had chronic diarrhoea. Active injection of the villous membrane may thus exist in an acute or chronic state, without any further change, for periods of very variable duration. In some cases, it will terminate in softening or ulceration in a few days; and in others, signs of irritation may exist for a very long time, and still simple injection without change of structure will only be found.—(c) When the *follicles* are the seat of increased vascularity, the injection is in the form of a small circle or *areola*, consisting of interlaced capillary vessels, with slight elevation of the membrane of the part, owing to the injection of these vessels and the tumefaction of the follicle. Often a smaller red circle is placed within the preceding, and situated, as M. ANDRAL supposes, in the margin of its orifice. Sometimes the situations of the follicles present both these inflamed circles quite distinct; at other times they both increase, and at last meet each other. In some cases, instead of these reddish circles, brownish or blackish circles, similarly disposed and elevated, are met with. In other instances, where this disposition of the injected vessels is observed, there is neither tumefaction within the circle, nor depression in the central red point, to indicate the existence of a follicle. Inflammation of the follicles of BRUNNER and PEYER has recently attracted great attention owing to the writings of BRETONNEAU, TROUSSEAU, and others on the subject (see the *Bib. and Refer.*).

23. Increased vascularity of the digestive canal is seated either (a) in the arterial and other capillaries, (b) in both the capillaries and venous trunks, or (c) in the larger vessels only. The *first* of these is an undoubted evidence either of irritation or of incipient inflammatory action, if no further lesion exist. The *second* may belong either to these pathological states, or to congestion, of a morbid kind existing during life, or of a mechanical nature occurring after death. The *third* may be the indication of pre-existing inflammation, partially subdued, or of increased determination of the circulation to the part. It is of importance to recollect, when judging respecting the nature of increased vascularity observed in the digestive tube, that, when it arises from augmented organic action, it com-

mences in the capillaries and extends to the larger vessels,—the former only being found injected after death, in many instances; whereas, when it proceeds from passive congestion, it begins in the large veins and extends to the capillaries—the former only sometimes continuing injected after dissolution. When the vascularity is active, it commences generally with a capillary or reticular injection, which increases until an uniform red tint takes place, and every transparent interval disappears, owing to the crowded state of the injected capillaries. As the vascularity declines, it again assumes the reticular form, and at last only some large vessels are observed in an injected state.

24. Can the colouring of the part be an index of a *primary chronic*, or of a *consecutively chronic*, state of inflammation, or of an *acute* inflammation which has supervened on the chronic? An approximation only to the truth can be made in answering these questions. M. ANDRAL supposes that the brown, grey, and slate colours especially belong to chronic irritation. But substances taken into the stomach, and proving quickly fatal by the extensive and intense irritation they occasion, or by their noxious impression on the nerves of organic life, or by both modes of action, usually impart a brown, dark, or purplish colour to the injected villous surface. The inflammation also of this surface, in adynamic fevers, is often of a very dark ochry or brown colour; and the asthenic forms of inflammatory action, as well as many of those in which the blood is contaminated or otherwise morbid, frequently present similar hues. Also a red colour may attend chronic as well as acute inflammatory action, although much less frequently. The above lesions of circulation are generally followed, after a longer or shorter time, according to the state of vital power, the condition of the circulating fluid, and intensity of action, by a change, to a greater or less extent, in the vital cohesion, and tonicity of the tissues composing the parietes of the canal, giving rise to the alterations of texture about to be described.

25. ii. *Lesions of the tissues composing the Parietes of the Canal.*—A. *Atrophy* may affect only one, or all the coats of the gastro-intestinal parietes.—(a) Atrophy of the *villous membrane* presents several grades: in a less degree, or at its commencement the *villi* are greatly diminished, or nearly or altogether effaced. In a more advanced grade, not only have the villi disappeared, but the membrane itself is remarkably attenuated. In some cases, the villi are obliterated in places, and not in others. In the situation of cicatrised ulcers they are always absent. Atrophy of the villous membrane is met with chiefly in chronic cases, similar to those in which anæmia has been stated to occur; and it is obviously in some cases a *post mortem* change. It is often a consequence of anæmia; but it may accompany ulceration, vascular injection, or other lesions of the digestive canal.—(b) The *muscular coat* may also be atrophied, so that its fibres become much less apparent, the fasciculi wasted and separated by wider intervals, occupied by cellular tissue, from which they can hardly be distinguished. Atrophy of the muscular coat most frequently co-exists with atrophy of the other tunics, but it may also occur when they are hypertrophied,

especially when the sub-mucous cellular tissue is much thickened.—(c) All the coats of the digestive canal may be co-existently atrophied, the parietes of the canal being then remarkably attenuated, and appearing to consist merely of a sero-cellular tissue, which is transparent and colourless, and apparently without villi, follicles, or blood-vessels (ANDRAL, LOUIS, BILLARD, &c.). This change is only met with in any considerable degree in parts of the tube; most frequently in the splenic portion of the stomach, and lowest third of the ilium.

26. *B. Hypertrophy*, or thickening, of the parietes of the alimentary canal may be confined to a single tissue, or may simultaneously exist in all the coats of which they are composed. This change, when far advanced, or seated in the sub-mucous tissue, and particularly when associated with ulceration, has been often mistaken, until recently, by British pathologists for scirrhus, and by Continental writers for true cancer. Although thus generally misconstrued, it appears to have been better understood by RUDOLPHI (*Bemerkungen*, th. i. p. 35.) and THILENIUS (*Med. u. Chir. Bemerk.* i. p. 202.).

27. (a) *Hypertrophy of the villous or mucous membrane* consists of an increase of its density as well as of its thickness, and is thereby distinguished from the slight tumefaction produced by inflammatory injection of its capillaries, and from tumefaction and softening, with more or less discolouration, occasioned by acute inflammation, or intensely irritating ingesta.—*a.* When really hypertrophied, the villous coat may be removed in large shreds, which are harder as well as thicker than natural. When thus altered, it rarely retains its natural colour, but commonly presents either various shades of redness, or a slate coloured, or a brownish, or blackish tint. This lesion is most common in the stomach; next in the rectum, cæcum, and colon; and least so in the small intestines. It may exist throughout either of these viscera, or in parts or points merely. When the membrane is thickened in the whole or greater part of the viscus, it may be either smooth, or unequal; in the latter case it usually presents a number of elevations separated by depressions, giving it a mammillated or papillary appearance. When the hypertrophy is only in isolated spots or points, it may proceed so far as to produce various elevations, patches, projections, tumours, and polypous growths, with or without narrow pedicles, and which have often been mistaken for fungous or malignant formations; but which, when prominent, are more appropriately termed vegetations or *excrecences*. They have been described by BARTHOLINUS, VAN DER WIEL (cent. i. obs. 56.), DE HAEN (*Rat. Med.* vi. cap. 4.), BAUER, SCHAARSCHMID (*Méd. u. Chir. Nachrichten*, b. v. obs. 10.), SANDIFORT (*Observ. Anat. Pathol.* l. i., et *Mus. Anat.* i. p. 255.), PORTAL (*Anat. Méd.* t. v. p. 243.), BAILLIE (*Ser. of Eng. &c. fasc.* iv. pl. 6.), STARK (*Archiv.* b. i. st. iv. n. 3.), REBIÈRE (*Journ. de Méd.* t. lxiv. p. 619.), ANDRAL, and others. These *excrecences* may either be of the usual consistence and colour of the mucous coat, or they may be harder or softer. They may also present every shade of colour; and be either nearly bloodless, or remarkably vascular. In some cases, their capillary vessels

are so numerous or interlaced as to impart to them an erectile appearance; in others, their veins are large and engorged so as to resemble the morbid productions described hereafter (§ 48—51.). They have bases of various extent; in some cases large, in others very narrow, or slender pedicles; their summits being either pointed or rounded, or broad, resembling a mushroom. They are found in every part of the gastro-intestinal surface; in the cardiac and pyloric orifices, or any part of the stomach; in the cæcum, in the commencement of the rectum, in the colon, and least frequently in the duodenum and small intestines. About the anal orifice, however, and inferior part of the rectum, they are very common, and are there often produced by the syphilitic virus. Their number varies from one to twenty or more. M. RULLIER preserved a stomach which was studded with about eighty, each of the size of a filbert. They may exist simultaneously in different portions of the digestive canal, as in the stomach and cæcum.

28. *β.* These excrescences should not be confounded with hypertrophy occurring in some of the *villi* with which the membrane is provided. When much enlarged, the villi project further, and are of a whiter colour, than the rest of the surface; and form small cylindrical vegetations, which may be readily distinguished from excrescences of the mucous coat itself.

29. *γ.* The villi, however, are much less frequently hypertrophied than the *follicles*. When the digestive canal of adults is studded with very apparent or projecting follicles, we may consider these bodies as diseased, although they may not be really hypertrophied. When they participate in the increased vascularity of the inflamed mucous coat, they become tumid from this circumstance, or from the morbid secretions collected in them, but not truly enlarged. When the aggregated follicles are tumified, elevated patches are thereby formed, giving rise to the *Dothineritis* of M. BRETONNEAU. However, as M. ANDRAL has remarked, when thus tumified from increased organic action, their nutrition is often thereby augmented, and they then continue enlarged, or even increase in size, after the morbid vascularity has disappeared, and are then truly hypertrophied. When thus changed, they consist chiefly of small, conical, hard, whitish bodies, with central orifices. This lesion is met with often in persons whose digestive functions had not been disordered, as well as in those who had experienced either acute, chronic, or recurring diarrhœa. But hypertrophy of the follicles may also arise without any signs of antecedent increase of vascularity either in them, or in the villous membrane itself. When this has been the case, the only disorder has been either constant, or recurring diarrhœa; but as often no ailment has been complained of. Enlarged follicles may have their orifices of the natural size, or widened so as to be mistaken for a small ulcer, or narrowed and even obliterated. When this latter occurs, the follicle becomes distended by its secretion, in some cases, to such an extent as to form large globular tumours. The parietes of the hypertrophied follicle may also be transformed into a fibrous, or fibro-cartilaginous, or even a cartilaginous tissue, thereby augmenting their thickness,—a change justly

imputed by M. GENDRIN to chronic inflammation. Hypertrophy of the follicles is most common in the inferior part of the ilium, in the cæcum, in the rectum and colon, and in the duodenum, but is rarely met with in the stomach. It is most frequently a consequence of *diarrhœa*, *dysentery*, and *gastric fevers* (which see); and may be mistaken for tufts of enlarged white villi, and for small white bodies, consisting of the rudiments of *valvula conniventes*. It is very common after the bowel complaints of children, amongst whom, however, the follicles are always more manifest than in adults.

30. (b) *Hypertrophy of the sub-villous tissues* may be more or less general throughout one of the principal divisions of the digestive canal, or it may be circumscribed. It is not unusual to find, after chronic *diarrhœa* or *dysentery*, the *sub-mucous cellular tissue* much more apparent than usual, or even two or three lines in thickness, in the colon or rectum, or both. It is then denser than natural, sometimes with more or less regularly arranged fibres, or plates, of a pale or pearly white colour, and without any evident blood-vessels. It is often of a homogeneous semi-cartilaginous-like texture; but when thus generally *enlarged* and *indurated*, the hypertrophy is never so great as when it is circumscribed. When it forms, in some part of the canal, a tumour, elevating the mucus surface by its thickness, it constitutes the change to which the term *scirrhus* has been very generally applied, and differs from the diffused hypertrophy only in being circumscribed, and many times thicker. That the tumour occasioned by the circumscribed hypertrophy, whether existing in the cardia or pylorus, is not the result of the production of a new tissue, but arises from enlargement and *induration*—owing to excessive irritation—chiefly of the sub-mucous tissue, is manifest in the early states of the lesion. This may continue to be the only change; but often ulterior alterations take place, and a new structure is developed; the part becomes vascular, is sometimes divided into lobes, and morbid secretions are poured into its substance, whereby it acquires the appearance of areolæ and cells containing these secretions; the fibrilles of the cellular tissue between them becoming at the same time more and more hardened and hypertrophied. Frequently the hypertrophy is not confined to the sub-mucous tissue, but is extended to the tissue connecting the muscular and peritoneal coats; hardened, white fibres running between and separating the fasciculi of the interposed muscular coat, and thereby connecting both layers of hypertrophied cellular substance. M. ANDRAL considers these fibres to consist of the cellular tissue placed between the muscular fibres, also in a state of hypertrophy; the latter structure gradually disappearing before the progressive increase and induration of the former. At last, all appearance of muscle is lost, and a mass either of simply hypertrophied and indurated cellular tissue, or of this substance further and consecutively altered, chiefly by the deposition into it of morbid secretions, is placed between the peritoneal and mucous coats.

31. This lesion is generally the consequence of inflammatory irritation long kept up or frequently reproduced in the mucous membrane,

which may be sound, no change of it having existed, or that which formerly existed having ceased. More frequently, however, it is either injected, indurated, softened, ulcerated, or entirely eroded in the hypertrophied part. Hypertrophy of the sub-mucous tissue is most frequent in the stomach and large intestines, particularly the rectum, where it may be either diffused or circumscribed; and the least so in the small intestines, in which it is commonly circumscribed. It is rarely met with in infants. MM. BILLARD and ANDRAL have, however, observed it in them; and I have seen it in the colon of children a few years of age, who had long been affected with chronic *diarrhœa*. It is seldom seen in the stomach before thirty; but it is common in this viscus between the ages of thirty-five and sixty-five, especially near the pylorus and cardia.

32. (c) *The muscular coat* is sometimes hypertrophied, either alone, or along with the sub-mucous tissue. In the former case, the pyloric orifice of the stomach is its chief seat (CRUVEILHIER, R. PRUS, LOUIS, BOUILLAUD, ANDRAL, &c.), and is much increased in thickness from this circumstance. In hypertrophy of the sub-mucous tissue, the muscular coat, instead of disappearing before the increasing bulk and induration of the cellular tissue that surrounds and penetrates it, as most frequently occurs, and as above described, is sometimes also hypertrophied. In this case, when a section is made of the diseased part, the hypertrophied muscular coat may be traced, in the form of a bluish semitransparent layer, placed between two other layers of a whitish colour, consisting of the sub-mucous and sub-peritoneal cellular tissue also in a state of hypertrophy. This central or muscular layer is traversed by lines of the same colour as the layers on each side of it; the enlargement and induration thus extending to the muscular coat, and through its fibres, by means of their interposed cellular tissue, to that connecting it with the peritoneum. This lesion is most frequent in the stomach, particularly near the pylorus, and constitutes, as well as the preceding states (§ 27.)—often with various alterations of secretion superadded—what is usually called *scirrhus*. (See STOMACH—Diseases of.)

33. C. *Hypertrophy of the nerves and vessels*.—(a) The nerves supplying the gastro-intestinal canal are very rarely enlarged. M. ANDRAL has never observed any such change in them. M. R. PRUS, however, found, in a case of circumscribed hypertrophy of the sub-mucous tissue and muscular coat (*scirrhus*) of a part of the body of the stomach, the right œsophagean branch of the pneumo-gastric nerve increased to twice its bulk, from the cardia to its disappearance in the tumour. It should be recollected, that the state of the nerves is seldom enquired after in *post mortem* inspections, and that to ascertain the condition of the ganglionic nerves requires the most minute research, which can seldom be devoted under such circumstances.—(b) The blood-vessels of the gastro-intestinal tube are very often large and dilated; but this is not hypertrophy. Their parietes are very rarely thickened. M. ANDRAL found, in two cases of chronic disease of the stomach, the parietes of the veins thus changed, constituting true hypertrophy. FORESTUS (Ob-

serv. l. xviii.; *Schol. ad Observ.* 18.) and VOIGTEL (*Handb. der Pathol. Anat.* ii. p. 95.) have noticed a *varicose* state of the *veins* of the stomach; a lesion which M. ANDRAL has not met in his numerous dissections.—(c) The *lymphatic* vessels, and especially the *glands* of the digestive canal, are very frequently hypertrophied, if the increase of volume so often found in the lacteal or *mesenteric glands* after irritation of the intestinal mucous surface be considered as true hypertrophy. But, in many instances, the enlargement is merely the consequence of vascular injection, and serous or sero-puriform infiltration of their tissue, without any increase of nutrition—the very element of hypertrophy. But after these pathological states have subsided, an evident increase of the bulk and density of these glands remains, whether the primary irritation continues, or has long previously disappeared. When these glands are enlarged, dense, and not very vascular, we may attribute the change to increase of nutrition, according to the state of our knowledge of what constitutes it. But when evident signs of inflammation—as increased vascular injection, redness, and tumefaction—are observed, the change must be chiefly imputed to increased organic action of the blood-vessels; although this condition does not preclude the co-existence of hypertrophy; with which, indeed, increased vascular action, in some grade or other, is very frequently, and even necessarily, associated, and of which it is generally the cause. However, in many cases of what may be called hypertrophy, or, otherwise, enlargement of the lacteal or absorbent glands, instead of being more vascular, they are pale, and even more bloodless and colorless than natural, particularly after chronic diarrhoea, hientery, and marasmus. The glands through which the lymphatics of the stomach pass are not so frequently enlarged as those of the mesentery. Often, however, those along the curvatures of the stomach and around the pylorus are much increased in size.

34. *D. Softening of the digestive canal* is one of the most common changes observed; and it may be limited to one of the coats, or extended to two or all of them. In this latter case the parietes of the canal may be torn with the greatest ease.—(a) Softening of the *villous coat* is most frequently met with: it occurs in every degree, and either throughout or in parts of this membrane only, the consistence of the other coats being undiminished. This lesion is most common in the stomach, where it has been most minutely studied. In its first stage or grade, it can hardly be removed in shreds, as it may be in the healthy state; and it is readily converted, by scraping, into a kind of pulp. As the softening increases, the slightest touch reduces it to a mucous-like pulp; and at still further advanced periods, it is either no longer uniformly spread over the gastric surface, or it is entirely deficient in parts or throughout, leaving the sub-villous tissue quite bare. This lesion may exist in the whole of the stomach, or in parts of it only,—most frequently in the splenic portion. It is often attended by marked dilatation of the veins running between the coats, evincing the antecedent existence of increased vascular action in cases where other appearances of it may have

vanished. In some cases of children, the softening exists only in a number of small round patches of a red colour; and in others, it is in lines, streaks, or irregular bands. It is probable that the small softened spots which have been also noticed by M. LESTIER may become ulcers from the extension of the lesion to the subjacent tissues. The colour of the softened villous coat may be greyish or natural, or white with a bluish tinge, or a dead milky white, or red, brown, brick red, and more rarely purple. Softening, with some one or more of these shades of colour in different parts of the canal, is met with as a consequence of various acute and chronic maladies seated either in the digestive organs, or in remote viscera, especially chronic diseases of the lungs. White softening in the lower part of the small intestine and colon is one of the most common lesions observed after chronic diarrhoea.

35. (b) Softening of *all the coats* of the digestive canal may take place to a remarkable extent, particularly in the stomach and bowel complaints of children, and in the gastric and adynamic fevers of adults. It has been described by JAEGER, ZELLER, F. RHADES, FLEISCHMANN, LAISNÉ, CRUVEILHIER, HAVILAND, WIESEMAN, GAIRDNER, and other writers referred to in the *Bibliography*. In some cases, the parietes of the stomach may be torn with the utmost ease, all the tunics and interposed cellular tissue having become friable and semi-dissolved; resembling, in extreme cases, a kind of jelly, without any trace of organization, and hence denominated by M. CRUVEILHIER "*gelatiniform softening*." In some of these cases, the gastro-intestinal parietes are modified only in respect of consistence, and have the outward appearance of being sound, until more closely examined. With this loss of vital cohesion, the colour of the part may be either natural, or remarkably pale, or red, and without reference to the acuteness or chronicity of the disease. The splenic portion of the stomach is most liable to general softening of the coats; but it also occurs in the small intestines, and the caecum and colon. M. ANDRAL states, that he met with reddish softening of the coats of the stomach in a child who had taken sulphuret of potash before death. I believe that this substance, as well as the caustic alkalies, will readily occasion this change, if exhibited in too large doses, or continued too long. As to softening of the gastro-intestinal parietes ever being a *post mortem* change, this pathologist remarks, that it may be established as a general principle, that any softening observed on opening the body at the usual period after death should not be considered as the result of putrefaction. But it may be, when observed in the stomach, the result of the action of the gastric juices, as shown by J. HUNTER and others referred to. It is, moreover, extremely probable that the acrid and morbid secretions of the diseased gastro-intestinal mucous surface may so far act upon any part of it as to soften and to erode it during the latter hours of existence, and the time that elapsed after dissolution. These inferences have received support from experiment and pathological observations (§ 6.). Dr. CAMERER, of Stuttgart, made, in 1818, a number of examinations with a view to the solution of this question; and found that, in all the animals

which had been killed while in good health, the great extremity of the stomach was softened, and if a sufficient time had elapsed, its parietes were dissolved or even perforated; no signs of putrefaction being observed. Whilst, on the contrary, in a dog already evincing putrefaction, no trace of softening existed in the stomach. This physician also found that the fluid collected in the stomach of two children who had died of gelatiniform softening of this viscus, introduced into the stomach of a man just dead, produced, at the end of twelve hours, solution of the coats of the part with which it had come in contact; that a portion of the same fluid had no effect upon the stomach of a living rabbit; but as soon as the animal was dead, or when the pneumogastric and trisplanchnic nerves were divided on each side, this fluid had an immediate action on the coats of the stomach. Hence it must be concluded that softening of this viscus is not unfrequently a *post mortem* change. It ought to be remarked, that softening of any part of the digestive canal has been too generally imputed to inflammatory irritation, owing to the frequency of its occurrence in febrile and inflammatory diseases, and from the action of acrid poisons. But the extreme cases of it that I have had an opportunity of observing, have been the *choleric fever* and *diarrhœa* of infants occurring after weaning, and in children who have died from aqueous effusion on the brain. In most of these it was unattended by vascular injection; the softened parts themselves, and those surrounding them, being either softened merely, or also attenuated or even eroded and perforated, and quite pale, excepting in the course of a few large vessels. I have likewise observed it, but in a different and more general form, in the adynamic and deliquescent states of remittent and continued fevers,* and in two cases of puerperal disease; the softened parts being more or less discoloured, and sometimes ulcerated, but not perforated. From the condition of vital manifestation in the cases in which I have remarked this change, it may be inferred that it results chiefly from a loss of the organic nervous power, and of the vital cohesion of the tissues previously to death, but is increased by this event, and by the action of the morbid fluids and secretions upon them.

36. *F. Ulceration of the gastro-intestinal parietes* is a frequent and important lesion, and has long attracted much attention in practice. It seems to have been first noticed by AVICENNA (*Canon*. l. iii. fen. 16. tr. 1. cap. 2.), who often makes mention of excoriations and ulceration as a cause of vomiting and diarrhœa; and it has been described by BONET (*Sepulch.* l. iii. sect. xi. obs. 2, 3, *et passim.*), GMELIN, FRIEND, HALLER, FIELD, PENADA, BAILLIE, FRANK, PROST, ANDRAL, and others (see *Bibliog. and Refer.*). It is met with in the parts of the canal in the following order in respect of frequency:—The inferior third of the ilium, the cæcum, the colon, the rectum, the upper two thirds of the ilium, the stomach, the jejunum, and the duodenum. In either of these situations it is a consequence—(a) Of softening of the villous coat,

without any evident injection, the ulcer being formed in the centre of the softened part;—(b) Of small inflamed spots of the villous membrane, which is quite sound in the intervals between them;—(c) Of a general injection or inflammation of this membrane, the intervals being more or less red;—(d) Of the sloughing of circumscribed parts of the villous, and sometimes of the sub-villous, and even of the muscular tissues;—(e) Of a change in the mucous follicles, either the isolated, or PEYER'S glands, or of both,—generally preceded by obstruction and enlargement of them. These glands first form conic knobs, and are either few or numerous, greyish or reddish, and with or without areolæ (§ 22. c.). Subsequently, a slight depression appears on their summits, owing to enlargement of their orifices, or to an incipient ulcer; this depression gradually becoming more considerable; the tumid glands thus resembling, particularly in their inflamed state, and when they contain a small quantity of puriform matter, the dimpled pustules of small-pox. They were formerly considered identical with these pustules, particularly when found, as is occasionally the case, in that disease; and they have been described as such by FERNEL (*De Abd. Rer. Causis*, l. ii. cap. 12.), BAILLOU (*Epid. et Ephem.* l. ii. p. 207.), HORSTIUS (*Instit. Med. Disp.* 3.), A. PARÉ (l. xiv. cap. i.), PEYER (*Observ. Anat.* ii.), MEAD (*De Variol. &c.* Lond. 1747, p. 323.), BARTHOLIN (cap. iii. obs. 29.), P. FABRICIUS (*Observ. circa Const. Epidem.* Ann. 1750, § 18.). Pustular ulcers have been particularly noticed in chronic dysentery, by Sir J. PRINGLE, Sir G. BAKER (*Epid. Dysent. of 1762.*), Sir G. BLANE, and Dr. D. MONRO; the last of whom describes the black colour of their bottoms in that disease. These pustular or pimple-like excrescences are often destroyed from the apices to the bases, leaving circular and deep ulcers in their places, that sometimes extend or run into one another when the aggregated follicles are affected, and thereby produce large, irregular, ulcerated patches. Ulceration originating in the follicles may proceed either from inflammatory action, or from obstruction of their outlets, and their consequent distention and irritation by their natural secretion, which had become acrid from the retention, or by the accumulation of a morbid or tuberculous like matter, which imparts to them the appearance of white granules; this change being succeeded by ulceration, often without any apparent increase of vascularity.—(f) Ulceration may also arise from disease of the sub-villous tissue, instead of commencing in the villous coat itself, as in all the preceding states. In this case the sub-villous tissue is the seat of various morbid secretions—as of tuberculous matter—which irritate the villous coat, inflame it, and at last ulcerate it; or which, by interrupting the connection of a portion of this coat with the parts beneath, cause it to sphacelate, leaving an ulcer-like excavation in its place.

37. *Ulceration of the digestive tube* is—or rather is an attendant upon—either an *acute*, or a *chronic* disease,—more commonly the latter. It is very rarely acute in the stomach, but is more frequently so in the small and large intestines. The number of ulcers is various—from one to some hundreds. They are generally only few, or even single, when they occur in the stomach; and very numerous, crowded together, and con-

* I should state, in support of my own originality as to this change in fevers, that it was noticed in a paper read by me to the London Medical Society in 1819, and published in the Quarterly Journal of Foreign Medicine for Jan. 1821.

fluent, in the ilium and large intestines; in which latter, however, they are sometimes met with singly, or few in number, and isolated. Their form is usually round or oval; but they are also sometimes linear and irregular. They are most frequently seated on one side of the canal, but they may occupy its circumference. Their margins are either white, pale, red, or of deep brown; the portion of villous membrane forming them, being either of natural thickness and consistence; or softer, harder, thinner, or thicker. In some cases the surrounding sub-villous tissue is thickened and indurated. Their bottoms consist of different tissues, according to the depths to which they may have penetrated. In some instances they are so slight as to appear like abrasions or excoriations; and in these the mucous coat still remains at their bottoms, the villi only having been destroyed. More commonly, however, the villous coat is penetrated; the sub-villous tissue, which is usually either grey, red, brown, or blackish, soft and fungous, or hard and scirrhous, forming the bottom of the ulcer. In other cases, neither the surrounding villous membrane, nor the cellular tissue below it, is further altered than as regards the solution of continuity, and sometimes diminution of consistency, the bottoms and margins of the ulcers being white, pale, without inflammatory appearances, and occasionally remarkably softened. These alterations are common in the stomach and bowels of children who have suffered diseases of these organs, or of the brain, after weaning; and in adults who have died of pulmonary maladies, or of bowel complaints after fevers. Dr. J. GAIRDNER considers that they are not true ulcers, but erosions of portions of the coats which were previously diseased, by the juices of the organs after death. I have seen many of these cases, chiefly in children, and believe that the principal part of the change must have taken place previously to dissolution, which had most probably rendered the surrounding tissues less vascular, and further diminished their already weak cohesion, long before the period at which these changes usually supervene (§ 35.).

38. As the ulcers deepen, the sub-mucous and the muscular tissues are successively penetrated, and in some cases without any appearance of vascularity in either the bottoms or the margins of the ulcers, or in the intervals between them; these latter cases generally occur in the diseases already alluded to, and in cases of great asthenic or vital depression, sometimes associated with anæmia or a cachectic habit of body; the ulcers assuming a truly phagedenic character. When the peritoneal coat is reached, it is either thickened, by a development of the cellular tissue connecting it with the muscular coat; or it is inflamed, the vascular injection being evident, and sometimes attended by an effusion of lymph, on its free surface, giving rise to partial adhesions between it and the opposite parts. In other cases, particularly in the asthenic ulcers now noticed, the peritoneum at their bottoms is thin, transparent, and pale; no coagulable lymph being thrown out upon its free surface, owing to the weak and cachectic state of the frame. A single small ulcer may penetrate deeply, and perforate the intestine; whilst a similar result may not arise, although the ulcerations are both numerous and large.

39. The coats in the intervals between the ulcers, as well as the parts immediately surrounding them, may be of natural colour, consistence, and thickness; or more or less either softened, injected, tumefied, thickened, or hypertrophied, and variously coloured. The intervening villous surface is often of healthy colour, but softened, and studded with enlarged follicles; and although it is more frequently slightly injected, yet, in some cases, the opposite condition already noticed obtains. The sub-villous tissue is often more or less thickened and indurated where the ulcer penetrates the villous coat, the ulcer appearing in the centre of a thickened or hypertrophied mass. The cicatrization of ulcers has been observed by BALDINGER (*N. Magazin*, b. ii. p. 347.), MALE, ABERCROMBIE, ANDRAL, TROLLIET, BILLARD (see *Bibl. and Refer.*), and others. A large cicatrized ulcer was found in the stomach of M. BÉCLARD, who had long experienced disorder of this organ. ANDRAL refers to several cases, in two of which the mucous membrane was evidently reproduced. The changes that take place on the peritoneal surface, when it becomes the bottom of the ulcer, as well as when it is perforated, have a marked reference to the state of vital power; under usual circumstances, and in a sthenic state of the system, the adhesions already noticed take place; but in an asthenic habit of body, coagulable lymph is not produced, or not in such a state as to form adhesions; and often merely an aqueous or turbid fluid is exhaled; sometimes long before the ulcers have penetrated far through the parietes of the canal. Thus ascites may supervene in any of the stages of ulceration, as observed by PROST (*Méd. Eclair. par l'Ouver. des Corps*, t. ii. p. 52.) and others.

40. *G. Perforations of the digestive canal* have recently attracted much attention; but they had not passed disregarded in former times. Among the numerous writers of the 16th, 17th, and 18th centuries, who have noticed this lesion, a very great proportion, having observed it associated with intestinal worms, imputed the perforations to them, — an inference not confirmed by more accurate modern research; the worms having merely passed through the openings they found ready made. Instances, however, of this lesion unassociated with the entozoa have been recorded by MORGAGNI (*Epist.* xxxi. art. 2.); MONRO, VETTER (*Aphorismen*, &c. b. i. p. 193), BANG, HUNTER, GERARD, PORTAL, BRESCHET, LAENNEC, (*Journ. de Méd. Cont.* vol. iv. p. 557.), PERCY (*Ibid.* vol. iii. p. 510.), LEROUX (*Ibid.* vol. xv. p. 239.), PENADA, JAEGER (*Hufeland u. Himly. Journ. d. Pr. Heilk.* May, 1811.), GISTREN (*Ibid.* July, 1811.), MARCUS (*Ephe-meriden der Heilk.* b. i. heft ii.), CLOQUET (*Nouv. Journ. de Méd.* t. i.), LOUIS (*Archives Génér.* &c. t. i. p. 17.), LEGALLOIS (*Ibid.* vol. vi. p. 68.), CHAUSSIER, RULLIER, EBERMAIER, GAIRDNER, ABERCROMBIE, ARMSTRONG, &c. (see *Refer. in Bibliog.*). This lesion may arise in various ways: (a) It may be partly or altogether a *post mortem* change, and attended by softening and thinning of the surrounding tissues; (b) or it may be caused by an eroding ulceration of the tunics, without injection, but with softening and thinning of the margins; (c) or by a circumscribed slough involving all the gastro-intestinal tunics; (d) or by an ulcer that has penetrated all the

coats; (e) or by rupture of a previously softened or otherwise diseased portion of the parietes.

41. (a) Perforation from the action of the gastric juice is always in the depending part of the stomach; its size is large and irregular, its margins are fringed and thin; and the surrounding tissues are pulpy or gelatinous and transparent, having a semi-dissolved appearance, and a pale, whitish, yellowish colour, sometimes streaked with brown or black lines from the action of the acid juices on the blood remaining in the capillaries. — (b) Eroding ulcerations of the stomach, such as have been described above (§ 35 — 37.), and which are with difficulty distinguished from the *post mortem* effects of the gastric juice, may end in perforations, having pale, thin, and soft edges, especially in children. Dr. COSTE records two instances of such perforations in the stomachs of adults, caused by the oxymur. of mercury and spirits, long and largely employed. — (c) A portion of the canal very rarely *sloughs* so as to involve all the coats, and to give rise to perforation when the slough is thrown off, excepting in cases of poisoning by acids, and of strangulated hernia. — (d) *Ulceration* is the common cause of perforation, and is most frequently, in such cases, seated in the solitary or aggregated glands of BRUNNER and PEYER. — *a.* It may occur suddenly, and peritonitis supervene, the patient having previously appeared in good health. Such instances are recorded by MALE, ROGERS, C. SMITH, CRAMPTON, TRAVERS, LAENNEC, ANDRAL, and BOURIENNE (*Journ. de Méd.* l. xxxvi. p. 464.), as having occurred in the stomach; and by NEUMANN and HUFELAND (*Journ. der Pract. Heilk.* b. ix. p. 170.), the perforation having taken place in the duodenum and jejunum. — *β.* Perforation is more frequent in the course of, or during convalescence from, the gastric and enteric form of continued fever, particularly in the epidemic or rather endemic forms of it, similar to those described by M. BRETONNEAU under the name of *Dothinenterites*, and previously by ROEDERER and WAGLER by that of mucous fevers. But it may occur in all fevers of an adynamic form, the surrounding portions of intestine being of a dark or dirty brown, or ochry colour, softened, and often ulcerated in numerous places, or studded with minute ulcers of the aggregated glands. This change has been well described by BRIGHT, CHAMBERS and HEWETT. (See FEVERS — *Diseased Appearances in.*) — *γ.* It is also met with after chronic complaints of the stomach or bowels, which are sometimes attended by much pain or retchings, as in the cases recorded by J. MOORE, M. WORKMAN, ELLIOTSON, and HEIM (*Horn's Archiv.* Jan. 1822.), but more frequently by little acute suffering, until after perforation, followed by peritonitis, has taken place. — *δ.* It may also supervene during chronic disease of the lungs, owing either to simple ulceration of the glands, or to softening of tubercular matter deposited between the gastro-intestinal coats, and consequent ulceration, as in the case recorded by M. LEGALLOIS (see *Refer.*); perforation from this latter cause sometimes occurring independently of pulmonary disease, particularly in children. — (e) Perforation from rupture of an ulcerated, cancerous, thinned, softened, or otherwise diseased part of the canal, is most frequently

observed in the stomach, and in the colon or cæcum; and is sometimes favoured by stricture, thickening, &c. of the portion below it; the rupture usually arising from the over-distension of the diseased part of the canal, from external violence or pressure, and from straining at stool or vomiting. Most of the cases of rupture of the stomach and bowels recorded have been consequent upon some one of the changes already described, as may be seen in the cases recorded by MORGAGNI (*Epist. liv. art. 15.*), ANDRY (*Hist. de la Soc. Roy. de Méd.* 1776, p. 257.), LIEUTAUD, ACREL (*N. Schwed. Abh.* b. ix. n. 3.), PORTAL, RICHTER (*Chir. Biblio.* b. xii. p. 403.), SOEMMERRING (*Notes, &c.*), SANDIFORT (*Observ. Anat. Path.* l. iv.), ZEVIANI (*Mem. di Matem. e Fisica della Soc. Ital. Veron.* t. v. 1790.), HUFELAND (*Journ. de Pr. Heilk.* b. v. p. 819.), BOUILLAUD (*Arch. Gén. de Méd.* vol. i. p. 534.), MARJOLIN (in *Ibid.* vol. ii.), ANNESLEY, CRAMPTON, ELLIOTSON, LISLE, F. DAVIS (in the duodenum), ABERCROMBIE, W. COOKE, and others. — (f) Ruptures of the stomach and duodenum, without, as well as with, vomitings, but without any organic change or violence sufficient to account for the occurrence, have been observed by DUPUY, LALLEMAND, CHEVALIER, and B. BROWN; but, probably, softening or atrophy, or thinning of the coats also existed, although not mentioned. Perforations of the digestive canal are most frequent in the stomach, especially in the splenic portion. In other parts of this canal they seldom supervene, except at the bottom of ulcers; whilst in the stomach they are more commonly produced by the other causes above enumerated. They may, however, exist simultaneously in different parts of the intestinal tube; and may occur at every age. CRUVEILHIER, WIESEMANN, GAIRDNER and BILLARD have observed them in young children. I have seen them as early as two and three months in infants deprived of their nurse's milk; but they are rarely met with until after weaning.

42. When perforation has taken place, various consequences ensue, according to its situation, and the disease and circumstances in which it has occurred. — (a) the contents of the viscus generally escape through the opening into the peritoneal cavity, and produce acute peritonitis, soon terminating fatally. But this is not a constant result; for the perforation may give rise to chronic peritonitis, under which the patient may continue to linger for several months. I have seen this in two instances — one in an adult, and another in a child. M. ANDRAL notices a case in which *lumbrici* escaped into the peritoneal cavity through the opening, and occasioned merely an obscure lingering irritation. — (b) The perforation may communicate with the cellular tissue outside of the peritoneum, as when the cæcum and rectum are penetrated, and give rise to abscesses and fistulæ. I have referred to cases of this description, one of which occurred in my own practice, in the article on the CÆCUM. — (c) In other cases, the gastro-intestinal contents do not pass into the abdominal cavity, owing to the circumstance of the peritoneum having, previously to its perforation, become inflamed, so as to throw out coagulable lymph on its surface, which excites inflammatory irritation in that part of it directly opposite, and

thereby forms adhesions between them, and shuts the opening. When this occurs, other consequences ensue. — *α.* The adhesion may take place to some part of the peritoneum reflected over the abdominal parietes, and the ulceration, by penetrating it, may also occasion abscess or fistula between the peritoneum and the walls of the abdomen. OSIANDER (*Denkwürdigkeiten*, b. i. p. 99.) has recorded a case of this description; and NEBEL, LIEUTAUD, VETTER, GODOT, JACQUINELLE, and B. GOOCH, instance others, in which the inflammation and matter thus formed advanced externally and opened in the left hypochondrium, a fistulous communication being thus established between the stomach or any other part of the digestive tube and the external surface. In this way *artificial anus*, or *fistula in ano*, commonly arises, when some part of the intestinal canal is perforated. — *β.* Owing to adhesion having taken place between the surface of some viscus and the penetrated peritoneal coat of the canal, the former either stops up the opening, preventing the escape of the gastrointestinal contents into the abdominal cavity, or becomes itself penetrated by the ulcerative process extended thither. MECKEL (*Epist. ad HALLER. Scrip.* vol. iii.) found the opening in the stomach closed by the omentum accreted over it. ZEVIANI, CHAUSSIER (*Bull. de l'École de M.d. de Paris*, 1808, p. 41.), and LEROUX (*Journ. de M.d. Cont.* vol. xv. p. 239.), observed it covered by the spleen, into which the ulceration had partially penetrated. KEPPELHOOT (*Sect. Cadav. Path. L. B.* 1805, p. 19.) met with a similar connection with the liver. M. ANDRAL saw an ulcer in the ascending colon, the bottom of which was formed by the substance of the kidney; and M. RAYER, a perforation of the duodenum stopped by the liver. Perforations of the stomach may be closed not only by the liver and spleen, but also by the diaphragm and transverse colon, and even may be likewise carried through either of them. M. ANDRAL records cases in which the perforation passed through the stomach and diaphragm into the thorax, and also into the substance of the lungs, the serous surfaces of each having previously adhered; and a communication had thereby been established between the cavity of the stomach, and either that of the pleura, or that of the bronchi. When the viscus which becomes accreted to the surface of the perforated portion of the canal has itself a cavity, then a communication generally takes place between them; thus CAMPER (*Mém. sur le Prix*, &c. t. v. n. 9.) met with an opening into the bladder. Indeed, communications thus formed with either the bladder, uterus, or vagina, are not very rare. A case occurred to M. CHOMEL (*M. ANDRAL's Anat. Path.* vol. ii. p. 136.), in which the duodenum communicated with the colon, through the gall-bladder, which adhered to both; and cases are not very uncommon, in which perforations and accretions of the serous surfaces of several parts of the digestive canal take place, and openings are thereby directly formed between them. I have seen communications thus existing in the same case between opposite parts of the small intestines in two places, and of the small and large intestines in three places. In another instance there existed no less than four or five such com-

munications, each of which was of course a double perforation. These changes have been observed by me in four cases in children; and in all, the perforations were associated with chronic peritonitis. Dr. G. GREGORY (*Trans. of Med.-Chirurg. Soc.* vol. xi. p. 258.), has recorded a similar lesion; and an instance, in which it occurred in an aged person, is given in the third volume of the *Bulletins* of the Faculty of Medicine of Paris. Dr. ABERCROMBIE found an ulcerated passage existing between the stomach and colon, feculent vomiting having preceded death; Mr. A. BELLOT detected several perforations, forming openings between the small and large intestines, and into the abdominal parietes of an adult female; and M. C. BROUSSAIS observed carcinomatous ulceration and perforation of the stomach, opening into the *vena porta*.

43. In all these, excepting the second perforation, by which a communication is established between contiguous portions of the canal, as in the cases now alluded to, the opening takes place from *within outwards*. But the perforation may be produced in an *opposite direction*, as where abscesses of the liver burst into the stomach or colon, M. CAYOL (*Journ. de M.d. by CORVISART, &c.* vol. xiv.) mentions a case in which an abscess in the kidney burst into the ascending colon. Abscesses, perforating, and opening into, the rectum, that had formed, in one case between it and the uterus, and in another between it and the sacrum, during convalescence from fever, have occurred in the practice of the author.

44. iii. MORBID SECRETIONS IN THE DIGESTIVE TUBE.—These may form on the free surface of villous coat, or in the substance of the parietes of the canal.—*A.* The secretions and fluids found on the internal surface of the villous coat are—1st, the natural secretions altered from the healthy state; and, 2d, those which are altogether adventitious and foreign to this situation.—(*α*) The mucous secretion and the aqueous and gaseous exhalations may be increased in quantity; and otherwise modified.—*α.* The mucus covering the villous surface is often greatly increased in quantity, and modified in consistency, either throughout the tube, or in portions of it only; this membrane itself being commonly of a bright red, and more or less injected; or of its natural colour, or sometimes even paler than usual.—*β.* The aqueous exhalation is also occasionally increased on the villous coat, and the vessels more or less congested, particularly the veins. The existence of increased aqueous exhalation, connected most probably with determination of the circulating fluid, is evidently the chief pathological state in cholera and serous diarrhoea. But vascular congestion is not always found upon dissection in those cases, especially if the person have died of some other disease, of which serous diarrhoea was a contingent symptom. In these the parietes of the intestines are generally attenuated and pale, and contain more or less of a serous, yellowish, or colourless fluid.—*γ.* The gaseous fluids, of which the digestive canal usually contains more or less in health, are often greatly increased, and are sometimes a very important symptom, although not constantly or generally connected with any one pathological state. Increased exhalation of the intestinal gases is,

however, a very frequent, although not a constant, result of inflammatory irritation of the villous membrane, or of disease of PEYER'S glands; but it may also proceed from extreme debility, manifested especially in the organic nervous system, and by the bloodless state of the digestive canal found after death. Hysteria, hypochondriasis, asthma, flatulent and lead colic, rabidity, and other affections, are characterised by great accumulations of air in the intestines, without any sign of vascular irritation of the villous surface. These gaseous collections are generally greatest in the large intestines; but they also take place in the stomach and small intestines, particularly in the latter, as observed in the last stages of typhoid fevers, and of various other acute diseases. The meteorismus of fever has been imputed by BROUSSAIS to disease, especially ulceration of the intestines; but, although the connection is frequent, it is by no means general, and, even when observed, both pathological states are merely associated effects of the same anterior change, viz. diminished vital power, expressed particularly in the organic nervous system and viscera influenced by it. The formation of air in the digestive canal has been chiefly attributed, in the article on COLIC, to exhalation from the villous surface. It may also arise partly from the chemical reaction of the diversified and heterogeneous substances taken into the stomach, as they are acted upon by the secretions and are propelled along the canal, and a portion is commonly swallowed with the ingesta.

45. (b) *The fluids and secretions foreign to the digestive canal in health*, but which are sometimes found in it, are, blood, pus, coagulable lymph, melanotic matter, tubercular matter, concrete or fluid fatty matter, a thick albuminous substance, calculous concretions, and worms.—*a. Blood* is occasionally found in the stomach and intestines, both in a fluid and coagulated state, and in very variable quantity. The causes of its effusion on the free surface of the villous coat are—1st, Atony of the extreme vessels, and diminished vital cohesion of the coat;—2d, A mechanical obstacle to the return of the blood, particularly in the vena porta;—3d, Inflammation or irritation of the villous membrane in various states of intensity and morbid association, supervening either spontaneously, or caused by irritating ingesta;—4th, A morbid or dissolved state of the blood itself, most frequently, however, associated with the 1st state, as in purpura, the black vomit of yellow fever, and purpura hæmorrhagica;—5th, The erosion of the coats of a blood-vessel in the seat of an ulcer;—6th, Disease of the coats of a blood-vessel, independently of any lesion of the villous coat;—and 7th, From having been swallowed, as in cases of excessive hæmoptysis, hæmorrhage from the fauces, &c. When the sanguineous effusion proceeds from the *third* source, it may be either very slight, the mucus covering the villous surface being merely tinged with it, or very considerable, according to the various concomitant circumstances under which it may take place. Its *fifth* and *sixth* sources are the most rare, but not so rare as M. ANDRAL supposes, the sixth being entirely overlooked by him. M. PROST, Dr. ABERCROMBIE, and others, have detailed instances of the former; and a case of the latter,

from atheromatous deposit in the coats of an arterial vessel disposing it to rupture, very recently occurred in my own practice. (See HÆMORRHAGE—from the Digestive Canal.)

46. *β. Puriform matter* is but rarely met with on the villous surface, instead of the mucus usually secreted by it, in any appreciable quantity. It is much more commonly found in the follicles, either in an inflamed state of this coat, or independently of any marked injection of its vessels. When the follicles contain this fluid, they generally present the appearances already described (§ 22. c., 36. e.), especially the conoidal and pustular state, the puriform matter escaping on incising them.—*γ. Dr. MONRO* describes a *brown fluid* like cocoa, which he has seen in some instances voided in large quantity during life from the stomach. In a fatal case, this viscus was very large, and half filled with this fluid, its coats and adjoining viscera being sound.—*δ. Coagulable lymph*, in various grades of density, and in the form of false membranes, is also sometimes found on the gastro-intestinal villous surface; but not so often as in the mouth, pharynx, and œsophagus. I have observed it most frequently in the form of whitish flocculent or thin membranous-like patches and shreds, covering the inflamed or partially injected surface, in fatal cases of scarlet fever, with gastro-intestinal symptoms. In sub-acute inflammatory affections of the digestive organs, either with or without diarrhoea or dysentery, as in the cases described by BAILLIE, POWELL, GOOD, ANNESLEY, LELUT, BILLARD, &c., the false membrane is occasionally so complete as to form a tube of various dimensions, which, when evacuated with the stools, has been mistaken for a sphacelated portion of intestine, or for its mucous coat. Dr. GODMAN found it covering the whole villous surface of the stomach; and Mr. HOWSHIP remarked a similar production in a child that had accidentally swallowed boiling water. M. ANDRAL thinks that it may sometimes proceed from a morbid secretion of the mucous follicles; but, as in the other situations in which it is seen, it evidently arises from inflammatory action of the villous or mucous coat itself, the exhalant vessels of which, in the inflamed state, throw out coagulable lymph instead of their usual watery or serous exhalation; these vessels also sometimes secreting puriform matter, in a modified form of disease.—*ε. The gastro-intestinal mucous coat* sometimes exudes a *black matter*, the *melanosis* of modern writers. This substance exists either in a fluid form, on the free surface of the membrane, or combined with its tissue, or in both forms in the same or different parts of the canal. When merely deposited on the free surface of this coat, it can generally be washed off; the matter composing it staining linen. But when it is infiltrated or combined with this tunic, it cannot be removed by ablution, and it does not stain linen. It is most apparent at the bottom of the lacunæ in the duodenum, or in the summits of the villi, or in the margins of the orifices of PEYER'S glands, or in the bottoms of small ulcers.—*ζ. Tuberculous matter* is sometimes found in the follicles, the intestines being studded with a number of small white bodies, seldom exceeding the bulk of a pea. The substance they contain is concrete, whitish, and friable. M.

ANDRAL remarks that these tumours are merely the follicles altered in their nutrition and secretion; the affection being a genuine *acne* of the mucous membrane.—*v. Fatty matter* is very rarely met with in the intestinal canal; but several cases are recorded in which it has been passed in a fluid and concrete state during the advanced stage of chronic diseases.—*g. A thick albuminous matter* is generally found covering the villous surface of the small and large intestines of those who die early in the *Pestilential Cholera*. (See art. PESTILENCE.) Of Calculous CONCRETIONS and WORMS in the digestive canal, a detailed account is given in their respective articles.

47. *B. Morbid productions in the tissues composing the parietes of the digestive canal.*—*a. Blood* is sometimes effused in the sub-mucous cellular tissue to an extent varying from a line to some inches, often without any change in the mucous membrane, and generally from the same causes as have produced its effusion within the canal (§ 45.)—*b. Serous infiltration, or œdema*, of the cellular tissue connecting the different tunics and muscular fasciculi with each other, is sometimes observed in various degrees, the thickness of the parietes being thereby proportionately increased. The fluid occasionally raises up the villous surface in the form of blisters or small vesicles. *œdema* is most frequent in the large intestines, the villous membrane being remarkably pale, or more or less injected and variously coloured, or softer than natural, or even more consistent, or ulcerated, either independently of disease of its follicles, or in the seat of PEYER'S glands, and with enlargement of them. The cellular tissue itself, the seat of serous infiltration, may be unaltered or softened, or hypertrophied, thickened, and indurated. In the latter case, it is, in some places, dry, and grates under the scalpel, without yielding any fluid; and in others, there are considerable deposits of serum, or of a gelatinous fluid of various consistency, constituting one of the more frequent states of what is usually called *scirrhus*, as met with in the pylorus or cardia of the stomach, or in the rectum. *œdema*, in the different forms now enumerated, is often the chief lesion observed after chronic diarrhoea and dysentery, and prolonged affections of the stomach. The exhalation of serum may also occur within serous envelopes or *cysts*, developed between the villous and muscular coats, and varying from the size of a pea to that of an egg.—*c. Gaseous exhalations* may take place between the coats of the digestive tube, soon after death, from incipient decomposition; but a case observed by M. J. CLOQUET (*Bullet. de la Faculté de Méd.* vol. vii. p. 267.) shows that it may also supervene during life.—*d. The secretion of fat* has been observed in one instance by M. ANDRAL in the sub-mucous cellular tissue, the coats of the small intestine, in which it formed a small tumour, being quite sound.—*e. Purulent matter* is seldom found in the substance of the gastro-intestinal tissues, and then only in small quantity in the sub-mucous and connecting cellular substance—forming either one or more collections, which are generally encysted, but also infiltrated in this tissue. These small abscesses should not be confounded with the pustular-like tumours, containing pus, formed by inflamed follicles. They do not appear

to give rise to any peculiar symptom.—*f. Tubercular matter* is secreted more frequently than pus in the gastro-intestinal parietes, particularly in the lower part of the small intestine, and generally in the cellular tissue connecting the coats. It forms small whitish tumours, owing to the colour and form of the deposition being perceptible through the elevated villous or peritoneal membrane, varying from the size of a millet seed to that of a pea. They may be very few or numerous—usually the latter in persons who have had tubercles in the lungs, particularly at the margins and bottoms of ulcers. They may exist long without giving rise to any symptom referable to the digestive organs, until the mucous membrane becomes affected, when diarrhoea—generally chronic and intermittent—is the usual result. The membrane over and around these tubercles may be unaltered, or injected and inflamed, variously coloured, softened, ulcerated, &c. The softening and breaking down of the tubercular matter, and the attendant ulceration, may also terminate in perforation, as in the case published by M. LEGALLOIS.—*g. Melanoid matter* is occasionally deposited in the cellular tissue connecting the coats, either in a diffused or disseminated state, or in isolated spots, forming small projecting tumours.—*h. Osseous matter* is very rarely deposited in any part of the gastro-intestinal canal. DE HAEN (*Rat. Med.* vol. iv. cap. i.), however, met with it in the stomach; and SHORT (*Edin. Med. Essays*, vol. iv. p. 353.), in the colon and rectum.

48. *IV. COMPLICATED PRODUCTIONS GENERALLY THE ADVANCED STAGES OF MORBID NUTRITION AND SECRETION CONJOINED.*—The morbid formations now to be mentioned, are chiefly the advanced stages of two or more of the morbid changes already described; and, as might be inferred *a priori*, so nearly approximate to each other in their external characters, as well as in their anatomical and chemical elements, as often to render it a matter of difficulty to distinguish between them, unless in an arbitrary manner. From this gradual approximation of the appearances of organic lesions to one another has arisen the difficulty of describing and arranging them; and from attempts at both having been made without being aware of this circumstance, or adverting to it sufficiently, or from endeavouring to establish, in respect of morbid changes, that which has been successfully performed in regard of the living productions of nature, and of which the former does not, but the latter does admit,—from describing as unvarying species what is merely constantly changing varieties,—has arisen much confusion and misconception.

49. *A. Local or partial hypertrophy of the villous membrane*, forming the excrescences already noticed (§ 27.), seems to be an early stage of several changes, which have been variously denominated, according to the appearances they have presented, and which have evidently arisen from alterations of their nutrition, and interstitial secretion, probably occasioned, as well as modified, by local irritation, constitutional vice, temperament, diathesis, age, and vital endowment.—(*a*) The simplest of these productions seem to be the *polypous* or *fleshy* mass, which may assume either a pyriform, oval, or spheroidal form; with a broad or narrow base, and an opaque, dark red or pur-

plish colour, and various grades of consistency, and of vascularity chiefly as respects its venous circulation. It has been found in the stomach by MORGAGNI, MONRO, GRANVILLE, and others; and in the intestines by RHODIUS, PORTAL, MONRO, &c.; and has been seen as large as the closed hand. After repeated irritation, it may either throw out much blood, or may experience a sloughing or destructive form of ulceration. — (b) Other modifications of polypous tumours present a lobulated, irregular, or fissured surface, with a more decidedly fungous appearance and spongy structure than the foregoing, particularly in the old and debilitated. They are commonly dark-coloured, abound more with varicose-like veins, are less homogeneous internally, are more cellular, spongy, and vascular, and contain a dark serous or sanious fluid in their areolæ or minute cavities. They also bleed more frequently and profusely than the preceding, and discharge a foetid and sanious matter; and, when they ulcerate, assume the form of a soft fungous mass. They have been mistaken for *fungus hæmatodes*, but, although they very closely resemble the hæmatoid form of it, they differ from it in occurring primarily in the digestive canal, and not simultaneously in other parts, in being more spongy than it, and in containing little or no albuminous or brain-like substance. — (c) A third modification of these polypous productions has been described by Dr. MONRO under the name of *milt-like tumour*. It approaches in appearance that variety of *fungus hæmatodes* which has been denominated *encephaloid*, from its brain-like structure. The milt-like formation resembles in colour and consistence the milt of some fishes, extends to a large size, and is very slow in its growth. It is externally of a pale red colour, with an irregular surface, emits an offensive foetor, and is covered by a fine membrane, in which a number of injected vessels are ramified. It has a homogeneous structure, consisting chiefly of a whitish albuminous secretion deposited in the texture, or under the epithelium, of the villous membrane; and is imperfectly organized. It is partly miscible with water, and is somewhat hardened by spirits; the surface to which it is attached, and the adjoining parts, being discoloured, vascular, abounding with large engorged veins, and, when it is removed, presenting a villous, honey-comb appearance, besmeared with drops of blood from the torn vessels. The neighbouring lymphatic glands generally participate in the disease, and are filled with a similar matter. This structure differs from the true *fungus hæmatodes* in being found only on the digestive mucous surfaces; the latter, in every situation. It is also not so firm and elastic, nor so dark-coloured and purplish, nor of so unequal a consistence in different parts, as that disease. Moreover, it is not liable to fungous ulceration, as the latter is; and while it occurs only in advanced life, the true hæmatoid or encephaloid disease is most common in early and middle age. It is met with most frequently in the stomach, and several cases of it are detailed in Dr. MONRO's instructive work.

50. B. The various states in which simple scirrhus or scirrho-carcinoma presents itself in the digestive canal have been here ascribed chiefly to hypertrophy of the sub-villous cellular

tissue; and to the modifications of nutrition and secretion superinduced in it by long continued irritation, morbid diathesis, advancing age, and depressed vital power. In the simple states of scirrhus, the hypertrophy of the tissues to which it has been chiefly attributed (§ 30.) may be distinctly traced, the thickening and induration of the sub-villous cellular tissue amounting in many instances to a fibro-cartilaginous change. But in further advanced stages, or in states of the disease which are different from the commencement, a more complex lesion evidently obtains; two or more, and ultimately even all, the anatomical elements of the part being involved in this change. Scirrho-cancer is most frequent in the pyloric extremity of the stomach, the cardia, the rectum, the sigmoid flexure of the colon; but it may occur in other parts of the stomach and small or large bowels; and has been described by MORGAGNI, BAILLIE, PINEL, HOWSHIP, MONRO, CHARDEL, ARMSTRONG, PALETTA, LOUIS, BAYLE, R. PRUS, CRUVEILHIER, and CRAIGIE. It appears commonly to commence in the sub-villous tissue; the mucous follicles, the villous tissue itself, the muscular coat, the blood-vessels, the lymphatics, the nerves, and lastly the serous coat, evincing sensible evidence of change. But, although the former of these are the first to manifest altered structure, there is every reason to infer that the morbid condition originates in the organic nerves of the part, their functions only being at first affected; and that lesions of circulation, secretion, and nutrition, more or less gradually result, and ultimately the organic changes which are found implicating the above anatomical elements. — (a) The scirrhus in its simpler state of this change consists of a greyish white structure, sometimes inclining to yellow, interposed between the internal surface and the serous coat of the part, frequently with lighter coloured and denser fibres — in some cases approaching to the fibro-cartilaginous texture — running through it, and generally in a transverse direction to the axis of the canal. This change may be confined to the connecting cellular tissue (§ 30.), or be coeval with a similar change in, or progressively implicate, the mucous follicles, and the villous or muscular coats. Along with the circumscribed thickening and induration of the part, a contraction of its canal generally takes place; the villous coat or the mucous follicles of the more prominent places become ulcerated; and, either consecutively or simultaneously, the interior of the morbid structure is partially softened and disorganized. Subsequently to this, a phagedenic, and, in some cases, a fungous form of ulceration rapidly proceeds; death, however, frequently anticipates this change. In rare instances, this structure is much more soft, lardaceous or pasty, and indented by erosions; and is chiefly met with in the rectum. I have, however, seen it once in the pylorus. — (b) In another variety, the scirrho-cancerous structure consists of circumscribed and irregular or nodulated masses; and, in the opinion of MONRO and CRAIGIE, commences in the mucous follicles. Its internal structure varies, but generally consists of a hard fibrous-like structure or bands traversing a soft or pulpy substance, frequently containing a gelatinous or ichorous fluid in minute cavities. (See CANCER.) At a more

advanced stage it becomes softer, often in separate parts, and at last ulcerates, leaving cavities with hardened, scirrhous, and ulcerating sides. It is most frequently found obstructing the orifices of the stomach. — (c) Scirrho-cancer of the digestive canal is not always limited, but sometimes extends to the adjoining parts; and it may attack distinct portions, or even other viscera, either simultaneously or consecutively. Generally the peritoneal coat is the last to be affected, and, when implicated, it resembles coarse parchment. The rugæ of the internal surface are generally thickened and indurated, or eroded and ulcerated in the centre, or studded with small hard tubercles. There are often fungous growths in the advanced stages, proceeding from the ulcerated surface, which has ragged, unequal, and retorted edges; the disease being then in an open or carcinomatous state. In some instances the adhesion precedes the ulcerative process; and thus life continues, though all the coats are destroyed, and the malady is extended to the adjoining parts. When adhesion has not taken place, the ulceration communicates with the cavity of the peritoneum. If the malady be situated so as to interrupt the passage through the canal, the parts above it generally becomes very much enlarged, at first thickened, but afterwards thinned, and ultimately either ulcerated, perforated, or ruptured. The thickness and hardness of the diseased part vary much. When it is seated in the cardia or the pylorus, it may extend to the diaphragm or duodenum respectively, and so on as to other parts. The lymphatic glands in the vicinity are usually enlarged and scirrhous. The progress of the malady is generally very slow; but in other cases it is more rapid.

51. *C. Medullary Sarcoma — Hamatoid, or encephaloid disease* — may originate in any of the elementary tissues of the digestive canal. It also presents modifications, according as the encephaloid, or medullary, or the vascular structure predominates. But it differs from the fungous and scirrho-cancerous maladies, in its more obvious connection from the commencement in constitutional vice, in the greater rapidity of its progress, in its belonging to early age, and in its simultaneous or consecutive occurrence in different and unconnected parts. Its colour varies remarkably: it being generally much lighter when the medullary or albuminous substance is greatest, and passing through every shade to a violet or purple, as it becomes more vascular, and consists more of convoluted and injected capillaries; and varicose-like and congested veins. It generally consists at first of a soft elastic and distinct tumour, without fluctuation, but occasionally of unequal firmness in different parts. In its progress it bursts, and a soft dark or purplish fungus, which bleeds profusely, rises from its centre, and rapidly increases. When divided, separate portions of it exhibit different colours and consistence, — some being as soft as brain, others as hard as the boiled white of egg, and others like cartilage, — and cavities of various sizes and forms, containing a bloody fluid. It experiences a fungous ulceration, and, as it extends, implicates or converts into its own form the tissues surrounding it. It occurs more frequently in the stomach than in others parts of the canal; and when it obstructs the orifices of this viscus, occasions the further changes

noticed with reference to the preceding lesion. (See HÆMATO-ENCEPHALOID DISEASE.)

52.V. CHANGES OF CAPACITY AND SITUATION.

— A. *Increased capacity* of the alimentary canal is usually partial only — in one of its compartments; and is often associated with, and, indeed, occasioned by, narrowing or constriction of a part immediately below it. General increase of capacity has, however, been observed in some cases of bulimia. The stomach and large bowels are most frequently thus altered; either of which may become so much enlarged as to occupy the greater part of the abdomen. Cases of this description have been observed by PLATER, MORGAGNI, HASENOEHL, HAMBERGER, FRANK, ANDERSON, STOERCK, SANDIFORT, myself, and others; and are usually attended by thickening, induration and constriction, or scirrho-carcinoma of the pylorus, when the stomach is dilated; and of the rectum, when the colon is thus changed. M. ANDRAL found the duodenum as large as the stomach in a case where the commencement of the ilium was contracted. When a portion of the canal becomes constricted or obliterated, either from simple thickening, induration and ulceration, or from scirrhous or carcinomatous disease, the part above may be not only dilated and sacculated, but also attenuated or even ulcerated, or it may ultimately burst from the consequent feculent and flatulent distension. Cases of this description have been recorded by GIRDLESTONE, BURRELL, ANNESLEY, and others. Instances of great dilatation of a part of the canal, without contraction of a part below it, are rare. M. ANDRAL, however, found the stomach excessively dilated in two cases, without any obstruction of the pylorus.

53. *B. Diminished capacity* also is generally a partial change, and seldom observed throughout the canal, excepting in a slight degree, after long fasting or death from starvation, or after an excessive or prolonged use of acids and astringents. The stomach has been found as narrow as an intestine after poisoning by acids, and sometimes after irritating substances; and the intestines contracted throughout from the same cause, and the protracted use of acids and powerful astringents. In cases of artificial anus, the portions of intestine below it, no longer receiving the matters transmitted along the canal, contract remarkably, their cavity being filled with mucus. Obliteration of the cavity of some part of the digestive tube may take place either partially or completely — 1st, from *intrinsic causes*; and, 2d, from *extrinsic causes*, or changes external to it, but which alter or destroy the permeability of its canal. The *intrinsic causes* are — (a) hypertrophy, with induration of one or more of the tissues forming its parietes; (b) excrescences or polypous growth on its internal surface; (c) concretions, either calculous or fecal, or a ball of worms; (d) constriction of the muscular coat in a circumscribed part. In this last form of constriction, which is not infrequently observed in fatal cases of dysentery, and of which several delineations are given by Mr. ANNESLEY in the work referred to, the adjoining portions of intestine are commonly distended by air; the internal surface of the constricted part being generally either injected, or ulcerated, or otherwise altered in structure. The contraction observed about the middle of the stomach, unconnected with any change of the tissues, by WEP-

FER, MORGAGNI, DE HAEN, E. HOME, MONRO, NACQUART, and others, has been ascribed to spasmodic constriction; whilst some conceive that it exists very generally during congestion. SOEMMERRING imputes it to the pressure of the stays, as it has been noticed chiefly in females. The four specimens figured by MECKEL all occurred in this sex (*Tab. Anat. Path. fasc. iii. tab. 20.*). The most common intrinsic cause of permanent contraction or diminished capacity of a considerable part of the digestive canal is that first assigned, — hypertrophy, with induration, of some one or more of its coats, either with or without ulceration. Numerous cases illustrating this are on record. Dr. DRAKE found the stomach diminished to one third of its capacity, its coats being thickened threefold throughout; and instances of thickening, induration, ulceration, and contraction of large tracts of the intestinal canal — most frequently of the large bowels — have been recorded by HILL, GREENHOW, BURRELL, HOLMES, CARTER, BOUILLAUD, HOWSHIP, MONRO, and many of the writers referred to. Besides these, other instances of the various forms of intrinsic constriction, or contraction from organic change, occurring in the stomach, and in the small as well as the large intestines, are adduced by BARTHOLIN, BONET, WALTHER, HALLER, PORTAL, MICHAËLIS, MOLINELLI, LOESECKE, MOLLISON, and several others, in places referred to in the Bibliography.

54. *C.* Intimately connected with muscular or spasmodic constriction of some part of the canal is the occurrence of *introsusception*; the contracted portion passing within the adjoining dilated part. A large proportion of introsusceptions takes place at the moment of dissolution, particularly in children, as justly remarked by CAMPER, MONRO, J. DAVIES, and others; at least, no symptom referrible to it had occurred during life. The usual results of this change both of capacity and position are strangulation of the retained portion of intestine, and obstruction or obliteration of the canal; with the symptoms of COLIC AND ILEUS (§ 39, 40.), and internal strangulation. In all introsusceptions, the villous coat is innermost; next, the two serous surfaces are in contact; and more externally still, the two villous surfaces are also in contact. This arrangement, as M. DANCE (*In Repert. d'Anat. et Path. &c. t. i. p. 441.*) has shown, should be recollected, as it explains how, in consequence of the constriction and inflammation of the introsuscepted portion, its serous surfaces, which are in close contact, adhere; and, owing to its consequent strangulation and sphacelation, the whole of it is sometimes detached and passed by stool, without any of the intestinal contents escaping into the peritoneum. Instances of this kind have occurred, and several are recorded in the works referred to. Introsusceptions are most frequent in the small intestines, several sometimes occurring in the same case. They may also take place in this situation to a small extent without any bad effect. A large portion — even the greater part of the small intestines — is in some instances invaginated in the cæcum and colon; and, in rarer instances, the cæcum itself, either with or without portions of the ilium and colon, may be introsuscepted into the sigmoid flexure of the last (HEVINUS, MONRO, ANDRAL, DANCE, and myself).

55. The extent to which the intestinal canal

may be thus invaginated is extremely various — from a few lines to many feet. The introsuscepted portion may even protrude more or less through the anus. Instances of this kind are recorded by the writers now mentioned, and by many others. When the invaginated part sphacelates, sloughs are thrown off, leaving perforations, through which the intestinal contents may pass into the peritoneum. But when, owing to the circumstance just explained, this part is separated, perfect adhesion of the parietes of the intestine at the point of separation taking place, the canal suffers no interruption of its continuity. In this case, the invaginated part is passed by stool. HEVINUS met with an instance in which twenty-three inches of the colon, and another in which twenty-eight inches of the ilium, were evacuated. CRUVEILHIER and ANDRAL saw twenty and thirty inches of small intestine, with a portion of mesentery, thus passed. Cases in which an opportunity occurred of examining the intestinal canal at a remote period from the separation of the invaginated part, are recorded by HEVINUS and DUMERIL. In that by M. DUMERIL, six inches of the jejunum and ilium had been detached. Upon examination after death, the two extremities of the intestines were perfectly united, their edges having been bevelled and exactly fitted to each other. They had contracted adhesions to the peritoneum at their junction, but the canal was not sensibly diminished even at the cicatrix.

56. *D.* The *extrinsic causes* of obliteration or strangulation of the digestive canal are numerous, and have been referred by M. ANDRAL to an irregular disposition, either of the peritoneum or of the intestinal canal itself. — 1st, *Those depending upon the peritoneum* are — *a.* Perforation of the mesentery; — *β.* Perforation of the omentum; — *γ.* Strips of the omentum adhering to the abdominal parietes, and entangled a coil of intestine; — *δ.* Fræna extending like arches from a portion of intestine to some other organ, as from the uterus or ligamenta lata of the rectum (ESQUIROL) — or from a portion of intestine to the abdominal parietes — or from the omentum to a part of the abdomen — or from one of the abdominal viscera to another; — *ε.* The mesentery or omentum, involving a coil of intestine, when folded or rolled together. — 2d. The *causes of strangulation seated in the tube itself* are — *a.* The compression of one portion of intestine by another, as a portion of the transverse colon situated between the vertebral column and the duodenum (M. GENDRIN, in *Arch. de Med. b. viii. p. 494.*); — *β.* The escape of an introsuscepted portion of intestine through a perforation or rupture in the containing part, the introsuscepted portion being strangulated by the margin of the perforation. (M. M. SOLON, in *Bullet. de la Soc. Méd. d'Emulation*, 1822.); — *γ.* Twisting of the appendix of the cæcum around a portion of the ilium, commonly owing to the unusual length of this part; — *δ.* Adhesions of the extremity of the appendix, so as to form an arch or ring, in which a portion of intestine may become entangled; — *ε.* The twisting of a diverticulum around either the part from which it is produced, or a coil of intestine; — *ζ.* Adhesions of the extremity of a diverticulum, which may compress a portion of intestine over which it passes, or that portion to which it is attached. All these causes may, however, exist

without giving rise to *internal strangulation*. But they more frequently produce it either slowly or suddenly. In the former instance, symptoms indicating a greater or less obstacle to the passage of the intestinal contents are generally complained of for weeks, months, or even years, before the signs of strangulation appear. In the latter case, no premonitory symptoms are observed.

57. *E. The situation of parts of the digestive canal* may be *changed* in several ways, which are referrible to two principal *classes*:—1st, Alterations of situation in respect of different parts of the tube, and of the related viscera,—or *internal displacements*;—2d. Protrusions through some part of the abdominal parietes,—or *external displacements*. (a) Internal displacements arise from—*a.* obstruction; *β.* alterations of its calibre; and, *γ.* the impulsion or dragging of adjoining parts. The stomach is not infrequently partially displaced from some one of these causes, especially its pyloric extremity, and generally in consequence of scirrhus thickening and induration, or tumours developed in it or its vicinity. I have seen the scirrhus pylorus form a tumour below the umbilicus,—a circumstance which might have led to an incorrect diagnosis, if it had not been known occasionally to occur. This viscus may also be displaced by the dragging of the omentum in a large hernia, the pyloric extremity descending equally low from this cause, as in a case recorded by Dr R. LOWIS. The situation of the small intestines, *cæcum* and *colon*, is also frequently changed from the causes now stated. Alterations of this description in the two latter of these have been noticed in their respective articles. The *second* or *external class of displacements* belong to the province of the surgeon, the medical relations of the subject falling more appropriately under the articles *DYS-PNŒA*, in which diaphragmatic hernia is noticed, and *PERITONEUM*, where the diseases of the serous coat of the digestive tube are considered.

58. vi. *CONGENITAL LESIONS OF DIMENSION AND SITUATION*.—The gastro-intestinal canal has never been found wholly wanting, even in monstrous productions. Of the different parts which constitute it, that proved to be the first formed is never deficient. This is the extension of the vesicula umbilicalis into the intestinal canal, which, however, may be arrested in its formation before one or other extremity of the tube has been produced, thereby occasioning deficiency of a portion of either, or the imperforation of their outlets. With the various congenital faults of configuration, dimension, and situation, it is unnecessary to occupy my limits. A few only of the most important may be noticed.

59. *A. The dimensions* of the digestive canal may be lessened or increased, either throughout, or in parts only.—(a) The stomach has been found so *small* as not to exceed the diameter of the small intestine. The convolutions of the small intestines have been observed less numerous or nearly wanting, and the length of the canal from the cardiac orifice to the anus hardly equalling that of the individual. The *cæcum* has sometimes been so small as not to form a *cul-de-sac*, or it has been, as well as the appendix, altogether deficient, the ilium opening directly into the colon.—(b) *Increased dimensions* of some part of the digestive canal are more common than the preceding. In infants and children, the stomach has

been found of a remarkable size; and in some, the duodenum has been as large as the stomach. The *cæcum*, or its appendix, has also been very large. BRUGNONI and MECKEL (*Tab. Anat. Pathol. fasc. iii. p. 23.*) have adduced instances of two colons springing from a single *cæcum*, and reuniting at the rectum, in the case of the former; but terminating in *cul-de-sacs*, floating freely in the abdomen, in that of the latter. One part of the canal has been found greatly increased in size, whilst the other is diminished. M. CARROL found the stomach of a person so large as to fill the greater part of the abdominal cavity, and the small and great intestines together little longer than three feet.—(c) Appendices or *diverticula* are sometimes attached, like the fingers of a glove, to the side of the canal. M. ANDRAL states them to be most frequent on the jejunum and ilium, and MECKEL on the lowest third of the ilium; but they have been found on the duodenum and on the rectum (MORGAGNI).—Their cavities are continuous with that of the intestine, and they terminate in a *cul-de-sac*, which either floats loosely in the peritoneal cavity, or adheres to some adjoining part. Their length varies from a few lines to three or four inches. They may either fall short of, equal, or surpass, the diameter of the intestine whence they spring; and they form every angle with it. They vary in number from one, which is most common, to five or six in the same portion of intestine. Their terminations are rounded or pointed, and they sometimes present a series of dilatations and contractions. MECKEL saw one inserted into the navel, forming a kind of umbilico-intestinal canal. From this and other circumstances—particularly their being commonly found single, and on the lowest third of the ilium—he infers that *true diverticula* are the remains of the original intestine formed by the vesicula umbilicalis; and contends that, when they occur in any other situation, or when more than one exists in the same case, they are *false*, and consist merely of hernia of the villous through the muscular coat, or of some other change (*Ueber die Divertikel*, in REIL's *Archiv. &c. b. ix. h. 3., et Tab. Anat. Path. fasc. iii. pl. 21.*) They seem to dispose the adjoining portion of intestine to organic change, as well as to alterations of capacity, as in the cases recorded by Dr. FRANCIS and others.

60. *B. The situation of the digestive tube*, or of parts of it, is variously changed, either by original conformation, or by accident or disease. The congenital abnormal positions of the viscera are so numerous, and of so little importance in a practical point of view, that I shall not touch on them. The reader will find them described in the works of MECKEL and ANDRAL referred to in this article. *Imperforations* of the canal come not within the scope of the work.

61. As the same alterations of structure occur in all the parts constituting the digestive canal, although in different degrees of frequency, I have described them in a connected manner, in order to prevent the repetition that could not be avoided if they had been comprised in the articles on the *INTESTINES*, *STOMACH*, &c. But in these, and some other articles, I have detailed the *symptoms* of those alterations, and the *treatment* they require, because the same lesions, seated in different parts of the canal, are attended by different phenomena, and claim modified means of cure;

reference being made to the changes here described. Therefore, the diseases of the digestive canal should be also studied in the following articles, which contain most of what is known respecting them:—CÆCUM, COLIC AND ILEUS, COLON, CONCRETIONS, CONSTIPATION, DIARRHŒA, DUODENUM, DYSENTERY, FAUCES, FEVERS, INDIGESTION, INTESTINES, ŒSOPHAGUS, PERITONEUM, PHARYNX, RECTUM, STOMACH, WORMS, &c.

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DISEASE—THE CAUSATION AND DOCTRINE OF.—CLASSIF. GENERAL PATHOLOGY; *Ætiology and Pathogeny.*

1. I. PRELIMINARY REMARKS.—It is of great importance to the tyro in medicine to acquire general principles, derived from a careful and

comprehensive investigation of disease, that may guide him in the practical course he has to pursue. Nor is it of less moment to the experienced to find inferences and doctrines calculated to serve as the basis of therapeutical indications deduced for him even from those phenomena which have become familiar from frequent observation, or have appeared trivial when viewed in an imperfect or false light. It is by an intimate acquaintance with morbid actions, in respect of their origin, of their conditions at the time of observation, and of their tendencies, and by a knowledge of principles derived therefrom, that we are chiefly enabled to direct our course through those numerous difficulties which beset us in the practical discharge of our duties, when we are insufficiently aided by published authorities, or imperfectly guided by the results of personal observation. Even the most experienced will often find examples of disease in some one or other of the numerous combinations or successions it is constantly assuming, of which memory will not furnish sufficient examples, by the results of which he may be guided; and will frequently have to recur to those principles, both doctrinal and practical, which he had learnt from his predecessors, or had acquired for himself by analysing and recombining the numerous manifestations of morbid action which have been presented to his view. In endeavouring to supply what is not to be obtained in our medical literature—to satisfy a want which I know has been very generally felt—I have only to regret that my limits will preclude those details, which many might require, and will confine me chiefly to succinct statements, where vivid illustrations might be necessary, and therefore looked for. But some advantage will be derived from exhibiting an outline of the subject, in a methodic manner, filled up in its more essential parts with such touches and shades as may be necessary to truth of representation, and treated in separate articles where it assumes a practical interest. The origin of disease, and the numerous circumstances, which, existing either *intrinsically* or *extrinsically* in respect of the frame, modify disease in its progress, are amongst the most important topics to which the mind of the scientific practitioner can be directed; inasmuch as upon a due recognition of these, in their individual or joint operation, will depend the justness of our indications of cure, the appropriate employment of remedies, and consequently the success of our practice, and our own eminence.

2. i. *The intimate Relation of the Subject to the Doctrine of Life.*—In all speculations respecting the causes, the nature, and the removal of diseased actions, the body ought to be considered in relation—1st, to its organization and mechanism; and, 2d, to the influence by which that mechanism is actuated: we should view it as presenting an assemblage of numerous and beautifully contrived parts, all displaying a wonderful and harmonious combination of phenomena,—the most perfect and the highest presented to us in the physical world. Some of the finest illustrations of mechanical adaptation and power, and of those principles of action to which the researches of the natural philosopher have been directed, are manifested in the human body. But these manifestations are subject to a finer and

yet a more powerful principle than any which govern the operations of inanimate matter. The whole organized creation, especially the higher animals, and man in particular, display functions which inanimate substances cannot produce; and although physical actions are observed in their most admirable conditions in the animal body, they are entirely subject to higher functions, to which the term *VITAL*, from their nature and object, has been applied. It is one of the chief characteristics of *life* that it is allied to matter, delicately and peculiarly combined, and differently constituted from inanimate matter, which is kept in a state of cohesion by means of the attraction subsisting between its particles, and which state its chemical affinities dispose it to preserve. Life allied with matter produces combinations entirely different from those, which the chemical affinities of the elementary particles dispose them to assume, and preserves these combinations in opposition to their physical tendencies as long as it continues thus associated. *Life*, then, as I have already contended, is a *superior power*; and this superiority is instantly shown by the readiness with which the elementary particles of that matter with which it is so intimately connected enter into different combinations and forms as soon as this principle is withdrawn. One, therefore, of the chief, although apparently one of the lowest and most generally diffused manifestations of life, is to preserve the textures, or the matter with which it is associated, in a state suitable to the performance of the various functions of the animal. But it also executes higher offices. By a series of beautiful processes, it changes substances foreign to the constitution of the animal to which it is allied, and at last assimilates them into the organized structures which it animates. Thus nutrition and growth are produced, and the decay of the organized body is prevented.

3. Life, in its intimate alliance with the structures of the body, gives rise to various manifestations, according to the peculiar organization of each; these structures being the instruments of its influence, and the organs by which vital operations are performed. Thus the muscular fibre, endowed with life, displays contractile properties, the nervous fibrils manifest sensibility; the liver and kidneys perform their secreting functions; and so on as respects the various parts composing a perfect animal. The *healthy functions* of life form the study of the physiologist, whilst the description of the *organs* performing them belongs to the anatomist. It is with the *derangements* of both *functions* and *organs*, that the pathologist and practitioner are chiefly concerned. The knowledge of structure and healthy function is, however, the basis on which both the one and the other raise a superstructure of great public benefit. The duly instructed pathologist is enabled to comprehend the beautiful combination of physical principles evinced by the human body; and to understand how they are directed by, and made subservient to, life, whether in perpetuating its healthy duration, or in guarding it against agents threatening any of the functions and organs which it endows, or in removing derangements when actually produced. It is from an enlightened recognition of the operation of external agents on vital functions, of the relation subsisting between causes and their effects, and of the succession of mor-

bid phenomena consequent on primary changes, either vital or organic, that the scientific practitioner is enabled to devise suitable plans and appropriate means of restoration to the healthy state. But, when contemplating the functions of the living body, whether in health or in disease, he should not restrict his considerations either to the physical, or to the vital, phenomena which any particular organ or structure presents. He should recollect that the physical phenomena are under the direction of the vital power; and that this power, although influenced by mechanical or physical operations, is equally energetic in controlling these operations, as they are, in their turn, of controlling it. The pathologist must be aware that the study of the living frame in health, and more especially in disease, is the investigation of the numerous manifestations of life through the various organs and structures with which it is wonderfully and inexplicably associated. Of *life* itself we know nothing but through those manifestations, and thus it is through them only we can enquire respecting its conditions. Although we cannot demonstrate the intimate nature of vitality, and cannot show the peculiar ties which bind it to organization, we can prove, by an accurate enquiry into the numerous phenomena exhibited by living bodies, and by the manner in which external agents modify these phenomena, as well as by the derangements evinced by particular organs and structures, that the connection is intimate, and that causes operating upon the one generally affect the other. This powerful influence of life over the functions of the organs with which animals are endowed, and the manner in which causes modify the conditions of this principle, whether acting immediately upon it, or through the medium of the organization with which it is allied, are amongst the most important topics which interest the medical practitioner.

4. The *conditions* of life, as manifested in the functions either of a single organ, or of the frame generally, are liable to change, from *intrinsic* and *extrinsic* causes; and the resulting alterations modify the structures with which this principle is so intimately and mysteriously related. On the other hand, the states of the animal organs and textures are readily affected by agents acting directly upon their organization; and these states of structure modify its vital manifestations, and, through them, the vital endowment of the body generally. From this mutual dependence — this reciprocative influence — it will appear that, as life can only be contemplated through the medium of an organized body, so the derangements of such a body cannot be accurately investigated, and the conditions of life — its manifestations in appropriate systems and organs — be left out of consideration.

5. ii. *Health and Disease defined.*—Whilst the energy of the vital endowment is uninjured, and its manifestations in the various systems are in due harmony throughout, and with the state of the structures with which it is associated, all the operations of the body are duly and steadily performed. This is the condition which may be termed *health*. But as soon as the energies of the vital principle become depressed, excited, exhausted, or otherwise altered, either throughout the body, or in any of the systems or organs

by which it is manifested, and when change from the natural condition is primarily produced in any of the structures with which it is associated, *disease* supervenes. This aberration from the natural condition of the vital energies endowing the whole, or parts of the frame, or alteration of the textures which these energies actuate, is produced by causes acting sometimes singly, occasionally in combination, and frequently in succession. To point out the nature and modes of operation of those causes upon the living body, as far as their natures and effects are known, is the object here proposed.

6. A knowledge of the causes inducing those changes; the nature of the changes produced, as respects either the vital manifestations, or the structural alterations; the signs or phenomena by which morbid conditions of vital function or of structure are recognised; are the chief topics which interest the pathologist; whilst the means of removing those disorders, of averting death, and of alleviating the sufferings which they occasion, when cure is beyond the reach of our science, are the ends which he proposes to himself as the reward of his investigations. In order that all that is advanced respecting the various kinds and states of disease may be more clearly understood, I propose to give, in this, and some articles that will be referred to, a sketch of pathological principles; so that, by pursuing the plan pointed out in the preface, the knowledge which the tyro or the inexperienced reader will have acquired from this part of his systematic course of study, will become serviceable to him in the acquisition of that which should be afterwards brought before him. By considering what is simplest and most elementary, and proceeding onwards to what is more complicated and difficult, the mind will be gradually enabled to understand the abstract subjects which will come before it; the knowledge successively acquired introducing it to an acquaintance with what will follow. Before treating of the principal states or alterations from the healthy condition of the frame, which constitute the disease, I shall point out, *first*, the causes which act upon the living body most frequently in an injurious manner; *secondly*, the morbid conditions themselves which these causes induce; and, *thirdly*, enquire (in a distinct article) into the symptoms by which the nature of these conditions are recognised. Hence, *disease* will appear as a series of changes resulting from causes, between which and their effects there is a most intimate, although not always an obvious, relation.

7. II. CAUSATION OF DISEASE, OR ÆTIOLOGY.

from αἰτία, cause, and λόγος, a discourse.

Causes act primarily on the vital endowment.

—I have already stated, that although the various textures and organs of the body display the finest combinations of mechanism, and the most beautiful principles of action presented by the physical world, yet they are entirely under the dominion of life, by which only they are actuated, and on which they entirely depend for the functions they present. It is not upon the textures or organs themselves that the causes of disease generally make their first impression; and even when they are brought in immediate relation to a particular organ or structure of the body, we have no evidence to furnish that they derange these parts by primarily affecting the machinery

of which they are composed; but, on the contrary, from the gradual manner in which derangement is produced, from the nature and effects of the disorder which follows, and numerous other considerations, it may be inferred that they make their first impression upon the vital endowment of the organ, disordering the functions which it performs under the dominion of life; and the functional disorder either leads on to the production of further disease, or indirectly to a return to the healthy condition. No doubt, some causes affect at once the organization of the part, such as many chemical, physical, and mechanical agents; but the majority modifies the vital manifestations of the frame, either in one organ or structure, or in several simultaneously; and by impeding or modifying, deranging or altogether changing these manifestations, thereby induces effects, which become themselves causes of further disease, until life itself is terminated, or a healthy condition of function re-established. Of the justness of this inference satisfactory evidence will be furnished in the sequel. (See § 63., *et seq.*)

8. The causes of disease have been variously arranged and named by pathologists. For the better understanding the subject, and writers on disease, the different arrangements and distinctions which this subject has received may be briefly alluded to. *Causes* have been denominated *external* or *extrinsic*, and *internal* or *intrinsic*, according as they operate upon the body from without or within. They have also been called *principal* and *accessory* or *concurrent*; disease proceeding chiefly from the former with the assistance of the latter. They have also been named *positive* and *negative*, from the manner in which they act upon the body; and by some they have been divided into *physical*, *chemical*, and *physiological*, according to their nature. The division, however, which has been most generally adopted is into *remote* and *proximate* or *immediate*, according to their relation to the disease occasioned by them: the remote being the first in the chain of causation, the proximate or immediate those early changes which they effect in the economy, and which constitute the primary condition of the disease, or, in other words, the pathological states arising directly from the operation of the remote agents. The *REMOTE* causes have been divided into *predisposing* and *exciting* or *occasional* causes; the predisposing being those which influence the conditions of the living functions so as to favour the operation of those occasional or exciting causes whence disease more directly springs. To these two classes I would add a third, viz. *determining* or *consecutive* causes, which, being posterior to the others in point of time, determine or call into action the exciting causes, or rather come in aid of, and follow up, the impression made by the latter; and which, without such aid, might have been insufficient to produce actual disease, or would have induced it only in a slight degree.

9. It must be obvious that all causes, as well as the effects they produce, must have an intimate relation to the condition of the living frame; and that those which may be quite inefficient on one person will be powerfully active on another; or which are without effect on an individual at one season, will be very influential at another, owing to the state of vital energy at

the time, to the concurrence of other causes, or to exposure soon afterwards to such as will determine, or otherwise aid, those which preceded it, and which, although the principal or exciting causes, were insufficient, until thus reinforced, fully to produce the disease. Owing, also, to the condition of the frame, no effect will sometimes follow one, two, or even three exciting causes; and until a greater number are brought into operation, no mischief will often result. The effects produced by various animal and vegetable exhalations on different individuals, or upon the same person at distinct periods, under different states of mind and predisposition; and by the action of numerous concurrent, accessory, and determining causes; fully illustrate this position. It is chiefly owing to a want of knowledge of the doctrine of causation, that so much error and difference of opinion prevail respecting infectious and non-infectious diseases. On the other hand, persons may be so very easily affected, that causes of the slightest nature, and such as are determining or accessory in the majority of cases, are *principal* in respect of them; and influences which are usually *predisposing* are often, in such persons, the exciting causes of disease. Also those which are *remote* in their operation on some constitutions, are *direct* or *immediate* in respect of others. Examples of this are found in the diseases of the lungs, liver, stomach, and bowels. In considering the agents which affect either the functions, or the organization, I shall first notice those which generally *predispose* the system to disease; next those which *excite* disease in a direct or immediate manner; afterwards such as are specific, or produce determinate results; the effects of their operation on the living frame being obvious, and often admitting of being foreseen; and lastly those circumstances which sometimes determine, reinforce, or call into action, exciting or specific agents.

10. I. OF THE PREDISPOSING CAUSES OF DISEASE.—These may be classed—1st, into such as are proper or peculiar to individuals, and the circumstances in which they are placed; 2d, into such as are not proper or peculiar to individuals, but which may affect various persons, and even numbers of persons, but individually and occasionally; and, 3d, into such as are general, and affect more or less all who are exposed to them.—*A. Those which are peculiar to the individual*, and to the circumstances in which he is placed, and which may be called the individual predisposing causes, are—1st, original conformation and hereditary predisposition, age, sex; temperaments, original and acquired; habit and constitution; trades, professions, and circumstances of life, &c.; and, 2d, the various external and internal agents, and circumstances modifying the state of the functions,—as previous functional disorder, and convalescence from disease; and the pregnant and puerperal states.

11. *a. Original conformation and hereditary predisposition.*—It is generally observed, that the constitutions, temperaments, and diathesis of the offspring closely resemble the parent; and that whatever disposition to disorder, whether of function or of structure, the latter may have possessed, is liable to evince itself in the former. From this circumstance having been very generally remarked in respect of certain maladies,

they have been termed *hereditary*. But it must not be supposed that children are actually born with the diseases of their parents. This is but seldom remarked; although, in rare instances, I have observed the commencement of tubercles in the lungs of a new-born infant by a consumptive mother; and small-pox and syphilis are sometimes communicated to the *fœtus in utero*, occasioning in some instances its premature birth, and even its death, either previously to or about the natural termination of utero-gestation. Hydrocephalus, cataract, and various imperfections of the organ of hearing, and, indeed, of other organs of sense, are not infrequently congenital, or examples of disease from *original conformation*; but, in such cases, it is rare that the parent is similarly affected at the time, although the hereditary predisposition, as about to be explained, exists nevertheless; and, as respects the first of these, a tendency merely to the disease could have existed at an early age in the parents. It should be kept in recollection, therefore, that the *fœtus in utero* may be affected by several cachectic, inflammatory, or even febrile diseases, communicated by the parents, or supervening *accidentally*: but, of those which are thus communicated, even the majority are not, properly speaking, hereditary; and those which are accidental do not depend upon the constitution of the parents, or the ailments experienced by the mother during the period of gestation. *Congenital diseases* are consequently divisible into—1st, Those which occur in the *fœtus*, without any participation on the part of the parents,—as imperfect development of organs, inflammations, effusions of fluid in various parts, &c.; 2d, Diseases in which the *fœtus* participates with the mother, owing to their contaminating influence, or their extension throughout her organization,—as syphilis, small-pox, fevers, &c.; 3dly, Those that affect the *fœtus* from a constitutional liability in one or both parents,—as hydrocephalus, cataract, tubercles, &c.

12. Most commonly, however, the child is born free from disease; but, inheriting the constitution and diathesis of the parent, has that condition of function and organization which renders it more susceptible of impressions produced by the exciting causes of certain maladies. Examples of this may be contemplated daily in respect of diseases of the lungs and brain; the constitution and functions of these viscera disposing them or rendering them more prone to experience those derangements by which the parent or parents had been affected. In some instances this predisposition may be more strongly marked in the child than in the parent; and in other cases the predisposition may be extremely slight, and only brought to light by the operation of the more energetic agents.

13. The predisposition of the offspring generally evinces itself more strongly at certain ages than at others, according to the kind of morbid constitution or predisposition which it may inherit, the causes to which it is exposed, and the nature of the malady which results. Thus, the disposition to *hydrocephalus*, *convulsions*, *idiocy*, *rickets*, *scrofula*, *cataract*, &c., is most apparent soon after birth, and at early epochs of life; to *epilepsy*, *hemorrhage*, and *pulmonary consumption*, about the age of puberty, or previously, or

soon after; to *gout*, *asthma*, and *angina pectoris*, in adult and mature age; to *insanity*, *apoplexy*, and *paralysis*, during the mature or advanced stages of life; and to various nervous disorders, at more irregular periods. But these diseases do not necessarily supervene, although one or both parents have been affected by them; and several usually appear in alternate generations. Some occur more uniformly than others. When the predisposition to them is derived from only one parent, they very frequently never make their appearance, unless as the effect of very active exciting agents. But even when the predisposition is derived from both parents, and when it may be considered as being thereby heightened, exciting causes are generally required to develop the disorder.

14. *b. Age.*—Each of the different epochs of existence is more liable to certain diseases than to others. During the *earlier periods*, there is generally a predisposition to particular disorders, even when no hereditary taint exists. This is partly owing—(a) to the changes going on in the frame; (b) to the state of vital manifestations; and (c), to irritations in the alimentary canal. Amongst the changes proceeding in the frame, that either readily suffer derangement or lead to it, the most important are the processes of ossification and development of the contents of the cranium. These processes are more or less under the dominion of the vital influence; and they are more or less disturbed as this influence is affected, in respect either of the system generally, or of particular organs. Hence, rickets, hydrocephalus, inflammations of the brain or its membranes, readily occur. The quantity of blood sent to the brain in early life is another predisposing cause of cerebral affections; and the readiness with which the functions and even the circulation of the brain are disturbed by impressions from without or by irritations from within, becomes, especially when assisted by other causes, a frequent source of disease. (See AGE, § 10.; and DENTITION.)

15. After the first dentition, and during *growth*, the powers of life are energetic, as shown by the reaction of the vital functions upon the depressing causes of disease; and are eminently conservative, particularly in resisting hurtful agents. The predisposition is chiefly to inflammatory ailments and acute attacks of fever, especially in those who breathe a wholesome air and are sufficiently nourished. But the susceptibility to impressions, both moral and physical, is energetic; and irritations, from whatever cause, are generally followed by augmented vascular action, with which the whole frame, owing to the susceptibility of the nervous systems, promptly sympathises. Hence febrile attacks, eruptive fevers, inflammations, cerebral affections, disorders of the air passages, of the alimentary canal, and lymphatic glands, usually appear. At this period, also, all specific causes readily take effect, particularly of those diseases which are incidental to childhood; their full operation, however, destroying the susceptibility to be again affected by them. About the time of *puberty* and *adolescence* various complaints first show themselves, especially some that are inflammatory, and to which there is an hereditary tendency,—as pulmonary consumption, hæmorrhage from the lungs, epistaxis, plethora; and as soon as the body has

ceased to grow in height, or the vessels to extend themselves in the direction of their axis, these disorders are still more readily produced by exciting causes. In *manhood* and *mature age*, the susceptibility to impressions gradually diminishes, and generally continues to decrease as age advances. During the former of these periods, hypochondriasis, melancholy, insanity, hæmorrhoidal affections, asthma, rheumatism, and the majority of organic diseases, with the exception of such as are scrofulous, commonly make their appearance. Towards the *decline of life*, gout, softening of the brain, apoplexy, paralysis, scirrhus, cancer, changes in the coats of the blood-vessels, diseases of the organs of sense, affections of the urinary passages, &c. usually supervene. (See AGE, and CLIMACTERIC DECAY.)

16. *c. Sex.*—There are a great many diseases to which both *sexes* are equally liable. Fevers, inflammations, organic diseases, and many others, attack both. But it has been observed, during the prevalence of epidemics, and in unhealthy countries, that the female sex suffers much less than the male. This, no doubt, arises from the more regular habits of females, and their less exposure to the determining or concurring causes: something may also, perhaps, be attributed to their periodical discharges, which tend to diminish plethora and to purify the circulating fluid—circumstances calculated to impart a partial exemption from several diseases, particularly those which are epidemic and endemic, although they may dispose to others. But the conformation and temperament of females, the sympathy existing between their generative organs and the state of the circulation in the brain, the marked susceptibility of their nervous system, and great mobility of their muscular organs, dispose them—especially those in cities and populous towns—to diseases usually denominated nervous. The natural vicissitudes, also, of female life are accompanied with a tendency to particular maladies, especially the periods at which the menstrual discharge commences and ceases; at the former of which, nervous and cachectic complaints—at the latter, diseases of the organs of generation, or of those closely allied to them in function or situation—very frequently appear;—chorea, chlorosis, irregular convulsions, hysteric or painful affections, difficult, suppressed, or irregular catamenia, occurring about the former epoch; and chronic inflammations, scirrhus, cancer, and other organic lesions of the womb, disease of the breast, and disorders of the colon or rectum, about the latter period.

17. *d. Temperament and diathesis.*—The *sanguine* and *irritable* temperaments dispose to plethora, inflammations, hæmorrhages, pneumonia, and to inflammatory fevers. The *bilious* temperament most readily experiences biliary derangements, bilious fevers, affections of the stomach and bowels, hypochondriasis, mental disorder, chronic cutaneous eruptions, and various organic derangements of the abdominal viscera. Persons of the *lymphatic* or *phlegmatic* temperaments are predisposed to catarrhal attacks, slow fevers, chronic discharges, dropsies, scrofulous and scorbutic affections, diseases of the joints and glands, and to tuberculous and other chronic diseases. In persons thus constituted, the powers of life are languid, the preservative influence and vital resistance feeble, and reaction

upon noxious causes or agents seldom developed or energetic. The *nervous* temperament disposes chiefly to convulsive diseases, especially to hysteria in the female sex; to mania and insanity, or other derangements of the mental manifestations, as hypochondriasis, melancholia, &c.; to nervous and typhoid fevers, &c. This temperament often modifies the progress of various acute diseases, and imposes upon them a nervous character. When the temperaments are *mixed*, an accordant predisposition may often be remarked; as, in the *sanguineo-bilious*, a disposition to bilious inflammatory fevers, to hepatitis, to inflammations of the alimentary canal, of the brain, and of the serous surfaces, &c., is often manifested.

18. *e.* Of *constitution* and *habit* of body, it may be remarked, that a robust constitution generally successfully opposes the impressions of many exciting causes; but when once a morbid impression is produced, disease assumes a more active or acute character, and is attended with higher vascular action, the powers of life and reaction being great. On the other hand, weak constitutions, and those of a scrofulous taint, are more disposed to disorder, more readily affected by its causes upon the first impression; and disease in them assumes a more chronic and low form. When persons thus constituted have become habituated to the impression of certain morbid agents, they frequently cease to be affected by them in the usual manner; as observed in respect of marsh or terrestrial emanations, which seldom give rise to regular attacks of fever in such subjects, but induce organic disease, and sinking of the powers of life.

19. *f.* *Habits* of life and *profession* are amongst the most influential predisposing causes of disease. Whatever profession or occupation requires an active exertion of the powers of the mind, and continuation of that exertion to the neglect of sufficient relaxation and exercise, occasions determination of blood to the head, and favours the production of inflammation of the brain or of its membranes, especially if such persons live fully or luxuriously; and, if fever attack them, the head, the liver, and stomach become severely and dangerously affected; and, unless the disease be actively treated at its commencement, death may supervene in consequence of serous effusion from the membranes, or of softening of the texture of the brain, rupture of its vessels, or of organic change in the liver or digestive canal. Those who take *active exercise* in the open air are generally more disposed to inflammatory attacks of an acute character, to pneumonia, and to rheumatism, than to other complaints; although in them the predisposition to disease is much less than in other persons. Those who indulge the *appetites* beyond what the economy requires, — especially the desire for food, and for vinous and spirituous liquors, — are liable to disorders of the stomach, liver, and intestinal canal; and, if attacked by fevers, these organs generally are the most seriously affected: such indulgences also dispose to plethora, apoplexy, paralysis, gout, dropsy; and in many cases directly excite those maladies. Inordinate *sexual intercourse* is also a frequent predisposing cause of many diseases, and often immediately induces disorder. Pulmonary disease, affections of the heart, epilepsy, mania, and the other disordered

manifestations of mind, frequently take place in consequence of the predisposition to them generated in the system by the excessive indulgence of this appetite. It also leads to other maladies, by lowering the vital energies of the frame, and thereby rendering them more assailable by the common exciting causes of disease.

20. *g.* The *circumstances* of life in which persons are placed have a marked influence in favoring or counteracting the operation of exciting causes. It has been determined, by exact observations and calculations, that those who enjoy easy or comfortable circumstances are much less subject to disease than the poor, the insufficiently clothed, and ill-fed. This arises not only from the former class being less exposed to its exciting causes, but also from the good effects of sufficient nourishment in supporting the energies of life, and thereby warding off the impressions of injurious agents and influences. Much, also, is owing to personal and domestic cleanliness, to proper clothing, and to living in airy apartments in healthy localities. Yet, while full living thus wards off many diseases, especially those arising from debility, as low or adynamic fevers, scorbutic disorders, scrofula, dysentery, and various others, it disposes to gout, dyspeptic and nervous affections, particularly to apoplexy and paralysis. (See ARTS AND EMPLOYMENTS.)

21. *h.* *Debility, previous disorder, and convalescence from other diseases*, often favour the operation of exciting causes; particularly when the powers of life are much depressed or exhausted. In respect of the predisposition occasioned by already existing disorder, some doubt may be entertained by those who may have adopted the hastily formed and incorrect dogma that two disorders cannot co-exist in the economy. This may be true in respect of certain febrile diseases, especially those of a specific or exanthematous kind: but in nearly all beside, so very numerous are the exceptions, that the principle becomes quite untenable; and, in many cases, even an opposite doctrine may be enforced, particularly in respect of bilious and nervous disorders. Thus, when the functions of the stomach are weakened, or those of the liver obstructed, various affections of different organs related to these, either in function or anatomical connection are apt to supervene, more especially febrile diseases, disorders of the bowels, brain, and lungs. The exhaustion of the powers of life partially continuing during *convalescence*, also disposes the frame to the invasion of the exciting causes. On this account, convalescence ought always to be watched by the ordinary medical attendant, who, if not allowed to continue his aid for this purpose, should state his reasons for proffering it; and, if it should be declined, the patient will then have himself only to blame. (See DEBILITY, &c.)

22. *i.* Amongst the other individual predisposing causes of disease, I may mention the *pregnant and puerperal states*, that favour, in a very marked manner, the occurrence of several maladies, which, owing to this connection, have been denominated puerperal, &c. Although these diseases arise chiefly from the predisposition created by the conditions of the female organs and constitution during these states, yet a great difference exists between them as to their necessary de-

pendence upon these conditions ; for, whilst these states predispose to the invasion of exciting causes developing disease in all instances, the maladies that result may be either such as are peculiar to them, as adynamic puerperal fever, &c. ; or such as are not necessarily dependent upon, although remarkably favoured by, them, as inflammations of the uterus and peritoneum, uterine hæmorrhage, convulsions, mania, &c. During the puerperal state, also, the predisposition to fevers, inflammations, consumption, various nervous affections, rheumatism, &c., although less strong than to the preceding, yet is greater at this period than at any other.

23. *B.* Amongst those predisposing causes which are not peculiar to the individual, but which affect persons individually and occasionally, certain states of the mind deserve the first place.—

(a) When the mental energies are depressed by grief, anxiety, disappointment, fear, &c., the powers of life are less able to oppose the debilitating causes of disease which invade them from without, and of which nature all the exciting causes of fevers, particularly those which are specific or contagious and miasmatic, generally partake in a most marked manner. On the other hand, when the mind is elevated by success, by hope, by confidence, and the other exciting passions, the depressing causes make little or no impression upon the constitution ; and individuals thus circumstanced almost always escape from diseases which readily invade the fearful, the dejected, and the disappointed. There is, perhaps, no circumstance which more certainly disposes the system to the operation of the exciting causes of fever, than the fear of being attacked by it ; whilst nothing fortifies the constitution more surely than a full confidence that the causes of disease will not take effect.

24. (b) Next in importance to mental depressions, is whatever lowers the vital energies, or exhausts and debilitates the body. Under this head, low diet, fatigue, previous illness, excessive secretions and discharges, want of sleep, and venereal excesses, may be classed. (See art. DEBILITY.)

25. (c) *Dress*, even, has a very evident influence in creating a predisposition to disease. Too little clothing, particularly in females, favours the occurrence of difficult and suppressed menstruation, pulmonary diseases, and disorders of the bowels. It was remarked, during the French revolution, when it was the fashion to dress classically,—which was almost a state of seminudity, and more appropriate to the warmer climates of Athens and Rome than to those of the north of France and this country,—that pulmonary diseases, rheumatism, suppressed menstruation, bowel complaints, catarrhs ; and amongst the children, who were exposed with naked busts and thin clothing, croup and other diseases of the air passages and lungs ; were uncommonly prevalent. On the other hand, *too warm clothing* is a source of disease, sometimes even of the same diseases which originate in exposure to cold ; and often renders the frame more susceptible of impressions of cold, especially of cold air taken into the lungs. The remarks now offered may be applied to overheated sitting and sleeping apartments, and to warm soft beds and bed-clothing. These relax and weaken the frame, dispose to disorders of the kidneys, urinary and sexual organs, and render the system much more

susceptible of injurious impressions from without. A predisposition is thus produced, not only to catarrhs, inflammations, affections of the lungs, and rheumatism, but to irregularity in the menstrual discharge. It has been remarked, that the females in Holland, who generally use very warm clothing, warm apartments, and warm beds, are very subject to excessive menstruation and fluor albus. Females, also, become disposed to various diseases, particularly those affecting the pulmonary organs and heart, from wearing very tight-laced and unyielding corsets. Indeed, those dressed in this manner can scarcely call the intercostal muscles into action, and can breathe only by means of the diaphragm. The mechanism of respiration being thus impeded, the requisite changes are not fully produced upon the circulating fluid ; and congestion supervenes in the lungs, right side of the heart, and parts situated below the seat of pressure. This cause is especially injurious to females during growth and pregnancy ; for the chest should be fully and freely expanded, especially at these periods, in order that the circulation through the lungs and heart may be unimpeded ; and that the blood should experience those changes without interruption, that are required for the development of the body and of the foetus. The functions, not only of the lungs and heart, but of the liver, stomach, and bowels, are materially interrupted, and even these organs themselves are removed from their natural positions in respect of each other, by this cause. This is more remarkably the case as regards the colon, which, by the squeezing together of the hypochondria and lateral regions of the abdomen, is thrown into unnatural duplicatures ; the passage of the fecal matters along it being thereby impeded, and habitual costiveness, with all its consequences, produced.

26. (d) Amongst the most frequent predisposing causes to disease, is *intemperance in food and drink*. Too much and too great a variety, particularly of animal food, high-seasoned dishes and soups, rich sauces, the too liberal use of vinous, spirituous, or other exciting liquors, overload, over-distend, and over-excite the stomach ; dispose it, the liver, and bowels to inflammations and functional and organic disease ; directly induce plethora ; and, when this state is produced, inflammatory complaints in early life, and gout, apoplexy, paralysis, &c. at a more mature age, frequently follow. On the other hand, an unwholesome, poor, innutritious diet, or food of a fluid or watery consistence, predisposes to diseases of debility, by diminishing the powers of life, particularly in the digestive organs, and lessening the vital resistance to depressing causes. Typhoid or adynamic fevers, dysentery, cutaneous complaints, verminous diseases, tubercles, scrofula, scurvy, scorbutic dysentery, enlargements and affections of the joints, are common under such circumstances.

127. (e) *Excessive secretions and evacuations*, although in some instances a disease of themselves, frequently predispose to further disease. The abuse of remedies which have an evacuating operation, excessive perspiration, fluor albus, too long suckling, and venereal excesses, weaken the powers of life, and expose them to the invasion of exciting causes.

28. (*f*) *Indolence and too great exertion*, both predispose to, and occasion disease; whilst moderate exercise, especially in the open air, increases the energies of the frame. Fatigue generally favours the impression of causes which produce acute affections, as fevers and inflammations; whilst indolence and sedentary occupations dispose to chronic maladies, as congestions of the liver and abdominal organs, to corpulency, apoplexy, hæmorrhoidal affections, and derangements characterised by diminished tone of the nervous and vascular systems.

29. (*g*) *Sleep*.—The want of this restorer of the vital energies favours the invasion of fevers, inflammations of the brain, and disordered manifestations of mind; whilst too much sleep, and the horizontal posture too long retained, or too frequently assumed, predispose to apoplexy, paralysis, softening of the brain, inflammation of the cerebrum or of its coverings, and affections of the kidneys. Many, also, of the causes of acute diseases make their impression during sleep, when the body is relaxed, and thereby exposed to their invasion. On the other hand, early rising promotes both mental and corporeal energy. It has been remarked by the actuaries of Life Insurance Companies, that early rising is, of all habits, the most conducive to longevity; all long lived being early risers.

30. (*h*) Due regulation of the temper, the passions, and desires, and a proper conduct of the imagination, are also necessary to resist exciting causes. Indulgence of temper and passion not only predispose to disease, but also frequently directly excite it, particularly in nervous, irritable, and sanguine temperaments. Diseases of the heart, brain, liver, stomach, and bowels, often originate in these sources. Uncontrolled passions of every description occasion numerous functional and structural changes, seated chiefly in the viscera of the large cavities. Moderation in eating and drinking, in sleep, in the indulgence of those appetites, feelings passions, and desires which have been implanted in our natures by a wise Providence for our advantage, gratification, social improvement, and happiness; an equable state of the mind, with confidence in our powers; and the pleasant excitement accompanying a well-regulated course of application to business or study; are the best means of resisting the impressions of injurious agents.

31. *C. General predisposing Causes*.—Of these, the most universal in their operation are certain constitutions of the atmosphere. Besides the variations in the temperature and dryness of the air, its electrical conditions also vary extremely; but as yet we are not possessed of sufficient data to enable us to state with precision how far these conditions may predispose to, or directly excite, disease, or what particular change in our bodies result from certain electrical states of the atmosphere. But that the electrical conditions, together with a more or less humid state of the air, are connected, in the relation of cause and effect, with the prevalence of disease, is extremely probable, although not satisfactorily demonstrated. Those conditions which predispose to disease are—1st, temperature; 2d, humidity; 3d, these two states conjoined; and, 4th, electrical conditions of this fluid. Two very important subjects, very intimately allied to these, and which act both as

predisposing, exciting, and specific causes, viz. ENDEMIC and EPIDEMIC influences, are considered in separate articles.

32. (*a*) *Temperature* has a considerable influence in generating a predisposition to certain diseases. Thus, in low states of atmospheric temperature, the functions of respiration are fully and actively performed, especially as respects the blood; and the diseases observed in such circumstances are of an inflammatory nature, are seated chiefly in the respiratory organs, and are characterised, unless when the reduction of temperature is remarkably great, or the air very moist, by reaction of the powers of life on the causes which excite them. Very warm states of the air impede the changes which the blood undergoes in the lungs; and, by thereby furnishing abundant materials for the formation of bile, occasion an increased secretion of this fluid. Hence bilious diseases are most prevalent during high atmospheric temperature. This effect upon the blood is still more marked, if warmth be conjoined with moisture (§ 34.). Under those circumstances, bilious fevers, hepatic diseases, dysentery, diarrhoea, and cholera prevail.

33. (*b*) *Moisture*.—In dry states of the air, changes are fully effected on the blood by respiration; its watery portions are more freely carried off from the exhaling surfaces; its purity is increased, its congestion and excessive fulness prevented; and, consequently, the vital energies are promoted; and the depressing causes of disease, as infectious animal effluvia, and terrestrial exhalations, make much less impression on the system. Disorders occurring in this state of air assume chiefly a phlogistic or sthenic character, and affect most frequently the organs of respiration and the nervous system. A very moist state of atmosphere causes opposite effects. It fails of producing to the full extent the requisite changes in the blood, and of carrying off the fluids exhaled from the surfaces, especially of the lungs; thereby rendering the powers of life more languid, and the system consequently more open to the invasion of the exciting causes. Less moisture, also, being exhaled, the elements of biliary secretion, and the watery portion of the blood, become redundant in the vascular system. Hence an abundant secretion of bile, fevers, affections of the liver, and determination of fluids to the intestinal canal, &c. are promoted. (See art. CLIMATE.)

34. (*c*) *Temperature and moisture conjoined*.—That warm and humid states of air are individually active as predisponents of disorder, has been shown; but it is when they are conjoined, that they are especially injurious. A warm and humid atmosphere dissolves and accumulates the specific causes, such as animal and vegetable effluvia; assists their operation; and favours a rapid transfer of electricity from the earth's surface, and the change in the condition and the accumulation of it in the air resulting therefrom. It has been shown by the experiments of PROUT, FYFFE, ALLEN, and PEPYS, in an artificially increased temperature, and by those I made in an intertropical atmosphere, that heat remarkably diminishes the changes effected by respiration on the blood; and these changes are further diminished by warmth associated with moisture, which, moreover, promotes the passage of positive electricity from the body. And as the researches of RITTER show that the

electricity of the positive pole heightens, whilst that of the negative depresses, the actions of life, the ultimate effect of humid atmospheric warmth, as respects both the state of the circulating fluid and the locomotive electricity of the body, will be to lower the whole circle of vital manifestations, and to dispose to, or even to induce, diseases of a low character — to occasion adynamic, continued, and remittent fevers, or agues of a pernicious and congestive kind, or dysentery, cholera, chronic asthma, diarrhoea, and affections of the liver and spleen. A moist and warm air may, therefore, be stated to be doubly injurious, inasmuch as it is of itself an extremely active predisposing and exciting cause, and as it is the means of dissolving vegetable and animal miasms, — of marsh, infectious, and pestiferous emanations, — and the vehicle or medium in which they act injuriously on the frame.

35. (d) *A moderately cold and a dry air* increases the respiratory actions, and the energies of the system; proving what is commonly called a bracing atmosphere. Diseases usually assume an acute, sthenic, or phlogistic form; and the respiratory organs are liable to suffer. — In *cold and moist* states of air, rheumatism, gout, nervous affections, scrofula, and glandular diseases, intermittent and adynamic fevers, erysipelas, dropsies, anasarca, and chronic disorders and congestions, often prevail, especially in low, ill-ventilated, and marshy places. The positive electricity being rapidly carried off by induction from the body, a salutary stimulus, and one which experiments have shown to be productive of increased activity of all the animal functions, may be supposed to be lost. But when the air is very dry, the transit of electricity from the surface of the earth and from the body is impeded; this fluid accumulating until a moister state of air diminishes its quantity, and changes the relation subsisting between the electrical condition of the frame and that of the atmosphere. In very *dry and warm* states of air diseases less frequently prevail than when it is both warm and moist; and are more frequently characterised by increased vascular action. Inflammatory fevers, inflammations of the brain, liver, and stomach, are then most prevalent.

36. (e) *Sol-lunar influence.* — Considerable importance has been attached to the influence of the sun and moon in creating a morbid predisposition. Close observation of the relation subsisting between the prevalence of fever and dysentery, and the full and change of the moon, has apparently established some degree of connection between them in warm climates, particularly in the eastern hemisphere; but the manner of explaining this circumstance has been by no means satisfactory. Some impute it to a direct lunar influence; and adduce in support of their opinion the fact, that dead animal matter, when exposed to the moon's rays, more speedily suffers decomposition than when protected from them. Others, who favour sol-lunar influence, argue that it proceeds from the height of the tides, at full and change of the moon, occasioning the rivers on the coasts to inundate their banks, and to deposit vegeto-animal matter, which is rapidly decomposed, when the water retires and leaves the low ground exposed to the sun's influence. But if the relation subsisting between the preva-

lence of disease, and the moon's changes, were owing to this circumstance, it could hold only in respect of parts situated in the low alluvial countries on the coast, and not in districts inland and much elevated above the level of the sea. This, however, is not the case; for observation has shown the influence, whatever it may be, to be as powerful in high and inland countries as in districts on the sea-shore.

37. (f) *Light and sunshine.* — That the power of the sun's direct and refracted rays, in the production and removal of disease, is by no means inconsiderable, is proved by their influence on the vegetable and animal kingdoms; and by the effects which ensue in the economy when they are entirely excluded. These effects have been described in the articles on the BLOOD (§ 47.), and DEBILITY (§ 6. c.). The vital depression, attended by increased sensibility, mobility, and susceptibility to impressions, and the anæmia and general cachexy, which ultimately result from the protracted exclusion of light, are sufficient proofs of the beneficial influence of the sun's rays upon the frame. But additional and more direct evidence is furnished in the greater activity of the vital functions in spring; and in the genial excitement of the frame of the aged and debilitated, and indeed of both the minds and the bodies of all, by sunshine; light, as ordained and regulated by nature, being a salutary stimulus, and necessary to the energetic and healthy performance of all the functions. The exciting and depressing effects of the excess and absence of light respectively prove its influence over all the organic and mental manifestations, and consequently its power in predisposing to, and even exciting, disease — the intense or continued action of light inordinately exciting the nervous and vascular systems, and producing disorders of this kind; its abstraction weakening all the mental and bodily functions, and favouring the occurrence of diseases of debility. It is obvious from this, that light, especially sunshine — and even its abstraction — may be made subservient to the removal of disease, either in its individual capacity, or in association with a pure, dry, and temperate, or warm air, assisted by suitable exercise, and change of locality; and that the partial abstraction of one or both of these requisites to the due or energetic performance of the functions, must be ultimately followed by disease, however remote the effect, or numerous the intermediate links in the chain of causation.

38. II. THE EXCITING CAUSES. — These have been called *occasional* by some writers, and *direct* by others, *determining* by several, and *principal* by a few writers. I shall divide this class of causes into — (a) those which are *occasional* in their operation; and (b) those which are *specific*, or whose influence is followed by specific and determinate results. The causes already described, dispose the body to the action of those about to be noticed; either by impeding, modifying, or interrupting some one or more of the vital functions, or by changing the constitution or organization of the tissues or organs which are the instruments of the functions under the dominion of life. But the predisposing causes may, either by their activity, or by their acting in combination or in close succession, of themselves produce disease, without the aid of any of those which are

usually termed exciting; the predisposing, being in such cases the true and only exciting, causes. Thus the indulgence of the appetites, fatigue, the depressing passions, moist states of the air, &c.—either alone, or associated with age, or constitution, or habit of body, &c.—are often the only causes to which disease can be traced. On the other hand, the *exciting causes* frequently produce their effects without the previous operation, as far as we have the means of knowing, of the predisposing causes; and many of them merely predispose the system to the action of others following in close succession.

33. 1st. *The occasional exciting causes* act either—(a) upon the vital functions, or the manifestations of life in the various organs and structures; or (b) upon the organization of the part to which they are applied.

40. A. *Of the causes which primarily influence the functions.*—These will be considered in relation to the organs on which they immediately and chiefly act:—1st, Those which are applied to, and disorder or obstruct the functions of the external parts of the body; 2d, Those which make their morbid impression upon the respiratory organs; 3d, Those which act simultaneously upon both the cutaneous and pulmonary surfaces; 4th, Those which act primarily upon the digestive organs; 5th, Those which affect the organs of sense; 6th, and lastly, Those which excite the feelings, passions, and moral emotions, and thereby modify the manifestations of mind, or the functions and organization of the body.

41. (a) *The causes which injuriously affect the external parts of the frame*, either disorder the perspiratory and eliminating functions of the cutaneous surface, or modify the sensibility, or obstruct the actions, of external parts.—a. The perspiratory offices of the skin are disordered by the diversified modes in which its temperature is affected. Heat increases the organic actions of this surface—by exciting the nervous influence, expanding and relaxing the capillaries and exhaling pores, and, indeed, all the integumentary tissues, by determining thither an augmented circulation, and thereby increasing the vital turgescence and excretory functions,—and cold diminishes or entirely arrests all these actions (as shown in the art. COLD); the excessive increase or diminution of the cutaneous functions in a part or in the whole of the surface, by disordering the balance between those performed throughout the frame, exciting diseases which assume varied forms and grades, according to the predisposition of different organs, the state of the system, and the causes which may co-operate with the change of temperature. Whilst insolation and unusual *warmth* in any form—as warm baths, vapour baths, currents of heated air, frictions, &c.—are powerful agents in the production or in the removal of disease, according to the circumstances in which they are employed, considerable or prolonged *cold* is equally efficient in both capacities. But it is more owing to the vicissitudes of temperature—to their rapid alternations—than to any excessive grade of either, that the supervention of disorder is to be imputed. The sudden suppression of a copious perspiration; the partial exposure, also, of certain parts, and the superfluous coverings of others; or the action of currents of cold air upon one part, and of

radiant heat on another, as when seated near large fires; and wearing unnecessary coverings on the head, whilst the circulation is determined to it by position; are also no mean agents in the production of rheumatic and nervous affections, and inflammations, by deranging both the perspiratory functions, and the sensibility of the parts thus oppositely acted upon. The influence of too much clothing around the hips and thighs of females, and of too soft and warm beds and couches, in favouring uterine and vaginal discharges, and hæmorrhoids; and of too little clothing on the same parts, in obstructing the catamenia; is generally admitted. The want of personal and domestic cleanliness, by allowing the accumulation of sordes upon the cutaneous surface, and the continued irritation of hurtful matters which may have come in contact with it, is a frequent cause of disorder of both its functions and its sensibility, and a common origin of many of the eruptions to which it is liable.

42. β. *Obstructions to the free actions of voluntary parts* are often occasioned by the kind or fashion of the coverings which protect them; and, not infrequently, injurious pressure of parts is superadded. Very thick and unyielding shoes prevent the developement of the muscles of the lower limbs, particularly the gastrocnemii, weaken the ankle joints, and occasion a shuffling gait. Strait, confined clothes, on young and growing persons, cinctures of any part, and too close or straitly braced breeches, sometimes produce diseases of the organs of generation, varicose state of the veins, varicocele, flexures of the spine; and wastings, painful affections and organic changes of the testes. All impediments to free motion and the exercise of our organs are more or less injurious.

43. (b) *The respiratory surfaces* are affected by several of the causes which act upon the cutaneous surface. The operation of a warm and moist, or of a cold and humid, air on the lungs, and, through them, upon the whole frame, has already been pointed out. (See § 32—35., and art. COLD.) The specific gravity, also, of the atmosphere has some influence in disease; the diminution of it occasionally producing hæmorrhages from mucous surfaces. Exertions of voice or speech, long and loud speaking, running against the wind, and foreign substances floating in the air (as shown in the article on ARTS AND EMPLOYMENTS) are common causes of bronchial and pulmonary affections. The pollen or the odour of vegetables, grass, and flowers, the effluvium of new hay, &c., sometimes give rise to severe attacks of asthma, or that form of it which has recently been termed *hay fever*. The animal effluvia floating in the warm, moist, and often stagnant air of assemblies, theatres, camps, ships, hospitals, and crowded gaols, independently of the admixture of any of the specific miasms hereafter to be noticed, change the condition of the organic nervous influence, disorder the secreting functions, contaminate the circulating fluid, and, in this manner, produce effects which are injurious in proportion to their concentration or intensity—generally low or adynamic fevers. Chemical fumes sometimes excite bronchitis; and various simple or compound gases, the air of mines, the exhalations

of privies and sewers, and even of new-painted rooms, are productive of syncope, asphyxy, or even apoplexy, convulsions, and paralysis. In such cases, the diminution of oxygen in the respired air, or the impression made by the foreign fumes or gases upon the nerves of the respiratory organs, or both conjoined, impede, obstruct, or arrest the changes produced upon the blood in the lungs, and ultimately terminate in death, preceded by one or more of the above affections.

44. (c) Several of the exciting causes act upon both the *external and respiratory surfaces*; especially vicissitudes of season, of temperature, and of dryness of the atmosphere, suddenly passing from a cold to a warm air, prevailing winds (see CLIMATE, § 11, 12.), the night or morning air; and numerous circumstances connected with the habitation or locality—especially the existence of the endemic sources of disease in its vicinity—ventilation, temperature, and dryness. The influence of northeast winds in reproducing attacks of ague and rheumatism; of the night and morning air in causing disorders of the mucous surfaces; and of low, damp, ill-ventilated, and crowded habitations, in giving rise to fevers; is well known.

45. (d) *On the digestive surfaces and organs.*—*a. Mode of operation.*—The numerous and diversified substances which are either commonly, occasionally, or accidentally received into these organs, produce their effects in different ways. Those which are injurious from their specific tendency, or from excess, as numerous poisonous and medicinal substances; and those which disagree, from idiosyncrasy, mode of preparation, or injudicious admixture with others, as various articles of food, drink, and condiment; act in some one of the following modes:—1st, By irritating the villous surface, or altering its organic actions from the standard of health. 2d, By exciting, depressing, or otherwise modifying the nervous power of these organs; the morbid impression being propagated, in a greater or less degree, to other related organs. 3d, By both these modes of action conjoined. 4th, By the absorption of these substances into the circulating fluids, and by their exciting, depressing, or changing the vital actions, through this channel; the manifestations of life in the organic nervous system, or in the blood itself, or in the cerebro-spinal system, or in secreting and excreting organs, being individually or conjointly affected in one or other of these ways. And, 5th, both by their primary morbid impression on the digestive villous surface and nerves, and their consecutive influence, as stated in the 1st, 2d, and 3d heads; and by their absorption and action, in the manner now assigned.* (See, also, art. POISONS.)

46. *β. Food and drink.*—The full discussion of these topics would comprise the subject of DIETETICS; upon which, however, the scope of this work will not allow me to enter further than very briefly in connection with the causation of disease. They have already received some atten-

tion in relation to climate and season (see CLIMATE, § 26.); and to the habits of individuals as to their use (§ 19.). It must be obvious that any article of diet will occasionally be found difficult of digestion, or even injurious, in certain latent and open states of disorder. When obstructions of any of the viscera, or accumulations of secretions in the biliary organs or in the *prima via*, already exist, owing to weak action or torpor of any of these parts, very slight aberrations from an accustomed diet, or substances not usually hurtful, may occasion very serious disease. It is also evident that the privation of food and drink; excesses in either, or in both; and, in this climate, too large a proportion, or the exclusive use, of either animal or vegetable diet; will be productive of correlative ill effects. The excessive use of animal food, particularly pork, gives rise to plethora, scrofula, and gout; and the want of vegetables, herbs, and fruits, in sufficient proportion to the salted provisions consumed, or an innutritious diet, is productive of scurvy, purpura hæmorrhagica, of an intermediate disorder which may be called land scurvy, and chronic diarrhœa and dysentery. Both flesh and fish are sometimes productive of disorder, owing to their being diseased at the time of being killed, to their becoming tainted subsequently, and to unwholesome ways of preserving them. A poisonous product is occasionally evolved in smoked and dried meats; and shell-fish, chiefly from being imperfectly boiled, and long kept by the retailers, is often extremely injurious. The plan very generally adopted by the fishmongers of London, of preserving fish—especially turbot, salmon, and, indeed, all the fish that is not sold before evening—by means of ice; a large proportion being frozen, thawed, and frozen and thawed again, as alternately exposed in the day on their stalls, and lodged in the evening and night in the ice-pits, until the cohesion of the fibres is lost, and the flavor dissipated; is most prejudicial to health, particularly during summer and autumn; and is one of the most frequent causes, in London, of disorders of the stomach and bowels, although overlooked by writers on this class of diseases. Nor does the evil end here; for all the salmon that becomes tainted from this mode of keeping, is either pickled or smoke-dried, and sold for that prepared in these modes from the fresh state. Independently, however, of these circumstances, all kinds of fish—some more frequently than others—may occasionally disagree, particularly with certain idiosyncrasies, and with weak digestive organs; as lobsters, mussels, &c. Some kinds are even poisonous, especially in warm climates; and others produce disorder from being out of season, as salmon, trout, &c. The injurious action of fish is exerted chiefly upon the stomach and bowels; generally in the form of cholera, attended by extreme vital depression; and sometimes by an eruption on the skin. That the poisonous elements are partially absorbed into, and act partly through, the circulation, may be inferred from their effects, and from their peculiar odour being afterwards detected in the cutaneous secretions. The means of preventing and counteracting the ill effects of fish are stated in the article POISONS. *Vegetables*, even, will also disorder the digestive organs if they be allowed to run to seed, or grow

* The above classification is in accordance with that published by me in the *London Medical Repository* for May, 1822, p. 380.; and was the first that was based upon the absorption of substances into the circulation, and upon their relative action on the organic nervous, and cerebro-spinal systems.

too far, or if kept too long after they have been removed from the soil.

47. *γ. Cookery and condiments.*—Animal substances become indigestible by being either too much or too little cooked; and vegetable substances, chiefly, by being too little. Fried and baked meats are less digestible than roasted and broiled. Stewed dishes, meats prepared a second time, and very highly seasoned articles, are all prejudicial. Fish often disagrees with the stomach, from the manner of cooking, and the sauces taken with it; and, of these, butter is one of the worst ingredients. Vinegar, lemon-juice, and salt are the most wholesome condiments; and, if the fish be rich and fat, Cayenne or black spice may be added,—these being amongst the best antidotes to any ill effects it may produce. The livers of fish are generally productive of disorder in weak digestive organs; for, during boiling, all the oil—which is extremely wholesome, and even medicinal, and which might advantageously enter into the composition of the sauce instead of butter—is extracted, and, swimming on the surface of the water in which the fish is boiled, is thrown away with it; the part remaining being that only which is generally, but improperly, used. *Condiments*, excepting by those who have been long habituated to them, are hurtful, unless taken in very small, or at least moderate, quantity. Salt, vinegar, and lemon-juice are the most wholesome under all circumstances. The fact, that salt is necessary to health at all periods of existence, is not easily reconciled with the equally well-established fact, that the protracted use of salted provisions is a principal cause of scurvy, scorbutic dysentery, external sores, ulcers, as well as an evident predisposing cause of fevers, inflammations, &c. But it may be presumed that the combination of salt with the animal fibre decomposes it or modifies its effects upon the living system. Besides, salted meat, particularly when it has been long preserved, becomes less nutritious, and more difficult of digestion; the ill effects being equally attributable to the deficiency of vegetables, frequently conjoined with bad water, and the depressing passions.

48. *δ. Baked pastes, and pies, tarts, &c., and the boiled dough of puddings*, are difficult of digestion, especially the former; and should never be taken by dyspeptics. *Fruit*, when in season, is much more wholesome. But if it be used either previously to being fully ripe, or when it has become over-ripe or stale, and particularly if it be uncooked, disorders of the stomach and bowels are frequently produced by it. New cheese is very injurious when partaken of largely; and nuts, cucumbers, and melons are always indigestible, however ripe they may be. A variety of fruits, immediately after a full meal, is also productive of disorder; the most wholesome being ripe oranges, grapes, strawberries, &c. All preserved and stimulating articles of dessert merely load the stomach, occasion thirst, and lead to the ingestion of a greater quantity of fluid, and of wine, than is consistent with easy digestion, and with the regular performance of the functions.

49. *ε. Drink and beverages* are also common sources of disease, either from being of improper kind, or used in excessive quantity. The most wholesome wines are port and sherry, after having been six or eight years in bottle, and the

finest and highest flavoured French and Rhenish wines. The constant use, however, of even the best port and sherry occasions vascular plethora, and its consequent ills, unless very active exercise be taken. Delicate persons should dilute them with an equal, or one half the quantity of water. Champagne often excites gout: I have observed two or three glasses of it bring on an attack the following day. *Malt liquors*, although both tonic and nourishing, owing to the hop and extract of malt contained in them, occasion disease when constantly used, from these very circumstances; a plethoric state of the system, obesity, and various contingent diseases, being the result. The most wholesome of this kind of beverage is brisk small beer. *Cider and perry* are sometimes productive of colicky affections, gastrodynia, indigestion, and diarrhoea, especially if they be taken while the body is perspiring, or in very hot weather. *Spruce beer* is much more wholesome. *Spirituuous liquors*, particularly those in common use, are most injurious to the frame; and, in the lower classes, are the most frequent causes of, first, functional, and afterwards organic, diseases of the stomach, liver, bowels, and brain, as well as of some other viscera, and of insanity. *Coffee and tea*, although, upon the whole, wholesome beverages, may be, in some constitutions and states of the system, productive of disorder. A strong infusion of *coffee*, taken soon after the principal meal, promotes digestion, and counteracts whatever ill effects the cold and poor wines used on the Continent might otherwise produce. But it is sometimes injurious, from its stimulant properties, in cases of cerebral irritation or excitement; and, when taken late in the evening, prevents sleep. The infusions of *black or green tea* are gently tonic and narcotic; the latter acting more energetically upon the cerebro-spinal system than the former. Green tea usually excites the nervous power; and, like coffee, increases the activity of the cerebral functions. But, when morbid, vascular, or nervous excitement exists, it generally proves an excellent tonic and sedative; procuring sleep, and diminishing both nervous and vascular disorder. In cases of asthenic vascular action, attended by coma or lethargy, I have found it a most valuable restorative of both vital and cerebral power. In addition to the above, the use of hard or unwholesome water, and either a high or a very low temperature of the ingesta, are often productive of disease.

50. *ζ. The effects of accidental or designed ingestion of poisonous substances*, as well as the means of counteracting and removing them, are considered at another place; and, although *injudicious uses of remedial means* are but too frequently causes of disease, and of its aggravation, especially the inappropriate use of mercurial preparations, of emetics and irritating purgatives, of vascular depletions; of stimulating and heating substances, exhibited with the view of restoring nervous power, or of promoting expectoration, when the increased vascular action from whence it proceeds should be allayed; and of secret remedies of every description; the nature of the subject precludes further allusion to it at this place. The influence of *morbid secretions poured into the digestive tube*, and the effects of arresting accustomed or salutary evacuations, as increased dis-

charges from the uterine organs, hæmorrhoids, &c., or vicarious secretions, without having opened an artificial outlet or produced artificial irritation and discharge, in extending, perpetuating, and aggravating disease, rather than originating it—for morbid states of secretion imply existing disorder—are sufficiently obvious.

51. (e) *The causes which act on the organs of sense* consist chiefly of the abstraction of the natural stimuli or impressions, and the application of them in unusually intense forms; the mental phenomena excited through the medium of the senses not falling under this head.—*a. Sight* may be weakened by prolonged darkness, and consequent inaction of the organ; but it is much more commonly injured by the unusual impression of light, which may so intensely excite and exhaust its sensibility as to destroy its functions. The rays of the sun, and lightning, have produced this effect almost instantaneously; and the light reflected from snow in northern countries, and from the sands of the arid districts of intertropical climates, has frequently occasioned it in a slower but not less effectual manner. Persons employed in glass-works, forges, foundries, &c., who frequently subject their eyes to an intense light and radiant heat; and those who are occupied on small, very near, or minute objects; are often affected by amaurosis, cataract, and other chronic disorders of the organ. When the sensibility of the eyes is increased by protracted darkness, the admission of even a moderate light often becomes painful and injurious, if it take place suddenly. Of the various colours reflected by the rays of light, white and red are most fatiguing to the sight.—*β. Hearing* is injured by very loud noises, or detonations, near to the organ: and persons of weak or nervous constitutions may even lose this sense by such causes; or experience convulsive seizures, syncope, violent palpitations, or disorder of the digestive and circulating organs. Loud noises are extremely injurious in all cases of cerebral and vascular excitement; and in cases of external injury, as well as of internal inflammation. M. PERCY states, that he observed the wounded often very sensibly affected by the report of cannon during sieges and battles.—*γ. The sense of touch*, and the sensibility of external parts, are acted on by many of the causes already noticed; but often in an imperceptible manner. Numerous external irritants; extremes of temperature, either of the air, or artificially excited, as extensive vesications and burns; violent or protracted excitement of the senses of sight and hearing; or irritations or injuries of nerves; frequently affect sympathetically the whole frame; and even occasion convulsions, spasms, inflammation of the brain and spinal chord, or of their membranes; and, when extremely intense in relation to the vital resistance of the sufferer, great depression, and even fatal sinking, of the powers of life.—*δ. The sense of smell* may be impaired by over-excitement; or by causes acting in this, or in any other way. It is also partly through this sense that various agents invade the system, especially those of a depressing kind, as infectious effluvia. (See art. INFECTION.) Odours sometimes, also, produce syncope, nausea, vomiting, and nervous affections through this medium.—*ε. The sense of taste* is least frequently the channel

through which exciting causes act: the impression, however, made upon the palate by certain articles are sometimes productive of severe disorder of the digestive organs; and, in the case of the more active narcotics, &c., of dangerous disease of the nervous system.

52. In the foregoing review, those causes which act externally upon, or through the medium of, the organs of sense have been noticed. But there are numerous changes, which are *intrinsic*, or take place in the organic, nervous, and circulating systems, as well as in the brain and secreting viscera, and which affect these organs in a very remarkable manner. These, however, are rather *secondary or pathological* causes—or the effects of agents acting primarily upon those or other parts of the frame, which effects become contingent or necessary causes of disorders of the organs of sense—from altering their condition, or the state of parts necessary to the perfect performance of their functions. Thus the senses may be disordered or altogether abolished by disease of the brain, or of their nerves, or by affections of the digestive and assimilating viscera. This influence of disease of one viscus or system, upon those anatomically or physiologically related to it, also subsists more or less evidently throughout the frame; the primary affection giving rise to a variety of sympathetic and secondary disorders, according to the progress it has made, to the circumstances that have influenced it in its course, and the predisposition of the individual (§ 21.).

53. (f) *On the sentiments and passions.*—The circulation of the brain, the action of the heart, and the functions of the digestive and generative organs, are frequently disturbed by causes affecting the manifestations of mind.—*a. Excessive mental employment*; long protracted attention, especially to one subject; over-exertion of individual powers, without the requisite repose, and the relaxation resulting from an agreeable diversity of pursuit; the distraction also occasioned by a number of pressing or abstract topics; can seldom be very long persisted in, without exhausting the mental energies, exciting or otherwise disturbing the circulation through the brain, and ultimately inducing either acute or chronic cerebral disease, as phrenitis, delirium, insanity, apoplexy, paralysis, epilepsy, &c.; especially if other circumstances concur to excite or overload the vascular system, and determine the circulation to the head, or if the requisite nightly repose be abridged or interrupted.—*β. Certain trains of feelings, and particular desires or passions*, as religious sentiments, affection, love, hatred, revenge, avarice, pride, vanity, &c., may all be carried to that pitch, by being constantly and exclusively entertained, as insensibly to pass into monomania, or other forms of insanity; or to occasion ecstasy, catalepsy, convulsions, or some one of the diseases mentioned above (α)—*γ. Various circumstances occasioning solicitude, anxiety, distress of mind, sadness, fear, shame, penitence, disappointments and losses of all kinds, the indulgence of grief, and anxious or constant longings after objects of desire or of affection*, may not only disorder the mental manifestations in a partial or general manner, but also disturb the functions of the heart, as well as those of digestion and assimilation.

lation. All the depressing emotions of mind have an especial effect upon the circulation, upon the nutrition of the frame, and indeed upon all the functions dependent upon the organic nervous system; and favour chronic and asthenic diseases of the heart, particularly passive dilatation and enlargement of its cavities, indigestion, and constipation; also chlorosis, pulmonary consumption, hysteria, and tubercles, early in life; and hypochondriasis, melancholia, chronic diseases of the liver, spleen, and pancreas, and cancerous or other malignant diseases, at mature or advanced ages.—*δ*. Surprise, fright, terror, anger, and indignation, are not infrequently productive of apoplexy, paralysis, epilepsy, convulsions, syncope, violent palpitations, painful or acute affections of the heart, disorders of the stomach, liver, and bowels, hysteria, abortions, derangement of the uterine functions, and of the manifestations of mind.—*ε*. Great mental excitement, unlooked-for success, the sudden accession of fortune, extreme joy, and all the pleasurable emotions carried to excess, are not infrequent causes of insanity, of phrenitis, epileptic convulsions, hysteria, and catalepsy.—*ζ*. An improper conduct, and an insufficient control, not only of the sentiments and emotions, but also of the imagination, are amongst the most common causes of disorder in the manifestations of mind, as well as of the other maladies enumerated above (*α*, *β*).—*η*. Inordinate indulgence of the sexual appetite occasions epilepsy, loss of memory, and mental and corporeal debility, impotency, diseases of the testes, prostate gland, and urinary bladder, and affections of the heart and lungs in males; and in females, inflammation of the ovaria and uterus, fluor albus, hysteria, chlorosis, melancholy, irregular convulsions, organic or scirrhus changes in the uterus, diseases of the ovaria, and sterility, &c. (See art. AGE, § 24.)—*θ*. Persons who have been habituated to excessive sexual indulgence, and become altogether continent, are liable to nocturnal emissions, to impotency, convulsive and other nervous diseases, and to disordered mental manifestations.—*ι*. Numerous acts of volition injudiciously attempted or directed may be productive of the most dangerous injuries and disease; as violent muscular efforts, of sprains, aneurisms, hæmorrhages, inflammation and caries of the vertebrae, or inflammation of the intervertebral substances. Positions with the head low, or on the back, and especially such as are uneasy or unnatural, too long retained, or too frequently assumed, give rise to cerebral disorder and curvatures of the spine; and encumbered, obstructed, or too rapid and protracted movements, produce injurious acceleration of the circulation, exhaustion, with other ill effects.

54. *B. The chemical and mechanical causes of disease require little notice here; the former of these having received attention in the articles on ASPHYXY, and POISONS; and the latter on that of ARTS AND EMPLOYMENTS, as Causes of Disease.*—(*α*) *Chemical agents* are injurious—1st, by their influence on the functions of the part with which they come in contact, their effects varying with their individual properties; 2d, by the change they produce in the structure itself, either in combining with it, or otherwise changing its constitution, so as to render it incapable of its

healthy offices; and, 3d, by totally destroying the nervous and vital influence, and intimate organisation of the part.—(*β*) Of *mechanical causes* and positions impeding, upon physical principles, the flux or reflux of the circulation and secreted fluids, continued pressure of various grades, and unnatural ligatures of parts, are the most common, and act slowly, and often insensibly and unremittingly. Shocks or concussions of a part or of the whole of the body, or other kinds of external violence, not only occasion the division, fracture, dislocation, bruise, and comminution of external parts, but also the rupture, laceration, hæmorrhage, displacement, vital depression, or extinction of function of internal viscera, as of the urinary bladder, liver, spleen, stomach, and bowels, brain, spinal chord, &c.

55. *III. THE SPECIFIC CAUSES OF DISEASE.*—Of the causes which may be thus termed, emanations from the soil are, perhaps, the most common.—*A*. The *miasmata* arising from stagnant water, partially covering the soil, or covered by vegetating substances; from vegetable matter in a state of decomposition; from moist absorbent soils exposed to the sun's rays; from the muddy and foul bottoms of lakes, marshes, and lagoons, or the marshy banks of rivers and canals; and from low grounds which have been partially inundated by the ocean or by rivers; are productive of agues, enlargements of the spleen, of the liver, and even of all the glands, rheumatism, catarrh, &c., in cold or temperate climates; and, in addition to these, of remittents, bilious and gastric fevers, dysentery, cholera, diarrhœa, and hepatitis, in warm climates and seasons, according to the predisposition of the patient, and the circumstances which have aided the action of the efficient cause on the system.

56. *B. When dead animal matters or exuviae mix with vegetable substances, and putrefy along with them, in a warm and moist air, the effluvia assumes a more noxious form, especially if the air stagnates in the vicinity of its source; and it becomes more certainly productive of disease than that which proceeds from the decomposition of vegetable matter only; the effects produced by it being often of a more adynamic or malignant character.* In warm countries, the localities enumerated above abound with dead animal bodies, and the exuviae of immense swarms of insects; and hence may be inferred the reason wherefore terrestrial emanations in these climates give rise to more severe forms of intermittent and remittent fevers, depress more remarkably the vital powers, derange more the vascular system, and more sensibly affect the blood and the secretions, than the miasmata exhaled from similar places in northern latitudes. The water of low, moist, and marshy places is also productive of various maladies, particularly of dysentery, chronic diarrhœa, diseases of the spleen, Guinea-worm, &c. These causes and effects, with what is at present known of their operation, are more fully discussed in the arts. ENDEMIC INFLUENCE, and FEVERS.

57. *C. Emanations from animal matter only, the air being in other respects uncontaminated, or frequently renewed, are seldom productive of any serious maladies.* But when they burst forth suddenly, in a close and moist air, the effects are sometimes most pernicious. It has been recorded, that fevers of a very malignant kind have attacked

persons who have opened a grave and exposed the body whilst undergoing decomposition, the effluvia having instantly produced a sensible influence upon the frame. The effects of air accumulated in sewers, privies, &c., are shown in the article on ASPHYXY.

58. The *particular elastic fluids* which are evolved from the foregoing sources have not been satisfactorily demonstrated by analysis. They seem, however, to consist of an admixture of various gases, in very variable proportions, particularly sulphuretted hydrogen gas, and sulphuro-carburetted hydrogen, with azote, and aqueous vapour, holding the subtiler particles of decomposed animal and vegetable matters in solution; which particles most probably make the most injurious impressions on the frame, and are the actual causes of the consequent disease.

59. *D.* The various *exhalations and secretions* formed in the course of disease are most common and important causes. These consist either entirely of insensible emanations from the bodies of persons affected by the exanthematous and specific fevers, &c. (*infectious*); or altogether of a consistent and palpable fluid formed on the morbid surface of the diseased body or part, as the itch, lues venerea, &c. (*contagious*). Many of the maladies which spring from specific causes, propagate themselves, both by impalpable or invisible emanations from the body floating in the surrounding air, and by the contact of a consistent fluid or virus formed in the diseased part, with a part of an unaffected body rendered capable of being affected by it. Such is the case with small-pox and plague (*both infectious and contagious*.) Maladies which are produced by the contact of a consistent fluid secreted by a diseased part, may be propagated artificially, or by inoculation, although not in every instance where it is attempted. Those, however, which do not form upon some part of the chief seat of disease a consistent secretion, capable of being artificially inserted in a healthy body, may nevertheless be conveyed from one person to another, by bringing substances capable of absorbing and retaining for a time the emanations given out from the diseased body, as frequently demonstrated by typhus and scarlet fevers, &c.; and all those which are propagated by contact, or by a palpable fluid, also, may be disseminated in a similar way. The substances thus imbibing and conveying the invisible or *infectious* emanations, as well as the palpable and *contagious* virus or consistent secretions, have been called *fomites*—if a single substance has been the vehicle, *fomes*. Of all the various materials which may thus become the medium of transmitting infectious diseases, animal productions, particularly woollen and hairy substances—manufactured or unmanufactured—furs and feathers, bedding and body-clothes, have the greatest disposition to imbibe the morbid effluvia, and to retain it the longest. It seems as if animal emanations were attracted and retained most strongly by substances belonging to the same kingdom. Next to these, cotton, flax, linen, and other substances of a soft and porous texture, are most likely to convey morbid effluvia. In respect of the diseases which are really *infectious* or *contagious*, or which proceed merely from terrestrial emanations, great difference of opinion exists, and has long existed. Many fallacies con-

nected with the use of the terms in dispute, much misapprehension and ignorance, great prejudice, and unbecoming acrimony, have characterised the controversies which have arisen on this subject. The topics, however, connected with it, both essentially and collaterally, are fully discussed in the articles on FEVERS—*Causes of*; and INFECTION;—and in those on the diseases, respecting the nature of which difference of opinion has existed.

60. *E. Mode of action of specific causes.*—On this subject, a very general remark merely may be hazarded at this place. Those specific causes which are suspended in the atmosphere or dissolved in the moisture it contains, and inhaled into the respiratory passages, seem to make their first impression on the nerves supplying those parts; the organic nervous system being chiefly affected. That this is the case in respect of marsh miasmata, and other terrestrial emanations, is indicated by the periodicity—the intervals the recurrences or paroxysms, the exacerbations, and the terminations, of the various diseases referrible to these sources. If the circulating fluid were early and chiefly affected by them, as some believe, morbid action would take place more rapidly, and assume a more malignant and continued form; for, as soon as the blood becomes affected, complete remissions are never detected; whereas all affections of the nervous system, especially those of a functional kind, are characterised by remissions and exacerbations; or by intermissions and regular paroxysms. In advanced stages, even, of those maladies, particularly after the various secreting and depurative functions have been disordered, the circulating fluid probably becomes changed, although not in a very remarkable manner; the chief morbid condition, however, still existing in the organic nervous system. When the miasms floating in the air consist principally or altogether of animal emanations—proceeding either from animal matter in a state of decomposition, or from persons affected by adynamic or specific forms of disease—not only may the first impression be made upon the organic nervous system, but the blood itself may also be early contaminated, although not at first in a sensible manner; for it is not unreasonable to infer, that the fluid emanations from the bodies of the diseased, and dissolved or floating in the respired air, may pass into the blood along with those constituents of the air which partially enter it, and in this way induce a similar disease of the whole frame, owing to the universal diffusion of this fluid, and the very intimate connection subsisting between it and the organic nervous system, even before the changes effected in it have become manifest to our imperfect senses.

61. *iv.* THE DETERMINING OR CONSECUTIVE CAUSES OF DISEASES require little observation, further than that the practitioner should not overlook the circumstance, that the exciting causes, whether common or specific, will frequently fail of being followed by any marked effect, when the system is in due health at the time of exposure to them, and is not subjected for some time afterwards to various additional influences or agents, particularly such as produce a depressing or debilitating impression. Thus, a person who has been exposed to emanations from the subjects of typhus fever, or from marshy grounds, &c., may experience no ail-

ment, until a change of weather—from dry to moist, &c.—or depressing mental impressions, or cold and fatigue, or venereal excesses, or, in short, any debilitating influence, occur to aid its operation and determine its action; and, if no such consecutive causes aid the principal or specific cause, in a few days from the exposure to it, disease will often not appear. I have frequently seen this exemplified in a very striking manner: one instance on a large scale will be sufficient. Between twenty and thirty persons were exposed all night, without cover, to the air of one of the most fatal sources of miasmata furnished by a warm climate, during the unhealthy season, but were soon afterwards removed to sea—far from any further exposure to this specific cause. They continued well for six or seven days, when about half their number experienced great fatigue. All these were nearly simultaneously—on the following day—seized with remittent fever; whilst those who had not been subjected to this consecutive cause, with the exception of two, who were not attacked till several days subsequently, entirely escaped, although all had been equally exposed to the specific cause of that form of fever. Further illustrations from my experience in different climates, and of various diseases, might be adduced; but the simple statement of the above fact is sufficient. The practical importance of it, however, should not be overlooked; for it shows—what I have frequently believed has been successfully practised—namely, that a person who has been subjected to the impression of a specific or any other exciting cause, may escape its effects, if he immediately fortify the system against it, and avoid exposure, for some time subsequently, to all other injurious agents, especially those which lower the vital energies of the frame. Persons even who experience the sensations more immediately caused by exciting agents of a specific kind, as infectious emanations, will often escape by observing this precaution, and having recourse to a restorative regimen, with the usual means of promoting all the secreting and excreting functions of the frame, as shown in the art.

FEVER—*Prophylactic Means.*

62. It is unnecessary to enumerate the causes which most commonly come in aid of the exciting agents of disease. They comprise nearly all those already adduced as predisposing the system to, as well as occasionally exciting, morbid action; particularly such as depress vital power, by their specific properties and immediate impression; the abstraction of requisite or accustomed stimuli, as of warmth, food, &c.; whatever impedes the functions of respiration, digestion, assimilation, and excretion; all weakening discharges; depressing affections of mind, particularly fear of being affected by the cause to which the person was exposed; and all circumstances in any way deranging the accustomed tenor of the mind, and habits of life.

63. III. GENERAL DOCTRINE OF DISEASE, OR PATHOGENY (from *πάθος*, disease, and *γενᾶν*, I gender, or produce).—An examination of the systems of medicine proposed since the revival of learning in Europe, or even of those advanced in modern times, would occupy more of my limits than I could devote to the subject. I shall, therefore, proceed at once to the development of those general views of disease, which observ-

ation and reflection have suggested to me, and convinced me to be of importance, not only in estimating aright the exact state of the more common specific maladies, but in forming safe opinions respecting those more anomalous or complicated affections, which frequently present themselves to the practitioner.

64. I have already contended (§ 7.), that, with few exceptions, which have been particularised, the causes of disease *first* modify the manifestations of *life* in some one or more of the systems and organs with which it is allied; or, in other words, first disorder the functions with which they have a direct relation; and that, after a period of longer or shorter duration, the disorder of function becomes a cause of further disorder in related or associated organs, and ultimately, if circumstances obtain hereafter to be noticed, of change of structure, either in the primary seat of disorder, or in that consecutively affected. From this, and what has been already stated, it will appear that a great proportion—nay, all—of those disorders of internal parts, which have been viewed as *intrinsic* predisposing and exciting causes of disease, are, in truth, pathological conditions, or existing states of disease, induced by some one or more of the causes specified above, and ready to produce further disease, or to lead on to a salutary change, according as the existing state of vital power or resistance, and the influences or agents acting on it, may determine the procession of phenomena, or incline the balance. These primary or early changes, or morbid conditions, may very aptly be termed *secondary* or *pathological* causes, when they give rise to ulterior change either of function or structure; but they are so diversified, that but little notice can be taken of them here, beyond what is necessary to the consideration of general principles; their different forms being more intimately viewed in the articles on specific diseases. It may, however, be remarked that they often exist in latent, or almost imperceptible, states, and predispose the frame to the invasion of causes to which it otherwise might have been exposed with impunity.

65. The great fault of all systems of pathology, down even to the most recent, has been their confined or narrow principles, and consequently their inadequacy to the explanation of all the states of morbid action constantly occurring. Brown and his followers admitted but two modifications of the vital manifestations from the normal state, viz. depression and excitement, whilst he substituted an inappropriate and single term as a sign for those manifestations, which are as obviously and frequently changed in kind as in degree. Dr. PARRY referred the chief states of disease to the vascular system, and to changes in its states of action, without sufficient reference to the nervous system, as controlling and even causing these changes, especially to the organic nervous system, with which the vascular is so intimately connected; whilst his contemporaries, who considered that disease originates in the nervous, and affects the vascular, system consecutively, viewed the cerebro-spinal axis, and its various prolongations in the form of nerves of sensation and volition, as the parts primarily impressed. Considering, however, as stated in the article on DEBILITY (§ 13.), that the intimate association of the organic nervous system with

the vascular system throughout the frame, and particularly in vital, secreting, and assimilating viscera, fulfils important objects,—that these systems are the chief factors of life in the various structures and organs, which, however, modify its manifestations, giving rise thereby to specific manifestations of this endowment, according to the nature of their superadded organisation, so that the liver secretes bile and not urine, the pancreas its peculiar secretion and no other, the kidneys urine, &c. — I believe that the causes of disease commonly act directly upon one or both of these systems, most frequently on the former; and generally on their numerous ramifications in one or more of those organs or surfaces, with which the exciting and other causes are more immediately related, and with which they are brought in connection from their nature and properties. Thus, those causes which are applied to the respiratory surfaces, primarily affect the organic nerves distributed to them, and the blood-vessels of the lungs, and in some cases the blood itself; and those which are received into the digestive organs, make their impression on the nerves supplying them, thereby modifying their vital manifestations, as well as the functions of related or associated viscera, according to the properties of the individual agents. Having pointed out the intimate relation of the exciting and other causes to the organs on which they chiefly act, and having here and at preceding places noticed the particular system on which they seem to exert their primary impression, it becomes requisite next to inquire into the nature of that impression, or early disorder, and afterwards to consider the changes which consecutively accrue, and the means which nature employs to arrest their progress or to give them a salutary tendency.

66. I. OF THE PRINCIPAL STATES OF MORBID ACTION.—In considering the earliest aberrations from the healthy state following the impression of morbid agents, without especial reference to the system or organs on which they directly act, we are particularly struck with their very diversified nature; and, upon an intimate view of the numerous shades of difference, often evanescent or inappreciable, between effects apparently similar, we necessarily arrive at the conclusion, that, however multiplied the various *grades* of action or vital manifestation may be, some other differences than such as are purely *dynamic* exist; and that the changes may also be of an *anomalous* or *cachectic* kind,—that the vital manifestations in the various organs may not merely present *SIMPLE CHANGES OF DEGREE*, but also *COMPLICATED ALTERATIONS OF KIND*,—that vital action may not only be *depressed* and *excited*, but also *changed in other respects*, or *vitiated*, as well as at the same time either depressed or excited. Sufficient proof of the above positions will immediately suggest itself to the practitioner, when he considers the different states of action that may be even artificially produced by the ingestion of different stimuli, the grades of whose action may be very nearly the same; or when he views the very numerous modifications in degree, form, and kind, in which either vital depression or excitement assumes, even in affections of the same system or organ. He will, moreover, recollect that numerous maladies have come before him, in which

the least distinctive characters were those resulting merely from grades of action; that the most prominent features, whether pathognomonic or diagnostic, had no reference to degree, but to form or kind; and that many of these were of the utmost importance in the recognition of the actual pathological condition, and as bases for therapeutical indications, however difficult it might be to describe or explain them, or to convey such an idea of them as he had himself formed, and successfully applied to practice. Indeed, every one must have remarked, that numerous phenomena, either cognisable to the senses of the observer, or merely connected with the sensations of the patient, indicate rather a change in the condition of life, a vitiation of its properties and manifestations, than any grade either of its depression or excitement. If we take the common symptom of pain, as remarked by Dr. PRING, we have no evidence that it is more intimately allied to increased, than to diminished, vital action. In imputing it to altered sensibility, we in fact imply that the alteration is not altogether one of grade merely; indeed, a careful examination of related phenomena will show that the most intense states of pain are more commonly connected with lowered than with exalted action. As respects, therefore, numerous changes in particular functions and organs, as well as in the whole body, and its general manifestations, it may be inferred, that the *condition or properties of life*, and consequently of vital action, may be altered very variously, otherwise than in degree; and that, as intermediate grades of action or vital manifestation are innumerable, and admit only of an arbitrary estimation, so are the modifications or alterations of it, in kind or condition, equally diversified,—merely the more prominent features admitting of recognition by our imperfect powers of sense and intellection.

67. 1st. OF THE DYNAMIC STATES OF VITAL MANIFESTATION.—Grades of action must necessarily be infinite, between the lowest consistent with life, and the highest to which excitement can be carried without passing instantly into complete exhaustion. They have been very generally divided into two classes or divisions, namely, those *below*, and those *above*, the medium grade of health; the former having the generic appellations of *debility*, *asthenia*, *adynamia*, and frequently of *exhaustion* when occurring consecutively, applied to them; the latter that of *excitement*, *hypersthenia*, sthenic or increased action, and often of *reaction* when secondary or indirect.

68. A. *Debility*, in its various conditions,—primary, secondary, and complicated; as well as its special manifestations and effects in the different systems, tissues, and organs; was fully discussed in an *article* devoted to the subject; where also its pathological relations—its associations, consequences, and terminations, with its practical bearings, were considered at length. I therefore proceed to give a succinct account of that state of vital action or manifestation which seems to mount above the standard of health; and which presents various modifications, and produces diversified effects, not only according to its cause, and the system or viscus primarily affected, but also as it may appear *primarily* or *consecutively*.

69. *B. Of excitement and reaction.* — No circumstance has tended more to prevent the acquisition of sound principles in pathology than the terms introduced by Brown and his followers, and the meaning attached to them. Indeed, it was a matter of no small difficulty to arrive at a precise idea of what meaning they did convey; for a single word was in itself an hypothesis; and "*excitability*" — accumulated, exhausted, &c. — "*sensibility*," "*susceptibility*," &c. were made to perform more than actually falls to their lot. As, however, these terms are frequently employed in medicine, and cannot now be conveniently discarded, it will be as well to state the idea that should be attached to them. *Sensibility* is the faculty of receiving impressions, and of being conscious of them. *Excitability*, the power of being excited by stimuli or irritants, whether consciousness attend the act or not; consciousness generally following their application to organs of sensation and volition, or of animal life; but not when applied to those of involuntary motion, or of vegetative life, unless the excitation be carried to a great height. *Susceptibility* is the power not only of receiving impressions, but of being affected by them, whether the agents be physical or moral, and whatever may be their mode of operation; consciousness either attending or not attending the act, according to the nature of the agent, and the organ it affects. Here it will be perceived, that *sensibility* implies a certain faculty; *excitability* the power of acting only in one direction; and *susceptibility* of being affected in every way, according to the nature of the cause; and that the meanings are the same, whether these terms be applied to a single organ or to the whole frame; they representing intimately allied manifestations of life in organized parts. The states, moreover, which these terms represent, are variously modified in different persons, according to temperament and constitution; but they are still more remarkably altered by the causes enumerated above, as well as by the successive changes characterising diseases; and hence they become important signs of the condition of vital power, and of the progress of functional and organic change. When existing in a very manifest or extreme degree, they are of themselves important pathological states, and in this respect they deserve notice.

70. *Sensibility, excitability, and susceptibility* are great or especially prominent in delicate, debilitated, nervous, and irritable persons, and are morbidly *increased* by whatever lowers the general amount of vital power, if the functions of the brain be not impeded, or by excited action in any part of the cerebro-spinal axis not attended by pressure. They are much less lively in the robust, lymphatic, and phlegmatic constitutions; and are more or less diminished in congestive diseases, particularly those of the brain; in many cases of vital exhaustion, when the blood becomes contaminated; or when pressure takes place in any part of the cerebro-spinal centres or prolongations. They are likewise temporarily or permanently impaired by the intense, frequent, or continued impression or action of the same impressions; and are restored or heightened by the abstraction of those which are of a lively or intense kind. Although *excitability* is easily and

quickly roused in the delicate and nervous frame, and in states of simple debility, as specified above, yet is it more rapidly exhausted or altogether extinguished; whilst, on the other hand, it is much less readily brought into action in the robust; but when once roused, it is either more energetic or longer sustained than in the debilitated. In these states of disease, which I have denominated secondary and complicated debility, and especially when the cerebro-spinal centres are congested or pressed upon, or when the circulating fluid becomes contaminated, the *excitability* is either much diminished or altogether lost, — chiefly, however, as respects voluntary organs, when the nervous system of animal life is affected; involuntary parts still admitting of excitation, although not so readily as in health. *Susceptibility*, even more remarkably than the two other powers, is *increased* by debility and novelty of impression, and *diminished* by a robust and due manifestation of vital power; by a repetition of the same effect, whether it be stimulant or depriment, unless each succeeding application of the same agent be made before that of its antecedent had altogether ceased; as evinced by both the causes of disease and the operation of stimulating and narcotic remedies. The complete manner in which the susceptibility to be affected by certain causes of disease is destroyed by their full and adequate action, is shown by several of the specific agents.

71. *Excitement* may be of two kinds, according to the manner of its occurrence: it may directly follow the impression of the exciting or irritating cause, in which case it is *primary or direct*; or it may follow as a more or less remote effect of agents which lower the action either of a part or of the frame throughout, when it constitutes what is called *secondary, or reaction*, as in the case of the vascular excitement following the application of severe cold to a part of or the whole external surfaces. It is necessary to distinguish between these two grand conditions or manifestations of excitement; for the secondary, or that following indirectly the impression of lowering or sedative agents, may be variously modified throughout by the nature of the primary impression, and its mode of action. Hence one cause for the distinction here made. There are, besides, numerous other modifications of excitement, whether primary or secondary, referrible to the nature of the agent, and the parts of the body on which they have directly acted. The excitement caused by mental emotions is different in its progress, duration, and consequences, from that following the ingestion of spirituous or other stimuli; and this latter, and indeed both, are different from the increased action following sympathetically the irritation of some organ or viscus. In the *first*, the cerebro-nervous and vascular systems are simply excited, the excitement terminating in slight exhaustion, unless some part has been injured during its continuance. In the *second*, these systems are more than simply excited. A more manifest febrile state continues for sometime subsequently, with concomitant lesion of the digestive functions or viscera, owing to the passage of a portion of the morbid agent into the circulation, and to the more immediate lesion experienced by the parts on which it made its primary impression. In

the *third*, the excitement is more especially expressed in the organic nervous and vascular systems—the chief factors of life—owing to its extension to the whole of these systems, from the part in which it originated, and still exists: hence its duration depends upon the primary lesion, and there is, in addition to the general or sympathetic excitement, disordered function of the part primarily affected, as well as of those more intimately allied to it. Even from what has now been stated will appear the importance, in pathological and therapeutical points of view, of instituting a comprehensive analysis of those states of vital action to which the term excitement has been applied, and which bears a very wide and often indefinite signification.

72. (a) *Primary or direct excitement* is one of the most frequent effects produced by the agents which surround the body. It may proceed from such only as are external to the frame, and to the part which it excites, or from such as are internal or intrinsic. Its phenomena and consequences vary as it arises from causes acting chiefly upon the organic nervous and vascular systems, and their immediately related organs—upon the organs and functions of organic life—and affecting them principally; or from such as act primarily upon the cerebro-spinal system, and organs of animal life, as those of sensation, reflection, volition, contractility, &c. But the modifications which spring from other sources, especially from the properties of the agent, the intensity of its operation, and the number of parts affected by it, are too numerous for a superficial view, even if the knowledge requisite to the attempt were attained. I must therefore content myself with noticing merely a few of the more prominent features of this condition of life.

73. a. *Excitement of the systems and organs of vegetative life* gives rise to various changes and phenomena, according to the nature of the impression, and its intensity.—Gentle excitation of the *digestive canal* increases the tone or insensible contractility not only of it, but also of all the circulating system, of the hollow viscera, and of fibrous or muscular parts. If the stimulus be considerably greater, either the same effect is produced, or the excitement is concentrated in the digestive viscera, and proportionately withdrawn from other parts. If the excitement be still greater, and be of a kind that irritates the villous surface, the secretions of this surface are augmented, and the muscular coats of the canal roused to more or less energetic action, followed by the excretion of their contents.

74. Excitement of the *vascular system* is generally a consequence of stimuli applied to the digestive surface, of irritation of any kind affecting the tissues, of local inflammation, of stimulating substances conveyed into the current of the circulation, of muscular exertion, and of the lively mental emotions, directly increasing the heart's action. The grade, duration, and effects of excitement originating in this system, vary with the cause and the state of the body at the time. Its gentlest, and, at the same time, most permanent, form is caused by the action of a pure, dry, and temperate atmosphere on the blood circulating in the lungs; whilst the most tumultuous and the most injurious, as respects its effects on the heart and blood-vessels, on the blood itself, and on the

functions of vital organs, is that produced by inordinate or continued muscular exertion; and by the absorption of various stimulating and irritating substances into the blood. Violent exercise affects the crasis of the circulating fluid (see BLOOD, § 134.), causes its irruption through the capillary canals of soft and yielding tissues, as the mucous surfaces and the parenchyma of the viscera, induces inflammation of the heart and arteries, and excites similar disease in predisposed organs. Irritating or exciting substances conveyed into the blood, inflame the internal surface of the heart and arteries, alter the condition of this fluid, occasion various acute and chronic diseases of the vessels (see arts. ARTERIES, HEART, and VEINS), and often severely affect the functions of secreting and excreting viscera, inordinately exciting or inflaming those depurative organs which carry them out of the system.

75. The *portal circulation*, and the liver, to which it is distributed, may be especially excited, owing to the quantity of stimulating, morbid, effete, or foreign matters carried into, or generated in, the blood which is returned from the digestive canal and other abdominal viscera. These may not only inflame the portal vessels, but also the substance of the liver; or, when the materials or elements in these vessels are of a less irritating kind, may give rise to morbidly increased secretion of bile, or to various organic changes and adventitious formations in this viscus.

76. The *absorbent system* is seldom or never co-existently excited with the arterial system. Indeed, inordinately increased vascular action is generally attended by a proportionate inactivity of the absorbents—both lymphatic and lacteal. Whilst it is frequently observable that a weak action of the arterial is accompanied with great activity of the absorbent system. It would seem as if diminished organic action, or that state resulting from an insufficient exertion of the organic nervous influence on the arterial and capillary systems—the chief source of nutrition, structural cohesion, and other vital manifestations—leaves, in consequence of the animal molecules being then held together by a weaker attraction than in an opposite state of this influence, a greater proportion of effete materials, by which the absorbent vessels are excited to increased action.

77. Excitement of *involuntary muscular parts* is characterised by spasmodic contraction of either a permanent or alternating clonic kind—or rather of the various intermediate states between sthenic and asthenic, as marking the extremes—and is generally occasioned by irritants of the surface covering the hollow muscles, and more rarely by direct excitation of the nerves supplying them, and by morbid states of the blood, affecting either them or the nerves supplying them. The asthenic or clonic form of spasm is most commonly associated with exhausted vital power or an impure state of the circulating and secreted fluids, the excitability of these structures being more easily acted upon in weak than in robust frames; and hence, when in action, is more rarely conjoined with excitation than with debility of other organs. It would seem that, in most spasmodic disorders, the excitation necessary to this state of action consists in the concentration of an undue proportion of vital power in the nerves supplying the affected muscles,

and in the muscles themselves, and a proportionate abstraction of it from other parts; and that when the excitability of an unaffected structure or viscus is energetically roused, the pre-existing morbid excitement will be derived from, or subside in, the parts in which it was seated.

78. The excitement of *secreting viscera and glands* presents various modifications and grades, according to the cause which induced it, and the elementary system especially affected. If the organic nerves supplying them be chiefly excited, the special functions they perform will be augmented—their secretions will be abundant. In this case the excitement will be more particularly limited to the organs whose excitability has been acted upon; the morbid condition consisting chiefly of a concentration of vital manifestation or action in them and derivation of it from other viscera, thus occasioning one of the forms of *DEBILITY* specified in that article (§ 8, 9.), the increased secretion generally preventing the occurrence of febrile commotion or acute sympathetic disorder, unless it be carried very far. But when the excitement is seated principally in the blood-vessels, and assumes the form of inflammation, the specific function of the secreting surface or organ will be variously altered; the fluid elaborated, in this case, by a secreting surface, being either increased or quite changed from the natural state, or both, according to the degree and form of the excited vascular action with which it is affected; and that secreted by glandular structures being also either much altered, diminished, or entirely suppressed, as in cases of inflammation of the kidneys, salivary glands, &c.; this form of excitement not giving rise to the state of vital concentration observed in respect of the former, but frequently to general or sympathetic febrile commotion. Excitement of secreting viscera, then, assumes two forms, viz. that affecting chiefly the organic nerves—the *excitement of irritation*, which is always attended by augmented secretion, and increased determination of the circulation to the part thus affected, but not necessarily with true inflammation, although this may follow; and that affecting the arteries and capillaries—the *excitement of inflammation*, which is accompanied with altered secretion, always in kind and frequently in quantity,—the quantity being often increased in mucous surfaces, and remarkably diminished from glandular organs.

79. The excitement of the *generative organs* may proceed from the accumulation and irritation of their proper secretions, from mental emotions, and from the excitation of adjoining and related parts, as when the rectum or urinary bladder is stimulated. It is, more especially at its commencement, a purely nervous change; the nerves of organic life which chiefly supply these organs being excited, either through the medium of the brain and sensorium, or in a direct manner, and as above stated. There is no part of the economy which furnishes so evident a proof as this does of the influence of the organic nerves upon the local or general circulation; their excitation being here shown to be followed, unless the susceptibility and excitability be entirely exhausted, by increased determination, vascular action, and vital expansion of the tissues; irritation of this class of nerves evidently

determining also in other parts of the body, particularly in mucous, glandular, and cellular structures, as well as in these organs, increased flux of blood, and occasioning the turgidity or vital expansion of the vascular canals running between the extremities of the arteries and the radicles of the veins. The influence of sexual excitement upon all the other functions, especially at the period of puberty, and subsequently; its sympathetic action on the rest of the nervous system giving rise to various disorders, particularly to the numerous forms of hysteria, anomalous convulsions, epilepsy, catalepsy, &c.; and its more direct operation in producing menorrhagia, fluor albus, inflammatory and organic changes of the ovaria and uterus, besides other disorders in both sexes, more especially referrible to premature, too frequently repeated, or to excessive stimulation, and consequent exhaustion of the excitability of those organs; are circumstances familiar to the practitioner.

80. *Excitement of the organs of animal life* may arise from intrinsic or organic changes, as from the condition of the organic nerves and vessels distributed to them, or of the blood itself; or from causes affecting the instruments of sensation, the general sensibility of the frame, or any of the mental manifestations; or from those which excite to mental or physical exertion. Intrinsic changes may occur in the organic nerves and vessels, influencing the circulation through the brain, without any very obvious cause; and these may be such as will excite not only this part, but all others depending upon it for their functions. It is more than probable, that with the brain, as with other viscera, the excitation may be seated chiefly in the organic nerves distributed to it, and hence assume more of an irritative state, or of an exaltation of function, without any particular lesion, as when it is simply excited by vinous or spirituous liquors: or the excitement may extend to, and principally affect, the blood-vessels; giving rise, according to its degree, to certain states of inflammatory action, and to general febrile commotion, with more or less lesion of function. It is almost unnecessary to observe that either of those forms of excitement, related as now explained, or both of them coëtaneously, may originate in the exercise of those faculties, of which this organ is the instrument under the endowment of life. It often falls to the physician to trace the progress of excitement in relation to the brain, from the lively exercise of function characterising talent and genius, into exaltations, approaching to morbid, of one or more of the mental manifestations; and next, into inflammatory action or mania; and lastly, into a state indicating mental collapse, or structural change. The influence, particularly in susceptible persons, of lively or of violent impressions upon the instruments of sensation, in exciting the nervous centres, with which these instruments are in constant communication, is shown, not only by the effects of loud noises, and of a strong light, but also by violent or painful stimulation of any portion of the sentient system distributed throughout the frame. The sympathetic operation of external injuries, of extensive burns or scalds, of long-sustained or suppressed pain and sufferings, in exciting an irritative state of the cerebro-spinal axis and its membranes, in increasing their vascularity, and even in giving

rise to effusion, with the related phenomena of delirium tremefaciens, mania, general febrile action, or convulsions, is not the less true or important, from its being overlooked, and the exact seat and nature of the consecutive suffering, as well as the more immediate cause of death, being misunderstood.

81. Excitement of the *voluntary muscles and locomotive organs* takes place either from volition, or from causes acting in opposition to it. Exercise promotes the synovial secretions, and the development of the muscular structures and of their energies. But long-continued exertion increases the flux of blood to the related parts of the cerebro-spinal axis, and to the muscles themselves. The morbid excitement, however, of voluntary muscles, which removes them out of the control of the will, has never been satisfactorily explained. Their more asthenic, or clonic anomalous actions, which have been usually denominated convulsions, have been frequently traced to obvious lesion in the brain; but they have likewise been as truly referred to causes seated in the *prima via*, irritating the organic nerves, and, through them, the voluntary nerves. The almost universal state of sthenic spasm, called tetanus, has been ascribed to inflammatory excitement of the arachnoid and other membranes of the spinal chord, from the circumstance of its having been detected in several cases, and by myself in two instances. But this change is as probably a consequence of the muscular excitation, as the cause of it. How, then, does this state of muscular action originate? The answer is not easy. But when we consider the connection — anatomically and physiologically — subsisting between the muscular, the voluntary nervous, and the organic nervous systems, the reasons wherefore irritants acting on either of the latter will affect the former, or those affecting the muscles themselves, or even their tendons, will, in certain circumstances, through the medium of the nervous systems, excite general muscular contractions of a permanent or recurring kind, will not appear so far beyond our comprehension. If we connect the causes of these affections with the earlier phenomena, we shall generally find, even when the exciting agent has acted on an external part, that the organic or sympathetic nerves have been thereby irritated; and that, owing to their influence on the voluntary nerves, a state of spastic action is kept up in the voluntary muscles, or recurs in them at intervals, the brain itself being affected only in those cases which present lesions of its functions. This opinion, published by me in 1821, subsequent experience — pathological and therapeutical — has confirmed me in the belief of, particularly in respect of those cases in which the brain is free from disease. (See arts. *CONVULSIONS*, *TETANUS*.) It follows, therefore, as corollaries from the foregoing, that whatever irritates the voluntary nervous system, or makes an extraordinary demand upon its influence, or any of its functions, will excite it, in that part especially upon which the particular influence or function called into operation depends, or with which the part principally acted on is in communication; and will determine to it an increased flow of blood, which may, in certain circumstances, go on to inflammation or structural change; and that irritation propagated to the voluntary nerves will so ex-

press itself upon the muscles they supply, as to give rise to various states of spastic action, according as it originates in the sympathetic nerves, or in the brain, or is connected with other changes, functional or structural. Thus, mental exertion excites and determines the circulation to the head; muscular exertion, to the spinal chord; and local irritation occasionally gives rise, through the medium of the organic and voluntary nervous systems, to spasmodic action of the muscles of volition, of either a remittent, intermittent, or continued form.

82. (b) *Secondary or indirect excitement, or reaction*, is that state of increased function or functions following the impression of causes of a depressing or sedative kind: as when the powers of life, having been for an indefinite time more or less lowered by cold, by terrestrial emanations, or by the effluvia from the sick, react upon the state of depression, and give rise to various phenomena characterised by excitement, which thus becomes one of the terminations of direct *DEBILITY* (see that article). Great diversity of opinion has existed as to the way in which the economy reacts upon injurious and depressing agents. The *vis medicatrix naturæ*, vital resistance, the conservative powers of life, with other terms, have been substituted as explanations of what admits not of explanation, either by names, however expressive they may be, or by any other means. We can merely express what appears to be a law of nature, and describe certain resulting phenomena. We believe that the organisation is built up and kept together by the aid and intimate alliance of life, and that this principle or endowment may be modified by changes in the structures, the instruments of its functions, — that, in short, so intimate is the union of life with all the organs and tissues, that it is constantly influencing them, according to its varying states, and being itself influenced by them, as they become changed, both in respect of its local alliances and its general condition. And all that we can know respecting *vital resistance and reaction* must resolve itself into the general inferences, viz. 1st, That the innate powers of the vital principle, and the intimacy of its union with its material instruments, are such, that it opposes, by means of these alliances, — by its manifestations throughout the organisation, and by their mutual dependence and reciprocative influence — and by the manner in which it is influenced or modified by changes in its allied organs, — impressions of an injurious nature, the intensity of which is not so great as immediately to dissolve its connection with the structures, or at once to overwhelm its energies; and that, whilst it thereby *resists* the further progress of change, it at the same time restores that which has been induced; these phenomena constituting what has been called *vital resistance*: 2d, That when the morbid impression is energetic, a succession of changes generally follow in some part of the economy, owing to the circumstances now adduced, calculated to remove the primary impression, and its more immediate effects, to recover the last balance of vital action, and to restore the impeded or interrupted functions, — to these changes the terms *reaction* and *secondary excitement* have been applied; which, however, may be variously modified, in form as well as in degree and duration:

3d, That when the impression and its immediate effects are very intense, relatively to the state of the person's constitution, the vital endowment may be thereby rendered incapable of resistance, or of developing any reaction; and, when this is the case, it sinks more or less rapidly, before the cause that effected it; sometimes, however, making certain feeble and abortive efforts at restoration, until, between its depressed state and the consequent changes on the tissues, its further manifestations and material alliance altogether cease.

83. If we endeavour to trace the succession of morbid phenomena characterising the simpler states of reaction, viz. those which take place from cold or from marsh miasmata, some idea of the way in which they are brought about may be formed. The impression made by cold upon the nervous, and, through it, upon the vascular systems, is evidently depressing, and vital action is diminished in the parts to which it is applied. Vascular determination, consequently, takes place to other, more especially to internal, parts; which are thereby excited, and their vessels enabled to react upon the greater quantity of blood sent to them. The consequence of this, in secreting organs and surfaces whose vital energy is not impaired, is an increase of their proper functions, as an augmented flow of urine, or free discharges from the bowels; but, during a state of predisposition to vascular lesion in any of the parts experiencing the increased determination, inflammatory action will be the result; and disorder will be extended thence to the whole frame, through the medium of the organic nervous and vascular systems, with especial affection of the internal organ primarily disordered. In other cases, a less simple process may take place; and the impression of cold not only may impede the exhaling and secreting functions of the surface or organ on which it directly acted, but, through the medium of the organic nervous system, may also interrupt the action of other secreting organs; and thus give rise to increased plethora, attended by the retention of elements in the circulation, which the healthy performance of the functions would have eliminated from it. The necessary consequences of these states will be reaction upon the distending and exciting contents of the vascular system; during the continuance of which, those organs which are most predisposed to disease, particularly to inflammation, will suffer especially. When miasmata act upon the system, it may be inferred, from the more immediate effects, that the nervous system of organic life is thereby especially impressed, and its influence diminished; the vital actions more immediately depending upon it impaired, and the secreting and excreting functions impeded. As those changes are often gradually induced, a considerable period of latent or of slight ailment may exist; until at last they reach their acmé, and the organic nervous energy is unequal to the active continuance of the circulation. When this point is reached, animal heat is imperfectly evolved; and the usual changes on the blood, as well as the proper functions of the viscera, are insufficiently performed. The necessary results are congestions of the large veins and yielding structures, and all the phenomena of the cold stage of intermittent or remittent fever; which rarely

proceeds so far as to overwhelm the power of vital resistance, but more commonly ends in the development of reaction. This is brought about by the greater fulness of the vascular system, and the more exciting properties of the blood, arising out of impeded secretion and excretion, and retention of exciting elements in the circulation, assisted by the influence of the rigors attending the cold stage in accelerating the circulation through the veins.

84. From what has been already advanced, it will appear evident that the nature of the *primary action*, or impression made upon the system by the depressing cause, will not only determine the character of the more immediate phenomena, but will also modify the state of reaction into which these may pass; and even the kind or *type* of action will not terminate with the development of this form of excitement, but will generally continue long afterwards. This is remarkably exemplified by the morbid impression made by malaria, which will apparently act in the manner now stated, until the hot stage of the disease, or that of reaction, is produced by it; and, although this subsides, and is followed by free secretion, still the morbid impression is not thereby removed, or its type changed, but continues, in the organic nervous system, to exert its influence upon all the vital actions, and to reproduce the same series of morbid changes, until either it is exhausted by their recurrence, or some internal organ undergoes structural change, and the disease thereby becomes complicated, or in some respects modified. Such is the case especially when it is left to nature. That the morbid impression is made chiefly on the nervous system, is shown by the periodicity of action, by the circumstance of the successive changes and free evacuations terminating the paroxysm not bringing the disease to a close, and by the most efficacious means of cure being those which most energetically excite that system. That the impression is made upon the organic nervous, and not upon the cerebro-spinal, system, is shown by the more especial affection of those functions and organs which the former actuates, and the general absence of any considerable lesion, even of the functions of the latter.

85. C. *The intensity and duration of excitement, whether primary or secondary*, vary remarkably, according to the cause, the constitution and habit of the patient, the circumstances in which he is placed, the agents or influences which continue still to act, and the states of the individual viscera, and of the circulating and secreted fluids. As respects *intensity of excitement*, it may be inferred that, where susceptibility and excitability are both great, intensity of excitement will also be great, but only relatively to the state of vital power; and that it will so much the sooner, and the more completely, exhaust itself. But, where neither is considerable, action will be moderate, and reaction will more slowly and less perfectly supervene. Where, however, the excitability is great, and the susceptibility not remarkably so, as in many robust states of health, excitement may not be so quickly or so readily induced, but it will be more energetic and of longer duration. Thus we perceive that, in delicate, irritable, or nervous constitutions, excitement is easily produced, and soon arrives at its termination; whilst the reverse ob-

tains in the robust. In the phlegmatic, lymphatic, and cachectic constitution, it is excited less perfectly and with greater difficulty, and often assumes a modified form, particularly as respects its terminations. When excitement arises *directly* from a cause that is constantly present, as when an irritating body is lodged in the intestines, or in any of the tissues, it generally is continued, sometimes remittent, and of long duration; but when it occurs *indirectly*, or from a depressing cause, it may be either imperfect or of short duration, the consequent exhaustion being great. This is evinced by diseases arising from malaria; reaction being less perfect, and vital depression with its effects more remarkable, when the cause continues to operate, owing to the residence of the patient in the locality which generates it. Excitement is, moreover, *modified* by states of the air—humidity lowering it, and a dry, pure air developing it—by mental emotions, by the condition of the circulating fluid as respects purity, and by previous health and habits. How these will influence the occurrence and course either of primary excitement or of reaction, is evident. The state of the vascular system as to fullness has also a great influence upon both: *plethora* favours local excitement and determination; whilst, when very great, it prevents the free development of reaction, and disposes to dangerous internal congestions in circumstances that would have otherwise induced a free and salutary reaction. The condition of the *secretions*, also, has a marked influence in the production and duration of increased vital action. The accumulation of morbid secretions in the *prima via* or in the biliary apparatus may either impede the occurrence, or shorten the duration, of excitement; or may determine it more especially to these parts. The state of the circulating fluid itself, particularly in respect of *purity*, will mainly influence this manifestation of vital power. If it contain stimulating elements in excess, reaction will be rapidly and strongly developed. But if materials of an opposite kind be carried into or developed in it, neither primary nor secondary excitement may at all appear; the conditions of life throughout the structures being thereby depressed and modified, and the living solids ultimately rendered unfit for the performance of their functions.

86. *D. The consequences and terminations of excitement, primary or secondary.*—(a) The consequences of excitement are, 1st, Various morbid productions or plastic formations, capable of organisation in certain situations, particularly when the vascular system has been affected in a sub-acute form; as the formation of coagulable lymph, and albuminous exudations in the form of false membranes, &c. 2d, The exudation of sanguineous, or sero-sanguineous, or mucus-albuminous fluids; as in cases of acute irritation of mucous surfaces. 3d, The production of various changes in the structures (see INFLAMMATION,) and adventitious formations. — (b) The terminations of excitement are varied according to the system or tissue principally affected, the nature of the cause, and the concurrent circumstances. It has been stated as a general axiom, that excitement terminates in *exhaustion*, the degree of which is proportionate to the height to which the former had been carried. But there are numerous excep-

tions to this, especially as respects reaction; which may be very slight, and yet the exhaustion may be extreme. The nature of the chief cause, numerous influences connected with the constitution of the patient, the surrounding media, and the mental affections, will modify the results. — *α.* Excitement, in any of its forms, may gradually subside into a slight and chronic grade, in which it may give rise to certain changes in the nutrition or secretions of the tissues affected; to morbid depositions, and effusions in shut cavities or the parenchyma of organs; or to increased secretions from mucous and glandular parts. — *β.* It may also pass more rapidly into exhaustion, expressed more especially either in one of the nervous systems, or in the capillary and vascular system, or in the absorbent system, according as one or other of these had been principally diseased. (As to the effects of exhaustion on the different functions, organs, and structures, see the article on DEBILITY, § 10—25.)

87. 2d. OF PERVERTED STATES OF VITAL POWER.—Having considered the simpler changes of the conditions of life, as manifested in the functions and characterising disease, those which are more complicated are next to be discussed; and it remains to be shown, *that the conditions and material alliances of life may not only be changed in degree, but also in kind*—the change in kind being, in some cases, unconnected with either excess or defect of action; and, in others, associated with the one or the other; but more frequently with depression, or an irregular distribution of the vital energies, and concentration of them towards particular parts. The conditions of life present *three states or stages of change in kind*, without any reference to degrees of action:—1st, Modifications in function, or vital manifestation, the proper offices of the part being vitiated, but the structure not being sensibly changed. 2d, Modifications of function, in connection with change in the constitution of the part; the natural tissues having been metamorphosed by an alteration of their nutrition or secretions, and by adventitious formations. 3d, Modifications in function and organisation in several parts, or in the whole of the frame; generally attended by a vitiation of the circulating fluids.

88. *A. The conditions of life may be modified in kind, without any visible alteration of structure.* This state is often the commencement of the others now particularised; but it also frequently proceeds no further, or one form of it may merely pass into another, or terminate in health. Its slighter grades are more especially seated in the moving powers; the organic and cerebro-spinal nervous influences, and the vital properties of contractile parts, being chiefly affected; presenting, accordingly, a great variety of morbid phenomena, not strictly referrible to either excitement or debility, but consisting chiefly of alterations of the sensibility of these systems; of pain and anxiety in their numerous forms; of cerebral affections, and disordered mental manifestations; of lesions of the contractile and locomotive organs; of modifications of the sensible and insensible contractility of parts, of their susceptibility and excitability; and of many changes in the state of the secretions and excretions, independently of those that relate to quantity. In its more exquisite and widely diffused forms, this state proceeds from

several of those causes which I have termed specific; as malaria, animal and infectious effluvia, endemic and epidemic influences, the rabid virus, various poisons received into the stomach, lungs, or circulation, &c. These, as well as the causes which produce the foregoing morbid conditions, evidently modify the nature of the vital functions, without any change of structure or of the circulating fluids to account for the effect; and, when organic lesions do occur, they are consecutive, and sometimes accidental, alterations, which, in their turn, occasion a further change in the life of the part, or of the system generally.

89. *B. The manifestations, as well as the structural alliances, of life may be vitiated* in a part of the body, from causes which determine to it a greater share of vital power; or which act frequently or permanently upon its excitability, and occasion an irregular distribution of life throughout the economy; or which abstract from it any portion of its nervous or vital influence; or modify the condition of this influence by their primary impression or continued action, particularly in constitutions predisposed to some hereditary vice, or imperfectly organised, or debilitated. A similar result may also follow unwholesome or innutritious food; the too frequent or excessive discharge of recrementitious fluids, as the seminal and prostatic; the absorption of an imperfectly prepared chyle, or of morbid secretions; or products generated in the body; repeated excitation of an organ, or continued irritation of a particular part, ending in change of structure, &c. When the vital actions of a part are depressed, or modified in any manner, or from whatever cause, and the change continues, owing to the vital endowment being insufficient to overcome it by local or general reaction, and thereby to restore the healthy condition—the powers of vital resistance and restoration being incapable of removing the morbid impression,—a succession of alterations may supervene: the depressed or otherwise modified life of the part will impede or diminish its circulation, or occasion its congestion; thereby facilitating changes in its fluids, or giving rise to alterations of its secreting and nutritive processes; and, ultimately, to various organic lesions of a chronic or malignant kind. Also, when the organic nerves and vessels of a part experience a continued or often repeated excitation of too slight a grade to extend far, or to affect related and sympathising organs, but sufficient to modify either its secreting or its nutritive actions, or both, its elementary tissues at last become more and more altered, adventitious formations are developed, and the continued change in the conditions of life in the part at last gives rise to a complete metamorphosis of structure. The life of the diseased part, having thus formed to itself new alliances and instruments of altered manifestations, is thereby, in its turn, further acted upon, until the vital endowment is modified throughout the body; the local alteration of structure experiencing, from this circumstance, a remarkable increase: and hence the properties of life, and of its structural alliances, act and react upon each other, until they become very sensibly vitiated, first in the part primarily diseased, and ultimately in the whole frame. Such appear to be the origin and progress of various changes of structures of a local, specific, and adventitious kind—tu-

bercular, scrofulous, scirrhus, fungous, carcinomatous, &c.

90. *C. The functions of life and the organisation are often vitiated, independently of grades of action, either in several parts, or in the whole frame.*—Alterations of this nature are frequently the most advanced states of the foregoing; commencing, as I have now stated, in modified vital manifestation of a part, or of the whole body; and irregular determinations of it, which superinduce alterations of secretion and nutrition, give rise to changes of the elementary tissues, and the formation of others which are adventitious, and terminate in the state now under consideration, with sensible alterations in the circulating and secreted fluids. But this general morbid condition may also occur more rapidly from causes producing a very powerful and quickly diffused impression on the organic nervous system, and affecting the circulating fluids; as several of the poisons, especially the animal poisons, infectious maladies of a pestilential or malignant kind, epidemic diseases, exanthematous fevers, &c. In all these, the grades of vital depression, or of excitement,—although most important circumstances, and each of them forming grand pathological conditions, when diverging considerably towards either extreme,—are much less distinctive features of the nature of the malady—are not so pathognomic—as differences of kind, which form the only true specific conditions by which we are enabled to distinguish one species from another; as typhus fever from plague, yellow fever from small-pox, scarlet fever from measles, &c. In these, as well as in several other maladies, grades of action merely, or the depression or the excitement of particular functions, or the irregular distribution of vital power throughout the frame, are far less attributes of their nature, than are perversions of their properties. The conditions of life in these are altered more especially in kind than in degree; this alteration in kind constituting the true morbid state. Hence one principal reason wherefore a lowering treatment is much less efficacious in changing the morbid action, than remedies which elevate the vital manifestations, and enable them to oppose progressive deteriorations in their conditions, and in the constitution of their allied structures. The delirium, and the morbid and apparently high vascular action, in many of such diseases, are often no reason wherefore remedies which excite the vital energies, and change their morbid actions, should not be employed. Every practitioner who has ventured beyond mere routine, or the track pointed out by the numerous authors who have written to obtain that experience of which their writings should have been the results, must have observed the beneficial operation of ammonia, camphor, cinchona, quinine, &c. in many cases of the above maladies; and even in states of action where it became a question whether or not an opposite practice should be employed.

91. *D. Of vitiation of the conditions of life, and of their allied fluids and structures, conjoined with depression or excitement.*—(a) The association of depression with vitiation of the conditions of life, and with change of the fluids and solids, obtains in the last stages of the maladies already instanced, particularly in those called malignant; whether originating locally or constitutionally and ad-

vancing slowly to the condition now being considered, as carcinomatous and their allied diseases; or taking place in a more rapid and violent form, as malignant or adynamic fevers, the effects of animal poisons, &c. It would seem that all deteriorations of the conditions of life are either consequences of, or otherwise related to, depression of them. If we trace the progress of those maladies in which the change in kind is the most conspicuous, we shall find that vital depression is a characteristic of the impression of their exciting causes, even although these causes may also irritate the vascular system, or impart irritating properties to the circulating fluids; for extreme depression of the manifestations of life—of its conservative and restorative properties especially—is frequently conjoined with an apparently high and, as respects rapidity of action, extreme vascular excitement. When great depression is the attendant upon vital and structural deteriorations, the sensible properties of the circulating fluid and of the tissues—the crisis of the one, and the vital cohesion of the other—experience rapidly progressive changes, until the bond of union between life and structure is dissolved; alterations of a very conspicuous kind taking place in various parts of the body some time before death. (See article *DEBILITY*, § 11. 26.)

92. (b) The excitement which is sometimes associated with an alteration of the conditions and material alliances of life is essentially morbid, and is different from that which attends an otherwise unchanged or non-deteriorated state of the vital powers. This morbid excitement is generally expressed in particular systems and organs; the vital actions of the rest of the frame being proportionately lowered: but, whether it affect chiefly the nervous or the vascular systems, or take place primarily or consecutively, it soon terminates in profound exhaustion, and in a more or less complete vitiation of the conditions and alliances of life. This is illustrated by the advanced states of adynamic and epidemic fevers, by plague, &c. in an extreme degree; and by the worst forms of erysipelas and eruptive fevers in a less conspicuous manner. The excitement thus associated with other vital and material alterations may proceed directly from its efficient cause, which may excite or irritate, whilst it otherwise affects, the organic nervous and vascular systems; or it may take place indirectly, or consecutively on depression, and be more or less a state of reaction, developed by changes in the circulating fluids, arising either from the absorption of irritating materials, or the interrupted elimination of hurtful elements. But in either case a progressive deterioration is observed; the morbid conditions of life affect the secreting and excreting functions, and consecutively vitiate the circulating fluids, and even the living solids; and the irritating or vitiated state of the former excites the vascular system; and thus alterations of the one reciprocally increase those of the others, either until the alliance of life with the structures can no longer be preserved, or until, in consequence of the exhaustion of the vascular action, which had been excited by the changes in the circulating fluid, and of the effects of this fluid on the secreting and excreting organs, the balance of vital excitement is inclined in their favour, a new action takes place, their functions are resumed,

morbid matters are thereby eliminated from the system, and health is ultimately restored; the change being either ushered in by critical phenomena, or promoted by remedies, the operations of which are merely an artificial or substituted crisis. (See art. *CRISIS*.)

93. IV. DISEASE OF THE FLUIDS AND SOLIDS, ORIGINATING IN ALTERED CONDITIONS OF LIFE, AND GENERALLY IN THOSE ALREADY DISCUSSED.—Morbid exhalation, secretion, and nutrition may be viewed as stages of the same organic action; exhalation passing into secretion, and secretion into nutrition. Thus we perceive the natural exhalations, during disease, assume the characters of a secreted or elaborated fluid, and certain morbid secretions become more or less organised. I shall therefore notice—1st, The simpler changes of exhalation and secretion; 2d, Simple modifications of nutrition; 3d, Preternatural exhalation and secretion, comprising the transformations and misplacements of these fluids; 4th, Preternatural or metamorphosed nutrition; 5th, Adventitious formations, or productions, foreign to the economy—consisting of secretions—(a) insusceptible, and (b) susceptible, of organisation; and, 6th, Of destruction of parts.

94. i. THE SIMPLER ALTERATIONS OF EXHALATION AND SECRETION.—I have considered in distinct articles, on account of their great importance, morbid states of the BLOOD, and CONGESTIONS of this fluid. I shall here briefly notice changes in the exhalations and secretions.—A. The exhalations into shut cavities, or in the areolæ of the cellular tissue, may be increased from the following changes:—1st, From deficient tone, referrible either to the exhaling vessels and pores, or to imperfect vital cohesion of the tissues, or to both: 2d, From deficient action of the absorbents, depending on diminished vital power, or on obstructions in their course: 3d, From increased determination of blood in the vessels distributed to these parts: 4th, From inflammatory action terminating in, or being followed by, effusion: 5th, From obstructed and retarded circulation of the venous blood returning from these places, particularly in the liver, in the heart, lungs, &c.; the consequent nervous and capillary distension favouring augmented exhalation: 6th, From increased vascular or rather serous plethora, owing to the obstruction of some emunctory,—as anasarca, from the sudden arrest of the cutaneous and pulmonary exhalations; and this, as well as other forms of dropsy, from inflammatory or structural disease of the kidneys: 7th, From the sudden arrest of an accustomed discharge from the pulmonary or digestive mucous surfaces, the morbid exhalation being determined to the contiguous serous surfaces; and, 8th, From two or more of the foregoing states conjoined. (See art. *DROPSY*.)

95. B. Alterations of the secretions depend—1st, upon the state of the organic nervous influence; 2dly, upon vascular action; and, 3dly, upon the condition of the blood itself—upon the chief factors of organic action and life; and they are thus indications of the manifestations of this principle. They may be—*a.* more or less diminished,—as from causes which lower the organic nervous influence, or retard the circulation; *β.* or more or less increased, chiefly from agents which alter the distribution or determination of organic influence, and consequently of

the circulation and vascular action, either by exciting the secreting structures themselves, and their intimately allied parts, or by depressing, impeding, or obstructing the functions of distant, and especially of other secreting organs, and from a superabundance in the blood of the elements of which the increased secretion is formed; *γ.* or more or less altered from the healthy state, independently of diminution or increase of quantity,—as when the conditions of life are modified otherwise than in grade, and when the circulating fluid is vitiated, either generally, or merely in respect of the greater abundance of some one element; *δ.* or both diminished in quantity and altered in quality, owing chiefly to lowered as well as modified vital power, to changes in the blood, and to morbid vascular action or inflammation of the secreting organ; *ε.* or, lastly, they may be both increased and vitiated, either from a morbid distribution, and alteration of vital influence and action, owing to the impression of causes on remote but related organs, or from irritation or excitement of the nervous influence of the secreting structure itself, by agents acting either exteriorly to the vessels, or interiorly, through the medium of the blood. Thus, various substances received into the digestive canal will increase and alter the secretions of its mucous surface; and the accumulation of the elements of bile in the blood, with other effete matters, will excite the liver, and give rise to an abundant as well as acrid or otherwise morbid bile. Such seem to be the chief *pathological states* on which morbid secretions depend.

96. From what has been stated, it will be evident that, although alterations of the secretions are often dependent upon vascular action in its various states, from augmented determination to inflammation and its results, and upon conditions of the blood, organic nervous influence has also a marked effect in generating them, and even in originating the vascular disturbances to which they have been most generally assigned by authors. And although the secretions are constantly and conspicuously disordered in fevers and inflammations, yet they are also often remarkably altered in other diseases; and, in some, even constitute the most prominent change from the healthy state. In fevers and inflammations, the secretions are more acutely affected, but are more disposed to a spontaneous and salutary change, than in chronic disorders. In those maladies in which their alterations form the chief pathological state, their natural conditions are very slowly restored; and, even when the restoration is effected, their derangement is apt to recur from the slightest causes. This is exemplified in diarrhoea, diabetes, and several other chronic diseases.

97. (a) The *recrementitious*, as the salivary, pancreatic, and gastric secretions; or the partly recrementitious and excrementitious, as the biliary and intestinal secretions; are more or less altered in most diseases, and from a diversity of causes. Agents, whose operations may be sufficient to excite the organic nerves, but not to produce inflammatory action; or whose properties are calculated to affect the influence of these nerves, rather than the action of the capillary vessels; may give rise to an increase or other change of the secretions in preference to inflammation.

Thus, aromatics and stimulants will excite the flow of the gastric juices, but will not occasion inflammation unless taken in very large quantities; various substances will increase the intestinal secretions, but not inflame the villous surface; and mercury, in small or moderate doses, will remarkably augment the salivary fluid, but, in excessive doses, will inflame the glands and diminish the secretion. The effects of stimulants upon parts related or contiguous to those to which they are applied, also show the influence of the nerves on the secretions,—as the action of certain odours and savours on the salivary and gastric secretions, and of various purgatives on the biliary fluid. Even mental emotions affect the secretions through the medium of the related organic nerves supplying secreting structures; and this effect is not limited to the recrementitious fluids, but is also extended to those which are entirely excrementitious, as the urine, the sweat, &c. The influence of mental anxiety in producing both diuresis and enuresis, and of hysteria in occasioning the former, is well known. Deficiency of the recrementitious fluids causes dyspeptic, hypochondriacal, and other diseases of the digestive organs; impedes or otherwise modifies sanguification and nutrition; and favours the production of nervous affections. Morbid states of the biliary secretion are amongst the most important in pathology. Impure air, want of exercise, increased temperature, rich or full living, stimulating liquors, &c. change both the quantity and the quality of this fluid; rendering it either more copious, or of a deeper colour, and of a more acrid quality, than in the healthy state. Its more languid circulation through the ducts, or its undue retention in the gall-bladder, owing either to indolent habits, or to exhausted powers of digestion and assimilation, favours the absorption of its more aqueous parts, increases its consistence, disposes certain of its constituents to crystallize or to congregate into calculi, and gives rise to various chronic disorders of the liver and of its related viscera. Obstructions to its passage or discharge, and various other circumstances, favouring its absorption on the one hand; and torpor of the liver, or suspended action of this viscus preventing its secretion on the other, and causing the accumulation of its constituents in the circulation; are important pathological conditions, and constitute no mean part of several acute and chronic maladies, besides those in which the biliary fluid is more especially disordered. (See *CONCRETIONS—Biliary; JAUNDICE, and LIVER.*)

98. (b) The *secretions* which are elaborated by the intestinal mucous surface are often remarkably changed, both in quantity and kind. Diarrhoea, dysentery, and cholera present extreme increase and alteration, not merely of these, but frequently also of those poured into the digestive canal from the collatitious viscera, originating in the pathological states adduced above (§ 95.); and illustrate the action of morbid secretions upon the surfaces with which they may come in contact. When these secretions are produced in large quantity and altered quality, whether from a modified and excited condition of the vital actions, or from both, or from these conjoined with an impure state of the blood, the effects following their passage over the villous surface are often very severe, and even disorganising. Thus,

an altered state of the salivary fluid inflames and ulcerates the mouth, tongue, and gums; and the irruption of a large quantity of acrid bile irritates the duodenum, excites severe vomitings and purgings, sometimes with spasms of the voluntary muscles owing to the irritation of the visceral nerves acting upon the related spinal nerves, and, in more chronic cases when morbid secretion is prolonged, even excoriates the intestinal surface. A similar effect very probably is occasioned by the intestinal fluids themselves, as shown in *dysentery*. But the injurious operation of the fluids poured into the digestive canal does not arise only from their morbid increase. Diminished secretion, if it be attended by the accumulation and retention of the fluid in the secreting viscera, and of the mucus on the villous surface, may prove equally detrimental, but more insidiously and slowly. Morbid increase of these fluids is usually an acute, and diminution of them a chronic, disorder. The latter is generally accompanied with alterations in their properties, especially if they are long retained. When the retention and alteration take place in respect of the mucus contained in either the solitary or aggregated follicles, dangerous or even fatal ulcerations, or other organic changes, may be the results. Their accumulations on the intestinal surface favour the production of worms, indigestion, constipation, colic, &c. The manner in which one secretion may be greatly increased, whilst the rest are suppressed, is remarkably illustrated in pestilential cholera. In this malady it would seem as if the efficient cause suppressed the vital manifestations of all other organs, determined the remaining vital influence and circulation to the digestive canal, and occasioned an uncommon increase and alteration of its exhalations; the serous portion of the blood being in great part evacuated in this situation, leaving a portion of its albumen lining the intestinal surface in the form of a muco-aluminous and tenacious exudation.

99. (c) The *excrementitious* secretions are also altered by the pathological states already specified (§ 95.). The changes of these, as well as of the foregoing fluids, are important agents in continuing or aggravating disease, and furnish some of the chief indications of its nature, progress, and terminations.—As the office of the organs which secrete this class of fluids is to expel those elements which are effete, and would be injurious to the frame if retained in the blood, it must necessarily follow, that any interruption to this function, and especially a complete obstruction or suppression of it, must be highly injurious. The dropsical effusions in various cavities following interruption to the action of the kidneys, and the more acute effects of entire suppression of their functions, fully illustrate this. As a large quantity of ingested matters is carried into the blood, either directly from the stomach, or along with the chyle, and discharged from it by the emunctories, it is evident, not only that the kind of ingesta will affect very remarkably the properties of the excretions, but that obstruction or even interruption of any one of them will be followed by serious effects, unless some other organ perform an additional office, vicarious of that which is suppressed; and even in this case, disease will generally ultimately arise.

100. α. The *menstrual evacuation*, and even the *lochia*, may be considered as excrementitious secretions, interruption or morbid increase of them being followed by similar consequences to those arising out of suppressed perspiration. That the menstrual discharge has essentially a depuratory effect upon the blood, is shown by the alterations which it undergoes from morbid states of the circulation; thus, I have seen copious catamenia, the fluid being remarkably offensive, irritating, and otherwise sensibly altered from the natural state, form the crisis of erysipelas, and fevers; and a copious, offensive, and excoriating lochia evidently the means of preventing the accession of those adynamic and malignant diseases which often affect puerperal females, owing to the respiration of the impure air generated by several females confined in one lying-in apartment. The catamenia, moreover, is diminished, increased, vitiated, or changed into a serous or mucous secretion — into fluor albus — by the same agents and pathological conditions (§ 95.) as affect the other excretions.

101. β. Morbid states of the *perspiration*, independently of its increase or decrease, are not infrequent attendants on both acute and chronic maladies. They may even accompany apparently sound health, particularly when the bowels are habitually constipated; this evacuation being sometimes so offensive, or both copious and offensive, as to render the person thus affected a nuisance to those near him. In this case, the skin evidently performs an office vicarious of the diminution of the intestinal secretions. The perspiration is generally promoted by excited vital action of the cutaneous surface; in which case it is fluid and warm. But it may also be much augmented by a very opposite condition of vital power, as by syncope, the skin being cold and clammy; or by the extreme vascular depression occasioned by excessive fear. In these cases, the lost tone of the integuments, and of the excreting pores, allows the escape of a portion of the fluids contained in the superficial vessels. This change also occurs in many instances of extreme vital depression, and shortly before death in many diseases. It is a pathognomonic symptom of pestilential cholera, in which it is most remarkable; the cold, wet, livid, and shrunk surface, being the result not only of the suppressed vital powers, but also of the circulation of venous blood.

102. γ. The *urinary*, of all the excretions, is the least frequently suppressed; the consequences of such a state being, if not soon removed, the most dangerous, or rapidly fatal. Whilst this excretion is very much influenced by the quantity and nature of the ingesta, and by the temperature and humidity of the air, it is also variously altered by disorders of digestion, sanguification, and circulation; but more particularly by the conditions of the blood itself, by changes in the nervous influence, and by injuries to the spinal cord. On the other hand, interruptions of the urinary discharge affect the quantity and quality of the circulating fluid, disorder the nervous systems, ultimately increase the exhalations and the other secretions, and change the constitution of the soft solids. The other pathological relations of diseased urine are fully explained in the articles *DIABETES* and *URINE*.

103. ii. SIMPLE MODIFICATIONS OF NUTRITION may affect the whole frame, or a particular tissue or part, or merely a circumscribed portion of a single structure. The entire absence of parts, or deviations in the distribution and arrangement of the elementary molecules and tissues, producing the various kinds of *monstrosities*, will be left out of consideration, they being of less practical interest. Those changes which are most important may be resolved into the following: — 1st, Alterations of bulk; 2d, Modifications of density and cohesion, either of which may lead to various complicated lesions. *Hypertrophy*, or augmented nutrition, perhaps never affects all the tissues simultaneously; and although generally a disease, sometimes of dangerous import, yet, when seated in the muscles of voluntary motion, it cannot be considered in any respect as a morbid change. It may be conjoined with *softening* or with *induration*, with increase or diminution of density and vital cohesion. *Atrophy*, or impeded nutrition, may also be associated with similar lesions. Any one of these four alterations, or either hypertrophy or atrophy conjoined with softening or with induration, may commence in one, or at most two, of the elementary tissues, and extend to those most intimately connected with it. In these modifications of nutrition — producing variations in size and density — it is understood that the tissues still retain their distinctive characters. (See ATROPHY, HYPERTROPHY, INDURATION, SOFTENING, and ULCERATION.)

104. iii. OF PRETERNATURAL EXHALATION AND SECRETION. — A. Transformation of the Natural Exhalations and Secretions. — (a) The exhalations of *serous surfaces*, or shut cavities, may be altered according to the state of organic action in the surface producing them. — α . Exhausted vital action and cohesion will be followed, according to its grade, by the effusion of an aqueous, serous, or sero-sanguineous fluid, the relaxed state of the capillary pores and serous tissue allowing, instead of a simple halitus, the escape of the watery parts of the blood, sometimes with a portion of its albuminous constituents, and even of its red particles; and, under certain circumstances, as of obstructed return of blood from, and congestion of, adjoining parts, and dyscrasia of this fluid, — states not infrequently consequent upon exhausted vital power, — the effusion of a portion of blood itself. — β . When depression of vital power and diminished cohesion of the serous surface is associated with increased action of the vascular system and contamination of the circulating fluid, as in several adynamic fevers, the exhalations are not merely increased, they are also turbid and of various shades of colour, from a dirty grey to a dark brown. — γ . When organic action is morbidly increased in serous surfaces, the exhalation is changed into a sero-albuminous matter, which is at first fluid or semi-fluid, but which afterwards assumes modified states, according to the grade of constitutional power and morbid action, and the particular characters such action presents, — whether that of pure phlogosis or sthenic inflammation, or that of diffusive phlogosis or asthenic inflammation, or of the intermediate forms. If the organic action consist chiefly of the former, in an acute or sub-acute state, the effused matter will be more or less albuminous, concrete, and spread over the inflamed surface in variable quantity,

and will contain a turbid serum in the open spaces. If the inflammation be of a diffused kind, the effusion will be more copious, and fluid, varying from a turbid serum to a dirty, deep-coloured, or flocculent, or sero-purulent, or albumino-puriform matter, without any adhesion of the opposite inflamed surface; and thus the morbid exhalation will be altered in all acute cases, as the inflammation, owing to the degree of vital power, has partaken more or less of the sthenic or asthenic state. If the inflammation be of a chronic kind, the effusion will be more dense and coherent, or even become organised; and, when the albuminous exudation consequent upon acute phlogosis has given rise to adhesions, or passed into a chronic state, they become transformed into cellular bands, with or without a turbid or flocculent serum contained in the unadherent spaces.

105. (b) The exhalations and secretions from *mucous surfaces* are also remarkably changed by the states of vital power, of structural cohesion, and of organic action. — α . When vital energy and cohesion are much diminished (§ 91. 95.), the watery exhalation from these surfaces may be increased, and transformed to a serous, or sero-sanguineous, or bloody discharge; particularly in some malignant and cachectic maladies. If the tone of the extreme vessels be lost, vital action being at the same time depressed, the sanguineous exhalation will be what has usually been termed *passive*, and the crisis of the blood — both that effused, and that circulating in the body — will be either lost or deficient. But if vascular action be increased, the capillary vessels and pores being either expanded or relaxed, or the cohesion of the mucous tissue greatly impaired, the hæmorrhage will assume more of the *active* characters, and the coagulation of the effused blood be more or less perfect. Between these grades of action, however, — the terms *active* and *passive* expressing the opposite extremes, — there will be every intermediate degree; much of the appearances of the exhaled blood being those of its condition — or depending upon its condition previously to its discharge. (See HÆMORRHAGE.)

106. β . Not only may the purely *exhaled fluid* be thus altered, but both it and the more strictly *secreted fluid*, as the mucous, may be disordered either consecutively or coetaneously. This change is usually a consequence either of local determination and irritation, or of inflammation of a slight or specific kind. In such cases these fluids are thin, serous, ropy, glairy, albuminous, mucous, or puriform, frequently in succession, and secreted in large quantity. Thus, when the respiratory mucous surface is irritated by catarrh, its natural secretion, which is scarcely evident in health, becomes successively transformed into these states; and a similar effect follows irritation of the digestive surface. In acute and sub-acute inflammations of this tissue, its exhalations and secretions are altered, either to a mucopuriform matter, streaked with blood, or to a puro-albuminous fluid, or to an albuminous exudation, which concretes in the form of a false membrane in the surface that produced it. These modifications of the morbid productions are referrible to the degree in which either the exhaling or proper vessels of the surface, or the mucous follicles, are

respectively affected, and to the grade of vascular action.

107. (c) The exhalation usually poured into the *areola of the cellular tissue* may be similarly transformed, and the various alterations may respectively depend upon the states of vital power, of vascular action, of structural cohesion, and of the crisis of the blood, particularised above,—a watery, serous, sero-sanguineous, a purely sanguineous, sero-albuminous, or a puriform fluid being poured out in this tissue, either where it connects more external or superficial parts, or forms the parenchyma of the viscera. In such cases, the transformed exhalation is either diffused or circumscribed, according to the state of action, and the consequent nature of the transformation. Thus, great depression or exhaustion of vital power and cohesion is connected with the diffused infiltration of a serous, or sero-sanguineous, or even a bloody fluid, and, if this state be attended by increased vascular action, with the infiltration of a puriform, or sero-puriform, or even an ichorous matter. But when vascular action is increased, and partakes of the phlogistic or sthenic characters, a puriform matter is formed, and is circumscribed (see arts. ABSCESS and CELLULAR TISSUE). The diffused or circumscribed deposition of a puriform fluid, which sometimes occurs in the cellular tissue, and the cavities of joints, consecutively upon inflammation or suppuration in the veins or in remote parts, during states of vital depression, have been explained in the articles now referred to, particularly the former (§ 29.).

108. *B. Of the Exhalations and Secretions which are adventitious to the situation,—or misplaced Secretions.*—(a) *Fatty matter* has, in rare instances, been found in unnatural localities; as in the blood, in the urinary bladder, and in the intestinal canal, either in its cavity, or forming small tumours in the connecting cellular tissue of the parietes.—(b) A *yellow matter* has frequently been observed colouring the various tissues and the secreted and excreted fluids, occasioning jaundice; and, although generally referred to the colouring matter of bile, has only recently been proved by chemical analysis to consist of that substance. This change is often connected with biliary obstruction or disorder, but in many cases no such connection exists, as far as can be ascertained during life or after death. In such instances we must infer—and the inference is borne out by the very sudden manner in which the change takes place, and by other circumstances—that other organs and tissues than the liver may acquire the power, under certain circumstances, of forming or separating the colouring, and probably other principles of the bile from the blood. I have been often convinced by practical observation, that more than one of the principles of the bile have passed off with the perspiration, in persons whose biliary organs were torpid, and in those affected by chronic cutaneous disorders connected with hepatic obstruction, even although the colour of the skin remained unchanged. (c) *Cholesterine*, another principle of the bile, has also been found in various secretions and structures; and therefore it must likewise be inferred, that it also may be sometimes separated from the blood by the tissues. (d) The *urine*, and certain of its pecu-

liar principles, have been secreted in unnatural situations. Facts of this description were often related by the older writers; and the more precise researches of modern times have determined the circumstance, as respects the presence of some of its principles in the supplementary secretions, which were formerly considered a metastasis of the urine: thus, uric acid has been detected in the sweat, and in gouty concretions, &c.

109. In respect of the *causes* of the misplacement of the secretions, it may be concluded that, as the elements of all the secretions exist in the blood, they may be occasionally separated from it by other organs or tissues, than by those which are the usual instruments of such separation and combination into the state of perfect secretions, particularly when the organs thus appropriated are diseased to the extent of impeding their functions. In such instances, however, the accumulation of the elements in the blood does not excite other organs to the elaboration of a secretion similar to the natural one; but merely to the elimination of the particular element or elements that may be in excess, in a separate form or different state of union to that which it naturally presents. Thus, when the urine is suppressed, it is only urea, or uric acid, that is found in the supplemental evacuations; or when the bile is obstructed, it is not elaborated bile, but certain of its principles, especially its colouring matter, that tinges the secretions, and, in aggravated cases, the structures; or when the milk is suppressed, it is not milk that is found in other situations than in the breasts, but caseum, &c. In the cases of obstruction of the urine and bile, the respective organs being unable, either from paralysed nervous influence, or inflammation, or structural change, to perform their depuratory functions, the aqueous and effete elements which consequently accumulate in the blood are either separated by the tissues, or pass off through other channels, but in different states of combination, the appropriated instruments of the function being incapable of elaborating them into the natural secretions. In cases, however, where this unnatural separation of elements occurs without evident interruption of the functions of the organ destined to excrete them, we must necessarily infer an exuberant formation of the elements in question in the blood, and a consequent elimination of them through additional channels. It is not uncommon to observe jaundice associated with a natural or copious secretion of bile, and even with a greatly augmented evacuation of this fluid; we must, therefore, conclude that the colouring elements are formed so abundantly in the circulation, as not to be sufficiently excreted from it even by the increased action of the liver; and, consequently, that they are accumulated to the extent of being separated by the different structures. It may further be conceded, that the elements may be combined into more or less perfect secretions in the organs destined to excrete them; but that, before they are discharged from them, or excreted from the system, they may be occasionally taken into the blood, and separated from it by other structures, and through different ways.

110. iv. METAMORPHOSED OR TRANSFORMED NUTRITION—or that change which consists of

the transition of one tissue into another—is of a less simple kind than that noticed above (§ 103.)—*a*. M. ANDRAL has shown that the same principle of development which obtains in the *fœtus*, extends also to the morbid transformations of the natural tissues; and that as the cellular is the matrix of the other textures, so it may, from disease, be changed into most of the other simple structures. There are, however, certain facts connected with such alterations deserving notice:—1st. Cellular tissue, in being changed into some other, no further affects the proper texture of the organ, which it either invests or of which it forms the *parenchyma*, than in causing its atrophy in some cases.—2d. Cellular tissue cannot be transformed into the nervous, unless in situations where the latter previously existed: thus, nerves that are divided, and of which a portion is removed, are first connected by cellular tissue, and subsequently by the extension of medullary substance from each divided extremity.—3d. Other tissues, whose continuity has been dissolved, have the breach repaired, in the first instance, by means of the production of coagulable lymph, which passes into the state of cellular tissue; this latter being frequently afterwards transformed into a texture analogous to that which was divided; thus, divided muscles are reunited by a fibrous tissue; and so on, as respects bone, cartilage, &c.—4th. The nature of the transformation of cellular tissue is sometimes regulated by the functions of the part: thus, when subjected to friction, it becomes a serous membrane; when exposed to external agents, it becomes tegumentary, &c.—5th. Other tissues, besides the cellular, may be transformed, but the alterations are similar to the natural changes they experience in the processes of fetal growth: cartilage being converted into bone, the mucous tissue into the cutaneous; or a reverse course may be followed, in respect both of these textures and of the muscular tissue, which can be changed only to the fibrous. Hence the metamorphoses of cartilaginous, osseous, fibrous, muscular, cutaneous, and mucous structures are much more restricted than those of the cellular.—6th. All tissues, when remarkably atrophied, present evidence of degeneration towards their primitive or rudimentary state, viz. to cellular tissue.

111. *β*. The causes of the mutation of one tissue into another are not easily ascertained. Some have ascribed it to inflammation or irritation.—By ascribing it to modified nutrition, we merely express an obvious fact, the cause of which is thereby not more nearly approached. It certainly is not occasioned by inflammation, although several of the transformations may be accidental or contingent consequences of that condition, especially in its slighter grades; for, however we may irritate, or determine blood to a part, we shall not transform it, unless under circumstances identical with those that are concerned in the production of those alterations. The series of analogous changes that take place in the *fœtus* is not connected either with irritation, or with inflammation, or with opposite states of organic action. We can, therefore, impute the metamorphosis only to modifications in the conditions and manifestations of life influencing the nutrition of the organ or part; for we know that increase of function, or of vital manifestation, will often occasion a transformation of nutrition in a

certain direction—will change cellular tissue to a higher grade of structure, as in the development of the organs of the *fœtus*; whilst the diminution or privation of function—that is, of its due vital endowment—will transform the organ which performed it into a more rudimentary tissue: thus, a part becomes atrophied from being unexercised, an unemployed muscle is reduced to a pale fibrous structure, and an impervious artery or duct to cellular tissue. In briefly noticing the specific metamorphoses of tissue, I shall commence with the simplest, and generally the earliest change, in the ascending scale of transformation.

112. (*a*) The cellular tissue having always existed as the matrix of the compound structures and organs, it is obvious, when, owing to suspended or abolished function, the superadded organisation devoted to such function is lost, that the cellular tissue will then remain as the primitive structural base. This is shown by the evidence already adduced. The coagulable lymph exuded during inflammation of serous surfaces may become organised into cellular, and even into serous tissue, and be the matrix of certain other changes (§ 140.).

113. (*b*) The serous tissue, and the cellular, are often transformed one into the other. Cellular substance may have serous cysts developed in it, in almost any part of the body, either from friction or pressure; or from the lodgement of a foreign body, or the existence of a coagulum, &c. But, independently of these causes, it may have cysts of various dimensions formed in it, either where it invests the different organs, or enters into their internal structure; the parenchymatous organs sometimes being either partly or altogether transformed into a serous sac, or having these productions attached to them. When thus developed, they have been attributed to irritation by some, to a diminution of the natural action by others, and to perverted action by several pathologists. There can be no doubt of the last being the case, whether other states of action may accompany it or not.

114. *a*. Serous cysts vary from the size of a millet seed to that of a child's head; they exist either singly or in clusters, have their external surface in contact with the organ in which they are produced, and are either intimately connected with the cellular tissue surrounding them, or entirely without any organised connection. Red vessels are seldom seen passing into them. The structures immediately surrounding them may retain their natural appearance; or may lose it for a time and regain it; or may be shrunk and condensed; or be altogether atrophied, and expanded over the cyst, as in the liver, brain, lungs; or be merely congested; or moreover be softened, indurated, or surrounded by pus, or by tubercular matter, or by blood. In this last case, the cysts themselves are sometimes broken down, or partially destroyed. The investing cellular tissue may also become fibrous, cartilaginous, osseous, or even calcareous; and additional layers thus may be superimposed on the original cyst. The internal surface of the cysts may be smooth, or may present changes altogether similar to those which serous membranes experience from disease; it may be uneven, rugose, granulated, covered by specks of concrete albumen, or lined by false

membranes, with or without cellular bands or partitions running across the cavity.

115. *β.* These *cysts* usually contain a limpid fluid, but other substances have been sometimes found in them; viz. 1st, a serous fluid tinged with the colouring matter of blood; 2d, blood, with its fibrinous coagulum; 3d, fluid or semi-fluid substances, of a dark colour, probably consisting of altered blood; 4th, a flocculent serum; 5th, a mucous fluid; 6th, a fatty substance; 7th, cholesterine; 8th, the different varieties of pus; 9th, tubercular matter resembling that found in the lymphatic glands of scrofulous persons; 10th, a solid elastic substance, probably consisting of altered albumen; 11th, several species of entozoa. Occasionally two or more of these substances are found in different compartments of the same cyst; and without any appearances in its parietes to account for the circumstance; thus furnishing an additional proof that the state of the secretion does not always arise from any appreciable modification of structure. As to whether these cysts are formed before or after the matters found in them, it may be stated that, in respect of those containing the first three kinds of fluids, and possibly of some others, there can be no doubt of the effused fluid having caused the formation of the cyst enveloping it; but as to those that contain different productions in separate parts of the cells, it must be inferred that the matter is secreted by the parietes or part of the cyst in which it is found.

116. *(c)* *Mucous membrane* may be produced from the transformation of the cellular tissue—1st, in the place of the old mucous membrane, which had been ulcerated or otherwise destroyed; 2d, in abscesses without external outlet; and 3d, in abscesses having some external outlet, and old fistulous passages. In the progress of this change, the cellular tissue becomes successively smooth, vascular, and raised to the same plane as the continuous surface. It then admits of being detached in shreds from the subjacent tissues; and, in the alimentary canal, ultimately becomes studded with villi. But in abscesses and fistulae, villi are not formed; and neither there, nor in the digestive canal, does the transformed mucous surface contain mucous follicles. MECKEL and ANDRAL record some cases, in which the internal surfaces of cysts containing a viscid fluid could scarcely be distinguished from mucous membrane. I have seen this appearance in the ovarium, where it has been principally met with. The free surface of the false membranes formed on serous surfaces has, in one or two instances, where there existed an external opening, been converted into a mucous-like tissue.

117. *(d)* The *cutaneous texture* is generally incompletely reproduced after being destroyed; the newly formed part being composed of a cellulo-fibrous layer, without the vascular tissue in which the colouring matter is deposited. Owing to this circumstance, the cicatrices in the black races are usually white. But there are exceptions; the vascular layer being occasionally developed at a later period, and the newly formed texture assimilated to the surrounding surface. When mucous membrane becomes constantly exposed to the air, it generally assumes more and more of the characters of the cutaneous structure, but the transformation is by no means complete.

118. *(e)* *Fibrous productions* are also evidently formed at the expense of the cellular tissue, the change from the latter admitting of being traced through its various gradations. They are generally composed of delicate filaments, sometimes parallel to each other, at others matted together or interlaced, and occasionally coiled, convoluted, or rolled up; and usually containing cellular tissue between the fibres. These productions may exist as bands, distinct patches, and as rounded or irregular bodies. They may be either pale, or slightly vascular, or exceedingly so; and be disposed in the shape of cords; or in that of membranes, surrounding or covering other parts or adventitious formations; or in the form of tumours.

119. *a.* *Fibrous tumours* vary as follows:—1st, They are homogeneous throughout, and consist almost entirely of condensed fibres; 2d, They are lobulated, having cellular tissue interposed between the lobules, in which the fibrous structure is more or less distinct and variously disposed, as stated above; and, 3d, They are, according to M. ANDRAL, granulated, the granules being disposed in lobules, connected by cellular substance. Fibrous transformations often undergo further changes, portions of them becoming cartilaginous, or even osseous. But, instead of these changes, they sometimes experience acute or chronic inflammation, which may disorganise either the fibrous structure or its connecting tissue, giving rise to infiltrations of pus, or of blood, or depositions of fibrine, the purely fibrous tumour thereby undergoing a complete metamorphosis.

120. *β.* To what *cause* is the fibrous transformation to be imputed? This can be answered only by adducing the circumstances under which it has been observed to occur.—1st. Fibrous growths sometimes appear in an apparently healthy state of the organ in which they are found, and are so completely isolated, a few delicate cellular and vascular connections excepted, as to admit of being removed without affecting the adjoining structure.—2d. The proper tissue of the organs has occasionally disappeared as the cellular tissue has become transformed into the fibrous state.—3d. The organs in which they are developed are sometimes the seat of inflammatory action, but it cannot be determined whether inflammation is the cause or the effect of the transformation. From these facts it may be inferred, that no conclusion, as to the immediate cause of the production of fibrous growths, can be offered with confidence; but that they may probably arise from altered organic nervous influence of the part modifying the state of vascular action and nutrition.

121. *(c)* *Cartilaginous transformations* are often found under the same circumstances as the fibrous. They are met with in the following situations:—1st. In the *cellular tissue interposed between organs, or connecting different textures*,—as in that subjacent to serous membranes—usually in the form of grains, large spots, or irregular depositions or incrustations; and either unattended by any other lesion, or accompanying changes in the serous membrane under which they are produced, or in the substance of the viscus; these changes being of the most diversified kinds in the different cases. They may also occur in the cellular tissue surrounding morbid secretions and productions,

either as masses, or as membranes; and of themselves, or with the serous or the fibrous transformations, or with both, may form the cysts or envelopes of these secretions.—2d. *In the structure of parenchymatous organs*, the cartilaginous productions are formed, like the fibrous tissue, at the expense of the cellular. They may be deposited in masses, or in the form of envelopes of various morbid secretions. Whilst cartilage is most frequently formed beneath serous membranes, these membranes themselves never experience this change. It is rarely produced in the cellular tissue under the mucous or villous coats; and very rarely in these coats themselves, and then only consequently upon repeated or prolonged irritation. The osseous tissue may also be transformed into cartilage. But in respect of the change of muscle, and of parenchymatous viscera—as the liver, spleen, kidneys, &c.—into cartilage, it is more probable that the development of this substance in the cellular tissue merely causes the disappearance of the proper structure in the part thus altered. There is, however, little doubt of a portion of brain being sometimes changed into cartilage.—3d. *In cavities lined by serous or synovial membranes*, cartilages have been found, either entirely loose, or attached by a membranous prolongation or pedicle to some part of the parietes. They vary from the smallest size to that of a bean, and are of different forms. They are generally homogeneous and elastic, and sometimes they contain osseous points in their interior. They have been found in the peritoneal cavity, by LAENNEC and ANDRAL; within the serous membrane of the brain; within the tunica vaginalis testis; in nearly all the articulations, but most frequently in the knee and shoulder joints; and even loose in the interior of serous cysts, by ANDRAL. As to their formation, this pathologist thinks “that they derive their origin from the fluid exhaled in serous and synovial cavities;” whilst BÉCLARD and LAENNEC suppose that they are originally formed on the external surface of the membranes lining these cavities, and that they gradually protrude before them the portion of membrane covering them, thereby giving rise to the pedicles by which they are sometimes attached to the sides of the cavities. Morbid cartilaginous formations vary from a fibro-cartilaginous or mixed state, to one purely cartilaginous, in which the internal structure is perfectly homogeneous; they also vary in firmness. They occur in the following situations in some one of these states:—1st, In false articulations; 2d, At the extremities of bones of which a portion had been long previously amputated; 3d, In the situation of ligaments belonging to ankylosed joints; 4th, In cicatrices; 5th, in compound tumours of the uterus, ovaries, and thyroid; 6th, In the form of incrustations or patches, in the parietes of arteries; 7th, In the cysts and envelopes of morbid formations; 8th, In certain parenchymatous organs; 9th, In the interior of articulations; and 10th, In serous cavities, both natural and morbid.

122. (f) *Ossiform formations* differ in form, and somewhat in constitution, from the natural osseous tissue; and are generally confined to the cellular, the fibrous, and cartilaginous tissues.—a. The cellular substance is not susceptible of this change in all parts of the body; for ossific

deposits have not been found in the sub-mucous, although frequently in the sub-serous, cellular tissue; the serous membrane apparently still covering the osseous formations, and giving them a smooth pale surface. This change has been found in the sub-serous tissue in every part of the frame; and it generally begins with slight thickening, and the infiltration of a turbid fluid; morbid nutrition, very evidently in this instance, and, indeed, in most other cases, as I have above contended, commencing in vitiated secretion. The connecting cellular tissue between the coats of arteries, especially that below its serous coat, is still more frequently ossified than the foregoing. Also the cellular substance surrounding fistulous openings, foreign substances, and adventitious secretions or productions, often become incrustated by plates, or grains, or complete layers of osseous matter. Thus tubercles, hydatids, &c. are sometimes contained in osseous envelopes.

123. β. *Ossification of fibrous and cartilaginous textures* is a part of the process of development in foetal and early life; and the process goes on through life, although generally in an imperceptible manner, until old age advances, when it extends more rapidly, and seizes on additional parts of these textures; the fibrous tissue of the arterial system, and the cartilages of the ribs, larynx, trachea, &c., being then often converted into bone. But when parts not liable to this change in old age are affected by it, or when those disposed to it are prematurely transformed, the circumstance is referrible to disease. The experiments of MM. CRUVEILHIER and RAYER show that a certain degree of inflammatory action or vascular injection of fibrous, fibro-cartilaginous, or cartilaginous tissues precedes the osseous deposit; and hence the reason that fractures or injuries are often followed by ossification of the adjacent parts of these textures; and that simple irritation of a slight but continued form has given origin to this alteration. But, in many instances, no cause or appearance of inflammatory irritation could be traced to the ossified part; as when the coats of arteries, the dura mater, the capsule of the spleen, &c. are thus affected.

124. γ. The form, texture, and constitution of ossiform formations vary much, both from one another and from the natural structure. As to form, they are—1st, *Granular*, and either isolated or in groups, their number being extremely various, and sometimes remarkably great; their size extends from a minute point to that of a pea; they are rounded, with either a smooth or a rough surface.—2d, *Lamelliform or membraniform*—developed in the adherent surface of serous membranes, or in the parietes of cysts, &c.—of various sizes, and sometimes of several inches in diameter, and consisting of thin irregular plates.—3d, *Amorphous*,—generally found either alone, or in conjunction with other morbid productions in the parenchymatous organs; they consist more of a phosphato-calcareous deposition, than of an ossiform formation. Their texture is—1st, *Homogeneous*, and without fibres or any division into compact and spongy parts; 2d, *Obscurely fibrous or radiated*, and more nearly resembling the natural flat bones. The constitution of natural bones is generally uniform; but that of the ossiform productions varies remarkably in respect both of their earthy or saline consti-

tments, and of the animal matters they contain. In some instances, the calcareous salts are found with little or no admixture of animal matter.

125. v. SECRETIONS AND PRODUCTIONS ADVENTITIOUS TO THE ECONOMY. — The morbid productions about to be considered present an infinite variety of appearances, in respect of consistence, colour, form, &c., occur under the most opposite circumstances, and are connected with the most diversified phenomena at their origin and during their progress. They have all a tendency either to increase by the juxtaposition of new particles; or to grow by the assimilation or intus-susception of matters transmitted to, and circulating in, their own vessels. But, in either case, they undergo various alterations, arising out of their own intrinsic properties, or of the surrounding parts, or of the state of the constitutional powers and vascular action. Such of them as are unorganised are liable to changes chiefly from the conditions of the system, and of the parts in which they are seated. These changes are of a more limited extent than are experienced by those which are capable of performing certain independent actions; and are generally confined to the removal by absorption of the more fluid parts when they are soft, and of the effusion of a fluid matter when they are hard and irritating to the parts containing them. Productions, however, which become organised, exercise functions of their own: they have become the instruments, under the influence of a derived vitality, of performing and secreting nutritive functions peculiar to them; and they thereby not only perpetuate and extend the morbid condition in which they originated, but also superadd others, either of a local or constitutional kind, or both.

126. a. The *local changes* connected with adventitious productions are various:—1st. The parts in which they are developed may be natural, or merely compressed by their bulk.—2d. The surrounding parts may be inflamed, injected, or congested, and variously coloured.—3d. They may be either indurated or softened, at the same time that they are pale or injected.—4th. They may be hypertrophied, or remarkably atrophied in other instances; but most frequently the latter; the presence, and probably the pressure, of the adventitious formation diminishing their nutritive action.—5th. They may exhale or secrete a fluid or puriform matter, which may dissolve the inorganised productions, or soften them, and dispose them to undergo farther changes. The states now enumerated of the surrounding parts, or certain of them only, may take place in succession; and may follow one another with various degrees of rapidity.

127. β. The *phenomena* which attend their commencement are very diversified; but the powers of life more frequently evince various grades of depression, and even of perversion, than those of excitement. In many instances, however, such changes are very slight or scarcely perceptible; but they generally become very manifest in the progress of the morbid production; the functions of organic life—circulation, secretion, nutrition, excretion, &c.—experiencing more or less disorder. When affecting internal viscera, this disturbance may exist long without the nature of the lesion being more than suspected. But the

symptoms, local as well as constitutional, will vary not only with the seat, but with the changes constantly supervening in the productions themselves, and in the structures surrounding them.

128. γ. The immediate *causes* of adventitious productions must necessarily vary with their nature. In most of them, the constitutional powers are in fault; and, in some, the cause is chiefly local. Some pathologists have referred them to debility; others, to increased organic action or irritation; and several, to the perversion of the functions of secretion and nutrition. The first and last opinions conjoined will, perhaps, the most nearly approach the truth; for it must be admitted that the perversion of these functions often originates in, or is associated with, debility. Those secretions, however, which proceed from sthenic or phlogistic vascular action, as healthy pus, coagulable lymph, &c., do not fall within this description. With those exceptions, therefore, they may be imputed to that condition of life to which I have already attributed them, viz. to depressed as well as perverted manifestations of vital power (§ 91.). The circumstances, extrinsic and intrinsic, in respect of the frame, under which they appear,—the agency of cold, moist, and impure air, of deficient and unwholesome food, and of the depressing passions, in producing them,—furnish strong evidence of the accuracy of this inference. Even as respects those changes which most frequently commence with signs of local irritation or vascular excitement or congestion, the general conditions of life, and, consequently, the whole economy, are more or less in fault; and are especially concerned in producing the local change, of which irritation, or any other form of local agent, is merely the efficient cause.

129. δ. The *terms* which have been assigned to the various productions falling under this head, have been sufficiently arbitrary; and a greater desire has been evinced to discover new species, and to impose on them new names, than to view them as they are actually presented to our observation, and without reference to the descriptions and opinions of their nature—too often erroneous, and improperly mixed up—that have been given of them. Nor have the *arrangements* of them that have been attempted been less arbitrary. Certain of them have been named, from their form, as tubercle; others, from their colour, as melanosis; and some of them, from their resemblance to healthy structures, as medullary, mammary, encephaloid substances: and they have been variously arranged; as, into such as are products of secretion without organisation, or of nutrition with signs of organisation. It must be evident, however, that the difference is chiefly that of terms; for nutrition is only a modification of secretion. They have also been divided into the *encysted* and the *non-encysted*; into the *local* and the *constitutional*; and into the *inert*, or not necessarily noxious, and the *malignant*, or contaminating. These distinctions, although very important, are not uniformly preserved; for the same substance may be both encysted, and non-encysted or infiltrated; and the alteration, which is merely local in some cases, may be constitutional in others, or become so; and that which may long or always remain inert in some instances, may sometimes be malignant and contaminating from the commencement. Besides, they may

originate either in changes in the nutrition of the natural tissues, the adventitious secretion being a consequent lesion; or in the production of new substances, alterations of nutrition being later lesions; or even the secretions, as well as the natural tissues in which they are elaborated, may undergo subsequent transformations. So extremely diversified are the causes which induce these diseases; the states of vital manifestation and of vascular action by which they are attended at their origin and in their progress; and so remarkably are they modified in their course by external agents and intrinsic states of action; and, moreover, so insensibly do they pass into one another, and so frequently and variously are they complicated; that any arrangement must necessarily be arbitrary, and a choice of difficulties. Reference, however, to the varying characters of the adventitious formations having been had in the articles upon specific morbid structures, and upon the varying alterations which the principal tissues and organs present, I shall here only take a general view of them, in the following order:—1st, Secretions adventitious to the frame, and devoid of organisation: 2d, Adventitious secretions associated with morbid nutrition; or those that are apparently organised, but which depend upon the adjoining tissues for their vitality: and, 3d, Those which become organised, and possess an independent life.

130. *A. Secretions adventitious to the frame, and incapable of organisation or vitality.*—These substances present no trace of fibres, laminae, canals, or areolae; they are of various degrees of consistency; and certain of them change either from a fluid to a solid state, or from the latter to the former. They consist chiefly of albumen, gelatine, and the usual salts found in the serum of the blood. The substances that fall under this description are:—1. Pus; 2. Tubercle; 3. Fatty matter; 4. Glue-like matter, or the colloid matter of LAENNEC; 5. Melanosis, or black matter; and, 6. Saline ingredients. These may exist either singly, or variously associated.

131. (*a*) *Pus.*—This term has been applied to a morbid secretion, whose physical properties vary considerably. That form of it which is usually secreted in a state of the constitution not remarkably depressed or vitiated, is a homogeneous cream-like fluid, of a yellowish white colour, faint smell, and slightly sweetish taste. But it often departs far from this state; and even that which is secreted from the same surface, may be very remarkably changed in a very short period, generally owing to modifications of vital power and vascular action. Sometimes it very closely resembles a thick cream; at others a mixture of curds and whey; and at others a turbid serum, or a grumous sanies, or the dregs of wine. Occasionally it seems disposed to become solid, and to assume the appearance of tubercle. At one time it is quite inodorous, at another very foetid. Its colour also changes from white to yellow, from green to red; or this order is reversed. In some instances, it is yellowish green, or yellowish brown, and other related shades. The following are its *varieties*, according to its physical properties:—1. Creamy, homogeneous, or laudable pus; 2. Curd-like pus; 3. Serous pus, or sero-puriform matter; 4. Muciform pus, or glairy puriform matter, or puriform mucus; 5. Bloody pus; and,

6. Concrete or lardaceous pus. These alterations are chiefly attributable to the texture in which it is secreted, to the degree of local irritation or action, to the period it has been retained, to the general state of vital energy and vascular action, to the condition of the circulating fluid, and to the diathesis and constitution of the patient. But these varieties often run into one another, showing that any arrangement of the physical appearances of this secretion must necessarily be arbitrary. In the scrofulous diathesis, however, it often presents certain distinctive characters, and inclines nearer to the curd-like variety, or seems more disposed to become solid, from the absorption of its serous portion, when it has been some time shut up. But the most specific differences that exist in pus are not to be ascertained by chemical research, nor external appearances. Two portions of this fluid, identical in every respect, will produce very dissimilar effects: when introduced beneath the cuticle, one will occasion merely a slight irritation; the other a most dangerous constitutional malady, capable of disseminating itself through thousands.

132. Pus has been found in every tissue, structure, and organ of the body, and in all the vessels, and in the blood itself, both imperfectly mixed, and in the centre of clots. It may exist in the tissues and parenchymatous organs, either collected in the form of abscesses, or disseminated and infiltrated through their structure. When formed in muscular, nervous, and even in some other structures, it is in reality furnished by the connecting cellular tissue, which is the chief seat of the inflammatory action producing it. In a great majority of cases, its presence, either in distinct collections, or in a state of infiltration, is accompanied with signs of irritation or inflammatory action; but instances occur, in which it is attended by no such appearances. The opinion, that it could be formed only where there is ulceration, has been shown to be unfounded: for it may be secreted on the surfaces of membranes, without any breach of continuity; or collected in the parenchyma of the organs, without any appearance of inflammation; or infiltrated between the fibres and in the areolae of the tissues, without any loss of substance. It is met with in the second and last of these forms in the consecutive states of *suppuration*, or when puriform or sanious matters have passed into the circulation, from distant parts, or from disease of the veins, &c. When the production of pus has been preceded by any degree of vascular irritation, the surrounding tissues present—1st, various grades of injection; 2d, various shades of colouration; 3d, different degrees of softening; 4th, solutions of continuity, which may either have preceded or followed the purulent secretion; 5th, the disappearance of the proper structure of the part, and its degeneration into cellular tissue, in the areolae of which the pus is infiltrated. (For the various distinctive characters of pus, the pathological states which generate it, the symptoms that precede and accompany its formation, and the means of protecting the frame against its contamination, see the articles ABSCESS, § 7. *et seq.*; INFLAMMATION, and SUPPURATION.)

133. (*b*) *Tubercle* especially illustrates several of the pathological inferences stated above relative to the constitutional conditions favouring

the occurrence of many adventitious productions (§ 128.). The history of these formations in the lower animals, and the depressing causes so frequently connected with their appearance in the human subject, would lead me to infer—1st, That the conditions of life throughout the frame, in tubercular disease, are not merely weakened, but also otherwise modified or perverted, either from original conformation, or from acquired diathesis: 2d, That this state of vital manifestation often obtains in connection with tubercles, without any symptom during life, or appearance after death, that can warrant the conclusion that they originate in inflammatory action: 3d, That they sometimes form under circumstances that would lead to the inference that inflammatory irritation is an energetic, although not a necessary, cause of their appearance: 4th, But, that local irritation, or that local or general inflammatory action, can no more account for their formation, than for the production of any other adventitious secretion, without the concurrence of those conditions of life alluded to above (1st); and that, whilst irritation or vascular action does not necessarily excite tubercles, they may occur without the least evidence of irritation: and, 5th, The general conclusion seems to be that the conditions of life modify or pervert the functions of secretion in those parts of the frame in which they are developed, and this perversion is often attended by vascular injection. (As to their SYMPTOMS, NATURE, and TREATMENT, see the article TUBERCLES.)

134. (c) *Glue-like, or gelatiniform matter, or colloid substance.*—Whilst pus and tubercle are chiefly composed of albumen, with varying proportions of water and salts, this secretion consists principally of gelatine. It is sometimes colourless, but it also occasionally presents shades from a yellow to a pale rose tint. It is without any trace of organisation. It is either infiltrated in the areolæ of the tissues, thereby altering very much their appearances; or it is collected in one or more masses, which slightly condense the surrounding structure. When infiltrated into the cellular tissue, it generally indurates this tissue, and constitutes a variety of scirrhus. M. ANDRAL states, that whether the induration is a true hypertrophy of the cellular fibre, or merely the result of mechanical condensation, the jelly-like substance is always traversed and divided into compartments, by numerous, white, hard, resisting plates, which seem to secrete it. Sometimes these plates pass into the fibrous or cartilaginous state; and red vessels have been observed ramifying on their surface, but have never been traced into this peculiar substance. It has also been found in tumours composed either merely of cellular tissue in a state of hypertrophy and induration, or of a variety of morbid products. It is often contained in serous cysts, which appear to have secreted it. When existing in this last form, it constitutes the tumours or cysts called *melicerous*, from the semblance of their contents to honey. It may thus be secreted in the different tissues in either an infiltrated or an encysted form.

135. (d) *Fatty substances* may be secreted in different parts of the system in two forms: 1st, that which is similar in every respect to the fat of the body; and, 2d, that which is in some

respect or other different from it. The *first* variety has been noticed under the head of transformed secretions; the *second* differs in appearance from the natural fat. Cysts of various sizes contain, either alone, or with several other organised substances—as bone, hair, fibrous structure, &c.—a matter resembling suet. These cysts are found in several parts of the body, but most frequently in the ovaries. The parenchymatous organs may have their proper tissue atrophied and replaced by a fatty matter, forming the fatty degeneration of modern authors.

136. (e) *Melanoid* and other colouring matters have been secreted in almost every part of the body. (For its nature and pathological relations, see the article MELANOSIS.) The *golden yellow tinge*, sometimes observed in spots, or generally diffused, in foetal bodies and new-born infants, constituting a variety of what has usually been called jaundice of this class of patients, has been ascribed to a peculiar secretion, called *cirronosis* (κίρρονος, yellow) by Professor LOBSTEIN; but it is probably nothing more than a modification of the colouring principle of the bile secreted under circumstances described above (§ 108.).

137. (f) The *saline substances* usually existing in all the fluids of the body are sometimes secreted in uncommon superabundance in various parts. But besides these, others, not generally found in the fluids, are secreted; and are found, 1st, in the reservoirs and excretory ducts, through which the secretions, in which they have been formed, pass out of the system, as in cases of salivary and urinary calculi; 2d, in the cellular tissue and parenchymatous organs, either alone, or combined with other morbid productions; and, 3d, replacing other morbid secretions—tubercles being sometimes succeeded by calcareous concretions, &c.

138. B. *Morbid secretion associated with morbid nutrition, or secretions susceptible of organisation.*—This class of productions, in addition to a small proportion of the constituents of unorganised secretions, contain a large quantity of fibrine. M. ANDRAL supposes that a small portion of this substance, either coagulated in the blood-vessels, or extravasated into or upon the tissues, is the original source whence the organised productions are formed; the fibrinous deposit presenting the appearance of a whitish or reddish mass, of variable consistence, and having a tendency to become organised, although at first possessing neither organisation nor vitality. But I believe that all fibrinous exudations have a certain degree of derived vitality, disposing them to organisation, particularly when they continue in contact with the part that produced them. This pathologist considers, that a portion of fibrine may, when coagulated, indicate its vitality without presenting any blood-vessels or any determinate texture; in which state it may be compared to a zoophyte, which performs a certain grade of vital function, although destitute of a circulating system: and that the fibrinous mass, when impregnated with life, becomes the seat of various organic actions; has a tendency to assume the form of some one of the simple or compound animal textures; performs the functions of secretion; and exhibits the same morbid phenomena, when irritated, as the natural tissues do under similar circumstances. He fur-

ther supposes that several tumours, the origin of which has hitherto been mistaken, may be traced to the solidification of fibrine in the blood-vessels of the part; and adduces cases, from the minute dissection of which, he infers, that many of the adventitious productions usually called *cancerous*, *sarcomatous*, *encephaloid*, and *medullary* are entirely formed in this manner; the minute vessels—arterial, capillary, and venous—being filled with solid fibrine deprived of its colouring matter. It appears, however, much better established, that the *latter* especially of these productions are formed chiefly of coagulated or altered fibrine, thrown out of the blood-vessels owing to their perverted action, and either collected in masses, into which blood-vessels are produced, or infiltrated into the tissue of the part, the vascularity of which is increased along with the alterations that supervene in the adventitious formation and its containing structure.

139. It may be stated of organisable products generally,—1st, that they seem chiefly to proceed from the secretion or formation, by the morbid state of the vessels,—frequently depending upon a morbid condition of the frame,—of a certain substance very nearly resembling coagulated fibrine deprived of its colouring matter; 2d, that this substance, from participating to a certain extent in the vitality of the structures in which it is lodged, and from the state of organic action in the parts which formed it, has circulating actions and vessels extended to it, and thereby becomes organised, and capable of performing a certain grade of function; 3d, that it is at the same time transformed into tissues, either similar to the natural textures, or entirely different from them, but equally organised and endowed with life. I shall next notice in a very general manner—1st, Organisable products arising from sthenic inflammatory action, and not necessarily depending upon a perverted or morbid state of the constitutional powers; and, 2d, Those adventitious productions, which not only originate in some constitutional vice, but which also increase both the local lesion and the vitiation of the circulating fluids and living solids.

140. 1st. *Adventitious structures consequent upon sthenic inflammatory action.*—(a) Organisable matter, of a fibrinous or fibro-albuminous nature, is frequently formed on *serous surfaces*, and is generally termed, in its unorganised state, *coagulable lymph*; and in its organised form, *false membranes*, *cellular adhesions*, &c., from its disposition to assume the appearance of serous and cellular tissues. That these adhesions or productions may be absorbed, and almost or altogether disappear, if the constitutional energies continue impaired, is established by the observations of MM. RIBES, DUPUYTREN, VILLERMÉ, and ANDRAL, as well as by my own experience. And I believe, moreover, that they may become more fully developed, and assume progressive alterations, when the vital powers are reduced or perverted. (As to the manner in which they are formed, and their progressive changes, see the articles INFLAMMATION and MEMBRANE.)—(b) The fibrinous exudation sometimes formed on the internal surface of the blood-vessels, and obstructing them, and ultimately causing their obliteration, is in most respects similar to that produced on serous surfaces; the chief difference

is in its influence in attracting the fibrine of the blood, and in the consequent results. (See ARTERIES and VEINS.)—(c) A coagulable matter, more albuminous than that formed on the surface of serous membranes, is sometimes secreted by mucous surfaces. I believe that it is merely a modification of the transformed exhalation noticed above (§ 106.), and proceeding from inflammatory action affecting chiefly the exhaling vessels of the mucous tissue, and transforming the fluid usually given out by these vessels to a fibro-albuminous state; the morbid exhalation concreting in the form of a false membrane upon the inflamed surface, owing to the evaporation or absorption of its watery parts.—Its organisation has been a matter of dispute with French and German pathologists. M. GUERSENT states that he has seen vessels ramifying in the false membranes of croup, and anastomosing with those of the mucous surface. (See CROUP, § 36.; INFLAMMATION, and MEMBRANE.)—(d) The internal surface of *serous cysts* may become inflamed and form coagulable lymph, and thereby give rise to further results;—1. merely to false membranes lining their cavities; 2. to lymph agglutinating their opposite surfaces, and gradually causing the obliteration of their cavities. This latter change often occurs in the cysts formed around coagulated blood, particularly when extravasated in the parenchyma of organs.—(e) The adhesion of *divided structures* takes place in consequence of the effusion of coagulable lymph, which becomes organised, and passes from a cellular to a fibrous state, and ultimately becomes identified with the tissues it unites.

141. 2d. *Adventitious productions, depending upon constitutional vice, as well as upon perverted organic action in their seat*, may be divided into two species—the *consecutive* and the *primary*—the former commencing in *carcinoma*, the latter appearing at once in the true *cerebriform* or *hamato-cerebriform* states. The former is the connecting link between carcinoma, or hard cancer, and the cerebriform disease. They both have certain points of resemblance,—secretion and nutrition being perverted in both; adventitious productions, and subsequent destruction of the affected tissues, taking place in both; and both being attended by a perversion of the conditions of life, and an increasing contamination of the circulating fluids and living solids. Their chief points of dissimilarity are referrible especially to the manner in which the *former* originates. It occurs, like the transformations in which it begins, in certain parts or tissues in preference to others, and only at mature or advanced epochs of life; commonly commencing locally, and but rarely simultaneously in different parts of the same tissue, or in different structures and organs, however frequently affecting both the one and the other successively.—The *latter*, or *primary*, is met with chiefly at the early epochs of life; it attacks any texture or viscus, either simultaneously or successively, and at once appears as a soft, tumefied, spongy, pulpy, or cerebriform structure, or in some one of its modifications (§ 142.).

142. The *consecutive species* only sometimes occurs in the advanced course of scirrhus-cancer, which usually commences in certain of the states of morbid nutrition and secretion noticed above,

especially in hypertrophy or condensation of the cellular and allied tissues, with a perverted secretion, and deposition of a firm, grey, semi-transparent substance in its areolæ, and without any specific boundary between it and the healthy structure, in some cases; or with a more distinct demarcation, and a regular or lobular formation, in others; or with the secretion of a purely gelatinous substance in minute masses, or in the areolæ of the tissue (§ 134.); or, lastly, with a uniform infiltration of a more albuminous and lighter coloured matter in the texture of the part, giving rise, respectively, to the different varieties of scirrhus. But these hard, grey, or gelatiniform, or lardaceous alterations, are generally softened, liquefied, ulcerated, or even partially destroyed, and have thereby passed into the carcinomatous state, before the adventitious production makes its appearance in any of the forms about to be noticed. Thus, scirrhus passes into carcinoma, or open cancer; and this latter, in rarer instances, into some one of the varieties which the cerebriform malady presents.

143. The primary species is very varied as to its colour, figure, size, and consistence. Some belonging to it have a homogeneous structure, resembling coagulated fibrine deprived of its colouring matter, and are of different degrees of hardness, occasionally approaching to cartilage, and sometimes being almost semi-fluid, or resembling putrefied brain. Others of these productions are composed of substances which are variously constituted; their structure being filamentous, or areolar, or cellular, or both cellular and lobular, generally with numerous canals or cavities containing different kinds of fluids. In all, there is an admixture of solids and fluids in various proportions; the latter being either colourless, resembling serum, or more or less coloured, or altogether fluid blood. This structure may be so arranged, as to constitute either of the varieties of *sarcoma*, especially the *mammary* and *medullary* of ABERNETHY; or it may, owing to its softness, the delicate nature of its vessels, the tendency to hæmorrhagic infiltration, the rapidity of its protrusion through its ulcerated coverings, and to the occasional bleeding from its surface, form the true *fungus hæmatodes* of several modern writers. When it assumes this last appearance, it is more or less coloured, either in parts, or throughout, from the admixture of fluid or coagulated blood, collected into small circumscribed masses, or infiltrated into portions of its tissue. (See HÆMATO-CEREBRIFORM DISEASE.)

144. It may be remarked generally, respecting all the forms of organic change characterised by the deposit of either an unorganisable or organisable substance, that the specific matters entering into their composition have been detected in the lymphatics, in the glands, and in the veins proceeding from the diseased part. Pus, tubercular matter, melanoid matter, cerebriform matter, &c. have all been found in these situations; the consecutive appearances of the disease in other parts being thereby explained, even although — in respect of certain of these maladies especially — it may also occur in more than one part, coætaneously, owing to the diathesis, or general condition of vital manifestation; and previously to the absorption of any portion

of the morbid deposition, and to its consequent softening or destruction.

145. C. In respect of those productions which are not only organised, but which possess an independent life, and which constitute the *Entozoa*, I shall add but little to what I have stated elsewhere. They are found in all animals, either in the cavities, or in the parenchyma of organs: each of them having its special habitation — the *fasciola hepatica* in the liver, the *filaria* in the cellular tissue, the *strongylus* in the urinary passages, and the *ascaris lumbricoides* in the intestines. They may be divided into three orders; the vesicular, the flat, and the cylindrical. Their organisation varies from a parenchymatous mass, or a cyst containing a limpid fluid, but without appendices, to that provided with one or more appendices, or with an evidently organised head; from this state, to a regularly formed structure, consisting of muscular fibres and an alimentary canal; and, ultimately, thence to a fully developed animal, possessed of sexual organs and the rudiments of nervous and circulating systems. LINNÆUS arranged the *entozoa* into the *intestinal* and the *visceral*. RUDOLPHI divided them into five classes, according to their form. CUVIER classed them into two orders; the *parenchymateux*, or those without any alimentary canal, and the *cavitaires*, or those possessing a digestive cavity. This last arrangement will be followed; inasmuch as in the article HYDATIDS will be noticed all those comprised in the *parenchymateux* of CUVIER, and under WORMS those belonging to the *cavitaires*.

146. As to the origin of the entozoa, much difference of opinion has existed, chiefly among German, French, and Italian writers. In respect of the first of the classes, viz. hydatids, little doubt can exist; but in respect of those that lodge in the intestinal canal, the case is otherwise. The subject, however, is sufficiently discussed in the articles referred to. But there is one important fact, which holds good in respect of the generation not only of hydatids and worms, but also of all adventitious productions and depositions; and which should not be lost sight of in devising means for their prevention and permanent removal, viz. that whatever depresses the manifestations of life throughout the frame — more especially those of healthy secretion and nutrition — will both favour their development, and their increase or extension. These morbid formations may be even produced at will, by whatever lowers the vital energies; — by cold, moisture, unwholesome air and food; by a watery, vegetable, or impoverished diet; by the depressing passions; by exclusion of light or sunshine, &c.; — and not only may they occur singly under these circumstances, but they may also be complicated with various other maladies, of a constitutional or local kind, the nature of which may be thereby so far modified as to require a different treatment from what would be required in ordinary cases. Thus, complications of fever or of visceral inflammations with intestinal worms, are often the ultimate effects of long-neglected states of debility, and require less lowering measures than under other or usual circumstances, as well as differently appropriated remedies. Are we to suppose that, whilst the human œconomy is under the influence of the depressing causes

noticed above, the organic molecules are thereby prevented from being so perfectly assimilated, or so highly animalised, and indeed vitalised, as in health; and that, the vital attraction requisite to due nutrition being weakly or insufficiently exerted, they proceed to arrange themselves, according to the grade of vitality they possess, into much inferior beings in the scale of creation?

147. VI. OF DESTRUCTION OF ORGANISED PARTS.—This may take place in three ways:—1st. By interstitial absorption, by means of which the part is first *atrophied*, and afterwards altogether removed;—2d. By superficial absorption, or *ulceration*, which may be consequent on inflammation, or may proceed from the pressure of adjoining parts, and from loss of vital cohesion in circumscribed portions of membranes or superficial tissues;—3d. By *mortification*, owing to intense grades of inflammation, either absolutely or relatively to the state of local or general vital energy,—to a destruction of the nervous influence of the part,—to interruption of the circulation from disease of the vessels,—to pressure impeding both nervous power and vascular action,—and to generally depressed vital power, associated frequently with a morbid condition of the blood, and sometimes with diseased blood-vessels, or with external pressure: hence the readiness of the occurrence of any of the forms of mortification in old age, during dynamic and exanthematous fevers, from erysipelas, from deficient or unwholesome food, and from syphilis or mercurial cachexy;—and 4th. By the softening and swelling arising from the greatly diminished or lost vital cohesion of cellular and adipose parts, and their infiltration with a serous fluid (comprising the *Noma*, or *watery cancer*, of authors) giving rise to a form of disorganisation different from the foregoing, that often passes rapidly into a state of jelly-like solution and gangrenous erosion, particularly in the lips, cheeks, and genitals of children. A similar destruction sometimes also takes place in the stomach; and the true softening of the brain, in its extreme states, seems to be of the same nature. This species of disorganisation is intermediate between ulceration and gangrene. (See *ATROPHY, CELLULAR TISSUE, GANGRENE, SOFTENING, and ULCERATION.*)

148. V. CONNECTION OF MORBID ACTIONS AND OF ORGANIC LESIONS WITH STATES OF THE BLOOD.—Depressed and perverted states of vital power have been shown to be often connected with a deficiency or vitiated state of the circulating fluid, in chronic and cachectic diseases, and with excrementitious plethora, or the accumulation of the constituents of the various secretions in the blood in the early and advanced stages of fevers. (See *BLOOD, and DEBILITY.*) Primary excitement, in either its local or general forms, is often caused, or at least favoured, by *vascular plethora*; and reaction, or secondary excitement, with local determinations or inflammatory action, is frequently produced by this condition, existing either absolutely or relatively, or associated with the accumulation in the blood of the constituents of the secretions and excretions, owing to the interruption of these functions, as in the stage of reaction in fevers (§ 85.).

149. The connection of the *lesions of secretion* with the states of the *circulation* is one of the most important topics in pathology, and has

therefore been noticed in this (§ 95. *et seq.*) and other articles. The superabundance and transformations of one or two of the natural secretions are sometimes owing to the alteration, interruption, or suppression of others,—to the derangement of the balance of healthy action, and to the consequent plethora or vitiation of the circulating mass. Thus, morbid states of the cutaneous or of the intestinal secretions are often caused by inactive function of the kidneys or liver; and alterations of the urine, or of the bile, are frequently produced by suppression of the perspiration, or of the secretions from mucous surfaces. Morbid increase of the exhalations, particularly those poured into serous cavities, or into the areolæ of cellular parts, is, in many instances, connected with *general plethora*, as well as with *local congestions*, and deficient excretion; whilst the transition of congestions into inflammations, and the transformation of these exhalations into a fibrinous or fibro-albuminous substance, by sthenic inflammatory action, are promoted by the abundance of this constituent in the blood, and the general exuberance of this fluid. When the recrementitious secretions are imperfectly elaborated, owing to depressed vital power, the functions of chylification, sanguification, nutrition, and depuration are also impeded; the usual results being insufficient excretion, an impure state of the blood, and ultimately slow irritative fever, marasmus, anæmia, and other chronic diseases. In such cases the morbid phenomena proceed in a circle, or rather act and react upon each other, either until vascular excitement is produced by the state of the circulating fluid, and the secreting and excreting functions are thereby restored, as shown in the article *CRISIS* (§ 15.), or until some organic change supervenes. If we attempt to trace the procession of morbid actions, we shall often find that depressed vital power affects the secretions subservient to sanguification; these modify the quality, and ultimately the quantity, of the blood; the altered condition of this fluid disorders the vascular actions and depurating functions, whilst it further deranges the nutritious secretions; and thus the evil continues to increase until the living solids become changed, and incapable of performing their prescribed actions.

150. In connection with the various *lesions of nutrition* which have been brought into view, the blood can seldom long retain its healthy state. But the change is evidently, in the first instance, that of quality rather than of quantity, although it is very difficult to show in what respect the quality is modified. Excessive excretion and discharge will often, however, sensibly diminish the quantity of this fluid before any other change either in it or in the functions of nutrition becomes apparent. Local alterations of secretion and nutrition conjoined, whether originating in the organic nervous influence of the part, or in the quality of the blood circulating through it, ultimately change both the one and the other, and generally in a way that cannot be mistaken. In many instances the alteration of the blood is evidently owing to the absorption of the molecules which had been deposited, secreted, or combined in the morbid structure, and removed in the usual course of that transition of the solids into fluids, which obtains in the living economy, equally with the transition of fluids into solids. Animal

organisation is the complement of a process of combination and decomposition,—of attraction from, and dissolution into, the blood, of the constituents of the various tissues composing it; and if, in the former part of the process, the elements form heterogeneous productions, the dissolution of these productions, and commixture of their molecules in the blood, must necessarily vitiate both it and the structures through which it circulates. Accordingly we find, even in fevers, that the rapid absorption of a large portion of the molecules of the simpler or primitive tissues alters the circulating fluid often in a very evident manner; diminishes the density, cohesion, and bulk of many of the soft solids; and changes, at the same time, the colour, and other sensible properties, of both fluids and solids, to a remarkable extent. But as this resolution of a portion of the constituents of the textures into the fluid state, in fevers, generally takes place without any pre-existing adventitious formation or malignant production, the absorbed materials admit of removal by the emunctories without permanently contaminating the frame, or being deposited in various tissues or organs, and thereby increasing and extending the mischief.

151. In case of *chronic alterations of secretion and nutrition*, giving rise to various adventitious productions, whether local, constitutional, or malignant, the dissolution of the molecules that must necessarily take place (conformably with the law of organisation stated above (§ 150.), if they be organised; and owing to the irritation of the surrounding tissues, and consequent secretion of a fluid matter which dissolves them, and prepares them for absorption, if they be concrete and unorganised), and the passage of these molecules into the blood, will first vitiate it, and next diminish its quantity; at the same time that such of the molecules as are not quickly discharged by the emunctories from the circulation, will be deposited in other parts of the frame, forming consecutive productions of a similar nature. The consequences, therefore, of various local alterations of secretion and nutrition—as of pus, tubercle, carcinoma, &c.—will be,—1st, As respects the *absorbent system*—(a) the presence of a portion of the molecules of these productions in the absorbents proceeding from the parts in which they are formed; (b) irritation of these vessels, excited by the morbid molecules, especially where they ramify and reunite in the glands; (c) the accumulation of the morbid matter in the absorbents, or its deposition in the glands themselves: 2d, As regards the *blood and vascular system*—(a) the passage of the morbid molecules into this fluid, either directly by the veins, or more circuitously by the absorbents, or by both channels; (b) the contamination of this fluid; (c) consequent irritation or inflammation of the blood-vessels; (d) an imperfectly assimilated or deficient quantity of blood, owing to disorder of the recrementitious secretions, and of the functions of chylification and sanguification: and, 3d, As respects the *soft solids*—(a) the deposition of the morbid molecules in the areolæ of the cellular tissue, or the infiltration of them into parenchymatous organs; (b) their secretion on the surface of serous membranes, or shut cavities, as those of the joints or bursæ; (c) their excretion on the mucous and cutaneous surfaces, with inflammation, softening,

ulceration, &c. of these surfaces, or of their follicles; (d) their excretion by glandular organs, either with or without inflammation and disorganisation of those organs.

152. VI. OF THE PROCESSION OF MORBID PHENOMENA.—i. *The Stages of Diseases* have been variously divided by pathologists. Some writers admit only three periods, viz. the *increase*, the *acmé*, and the *decline*; whilst others enumerate five, six, or even seven. The three stages now mentioned are sufficient to distinguish the principal changes of disease generally; but in respect of febrile diseases*, they may be subdivided with advantage. A. The *first* or *INCREMENTAL* stage consists of—(a) the *precursory period*, or the time that elapses from the impression of the exciting cause until the disease forms, or manifests itself in an evident manner. The characteristics of this period are generally languor, a diminution of the usual physical and mental energy, a weak or slow pulse, or irregular accelerations of pulse, slight chills, alternating with flushings or heat of skin; change in the countenance; and weakened power of the digestive, secreting, and excreting functions. In many instances, little or no complaint is made; or, at most, only a slight *malaise*, or indefinite feeling of indisposition, indicative of depression of the vital energies. This period is of very variable duration—from a few hours to two or three weeks—and is the same with the “*stadium opportunitatis*” of HILDENBRAND, the “*latent period*” of Dr. MARSH, and the period of “*incubation*” of the French pathologists.—(b) The *formative period*, or that of *manifest invasion*, comprises the time from which the commencement of the disease is usually reckoned, and critical evacuations expected. It is frequently attended by convulsions in young children; by syncope in females; and by chills, rigors, sickness or vomiting, pain, &c. in all classes of patients. These symptoms are generally accompanied by others, having a more especial reference to the nature of the disease which they usher in: as by aching pains in the head, loins, and limbs, in fevers; by acute pain and difficulty of breathing, in pleuritis; by vomiting, constipation, and pains about the umbilicus, in enteritis, &c.; and seldom continue longer than some hours.—(c) The period of *developed excitement*, or of *reaction*, or—if this pathological condition is not prominent—of *aggravation* of the chief symptoms: in which the pulse becomes quicker, fuller, and harder than in the former periods; the functions of digestion, assimilation, secretion, and excretion more or less impeded; the animal temperature and thirst commonly increased; and the tongue coated, &c. This period may continue only a few hours; or be prolonged to as many days, or even weeks, in sub-acute or local diseases. The whole duration of this stage is extremely various; but is usually much shorter in febrile than in local and organic diseases.—B. The *second stage*, or the *ACMÉ*, consists—(a) of the period of *stationary reaction*, in which the symptoms, having reached their height, remain in this state

* This division of the periods of fevers, and an abstract of my opinions of their pathology, taken from my Lectures delivered from 1824 to 1829, was published in the *London Medical Repository* for Sept. 1827, p. 233. I state this, as similar views have been promulgated by others subsequently to this last date.

for an indefinite time—varying from a few hours to several days, weeks, or, in local maladies, even to some months—presenting slight modifications and vacillations, tending either to a favourable or unfavourable termination.—(b) Of the period of *crisis*, in which new phenomena appear, indicating either a salutary or fatal issue. The whole duration of this stage is, in febrile diseases, generally shorter than that of the first; but there are numerous exceptions to this rule.—C. The *third stage*, or that of *DECLINE*, consists—(a) of the *period of decrement*, or *exhaustion*, in which the symptoms subside more or less rapidly, and the vital organs begin to resume their functions, in favourable cases; or the energies of life to sink, in those of an opposite tendency.—(b) Of the *period of convalescence*, in which the remaining traces and consequences of the malady disappear, and the vital and animal functions regain their healthy condition and balance.

153. There may be some doubts of the propriety of adopting certain of the above subdivisions, as they are chiefly applicable to febrile diseases; but they likewise obtain in some other maladies. In those in which they are less remarkable—namely, in organic diseases—any division into stages can seldom be adopted with advantage, or be made otherwise than in an arbitrary manner. In these maladies, and, indeed, in some others, the second or formative period of the first stage may not be manifest; nor the second, or critical period of the second stage; and many may question the propriety of making *convalescence* a period of the disease. But I believe, that, during the restoration of the various functions, there still remain certain pathological states or degrees of disorder, requiring the attention of the practitioner; and, in many instances, a marked tendency to relapse upon exposure to the exciting causes of the malady. For pathological reasons, therefore, as well as on account of the future health of the patient, convalescence should be always treated as a period of disease.

154. ii. *Grades of Action*.—The terms *active* and *passive* have been much employed in pathology, and often without regard to precision. They should have reference only to the kind of vital action characterising disease, and not to its duration; with which, however, they have been too frequently confounded. Thus the term *active* has been often employed synonymously with *acute*, and *passive* with *chronic*. But, although an *active* disease is generally *acute*, it is not so always or necessarily, and may even be of a *chronic* duration; whilst the most *passive* maladies, as respects the grade of vital action, may be most *acute* with reference to their continuance. It should never be overlooked, in our appreciation of pathological conditions, that medical terms are only conventional or arbitrary signs, employed, often too indefinitely, to convey our ideas of certain ever-varying conditions of vital manifestation and organic change; and that, in using the words *active* and *passive*, we should restrict them entirely to the expression of grades of vital action, and view them as possessing an arbitrary as well as a relative import, inasmuch as there is every intermediate degree between the most *active* and the most *passive* states of disease.

155. iii. *Of the Type or Form of Disease*.—

The *type* is the order of succession observed to obtain among certain morbid phenomena; and admits of modification from various causes, without the intrinsic nature of the phenomena being essentially affected. It has commonly been divided into the *periodic* and the *continued*; the former being subdivided into several specific forms.—A. *Of the periodic type, and the periodicity of morbid actions*.—The intermissions or remissions of morbid phenomena, and their return or exacerbations after regular or nearly regular periods, constitute their periodicity; and are characteristic features of a number of diseases. These features are, however, more or less modified and marked in certain maladies than in others, in respect both to the paroxysms or accessions of morbid action, and to the intervals which separate them; and hence periodic maladies admit of various modes of arrangement, of which, however, that into the *febrile* and *non-febrile* (*pyrexial* and *apyrexial*) seems to be the preferable. The former are characterised by the regular stages of febrile action which the paroxysm presents in most instances, and the definite duration of the intervals or remissions: the latter are remarkable for the suddenness of attack, and their evident dependence upon, and affection of, the nervous system; as well as for the less regularity of their intervals. Of the various modifications, which these two classes of disease present, sufficient notice has been taken in the articles on *FEVERS*, and on the nervous disorders which possess this feature, especially *ASTHMA*, *EPILEPSY*, *HYSTERIA*, and *NEURALGIC AFFECTIONS*.

156. The *cause* of the periodicity of many diseases has never been satisfactorily assigned. Some have imputed it to the daily alternation of the erect and supine postures; others to the action of light, or, in other words, to solar influence. There is a certain tendency to periodicity in almost all diseases, in which the nervous functions are more or less affected, and even in convalescence: the remissions being often scarcely perceptible, and the exacerbations generally assuming the tertian type. The periodicity of morbid actions cannot be explained otherwise than by referring it to a law of the animal economy; and, as those maladies, in which the nervous systems are primarily and chiefly affected, are most remarkably periodic, we may infer that it is especially dependent on these systems. This law obtains to a certain extent in health, as respects the performance of many of the vital functions; its existence in disease, in a more evident or modified form, should not therefore be a matter of surprise, particularly when the functions of those systems on which it is more immediately dependent are principally affected. It is most distinct, and the intervals most complete, in maladies consisting especially of disturbance of the organic and cerebro-spinal functions, and in those in which the excretions are not much impeded, and the blood consequently not materially altered from the healthy state, or where the other causes to which the continued type is attributed (§ 157.) do not exist.

157. B. *The continued type* consists of an uninterrupted succession of the morbid phenomena, from the irruption of the disease to its termination. Some maladies present a nearly regular intensity during their course, and have therefore been called

by the older writers "*morbi continentes*." Others evince slight morning remissions, with exacerbations in the afternoon or towards evening: others, in addition to these, experience some degree of exasperation on certain, most frequently on alternate, days; and others, as some kinds of fever, assume at first a remittent form, but soon become continued, and at last again slightly remittent during convalescence. Even the more strictly continued febrile diseases evince a remitting or periodic type, in some degree, during decline or early convalescence. It would seem that a marked tendency to periodicity exists in all diseases, and that the continued type is imposed—(a) by a high degree of inflammatory action; (b) by impeded or interrupted secretion and excretion, and consequent alteration of the quality and quantity of the circulating fluid. Thence it may be inferred, that the type will be the more evidently continued, the greater the pathological states to which I have chiefly imputed it; and that, as in respect of other medical terms, *continued* or *periodic* are usually employed in an arbitrary manner,—the one type passing into the other, the regularly periodic and the continued forming the extremes of the scale, between which there is every grade, ascending from the former, or regularly intermittent, through the less perfect and the remittent, until the continued is reached.

158. iv. *Of the Duration of Morbid Actions.*—The period intervening between the actual irruption and the termination of disease is of very various length. Hæmorrhages sometimes continue only a few minutes, cholera a few hours, whilst asthma, rheumatism, and gout, may remain the greater part of life. Some maladies, originating in infection, have a specific duration, as small-pox, measles, typhus, &c. If we calculate from the time when the exciting cause made its impression, many diseases, whose length often appears definite, will present a much less uniform character. Thus, in plague and other pestilential maladies, the effluvia from the sick has sensibly affected the healthy, and terminated existence in a few hours from its impression, whilst other persons have not been seized by the fully formed malady until many days after exposure to its cause. Marsh miasmata have, in some instances, not produced ague until several weeks after their impression was made on the frame; and the rabid virus has sometimes not occasioned its dreadful effects until many months after its inoculation. If we comprise the time that elapses from the first manifestation of functional disorder, to its termination from fatal organic lesion, the duration of numerous diseases will not infrequently form no mean portion of the usually allotted period of existence. Some maladies of a slight and febrile kind, depending upon disturbance of the stomach or bowels, occasionally subside in a few hours, or in a day or two, and from this circumstance have been called *ephemeral*.

159. A. The terms *acute* and *chronic* are very arbitrarily employed to designate the duration of morbid actions; and, owing to the circumstances of their being often used as general but loose characteristics of disease, they have been mistaken by the inexperienced as indicating the existence of two forms, between which there is none intermediate. To this misconception medical writings have contributed, chiefly by de-

scribing merely these two conditions as simple and unvarying forms, instead of considering them as arbitrary signs employed to indicate the more extreme states, in respect of duration, between which there may exist every intermediate degree. Many employ these terms, to express not only the duration of morbid action, but also its grade or intensity. Of this little need be complained, if the meaning attached to the words be previously assigned. Numerous writers, impressed with the vague manner in which these appellations have been used, have endeavoured to give them a greater degree of precision by adjoining qualifying epithets to them.—(a) Diseases have been generally viewed as *acute*, when they are not prolonged beyond forty days; some writers subdividing those thus characterised, into the "*most acute*," when they terminate in three or four days,—into the "*very acute*," when they do not continue longer than seven days,—into the "*simply acute*," when they endure for fourteen days,—and into the "*sub-acute*," when they reach forty days.—(b) Maladies which are prolonged beyond the last term have been usually designated *chronic*; but they hardly admit of a similar subdivision to the above, their duration being indefinitely prolonged. The subdivision of them into *functional* and *organic*, if the distinction could be made during life, would be of practical importance; but, although it might be made in diseases of some organs, it cannot so readily in respect of others: besides, most chronic ailments are first functional, and so gradually and imperceptibly run into organic change, that no line of demarcation can be drawn between the two states.

160. VII. OF THE TERMINATIONS OF DISEASE.—Morbid actions end ultimately in two ways: 1st, In health; 2d, Death. But before terminating in either, they may assume other forms, or altogether distinct characters; giving rise to what may be called the succession, the transition or conversion, and the metastasis of disease.—A. *The return to health* consists in the restoration of all the functions. It takes place in ways peculiar to the nature of the malady, and consequently in very diversified modes.—(a) In *local diseases*, and in those simple pathological states consisting of debility, excitement, exhaustion, &c., the terminations in health are the most direct. Nervous affections and hæmorrhages commonly end by the mere cessation of the phenomena of which they consist; and a similar occurrence obtains in respect of simple congestions and various functional complaints, as jaundice, disorders of the stomach and bowels, &c. In the restoration, however, of inflammations to the healthy state, the changes are more numerous, the various phenomena of which this lesion is composed either disappearing in succession and gradually, that is, in *resolution*; or giving rise to other alterations of a more or less serious or disorganising kind; and these to new secretions and states of nutrition, as purulent collections, ulceration, sphacelation, and ultimately to the productions of coagulable lymph, granulations, and cicatrization.—(b) In *febrile* and *constitutional* maladies, the return to health is generally the result of a series of changes in the economy, however rapidly it may take place; and is usually characterised, *first*, by the subsidence or

exhaustion of the morbid state constituting the chief pathological condition, and, *second*, by the restoration of the secreting and excreting functions, the interruption of which constituted one of the chief features of disease. (See *CRISIS*.)—(c) In *organic lesions*, the restoration of the health is less frequently effected, either by nature or by art, than in the preceding classes of disease, and is usually the result of modifications of the secretions and nutrition of the part different from those in which the organic alterations originated. Consequently the return to the natural structure is generally slowly, and often only partially, accomplished,—is always aided by a due manifestation of the vital energies and performance of the secreting and excreting functions,—and is frequently favoured by irritation of, and derivation to, some remote tissue or viscus, occurring spontaneously or excited by art.

161. In all diseases, the restoration to health is as much owing to the vital energy, as to subsidence of the particular morbid actions which constitute them. Thus, acute or sub-acute inflammations occasion various changes of structure; yet the mere disappearance of the inflammation does not constitute the return to health. The organic lesions still continue; but these are ultimately removed in the course of that constant process of attraction from, and dissolution into, the blood, of the special molecules of the tissues. Secretion and nutrition have been shown to be not the mere deposition of organic particles, but a constant circulation of these particles from the blood into various fluid and solid forms, and back again into the blood, after having retained these forms for a longer or shorter period: and, as the organic molecules are identified with the various structures, in virtue of the vital influence and attraction which actuate these structures, it follows that the more this influence is exerted, the more will nutrition be perfected, and any aberration from the healthy form avoided and restored. Consequently, in the course of this process, the natural type of formation will be preserved, and any morbid production be removed.—(a) Various phenomena (*critical changes*) of a very marked character indicate the termination of acute diseases in health; and have received, from their importance, the attention of physicians. (See *CRISIS*.)—(b) As the functions become re-established and the pathognomonic symptoms subside, and at last disappear, so the decline of disease passes into *convalescence*, in which, at first, more or less of the phenomena constituting the disorder, and of debility, not merely of the organ chiefly affected, but also of the rest of the frame, still remain; the functional or the organic lesion gradually disappearing as the manifestations of life throughout the system become more and more developed, or attain their healthy state and balance. (See *DEBILITY*, § 43.)

162. B. The *termination in death* takes place in various ways, both in *acute* and *chronic* diseases. It may occur in the *former* more or less suddenly—(a) from rapid sinking of the vital powers, as in adynamic fevers; (b) or from fatal hæmorrhage before exhaustion has reached its utmost, as in some diseases of the lungs and digestive canal; (c) or from pressure on, or interrupted circulation through, the brain, accompanied with convulsions, or coma, or with both, as in various diseases of this organ; (d) or from profound or prolonged

syncope and sudden cessation of the heart's action, as upon quickly assuming or retaining the erect posture in states of exhaustion; (e) or lastly, from *asphyxy*, as pointed out in that article. Death may also occur much more slowly in acute maladies, owing to the gradual sinking and abolition of the vital manifestations; giving rise to the collapsed countenance, the frequent, weak, and unequal pulse and respiration; the loss of animal heat, and cold clammy perspirations, the resolution of the sphincters, and insensibility, the cadaverous smell, &c. observed some hours previously to, and ushering in, dissolution. In some *chronic* maladies, death often occurs suddenly, as in organic diseases of the heart, large blood-vessels and lungs, owing to effusion into the pericardium, interruption of the heart's contractions, to rupture of its cavities or valves, to bursting of aneurisms or profuse hæmorrhages, to suffocation from effusion into the bronchi, or into the pleural cavities, &c. More frequently, however, death takes place slowly in this class of maladies; and is chiefly owing to the exhaustion of the vital energies, or to the disorganisation of some important part, and the interruption of a vital function, disordering and ultimately obstructing others; as when fluid is slowly effused in any of the large cavities.

162. VIII. OF THE RELATIONS, SUCCESSIONS, AND COMPLICATIONS OF DISEASE.—A. The relations of disease are not easily explained in many instances; in others, however, they are more obvious. It cannot be shown wherefore a state of *erethism*, or inflammatory irritation of the digestive mucous surface, should frequently co-exist with acute or chronic eruptions on the skin otherwise than by supposing that the state of the circulating fluid is such as to excite or irritate the vascular reticulations of both the skin and villous membrane; and, although this fluid may be in excessive quantity in the majority of such cases, yet quantity merely will not account for the phenomena, without calling into aid an alteration of quality; which, while it excites the digestive mucous surface, also inflames the cutaneous vessels, during the depurating process they exert upon the blood. But the state of this fluid will not explain all the relations of complicated morbid actions. The reciprocative influence of the organic nervous and cerebro-spinal systems, and of the former and the vascular systems, must be considered as the earliest and chief sources of morbid associations. When the dependence of vascular action and of the secreting and excreting functions on the organic nerves,—of the conditions of the circulating fluid on the states of these functions,—and of the cerebro-spinal manifestations on both the organic nervous and vascular systems—on the strictly organic actions,—is duly considered, the relation and succession of several morbid conditions will appear as necessary results of this union. When we perceive the processes of digestion, secretion, and defecation imperfectly performed—processes essentially dependent upon the organic nervous influence—should we be surprised to observe further disorder supervene? and are we not rather to expect morbid phenomena to present themselves, referrible to the vascular system, to the circulating fluid, to the nutritive functions, and to the purely animal manifestations? When important eliminating processes are either impeded or increased to such a degree

as to constitute disorder, ought not other states of disease to be looked for? When the urinary secretion is interrupted, excrementitious vascular plethora, followed by a morbid increase of the exhalations, dropsy, congestion or effusion on the brain, convulsions, coma, &c. will necessarily follow. When this excretion is morbidly increased, the other secretions will be diminished, and assimilation and nutrition impeded. When the menstrual discharge is delayed or suppressed from torpor of the generative organs, an important depurating function is not performed, the co-existent debility of all the organic actions is thereby increased, the cerebro-spinal functions are weakened; ultimately assimilation and nutrition are reduced to the lowest grade, and anæmia and marasmus supervene. But when this discharge is copious and frequent, owing to increased action or excitement of these organs, the blood is purged of its impurities, all the organic functions assume a proportionate activity, and the cerebro-spinal system evinces augmented susceptibility and excitability: sanguification and frequently nutrition proceed rapidly; and vascular plethora, with a tendency to local determinations, to inflammations, to hysteria, to convulsions, &c., is the consequence, particularly upon any interruption of the discharge.

164. *B.* Also, when morbidly increased secretions have become habitual, other and more important diseases may succeed any interruption they experience. An habitual diarrhœa, when suppressed, may be followed by peritonitis or ascites; an old bronchorrhœa, or chronic bronchitis, may, when arrested, be succeeded by hydrothorax; leucorrhœa, or menorrhagia, if injudiciously treated, may pass into inflammation of the womb, or of the peritoneum, and even into ascites. In these the succession of morbid actions admit of ready explanations; for these morbid secretions or discharges being generally the result of local determination and plethora, their interruption or suppression merely changes their direction from a surface, whence they were evacuated, and where they, consequently, were comparatively innocuous, either to the substance or to the surface of the organ or part affected, where their retention and accumulation occasion dangerous or fatal effects.

165. *C.* Whilst the mutual dependence—the reciprocative influence—of the different systems and functions of the frame, explains the relations and successions of diseases, it also accounts for their complications, and for the comparative infrequency in practice of those simple or specific forms or states of morbid action described by nosologists. Indeed, when we reflect on the intimate manner in which the various parts of our frame are anatomically related and functionally dependent, we should rather be surprised to find disease so simple as it often is, and be prepared to observe not only associated lesions of structure and disorders of function, but also the one variously complicated with the other. There are numerous circumstances which favour the complication of disease. Amongst these the following are the most important:—1st. Constitution and diathesis,—as the scrofulous, the rheumatic, the gouty, the plethoric, and the debilitated;—2d. The nature of the predisposing and exciting causes, viz. those which act upon the organis-

ation generally, as impure air, unwholesome food, &c.;—3d. The state of the secretions and excretions, particularly the vitiation or interruption of them;—4th. Vascular plethora, anæmia, and a morbid state of the blood;—5th. The disposition of membranous or continuous parts to experience an extension of morbid action, particularly when vital resistance is weak, and the excretions unnatural or interrupted;—6th. The influence of irritation of a part upon remote organs, through the medium of either the organic or cerebro-spinal nervous systems;—and, 7th. Injudicious treatment. It would be inconsistent with my limits, were it possible, even to enumerate the complications which result from these and other causes; but there are certain illustrations required to show the truly practical importance of this branch of pathology.

166. (*a*) Tubercular productions in the viscera, or in the membranes, often co-exist with disease of the absorbent vessels and glands. Rheumatism and gout not merely modify the character of other diseases, but may seize on a number of parts successively, and even on several simultaneously, whilst they are very often associated with a torpid state of the liver and bowels, and disorder of the stomach and urinary organs. A plethoric state of the vascular system, whether absolute or relative, associates congestions of internal viscera with various disorders of secretion and excretion; with affections of the nervous system, and of the female generative organs, and sometimes with eruptions on the skin. Debility disposes to the extension of inflammatory action to continuous or contiguous parts, and associates disorders of the digestive and assimilating viscera with those of the nervous system and sexual organs; and thus examples of the *succession and complication of disease from diathesis and constitution* (§ 165, 1st.) are constantly appearing in practice.

167. (*b*) Extremes of temperature, and humidity, and impure air often seriously affect more than one organ. A warm and impure air frequently produces, either successively or simultaneously, not only functional but also structural disease of the liver, spleen, and bowels, as well as fevers in which these viscera and the stomach are principally affected. Unwholesome food contaminates the chyle, the circulating and secreted fluids, and ultimately occasions co-existent disease of several viscera,—the *complication of causation* (§ 165, 2d.).

168. (*c*) A vitiated, copious, or interrupted state of one or more secretions not only affects the organs which produce them, and the viscera to whose functions they are either directly or indirectly subservient, but also vicariously influences other secretions, and changes their quantity or quality. A copious flow of acrid bile may complicate disease of the liver with inflammation of the mucous surface of both the stomach and the intestines, particularly of the latter; and functional disorders, or inflammations, or structural change of the kidneys, may so alter the conditions of the urine and blood as to associate with them either renal and vesical calculi, or inflammation and structural disease of the urinary bladder, or dropsy of one or more of the shut cavities, and of the cellular tissue. Also, interrupted discharge of the secretions, particularly of those that are excrementitious, from disease of their outlets, not

infrequently occasions consecutive changes in the organs which elaborate or retain them. Obstructions to the due evacuations of the urine, from obstacles existing either in the urethra, or about the neck of the bladder, or in the ureters, superinduce alterations of the kidneys, or of the bladder itself; and disease of the biliary ducts commonly associates with it lesions of both the gall-bladder and liver, and of the digestive canal; furnishing examples of *superinduced complications* (§ 165, 3d.).

169. (d) Changes in the quantity and quality of the circulating fluid, especially when carried far from the healthy state, although usually the consequences of disorder of one or more of the secreting and assimilating viscera, yet become the causes of co-existent disease of several organs, and structures, modifying their interstitial secretions, their nutrition, and their vital cohesion and manifestations; the whole organisation generally presenting more or less of change. These complicated effects may assume varied forms, and implicate particular organs in a more remarkable manner than the others, according as either plethora or anæmia may be associated with the accumulation of excrementitious matters in the blood, or as the quantity and nature of these matters may vary — thereby causing diversified *humoral complications* (§ 165, 4th.).

170. (e) — *a.* When we advert to the circumstance of disease essentially the same having different symptoms, and producing varied effects, merely in consequence of a slight difference in its seat, one reason for the frequency of what should be called rather the extension or succession of disease, than its complication, will be apparent. Thus, when inflammation of the fauces extends down the trachea and bronchi, there may be either a succession of disease, if the inflammation disappears from the former seat as it extends to the latter; or a complication, if it exist at the same time in all; and yet the nature of the morbid action is essentially the same, as long as the vital energies remain unaltered. When inflammation extends along the digestive mucous surface, or to distinct parts of it only, a similar succession or complication, but without difference of the nature of the disease, also obtains. These are instances of the *succession or complication of continuity*. — *β.* But disease may extend from one tissue to another, instead of being thus limited to the same, as in the above instances; — it may originate in a membranous surface, and involve the substance or parenchyma of an organ, and ultimately even its opposite and differently organised surface, and either disappear from the former upon affecting the latter, or implicate them all simultaneously, thereby giving rise to a succession or complication of morbid actions, without altering their characters, although materially changing their symptoms. Thus, bronchitis may pass into pneumonia, and this latter into pleuritis, or they may all co-exist; and inflammation of a part of the digestive mucous surface may be extended to the cellular tissue connecting the coats of the alimentary tube, and thence to the peritoneum; and so on in respect of other organs, which, equally with these, not infrequently furnish examples of the *succession or complication of contiguity* (§ 165, 5th.).

171. (f) Irritation and other disorders of an organ or part not infrequently associate with them a morbid condition of remote as well as adjoining

parts. Worms in the intestinal canal often induce either febrile or convulsive affections. Congestion, inflammatory irritation, erethism, or merely functional excitement of the female organs, may occasion epilepsy, irregular or anomalous forms of convulsions, hysteria, altered sensibility of the nerves — referred by some writers to irritation of the spinal cord — vitiated appetite, and disordered manifestations of mind. Injury of a tendon or nerve may produce tetanus; and the accumulation of faecal matters in the large bowels may excite, and be complicated with, various disorders of the stomach, inflammation and ulceration of the fauces and pharynx, febrile disturbance, hæmorrhoids, numerous nervous ailments, and disorders of the uterus. These may be termed the *sympathetic associations or complications of disease*.

171. (g) That injudicious treatment often complicates disease, may not be so readily admitted as the circumstances now adverted to. But I can state, as the result of observation, that lowering measures carried too far will occasionally favour the extension of disordered action and structural change, either by continuity or contiguity (§ 170.), or by promoting the function of absorption, and the passage of morbid matters into the blood (§ 169.); and that stimulating remedies used too freely will, either by their operation on secreting organs and surfaces, or by irritating the parts to which they are applied, sometimes superinduce inflammatory action in addition to the disease which they were intended to remove. Thus, arsenic exhibited too freely, in order to cure agues, has produced inflammation of the internal surface of the heart and arteries; and bark or quinine, given freely before morbid secretions and faecal matters have been carried off by purgatives, has superinduced hepatitis or dysentery, or both, upon the intermittent disease for which it was prescribed. Stimulants and tonics taken in some forms of dyspepsy, as complicated functional or structural disease of the stomach, liver, and bowels; and astringents imprudently employed, have excited inflammation in the organ whence the discharge, for which they were exhibited, proceeded, as well as disease in some related organ.

172. IX. OF THE METASTASIS OF DISEASE. — *Metastasis* (μετάστασις, a change, migration, from μεδίστημι, I change, or transfer) of disease has been often improperly confounded with the terms *Metaptoxis*, *Epigenesis*, *Diadoxis*, and *Metaschematismus*, which have had different meanings attached to them. *Metaptoxis* has usually been used to mean a change in the nature or state of a disease, without a change in its seat; — *Epigenesis*, the superinduction of another, upon an antecedent, disease; the anterior affection not being ameliorated by the occurrence; — *Diadoxis*, the succession of a less, to a more, important malady; — *Metaschematismus*, the transformation of disease simply; — and *Metastasis*, the displacement or disappearance of disease from one part of the frame, and its seizure of another of more vital importance. It will be perceived, that the phenomena which these terms have been employed to express, have been already noticed, excepting those which fall under the last. When rheumatism or gout disappears from a joint and attacks the head, heart, or stomach; or when erysipelas, or any febrile or chronic eruption, forsakes the surface and is followed by angina, or pneumonia, or internal abscess, or inflam-

mation of the alimentary canal, or peritonitis; there is a metastasis, or change of the seat, of the disease.

173. *A.* There are certain topics connected with this subject, which have been much discussed, viz. Whether the disappearance of disease from its original seat is the consequence, or the cause, of its seizure of another part; and through what channel does the transfer take place. The abettors of the humoral pathology explained the occurrence of metastasis, by considering that a transfer of the *materies morbi*, or morbid matter, takes place from one part to another, through the vascular system; and that the consecutive disease is generally the consequence of the disappearance of the antecedent. The supporters of solidism, whether with reference to nervous influence or to the doctrine of excitability, supposed that disorder manifests itself in the new seat owing to its suppression in the old, — the cerebro-spinal nervous system being the medium of displacement; whilst they admitted — particularly the disciples of Brown — that its irruption in the former frequently subdues it in the latter, owing to the excitability being more intensely acted upon in the one than in the other. A greater desire, however, has been displayed by either class of theorists, to conform facts to their views, than to investigate the matter in a legitimate manner. In order to draw accurate inferences, it is necessary to interrogate Nature herself, by an intimate observation of the phenomena to which the term metastatic has been applied; and, when the practical importance of this subject is considered, the results will repay the investigation. A few facts which have fallen under my observation will serve to elucidate the subject.—1. A medical friend had gout in the lower extremities, for which he took a large dose of colchicum before the morbid secretions had been evacuated. He almost instantly had a violent attack of the disease in the stomach, with simultaneous disappearance of it from the original seat. The free use of stimuli caused it to relinquish the stomach, and to reappear in the extremities. In this case, the transfer from one place to the other was instantaneous; the medium being evidently the nervous system.—2. Another patient had, upon suppression of gout from the lower extremities, an attack of simple apoplexy, for which he was bled and purged. When I saw him, he was still comatose. The head, however, was cool. I directed mustard cataplasms to the feet, and camphor and ammonia internally. The gout suddenly reappeared in the feet, and at the very same instant he awakened as if from a profound sleep, evincing not the least cerebral disturbance, organic or functional.—3. A middle-aged and not robust man had most severe rheumatism in the thighs and legs, for which he took a large dose of croton oil, which produced hypocatharsis, and the complete cessation of the pains of the limbs, followed by the most distressing agony referrible to the heart, with palpitations, &c. He was actively treated, but he died in a day or two. With the exception of a somewhat increased vascularity of the substance of the heart, no disease could be detected in any part of the body.—4. A female, about 30, sanguine and plethoric, had rheumatism of the lower extremities, which she attempted to remove by a quack embrocation. The disorder disappeared from the extremities, but she was instantly seized by most acute pains and tenderness in the region of the uterus and ovaria, the latter being

greatly enlarged, so as to form small tumours. Similar cases to the above have been observed by me, and show that rheumatic and gouty diseases, when suppressed in one part, or suddenly subdued by lowering remedies or evacuations, will often be manifested in some vital organ, and be removed from it, in such a way as can be explained only by nervous agency; and, when the conformation of the parts consecutively affected are considered, and the proneness of the disease thus superinduced to assume an inflammatory and congestive state, retaining at the same time the gouty or rheumatic character, is taken into account, it is reasonable to suppose that the organic nerves are the chief channel of transfer, and seat of the affection; their intimate anatomical connection with the blood-vessels explaining the morbid state of vascular action with which the transferred disease is so frequently accompanied.

174. *B.* But there are metastases of a somewhat different kind from the above; but which, equally with these, present morbidly excited action: the difference consisting chiefly in the extreme degree in which sensibility is altered in those already noticed. In the exanthemata, and even in the course of several chronic eruptions, the cutaneous affection suddenly disappears, and dangerous disease is developed in an internal organ. In some cases, the superinduced malady is merely the localisation or determination of the morbid action to a single organ, the external affection disappearing in consequence — a result not infrequently of depression of the powers of life, or of irritants acting upon the part thus secondarily diseased, or of both causes conjoined. In other instances, particularly in chronic eruptions and discharges, the internal or consecutive malady is the consequence of the suppression of the external disorder. In order to form an opinion relative to the nature of metastasis in exanthematous diseases, it is necessary to attend to the following circumstances:—1st. That they are frequently caused by the neglect of sufficient evacuations early in the disease, by a cachectic habit of body and constitutional vice, by breathing a foul air, and by injudicious regimen;—2d. That whatever suddenly lowers the nervous energies, or weakens vital resistance to hurtful agents, or perturbs the frame, will often cause a metastasis of the disease;—3d. That the metastasis may be either complete, the external eruption disappearing entirely; or incomplete, the eruption still partially remaining. In these diseases, the morbidly excited vascular action of the skin evacuates a peculiar matter, which is capable of propagating the disease, and which is either carried off chiefly in the insensible perspiration, as in measles and scarlatina, or in the more consistent matter of the eruption, or in both, as in small-pox. When, therefore, the morbid vascular action and its attendant evacuation are either prevented from appearing in, or suppressed from, the cutaneous surface, it may be reasonably inferred that they will be determined to some internal viscus, giving rise to inflammation of, and serous effusion from, mucous or serous surfaces; and congestions, infiltrations, inflammation or hepatisation of parenchymatous organs. Thus, in scarlatina, measles, small-pox, erysipelas, &c. the suppression of the eruption not infrequently produces one or more of the above effects, and constitutes the chief diseased appearances in fatal cases.

175. C. There is another form of metastasis, that consists chiefly of morbid secretion; and although vascular action is concerned in producing the matter found in the secondary seat of disease, still the transfer from the original seat evidently takes place through the channel of the circulation. We not infrequently observe purulent or ichorous matter, which has been formed in one part, removed from thence, and infiltrated, or secreted and accumulated, in another part; occasioning consecutive abscesses (see *ABSCCESS*), or some other structural change, in a parenchymatous organ, or puriform effusion into natural cavities. In these cases, the passage into, and presence of morbid matter in, the blood, excite increased vascular action in some part by means of which it is either evacuated from the system, if the morbidly excited part be an emunctory; or infiltrated and collected, if it be a parenchymatous organ; or effused and retained, if it be a serous or synovial cavity. Thus, collections of puriform matters have been found in the liver, in the joints, in the lungs, in the brain, &c. after small-pox, erysipelas, fevers, inflammations of veins, or of remote or external parts, and after fractures; and often without any antecedent disease of the viscera thus consecutively disorganised, or disorder referrible to them, proportionate to the extent of disorganisation observed on dissection of fatal cases.

176. D. From the foregoing I conclude, 1st. That metastases may be divided into—(a) those manifesting fully expressed disordered action, in which the sensibility is more or less excited; and (b) those consisting of latent disorganisation, and produced chiefly through the medium of the circulating fluid: or into—(α) those which affect the substance of an organ; and (β) those which take place to an excreting surface or viscus—as the skin, the intestinal mucous surface, the kidneys, and the salivary glands—and which frequently terminate favourably by evacuation from the circulation of noxious matters that were the chief cause of the metastasis.—2d. That they are brought about—(a) by means of the organic nervous system, as in gout and rheumatism;—(b) by the influence of this system of nerves upon the blood-vessels and capillaries, determining to various surfaces or structures a preponderating degree of morbid action and its results, according to the operation of numerous intrinsic and extrinsic causes, as in exanthematous metastases;—(c) by the absorption of hurtful matters into the circulating current, where they excite, internally as respects the capillaries, the increased or morbid action of some secreting surface or emunctory, or occasion the disorganisation of some predisposed parenchymatous organ.

177. X. THE CIRCUMSTANCES MODIFYING THE FORM, COMPLICATIONS, DURATION, AND TERMINATIONS OF DISEASE, are as numerous as the causes,—predisposing, exciting, and determining,—in which it originates. The constitution and diathesis of the patient; a cachectic or vitiated habit of body; the continued operation, during the course of the disease, of the causes which induced it; the depressing passions; impure or stagnant air; all sudden mental and physical perturbations; extremes of temperature; injudicious treatment and regimen; the use of medicines which either suddenly or intensely excite, or depress, the vital or nervous energies, and weaken the restorative powers; neglect of evacuations,

and of the state of the secretions and excretions; the *nimia diligentia* of the practitioner, or improper interference with the salutary processes of nature, and with critical evacuations and changes, the too early recurrence to a full or stimulating diet, or exposure during convalescence to any of the causes specified above; will not only modify the states and duration of disease, but also occasion the *succession* of one disease into another, render morbid action more or less complicated, transfer it from one structure or organ to another, and occasion *relapses* of greater or less severity. (See *PHYSIC—Practical Principles of*; and *SYMPTOMATOLOGY*.)

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DROPSY. — **SYN.** "Υδρωψ, Th. (Υδωρ, water, and Ψω, aspect, appearance). *Hydrops*, Lat. *Hydropsie*, Fr. *Die Wassersucht*, *Die Hydropsie*, Germ. *Idropisia*, Ital.

CLASSIF. — 3. *Class*, Chaectic Diseases; 2. *Order*, Intumescences (*Cullen*). 6. *Class*, Diseases of the Excremental Function; 2. *Order*, Affecting Internal Surfaces (*Good*). IV. *CLASS*; I., II., and III. *ORDERS* (*Author*).

1. **NOSOL. DEFIN.** *The accumulation of watery fluid in the natural cavities, or in the cellular areolæ, or in both, causing distension, impeding functions of the affected and adjoining parts, frequently with fluctuation, softness, &c.*

PATHOL. DEFIN. *A collection of fluid arising either from increased exhalation or from diminished absorption, each of which conditions depend upon antecedent states of disease.*

2. After having taken a general view of the nature and treatment of dropsical effusion — of Dropsy in its generic acceptation, — I shall proceed to consider its specific forms. By thus viewing, in a connected manner, the various species of dropsy, which have been improperly separated the one from the other, much unnecessary repetition will be avoided, and several advantages obtained.

3. I. **PATHOLOGY OF DROPSY.** — i. *Brief Historical View of Opinions.* — Different views of dropsical diseases may be found in several parts of the writings ascribed to HIPPOCRATES. There can be no doubt, however, of the connection between them and a state of active vascular disorder, as well as of obstructions of the liver and spleen, having been known to him. ERASISTRATUS is said to have referred these maladies chiefly to engorgements of the liver; and ASCLEPIADES to have viewed them as being either acute or chronic. ARETÆUS gave merely a lively description of the history of dropsies: but Galen, in the unconnected observations on these maladies scattered through his writings, stated some just views of their nature. He pointed out the seat of the ascitic effusion; contended, in opposition to

ERASISTRATUS, that dropsies often depend upon other causes, and upon disease of other viscera, beside hepatic obstruction; and that they frequently proceed from a morbid state of the blood. CÆLIUS AURELIANUS assigned, as their causes, lesions not only of the liver, but of the spleen, of the womb, and of the large and small intestines. AËTIUS made some reference to a cachectic habit of body in relation to them; and ALEXANDER of Tralles noticed, but in a superficial manner, their connection with diseases of the lungs, and with antecedent fevers and inflammations.

4. Amongst the Arabian writers, little respecting dropsy beyond what is contained in the works of their predecessors is to be found. AVICENNA, however, attributed it to the liver and to the kidneys; and stated that the latter, owing to the coldness or warmth of their temperature, or to obstruction or induration of their structure, fail to attract or separate the watery fluids. MESUÉ gave a similar view to the foregoing, and both agreed in stating that the liver does not concoct pure, but a watery and phlegmatic, blood. When we reflect that the lights of modern science have shown that the liver is both indirectly and directly concerned in sanguification; that the crisis and vital constitution of the blood is really affected in many states of dropsy, and that the kidneys are often very demonstratively diseased, and in a way that may be expressed in general terms nearly similar to those used by AVICENNA, we must conclude, that some of the pathological opinions of the ancients are not so despicable as many of the moderns suppose; and that, even in recent, as well as in bygone, times, there have been more absurd theories than sound views of morbid actions, and a greater disposition to generalise from a few imperfectly ascertained states of disease, than to take into account numerous concurrent circumstances and morbid associations.

5. Since the revival of learning, but little was added to the knowledge of dropsies, until the writings of WILLIS appeared. This very eminent physician first called in the state of the vessels to the explanation of these diseases; and argued that, whilst the vascular extremities are either too relaxed or too constricted, causing thereby an increased effusion and diminished absorption respectively, the blood itself is often altered, and its circulation impeded by scirrhus tumours, tubercles, and obstructions in any of the abdominal viscera. ETTMULLER and LISTER adopted the views of WILLIS. The experiments of tying the veins, first performed by LOWER, confirmed the opinion promulgated but not carried its due length by WILLIS, that interruption of the venous circulation is a chief cause of dropsical effusions. F. HOFFMANN repeated the experiments of LOWER, and, as well as BOERHAAVE and VAN SWIETEN, admitted the importance of venous obstruction in the pathology of dropsies. MORGAGNI says, "Quacunque causa diutius potest sanguinis aut lymphæ cursum morari, aut humoris quo cavæ corporis madent, aut secretionem augere, aut exitum deinde imminuere morbo huic potest originem præbere." LUDWIG first directed attention to an atonic state of the vessels as a principal source of those maladies, and his contemporary MILMAN assigned as their chief causes a laxity of the fibres, exhausted power arising from copious evacuations, and acute diseases passed into the chronic state,

and an obstacle to the return of the blood through the veins. The views of HALLER were nearly those of LUDWIG and MILMAN; but he considered not only that the mechanical obstruction, but also that that grade of debility of the veins, which would retard their circulation, would occasion dropsies. The opinions of D. MONRO, and CULLEN coincided with the foregoing; the former considering, and indeed proving by experiment, that the notion entertained at the time he wrote, as to rupture of the lymphatics being a cause of the effusion, was not well founded.

6. When lymphatic absorption became generally insisted upon, owing to the writings of HUNTER, HEWSON, and others, an additional cause of these maladies was acknowledged, and, as might have been expected, the part assigned to these vessels was greater than they perform. VOGEL applied the doctrine of atony to them; and most of his contemporaries entertained a similar view. SOEMMERRING, WEDEL, ASSILINI, and MASCAGNI, nearly altogether deprived the veins of their share in the production of aqueous effusion, and assigned its source almost entirely to the lymphatics. These writers, with many of their predecessors, still conceived that the rupture of these latter vessels sometimes caused it, and adduced cases in which this lesion was detected on dissection. MASCAGNI considered that, besides other alterations, the absorbents are either obstructed in their glands, or dilated to such an extent as to prevent their valves from opposing the reflux of the fluids absorbed by them. The untenable hypothesis of a retrograde action of these vessels was advanced by MEZLER and DARWIN, but found no support.

7. The division of dropsies into *active* and *passive*, or *acute* and *chronic*, may be traced to RIVIÈRE, or RIVERIUS, who denominated them *hot* and *cold*. BOERHAAVE, BACKER, TISSOT, STOLL, and later writers, have given greater precision to this division, by denominating the former plethoric, active, sthenic, and inflammatory, according to the state of the circulation and of vital action. It was, however, chiefly TISSOT, STOLL, and J. P. FRANK, who drew attention to active, plethoric, or acute dropsy; and GRAPENGIESSER, the pupil of FRANK, BLACKALL, FAUCHIER, POILLOUX, BRESCHET, ABERCROMBIE, and AYRE, have further illustrated this doctrine. GRAPENGIESSER, with much justice, observes, "Omnis, enim, inflammatio modica si organon secerens occupat, functionem ejus auget." GEROMINI, a recent Italian writer, carried the inflammatory origin of dropsy as far as a medical sectarian might have been expected to have done, and discarded venous obstruction from any share in the production of this lesion. The facts, however, which have been adduced by Dr. D. DAVIS, M. BOUILLAUD, M. VELPEAU, and Dr. R. LEE, demonstrate the important part obstruction of the veins performs in the causation of at least partial dropsies; and the interesting researches of Dr. BRIGHT, followed up by Dr. CHRISTISON and Dr. I. GREGORY, disclose the great share the kidneys have in occasioning this class of diseases. As to the existing state of our knowledge of their pathology, fuller details will appear in the sequel.

8. ii. OF THE CAUSES OF DROPSIES.—It is evident that the chief causes of these diseases are the pre-existing lesions which will be hereafter

described. But there are others, more remote in their operation, which deserve to be succinctly noticed. — *A. Remote causes.* — *a.* The *predisposing* causes are chiefly a cold and moist climate, or a warm and moist temperature when conjoined with an impure air; the lymphatic, phlegmatic, and bilious temperaments; a soft, relaxed, and plethoric habit of body; the scrofulous diathesis (HEISTER); the syphilitic taint (PIDERIT and HUFELAND); and advanced age. The infrequency of these maladies in warm and dry climates, as Egypt, Syria, Arabia, and Nubia, has been remarked by several writers. — *b.* The *exciting causes* are, — 1st, External, or physical agents, which occasion chiefly the more idiopathic and active forms of dropsy; and, 2d, Antecedent diseases. — *a.* Of the former, the most influential is cold conjoined with moisture, particularly if acting upon a person in a state of perspiration. The influence of a humid atmosphere may be imputed to the circumstance of its impeding the pulmonary and cutaneous transpirations, and occasioning the accumulation in the vascular system of the watery parts of the blood, or a recrementitious plethora, if the kidneys perform not a proportionately increased function; and this effect is promoted if cold be superadded. When a moist air is loaded with miasmata, the injurious effects are still further heightened, as internal congestions and obstructions of the liver and spleen are thereby produced; humidity and cold frequently giving rise to acute, and warm moisture with malaria to passive, dropsies, or those depending chiefly on visceral obstruction. The operation of humidity in causing these diseases was explained by ERASTUS, VAN SWIETEN, and DE HAEN, on the supposition that a portion of the moisture was absorbed from the air into the circulation. Unwholesome food and a poor and watery diet, although justly considered as a cause by BONET, FOTHERGILL, and others, can act only by debilitating the frame, and inducing a state of general cachexy, or disease of some viscus terminating in effusion. VAN HELMONT and PEZOLD conceived that the use of pork is productive of dropsies; and I believe that there is some truth in the opinion. That this diet favours the generation of the scrofulous and gouty diathesis, is certainly a result of my observation. Drinking cold fluids, particularly when the body is perspiring and fatigued, not infrequently causes the active states of these diseases; and all kinds of ingurgitation, especially drunkenness, are perhaps the most common agents, in as far as they seldom fail of producing those visceral lesions on which watery effusion so often depends. Violent fits of passion were considered by LUDOLFF and DE MEZA, indolence by TISSOT, sedentary occupations by RAMAZZINI, and general debility by WAINSWRIGHT, DE HAEN, D. MONRO, and LUDWIG, as occasional sources of dropsies. The influence of anxiety and the depressing mental emotions, in favouring their occurrence, if not in directly exciting them, cannot be doubted. Pregnancy, and abortions; severe injuries, succussions and concussions of the trunk (BONET, DE HAEN, &c.), difficult dentition, may also excite some one of these maladies. The complication of ascites with pregnancy has been observed to every practitioner. The sudden suppression of cutaneous eruptions and accustomed

discharges is one of the most common causes of dropsical effusions, particularly when other concurrent circumstances are present. LENTIN, HAUTESIECK, BACHER, RIEDLIN, THILENIUS, WIL- LICH, SCHMIDTMANN, and FRANK, insist much upon the repulsion of the acute exanthemata and erysipelas; and GMELIN, HUFELAND, and OS- ANDER, upon that of the itch, herpes, lepra, and porrigio. I have often seen acute hydrocephalus appear after the use of external remedies in the cure of porrigio, to the neglect of internal measures. MORGAGNI, PISO, GUYON, FISCHER, MICHAË- LIS, and others, instance the occurrence of acute dropsies after the suppression of gout and rheumatism; CÆLIUS AURELIANUS, RHODIUS, FORE- STUS, and SCHMOEGER, after the disappearance of hæmorrhoids; and MORGAGNI, HOFFMANN, AB HEER, OBERTEUFFER, DEMIANI, BRIS- BANE, FRANK, and FAUCHIER, after the sup- pression of the menses and the lochia. The sud- den arrest of an habitual diarrhoea and of chronic dysentery has been observed by HIPPOCRATES, RIEDLIN, FRIZÉ, and STOLL, to produce effu- sion, particularly in the peritoneal cavity; and general dropsy has been observed by BARTHOLIN, LISTER, DE HAEN, POMARD, and LENTIN, to result from suppression of urine. That aqueous effusion should follow excessive depletions and hæmorrhages, has been doubted by some of those who consider it as a consequence of plethora or increased action: but FORESTUS, BLANKARD, HOFFMANN, HALLER, DE HAEN, D. MONRO, GORDON, HELWIG, and others, have met with such occurrences.

9. β . The diseases upon which dropsy most commonly supervenes, are chiefly fevers, and vis- ceral inflammations and obstructions. Quotidian and quartan intermittents, and bilious remittents, when purgatives have been neglected, or when bark and stimulants have been too freely exhibited, to the neglect of requisite evacuations, are often followed by dropsy. THOMANN states, that he has seen it consequent upon sanguineous evacua- tions carried too far in these maladies. The occurrence of effusion as a termination of inflam- mations, particularly of serous membranes, and from diseases of the heart, lungs, liver, and spleen, has been generally admitted in modern times. The frequency and the characters of dropsy after scarlet fever have attracted the notice of most writers on these diseases, particularly of WITH- ERING, FRANK, PLOUQUET, and HUFELAND. Its occasional supervention during *phthisis*, bron- chitis, chronic catarrh, and hooping-cough, must have been familiar to every physician of expe- rience. An aqueous or aqueo-sanguineous effu- sion into the serous cavities was a common cir- cumstance in the scurvy which formerly proved so destructive to fleets and armies. The connec- tion of dropsies with chronic and obscure diseases of the kidneys, imperfectly noticed by AËTIUS, AVICENNA, MESUË, LENTIN, and TILING, and fully established by the researches of Dr. BRIGHT, is of the utmost practical importance. The occa- sional dependence of these maladies upon lesions of the uterus and alterations of the organs already mentioned, as well as upon others, will be more particularly noticed hereafter.

10. iii. APPEARANCES OBSERVED ON DIS- SECTION. — A. In the cavities and parts the seat of the effusion. — (a) The serous membranes

are frequently found thickened and opaque, some- times softened, and occasionally harder than natural. In many cases, evidence of antecedent inflammatory action, as coagulable lymph, and cellular bands, or the remains of old adhesions, exists in the pleuræ or peritoneum. BONET ob- served the latter membrane inflamed and covered by a mucus-like matter; DE HAEN and BARRON, granulated or tuberculated; TACHERON and AYRE, thickened, opaque, and white; and STO- ERCK and others, indurated, and in parts cartila- ginous. Similar changes are detected in the pleuræ. Both membranes are often blanched and thickened when the effusion has been of long duration. The cellular tissue in anasarca is some- times merely infiltrated, and its areolæ distended by the watery fluid. PORTAL states, that it is frequently thickened, the cells dilated or lacerated, and the intermuscular tissue indurated and almost cartilaginous. When the infiltration and disten- tion become great, the denser structure of the cutis vera is sometimes penetrated, owing to the separa- tion of its fibres (BICHAT); and the epidermis is either raised into blisters, — some of which have been seen unusually large by MORGAGNI, — or lacerated, the fluid partially or nearly alto- gether escaping through the apertures. Occasion- ally the cellular tissue is much softened and plastic after the liquid is removed; or it is very white or blanched, its appearance suggesting the idea of maceration.

11. (b) The characters of the effused fluid have been remarkably overlooked. They vary extremely, but they generally have some reference to the state of vascular action in the seat of effu- sion. When this has been considerable, the fluid is more or less whey-like and turbid; or it con- tains pieces of albuminous matter, or flocculi, or fragments of a filamentous lymph; and the serous surfaces are often slightly covered in parts with a reticulated lymph, or a muco-albuminous sub- stance. In cases where the effusion has been chiefly owing to an altered state of the blood and diminished vital cohesion of the tissues, the accu- mulated fluid is frequently dark-coloured, turbid, of a dirty or sanguineous appearance. These conditions are principally found in dropsy of the pleuræ, pericardium, and peritoneum. When the disease occurs slowly, and is chiefly owing to de- bility, original conformation, or impeded circula- tion, the fluid is usually more limpid; and it is frequently remarkably so, being also nearly de- void of animal matter, as in chronic hydrocephalus and spina bifida. In some instances, and particularly in ascites or ovarian dropsy, the fluid collected after repeated tapping often assumes very diversified appearances. It has been re- marked of a yellowish, greenish yellow, or greenish colour; or brownish, or even nearly black, by MORGAGNI, LITRE, and others. It has likewise presented puriform, viscid, gelatinous, milky or chylous characters, according to WILLIS, MORTON, BECKER, COSTE, and PRO- CHASKA. It has, moreover, been found possessed of a foetid or penetrating odour by some authors now mentioned, and by myself. The milky or chylous fluid is ascribed by several pathologists to rupture of a lymphatic vessel. The puriform and viscid or jelly-like effusion is most probably caused by sub-acute or chronic inflammation. The yellowish or greenish yellow tint is some-

times owing to concomitant jaundice, or disease of the liver occasioning the accumulation of the colouring constituents of bile in the fluids; and the green, brown, or black colour probably arises from the presence of a portion of the colouring matter of the blood. The offensive odour, as well, perhaps, as some of the above alterations, may be the consequence of the admission of air into the cavity after tapping, and of the super-vention of inflammatory action upon this operation, or of the long retention in a high temperature of a fluid containing a large proportion of animal matter, or of both circumstances conjoined. The liquid effused into the ovaria is generally possessed of very different characters from those presented by the fluid found in the pleuræ or peritoneum; and that of chronic hydrocephalus and spina bifida is commonly different from all others,—the liquid found in the ovary, and in the brain, presenting, respectively, the opposite extremes of fluidity, or rather of animal matter. As the properties of the fluids are different not only in the several seats of the effusion, but also according to the states of vital action accompanying it, but little importance can be attached to the results of chemical analysis, unless they be derived from an extensive and diversified series of cases. These obtained by Dr. MARCET are not materially different from those furnished by BOSTOCK, BARRUEL, and BERZELIUS, who found that all the specimens of fluid contain nearly the same saline ingredients as the serum of the blood; and that the chief difference consists in the quantity of animal matter, chiefly albumen and incoagulable mucus (the osmazome of BERZELIUS and BARRUEL) they furnish. The following table is given by Dr. MARCET:—

In 1000 grains of fluid.	Specific gravity.	Total solid conds.	Animal matter.	Saline matter.
		grains.	grains.	grains.
Fluid of Spina bifida	1007.0	11.4	2.2	9.2
Hydrocephalus	1006.7	9.2	1.12	8.08
Ascites	1015.0	33.5	25.1	8.4
Ovarian dropsy	1020.2	—	—	8.0
Hydrothorax	1012.1	26.6	12.8	7.8
Hydrops pericardii	1014.3	33.0	25.5	7.5
Hydrocele	1024.3	8.0	71.5	8.5
Blister	1024.1	—	—	8.1
Serum of Blood	1029.5	10.0	90.8	9.2

12. *B. The lesions of the viscera* which are connected with the production of dropsies, include almost every variety of which they are susceptible. The heart, its valves, and membranes; the blood-vessels, particularly the veins and lymphatics; have presented, in different cases and states of the disease, nearly every alteration described in the articles on the morbid anatomy of those parts. To these I must refer; but here may add, that the absorbent vessels have been found varicose and otherwise diseased, and the glands in the vicinity of the blood-vessels indurated and enlarged, by MORGAGNI, MORTON, SOEMMERRING, HAASE, ASSALINI, BICHAT, MASCAGNI, and HODGSON. The frequency of inflammatory appearances in the inner membrane of the arteries, and the presence of ossific deposits in them and in the aorta, have been remarked by HOFFMANN, FRANCK, BADER, and myself. The respiratory organs, the liver, gall-bladder, and spleen, present, in different cases, all the appearances described in the articles on these viscera. As

respects the liver, it may be observed, that those changes and morbid productions which interrupt the circulation through the ramifications of the vena portæ, as remarked by Dr. BRIGHT; also the nutmeg-like state of its substance, obstruction of the branches of the hepatic duct by inspissated bile and cholesterine, and calculi in the gall-bladder; are the most common lesions.

13. The next important changes are detected in the kidneys. MORGAGNI gives a case from PICCOLHOMINI, in which one of them being lacerated from the presence of calculi, the urine flowed into the abdomen. RIBE (*Schved. Abhandl. b. xiv. p. 47.*) found them scirrhus; and HUFELAND met with numerous hydatids contained in cysts formed in their substance. Instances, however, were few, in which disease of the kidneys was mentioned by authors in connection with dropsy, and, when noticed, it was in a very vague and unsatisfactory manner, until Dr. BRIGHT furnished numerous proofs of the frequency of lesions of structure in these organs, and described their various forms, and relations to dropsical effusions. The *first* form which he particularises, seems to consist of wasting of the structure, and diminished vascularity and firmness, of the kidneys, which are of a yellow mottled appearance externally; their internal structure being also yellow, slightly tinged with gray, and the tubular portions of a lighter colour than natural. They contain no morbid deposit. This change is connected with a cachectic habit of body and debility; the urine being only slightly coagulable. The *second* form is that in which the whole cortical part is converted into a granulated texture, with a morbid interstitial deposit of an opaque white substance; giving, in its earliest stages, when the tunic is taken off, an increase of the natural fine mottled appearance of the organ; subsequently, with innumerable specks strewn over its surface, and distributed throughout its whole cortical substance, and with deficiency of its firmness. At a later period, the granulated texture shows itself externally, occasioning irregular projections of the surface, the organ being generally somewhat enlarged. In the *third* form of disease, the kidney is quite rough and scabrous, and its surface rises in numerous projections, not larger than a pin's head, of a yellow, red, and purplish colour. Its shape is often inclined to the lobulated; it is nearly of a semi-cartilaginous hardness, and it gives great resistance to the knife. The tubular portions are drawn near to the surface, every part of the organ appearing contracted, and less interstitial deposit being present than in the foregoing variety. Dr. BRIGHT connects these two varieties with coagulable urine; and thinks that, as the one appears to pass insensibly into the other, they are commonly grades, or stages of the same change. Besides these, there are other lesions of the kidneys found in dropsies: as preternatural softness; obstruction of the tubular structure, by a white deposit resembling small concretions; serofulous matter infiltrated or deposited in the cortical substance, and in the interstices between the tubuli; and, indeed, most of the lesions described in the article KIDNEYS. It is very justly remarked by Dr. J. GREGORY, that disease of these organs is chiefly found in those dropsical patients who are of a strumous diathesis, or who are addicted to

spiritous liquors. The uterus and ovaria often present numerous lesions of structure, but none that are especially connected with dropsy, excepting those accumulations of fluid which sometimes take place in the latter organs, and which can scarcely be considered as a species of this disease. Various morbid appearances are also found in the omentum and mesentery, particularly in ASCITIS. (See DROPSY of the Abdomen.)

14. IV. OF THE CHIEF PATHOLOGICAL STATES OCCASIONING DROPSIES.—The lesions, to which dropsical effusion has been imputed in modern times, have been too generally those alterations of structure either preceding or attending it. But, although these are manifestly important agents in its causation, yet they are not the only agents, for we very frequently find them in their most fully developed forms without any effusion. Of the numerous remote and pathological causes enumerated above, there is none, which will singly produce dropsy. And, perhaps, in no other disease is a greater concourse of causes requisite to its appearance, than in this. In recent times, the changes of structure have been investigated, somewhat to the neglect of vital conditions or manifestations; and the former has been too generally looked upon, in respect of the diseases now under consideration, as proximate causes, instead of being viewed as concomitant lesions resulting from anterior changes implicating the functions of life, in one or more of the systems and organs of the frame. The association, however, of these lesions should not be overlooked; and the share which each may have in augmenting or perpetuating the other ought to be kept in view, but with a philosophic reference to anterior conditions.

15. Up to the end of the last century, dropsies were considered as essentially depending upon obstructions or debility; although some among the ancients, particularly HIPPOCRATES, admitted the propriety of bleeding in some cases. STOLL, STRAK, BRAMBILLA, SCHMIDTMANN, J. P. FRANK, and GRAPENGISSER, at the epoch now alluded to, inculcated the frequent inflammatory origin of these diseases. WELLS, BLACKALL, ABERCROMBIE, STOKER, and AYRE followed in the same track; and, excepting a slight disposition to carry this doctrine too far, contributed to the advancement of this branch of medical knowledge. At present it is generally admitted that dropsy may arise from sur-action, or sub-action,—from general or local plethora, as well as from obstructed circulation,—from deficient excretion, and from excessive evacuations rendering the blood thin or watery. The numerous changes detected in connection with aqueous effusion, and allowed to favour both it and the accumulation of the fluid, may be resolved into a single proposition, viz. increased exhalation and diminished absorption, which comprises all the views promulgated on the subject, the matter chiefly in dispute being as to which of these changes is the accumulation of fluid chiefly owing. It has been attempted to settle the point by experiment and *post mortem* research. But a matter purely of function — lesions so dependent on vital action and structural cohesion as effusion most undoubtedly is in many cases, however associated, or otherwise dependent upon organic change — cannot admit of a satisfactory elucidation in this manner alone.

16. Those who favour the doctrine of increased exhalation argue, that this change usually follows excited action, or irritation of serous surfaces, or relaxation of the exhaling pores, or this latter state associated with increased action of the larger vessels; that the appearances of the fluid and the constitutional symptoms indicate the existence of excited action; and that absorption is not diminished, is shown by the increasing emaciation attending the effusion, and by the fact of this function being generally augmented with the progress of debility. The believers in diminished absorption contend that, when the agents of this function — either lymphatics or veins — are obstructed, an accumulation of serum takes place in the parts beyond the obstruction; that when plethora, general or local, exists, absorption is diminished, as shown by the experiments of MAGENDIE and FODÉRA; and that, as vascular fullness and action are removed, this function becomes restored to its natural activity. That the balance of function — of exhalation and absorption — is broken, is very obvious; but the question is, to which is the fault chiefly attributable? It is evident that exhalation preponderates over absorption, in all cases where vital action or vascular plethora is increased; and that, on the other hand, diminished absorption chiefly obtains where the venous or lymphatic circulation is either impeded or obstructed. These propositions are proved by experiment, and confirmed by repeated observation and numerous pathological facts. So that, instead of contending as to which of these functions is chiefly disordered, it would have been more correct to admit that either may be more or less affected in different cases and forms of the disease, according to the states of vital energy and the nature of concomitant organic change. Conformably, therefore, with these facts, rejecting all exclusive doctrines, and following nature as closely as I am enabled to interpret her actions, I believe that dropsy may arise as now stated, as more precisely expressed in the article DISEASE (§ 94.), and as will be more particularly described in connection with lesions of vital manifestation and of structure.

17. In considering the pathological states occasioning dropsy, the *conditions of vital action* appear equally important with *structural change*, the more especially as the effusion, even where the latter is the most obvious, depends as much upon the former as upon it; alterations of vital manifestation giving rise to both the change of structure and the effusion, whether or not the effusion be a concomitant or a consecutive result. This consideration has so forcibly influenced the ablest writers, as to induce them to arrange the forms of this disease with strict reference to it. Thus they have been divided into the *acute* and *chronic*, the *sthenic* and *asthenic*, the *tonic* and *atonic*, the *active* and *passive*, the *inflammatory* and *non-inflammatory* or *leucophlegmatic*, and into the *idiopathic* and *symptomatic*, or the *primary* or *secondary* — as they proceed directly from their external causes, or from some visceral disease. These forms are met with in all the seats of dropsy, but in different degrees of frequency. The acute, sthenic, or active state — the effusion consequent upon increased determination and excited action — occurs most frequently in the ovaria and brain, and next in the

pleuræ, pericardium, cellular tissue, and peritoneum. Although these states are nearly allied to, they are not identical with, the inflammatory variety of dropsy, which is also most common in the former of these situations. Idiopathic or primary dropsy very generally assumes these states, being connected either with plethora, with increased determination, or with inflammatory action, the augmented exhalations supervening to, and promoting the resolution of, its acute or early stages. This connection will, therefore, be kept in view in the following remarks.

18. *A. Primary or Idiopathic Dropsy.*—(a) *Acute dropsy, or effusion from increased action* (the *Sthenic, Tonic, Acute, Active, and Inflammatory*, of authors; the *Augmented Secretion of Irritation* of DUPUYTREN and BRESCHET; the *Hydrophlegmasia* of M. RAYER; a form of *Hypercrinia* or augmented secretion, by M. ANDRAL). TISSOT, GEROMINI, and BOUILLAUD consider this form of disease to be intermediate between healthy exhalation and inflammatory action; and Dr. PARRY, that it is the result of increased momentum or determination of the circulating fluid to the seat of effusion. That it often originates in vascular excitement of the part chiefly affected, and is frequently connected with general, relative, or excrementitious plethora, have been fully demonstrated. But the vascular excitement, and especially the injection of the capillaries usually accompanying it, is often dissipated, either partially or altogether, soon after the effusion it occasions has become considerable; and but little remains of the vascular action, which may have approached the inflammatory state at the commencement, or of its usual results, but the unabsorbed fluid.—As soon as the vital tonicity of the exhaling vessels or pores become even partially exhausted, or the vital cohesion of the serous or cellular tissues diminished, even the natural momentum of the circulation in the larger vessels will be sufficient to produce or keep up a morbid increase of the exhalation.

19. *α. The exciting causes* of acute dropsy are suppression of the perspiration and of any of the natural secretions and discharges, repulsion of the exanthemata and acute eruptions, and the usual causes of inflammatory diseases. It is often consequent upon scarlatina, and the puerperal states; or connected with inflammations, particularly of the viscera invested by serous membranes; and with sub-acute inflammation or active congestion of the central parts of the brain, the substance of the lungs, the pleuræ, the pericardium, the uterus, and the ovaria. It occurs most frequently in the young and comparatively robust; and is either an *idiopathic disease*, as I have here chiefly considered it, or a *termination* of a morbid state nearly allied to inflammation, or a *consecutive or symptomatic* malady, as when it is preceded or attended by lesions of some adjoining or remote viscus, in which form it will be considered in the sequel.

20. *β. Progress.*—Although acute dropsy generally appears suddenly and increases rapidly, yet various symptoms of disorder precede those dependent upon the effusion. The preliminary disturbance is often indefinite; but a sense of uneasiness, soreness, or slight pains of the parts in the vicinity of, or inclosed by, the cavity about to be the seat of the effusion, with disturbance of their functions; more or less derangement of the natural

secretions and excretions; increased hardness, or fulness, or frequency of pulse; irregular chilliness or febrile phenomena, and a feeling of general indisposition; often precede, in various grades of severity, and for a longer or shorter time, the pathognomonic symptoms of effusion. When these first appear, the pulse is usually hard, full, and accelerated, and the skin hot and dry. There are also restlessness, pains in the back and limbs; tenderness of the surface of the body, particularly over the chief seat of disease; loaded or white tongue, thirst; constipated bowels; scanty, thick, high-coloured urine; and, if the effusion takes place in the thorax, dyspnoea, cough, and other symptoms of that form of the disease, generally precede rather than accompany it. The febrile symptoms often partially subside in a few days as the effusion increases, whilst the symptoms caused by the accumulation become more and more urgent. The urine, in this form of dropsy, generally furnishes, by heat and acids, more or less of a coagulated albumen,—a fact first insisted upon by Dr. WELLS and Dr. BLACKALL, and imputed by Dr. BRIGHT to disease of the kidneys. There is no doubt of this being a frequent phenomenon, both in acute dropsy, where there is no evident lesion of these organs, and in other forms of the disease, where they are extensively altered. I have, however, occasionally observed it where there was neither dropsy, nor any disorder of these excretories; but it is probably more frequently connected with these disorders, than otherwise.

21. (b) *Sub-acute dropsy.*—The preceding may be viewed as the most acute or inflammatory form. Yet there are states of the disease intermediate between it and that next to be noticed.—

α. Those which approach the nearest to the sthenic or acute arise from similar causes, are often preceded by the same indefinite symptoms, and manifest themselves more or less suddenly, but advance less rapidly, than it. Sub-acute dropsy most commonly occurs in the cavities of the chest and pericardium, or in the cellular substance; and is not infrequently complicated with bronchitis, or with inflammation and hepatization of the lungs. It sometimes follows scarlet fever, or even measles. I met with two cases of it after severe attacks of the influenza of 1833.—

β. Those states of it which approach the asthenic or passive form (§ 22.) are most frequently seated in the peritoneal cavity, or in the cellular tissue, or in both; are sometimes connected with the puerperal states, or chronic bronchitis; and are seldom preceded or attended by any fever, increase of temperature, or tenderness of surface: but all the secretions and excretions are more or less impeded, and some of them are entirely interrupted. The urine is only occasionally, or slightly, coagulable, and chiefly in those cases which approach closest to the acute.—*γ. The sub-acute form of dropsy, especially, may arise from whatever will determine or solicit a greater flow of blood than natural to serous surfaces; particularly if the tonicity of the exhaling pores, and vital cohesion of the tissue, are insufficient to oppose the momentum of the circulation.*

22. (c) *Asthenic or passive dropsy* is much more rarely a primary or idiopathic disease than symptomatic of, or dependent upon, the pathological states about to be described. In its primary form, it may be attributed chiefly to relaxation of

the exhaling pores, and of the serous and cellular tissues, and to increased tenuity, or alterations of the blood existing independently of any considerable structural change. It is sometimes caused by excessive sanguineous evacuations, or exhausting discharges; by the suppression of secretions; and by a deficient, watery, vegetable, or unwholesome diet. The dropsy that sometimes prevails among the poor in times of scarcity is generally of this kind. It is usually characterised by a weak, unequal, small, and frequent pulse; paleness of the lips, tongue, and gums; flaccidity of the muscles; anhelation on slight exertion; feebleness of the joints; swellings of the lower limbs, or anasarca attending or preceding the effusion into the cavities of the trunk; an unhealthy appearance of the cutaneous surface; and absence of those symptoms which indicate the existence of visceral obstruction or disorganisation. The urine does not coagulate by heat or acids. This form of dropsy is usually chronic, and is, in adults, most commonly seated in the abdomen, or in the cellular tissue, or in both; sometimes appearing in these situations, particularly the former, after parturition, when it may assume a less asthenic form than that now described. It occurs most frequently in females, and is occasionally associated with hysteria. I have seen it supervene on chlorosis. In infants it usually takes place in the head, and proceeds from constitutional disposition or congenital vice.

23. *B. Secondary or Consecutive Dropsies—Symptomatic Dropsies—Chronic or Passive Dropsies*—are of most frequent occurrence. They are sometimes preceded by inflammatory action; are seldom, however, attended by acute, but often by sub-acute or chronic inflammation, or by active congestion. They are usually of long duration, and frequently the effects of complicated organic change, although generally more immediately dependent upon some specific lesion.

24. (a) *Dropsy from disease of the heart* is always preceded, for a long or indefinite period, by symptoms of disease of this organ. When effusion commences, early evidence of it is presented in the countenance, particularly in the morning, in the eyelids; and next in the feet and ancles, in the evening; or in the hands and forearm, particularly the left. These partial anasarca swellings usually continue a considerable time before signs of the accumulation of water in the chest are manifested, and still longer before any effusion takes place in the abdomen. In some cases, indeed, no fluid is found in this latter situation. The pulse is frequently, but not always, much affected long before any anasarca is observed. When water collects in the face, hands, or arms, after protracted ill-health, and without pulmonary symptoms, disease of the heart may be inferred, notwithstanding the regularity of the pulse: but auscultation will detect its nature. Generally, as the effusion increases in these parts, so symptoms of its commencement in the chest or pericardium, most frequently in both, make their appearance. The patient at first requires his head and shoulders more elevated than usual in bed; and at last he cannot lie down, the effusion increasing in the cellular tissue, and extending to several or to all the shut cavities. In some cases, particularly when the disease of the heart is of an active nature,

hæmoptysis, pneumonia, or pleuro-pneumonia, or congestion, takes place in the lungs in the course of the dropsy, and favours or increases the thoracic effusion. When the cardiac disease consists chiefly of passive dilatation and thinning of the cavities, the effusion is usually also of a passive kind, or attended by vascular and general asthenia, a lowering treatment accelerating a fatal issue. Occasionally the anasarca disappears, or is diminished, for some time before death; but the symptoms of the internal accumulation of fluid become more urgent. When obstruction in the valves of the left side of the heart exists, congestion of the lungs, with sudden increase of the effusion into the pleura, not unfrequently occurs, and terminates life by asphyxy. The urine, in this state of the disease, is often without any albuminous coagulum, or with very little: but it may, or may not, exist even in the same case, at different stages of its course. This form of dropsy is very frequently benefited by treatment, or for a time apparently removed; but it as often recurs, until the progress of the primary lesion, and the exhausted vital energies, at last favour an increased, a more general, or more sudden effusion, often associated with pulmonary congestion, and life is thereby quickly terminated. When the excreting functions are impeded, the effused fluids may, from effete or irritating matters being secreted along with them, act injuriously upon the surface or tissue with which they are in contact; and, in this manner, much of the appearance of irritation or of structural change, observed either in its course or after death, may be superinduced.

25. (b) *Disease of the blood-vessels and lymphatics* is often productive of dropsies; but in many instances its seat and nature cannot be determined during the life of the patient, and frequently with difficulty afterwards.—a. The actions of the arteries and capillaries are more or less affected—are obviously increased in acute, and diminished in passive, dropsies;—but the change is one of function rather than of structure. There are, however, few cases of the chronic or passive forms of the disease met with in advanced age, where the arterial system is entirely devoid of structural lesion. But when we consider the frequency of alterations in this system in old age, it becomes a question whether it be connected with effusion, otherwise than as both may be coincident results of anterior disorders. Some French pathologists, however, believe that the simple retardation of the circulation, occasioned by structural change in the arteries, favours effusion into the cellular tissue and serous cavities.

26. *β.* In respect of disease of the veins, it may be inferred *à priori*, and pathological facts have confirmed the inference, that obstructions of them will occasion dropsical effusions, unless a collateral circulation be established sufficient to prevent extreme congestion of the vessels below the part where the impediment exists. This position, acknowledged since its demonstration by LOWER, has been frequently illustrated by the details of cases. RAIKEM found, in two instances, anasarca of the lower limbs, fibrinous concretions obstructing the vena cava and internal iliac veins. MORGAGNI observed a similar state of the extremities from a tumour which pressed upon these vessels; and attributes, in some cases,

dropsy within the head to pressure upon the superior vena cava. HALLER states, that compression of the jugular veins has produced dropsy of the ventricles and membranes of the brain. LAENNEC found obliteration of the vena cava in a case of ascites and anasarca. I have seen, in two cases, enormous distention of the thigh and leg, from the pressure of a psoas abscess upon the iliac vein; and analogous facts are recorded by HODGSON, D. DAVIS, BOUILLAUD, VELPEAU, MECKEL, and LEE. Organic change about the right side of the heart, or tumours pressing upon the thoracic portion of the vena cava, will obviously produce a similar, but more general effect. And I believe, with several pathologists, that congestion or engorgement of the large veins, from deficient vital power, particularly if it continue for any time, will, independently of mechanical obstruction, be sufficient to occasion both increased effusion and accumulation of fluid, owing — 1st, to impeded circulation, consequent dilatation of the smaller vessels, and escape through the pores of a part of their more fluid contents; and, 2d, to diminished absorption, which M. MAJENDIE has shown by experiment to exist in parts whose blood-vessels are inordinately congested. If we allow, with this physiologist, and with several others, who have furnished evidence in recent times, that the veins exert an absorbing function, either directly by their radicles, or by lymphatic vessels opening into them, we must necessarily admit that any obstruction, vital or structural, of the venous circulation, will be followed by an accumulation of fluid in parts beyond the seat of obstruction.

27. *γ. Diseases of the lymphatics*, both functional and organic, have been viewed, as stated above, as causes of dropsies. It is obvious that little beyond the evidence of analogy can be advanced in favour of impaired function of these vessels: but when we consider that many of them open into veins, without passing through glands, we may admit that they will experience the same modifications of function as those vessels with which they are thus intimately connected. And when we reflect on the various circumstances calculated to retard or to entirely obstruct the circulation in the lymphatics passing through glands, and conveying their fluids into their principal trunks, the admission of impaired function, in some cases, cannot be unreasonable. Of this species of lesion, it is obvious that *post mortem* research can furnish no positive proof: but of structural change direct evidence may be advanced, although the difficulty of obtaining it, even in cases where it may exist, will necessarily diminish the amount. It has been considered by several of the authors mentioned above (§ 26.), that rupture of the lymphatics; by MORGAGNI, ASSALINI, BICHAT, SOEEMMERRING, &c. that a varicose state of these vessels; by SCHERR and SAVIARD, that concretions formed in their principal trunks; by HAASE, BOYER, HUNTER, CRUICKSHANKS, SOEEMMERRING, MASCAGNI, &c. that compression of either them or their glands; by most of the authorities now named, that obstruction, destruction, or extirpation of these glands; and, lastly, by some of them, that inflammation of the lymphatics, may severally be followed by dropsical accumulations. On the other hand, cases have been adduced by MORTON, D. MONRO, CULLEN, A. COOPER, BICHAT, and LAENNEC,

in which the principal lymphatic trunks were obstructed without any collections of fluid having been formed. — D. MONRO and M. DUPUYTREN tied the thoracic duct in the lower animals, but dropsy was not the consequence; whilst Mr. CHESTON found it obliterated in a case of anasarca. I therefore infer, that alterations of these vessels either may, or may not, be the principal pathological cause of the accumulation of fluid; that, in respect of these species of lesions, as well as of others, additional changes are frequently requisite to the production of effusion; and that, in many instances where disease of these vessels has been found in connection with dropsy, it has been rather a coincident effect of functional or structural change, or of both, in some vital organ, than the chief source of the collection of fluid. From what has now been stated, it may be concluded, that opinions as to the exclusive operation of any one set of vessels in producing symptomatic dropsies are altogether erroneous, and that either of them may be concerned in the result, more especially the veins.

28. The *fluid* collected in dropsy from obstruction in the circulation differs from the serum of the blood chiefly in containing much less albumen. It is usually limpid, inodorous, either colourless or of a citron tint; and, in some instances, when the obstruction has occurred suddenly, it is slightly coloured by the escape of a few of the colouring particles of the blood. The parts containing it are commonly free from any material change, excepting in the more chronic cases; and it often collects in very considerable quantity, before much disorder referrible to the accumulation is complained of. The symptoms will necessarily vary with the seat and rapidity of the collection, and the parts primarily or consecutively affected. The *diagnosis* of effusions depending upon disease of the circulating vessels is very difficult in all cases, and nearly impossible in many. When it occurs in the strumous diathesis, or early in life, or is connected with, or consequent upon, swellings of the lymphatic glands, lesions of the lymphatic system may reasonably be inferred; and when it commences as a local œdema, or is limited to a single limb, or continues in the lower extremities without any signs of disorder referrible to the large cavities, the obstruction of a considerable venous trunk may be inferred. If it appear very slowly in the lower extremities, and increase very gradually, and be attended by a slow, or unequal, or irregular pulse, great coldness of the limbs, with or without discolouration or sores of the legs, particularly in aged or gouty persons, the arterial system will very generally present structural change, as ossific deposits in some part of its course.

29. (*c*) *Dropsy connected with disease of the lungs*. — Either hydrothorax or anasarca, or both, may occur in consequence of pulmonary affection, or merely as coincident effects of the same causes; and in many instances effusion may take place in the pericardium, in addition to the other forms of dropsy. The acute states of anasarca are not infrequently connected with inflammation, congestion, or hepatisation of the substance of the lungs, or with acute bronchitis, particularly after exposure to cold and moisture, or after scarlatina or measles. In many of these cases the pulmonary affection is somewhat obscure, the symptoms

being imperfectly developed; and, unless auscultation be used, is liable to be overlooked or mistaken. Dropsy from chronic bronchitis generally supervenes and proceeds much more slowly than that which is connected with the acute diseases now mentioned, but it usually appears in the same manner; the face, particularly the eyes, and upper extremities, first becoming cedematous, and subsequently the ancles. When any aggravation of the bronchial affection occurs, or if the inflammation extends to the substance of the lungs, the dropsical effusion often increases rapidly. After repeated exasperations of the pulmonary disease, with occasional amelioration during summer, in the more prolonged cases, the anasarca becomes more and more general, and at last effusion takes place into the pleuræ, the pericardium, the cellular substance of the lungs; less frequently into the peritoneum; and in some instances into the ventricles, or between the membranes of the brain; and the patient is more or less suddenly cut off.

30. As fluid is effused into the pleuræ, or cellular parenchyma of the lungs, difficulty of lying down, and dyspnœa, come on and increase; and as it collects in the pericardium, irregularity of the pulse, palpitations, anxiety, œdema of the countenance, fulness of the jugular veins, &c. supervene. If it accumulate on the brain, stupor, coma, paralysis, or apoplexy, takes place. Dropsy occurring in the latter stages of tubercular consumption or chronic pleurisy is generally confined to the lower extremities. It sometimes, however, extends more generally, and occasionally more or less fluid is effused into the cavities of the chest.

31. (d) *Dropsy from disease of the liver and spleen.*—The ancients imputed dropsy more to the liver than to any other part; and during the fifteenth and sixteenth centuries, this organ was generally considered as being always its cause. WARBOLD, PEZOLD, VATER, BIANCHI, and others, however, showed that it was sometimes free from alteration, even in ascites; and more recent and precise research has proved that it is often not materially changed; and that, in many cases of dropsy, where it has presented certain alterations, disease was likewise found in other viscera, to which the effusion might be referred with greater justice than to the hepatic lesion. But collections of fluid are very frequently formed in the last stages of most chronic diseases of the liver; especially in those which impede or obstruct the circulation of the vena porta. As to the nature of the lesion, very imperfect, or hardly any, knowledge can be obtained during life, or even previously to the effusion, unless as to the existence of enlargement, and sometimes of abscess, which may generally be ascertained by careful examination and percussion.

32. When, however, the dropsy has been preceded, for a long period, by dyspeptic symptoms, particularly by flatulence, uneasiness in the stomach after a meal; by pain or tenderness in the right hypochondrium, below the right shoulder-blade, or at the top of the shoulder; by short, dry cough, and the usual signs of chronic disease of the liver, more particularly by the projection of the edge of the organ below the cartilages of the false ribs; by jaundice; light or clay-coloured stools; scanty red or high-coloured urine, depositing the lithic acid sediment; and by slight evening fever; the accumulation may be imputed

to the liver, the disease of which, and its attendant symptoms, being frequently of very long duration before any collection forms. The dropsy usually appears first in the ancles, towards night; or in the abdomen, occasioning slight fulness; or nearly at the same time in both. The urine is then more scanty; and sometimes becomes dark, muddy, turbid, or thick. The skin is often harsh or dry, the bowels constipated, and thirst increased. The progress of the accumulation varies considerably. Occasionally the anasarca of the lower extremities and the ascites increase equally and gradually. In some instances, the former proceeds much more slowly than the latter; and, in others, the ascites arrives at its utmost extent without much œdema of even the ancles. In many cases there is great vacillation in the course of each; the one increasing and the other diminishing, or either or both experiencing a sudden aggravation, and rapidly reaching the acmé. Sometimes, the collection in the abdomen advances rapidly, and arrives at the utmost in a very few days, without any attendant anasarca; the bowels being obstinately constipated, and the urine nearly suppressed. In these cases, the patient generally complains of much pain and soreness, and frequently of tenderness, of the abdominal parietes — probably owing partly to the rapid distention; and possibly, also, to the action on the peritoneum, of the irritating properties of the collected fluid, arising out of the circumstance of its containing much of the injurious constituents that are usually removed from the system in the excretions which are so completely suppressed. In dropsy from diseased liver, there is seldom any effusion into the serous cavities of the chest or head. But as ascites reaches the utmost, dyspnœa becomes urgent, owing to the diaphragm being carried high up into the thorax; and, during the last few days of existence, slight or low delirium appears, at first during the night; the pulse and breathing becoming rapid and weak, and the general weakness extreme, sometimes with distressing nausea or retchings, and the patient sinks.

33. When dropsy depends upon disease of the spleen, evident enlargement of it generally precedes the accumulation of water, which, as when it arises from disease of the liver, usually forms in the abdomen, and in the lower extremities. In some cases, particularly in those who have resided in warm countries, or in miasmatic localities in temperate countries, the enlargement of the spleen is associated with chronic alterations of the liver; and the consequent dropsy is but little under the control of medicine. But when the lesion of the spleen is its chief or only source, it may be removed by treatment, along with the disease in which it originated. When dropsy comes on after repeated attacks of ague, and residence in an insalubrious climate, enlargement of the spleen is often influential in its production, or co-operates with other lesions in causing it. In these cases, change of air is one of the best means of removing it.

34. (e) *Dropsy from disease of the kidneys.*—It may be stated of lesions of these organs, as well as of others found in dropsies, that they are often the principal pathological causes of the effusion, but that they frequently also exist without this effect resulting from them. There can be

no doubt that every change of structure, to which the kidneys are liable, may be more or less concerned in the production of effusion, especially those which impede or interrupt their functions. Of this latter kind seem to be the principal of those so well described by Dr. BRIGHT (§ 13.). Dropsy may arise either from disease of the kidneys alone—which but rarely occurs, and in which case it usually commences with anasarca, at first affecting chiefly the lower extremities—or from lesions of these organs associated with those of the heart, or of the lungs, or liver. In such complicated cases, the disease of the kidneys may be either *primary* or *consecutive*; perhaps, more frequently, the latter.—*α*. When it is *consecutive*, the dropsy commences, as already described, in alterations of either the circulating or respiratory systems; the accession of the affection of the kidneys being often distinctly indicated by pains in the loins, sickness, vomiting, occasionally purging, and coagulable urine. In some instances, however, renal disease may exist without these symptoms being prominent; and coagulable urine may be present without the kidneys being particularly implicated.—*β*. When the renal affection is the *primary* alteration, the dropsy commences as anasarca; but rapidly extends to the cavities of the pleuræ and pericardium, of the peritoneum, and not infrequently of the arachnoid. In most of these cases, the symptoms are more acute, and the progress of the disease more rapid, than in any of the other forms of symptomatic dropsy. This seems attributable to the disease of the kidneys being such as prevents them from removing all, or even a large proportion, of the injurious elements constantly requiring elimination from the blood; to the consequent secretion of a portion of them in the accumulated fluid; and to their imparting irritating properties to it; whereby it induces inflammatory action in the serous surfaces containing it, with rapid aggravation of all the phenomena, and occasionally a concentration of the malady in one or more of its usual seats. Thus, it is not uncommon to perceive symptoms of pleuritis or pericarditis, or even of peritonitis, to accompany, or even to precede, the more advanced periods of the effusion into the respective cavities; and, as the disease is increased in one or more of these, to observe the disappearance of the fluid from the extremities. In some instances, where the collection has formed rapidly in the cavities of the chest, either preceded or attended by acute symptoms referable to this situation and its contained organs, not only the anasarca, but also the ascites, where one or both have previously existed, has partially or nearly altogether disappeared, the rapid effusion into these situations soon terminating existence. In other instances of this form of dropsy, effusion on the brain is superadded to these, and the patient dies comatose. Dr. BRIGHT and Dr. GREGORY remark, that there is great proneness to salivation from small doses of mercury in dropsy from diseased kidneys.

35. (*f*) *Dropsy from disease of the uterus and ovaria* may arise either from the pressure they produce, when enlarged, or containing tumours, on the veins and lymphatic glands and vessels; or from the extension of disease from them to their peritoneal covering. I met with a case, in which ascites was consequent upon chronic inflamma-

tion of the uterus, the peritoneum covering the fundus having become consecutively affected; and a nearly similar instance, in which the effusion into the peritoneum was owing to the suppression of leucorrhœa by astringent injections. In this latter case, I inferred that the discharge proceeded from inflammatory irritation of the internal surface of the womb, or of the os uteri, and that the treatment had suppressed the morbid action in these situations, and determined it to the fundus and peritoneal surface; whence it had extended further, and produced effusion into the abdominal cavity. But little anasarca was present in these cases, and that was confined chiefly to the feet and ankles. Ascites may probably likewise follow chronic inflammation of the ovaria, owing to a similar extension of the irritative vascular action to the peritoneum. Excessive hæmorrhage from the uterus, and abortions, may also produce dropsy, as stated above (§ 8.). Those diseases which have been generally described as ovarian and uterine dropsies, are purposely excluded from the present view of the subject.

36. *Of the Urine in Dropsies.*—Owing to the attention that has been paid to this topic in modern times, and particularly since the investigations of WELLS, BLACKALL, PROUT, and BRIGHT, the state of this secretion has become an important source of information as to the pathological conditions giving rise to dropsical collections; although, when viewed alone, much less dependence can be placed upon it. Dr. WELLS found that the urine was more or less coagulable in the dropsies consequent upon scarlatina, and even from the exhibition of mercury; and that this symptom was most frequent in anasarca, it having been remarked in twenty-four cases out of thirty-seven. Dr. CHRISTISON and Dr. I. GREGORY also remarked it most commonly in this form of dropsy; and my experience accords with theirs. I have seldom seen it in ascites. Dr. BLACKALL considered it as an attendant upon the acute form of the malady; and Dr. PROUT, as an indication of irritation. Dr. BRIGHT's cases prove its connection with the more advanced states of the changes of the kidneys he has described, independently of the existence of acute or sthenic vascular action. Several physicians have remarked this state of the urine in other diseases, unconnected with lesions of the kidneys; but admit its frequency in such circumstances, as well as in acute dropsies. I have often observed it in acute diseases of children, where no alteration of the kidneys existed; and I believe it is not uncommon after the exanthemata. The above writers have also noticed a less specific gravity of albuminous than of healthy urine. As to the dark brown colour which this urine frequently presents in dropsy, the inference of Dr. BRIGHT, that it arises from the red globules of the blood, seems to be correct. The presence of albumen may be ascertained either by boiling, or by the nitric or muriatic acids, alcohol, the ferro-prussiate of potash, or corrosive sublimate. The last re-agent is, upon the whole, the best. The opinion of Dr. PROUT, as to the value of albuminous urine as a symptom, will be adopted with advantage; namely, that we ought always to be aware of its presence, as, taken along with the others, it may be

occasionally useful in directing our judgment of the nature of the disease; but that, in the present state of our knowledge, it does not indicate any particular remedy or mode of treatment.

37. v. PROGNOSIS.—The prognosis in dropsies will necessarily depend on their form and origin; on the extent and complication of the structural changes occasioning them, the state of vital manifestations, and the habits and age of the patient. — (a) *Acute* and *sub-acute* dropsies are generally much less dangerous than the symptomatic, particularly when occurring in young persons and in tolerably sound constitutions; but concomitant circumstances, more especially their association with pulmonary disease, and the nature and extent of that disease, will greatly modify the opinion to be formed of the immediate or ultimate result. The form of dropsy which occurs after scarlatina or measles is much more curable than any other. *Asthenic* dropsy, from excessive evacuations or hæmorrhages unconnected with structural change, or that from insufficient or unwholesome diet, generally admits of cure.

38. (b) *Consecutive* or symptomatic dropsies seldom are permanently removed. Those arising from organic change of the heart may be remedied for a time, but they generally recur again and again; judicious treatment frequently prolonging life, nevertheless, for several years. When the effusion proceeds from disease of the lungs, the prognosis will be formed with strict reference to it; and, on the whole, will be less favourable than in the foregoing. The same remark applies to dropsy from changes in the vessels. Accumulations of fluid from organic lesions of the liver are but little under the control of medicine, and generally terminate fatally sooner or later. Occasionally, however, exceptions occur; and much relief is often obtained for a considerable time. When the malady depends chiefly on enlargement of the spleen, a more favourable result has frequently been obtained. Dropsy from disease of the uterus and ovaria seldom terminates favourably. And it would appear that effusions from structural lesions of the kidneys are the most rapidly and certainly fatal.

39. II. TREATMENT. — It will be obvious to every experienced practitioner, that the distinctions made above are merely the more prominent features by which the malady may be recognised, where the acquaintance with it is imperfect; but that there are numerous other shades of character which deserve to be known, and by which he will be in some measure guided in practice, that scarcely admit of description. Of this kind more especially are those ever varying states of vital power, and grades of vascular action, which demand certain indications of cure, or different modifications of treatment, as imperatively as any well-ascertained alterations of structure. There are, perhaps, few diseases that require in the treatment a stricter reference to the conditions of vital power, in connection with changes of its organic alliances, than those now being considered. To ascertain these conditions, and to act strictly in accordance with them in dropsies, even as respects those slighter modifications that can neither be illustrated by examples, nor be made subjects of precept, will tend more to successful practice, than any other object of investigation.

40. I. OF PRIMARY OR IDIOPATHIC DROP-

SIES.—A. *Treatment of the Acute.*—The first object of investigation will be the state of the disease in relation to its remote and proximate causes, and of the constitutional powers of the patient, comprising every appreciable change in the vital functions, and in the appearance of the soft solids, as indicating modifications not merely in the grade, but also in the kind, of action. By the inferences derived from this source, the practitioner will be guided in the appropriation of the means of cure, and in the alterations he may conceive necessary of the measures about to be described.—In this form of the disease, especially if it be associated with congestion or inflammation of the lungs, if the constitutional powers be unbroken, and if it have appeared suddenly or advanced rapidly, a full *bloodletting* will be requisite, and may even be repeated. In most cases, however, local bleeding by cupping will be preferable to a repetition of the venæsection; and in more doubtful cases, the local depletion, if decidedly employed, will be sufficient. If cupping be prescribed, it should be performed on the part opposite to the seat of soreness or pain, or at a distance from it, particularly when the lungs or pleuræ are affected. Contemporaneously nearly with depletion, medicine should be taken to act upon the secretions, and equalise the circulation; and, for this purpose, there is, perhaps, nothing superior, in the first instance, to *calomel*, in a full dose, combined with *James's powder*, or with a moderate dose of *camphor*, or with both. In some cases, and particularly in persons who have been addicted to drinking, the *calomel* will be advantageously conjoined with *opium*. In this class of subjects, general bloodletting must be employed with caution. After one or two doses of *calomel*, in either of these states of combination, a *purgative draught* should be exhibited and repeated, and its operation promoted by a *terebinthinate enema* (F. 149, 151.). Having removed plethora and reduced the increased action, the good effects of *counter-irritation* will be more readily obtained. The tartarised antimonial ointment (F. 749.), or the pea issue, are upon the whole to be preferred; but they should be employed on the side opposite to that where uneasiness is complained of, or at some distance from the most affected part. Whatever external irritant may be adopted, should be long persisted in. In the course of treatment, *calomel* or blue pill, with either *James's powder* or *tartarised antimony*, should be repeated from time to time, until increased action disappear; or be regularly continued, particularly if the pleuræ or pericardium be affected, until the specific mercurial effects become manifest; when deobstruent and *saline purgatives* may be prescribed, and their effects promoted by the occasional exhibition of the enema already recommended. The more cooling *diuretics* only should be given at short intervals, in order to promote the functions of the kidneys. These will be advantageously associated with *diaphoretics*. For the former purpose, the supertartrate of potash with borax, the acetate of potash, and the nitrate of potash alone, or with nitric æther, may be used; and for the latter, the camphor julap with liq. ammoniac acetatis, with vinum antimonii tartarizati, or acetum colchici, and small doses of opium. In this form of dropsy, I believe that all heating diuretics, as squills, juniper, seneka root, horseradish, with their com-

binations and preparations, are more or less injurious, unless vascular action has lapsed into a state different from the sthenic form with which it commenced. With this impression, I have usually preferred those that are the most sedative and refrigerating, especially foxglove, colchicum, the wine of tobacco in small doses, and the spiritus ætheris nitrici, as long as any evidence of increased action remains.

41. *B. Of Sub-acute Dropsy.*—Those intermediate states of the disease, between the acute and the passive — between the sthenic and asthenic forms — will necessarily require means appropriate to the grade of action they may evince. In the more acute cases, local depletions, and the rest of the treatment described above, will be most efficacious. In these, the judicious exhibition of derivatives and purgatives, followed by diaphoretics and diuretics, constitute the chief means of cure; and, when this state of the disease occurs after scarlatina or measles, or in connection with bronchitis, digitalis, the preparations of antimony with opium, and the warm or tepid bath, in addition to these medicines, and followed by change of air, will prove of essential benefit. In the more sthenic cases of the sub-acute, as well as in the acute, disease, when it arises from suppression of the perspiration, or of the exanthemata, the warm or tepid bath, or medicated baths consisting of emollient decoctions, &c., or containing the sulphuret of potash, or the sub-carbonate of soda or of potash, will be serviceable, when employed after sufficient sanguineous and alvine evacuations. In the less active states of the disease arising from the same causes, particularly from suppressed eruptions, the application, and, occasionally, the repetition, of a large blister, or of mustard poultices, or of warm terebinthinate epithems, at a distance from the seat of effusion, or of irritative action, where the existence of this latter is inferred, will frequently be productive of benefit. In those cases which approach the passive or asthenic character, or in such of the above which may lapse into it, owing to neglect of treatment, or to a too active treatment relatively to the nature of the case, or to constitutional fault, the means that will be advised for the form of the disease which is thus characterised (§ 42.) should be employed. It will sometimes occur, especially in the intermediate or more doubtful cases, and even also in the acute, that the more antiphlogistic means will be productive of little or no benefit, or will even appear to aggravate the symptoms, although their exhibition seemed clearly indicated. I have generally observed that the practitioner has been misled by the great frequency of the pulse, which he has mistaken for a sign of increased or sub-acute action, instead of viewing it, when it is at the same time soft, small, and easily compressed, and when it is connected with other signs of depression of vital power, as evidence of great weakness conjoined with increased irritability of the vascular system. In such circumstances, I have found gentle tonics and astringents, with deobstruent laxatives, or with alkaline sub-carbonates; and the moderately stimulating diuretics, more especially the balsamic and terebinthinate preparations, with camphorated opiates, &c.; and, if the pulse be languid, with frictions, actively, long, or frequently employed; prove very beneficial. Sub-acute or acute dropsies,

appearing after the suppression of the hæmorrhoidal discharge, require, after moderate bloodletting, the active exhibition of *hydragogue purgatives*; and the same states of disease connected with suppressed menstruation are most benefited by a nearly similar treatment, with the addition of the *sub-borate of soda*, continued regularly for some time. In some cases of the less sthenic state of sub-acute dropsy, the internal and external use of the *nitro-muriatic acids*; or a well-regulated course of Bath waters, with frequent changes of air; and in others, the artificial waters of Carlsbad, Ems, or Marienbad; and where the bowels require frequent assistance, the Seidschutz waters; have proved very serviceable.

42. *C. Treatment of Asthenic or Passive Dropsies.*—In cases where the debility is general, at the same time that vascular action is either languid, or weak—notwithstanding that the pulse is frequent—and the vital cohesion of the cellular and serous tissues is diminished, *tonics* with the *mineral acids*, especially the infusion of cinchona or the sulphate of quinine, should be prescribed. Where a cachectic habit of body is manifest, quinine will probably occasion heat and feverishness. In such cases, it will be necessary to associate the vegetable tonics with *deobstruents* and *laxatives*; to exhibit the blue pill or PLUMMER'S pill in small and frequent doses, with *taraxacum*, or the compound decoction of *sarsaparilla*, the mezereon having been left out. In many of those doubtful cases of this form of the disease, where it is difficult to determine whether it is primary, or associated with obscure lesion in the secreting substance of the liver or kidneys, some advantage will be derived from minute doses of the *oxymurias hydrargyri* in large quantities of the decoction of sarsaparilla, or of any of the species of the *smilax*. I have likewise, in such circumstances, found great service from *iodine*, particularly the hydriodate of potash, and the iodurated solution of the hydriodate, in smaller and much more frequent doses than are usually directed.

43. When this form of dropsy has arisen from excessive losses of blood, or has supervened on chlorosis, the *chalybeate preparations*, with chalybeate mineral waters, or the artificial Pyrmont and Spa waters, will be of the utmost service. But care should be taken to ascertain the non-existence of visceral obstruction before they are resorted to, and to preserve the bowels freely open during their use. When passive dropsy occurs after delivery or abortion, bitter infusions, and vegetable tonics, the decoction of cinchona with mineral acids, occasional purgatives, and the terebinthinate enema, with frictions of the surface and bandages, will be requisite; and, if it be accompanied with hysterical symptoms, the preparations of juniper, spirit. ætheris nitrici, or other ætherial preparations, with tinct. camphoræ comp., or small doses of opium, will be of much service. In these cases, the combination of diuretics with bitter or tonic infusions, and small doses of the tinctura camphoræ Thebaïca (F. 708.), or the tinct. opii camph. (F. 728.) will generally be advantageous.

44. *ii. TREATMENT OF CONSECUTIVE OR SYMPTOMATIC DROPSIES.*—It is obvious that the intentions of cure in this class of dropsies should have strict reference to the nature of the organic lesions concerned in the production of effusion,

and to the state of vital energy and structural cohesion; and that they should comprise the following objects.—1st. To remove these lesions, and if this cannot be accomplished, to retard their increase, as the chief means of diminishing the effusion;—2d. To promote the absorption of the fluid accumulated;—and, 3d. To support the constitutional powers; as being necessary both to the due operation of remedies, and to the exertion of that vital resistance which guards the structures against the impression of hurtful agents, whether generated within the system, and acting intrinsically, or invading them from without.

45. *A. Of dropsy consequent on disease of the heart.*—It will be important to ascertain, as correctly as the rational and auscultatory signs will enable us, the nature and seat of the cardiac lesion, in connection with the seat of effusion, and its characters in respect of activity. If obstruction to the circulation be seated in the left side of the heart, there will very probably be associated with the effusion, congestion of the substance of the lungs, which will aggravate the hydropic symptoms, and render depletion the more necessary. Also, if the cardiac disease consist, either altogether, or in part, of active enlargement of the parietes of the cavities, the dropsy will present a sthenic character, and require antiphlogistic remedies; but if the lesions be chiefly passive,—if there be dilatation with thinning or softening of the parietes of the heart,—the constitutional symptoms will possess analogous features, and the disease require an opposite—a tonic, treatment. It will be evident from these facts merely, that, in symptomatic, as well as in idiopathic, dropsy, and even in that connected with impeded circulation through the heart, the strictest reference should be had to the state of vital power and vascular action, as the principal basis of our intentions of cure.

46. If a state of sthenic action exist, *local depletion*—preferably by cupping; hydragogue cathartics, as *elaterium* and the *croton oil*, repeated from time to time; or even these independently of depletion; and subsequently the use of *diuretics*, or these at an earlier period where the active and repeated exhibition of purgatives are not well borne; will frequently remove the accumulation of fluid. In this state of the disease, *digitalis* is the most efficacious diuretic, especially after local depletions and purgatives, in the more sthenic cases. Debility rather indicates, than contra-indicates, the propriety of resorting to it. The infusion is the most certain preparation of this medicine. Half an ounce of it two or three times a day, as usually directed, is a much larger dose than that recommended of its other preparations; hence the reason of its activity, its diuretic operation being heightened by the addition of small doses of opium. If a tensile pain in the forehead, with disturbance of the cerebral functions, come on early after its exhibition, it will rarely be of service, or it may even be injurious, as remarked by Dr. BLACKALL, and it, therefore, should be immediately relinquished. When there is much debility, it should also be discontinued upon the first appearance of an increase of the urine. But even great debility is no reason against the use of this medicine, as Dr. WITHERING has shown; only the more caution is required in its exhibition. In such cases I

have usually combined it beneficially with camphor, a small quantity of opium, or with cinchona (F. 859.), and other vegetable tonics and cordials, or with F. 708. or 728. *Colchicum* is sometimes of service when this form of dropsy assumes a sthenic character, or appears in the rheumatic or gouty diathesis; but it requires much caution. It is most safe, and at the same time most serviceable, when combined with camphor or ammonia, or with the alkaline sub-carbonates, and infusion of cinchona.

47. When the cardiac disease and its consequent effusion are of a passive kind, and especially if the constitutional powers are much reduced, a tonic treatment, in conjunction with stimulating diuretics, is requisite. The remedies of this description already recommended (§ 43.),—the *infusion of quassia*, with the *muried tincture of iron*, and tincture of *digitalis*; the compound infusion of *angelica*, (F. 219.); the decoction of *broom tops* (F. 75.), with the compound spirit of juniper; the compound decoction of *taraxacum* (F. 77.), with tincture of *calumba* or *tartarised iron*; and either Formulæ 570. 781. 859., or the following, will often be prescribed with benefit:—

No. 179. R Potassæ Sub carbon. ℥j.; Tinct. cinnamon. Co. ℥j.; Spirit. Æther. Nit. ℥j.; Infus. Gentianæ Comp. ℥j.; Aquæ Anethi ℥ij. M. Fiat Haustus ter quotidie sumendus.

No. 180. R Potassæ Acetatis ℥ss.—℥ij.; Tinct. Digitalis ℥viij.; Tinct. Opii ℥v.; Spirit. Junip. Comp. ℥j.; Infus. Quassia ℥ix.; Aquæ Pimentæ ℥ij. M. Fiat Haustus ter quaterve in die sumendus.

No. 181. R Camphoræ subactæ, Guaiaci Resinæ, aa ℥j.; Pulv. Scillæ et Pulv. Digitalis aa gr. xv.; Op. Puri gr. v.; Olei Juniperi ℥xij.; Mucilag. Acaciæ q. s. M. Contunde simul, et distribue massam in Pilulas aequales xlviii., quarum capiat binas ter in die.

No. 182. R Tinct. Digitalis ℥x.—xv.; Liquor. Ammonia Acetatis ℥ij.; Infus. Cinchonæ et Mist. Camphoræ aa ℥vj.; Tinct. Camphoræ Comp. ℥j.; et Spirit. Anisi ℥ss. M. Fiat Haustus bis quotidie sumendus.

48. *B. Dropsy from disease of the absorbing systems—veins and lymphatics.*—The difficulty of determining when the effusion is owing to these causes has been stated above, with such signs as sometimes indicate its existence (§ 25. et seq.). In the more limited states of anasarca, and even in ascites, *bandages* and *frictions*, assiduously employed, with the internal exhibition of the *hydriodate of potash*, or of the other preparations of iodine to be found in the *Appendix* (F. 234. 723.), have proved exceedingly beneficial in some cases in my practice. The decoction of *broom tops* with liquor potassæ, or this latter in the compound decoction of sarsaparilla; equal quantities of the sub-borate of soda and supertartrate of potash in the *decoctum cydonia*, or *decoctum guaiaci comp.*; the *diuretic drinks*, in the *Appendix* (F. 588. et seq.); and frictions with deobstruent *liniments* (F. 295. 297. 311.), will occasionally be of much service. The sub-carbonate of *soda*, or *nitrate of potash*, or both, exhibited in tonic infusions, to which small doses of *digitalis* are added; and the infusion of *berberis*, or the compound decoction of *taraxacum* (F. 76, 77.), with sub-carbonate of potash or of soda; or the same alkaline carbonates with the infusion or mixture of the *diosma crenata* (F. 231. 396.); may likewise be employed, with a prospect of advantage, from their deobstruent operation. In all cases of this kind, gentle exercise in the open air; the use of the artificial waters of Marienbad, and Eger, or of Seltzer or Seid-schutz; and strict attention to a moderate, di-

gestible, and cooling diet; will prove of essential benefit.

49. *C. Dropsy connected with pulmonary diseases.*—The treatment in this complication should mainly depend upon the character of the vascular action, and vital power, and the nature of the existing pulmonary lesion. If active congestion or inflammatory action be present in the substance of the lungs, or in the pleuræ, general or local depletions, or both; the internal use of *antimonial* preparations with *diuretics*; and external derivation, as pointed out above (§ 40, 41.); constitute the principal means. The same treatment is required, with the addition of purgatives, if the effusion be associated with acute or sub-acute bronchitis. In these states of the disease, the heating diuretics, as squills, ammoniacum, senega, &c., ought not to be exhibited. The supertartrate of *potash* with *borax*, or with *digitalis*; or any of the neutral salts, with *liquor ammoniæ acetatis*, the *spiritus ætheris nitrici*, or the *acetic æther*; or the preparations of *colchicum* with the alkaline carbonates, or with camphor or ammonia; are the most appropriate. In the chronic and asthenic states of pulmonary disease connected with a similar condition of the system, a tonic treatment is indispensable; and the warmer diuretics (F. 552. 570. 893.) will generally be employed with benefit, more particularly the *balsamic* and *terebinthinate* preparations (F. 22. 169. 485. 487. 571. 681. 827.), and *ammoniacum*, with the tinct. camphoræ comp. (F. 708.), or the tinct. opii camphorata (F. 728.), or the preparations of *squills* with any of the neutral salts, given in the light bitter, or tonic, or diuretic infusions. (See BRONCHITIS—Treatment of Chronic, &c.)

50. *D. Treatment of dropsy from disease of the liver and spleen.*—(a) This form of dropsy is very commonly connected with general debility, and with a cachectic state of the frame. In some cases, the colour, consistence, and vital cohesion of the soft solids are more or less changed, particularly the cellular, serous, and mucous tissues. These circumstances should not be overlooked in framing plans of treatment. Cases of this complication are comparatively rare, that require general or even local depletion. However, when symptoms of inflammation of the liver are present, *general* and *local depletions*—the latter at least—should not be omitted. *Mercurials* should also be employed, especially when the surface of this organ is the part chiefly inflamed; and occasionally externally by friction, as well as internally; counter-irritation being kept up at the same time. But it is doubtful whether or not these preparations are beneficial in the chronic lesions of the substance of the liver. I have generally abstained from prescribing them in such cases, excepting the oxymuriate, in minute doses in the compound decoction of sarsaparilla, or in the preparations of cinchona. More service will accrue from the *nitro-muriatic acid bath*, or from sponging the surface of the hypochondria, night and morning, with a warm lotion containing these acids, or from the internal use of them. The *chlorate of soda* may also be taken with advantage; but I believe that greater benefit will be derived from the *hydriodate of potash*, or the other preparations of *iodine*, given in minute doses, and continued for a due period, than from any other medicine. Either the infusion of *calumba* or of

quassia, or the infusion of pine tops; or the decoction of *genista*, or of *taraxacum*, with the alkaline sub-carbonates, or with the *liquor ammoniæ acetatis*, and *spiritus ætheris nitrici*; and the supertartrate of potash with sub-borate of soda, and *squills*, taken in the form of electuary, with the inspissated juice of the *sambucus nigra*, will be more appropriate when the liver is organically changed than in the other forms of the disease. The preparations of *colchicum* and *tobacco*, particularly the *tinctura tabaci composita* (F. 742.), may also be given in this complication, but with caution. They have seemed to me most beneficial when associated with large doses of the alkaline sub-carbonates, and taken in tonic infusions or decoctions; as those remedies which depress the vital powers too low are seldom productive of benefit in cases of this description. (See DROPSY—of the Abdomen.)

51. (b) A nearly similar treatment will be necessary when the *spleen* is enlarged, to that now recommended in cases of organic change of the liver. I believe, however, that tonics of an active kind, particularly cinchona, quinine, the preparations of iron, and the arsenical solution, either conjoined, or alternated with purgatives or diuretics, are much more necessary in this complication than in that last discussed. All the cases I have seen connected with enlargement of the spleen were consecutive of protracted agues; and in these, after exhibiting one or two full doses of calomel with camphor, and fully evacuating the bowels by means of the compound infusions of gentian and senna (F. 266.), the above tonics, prescribed as now mentioned, and assisted by frictions over the region of the spleen, were productive of great benefit. In the case of a patient from one of the most marshy parts of Essex, with this complication, the preparations of *iodine* were essentially efficacious. In this state of the disease, but little or no permanent benefit will be derived as long as the patient continues to reside in a miasmatic locality. In it, also, more than any other form, will advantage accrue from moderate exercise, change of air, sea-voyaging, and the use of the Carlsbad or Ems mineral waters,—which, with those of Marienbad, Eger, and Seidschutz, are often of service when the effusion arises from hepatic obstruction.

52. *E. Treatment of dropsy from disease of the kidneys.*—Attention has been so recently drawn to this complication, by the writings of Dr. BRIGHT, that sufficient experience of the means of treating it has not been yet acquired. I have had an opportunity of treating only three cases, in which these organs were found diseased after death, since the publication of Dr. BRIGHT's work. They were persons of broken-down constitutions, by drinking. In one of them the accumulation steadily increased, notwithstanding cupping over the loins, counter-irritation in this situation subsequently, friction with stimulating liniments, and various internal remedies, were employed. In the others, these means were of temporary benefit. The supertartrate of potash with jalap, and squills with opium or hyoscyamus, are mentioned by this pathologist as having been the most serviceable in the cases which occurred in his practice. I believe that, in a very great majority of instances where effusion proceeds from this cause, the irritating nature of the fluid poured out superinduces

inflammation of the membranes and cellular tissue containing it, and thereby aggravates the disease, and accelerates a fatal issue. That the fluid is possessed of these properties may be viewed as a postulatam; but if it be considered that, when the functions of the kidneys are interrupted, excrementitious or serous plethora (see BLOOD, § 19.) will be the result; and that the watery parts of the blood, which are effused from this cause, must necessarily contain a considerable quantity of the injurious matters usually eliminated by these organs; the irritating quality of the accumulating fluid here contended for will be admitted. In the cases seen by me, consecutive inflammatory action appeared in the seats of effusion; and a similar occurrence took place in most of those detailed by Dr. BRIGHT. When this complication is attended by debility or diarrhoea, the propriety of employing tonics, with diuretics and opiates, as cinchona or quinine with the mineral acids or squills, cannot be doubted; and, when the bowels are constipated, or when diarrhoea is not present, free alvine evacuations by purgatives combined with bitter tonics, which increase their operation, will be productive of benefit. I believe that there are few cases of this form of dropsy that may not admit of the judicious exhibition of strengthening medicines, when a free action is exerted on the bowels; that the diarrhoea and tormina which sometimes accompany it, are seldom attended by copious evacuations, but require that they should be procured by medicine; that the *balsams* and *terebinthinates*, either conjoined with these, or trusted to chiefly alone, or with small doses of opium, will prove more beneficial than other diuretics; and that a lowering or antiphlogistic treatment has been too generally adopted, as well in cases of this description, as in others where coagulable urine is observed, owing to the mistaken notion that this symptom always indicates inflammatory or sthenic action.

53. *F. The treatment of dropsy from disease of the uterus or ovaria* will depend upon the state of vital power and vascular action. Although very generally evincing an inflammatory character, and connected with suppression of the sexual discharges, yet it is often associated with depressed vital or constitutional power, at least in those instances which have come before me. When, however, it supervenes on chlorosis, it is altogether a disease of debility. In the former class of cases, local depletions, cooling aperients and diuretics with gentle tonics; the nitrate of potash and sub-carbonate of soda, with the spiritus ætheris nitrici and hyoscyamus in the infusion of cinchona, or of calumba, or of juniper berries; the supertartrate of potash with sub-borate of soda; the expressed juice of the sambucus nigra and syrup of squills; and frictions with oleaginous or terebinthinated liniments (F. 297. 311.); may be severally employed; but the treatment should mainly depend upon the presumed state of the primary disease, of the consecutive effusion, and state of vital power. The object, in this form of the disease especially, should be to remove the primary lesion; for when this is accomplished, the effused fluid will soon be absorbed. When the disease follows *chlorosis*, the preparations of iron, the *mistura ferri composita*, the sub-carbonate of iron with electuary of senna and oxymel of squills; the preparations of juniper with cinchona, &c.,

with change of air; horse-exercise, the chalybeate mineral waters, and warm clothing, will generally be efficacious. I had recently a case of this description under treatment, both whilst it was simple chlorosis, and when water had collected in the abdomen and lower extremities. I was surprised at its resisting the free use of chalybeate and other tonics; when I found that the patient had entertained a dislike to salt, and to food which contained it, and had long avoided it. The cause of the general and extreme cachexia was now evident: the use of salt was enforced; the chlorate of potash was also prescribed alternately with the preparations of iron, and recovery soon took place.

54. ii. NOTICES OF THE MEDICINES RECOMMENDED IN DROPSIES BY AUTHORS, WITH PRACTICAL REMARKS.—Having, in the foregoing sections, stated chiefly the results of my own experience, I now proceed to notice, under distinct heads, the means advised by respectable and original authorities for the treatment of this class of diseases. The remedies recommended in the cure of dropsies have usually been directed with the following intentions:—1st. *To remove the state of vascular action, and vital power giving rise to effusion*—(a) by refrigerants, comprising vascular depletion and other antiphlogistic remedies; (b) by sedatives; (c) by external irritation; (d) by tonics and astringents; and (e) by a combination of two or more of these;—2d. *To remove obstruction to the circulation, and to promote the absorption and discharge of the accumulated fluid*—(a) by deobstruents, frictions, and bandages; (b) by purgatives and hydragogue cathartics; (c) by diuretics; (d) by emetics; (e) by sudorifics and (f) by various combinations of them;—and, 3d. *To evacuate the fluid by surgical aid*—(a) by blisters and scarifications; (b) by acupuncture; (c) by paracentesis. Of these last means notice will be taken when the specific states of dropsy in which they have been employed come under consideration.

55. 1st. *To remove the State of Vascular Action and Vital Power giving rise to Effusion.*—A. *By refrigerants, &c.*—(a) *Vascular depletion*, general or local, or both, has been advised in the acute states of the disease from HIPPOCRATES up to the present day; and has been more particularly insisted on by MESUÉ, BONET, AASCHEIM, SCHULZE, BRUELE, JUNCKER, STOLL, TISSOT, RUSH, OBERTEUFFER, GRAPENGIESSER, BLACKALL, ABERCROMBIE, GRAHAM, VENABLES, and AYRE. The propriety of repeating it has been shown by J. P. FRANK, Dr. GRAHAM, and some later writers; although the number of cases that can admit of the repetition of general blood-letting will be comparatively small, and those only in the young or unbroken constitution.—(b) *Nitre* has been very generally prescribed, not merely as a refrigerant, but as a diuretic. RUSH attached some importance to it after venæsection, directing it with *sparè diet*; and ROSIER and OBERTEUFFER, with squills.—(c) *The muriate of ammonia*, in doses of ten grains to a scruple, has been given by me in some cases consequent upon ague with benefit; and is appropriate not only to acute and sub-acute cases, but also to the more passive states of the disease, particularly when taken in tonic or warm diuretic infusions, and conjoined with ammoniacum.—(d) *Low diet* has been especially noticed by TISSOT and RUSH.

56. *B. By sedatives.*—(a) *Antimonials* may be more appropriately considered as sedatives than as diaphoretics, inasmuch as their operation in the latter capacity arises from their sedative influence on vascular action. *James's powder* and *tartar emetic* are the preparations of this class most to be depended upon, and are sometimes useful in the acute and sub-acute forms of the disease, conjoined with calomel, or with cream of tartar. They have been prescribed in such cases by VAN HELMONT, SYDENHAM, MYNSICHT, and RICHTER. With squills and saline diuretics, they have been employed by BRISBANE and WILlich.—(b) The diuretic operation of *tobacco* is evidently owing chiefly to its sedative influence on the circulation. This active substance is indicated in the more acute states of the disease, but it may also be exhibited with tonics and stimulating diuretics, where the debility is more manifest. It has been recommended in the form of powder, infusion, wine, or tincture, by MAGNINUS, BARTHOLIN, FOWLER, NEANDER, GARNETT, and BALDINGER. Dr. FOWLER advises the *infusion* in gradually increased doses; GARDEN, its ashes with *rhubarb* and sulphate of iron; and some Continental writers with camphor in the form of *tincture* (see F. 742.), which may be added to other medicines. The *ashes* of tobacco are very frequently mentioned by the writers of the last century, but their operation can depend only on the quantity of vegetable alkali they furnish.—(c) Several of the *solanaceous* order of plants, besides tobacco, have been employed in dropsies, both as the principal means confided in, and in order to assist, by their sedative and diuretic operation, other medicines possessed of less equivocal diuretic properties. The *belladonna*, the *physalis alkekengi*, the *solanum dulcamara*, the *s. somniferum*, and the *s. nigrum*, have been employed by STOËRK, BALDINGER, STARK, and others, with this intention. The *hyoscyamus* has also been very frequently prescribed, with the view of diminishing irritation and promoting the action of other medicines; but it is inferior to—(d) *opium*, in this respect, the good effects of which in dropsies have been particularly noticed by WILLIS, ARNEMANN, BROCKLESBY, RITTER, BAKER, and MASON. Its influence in determining and heightening the effects of diuretics has been shown by LENTIN and PARIS. DOEMLING always added it to *squills*; and LEAKE, to this medicine and cream of tartar.—(e) The *lactuca virosa* has also been recommended to fulfil the same indications with the above by COLLIN, DURANDE, and RICHTER, particularly in conjunction with *digitalis*—two grains of the extract of the former, with half a grain of the dried leaves of the latter, finely triturated with white sugar, and taken three or four times a day. The foregoing sedatives, as well as the *colchicum* (§ 80.), will be found very useful adjuncts, and indeed not infrequently the chief means that should be resorted to when the disease is attended with much pain, or with spasms or cramps.

57. *C. By external irritation.*—It is but rarely that external irritants give issue to a quantity of serum sufficient to unload very considerably the vascular system: but in the acute, and especially in the sub-acute, states of the disease, after depletions, a judicious use of them is often productive of benefit, by transferring the irritation

sometimes occasioning the effusion, from the internal parts. They are applicable chiefly to dropsies of the thoracic cavities, depending upon pulmonary disease, to those consequent on scarlatina, and to ascites. The means by which counter-irritation should be effected is an important consideration. In the states and species of the malady now alluded to, the *tartarised antimonial ointment*, or *issues*, may be preferred; or blisters may be applied in the more asthenic and rapidly progressive cases. When the effusion seems owing to obstruction of the liver, *blisters*, several times repeated, over the right hypochondrium, and below the right shoulder-blades, or *rubefacient plasters* in the same situation, are sometimes of much service. When the kidneys are apparently affected, they may be applied over the loins, after cupping in that situation; or the tartarised antimonial ointment may be used. In the more sthenic cases, or when the urine is very thick and scanty, it will be preferable to apply fine tissue paper between the skin and the blister, or to dip the plaster in boiling water before applying it, in order to prevent the absorption of the irritating principle of the flies. In some cases, scraped horseradish, or the inner bark of the mezereon, will prove excellent counter-irritants; or mustard poultices may be used for this purpose. I have, in several cases, however, seen more benefit arise from the application of a cloth moistened with either of Formulæ 296. 300. 311. in the Appendix, or with spirit of turpentine, over the seat of disease, than from any of the foregoing. The inflammatory irritation they occasion is never followed by unpleasant results, as in the case of blisters, which, in the old and debilitated especially, sometimes produce dangerous effects if not carefully watched.

58. *D. By tonics and astringents.*—These medicines are often necessary in some of their various combinations, even in cases where it is necessary to resort to vascular depletion, and not infrequently after this practice has been employed. Much, however, will depend upon the selection of these medicines, and the mode of exhibiting them, appropriately to the pathological states of the case. The observations already offered will assist the practitioner, with a due exercise of his own discretion, in this important matter. Tonics and astringents are indispensable in all the passive or asthenic states of the disease, associated either with diuretics or with purgatives; and in many of the sub-acute and even acute forms, after the antiphlogistic treatment has been prescribed, particularly when conjoined with cathartics. They are especially indicated where the effusion seems to depend chiefly upon an atonic state of the extreme vessels, and deficient vital cohesion of the cellular and serous tissues, with flaccidity of the soft solids generally. In cases of this description they have been directed by most writers, and even by J. P. FRANK and RICHTER, by whom the inflammatory and sthenic states of effusion have been so ably investigated.

59. (a) Of the particular tonics that may be employed, the preparations of *cinchona* and *sulphate of quinine* are the most generally applicable. They have been especially noticed by LENTIN, DE HAEN, BROUGHTON, and RING. The *infusion* or *decoction* of bark is an excellent vehicle for the alkaline and saline diuretics, as

well as for several purgatives, the action of which it tends to promote. LETTSOM gave cinchona with squills; LYSON, with serpentaria, either in tincture or infusion; J. P. FRANK, with juniper; HORN, with the balsams or turpentine; and VOGEL, with the neutral salts, or sub-carbonates of the alkalies. Where the sthenic diathesis may seem to contra-indicate its use, the infusion will be advantageously associated with the nitrate of potash and sub-carbonate of soda, and with appropriate diuretic tinctures or spirits. It may also be given with the mineral acids and aethers, especially the muriatic or sulphuric. The sulphate of quinine may also be taken in the compound infusion of roses, or of orange peel, in conjunction with the sulphates of magnesia, or of potash, or of soda, and any diuretic spirit or tincture.—(b) The infusion of calumba, of quassia, and of gentian, have been exhibited in similar states of the disease, and combined with the same substances, as cinchona.

60. (c) The preparations of iron have been as generally prescribed in dropsies as those of cinchona; and, as in respect of them, with the object of imparting tone to the minute vessels, and thereby of diminishing effusion, and of preventing its recurrence after the fluid has been directly removed. This class of tonics was much employed by DOVER, BLACKMORE, BERGIUS, TISSOT, GRIEVE, FRANK, and RUSH. The combination of chalybeates with purgatives is advised by RIEDLIN and THOMANN. DOVER recommended an electuary consisting of the sulphuret of iron, scammony, and crude mercury; of which Dr. BLACKALL has made favourable mention. FOUQUET directed it with sulphur. The ferrum tartarizatum and the muriated tincture are the preferable preparations; but the sulphate or sub-carbonate may likewise be used. An electuary containing the tartarised iron, the confection of senna, the inspissated juice of the sambucus nigra, and the syrup of squills, will often prove serviceable in asthenic states of the disease.—(d) The absinthium, in the form either of infusion, wine, or powder, was formerly much employed; and was praised by CELSUS, BONET, HARTMANN, and many others, particularly when given in conjunction with juniper, or other diuretics. It has now undeservedly fallen into disuse.—(e) Of the stimulating tonics, phosphorus has been prescribed, in minute doses, and usually dissolved in oil or aether, by LOEBEL, GAULTIER DE CLAUERY, and others: it has likewise been used externally in oleaginous liniments.—(f) Insolation, or exposure to the sun's rays, has been recommended by CELSUS and PORTAL.

61. (g) Several of the astringent tonics have been directed in various combinations. The sulphuric acid was recommended by MONDSCHEN, HALLER, TISSOT, BANG, and HARTMANN; and was frequently given with the infusion of the bark or of the flowers of the sambucus nigra, or the infusion of quassia, or of cinchona. The muriatic acid was also exhibited in similar states of combination by RIVERIUS and DIGBY. The nitric acid, either alone, or with the muriatic in equal proportions, has been very commonly employed, both internally and externally, by practitioners in the East Indies, in cases depending upon hepatic disease (§ 50.).—(h) The sulphate of copper, in doses of half a grain each, with opium, has been

praised by WRIGHT.—(i) In addition to these, the centaurium minus and the inula campana have been noticed by GRÜLING and others, who have prescribed them in the form of wine or beer; and the prinos verticillatus, by BARTON.—(k) The mineral waters of Pyrmont, Spa, Bath, and Tunbridge, have been severally directed in cases for which tonics are appropriate. Dr. PERCIVAL recommended the natural and artificial waters which contain fixed air. SCHENCK, QUARIN, GILCHRIST, J. P. FRANK, and several other writers, mention in favourable terms change of air and sea-voyaging.—(l) Most of the ancients, with FULLER, RUSH, and some others of the moderns, have insisted on the good effects of active exercise in the open air. When the patient is able to adopt this advice, there can be no doubt of its great efficacy.

62. D. By a combination of two or more of the foregoing plans of cure.—I have already remarked that depletions are not infrequently requisite to a moderate extent, in order to remove relative or excrementitious plethora, even although vascular action may not be increased; and there is often a necessity for the exhibition of tonics at the same time, generally with purgatives or diuretics. The propriety, however, of associating sedatives with the various antiphlogistic measures noticed above, and counter-irritation with both, in the inflammatory or acute states of the disease, is still more manifest. The combination, also, of some one of the sedatives with the tonics or astringents, whether these latter be given alone, or conjoined with one or more diuretics or deobstruents, is generally found useful, not merely in promoting their operation, but also in relieving the more uneasy sensations which frequently occur during the progress of the disease.

63. 2d. To remove Obstructions to the Circulation, and to promote the Absorption and Discharge of the accumulated Fluid.—This indication comprises three objects,—the removal of obstruction, the promotion of absorption, and the augmentation of the urinary discharge. These, however, are so intimately connected, that the attainment of the first is generally followed by the second and third.—A. By deobstruents, and the use of frictions and bandages.—These means are obviously appropriate to cases of dropsy depending chiefly on congestion of the large veins, or to obstruction either of them or of the lymphatic system (§ 48.). Many of the remedies which are supposed to act upon the kidneys, operate in some respects by removing obstructions to the venous and lymphatic circulation, and increasing the action of the absorbents. Those substances which have been very commonly termed deobstruents, pass into the blood by the veins or lymphatics, where they either modify its condition, or excite the extreme vessels when they are congested, thereby accelerating the circulation through them and the veins, and removing the state that favours increased exhalation.—(a) Mercurial preparations are amongst the most common medicines employed as deobstruents. But they are not always applicable; for when the dropsy is connected with organic change in the substance of the liver, they should be given with circumspection. When the obstruction exists chiefly in the venous and lymphatic systems, or depends upon disease of the heart; or when

the effusion is caused by increased action in the serous membranes; they are valuable medicines. The scrofulous diathesis and weak vital energy are not always satisfactory reasons against their use, although these states of system require a peculiar mode of exhibiting and combining them. In acute cases, *calomel*, with antimony or camphor and opium, is the preferable medicine. In this and similar states of preparation, it has been employed by LYSONS, LANGGUTH, HAMILTON, BECKER, and others. Where active disease exists in the pleurae, pericardium, peritoneum, or surface of the liver, this is the best mode of exhibiting mercurials; but where there is much *debility*, this medicine should be given in small doses with soap, and guaiacum, as advised by RIEPENHAUSEN; or in the form of PLUMMER'S pill, with soap and taraxacum. In an atonic or asthenic state of vital action, as well as in the scrofulous diathesis, small doses of blue pill, similarly combined; or of the *sublimatum*, dissolved in the compound decoction of sarsaparilla, or tincture of cinchona, with diuretics; will be found both safe and beneficial medicines. Mercurials have been directed to be pushed to salivation by many authors; and in cases where the disease is connected with inflammatory action in the serous membranes, and when vascular depletion has been previously instituted and carried sufficiently far, the practice is beneficial. It is likewise applicable when there is evidence of inflammation of the surface of the liver, as indicated by pain, soreness, and tenderness of its region, &c. In the more chronic and asthenic states of disease, mercurials have been directed to be given with squills, by FISCHER and other writers; and with tonics, by WRIGHT.

64. (b) *Iodine*, variously combined, has proved, in several cases of dropsy in which I have employed it, a most valuable deobstruent and diuretic. It is not applicable to the cases arising from disease of the serous membranes, and heart; but when the effusion proceeds from obstruction in the liver, or in the spleen, or in the veins and absorbents (§26, 27, 31.), it seems to me more to be depended upon than any other medicine. I have prescribed it in the form of *tincture*, *hydriodate*, *iodurated solution of the hydriodate*, and of *ioduret of mercury*, both internally and externally, according to the circumstances of the case; and have more frequently preferred the second and third of these preparations; but when the debility is great, the tincture is, perhaps, more to be depended upon than the others.—(c) The fixed *alkalies* and their sub-carbonates have had much repute in dropsies, and were very commonly employed by SYDENHAM, QUARIN, J. P. FRANK, and most recent writers. Although generally used as diuretics, they act chiefly as deobstruents, particularly when combined with taraxacum, small doses of antimony, or of mercury. In cases of debility, they are extremely useful with the tonic or warm diuretic infusions or decoctions,—as the infusion of cinchona, of juniper berries or pine tops; and they may be also associated with the nitrate of potash and diuretic syrups or tinctures. Or they may be prescribed with myrrh, or guaiacum, or sulphur, or ammoniacum, or squills, or camboge, or the extract of black hellebore, according to the peculiarities of the case.—(d) The *sub-borate of soda*

is a very useful adjunct to other deobstruents, and to diuretics (see F. 57. 397. 599.). I believe that its deobstruent action is greater than that of the alkaline carbonates.—(e) *Ammoniacum* has also been exhibited, chiefly on account of its deobstruent operation, and is indicated in the atonic states of the disease, and in the complications with organic change in the liver, spleen, or kidneys; and in cases of venous, absorbent, or glandular congestion or obstruction. In these it may be conjoined with alkalies, extract of taraxacum and squills (see F. 552. 893, 894.). FORDYCE gave it with antimony and nitre,—a form in which it may be safely prescribed in the acute and sub-acute cases, after vascular depletion and purgatives; and RICHTER, with the muriate of ammonia and squills.—(f) *Sulphur*, when judiciously associated with other deobstruents and aperients, or with diuretics, possesses no mean deobstruent properties, more particularly when given with cream of tartar, as HUFELAND advises; or with this substance, the *sambucus nigra*, and the sub-borate of soda; or with the nitrate of potash, and squills; or with the balsams, as directed by MONDSCHIEIN.

65. (g) The *external deobstruents* consist of certain of the substances already noticed, kept constantly applied over the chest, or the loins, or hypochondria, in the form of *plaster*; or assiduously rubbed into the same places, in the form of *liniment* or *ointment*. The *Appendix* will furnish, under these heads respectively, several preparations, consisting chiefly of ammoniacum (F. 109. 117. 891.), the preparations of iodine (F. 302. 768. 775.), of the terebinthines (F. 120. 296, 297.), of mercury (F. 511. 761.), of camphor (F. 115. 306. 758.), and of the sulphurets (F. 309. 776.), with other substances; calculated to promote their operation, and allay internal pain and vascular irritation. Besides those now indicated, will be found arranged along with them, several preparations which may also be used according to circumstances.—(h) *Frictions* are of more benefit in dropsies, particularly in those which depend upon obstruction and atony of the vessels and tissues, than is usually imagined; and were commonly employed by STÖCKER, STOLL, RUSH, WRIGHT, and others. They will be advantageously used with the *liniments* or *ointments* already noticed employed in weaker forms. Frictions with the weak *mercurial ointment* were advised by BROUGHTON, FRANK, and KNIGHT; the addition of camphor to this liniment, as recommended by LENTIN, or the linimentum hydrargyri reduced by the addition of olive oil, or of the linimentum saponis compositum, will be found superior to the mercurial ointment alone. Frictions with olive oil were much confided in by STOLL, OLIVER, CHAMBERLAINE, LANGE, GARDANE, RUSH, and WRIGHT, particularly in ascites and anasarca; and are certainly often beneficial in favouring a free transpiration from the surface, and do not merit the disuse into which they have fallen.—(i) The good effects of *bandaging*, not merely in anasarca, but also in ascites, were insisted on by RUSH; and have lately been shown, in the latter form of the disease, by some French practitioners.

66. B. *By purgative and hydragogue cathartics*.—Purgatives are very generally applicable in dropsies—(a) on account either of their *ecco-*

protic action, or of their deobstruent operation when uninterruptedly continued, or of their influence in deriving from the seat of effusion, in draining the fluid parts of the blood from that circulating in the intestinal tube, in thereby lessening excrementitious or serous plethora and favouring the absorption of the effused fluid. They constitute a most important part of the treatment of every form and state of the disease, according to the selection of them and the manner of combining them. Thus, calomel and antimonials, subsequently to bloodletting, are most appropriate to the inflammatory, the pulmonary, and cardiac complications; the hydragogue cathartics in ascites and anasarca; and the milder purgatives associated with tonics and diuretics in the atonic or passive forms. The advantages to be derived from conjoining the saline purgatives with bitter infusions and with diuretics, even in the acute states of the disease, after the antiphlogistic treatment has been directed, should not be overlooked (§ 59.) The combination of purgatives and cathartics with tonics and diuretics, was adopted by SCRIBONIUS LARGUS, FORESTUS, RIEDLIN, SYDENHAM, THILENIUS, BACHER, WINCLES, RITTER, GRIEVE, and most recent writers: the chief difference being as to the choice of substances, and the appropriation of them to the various states and forms of dropsy.—(b) The *deobstruent* effect of purgatives is most certainly obtained from moderate doses of *jalap* with cream of tartar; or from the extract of *black hellebore*, with myrrh, ammoniacum, and soap; or from *Plummer's pill*, with camboge, soap, and taraxacum, given in moderate doses daily, and long persisted in.

67. (c) A *hydragogue* operation is produced chiefly by elaterium, croton oil, camboge, the inner bark of the common or dwarf elder, the *rhamnus catharticus*, hellebore, and the neutral salts.—a. *Elaterium* is often productive of benefit. It was much employed by SYDENHAM and DEMIANI, and is still very generally prescribed. It is given with soap or any tonic extract, in doses of half a grain every hour, until copious watery evacuations are procured. The following pills will be found the most certain in their operations:—

No. 183. R Extr. Elaterii gr. vj.; Potassæ Sulphatis gr. x.; tere benè simul, dein contunde cum Pulv. Radicis Zingiberis ʒj.; Saponis Duri gr. xvj., et forma in massam cum Olei Anisi ʒj. vel q. s. Divide in Pilulis xvij., quarum capiat unam, duas, vel tres, omni horâ.

68. *β. Croton oil* is one of the most certain hydragogue cathartics that can be employed. It may be given with soap and compound extract of colocynth (F. 543.), or with the aloes and myrrh pill, in doses of about half a drop every two or three hours, until it operates copiously. Dr. NIMMO and Dr. GOOD prefer the alcoholic solution of this oil, but of that I have had no experience; I have found the mode in which I have directed it answer my expectations.—γ. The *extract of black hellebore* has been much used in all drop-sical cases. This plant was very commonly employed by the ancients, and by AVICENNA, RIEDLIN, MONDSCHIEIN, VAN SWIETEN, and QUARIN. The *extract* as prepared (F. 156), and combined, by BACHER, is, upon the whole, the best mode of exhibiting it. It should be fresh, and its effects carefully watched. If it produce restlessness and anxiety, it ought to be relinquished. The following is BACHER's recipe for the pills known by his name:—

No. 184. R Extr. Hellebori Nigri, Myrrhæ, ʒā ʒ ss.; Pulv. Cardui Benedict. ʒjss. Contunde secundum artem in massam æqualem. Capiat gr. ij. ad vj. ter quaterve quotidie.

69. *δ. The sambucus nigra and s. ebulus*—the common and dwarf elder—were praised by FORESTUS, SYDENHAM, SCHROEDER, FOUQUET, BROCKLESBY, QUARIN, CHESNEAU, and LANGE. The inner bark is cathartic, and the flowers both purgative and diuretic. The infusion, inspissated juice, and powder, may be used. It has been almost entirely neglected by recent writers, but I have prescribed it with much benefit.—ε. The *rhamnus catharticus* was likewise employed by SYDENHAM, and is still used in the form of syrup. *Camboge* is often very efficacious when triturated with supertartrate or sulphate of potash. HOFFMANN prescribed it in an alkaline solution; RICHTER, dissolved in oil; and ACKERMANN, finely levigated with white sugar or cream of tartar.—*Jalap*, either its powder or its extract, has been very generally used. GRIEVE gave it with nitre, and VAN SWIETEN with turbith mineral.

70. *ς. Dr. HORNE and Dr. FERRIAR* placed great reliance on the *supertartrate of potash*. I have employed it more than any other medicine in the acute forms of the disease, after the exhibition of mercurials, sometimes in very large doses, in the form of electuary, and variously associated. In these, as well as in other states of the disease, it often proves more efficacious than its purgative or diuretic operation indicates. Either alone, or with the sub-borate of soda, it often succeeds in removing obstructions from the liver, and accumulations of bile from the hepatic ducts, after other medicines had been directed with this intention to no purpose. It may be given in as large doses as Dr. THOMSON and Dr. GOOD have stated (3vj. and ʒj.); but two or three drachms twice or thrice in the day, and persisted in for several days, is preferable. It is apt to be nauseated by the patient; in which case the electuary should be prepared with syrup of ginger, to which the oleum anisi, and a little tincture or powder of capsicum, may be added in addition to the other substances with which it may be requisite to conjoin it. In some cases, sulphur will be added to it with advantage; in others, guaiacum, ammoniacum, or squills; and in some the inspissated juice of the *sambucus nigra*, and extract of taraxacum. Its association with *sulphur* was much confided in by PIDERIT; with *borax*, by GRANT, QUARIN, and most Continental writers; with *camboge*, intimately triturated together, by SALA and others; with *squills*, by BANG; and with *jalap*, by DEMIANI. Of other purgatives it is unnecessary to take any particular notice. The *neutral salts*, particularly the *sulphates*, are often of great benefit, both as laxatives and as diuretics, when prescribed with other preparations possessed of the latter properties. The *iris florentina*, *i. pseudacorus*, *i. vulgaris*, *i. versicolor*, and *i. fatidissima*, have severally been employed as hydragogue cathartics in dropsies, in the form of the expressed juice, or powder, infusion and decoction of the roots, and have received the commendations of PLATER, ELLER, DUVERNEY, and SPINDLER.

71. *C. By diuretics*.—This class of medicines is, perhaps, more than any other, empirically prescribed in dropsies, owing chiefly to the imperfect state of our knowledge of, and in some measure

to want of attention to, the mode of their operation. From researches into this subject, in which I was engaged during the years 1819, 1820, and 1821,—part of the results of which, particularly in respect of diuretics*, was published in the *Medical and Physical Journal* for July and August, 1821, p. 112—115.—it was there shown, that these substances act—i. *Upon the digestive canal, and on the nerves of organic life, exciting or otherwise modifying, according to the nature of their impression, the functions of these viscera, and by sympathy the functions of those intimately related to them*:—ii. *By absorption, and by their action on the lymphatic, capillary, and venous systems, both during and subsequently to their passage into the blood*,—a. in exciting the extreme vessels, or restoring their tone, and thereby promoting their circulating functions; b. in exciting the absorbent system, and gradually removing impediments in the way of the lymphatic and venous circulation, or in producing a deobstruent operation; c. in developing constitutional power, increasing the vital cohesion of the soft solids, and enabling them to yield the requisite support to the capillaries and to the exhaling vessels and pores:—iii. *By their action on the kidneys, and other secreting and excreting viscera, through the medium of the circulating fluid*,—a. in directly stimulating the kidneys, by one or more of their constituents, during their presence in the blood and elimination with the urine, and in exciting them to excrete the watery parts of the blood; b. in thereby diminishing the quantity of the watery parts of the blood, and promoting the absorption of fluid from the cavities or tissues in which it superabounds. It will be seen from the above, that substances which have had a diuretic action ascribed to them, operate—1st, in a more or less *indirect manner*, whether their influence be mainly exerted upon the *prima via*, or upon the circulating systems and tissues by means of absorption; and, 2d, in a *direct manner*, during their circulation through these organs, and elimination from the blood by their agency. Conformably with these views, I proceed to notice the use of this class of medicines in dropsies.

72. 1st. *Indirect diuretics*.—(a) *Those which act chiefly upon the digestive canal*. Under this head may be comprised most of the tonic and stimulating medicines already noticed, and which, by increasing the organic nervous energy, and promoting the digestive and assimilating functions, also assist the circulating and eliminating actions, particularly in the indirect manner already noticed.—(b) *These effects are both accelerated and heightened by associating these medicines with substances which, being absorbed into the circulation, excite the extreme vessels, restore their tone, and promote a healthy circulation through them*. Of these last, some mention has been already made under the head of *deobstruents*

* The former of these memoirs contained the first attempt that had been made to determine the precise way in which diuretics operate, and to arrange their effects. In that article, as well as in the *London Medical Repository* for May, 1822, p. 380, 381, will be found the arrangement of the action of diuretics given above, drawn in a more precise and detailed manner than my limits will here allow me. I state this, because similar arrangements have been put forth at much later periods than the last of these, but without reference to the original sources now referred to.

(§ 63—66.). *Mercurials*, when used as diuretics, operate chiefly in this manner, unless carried to the extent of injuring the constitutional powers, and of hazarding the production of their peculiar cachexia. *Foxglove* seems to act chiefly in this way, as well as in lowering the frequency and strength of the heart's action, thereby diminishing effusion, and determining the balance of action in favour of the absorbing vessels. Its effects are promoted by combining it with substances which, being received into the circulation, act in a similar manner with it, or in one of the modes mentioned in the second order of the above classification (§ 71.); more particularly with the blue pill, or minute doses of the oxymuriate of mercury; with the nitric or nitro-muriatic acids, in broken-down constitutions, or where mercury has been already employed; with the spiritus ætheris nitrici, or liquor ammoniæ acetatis; with the supertartrate of potash and borax; or with colchicum and the tinctura camphoræ composita (F. 195. 395. 400. 599. 627. 859.). The diuretic operation of digitalis is most certain after depletions and alvine evacuations in the more acute states of dropsy, in the atonic forms of the disease, and in the complications with lesions of the heart and lungs. The preparations of this plant necessarily depend for their efficacy upon the period at which they are gathered, and the manner of drying them. As soon as the leaves or powder lose the green colour, they also lose their active properties. Digitalis was much recommended by SCHIEMANN, WITHERING, DARWIN, I. WARREN, DICK, ODIER, HEUSINGER, and many others; and it still retains its reputation, particularly in hydrothorax. FERRIAR prescribed it with cream of tartar; LANGENBECK, with opium; and BEDDOES, ACKERMANN, KNAUS, and LETTSOM, with calomel and opium. The addition of small doses of this last promotes its operation, and partially counteracts any unpleasant effect it may produce,—a fact which I have heard confirmed by the extensive and discriminating experience of Sir H. HALFORD. The tinctura opii composita (F. 729.) is perhaps the most eligible preparation for this purpose. The decoctum senegæ has also a diuretic effect, and evidently from its influence on the capillary circulation. It was used by MILLMAN; but is applicable chiefly to the atonic states of the disease. OBERTEUFFER conjoined it with cream of tartar, which is, I believe, the best way of giving it. *Squills* and *ammoniacum* (§ 78.) seem to act, partly at least, in the present mode; but, of the former, more particular notice will be taken in the sequel.

73. (c) *Diuretics which excite the absorbing vessels, and remove impediments to the lymphatic and venous circulation*, are manifestly few in number. It is probable that several of those already noticed, and usually termed deobstruents, operate partly in this manner; but we have no satisfactory proofs that they do so act, as to any of them, excepting the preparations of iodine, of which mention has already been made (§ 64.). These evidently excite the absorbing vessels, and produce a diuretic action in this way, particularly when given in full doses. The sub-carbonates of the *alkalies*, the pure fixed alkalies, ammoniacum, mercurials, &c. may probably also act partly in the same manner.

74. (d) There are various substances which exert a diuretic operation through the medium of the circulation, by developing constitutional power, increasing the vital cohesion of the soft solids, and thereby restraining morbid exhalation or effusion. In this manner, all the tonic and astringent mineral salts may indirectly increase the secretion of urine, as well as the mineral and some of the vegetable acids. LENTIN, TISSOT, WINTRINGHAM, and others, prescribed the mineral acids; REUSNER directed the sulphuric acid, with infusion of the bark or flowers of the *sambucus nigra*; and BANG, the tartaric acid with squills. Citric acid and lime juice have been found efficacious in the complication of dropsy with scurvy; and I have seen benefit derived from pyroligneous acid. Sulphate of iron, and sulphate of quinine with sulphuric acid, will also prove of service in the asthenic states of the disease, by operating in this manner. But these are, upon the whole, inferior to the *ferrum tartarizatum*, which, whilst it increases the tonicity of the extreme vessels and soft solids, produces a very manifest diuretic action.

75. 2d. Direct diuretics.—Substances which stimulate the kidneys through the medium of the circulating fluid are the only direct diuretics. But there are very few of them which act in this way solely; nearly all of them producing more or less effect upon the organic nervous system, on the vascular systems, and on the vital cohesion of the tissues, during their presence in the blood. It will be found that such of them as excite the kidneys most remarkably are eliminated from the blood by these organs, and it may be therefore presumed that their influence is principally or specifically exerted upon them. It will be manifest, that substances which increase the proper function of the kidneys will produce the double effect above stated (§ iii. a. b.), of excreting the watery parts of the blood, of diminishing excrementitious plethora, and thereby increasing the absorption of fluid from the situations where it superabounds. I have long since shown (*Lond. Med. and Phys. Journ.* for July, 1821.) that certain diuretics, and these the most active, are conveyed into the circulation, and to the kidneys, unchanged; and Dr. PARIS has contended that various other diuretics are decomposed or digested, and operate by means of certain of their active constituents. This seems very probable as to some, but does not admit of proof in respect of many of them. That the balsams, juniper berries, and cubebs, excite the kidneys by means chiefly of their essential oil, is very evident; but that colchicum and squills are diuretic, owing to the separation of veratria and scillitina, is merely a matter of opinion.

76. (a) *a.* Oil of turpentine, and substances containing it, as the Canadian, the Chian, the Venetian, and the common turpentine, are the most energetic and direct diuretics that can be prescribed; and, in the endless forms of combining and exhibiting them, admit, in the hands of the practitioner who is acquainted with their properties and effects, of very general application: as they excite the tonicity of the extreme vessels and soft solids, during their presence in the circulation; stimulate the kidneys, in the asthenic states; lower inflammatory action, and prevent the consecutive effusion, in the acute forms of the

disease. The oil, the active principle, may be taken as prescribed in the Appendix (F. 149. 169. 681.), may be exhibited in clysters, and employed externally in the form of liniment or epithem. Its smell may be covered by the *cajeput* or *lemon* oils, which also are direct diuretics; and the unpleasant eructations it occasions, in great measure prevented by giving it with magnesia, or by taking this substance immediately after it. In the asthenic states of dropsy, MONDSCHIEIN and RULAND combined it with sulphur, in the form of *balsamum sulphuris* (F. 22.). The former of these writers also recommended the infusion of *pine tops* (F. 51.), which is an excellent diuretic vehicle for the saline substances and spirituous tinctures belonging to this class of remedies (F. 827.).—*β.* The various balsams (F. 485—487. 570.) are especially indicated in the more passive states of dropsy, and when the kidneys seem to be diseased. The Peruvian balsam was much praised by DE HAEN; but *copaiba* is equally efficacious. These, as well as the terebinthines, may be given in the form of pill with magnesia, or with the alkalies.—*γ.* The preparations of juniper berries also act directly upon the kidneys, by means of their essential oil. They are most appropriate in the sub-acute and asthenic cases, and are excellent adjuncts to other diuretics (F. 194.). The infusion (F. 235, 236.) is a suitable vehicle for various substances appertaining to this class (F. 397. 399.). RIVERIUS prescribed it with small doses of sulphuric acid; BANG, with cinchona; and PERCIVAL, with camphor.—*δ.* *Cajeput* oil, oil of aniseed, and others of the essential oils, possess diuretic properties, and may be used both internally and externally, as adjuvants of other substances belonging to this class of medicines, especially in the more asthenic states of the disease. The oil of aniseed is very serviceable in effusion connected with asthma, bronchitis, or lesions of the lungs, and with affections of the heart; and is a useful adjunct to colchicum, digitalis, camphor, &c.

77. (b) The alkalies and their salts are diuretic in small or moderate doses, and are appropriate to most cases of the disease. *Liquor potassæ* has been already noticed as serviceable in conjunction with other deobstruents and diuretics (§ 64.). It evidently neutralises the acid in the stomach, and is absorbed into the circulation. The sub-carbonates and carbonates of both potash and soda are more generally useful, especially in the complication with lesions of the liver, kidneys, and uterus, and when judiciously combined. They are also absorbed, and are decomposed by the acid (the muriatic, as shown by Dr. PROUT) of the stomach. But as the quantity of this acid which the stomach contains at any time is but small, the change can be effected only on a portion of the salt, if it be given in full doses. A similar change is most probably produced upon some of the vegetable acid salts in the stomach by the same agent, as Dr. PARIS has contended. The citrates or tartrates are useful and pleasant. They may be taken in bitter or diuretic infusions, whilst the fixed air is being disengaged by the action of the acid on the bicarbonates. The most certain, however, is the *cream of tartar*, in doses that act not energetically on the bowels. When prescribed in order to obtain its purgative effect

(§ 70.), it frequently also excites the kidneys; and, with borax, it is sufficiently soluble to be given in the form of draught or mixture, with diuretic infusions. It is also advantageously conjoined with the ferrum tartarizatum and other tonics in the asthenic states of the disease; and is most serviceable in ascites and anasarca. Formulae 57. 397. 588. 590. 599. 628. are the best modes of exhibiting it as a diuretic. *Acetate of potassa* and *acetate of ammonia* may also be exhibited with tonic or bitter infusions (F. 196. 386.), and with either the decoction, spirit, or infusion of the various diuretics about to be noticed (F. 194. 358. 395. 400.). The *decoction* and the *extract of taraxacum* are excellent adjuvants of all the foregoing salts, as well as of the carbonates. They have been much praised by BONET, BANG, and J. P. FRANK, for their deobstruent and diuretic operation (F. 390—392.). *Nitrate of potash* has already been noticed among antiphlogistic remedies (§ 55.). It is readily absorbed into the circulation; and during its presence in the blood and elimination by the kidneys, it excites the capillary vessels, and stimulates these organs. It is indicated in all the acute states of the disease; and in these, after depletions, as well as in the atonic forms, it may be given in tonic infusions and decoctions, with diuretic tinctures or spirits (F. 399. 401. 406. 588. 591. 599.). All the *neutral salts*, particularly the *sulphates*, and the *super-sulphate of potash*, are absorbed, and excite the kidneys and extreme vessels, when taken in small doses, or much diluted. They are indicated chiefly in the acute or sub-acute varieties of dropsy, and in their complication with organic change in the liver. They admit of the same forms of exhibition as those more particularly mentioned, and are assisted in their operation by the same adjuncts.

78. (c) The action of the foregoing on the kidneys is well ascertained; but there are several other substances which are as energetic as they, but whose mode of operation is not so well understood. That the diuretics now about to be noticed excite the kidneys by means either of one or more of their constituent principles, seems very probable; but they also act in a similar manner upon the tissues to which they are immediately applied; and, when taken in small or moderate doses, so as to be absorbed into the circulation, they manifestly stimulate the capillary vessels, or impart more or less tone to them. Hence they are most beneficial in the atonic forms of the disease; or in the sthenic and plethoric states, after evacuations. Of this class of diuretics, *squill* is the most generally used. FRIZE, STOLL, and ZEVIANI, advise it to be prescribed with caution. It is commonly given with calomel and blue pill, in doses of a grain, gradually increased to five or six; or with the neutral salts, in the form of vinegar, tincture, or oxymel. CULLEN prescribed it with the oxymuriate of mercury; LANGHAUS, HOME, LANGE, and BROUGHTON, with nitre, rhubarb, cream of tartar, &c.; TISSOT, with camphor; WILlich, with tartar emetic; BERTRAND, with the *Æthiops mineral*; and KNEBEL and LEAKE, with opium. When it irritates the stomach or bowels, in conjunction with mercurials or saline substances, the addition of opium is requisite, if the propriety of continuing the

combination be still manifest; but, under such circumstances, it is seldom productive of benefit; and, in cases where vascular plethora or sthenic action is present, it is more injurious than beneficial. The preparations of it in the British Pharmacopœias are the best modes of exhibiting it; and these may be combined as directed in the Appendix (F. 196. 399. 533. 552. 627. 781. 893.). This substance is indicated principally in the atonic states of effusion, when the urine is high-coloured and scanty (BLACKALL), and it acts more energetically upon the extreme vessels than on the kidneys.

79. *Genista*, or *spartium scoparium*, the common broom, in the form of decoction, has been prescribed by most writers on dropsies (F. 95.); as well as the *sarsaparilla*, various species of the *similax* evidently possessing diuretic properties. *Gratiola officinalis*, or *hedge hyssop*, in the form of inspissated juice or decoction, was recommended by DUVERNEY and STÖERCK in dropsy consequent upon scarlatina, both as a purge and as a diuretic, in small doses. The *pyrola umbellata* has been employed by RUDOLPH and SOMERVILLE. The former combined it with tartar emetic and opium. Dr. SOMERVILLE, Dr. BEATTY, and Dr. BIGELOW have adduced strong evidence in favour of its diuretic operation. The decoction is the most active form of exhibiting it. It seems most efficacious in the hepatic complications of dropsy. In addition to these, the infusions of the *ballota lanata* and of the *b. suaveolens* have been prescribed by REHMANN; the decoction of the *petroselinum*, or parsley, by RICHTER; the inspissated juice of the *rhapbanus raphanistrum*, by GRULING and others; the expressed juice or infusion of *charefolium*, or *musk chervil*, with nitre; the *chenopodium anthelminticum* and *c. ambrosioides*, by LENTIN; the *cichorium verrucarium* and *chondrilla juncea* (species of *succory*), by SPINDLER. Several species of *saponaria*, the *angelica archangelica*, the *levisticum*, or lovage, the *sium berula*, sassafras, sweet fennel, asparagus, and various other plants, have been recommended by authors, in the form either of infusion, decoction, or of the expressed juice.

80. *Colchicum* was much used by STÖERCK, BOEHMER, ERHMANN, DE MEZA, and OBERTEUFFER, as a diuretic. It possesses much of this property, when it does not irritate the stomach or bowels. HAUTESIERK justly considers it inferior to squills. In the acute states of dropsy, it is best given with mercurials in powder; but, in asthenic cases, it is most advantageously conjoined with the warmer diuretics, with tonic infusions, or with preparations containing camphor or ammonia (see F. 194. 395.), or with large doses of the alkaline sub-carbonates, particularly in the gouty or rheumatic diathesis. STÖERCK combined it with the infusion of rhubarb; and OBERTEUFFER, with cream of tartar, juniper, and guaiacum. The diuretic action of *rhubarb* is deserving of notice. When given either in small doses, or in infusion as a vehicle for other substances of this nature,—as the saline diuretics and the preparations of squills, of juniper, or of colchicum,—it is a useful medicine in dropsies. It was employed in this way by WERLHOF, FORDYCE, BANG, and RUSH. The *diosma crenata* also acts upon the kidneys. Its infusion may be used in similar cases and states of

combination to those in which rhubarb is appropriate (see F. 231. 396.). The *marchantia hemispherica*, or liverwort, has been recently employed with much benefit by Dr. SHORTT, in cases where other remedies had been employed without advantage. He has, however, found but little service from its internal use, and has employed it chiefly externally as a poultice. For this purpose it is first boiled, afterwards beat into a pulp, and mixed with as much linseed meal as will bring it to the consistence of a poultice, which is spread upon flannel, and applied warm over the seat of the effusion, repeating the poultice every twelve hours, until the accumulation of water is removed. It produces "copious perspiration, and at the same time acts powerfully on the kidneys." The sinking sensation it sometimes occasions is relieved by the *spiritus atheris nitrici*. The effects of this application are stated to be increased by allowing the patient warm and nourishing diluents, and beef tea, &c. Dr. SHORTT believes that this application will be found to succeed in many cases where the kidneys are affected. The bark of the root of *cichorea racemosa anquifolia* has been lately employed by M. LEMASSON. This bark furnishes a crystallisable principle, of a bitter and astringent taste, soluble in water and alcohol, in which the virtues of the plant reside. A decoction of two drachms of the bark in eight ounces of water is divided into two doses, which are taken with an interval of two hours. This generally affects the kidneys, and the action continues for some days. As soon as its action begins to diminish, the same doses are repeated. It is suitable only to the asthenic states of the disease.

81. *Cantharides* have been recommended in dropsies, on account of their diuretic action, by HIPPOCRATES, GALEN, DIOSCORIDES, and others among the ancients; and by BRISBANE, FARR, and several modern writers. HOFFMANN, WERLHOFF, and HUFELAND, gave them with cream of tartar, the tartaric acid, or nitrate of potash, and with camphor; and TULPIUS in the form of tincture with *spiritus atheris nitrici*, cardamoms, &c. They should be exhibited with great caution, and only in the most asthenic forms of the disease. Dr. GROENEVELT, a licentiate of the college of physicians, was committed to Newgate in 1693, by the president and censors, on the plea of *mala praxis* for prescribing them in diseases of the urinary organs, although numerous authorities in support of the practice could have been adduced. *Cantharides* act upon the kidneys, and upon the capillary system, chiefly from the absorption of their active principle, which has been termed *canthariden*.

82. The *athers* also act upon the kidneys, especially the *spiritus atheris nitrici*, and *spiritus atheris sulphurici*. They are useful chiefly as adjuvants of other diuretics. The sweet spirit of nitre is, however, an active diuretic when judiciously combined, or when given while the patient can take exercise in the open air (see F. 169. 195, 196. 397.). It may be remarked generally respecting the use of diuretics, that the addition of small doses of opium, or of the tinctura opii comp. (F. 728.) as advised by HUFELAND and PARIS; and of out-door exercise, as directed by TISSOT; will much augment their operation. Many of the Continental writers advise them to

be taken in *malt liquors* — a vehicle which certainly promotes their action, and is not inappropriate in the asthenic forms of the disease. It is in these forms principally that Dr. RUSH conceived that any advantage was derived from this class of medicines; and DECKERS, FRIZE, MURSINNA, and MAGENNIS, seem to have been of nearly the same opinion, they having recommended them to be given with tonics.

83. *D. Emetics* have been employed by several authors, particularly by SYDENHAM, LILLIE, J. P. FRANK, and PERCIVAL, chiefly after other medicines had failed; and some advantage has been said to have accrued from them. Squills are the emetic most commonly employed, which probably are partially absorbed, and act also as a diuretic. Several writers have mentioned instances of the disappearance of dropsy after spontaneous vomiting; and have looked upon this circumstance as an indication for exhibiting emetics. They are scarcely ever used in modern practice, and probably the cases are few in which they are indicated. I have seen, however, instances wherein obstinate vomiting supervened apparently upon the medicines which had been exhibited as diuretics, particularly digitalis, squills, and colchicum; but the good effect that appeared in these cases was attributable to the preceding course of medicine, and to the accumulated effects of these substances upon the system.

84. *E. Diaphoretics* and *sudorifics* have been recommended by most writers. But in the majority of cases, particularly in the acute and plethoric, there is great difficulty in producing perspiration; the means which are employed, unless they be of a contra-stimulant or relaxing nature, tending rather to excite the vascular system, and to increase the morbid exhalation, than to relax the surface, and produce diaphoresis. *Tartarised antimony*, *Dover's powder*, and *spiritus atheris nitrici*, are, perhaps, the best sudorifics that can be employed; but the former should be given, in the acute cases, so as to occasion some degree of nausea; and the last named, in asthenic cases. *Dover's powder* was much confided in by MUDGE, and *guaiacum* by CHAMBERLAINE and BRÜCKMANN. As to the propriety of resorting to *warm bathing*, in order to induce perspiration, much difference of opinion has existed. Tepid baths were recommended by STOLL and FRANK, in the acute states of the disease, and *vapour baths* by DARBEY and others.

85. *F. Mineral waters*, if judiciously directed and brought in aid of medicine, are often productive of much benefit. ZACUTUS LUSITANUS recommends the internal use of *sea water*; and there can be no doubt that it will prove beneficial if persisted in, particularly in the sub-acute and atonic states of the disease. In the more asthenic forms of dropsy, the *Bath waters*, the mineral waters of *Carlsbad*, *Ems*, *Marienbad*, and *Vichy*, and those of *Seltzer*, are often serviceable. In cases depending chiefly upon obstruction, and where an aperient action is desired, the waters of *Harrogate*, *Moffat*, and *Leamington** may be tried.

* Dr. LOUDON, of Leamington, favoured the author with the results of an extensive series of experiments made to ascertain the composition of these waters. There are eleven springs of mineral water, seven of which are purely saline, three sulphureous, and one chalybeate. The saline contains .093 cubic inches of oxygen, .763 of azote, 3.156 of carbonic acid, 34.435 grains of sulphate of soda,

86. *G. The combination of two or more of the plans now mentioned is often necessary.* But this must depend entirely upon the nature of the case in respect of vital energy, and of visceral complication. Certain, however, of the above classes of measures are incompatible one with the other; as purgatives with diaphoretics, and cathartics with diuretics. But a moderate purgative action will often not materially prevent the operation of medicines on either the skin or kidneys; and some purgatives will even act sensibly upon both the bowels and urinary organs, particularly cream of tartar. Deobstruents, emetics, and external applications, often aid the operation of both diaphoretics and diuretics. Various substances, especially those of vegetable origin, are even more diuretic when applied in the form of poultice, or fomentation, or liniment, to the cutaneous surface, than when taken into the stomach, probably owing to the alteration or digestion they undergo in the alimentary canal, by which they partially lose their activity. Several of the older writers insisted much upon the external use of medicines in this disease, evidently from having witnessed instances of the success of the practice.

87. *Diet.*—In respect of diet, little need be added. It should entirely depend upon the form of the disease—be spare and cooling in the acute cases, and light and nourishing in the chronic or asthenic; and directed with reference to the visceral complication. The patient should not be restricted from drink. Under the head "*POTUS*," in the *Appendix*, will be found formulæ for several beverages, which may be reduced, modified, or rendered agreeable, as circumstances may require such changes. Weak Hollands or gin-punch, or cyder, perry, or soda water, may also be allowed, according to the habits of the patient. Spruce beer is, perhaps, the best.

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III. DROPSY OF THE ABDOMEN.—*ΣΥΝ. Ἀσцитῆς* (from ἀσцитῆς, a leather bottle); *Ascites*, Auct. var; *Hydrocælia*, *Hydrops Abdominis*, *Hydro-abdomen*, *Dropsy of the Peritoneal Cavity*; *Die Bauchwassersucht*, Germ.; *Ascite*, *Hydropisie Ascite*, Fr.; *Idropisia Ascite*, Ital.

88. DEFIN. Heavy, tense, and fluctuating swelling of the whole abdomen, arising from a collection of watery fluid in the cavity of the peritoneum.

89. I. CAUSES, &c. (a) The great extent of the peritoneum, the number and importance of the

viscera with which it is connected, and of the absorbent glands it encloses, the numerous sources of disorder to which these organs are exposed, the great number and weakness of the veins which transmit their blood to the portal vessels, and the absence of valves from them, in some measure account for the frequent accumulation of fluid in this cavity. Ascites may arise from any of the causes enumerated above (§ 8, 9.), and at any age. CAMPER, LEE, and others, have seen it in new-born infants; but it is most common in women and aged persons. I have observed it in children at all ages. It occurs more frequently in married than in unmarried females and girls; and is often the consequence of the distention and pressure attending pregnancy, of difficult or instrumental labors, and of suppression of the puerperal secretions, or of the perspiration or catamenia, or of the disappearance of this last evacuation. It appears in both sexes from the usual causes of inflammatory diseases, and the morbid agents to which the abdominal organs are liable, particularly the injection of cold fluids when the body is perspiring, the use of spirituous liquors, cold, and moisture, and both, or moisture merely, conjoined with marsh effluvia, a poor, watery, or unwholesome diet, or errors in diet, the drastic operation of purgatives, external injuries of the abdomen, and the suppression of accustomed secretions and discharges.

90 (b) *Pre-existent disease*, particularly diarrhoea or dysentery, and sudden interruptions of these discharges; intestinal worms; organic lesions of the liver and spleen, especially obstructions of their venous circulation; inflammation of the vena porta, and obliteration of one or more of its principal branches; the suppression of chronic eruptions, or of the exanthemata,—as scarlet fever, erysipelas, &c.—or the premature disappearance of the cutaneous affection in this latter class of disorders; acute or sub-acute peritonitis; organic change of the structure of the kidneys; the rupture of cysts into the abdomen; uterine or ovarian disease (§ 35.); intermittent or remittent fevers; excessive evacuation and hæmorrhages; are all occasionally productive of effusion in this situation.

91. II. PATHOLOGICAL STATES.—Ascites is, 1st, *In respect of its structural relations*—(a) idiopathic, or primary; (b) consecutive, or metastatic; and (c) symptomatic, or complicated;—2d, *As regards the state of vital energy and vascular action*; (a) acute or sthenic; (b) sub-acute; and (c) chronic, passive, or asthenic.

92. A. The idiopathic form constitutes but a small proportion of the number of cases of ascites met with in practice. LEPOIS and MORGAGNI have adduced several instances in which it appeared soon after drinking large quantities of cold water; and many more may be found in the works of other authors.—(a) The acute, or active, or even the inflammatory state, is that in which idiopathic ascites is most frequently observed. It usually occurs either in the young, the robust, or the well fed, and presents all the symptoms of the phlogistic diathesis:—the pulse is hard, thirst increased, the urine scanty; the skin is warm, hot, or coloured, and resists more or less the pressure of the finger. It commonly proceeds directly from the external agents men-

tioned above, or from the suppression of an accustomed discharge, or of some eruption; and often advances rapidly, with symptoms of inflammatory or excited action in the peritoneum, — with pain, tenderness, and sometimes tension of the abdomen; a quick, small, hard, or wiry pulse, and suppression or diminution of all the secretions and excretions. Either consecutively on, or concomitantly with, these symptoms, fullness of the abdomen is observed, which usually augments rapidly. At first the increase is most remarkable in the lower part of the abdomen and iliac regions when the patient is sitting up, and the liver is not enlarged; but it is always diffused when the patient is in the supine posture, and without any limitation or tumour. Upon examining the abdomen by percussion, a somewhat dull sound is emitted, and the examination occasions pain. The surface of this cavity is generally dry or harsh, warmer than natural, and more tender to the touch; and fluctuation is very easily perceived by placing one hand, or the index finger, upon the anterior part of either iliac region whilst the patient is erect or sitting up, and striking gently, at a little distance, with one of the fingers of the other hand. According to M. TARRAL, a slight effusion will be detected, and the nature of the disease made evident by this means, long before it reaches the height that can be recognised in the usual way. (See ABDOMEN, § 16.) As the accumulation augments, all the abdominal functions are more and more disturbed; and at last respiration becomes difficult, from the pressure of the water upon the liver and stomach, and the impeded descent of the diaphragm; and the patient is unable to lie down. The abdomen is now large and prominent in its upper regions, and pushes, particularly in young subjects, the ribs and cartilages upwards. Irritability of stomach, anxiety, restlessness, want of sleep, great quickness of pulse, sometimes delirium, and ultimately coma and death, supervene, if temporary or more prolonged relief be not obtained from treatment.

93. (b) The *sub-acute form* of ascites is milder in its character and slower in progress than the foregoing; and, as well as the acute, is not an infrequent sequela of scarlet fever, and more rarely of measles; but is, in such cases, always attended by more or less anasarca. When it thus occurs, it usually appears gradually, and commences from seven to fourteen days from the disappearance of the eruption, commonly with a recurrence of the febrile symptoms, quickness of pulse, dryness of skin, thirst; loaded, white, or furred tongue; and diminution or interruption of the secretions. All the phenomena increase more gradually, however, than in the acute; and are more readily controlled by treatment. In both these forms of ascites, the urine is scanty, often pale, and always contains more or less albumen. The face is generally œdematous in the morning, and the ankles in the evening. In other cases of the sub-acute variety, the effusion takes place upon the disappearance of some acute disease, either attended by free discharges, or treated by copious depletions; frequently with febrile symptoms, and always with interruption or diminution of the natural secretions, the fluid parts of the blood being discharged by the increased determination to the peritoneum. In

both the *acute* and *sub-acute idiopathic forms* of ascites, the accumulation of fluid arises from increased exhalation — *hypercrinea* of the peritoneum, according to the phraseology of M. ANDRAL — the result either of morbidly excited vascular action, or of increased determination of blood, conjoined with a relaxed or weakened state of the exhaling vessels and pores.

94. (c) The *asthenic, or passive, state* of idiopathic ascites is the most rare. It occurs chiefly after profuse hæmorrhages and evacuations; in chlorotic females, or shortly before puberty; in ill-fed persons, living in cold, low, or damp localities; and in those who are excluded from the solar light, or are under the influence of the depressing passions, and are employed in sedentary occupations. It usually commences with, or is preceded by, œdema of the ankles, feet, and legs. It proceeds very slowly; and is attended by general debility; cold extremities; a pale and sickly countenance; a cold or cool skin; a weak, small, quick, or fluttering pulse; pale or loaded tongue; diminished or vitiated appetite; various dyspeptic symptoms; and by chlorosis or hysteria in females, amongst whom this variety is most frequent. The urinary secretion is more copious, and the bowels more irregular, and more readily acted on by purgatives, in this than in the other forms. Whilst lowering measures benefit the two preceding, they aggravate this variety of the disease (see § 102.).

95. B. *Consecutive, or metastatic, ascites* occurs in either of the *acute* or *sub-acute* states described above; more frequently the latter (§ 93.), when there has been no suppression of the disease on which it is consequent; but, when any of the febrile exanthemata have been prematurely driven from the surface; or when the patient has been exposed to cold or moisture, or both, during convalescence; or if it have supervened upon erysipelas, rheumatism, or gout; the acute or sthenic condition is most common. It is much less acute, if it have supervened upon inflammation of some parenchymatous or adjoining organ; or if it accompany pregnancy. In other respects the characters and progress of the disease are the same as those stated in respect of the idiopathic varieties.

96. C. The *symptomatic, or complicated, states* of ascites are the most common; and, like the primary or idiopathic, present every grade of activity and acuteness. But whilst, in the latter, the acute and sub-acute are most frequent, in the symptomatic, the asthenic state predominates; although an irritative form of inflammation is sometimes observed to occur in the course of the disease, often, probably, owing to the irritating properties of the effused fluid, as shown above (§ 34.). Complicated ascites presents many of the organic lesions that occasion symptomatic dropsy (§ 12.); most commonly structural changes in the liver, or vena porta; in the spleen; in the mesentery and its glands; in the kidneys; in the uterine organs; and in the veins and lymphatics. The dropsical collection appears after a longer or shorter period of disease referrible to these organs; commences imperceptibly, and proceeds slowly; and generally without febrile symptoms until towards the fatal close of the disease. Frequently œdema begins in the feet, and extends upwards to the knees, thighs, scrotum, or hips,

and as high as the iliac regions and loins. But ascites often reaches its acmé without any anasarca or œdema. As the accumulation increases and rises up into the epigastric region, the symptoms become more urgent,—the respiration more quick, short, and difficult; the pulse more rapid; the functions of the stomach more disordered; the alvine evacuations longer retained; the urine more scanty, higher coloured, and more turbid—often brown and foetid; the skin drier; and the face, and other parts which are not œdematous, more emaciated. In this form of the disease, the veins of the abdominal parietes often enlarge and become very apparent; a symptom which M. REYNEAUD found dependent, in several cases, upon obstruction or obliteration of the vena porta; the sub-cutaneous veins of the abdomen having been enormously dilated. When the effusion arises from disease of the substance of the liver, it is not infrequently associated with some degree of jaundice. With great distension of the abdomen, distressing borborygmi occur, and aggravate the symptoms. The anxiety, debility, restlessness, and inability to sleep increase; and in some instances, hydrothorax or anasarca, or both, either with or without a diminution of the abdominal accumulation, supervene in this stage of the malady. The fatal close of the disease is generally ushered in by somnolence, or by delirium followed by somnolency; by urgent thirst and dryness of the mouth and throat; by vomitings or retchings; by leipothymia; small, frequent, and irregular or fluttering pulse. The duration of this form of ascites is extremely various: it may continue for years, or it may run its course in a few days. In this latter case, either the kidneys are very seriously diseased, or the circulation through the vena porta is obstructed. The complication of ascites with pregnancy will be considered in the sequel.

97. iii. APPEARANCES IN FATAL CASES.—(a) The effused fluid varies greatly in quantity and appearances. It is usually of a pale citron or yellowish tint; sometimes greenish, or even brown. When it has arisen from obstruction in some adjoining viscus, as in the passive states, it is generally limpid and nearly transparent; but when it has proceeded from disease of the peritoneum, as in the acute forms, or from sub-acute inflammation, it is turbid, whey-like, contains albuminous flocculi, or pieces of filamentous lymph, or even thin or partial adhesions. In some cases the fluid exhales a foetid or urinous odour, and it is occasionally of a brown, or nearly blackish hue, from the exhalation of some of the colouring particles of the blood.—(b) The peritoneum presents, in different cases, all the changes already described (§ 10.). Sometimes it is covered by a thin albuminous or muco-albuminous coating, or is adherent in parts. In other cases it is softened, thickened, blanched, and as if macerated; and in some granulated, or tuberculated (BICHAT, BARRON, ANDRAL). The omentum has occasionally nearly disappeared (MORGAGNI, PEZOLD, DE HAEN, &c.); or it is pushed up towards the stomach (OSIANDER, myself, and others); or adherent in parts to the intestines, or to the abdominal parietes (RIBE, ANDRAL, &c.); or suppurated, thickened, and indurated (STOËRCK, OSIANDER, &c.). It has likewise contained steatomatous or other tumours. The mesentery is sometimes also

diseased. Its glands are very frequently enlarged; and tumours of various kinds have been found in it by TULPIUS, HARDER, J. P. FRANK, VON BERGER, ALIX, ANDRAL, myself, and others. The pancreas has been seen enlarged and scirrhus, but it is not often altered in structure. The liver is most generally diseased. The vena porta has been found obstructed by coagulable lymph, the product of inflammatory action, and even altogether obliterated, by REYNEAUD; or pressed upon by tumours, or its circulation impeded or interrupted by atrophy, or by enlargement, or by induration of the substance of the organ; or by scirrhus, granular, or tubercular degenerations of its structure (see LIVER). The gall-bladder and hepatic ducts have been found containing biliary concretions, by MORGAGNI, HOFFMANN, STOËRCK, MARTEAU, and others; and in some instances distended by a black and thick bile; or containing a small quantity of pale mucous bile, by the same authors, as well as by RIDLEY, PEZOLD, DUVERNEY, YONGE, and several recent writers. The kidneys have also been often seen diseased as described above (§ 13.); and the spleen is very frequently enlarged, indurated, and otherwise changed (SELLE, SCHMUCKER, HORN, GROTTANELLI, and myself), as described in that article, especially in the abdominal dropsies that occur in low, moist, warm, and miasmatic localities.

98. iv. DIAGNOSIS.—A. Ascites may be mistaken for tympanites, for the various kinds of encysted dropsy, and for pregnancy.—(a) Tympanites is readily recognised by the clear resonance furnished on percussion; by the absence of fluctuation, and of œdema of the lower extremities; and by the history of the case.—(b) Ovarian dropsy is generally preceded by pain, tenderness, and tumefaction, or distinct tumour in the regions of the ovaria; and the enlargement proceeds from one or both these parts. It is never general or uniform in its earlier stages, as in ascites; and fluctuation is usually very obscure, and to be detected only in the situation of the tumours, the circumscribed form of which may be determined until a very advanced period of the disease. Instances, however, occur, in which the ovarian tumour induces effusion into the peritoneal cavity: in this case, the exact nature of the disease can be ascertained only from a knowledge of the phenomena attending its early stages, or of those consequent upon tapping; the letting out of the ascitic fluid generally allowing the ovarian disease to be readily detected. The same remarks apply to dropsy of the Fallopian tubes, which are attended with nearly the same phenomena as the ovarian disease.—(c) In hydrometra, or dropsy of the uterus, fluctuation is with difficulty ascertained; and cannot be detected in the iliac regions, by the means described above (§ 92.); besides, the form of the uterus may be defined upon a careful examination; the progress of the affection is usually much slower than in ascites, and there is much less disturbance of the general health. There are, moreover, entire obstruction of the catamenia, and a sense of heavy pressure on the rectum, bladder, and adjoining parts.—(d) Cysts containing a watery fluid, and of great size, are sometimes attached to the liver or to the spleen, giving rise to appearances in their advanced states closely resembling ascites. But they always present a circumscribed tumour upon ac-

curate examination, the swelling commencing on one side, generally in the upper regions of the abdomen, whilst ascites begins, when the patient is up, in the lower, and is equally diffused when he is supine.—Of *encysted dropsies*, generally, it may be remarked, that a heavy weight, sometimes with dragging pain, is commonly felt when the patient turns in bed, particularly to the opposite side to that to which the cyst is attached; and that he usually lies on the latter side. When only one large cyst, containing a watery fluid, exists, the diagnosis is sometimes very difficult, unless the history of the case is known, particularly in respect of the last stages of some kinds of ovarian dropsy. In rare instances, several cysts are attached to different parts of the same viscus, or even to different organs, or to the abdominal parietes. But very much more frequently the dropsical ovarium, or ovaria, is very irregular and lobular, owing to its division into several distinct cysts. In all such cases, the abdomen, upon an accurate manual examination, will feel more or less irregular and unequal, and the nature of the disease be nearly manifest. M. Piorry states that a duller sound is emitted upon percussion in encysted dropsies than in ascites; and that the parts around the cysts furnish the same sound as in health. The progress also of encysted dropsies is always slow, and their duration frequently very long. They are commonly unattended by much constitutional disturbance until they reach a very great height, so as to press injuriously upon the stomach, and to impede the functions of respiration, when hectic fever is often developed: the secretions and excretions, and even the quantity of the urine, not being much diminished or disordered until then (see *Dropsy—Encysted*).—(e) *Pregnancy* is distinguished from ascites by the state of the *os uteri* upon examination; by the progress of the enlargement, and the defined form of the uterus, when the patient is supine, and the abdominal muscles relaxed; by her unbroken health and clear complexion,—the countenance of dropsical persons being pale, sickly, and cachectic; by the enlargement and firmness of the breasts, and the deep colour of the areolæ,—these organs being soft and flaccid in ascites. (See *Pregnancy*.)

99. B. It is not enough that we should satisfy ourselves as to the exact situation of the effused fluid, but we should *determine as correctly as possible the pathological condition giving origin to it*. In order to do this, we should endeavour to connect it with its exciting causes, and to enquire into the external agencies concerned in its appearance, and the conditions of the various secreting and excreting organs. The manner of its accession, the rapidity of its early progress, the sensations of the patient previously to this event, and the several phenomena furnished by an accurate manual examination, as well as a rational consideration of all the natural functions, in connection with external signs, must be our main guides in coming to a conclusion relative to the alteration or alterations, functional and organic, upon which it chiefly depends. The rapid increase of the swelling after exposure to cold or any of the usual causes of inflammatory disorder, or after the suppression of discharges or of eruptions; a sense of tension or pain in any of its regions; increased sensibility upon examination

by percussion, or in any other way, especially in the hypochondria, in the loins and uterine region, demand particular attention; and the urine should be daily examined, and its coagulability noted. The size of the abdomen should also be observed daily, and the decrease and increase marked by a tape measure.

100. v. *PROGNOSIS*.—The prognosis in ascites must necessarily depend upon its form and complications, upon the habit of body, and constitutional powers of the patient, and the effects of remedies. A much more favourable opinion of the result may be formed when the disease is primary, occurs in young and previously healthy persons, or follows scarlet fever or measles, than when it proceeds from organic change either in the liver, kidneys, ovaria, or other abdominal viscera. In cases of this latter description, very few recover permanently. Swelling of the hands; emaciation of the arms; frequent cough; very scanty foetid and thick urine; colicky pains; the presence of jaundice; and the occurrence of hiccup, vomitings or diarrhoea; are very dangerous symptoms. The appearance of aphthæ, of convulsions, of livid blotches on the extremities, particularly on the hands and forearms, are commonly fatal signs, as justly insisted on by HIPPOCRATES, FORESTUS, FRANK, and others. Somnolency, great irritability of stomach, a pulse above 120 or intermittent and small, and delirium, are not less unfavourable (see § 37.). The characters of the fluid let out by tapping also indicate the result. If it be thick, foetid, brown, glutinous, or albuminous, no permanent advantage will be derived from the operation.

101. vi. *TREATMENT*.—But little in addition to what I have already stated may be said of the treatment of ascites.—A. Its *acute or sub-acute idiopathic states* require vascular depletions, general or local, or both, and the rest of the antiphlogistic regimen, to an extent which the pulse and symptoms, and circumstances of the case, will indicate. In ascites occurring in *children* after the exanthemata, local depletions will be sufficient, but if leeches be applied, their punctures should be carefully watched; for there is often great difficulty in arresting the hæmorrhage from them after these diseases. Mercurials and antimonials, at first so as to act upon the bowels, and subsequently as alteratives, or with opium, and pushed as far as to affect the mouth; external irritants and derivatives; deobstruent diuretics, and digitalis—this last particularly in the ascites consequent on scarlet fever; diaphoretics and warm or vapour baths, followed by oleaginous frictions of the skin, in order to restore its perspiratory functions; and, lastly, gentle tonics conjoined with purgatives, or with diuretics, and assisted by warm iodine or medicated baths, will frequently succeed in removing disorder, if early employed, and if a vital organ have not experienced serious structural change. Upon the whole, these forms of ascites should be treated as described at length in a preceding chapter (§40.).

102. B. The *asthenic form* of primary ascites (§ 94.) is most readily removed by the tincture, or other preparations, of iodine; by the ferrum tartarizatum with cream of tartar; by the combination of purgatives with tonics, as BACHER'S pills; or of tonics with diuretics; by warm salt-water bathing; warm medicated baths, particularly

those with iodine or aromatic herbs; and frictions of the surface with stimulating liniments. The gentler vegetable tonics should be first employed, and subsequently chalybeates and the more active tonics, as bark, gentian, &c.; and these may be conjoined with acids, particularly the sulphuric with spiritus ætheris sulphurici, or the nitro-muriatic with spiritus ætheris nitrici, and other diuretics; and alternated or associated with the rest of the treatment recommended above (§ 42.). In this, and other forms of asthenic ascites, J. P. FRANK advises the exhibition of full doses of opium,—a practice from which I have seen much benefit obtained after morbid secretions had been evacuated by purgatives as now prescribed. I have, however, usually combined the opium with diuretics and tonics. Dr. GRAVES, whilst he adopts this part of FRANK's practice, recommends, in addition, the free use of animal food, which is doubtless requisite in many instances, particularly when the effusion has arisen chiefly from a poor or thin diet, and other depressing causes.

103. C. The metastatic form of ascites requires a similar treatment to that directed for the acute and sub-acute states (§ 40, 41.), together with means to restore the primary affection. Counter-irritation of an active kind, and long persisted in, as well as appropriate to the nature of the disease on which it has supervened, will often prove beneficial. The repeated application of moxas has been for ages commonly resorted to in ascites in the eastern countries of Asia, and has more recently been found useful by some Continental physicians. Several moxas are usually directed to be placed around the umbilicus, or over the hypochondria, or upon the loins, according as the functions of the liver or kidneys appear to be most obstructed. Sulphureous, vapour, iodine, and other medicated baths, seem calculated to prove beneficial in this, more than any other form of the disease. In this variety, also, the oxy-murias hydrargyri may be taken in the compound decoction of sarsaparilla, with colchicum or squills; or the ioduret of mercury may be cautiously exhibited, in small doses, with digitalis and extract of conium. When the disease has followed the suppression of the catamenia, the preparations of iodine*, much diluted, or the

supertartrate of potash, with an equal quantity of borax, and sulphur, have succeeded in restoring the suppressed evacuation, as well as in removing the disease.

104. D. The symptomatic, or complicated, form of ascites must be treated according to the principles laid down (§ 44. et seq.), and with strict reference to the original lesion or malady, as far as that can be ascertained. The remedies, perhaps, the most to be depended upon, are purgatives, alteratives, and diuretics;—calomel, elaterium, croton oil, camboge, jalap, &c., variously combined; the nitro-muriatic acids, internally with the compound decoction of sarsaparilla, and externally in the form of bath or lotion; saline substances, with taraxacum; the preparations of iodine in small but frequent doses, much diluted, long persisted in, and associated with narcotics, particularly opium, or lactucarium, or conium; cream of tartar or acetate of potash, variously combined, especially with squills; and, subsequently, the decoction of broom tops (F. 75.), or of pine tops (F. 51.), or the decoction cydoniæ compositum (F. 57.) or the decoct. inulæ comp. (F. 67.), or the infusum berberis (F. 225.), with one or more diuretic medicines. Cream of tartar was found most successful by Dr. HOME; and, if given in sufficiently large doses, conjoined with substances suitable to the complications of the case, and continued sufficiently long, is the most certain remedy that can be prescribed. I have usually exhibited it, in this state of the disease, in doses of from two drachms to half an ounce, in the form of electuary, with an aromatic powder and diuretic medicine. In this form it generally acts freely on the bowels, and sometimes, also, increases the flow of urine. Terebinthinate injections, and oleaginous frictions, as already directed (§ 65.), are also useful adjuvants. In some states of ascites, advantage may be derived from the internal exhibition of *cantharides*. J. P. FRANK has seen cases where it has effected a cure; yet he considers it the most uncertain medicine that can be prescribed. Graduated compression of the abdomen, by means of the belt recommended for ascites by the first MUNRO, has been employed successfully by Professor SPERANZA and M. GODELLE; and, when it can be borne, may prove serviceable in some asthenic and chronic states of the disease. RIVIERUS recommends poultices of the bruised *charlock*, the *raphanus raphanistrum*, to be placed over the loins or upon the abdomen, and to be frequently renewed. Bran poultices are also in common use. The warm medicated baths, already noticed, are calculated to be of service, when assisted by *sudorifics*. But these last cannot be depended upon unless they be combined with opium. Hence the occasional good effects of DOVER's powder. In some cases, an increased porportion of the ipecacuanha will be useful. I have seen benefit derived from the following, when the stomach was

* I was consulted, some years ago, respecting a case of ascites consequent upon profuse and frequent menstruation. This discharge had been suppressed by exposure to cold; and, soon afterwards, symptoms of inflammation of the serous covering of the liver, with effusion, were observed. These were combated by local depletions, which were repeated; by external irritants, by me curials, and, subsequently, by cream of tartar with borax and diuretics, and other means in various forms of combination; but without any permanent benefit. I directed at last a weak solution of the hydriodate of potash with iodine; and caused it to be persisted in for seven or eight weeks, when good effects began to appear. This medicine was continued for five or six months; at the end of which time the catamenia had become regular, and the effusion had entirely disappeared. I was more recently consulted as to a similar case, in the care of Mr. GRABHAM, of Rochford; which had, likewise, been preceded by profuse catamenia, suppression of this discharge followed by pulmonary disease, and extension of tenderness and fulness from the thorax, over the region of the liver and abdomen; with effusion of fluid into the abdominal cavity. The pulmonary affection and the more acute symptoms subsided under the very judicious practice of this gentleman; but the means successive y adopted in consultation failed of removing the dropsical collection, and of arresting the progressive emaciation. There was also, in this case, scrofulous disease of one or two of the metacarpal bones of the left hand. This was left to itself, in hopes

that the discharge from it would have had a salutary effect on the principal seat of disease. In summer, 1832, this young lady came to London, where various remedies were prescribed, without relief. I then put her upon a course of iodine; and, directing her to persist in its use, advised her return to the country. I have since understood that, during the use of this medicine, the effusion disappeared, and the catamenia returned; that she recovered her looks, and is now married.

not irritable, or when its contingent effect of causing vomiting would not be injurious.

No. 185. R Pulv. Ipecacuanhæ gr. ij. ad iij.; Camphoræ Subactæ gr. j.; Pulv. Opii Puri gr. j.; Potassæ Nitratis et Pulv. Radic. Glycyrrh. 3ā gr. x. M. Fiat Pulvis quovis in vehiculo idoneo sumendus; vel sit bolus cum Conserv. Ros., et his terve in die capiendus.

105. *Paracentesis* is the last means to which recourse should be had. I took occasion, many years ago, in the *London Medical Repository*, to differ from those who advise either an early or an indiscriminate recourse to this operation, and for reasons about to be stated. It has, however, had many advocates, from the earliest period of the art, and probably originated in the benefit, in some cases, derived from the spontaneous rupture of the umbilicus and discharge of the fluid. The empirical manner in which it was resorted to during the fifteenth and sixteenth centuries had brought it into disrepute, when MEAD, DELIUS, BANYER, STÖERCK, SCHMUCKER, and some others, wrote in favour of it, and endeavoured to establish it on a more rational basis. HAUTESIERK expressed himself favourably of it, and advised purgatives and tonics to be perseveringly prescribed after its performance. FOTHERGILL conceived that its want of success arose from its being too long delayed, and directed it to be resorted to early. In the present day it is certainly more frequently performed than circumstances appear to me to warrant; and although it should not be proscribed from practice, I believe that the cases are few that will be benefited, and still fewer that will be cured, by it. The chief objections to it are founded on its being inappropriate in a large number of cases, on its liability to induce inflammatory irritation in the peritoneum, and on the facility with which air may enter the abdominal cavity during the usual mode of performing it. On these topics I will add a few words.

106. 1st. *Paracentesis* seems calculated to increase the mischief, and to diminish the chances of a complete cure, in acute and idiopathic ascites, either by increasing inflammatory irritation, where this already exists, or risking its supervention in the asthenic forms of the malady. When ascites depends upon altered structure of the kidneys, it will seldom do more than give temporary relief; and a similar remark applies to the complication with disease of the liver. This advantage is, however, worth procuring, and is sometimes considerable, especially when a more decided effect is produced by medicines, as is sometimes the case, after the abdominal distension has been removed by it. But unfortunately this result is not always obtained; for inflammatory irritation often extends from the punctured part, owing to the readiness with which an asthenic or erysipelatous form of inflammation follows punctures of serous surfaces, in a cachectic habit of body, and particularly when the functions of either the liver or the kidneys are obstructed; and thus, in addition to the original structural lesions, disease is superinduced in the peritoneum, and the effusion is renewed with greatly increased rapidity. This complication is, moreover, favoured by the effects of the fluid upon the wound in the peritoneum; for, as I have already shown, this fluid, owing to interruption of the depurating functions, is often possessed of properties which induce inflammatory irritation in the healthy peritoneum, and which are more likely to have a similar effect

when this membrane is punctured or otherwise divided.

107. 2d. The introduction of air into the abdominal cavity, although frequently unattended by any inconvenience in a healthy state of the frame, and particularly when the peritoneum and adjoining viscera are not in a morbid or irritable condition, is certainly sometimes productive of very serious and even fatal effects, especially in that state of the constitution and of the abdominal organs, in which ascites commonly presents itself. I believe that this inference is conformable to the experience of the most enlightened pathologists. The instrument, also, with which *paracentesis* is usually performed, although calculated to facilitate the removal of the fluid, favours the introduction of air. The wound it inflicts is such as to prevent the immediate closure of the aperture in the peritoneum; and in some instances this membrane is pushed before its point so far as to detach it to some extent from the abdominal parietes,—circumstances which, when viewed in connection with the cachectic habit of body, weak powers of restoration, and morbid state of the accumulated fluid, are certainly favourable to the occurrence of asthenic inflammatory action, and its consequent effusion, after the operation. On this account, therefore, *paracentesis* may be perferably performed by the lancet, as recommended by J. P. FRANK; or, after the abdominal parietes are divided by the scalpel, the lancet may be pushed through the peritoneum, a bandage placed around the abdomen being tightened as the fluid passes off, and care being taken to close the aperture with accuracy as soon as the stream begins to cease. But even in this manner the operation is not likely to prove of much service, where there is tenderness of the abdomen. Many of the cases of recovery imputed to *paracentesis*, I am convinced would have taken place without it, under an appropriate treatment; whilst, doubtless, benefit has been derived from it, both of a temporary and permanent kind. Instances certainly sometimes present themselves, in which the symptoms are so urgent that it would be culpable to neglect having recourse to it. It should, however, be the last resource. In ascites appearing during pregnancy, it, or puncturing the fetal membranes, is both requisite and successful; although in two such cases, in which I was consulted, the means hereafter to be noticed prevented the necessity of performing either. It is unnecessary to state the number of times the operation has been performed, and the quantity of water removed either at once or altogether. Extreme instances are comparatively rare, and convey no useful information. On this subject I will only add further, that tapping through the umbilicus has been recommended by Dr. SIMS, and several other writers; that it has also been advised to perform the operation through the vagina; and through the bladder, by Dr. BUCHANNAN. The objections to the second and third of these are very obvious; and, as respects the last, the risk of urine escaping into the peritoneum must put it out of the question. The recommendation of conveying astringent fluids, or vapours, into the cavity of the abdomen, advocated by a few writers, both British and Continental, about the end of the seventeenth and beginning of the

eighteenth centuries, merely shows that medical and surgical temerity is not a result of science, but of its earliest dawn.

108. The diet and regimen in ascites is the same as that briefly noticed above. In the more asthenic states, a liberal diet of animal food of a light and nutritious kind is requisite, in addition to a tonic treatment; and much benefit will sometimes accrue from allowing the patient the use of malt liquor, or gin-punch, in moderate quantity, and from making either of them the vehicles for the exhibition of diuretics, with gentle tonics, or adding them to some one of the diuretic drinks in the Appendix (F. 588. *et seq.*). In cases of this description, Recipe 781., or the following, recommended by RICHTER, may likewise be used:—

No. 186. R. Rad. Scillæ Recent. ʒj. ; Cort. Aurantii, Radicis Calami Arom. ʒā ʒij. ; Juniper. Baccar. contus. ʒij. ; Vini Albi Hispan. lb. iv. Digere per dies tres, cola, et adde Oxy-mel. Scillæ ʒij. M.

109. IV. PUERPERAL ASCITES.—i. PATHOLOGY.—The more frequent occurrence of ascites in the female sex has been partly attributed to the influence of the female organs in giving rise to it (§ 35. 89.), independently of the puerperal states. But effusion into the peritoneum may occur either (a) during pregnancy, or (b) after delivery.—A. The association of ascites with pregnancy has been noticed by several of the older writers, and by many of the moderns, and is not an infrequent occurrence. Either impregnation may take place during the dropsical disease, which is very rarely the case; or the effusion may be excited by pregnancy, being favoured by pre-existing obstruction in the liver, or a plethoric state of the system. This latter is the common mode of its appearance. It is generally of a sthenic or plethoric character, and is often associated with impeded circulation through the liver, or the right side of the heart; although it may be occasioned solely by changes induced by utero-gestation; and independently of visceral disease. In this latter case, the ascites seldom commences until about the third month. When it exists, the form or even the body of the uterus often cannot be ascertained by a careful examination of the abdomen, unless with difficulty, when the patient is quite supine, with the hips elevated. The hypochondria become enormously distended and elevated as the effusion and pregnancy proceed. The urine is lateritious, scanty, and of a high colour; and there is much thirst, and pains in the back, loins, and thighs. SCARPA states, that fluctuation is obscure in the hypogastric region and flanks, but distinct in the hypochondria, particularly in the left. The state of the os uteri, the patient's sensations, and the history of the case, will generally enable the practitioner to decide as to the nature of the complication and the period of pregnancy. This state of disease becomes remarkably distressing. The patient is afflicted by dyspnoea; and by cramps, pains, and oedematous swellings of the lower limbs, from pressure on the nerves and vessels supplying them, and by sickness and vomitings. She is unable to ascend the stairs, or to lie down in bed. The bowels are very constipated, and the breathing short and difficult; to these often are superadded great anxiety, lividity of the lips and countenance, heavy and somnolent headach, leipothy-

mia, palpitations, and other symptoms indicating the propriety of having immediate recourse either to paracentesis, or to the rupturing of the membranes. When the disease is dependent upon obstruction or structural lesion of the substance of the liver, a fatal issue often takes place soon after delivery, whether that have been premature or at the full time. But when it is occasioned chiefly by the changes in the nervous and vascular systems, and state of the circulation connected with pregnancy, a favourable termination may be expected. SCARPA, DESORMEAUX, and LEE, record cases, in which this disease was still further complicated with dropsy of the amnion (§ 115.).

110. B. Ascites more frequently occurs subsequently to delivery, but at no definite time; either in a very few days, or not until some weeks, or even months, afterwards. It may either be a sequela of the adynamic form of puerperal fever, of which I have observed two cases; or of peritonitis; or of inflammation of the uterus, ovaria, or of their veins, occurring at this period. It may likewise be induced by suppression of the lochia; or by a diarrhoea which has been suddenly arrested before disordered secretions and accumulated fæces have been evacuated; or which has been long neglected, or injudiciously treated. It is generally acute or sub-acute, when it appears in this manner; but if it occur in females who have been ill-fed, or who have experienced large losses of blood about the period of labour, it possesses very different features.

111. ii. TREATMENT.—(a) Ascites associated with pregnancy is seldom benefited by diuretics. In two cases which came under my care, and presented the symptoms described above, early, repeated, and moderate venæsection; a gentle and constant action upon the bowels by cream of tartar and confection of senna; and full doses of opium, assisted by various other means directed according to the symptoms; carried both patients to about the full period of gestation; and both bore living children. After delivery, the rapidity with which the water passed off by the kidneys was surprising. In one of the cases, three large chamber utensils were filled in twenty-four hours. Paracentesis was urged by the ordinary medical attendant in one of these, but was delayed as a last resource: it was not performed in either. Utero-gestation very seldom reaches the full time, when fluid is effused into the abdomen, whether the operation be resorted to or not. SCARPA advises its early performance, and adduces a case in which this complication was aggravated by dropsy of the amnion, and in which it was performed under the left false ribs, and the patient recovered. It was also resorted to successfully in the one recorded by Mr. LANGSTAFF. In M. DESORMEAUX's case there were ascites, dropsy of the amnion, and anasarca. He punctured the membranes, and brought on labour. The instance adduced by Dr. R. LEE resembled that mentioned by SCARPA. The cervix uteri being obliterated as in the ninth month of pregnancy, he ruptured the membranes, and brought on labour; after this the patient slowly recovered.

112. (b) As to the treatment of ascites occurring soon after delivery, the same means, appropriately to the circumstances of the case, as

have been already described, are to be put in practice. The great majority of such cases will recover under judicious management, if the liver or uterine organs be not very seriously diseased. Paracentesis is very seldom required; and I believe the risk of performing it to be greater in this state of the disease, than in any other, from its liability to induce asthenic inflammatory action in the peritoneum, and to increase it if it be already present. I may add, that instances have occurred in which air has been extricated from the decomposition of the animal matter in the fluid effused, particularly when the disease has depended upon atonic inflammatory action in this membrane, and thus the ascites has become complicated with true tympanitis. This is more likely to occur, after paracentesis has been employed in a case of this description. (See *Author*, in *Lond. Med. Repos.* vol. xvii. p. 378.)

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V. DROPSY OF THE AMNION.—Hydrops

Amniosis, Mercier; *Hydrops Amnii*; *Hydrometra of Pregnant Women*, Desormeaux.

113. DEFIN. The preternatural distention of the uterus, by an excessive secretion of liquor amnii, giving rise to symptoms of ascites, sometimes with obscure fluctuation.

114. i. PATHOLOGY.—A morbidly increased secretion may take place, 1st, within the amnion; and, 2d, between the membranes and uterus. The former usually occurs during advanced utero-gestation; the latter in the early months, and generally passes off without occasioning any disturbance as pregnancy proceeds. The excessive accumulation of fluid in the cavity of the amnion was first accurately described by M. MERCIER; and it was imputed by him to inflammatory action in this membrane. It has more recently been noticed by MM. MAUNOIR, DUCLOS, and DESORMEAUX; but the researches of this last physician have not confirmed this view of its origin. Dr. R. LEE has recorded five cases, in none of which were any inflammatory appearances in the amnion, and only in two were there inflammatory or dropsical symptoms in the mother. But in all of them, some malformation or diseased condition of the involucre, or of the fœtus, existed, and rendered it incapable of supporting life subsequently to birth. It is sometimes connected with a dropsical diathesis in the mother; but is more frequently entirely dependent upon disease of the fœtus and its envelopes. It possibly may also depend upon an affection of the uterus itself, as hinted by M. DESORMEAUX.

115. The Diagnosis of dropsy of the amnion in its simple form, and where the quantity of fluid is not very great, is difficult. Fluctuation is obscure, deep seated, or wholly imperceptible. On examination, however, *per vaginam*, the body of the uterus is prematurely enlarged; the cervix is almost entirely obliterated; and there is a sense of fluctuation in the vagina upon percussion of the abdomen. The rapid increase of the uterus, the gravative pain in its region, the feeling of weight and pressure in the pelvis, the frequent calls to evacuate the bladder, and scanty secretion of urine, will further guide the practitioner. The diagnosis, however, will be rendered more difficult if it be complicated with ascites, as in the instances recorded by SCARPA, DESORMEAUX, and Dr. LEE. In this case there will be fluctuation on percussion, but this will be no sure information as to the situation of the effusion. The progress of the enlargement of the uterus, and the result of vaginal examination, in connection with an attentive manual investigation of the abdomen, alone can furnish correct indications as to the nature of the disease.

116. ii. TREATMENT.—The chief intentions are to relieve urgent symptoms, and to carry the patient safely, if possible, on to the period of delivery (DESORMEAUX and LEE). These objects may be attained by the treatment I have already advised (§ 111.), when the constitutional powers will admit of it. But if the symptoms become urgent, and the functions of the stomach entirely overturned, the advice of DESORMEAUX to puncture the membranes and induce delivery should be followed; when the disease will be remedied, if not complicated with ascites; in which case, the means already described must be practised.

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VI. DROPSY OF THE CELLULAR TISSUE,—

SYN. *Anasarca* (from *ana*, through; and *σαρξ*, the flesh), *Υποσάρκω*, Auct. Vet.; *Ανασάρκω*, Lossius; *Leucophlegmatia*, of Carthuser, and several of the older writers; *Hydrosarca*, *Hydrops Anasarca*, Auct.; *Hydrops Cellularis*, M. Good; *Die Hautwassersucht*, *Zellgewebe-wassersucht*, *Die Wassersucht des Zellegewebe*, Germ.; *Anasarque*, Fr.; *Anassarca*, Ital.

117. DEFIN. Diffused swelling, pitting beneath the pressure of the fingers, arising from an unnatural accumulation of serous fluid in the cellular tissue.

118. Dropsy of the cellular tissue occurs in various forms and states: 1st. In respect of its form, it may be—(a) partial (*Œdema*); or (b) more or less general, affecting either the tegumental cellular tissue chiefly (*Anasarca*), or the whole cellular substance (*Leucophlegmatia*). 2d. As to its state, it may be the result of increased action, or of obstructed circulation, or of vascular oppletion (see CELLULAR TISSUE, § 6.) I shall, therefore, treat of dropsy of the cellular structure, first, in its partial, and secondly, in its general, forms; and with strict reference to the states of vascular action and vital powers.

119. i. PARTIAL CELLULAR DROPSY,—Œdema (*ᾠδῆμα*, from *οἰδέω*, I swell). *A. Limited infiltration of the cellular tissue* is characterised by more or less swelling, which retains the impression of the finger for a short time. It is very common both as a symptom of general debility, or of disease of some adjoining or remote part, or in connection with the dropsical diathesis, of which it may be the earliest manifestation. It often accompanies inflammatory action of the other structures—as the mucous, the fibrous, &c. the contiguous cellular tissue being then infiltrated with serum, owing to its participation in the excited vascular action. Bronchitis, pneumonia, œdema glottidis, rheumatic or gouty affections, are illustrations of this occurrence. In cases of phlegmonous or sthenic inflammation of any part, especially of the cellular tissue itself, or of parenchymatous organs, the parts surrounding its seat are also often œdematous from the same cause. It may also arise from obstructed natural evacuations, as suppressed catamenia, the disappearance of this discharge at the decline of life, constipated bowels, imperfect action of the kidneys, &c. and, in such circumstances, it usually appears in the feet and ancles. It accompanies several affections of the skin, especially erysipelas; and various structural and malignant diseases, particularly those implicating the venous or lymphatic circulation. It frequently follows the inoculation of animal poisons, as the bites of serpents, &c.; and it is always attendant upon diffusive inflammation of the cellular tissue, and induration of this structure (see CELLULAR TISSUE, § 9. et seq.). Its dependence upon pressure or disease of the veins, or of the nerves, especially in the puerperal

states, has been satisfactorily illustrated by the researches of several modern pathologists, and is fully shown in these articles. It may also arise from extreme fatigue, from exhausted vital powers, the result of previous disease or of old age; it then being generally limited to the lower extremities, and unconnected with any change in the urinary secretion.

120. B. The states of organic action and circulation, from which partial cellular dropsy often proceeds, may be resolved into the following:—(a) Increased determination of the circulation, sometimes with diminished power of the exhalants, the œdematous part being firm, resisting pressure, pitting very slightly, and without any diminution, or sometimes with increase of temperature; this constitutes *sthenic* or *active* œdema.—(b) Inflammatory action in the nerves of the part, occasioning augmented determination of blood, and effusion of serum, with elevated temperature, and firm swelling, resisting or admitting only of slight and evanescent pitting, and forming an *acute* or *sthenic* œdema of rare occurrence.—(c) Obstructed circulation through either the veins or lymphatics, the part being less firm, pitting more easily, and the temperature lower than in the former: in this case, the obstruction may be either internal or external as respects the vessels, or it may exist in the glands; the œdema being either *acute* or *chronic* as to its duration, and *active* or *passive*, generally the latter, as to its grade of action.—(d) Vascular plethora, or relative increase of the watery parts of the blood, owing to diminished exhalation or elimination by the skin, pulmonary surface, or kidneys, or to the stoppage of accustomed evacuations, giving rise generally to sub-acute œdema, chiefly in the feet and ancles.—(e) Diminished tone of the extreme vessels or exhaling pores, attended by a laxity or lessened vital cohesion of the cellular tissue, producing *passive* or *asthenic* œdema, the part being soft, pitting easily and deeply, its temperature very much lowered. Attention to the foregoing pathological conditions and distinguishing characters will readily suggest an appropriate treatment (§ 132.).

121. ii. GENERAL CELLULAR DROPSY, or Anasarca, affects chiefly the sub-cutaneous cellular tissue, usually in a great degree, and very frequently in an acute or sub-acute manner. The cellular tissue throughout the body may possibly become dropsical; but this must be a very rare occurrence, and manifestly incompatible with the duration of life; although probably it may exist slightly, and constitute the *Leucophlegmatia* of CÆLIUS AURELIANUS, in which he conceives that this tissue resembles wetted bibulous paper, or a charged sponge. Indeed, a state nearly approaching to this very general or leucophlegmatial form sometimes appears in the dark races of the species. The anasarca described by Mr. W. HUNTER, as occurring in Lascars, seems to have been of this kind; the lungs being especially affected, giving rise to severe and often fatal dyspnœa. Anasarca presents every grade of organic action and duration; and hence it may be divided into the *acute* or *sub-acute* or *sthenic*; and the *chronic*, *passive* or *asthenic*. It may be either *primary*, as when it proceeds from cold or moisture; or *consecutive*, when it follows some one of the exanthemata;

or symptomatic, when it depends upon obstructed circulation about the heart or other viscera. I shall consider it accordingly.

122. *A. Primary acute and sub-acute anasarca* has been well described by STOLL, J. P. FRANK, WELLS, ABERCROMBIE, and others. It commonly occurs from exposure to cold and moisture, or from drinking cold fluids, when the body has been perspiring; and chiefly in the young, or in persons not much past the vigour of life. Oppression and uneasiness of breathing are first complained of; occasionally only tightness about the chest, without cough or pain, is felt; and sometimes cough with pain, aggravated by a full inspiration, and inability to lie down, from increased oppression of breathing, are experienced. In a few hours, seldom beyond twenty-four, the dropsical swelling makes its appearance—commonly in the face, and descending downwards to the trunk and lower limbs; sometimes in the legs; and often in both the face and lower extremities, nearly at the same time. The pulse is either a little accelerated, or of natural frequency; but generally weak or unequal, or even irregular. The urine is scanty, high-coloured, and in some cases coagulable, but in others without traces of albumen. The bowels are usually constipated, and the tongue loaded. There are also headach and thirst. If the effusion be not arrested by treatment, the swelling increases, and respiration becomes more oppressed, or even difficult; and the disease may terminate fatally in a few days, or be protracted to several weeks, or even months. This form of anasarca frequently attacks individuals belonging to the *dark races*, upon removing to a cold climate, or when the perspiratory functions, which are extremely active in them, are suddenly checked; and is generally attended with extreme dyspnoea, owing to a sub-inflammatory and oedematous state of the parenchyma of the lungs, which often become affected to the extent of producing asphyxia.

123. The *Diagnosis* of this variety of anasarca requires attention, as the swelling of the face, and oppression of breathing, with the other symptoms referred to the chest, often existing without fever or acute pain, may cause it to be mistaken for effusion into the pericardium, or into the pleural cavities. But the nature of the affection will be manifest on auscultation. These symptoms generally proceed from active congestion of the substance of the lungs, and in some cases from a state of vascular action intermediate between congestion and inflammatory action, attended by more or less serous infiltration of the parenchyma of the organ. That such conditions actually exist, to a greater or less extent, when the respiratory functions are disordered, is shown both by the stethoscopic and the rational signs, and by the appearances of inflammatory action or congestion observed in fatal cases.

124. *B. The consecutive form* of anasarca was noticed by several writers previously to J. P. FRANK, more especially by STOLL and PLENCIZ. But this celebrated physician first accurately described it, about 1790, and subsequently his pupil, GRAPENGISSER and Dr. WELLS. It has more recently been illustrated by the observations of several writers. It may occur after any of the exanthemata, but most frequently after scarlatina, of which it is rather a common sequela,

than a consequence of suppression of either the eruption or the perspiration. It should not, however, be supposed that anasarca is the only form of dropsy that appears after the exanthemata; ascites, or hydrothorax, or even hydrocephalus, may likewise occur, and either of them may be complicated with anasarca. From a number of cases that have come before me, I conclude—(a) that it is dependent on excrementitious plethora, arising out of the suppressed or imperfectly restored functions of the skin, and other eliminating or depurating organs; (b) that an incomplete or suppressed eruption will not occasion it, unless the internal secretions and excretions be also impeded; (c) that exposure to cold, or to a cold and humid air, or even to humidity alone, will favour its occurrence, although it frequently appears without those aids, and even in very different states of the atmosphere; (d) that it is more immediately induced by febrile or generally excited vascular action, arising out of an impeded or interrupted secretion and excretion, and a consequent morbid state of the blood (a), and increase of its fluid parts, accompanied by deficient power or tone of the extreme vessels and exhaling pores, either absolutely or relatively to the action of the heart and arteries.

125. PLENCIZ describes the anasarca consequent upon scarlatina as having been more fatal in Vienna, about the middle of the last century, than the original disease; whilst Dr. CULLEN states it to be a mild and manageable affection. Its severity, probably, varies with the state of the prevailing epidemic. It is often the most severe when the cutaneous eruption and angina have been slight. There is some difference observed in the period at which it supervenes. FRANK often met with it as early as fourteen days from the commencement of the fever; whilst, in other cases, it has not come on until twenty-eight or thirty-one days from that time. It commonly appears in from sixteen to twenty-four days, and is preceded by slight fever and languor. The sore throat and fever of the primary malady generally have partially or nearly altogether disappeared, and the appetite begins to return; but the bowels continue costive, the urine scanty and high-coloured, and the skin dry and harsh. Slight increase of the fever in the evening, the patient being morose and restless, thirst, and sometimes pain about the throat, capricious appetite, and sickness, come on, and are soon followed by oedema of the face, particularly of the eyelids, which is greatest early in the morning, extending rapidly over the body. With this extension of the anasarca, there are often symptoms of vascular fulness in the head, the patient becoming somnolent, torpid, and the pulse less frequent. In other cases, symptoms of effusion into the peritoneum, or into the pleuræ, or upon the brain, or of an oedema of the lungs, are superadded, the two latter affections being attended by evidence of danger, occasionally as early as the third or fourth day. As the anasarca becomes general, or thus complicated, or even previously, the urine, which had been long scanty, assumes a still higher colour; is turbid after standing, depositing slight albuminous flocculi, or resembling whey; is voided frequently, and in very small quantity, and often with pain in the region of the bladder or in the loins, and vomitings. In some

instances, the urine has a brown appearance, from the presence in it of some of the red particles of the blood. FRANK likens it to the washings of flesh, owing to this circumstance. It generally coagulates more or less on the application of the usual re-agents.

126. In the less favourable cases, *symptoms of danger* appear from the third to the ninth day from the commencement of the œdema of the face; but after twelve or fourteen days, they very seldom occur; convalescence often, under a judicious treatment, having commenced or proceeded far by this time. The danger in this form of anasarca depends upon its complications.—1st. Upon active congestion, inflammatory action, or serous infiltration of the substance of the lungs, as in the primary form of the disease (§ 122.); dyspnoea, sense of oppression, constriction and anxiety in the chest, with dry cough and inability to lie down supervening, and indicating the nature of the complication:—2d. On effusion on the brain, ushered in by headach, sickness, and vomiting; and evinced by dilated pupils, slow pulse, convulsions, strabismus, loss of sight, and other signs of acute dropsy of the brain:—3d. On effusion into the pericardium, indicated by swellings of the face, neck, and hands, fulness of the veins of the neck, bloated countenance, irregular pulse, leipothymia, and fulness and tenderness of the intercostal spaces, chiefly of the left side:—4th. On effusion into the pleurae, sometimes also associated with some effusion into the pericardium, and the symptoms of hydrothorax:—and, 5th. On disease of one or more of the abdominal viscera, either with or without effusion into the peritoneum; severe diarrhoea or dysentery occurring, and, whilst it carries off the dropsy, causing a chronic disease of the digestive mucous surface, occasionally with ulceration and its consequences; or suppression of urine from congestion or inflammation of the kidneys taking place, and aggravating all the dropsical symptoms; or obstruction of the liver superinducing an obstinate and dangerous form of ascites.

127. Anasarca consecutive of scarlatina is most frequent in children, and is rare in adults. Other eruptive diseases, beside this, give rise to dropsy of the cellular tissue, especially measles, erysipelas, urticaria, miliary fever, and many chronic diseases of the skin; owing not only to their *suppression* or retrocession, but also to impeded secretion, and to the consequent excrementitious plethora often attendant, or consequent, upon them. When it is consecutive of these diseases, it possesses either the sub-acute character common in that following scarlatina, or the more acute symptoms of the primary form.

128. *C. Primary asthenic anasarca* is not so frequent as the preceding. It is even questionable whether or not the asthenic cases, usually considered as idiopathic, are not depending either on structural change in an important emunctory, as the kidneys, or on obstruction about the right side of the heart, or on congestion of the large veins and of the lungs. There can be little doubt that many of them are thus connected; yet some instances will present themselves, in which the asthenic state is primary, as far as can be ascertained. These are most likely to occur in persons living in cold, miasmatic, moist, low, imperfectly ventilated, and dark places; particularly in

those of a lymphatic or phlegmatic temperament, or who lead sedentary lives, and are insufficiently nourished; in those who have experienced copious losses of blood, or are reduced by chronic or repeated discharges, as by hæmorrhagia, diarrhoea, dysentery, &c., or who, whilst convalescent from severe exanthematous or other fevers, have been exposed to cold and humidity; and in persons under the influence of depressing emotions, or who have suffered some sudden alarm. This form of the disease may accompany retention of the menses, or chlorosis; and it may supervene also, in debilitated states of the frame, upon obstructions of the catamenial or hæmorrhoidal evacuations. Many of such cases, however, will approach very nearly to the sub-acute form, and derive benefit from evacuations. The cases of anasarca produced by terror, disappointment, surprise, mental distress, &c., and termed spasmodic by LANDRÉ BEAUVAIS, and some other writers, appear to belong chiefly to this variety. That these and similar causes are sometimes followed by anasarca, cannot be disputed; but I question the dependence of the disease on spasm. Even granting the existence of spasm, what are the parts affected by it, and how does it act? Convulsions will sometimes occasion œdema of cellular parts; but they will also, during their continuance, sometimes remove the effusion, as observed by Dr. WELLS. The causes which are supposed to act by spasm, merely derange or impede the circulation through the heart and lungs, occasionally also rendering the hepatic circulation more languid or difficult than natural, whilst they lower the vital tone of the extreme vessels, particularly in weak and irritable constitutions, and interrupt the excretory functions, thereby inducing the conditions of the vascular system most favourable to the occurrence of serous effusion. Cases rapidly produced by fright have been recorded by TISSOT, DESESSART, BEAUCHÊNE, BRESCHET, BATEMAN, and others; and numerous instances connected with disordered or delayed menstruation, and the exhausting diseases mentioned above, have been adduced by PLATER, RIEDLIN, FORESTUS PISO, WILLIS, ELLER, HOFFMANN, SAUVAGES, LEIB, MELITSCH, and later writers.

129. Asthenic anasarca generally appears slowly, and with all the signs of debility and laxity of the soft solids; whilst the sthenic disease often forms rapidly, and with many of the symptoms of fever, or increased action. The infiltration usually commences in the lower extremities; sometimes in the face, or in both; slowly extends over more or less of the body; and is most remarkable, as well as most early, in those parts of the cellular tissue which are the most lax, as the eyelids, genitals, &c. The pulse is small, soft, and occasionally slow; the skin becomes paler, whiter, and colder than usual. The surface pits much more easily on pressure, and retains the impression longer, than in the acute or sub-acute forms. At first, the infiltration of the lower extremities is most remarkable at night, and nearly disappears in the morning; but it subsequently returns earlier in the day, and to a greater extent, and is incompletely or partially dispersed by the horizontal posture; the reverse taking place as to the œdema of the face. Ultimately it becomes much more con-

siderable, more general, and more permanent, sometimes with signs of coincident or consecutive effusion into one or more of the serous cavities. But the collection is very rarely so great, or so complicated, in primary asthenic anasarca as in the symptomatic. The urine is in small quantity, and seldom contains albumen. The bowels are either sluggish or irregular, more commonly the former.

130. *D. Symptomatic anasarca* may present either acute, sub-acute, or chronic characters. But it is most frequently chronic, passive, and asthenic, and nearly resembles the primary asthenic variety now described, as respects the constitutional powers. When, however, anasarca is complicated with, or consecutive on, *acute diseases of the lungs* (§ 29.), it is also acute or sub-acute; but it is rather, in this case, a concomitant effect of the exciting causes of the pulmonary disease, than a symptomatic affection. Organic changes of the heart and kidneys are the most frequent sources of symptomatic anasarca. I shall, therefore, notice this complication more closely than the others.—(a) Anasarca generally supervenes on *chronic lesions of the heart*, and especially towards the close of life; usually commencing in the face, particularly in the eyelids, and upon rising in the morning. Sometimes the ankles begin first to swell, and occasionally both the face and ankles—the former in the morning, and the latter in the evening. The infiltration gradually increases and extends; effusion into the pleura, or into the pericardium, or into both, also taking place either simultaneously or subsequently.

131. (b) Anasarca caused by *disease of the kidneys* is very seldom seen unassociated with effusion into one or more of the serous cavities. It is, when thus complicated, attended by pain in the loins, by sickness, vomiting and diarrhoea: it usually commences in the lower extremities; and is commonly in consequence of irregular and drunken habits, or of the scrofulous diathesis. It is very liable to recur, and is seldom permanently removed (§ 34.). Anasarca is also sometimes a consequence of chronic disease of the lungs, particularly *chronic bronchitis*, *bronchorrhoea*, *chronic pleuritis*, and *tubercular phthisis*. In these cases, the infiltration commences either in the face or in the lower extremities, only occasionally extends as high as the thighs or hips, and seldom becomes general; but is often associated with effusion into the cavities of the chest. Organic changes of the *liver* and *uterine organs* but rarely occasion anasarca, until after effusion into the cavity of the peritoneum. The observations already offered respecting the connection of dropsy with *disease of the blood-vessels and lymphatics* (§ 27.) are entirely applicable to this species of the disease. Although complete obliteration of one even of the largest venous trunks has taken place, serous effusion will not necessarily follow, especially if a collateral circulation be established. A remarkable instance of this is recorded by Mr. WILSON, where the *vena cava* was entirely obstructed, but no vestige of serous effusion existed,—evidently proving that other pathological conditions, beside venous obstruction, are requisite to the occurrence of effusion; whilst in the case of obliterated *cava* published by LAENNEC, ascites and anasarca

of the lower limbs existed. Of the agency of disease of the vascular systems in causing local or partial anasarca, sufficient notice has been taken (§ 25. *et seq.*). The *causes*, *morbid appearances*, and *prognosis*, in anasarca, have been described under these heads in the early part of this article (§ 8. 14. 37.).

132. iii. TREATMENT.—1st. *Of partial or local Anasarca*.—After removing the remote causes (§ 8.), the next object that we have to attain, is to restore the natural secretions and excretions, when any of these are in fault, and to remove the pathological state on which the affection depends. The restoration of the secretions will be attempted by the means appropriate to those chiefly disordered,—by purgatives, diuretics, diaphoretics, deobstruents, &c., as the intestinal, the renal, the perspiratory, and the biliary secretions, may indicate more or less of disorder or of interruption. If the œdema depend upon the *arthritic* or *rheumatic* diathesis, after the use of these means, colchicum internally, and iodine externally, may be prescribed, and aided by the support of bandages: if it proceed from *amenorrhœa*, or the final disappearance of the catamenia, a moderate bloodletting, general or local, should precede the means directed to act on the secretions. In many of such cases, as well as in others where there is no obstruction to the catamenia, particularly in females who have had children, or who are subject to constipation, and faecal accumulations in the large bowels, the *femoral veins* are either chronically inflamed, obstructed, or varicose. Their course should, therefore, be carefully examined; and if any hardness or tenderness exist, leeches ought to be applied. In old or chronic cases, however, the veins will either feel hard and obstructed, without much pain, or they will be nearly obliterated, the superficial vessels being distended and varicose, and the surface of the limb sometimes purplish or dotted with dark red spots, cold, tumid, and unyielding to the touch; pain and stiffness being referred chiefly to the lower part of the leg and ankle. In several such cases, I have prescribed, with marked benefit, deobstruent purgatives, the sub-borate of soda, and iodine; causing the patient to wear a laced stocking, and to have frequent recourse to frictions. Benefit will be derived also from frictions with mercurial liniments, united to one of those about to be referred to; and from a course of bitter aperient medicines. When the disease of the veins is connected with marked debility and weak powers of digestion and assimilation, gentle tonics, chalybeates, frictions with stimulating and deobstruent liniments (§ 65.), will accelerate a cure. (See PHLEGMATIA DOLENS and VEINS; — *Diseases of*.)

133. The connection of œdema with *amenorrhœa*, independently of obstruction in the veins, requires a persevering internal use of iodine, or of the sub-borate of soda, with tonic aperients, or the compound decoction of aloes, &c., preceded by general or local depletion when signs of plethora or internal congestion are present. But when there are a chlorotic appearance of the countenance and surface, or irregular manifestations of hysteria, with great mobility of the muscular, and susceptibility of the nervous, system; a weak, soft, open, or undulating pulse; and

especially if the catamenia have not appeared, or, having imperfectly commenced, have disappeared; the disorder may have been induced or perpetuated by manustupratio, and require from the commencement a tonic and stimulating treatment, and the liberal use of the preparations of iron. When aperients are necessary, the compound decoction of aloes with the compound mixture of iron; and the pil. ferri comp. with the aloes and myrrh pill, or with aloes only; are amongst the best.

134. When œdema of the lower limbs depends on the pressure of the gravid uterus, cooling aperients, especially the confection of senna with cream of tartar, small bloodlettings if there be vascular oppletion, a light diet, the recumbent posture, pure air, and patience, are the chief remedies. When the local anasarca is caused by the pressure of enlarged or diseased glands, mercurial deobstruents, internally and externally, the preparations of iodine, or the ioduret of mercury, may be used, and the secretions and excretions promoted and duly evacuated by deobstruent purgatives; or with a combination of tonics and aperients. The taraxacum with the alkaline carbonates, and either the liquor potasse, or the oxymuriate of mercury in very minute doses, taken in the compound decoction of sarsaparilla, or in the concentrated preparation of Messrs. SAVORY and MOORE, have been of essential service in several cases in which I have prescribed them.

135. 2d. Of general Anasarca. — A. Of primary acute and sub-acute anasarca, little beyond what has been advanced respecting the treatment of acute dropsies (§ 40, 41.) need be here stated. If any difference in the measures is at all admissible, it respects merely a more energetic adoption of depletion, and a greater necessity for repeating it, in this than in any other species of dropsy, especially in its acute states, occurring in young, plethoric, and robust subjects. The instructive case published by Dr. GRAHAM is an excellent illustration of this practice. When the patient complains of pain in the loins, and the urine is very scanty, or nearly suppressed, general bleeding will often be advantageously followed by cupping on the region of the kidneys. In addition to vascular depletions, the same remedies, especially purgatives or cathartics, directed in nearly the same succession and manner, as described at the places referred to, and at § 55., should be employed; and lastly, diuretics, associated in the way there advised, may be resorted to. It is obvious, however, that the extent to which the antiphlogistic treatment should be carried, must depend upon the nature of the case, and the acumen of the physician in detecting those latent states of active congestion, or of increased organic action, to which acute dropsies so often are owing.

136. B. In consecutive acute anasarca, appearing in the manner described (§ 124, et seq.), a nearly similar treatment to the above, in a less active form, however, in many cases, will be required. The sources of danger in this form of the disease, particularly when it follows scarlatina or measles, should always receive attention; and the remedies ought to be so directed as to prevent their accession. The directions already given (§ 40.) respecting general or local bleedings, should be strictly followed; and active counter-irritation and external

derivation,—as the application of a large blister upon the nape of the neck, or between the shoulders,—be afterwards resorted to, especially if symptoms of cerebral oppression, or of affection of the thoracic organs, manifest themselves. If tenderness on pressure be felt in any part of the parietes of the chest or abdomen, or of the region of the heart, inflammatory irritation in the pleuræ, peritoneum, or pericardium, should be dreaded, and local depletions at some distance from the seat of pain, followed by external irritants and derivatives (§ 57.), be prescribed. If sickness and vomiting come on, an inflammatory affection of the head should be suspected, and be treated by active depletion and cathartics. In some cases, however, the vomiting depends upon disease of the kidneys; attention, therefore, should be paid to this circumstance. When diarrhœa is present, the supervention of ascites, or the existence of lesions of the kidneys, is to be feared. Without suddenly checking this discharge, means should be used to moderate it if it be caused by inflammatory action, and to evacuate offending matters if it seem to proceed from this cause. Leeches should be applied to the abdomen or its vicinity—to the anus or sacrum, if there be tenesmus—and be followed by hot fomentations, especially the terebinthinate; and, if the evacuations be offensive, scybalous, knotty, &c. a full dose of castor oil, or any other purgative, as calomel and jalap, &c. should be taken, and a full effect be promoted by purgative or laxative and emollient enemata. Afterwards digitalis may be exhibited, with liquor ammoniæ acetatis, infus. taraxaci, and syrupus scillæ; or the ammoniated spirit of colchicum may be given in a similar form.

137. In all cases, of both the primary and consecutive disease, the propriety of acting upon the secretions and excretions should be kept in view. In the former state especially, the cathartics, particularly those which act as hydragogues, as elaterium, croton oil, the euphorbia lathyris, and others enumerated above (§ 66.), may be prescribed with due caution; but, in the latter form, the common purgatives, as calomel and jalap, or the infusion of senna with some neutral salt, will be sufficient. The restoration of the cutaneous functions should be a chief object in the treatment of consecutive anasarca. With this intention, tepid bathing in acute cases, when the temperature of the surface is increased; and warm bathing (AASKOW) in the sub-acute; and the various medicated baths already noticed; may be directed, and be followed by gentle friction of the surface with warm oil, as advised by SCHMIDTMANN; or with sweet oil, as used by OLIVER, &c.; or with almond oil. I have adopted this treatment in several cases of anasarca following scarlatina, and seen benefit derived from it. As to the use of diuretics, it is unnecessary to add to what is stated in other places (§ 71.) respecting them.

138. 3d. In Primary Asthenic Anasarca, the preparations of iodine, the ferrum tartarizatum, with cream of tartar; the balsams and terebinthines; sulphur; the association of tonics with purgatives and the warmer diuretics; chalybeates; and the rest of the tonic treatment recommended above (§ 42, 43.); are chiefly to be depended upon. In many cases of this description, the preparations of digitalis or of squills may be added to bitter vegetable infusions and

decoctions, and some one of the neutral salts; and *cantharides* may be tried, as advised by CHALMERS, ALIX, &c. The following also may be employed; the first of which has been recommended by M. DUMAS, the latter by Mr. SPRAGUE:—

No. 187. R Antimonii Pulver. gr. xx.; Croci Martis Aperit. gr. xxv.; Pulv. Scillæ gr. xij.; Gum. Ammoniaci ʒj.; Extr. Dulcamaræ ʒij.; Olei Juniperi q. s. M. Contunde in massam æqualem, et divide in Pilulas lx., quarum capiat binas vel tres bis terve in die.

No. 188. R Decocti Spartii Cacum. (F. 75.) ʒx.; Potassæ Acet. ʒij.; Spirit. Æther. Nit. et Spir. Lavand. Comp. aa ʒj. M. Fiat Haustus ter in die sumendus.

No. 189. R Decoct. Spart. Cac. ʒx.; Liq. Ammoniac Acetatis ʒss.; Spirit. Æther. Nit. ʒjss.; Tinct. Scillæ ʒss.; Tinct. Capsici. M x. M. Fiat Haustus ter die capiendus.

139. 4th. *The Symptomatic, Chronic, or Passive states of Anasarca*, require the same intentions and means of cure as have been already stated (§ 44. *et seq.*), but with a strict reference to the nature of the organic change with which it is connected, as far as that may be ascertained. *Anasarca* dependent upon disease of the lungs is sometimes benefited by local bloodletting, but the practice requires the utmost discrimination. It is seldom admissible in aged patients; but in the younger and more robust, and when the pulmonary disease consists of active congestion or inflammatory action in the substance of the organ, or if the congestion be associated with obstructed circulation through the heart, moderate local depletions, repeated in the more acute cases, will be of service: when *anasarca* follows chronic bronchitis, or tubercular phthisis, it will seldom be productive of benefit, and in the former may be injurious. External derivation, actively and perseveringly employed, is more generally appropriate. In this form of the disease, the preparations of colchicum or of digitalis cautiously exhibited, and the rest of the treatment directed in the manner described above (§ 49.), will afford more or less relief.

140. When the disease of the heart, associated with *anasarca*, is of an active kind, and the patient is plethoric or robust, local depletions, followed by hydragogue purgatives and digitalis, are requisite. But, if it be of a passive or a tonic kind, an opposite practice is indicated. The particular remedies that may be used in these cases have been fully stated (§ 45. *et seq.*). If the liver be diseased as well as the heart, the prolonged and daily use of deobstruent purgatives (§ 66. *et seq.*) and diuretics; the alkaline carbonates, with extract or decoction of taraxacum; a discriminating use of mercurial purgatives; calomel with digitalis, as advised by WIEDEMANN; cream of tartar with sulphur and sub-borate of soda, as recommended by PIDERIT; and the ammoniated preparation of colchicum, with the sub-carbonates and bitter infusions, and some diuretic tincture or spirit; will be productive of advantage. When the effusion seems to arise from disease of the kidneys, the treatment already recommended (§ 52.) may be tried. The effects of remedies on the urine, and on the symptoms referrible to the kidneys, ought to be carefully watched. Cream of tartar with borax, the alkalies with the uva ursi, the acetum scillæ saturated with potash (SACKENREUTER), the balsams with magnesia or the carbonates, and external derivatives, or counter-irritation, may be employed. Dr. VENABLE recommends cupping on the loins, and the insertion of issues in that situation; and I have

seen benefit derived from the practice. But when these organs are manifestly diseased, no permanent good effect can be expected from medicine. The connection of *anasarca* with *uterine disease* requires but little additional remark. The means already described (§ 53.) are quite appropriate to this species of dropsy. When, however, hysteria is present, the more cooling tonics, as the decoction of cinchona with the liquor ammoniac acetatis, nitre, and the nitric ether; or vegetable bitters, with alum and opium, as advised by LEIB; tonic infusions with an alkaline carbonate, nitrate of potash and squills, &c.; will generally be serviceable.

141. The treatment now described will require constant modification, in respect both of the association of different classes of medicines, and in the combination of those possessed of analogous properties—as regards conjoining tonics with purgatives, or various diuretics one with another. The remarks offered above, as to the numerous medicines which have been employed in dropsies (§ 54. *et seq.*), will assist the practitioner in selecting from amongst them for the removal of *anasarca*, whether this species exist simply, or in conjunction with effusion into one or more of the serous cavities. The *pyrola umbella*, recommended by Dr. SOMERVILLE, and more recently by Dr. BEATTY and Dr. SEYMOUR; and the *liverwort*, employed in the manner pointed out by Dr. SHORTT, should be duly tried.

142. The propriety of having recourse to *scarifications and punctures* has been much questioned. But it entirely depends upon the circumstances of the case, and the manner of making them. When the limb is cold, pits deeply, and retains the impression long; when the patient is old, and, from the irregularity of the pulse, &c., probably has ossified arteries; and when livid or dark spots appear in the extremities; scarifications will be attended by much risk of being followed by sloughing sores, although *acupuncture* may be substituted with advantage, as recommended and employed successfully by Mr. CHURCHILL. Indeed, this seems to be the preferable mode of attempting to evacuate the collected fluid. Dr. KOENIG advises the use of *electro-puncture*. It is a question whether or not *acupuncture* may not be preferable to any other mode of puncturing in this disease. Several practitioners direct small punctures with the point of a lancet, as the safest and best mode of directly evacuating the infiltrated fluid. This practice was praised by COL DE VILLARS, GUENAU, ADET, THILENIUS, and some later writers. In several instances of sloughing sores consequent upon the rupture of the skin, and upon scarification, I have seen the most decided benefit derived from the application of a cloth moistened with spirits of turpentine over them. This medicine causes a rapid subsidence of the swelling, and restores the cohesion of the rarified and weakened tissue surrounding the divided or destroyed parts.

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VII. DROPSY OF THE CAVITIES OF THE CHEST.

143. DEFIN.—*Sense of oppression in the chest; urgent dyspnoea on exercise or in the horizontal posture; livid lips; œdematous countenance and extremities; weak, small, and irregular pulse; disturbed sleep, with sudden startings, &c.*

144. As dropsy of the pericardium is so very generally connected with more or less effusion into the cavities of the pleuræ, that we seldom find the one without the other, although in varying grades and relative proportions; and as the former, as well as the latter, is a very frequent consequence of structural change in the substance of the lungs, or in the pleuræ, or in the heart itself and its valves; I shall, therefore, describe them as species of the same genus. The difficulty, also, of determining whether the fluid is chiefly, or altogether, in the pericardium, or in the pleuræ, even in cases where it is limited to one only, is an additional reason for considering hydro-pericardium and hydrothorax in connection with each other. It is principally, however, when the effusion is symptomatic of structural lesions of the thoracic viscera, or of a more generally morbid state of the frame, that we find them co-existent, and without any remarkable preponderance in favour of either the one or the other. But when effusion is the more immediate result, or the sequela, of inflammatory action, or of a state of organic action closely allied to inflammation, in either the pericardium or pleuræ, it is generally limited accordingly, and it often accumulates to a very great extent.

I. DROPSY OF THE PERICARDIUM.—*SYN. Hydrops Pericardii, Hydro-pericardii, Hydro-pericardica, Hydro-pericardium* (from *ὕδωρ*, water, and *περικαρδιον*, pericardium) of Authors; *Herzbeutelwassersucht*, Germ.; *Hydro-péricarde*, Fr.; *Dropsy of the Heart*, Eng.

145. DEFIN.—*Oppressive dyspnoea, with a sense of weight and tremor referred to the region of the heart; anxiety; inability to retain the supine posture; weak, irregular, or intermitting pulse; livid and œdematous countenance; distension of the jugular veins; leipothymia; fulness of the epigastrium, and of the anterior intercostal spaces; percussion emitting a dull sound, and auscultation furnishing a faint and diffused sound, over all the cardiac region.*

146. A. It is obvious that pathologists ought to agree as to the least quantity of fluid in the pericardium that should be considered to constitute dropsy of its cavity. *VESALIUS* states, that it always contains a small quantity of water in health, and that he had observed it in criminals who had been quartered while alive. *LOWER* entertains a similar opinion. *F. HOFFMANN*, however, comes to a different conclusion; he having observed no fluid in the pericardium of healthy animals: whilst *LITRE* found some in the animals on which he experimented. *HALLER* believes that this cavity contains a fluid destined to facilitate the functions of the heart, but gives no opinion as to its quantity, in health. He remarks, that it may be greatly increased in various diseases, and that it may be absorbed (*Elementa Physiol. &c.* 4to. vol. i. p. 292.). *SENAC* infers that, in the natural state, the pericardium contains no fluid; he having found none in several cases in which this membrane and the heart were both healthy. *CORVISART*, *TESTA*, *J. P. FRANK*, *KREYSIG*, *BERTIN*, *LOUIS*, *ELLIOTSON*, *HOPE*, &c. appear to have adopted the opinion of *HALLER*, in considering that this cavity always contains a little fluid; but they differ in some respects as to the amount which should be viewed as constituting dropsy of it. *M. CORVISART* believes that, when it reaches six or seven ounces, hydro-pericardium exists. This inference has been adopted by *PINEL*, *BERTIN*, *ELLIOTSON*, and *HOPE*, who think that this quantity will give rise to symptoms indicating, although with great uncertainty, the seat of effusion; whilst *LAENNEC* concludes that double or triple this quantity may not admit of a correct diagnosis. Much, however, will depend upon the rapidity of its collection, and the nature of the pathological states either causing it, or connected with it. A larger quantity than that now named, has sometimes accumulated without having induced such symptoms as could enable the practitioner to decide as to the exact nature and seat of the disease, particularly when chronic affections of the lungs or heart have accompanied it.

147. From one to five or six ounces of fluid are sometimes found in the pericardium, in several maladies either of adjoining or of remote organs, especially in persons who have died of phthisis. This collection, obviously greater—at least, the higher amount—than exists in health, seldom gives rise to specific symptoms, although the larger quantity may occasion much disorder. It may, indeed, form very shortly before death, and may merely be contingent on the changes immediately preceding dissolution, particularly when the malady destroys life by asphyxia, or when congestion of the lungs and disorder of the respiratory actions have been present for a short time previously; and its amount may even be increased subsequently to the fatal issue. When fluid collects

in the pericardium to an extent obviously constituting dropsy, and calculated, from its influence on the functions of the heart and lungs, to be the chief lesion by which life may be abridged, it will give rise to a certain train of symptoms, generally indicative of the presence of water within the chest, although not always of its precise situation. The quantity that may admit of detection, in this situation, cannot be stated absolutely. The existence of eight or ten ounces, or even of a smaller quantity, may be ascertained, in some instances; whilst in others, nearly double the amount may not be recognised with precision, as FRANK and LAENNEC have truly contended.

148. *B.* It is important to know the *pathological states on which effusion of fluid in this situation depends, and the conditions of life and of organisation with which it is connected.* These points have been but imperfectly ascertained; but, from some attention I have paid to the subject, I believe that they may be referred to the following:—1st. The effusion may be one of the more immediate results of inflammatory action (see PERICARDIUM—*Inflammation of*), in some instances; and, in others, a remote sequela of this disease.—*a.* In this case it generally forms more or less rapidly; may not be attended by any or much effusion or inflammatory appearances in the pleural cavities, although it very frequently is so associated; and it may accumulate to a great extent. The instances referred to by CORVISART, FRANK, and others, in which several pounds of fluid were found in the pericardium, seem to have been of this kind. The nature of the disease, in this variety, may generally be inferred with some accuracy, when the effused fluid amounts to more than six or eight ounces,—from antecedent symptoms of inflammatory or acute disease referable to the region of the heart, either previously to, or attending, the effusion; from urgent anxiety at the præcordia, with continued jactitation; from a dull sound being emitted, by percussion, to a greater or less extent over the cardiac region, and a faint and diffused sound being furnished by auscultation; from the motions of the heart being perceptible beyond their ordinary limits, the impulse being undulatory, unequal, and felt at various points; and, when the accumulation is great, from a marked fulness in the epigastric region, occasionally with a vibratory pulsation, and with fulness of the anterior intercostal spaces of the left side, or with some degree of external œdema in this situation. In some instances of this form of the disease, these symptoms suddenly supervene, and are attended by orthopnoea; small, frequent, irregular, intermitting, and weak pulse; syncope or leipothymia, followed by slight fits of obscure palpitations, distension of the jugular veins, bloated livid countenance, and cold extremities.—*b.* On *dissection* in these cases, marks of inflammation are observed in the pericardium, with thickening and sometimes with lymph adhering to its surface, or floating in the fluid in filaments or in the state of albuminous flocculi. Occasionally the fluid is serous and turbid, resembling whey; or albuminous, or sero-puriform, or nearly purulent, or even sanguineous. In these, the rapid effusion of fluid appears to be owing to the sudden loss of the tone of the extreme capillaries and exhalants; the increased and morbid action of the

vessels supplying them still continuing, sometimes connected with an unhealthy state of the system.—*c.* This form of pericardiac dropsy may exist either *alone*, or it may be *complicated* with, or consequent upon, pleuritis, or pneumonia, or acute bronchitis; or may be connected with the rheumatic or gouty diathesis, and be even a metastasis of these maladies.

149. 2d. Fluid may be effused in the pericardium, as in other serous cavities, by a slower process than that generally accompanying or following inflammatory action; and be attended by a very different state of this membrane.—*a.* In this class of cases, the effusion commonly depends upon impeded or disordered circulation through the heart or lungs, arising from a variety of organic changes of a chronic kind in these organs; or upon structural lesions of the pleura; or upon disease seated in the mediastinum, or in the large vessels. It is, in such instances, often connected with a leucophlegmatic, lymphatic, or dropsical diathesis, and debilitated frame. The fluid collects slowly, is accompanied by no local or constitutional symptoms of an inflammatory kind; and the attendant disorder is aggravated by an anti-inflammatory treatment. When it reaches a very considerable amount, the patient feels a weight in the cardiac region, with pain in the back and loins; and if he be emaciated or thin, the impulse given to the fluid by the dilatations of the heart may be felt and seen between the third and fifth ribs. The sensation of the organ floating in a fluid, said, by some writers, to be felt by the patient, has not been confirmed by my observation; but the feeling communicated to the hand of the physician, by the stethoscope, is frequently that of an impulse transmitted through a fluid, and an undulation is sometimes felt. In addition to these, and the preceding symptoms (§ 148.), there are often a dry cough, leipothymia, sometimes followed by palpitation, which is occasionally violent; inability to use any exertion; a necessity of sitting up, and of leaning forward; a cold, leucophlegmatic, or œdematous countenance, with lividity of the lips; cold and anæsthetic extremities; lowness of spirits; emaciation, particularly of the trunk; scanty, red, and lateritious urine. Inability to lie in the supine posture is often an early sign; although the patient may lie on either side. But this, like several of the other symptoms, is uncertain; for some persons in health are incapable of retaining the supine posture even for a short time. The above phenomena are also inconstant, owing to the nature of the primary or co-existent lesions; and, when present, they are often obscured by the more prominent symptoms directly depending upon these lesions.—*b.* On *dissection*, the pericardium is not reddened or injected; it is somewhat paler, or whiter, than natural—occasionally of even a satiny whiteness; but it is generally opaque, slightly thickened, and sometimes softened, and appearing as having been macerated in the liquid it contained,—an appearance which has been doubted by LAENNEC. The *fluid* itself is usually colourless and limpid; sometimes of a citron tint, or yellow; and occasionally turbid, of a brownish, or of a greenish hue.—*c.* This form of the disease is seldom or ever met with unconnected with the lesions already alluded to; and is frequently

merely a part of a more general effusion of fluid, either into other serous cavities—particularly the pleural—or into the cellular tissue. J. P. FRANK could adduce only four cases from authors and his own experience, in which hydro-pericardium was not accompanied by some other change in the membrane or related organs; and even one or more of these might have been thus associated. Whilst this variety of the disease is *chronic*, and manifestly *symptomatic*, the preceding is *acute*, at least in its early stages, but sometimes assuming a more chronic and passive character; and, although it cannot be said strictly to be idiopathic or primary, it may be viewed as a consequence of a morbid state of vascular action not altogether identical with the sthenic inflammation which takes place in a healthy constitution. I have seen several instances of it arising from metastasis of rheumatism to the pericardium, occurring in weak and unhealthy constitutions.

150. 3d. Fluid may be effused in the pericardium in a third form, but seldom to the extent of constituting the principal morbid change. It has been shown that the lesion giving rise to the *first* variety is chiefly seated in the pericardium, and is nearly allied to, although it is probably seldom identical with, the true inflammatory action, or phlogosis, of the internal surface of that membrane; and that the *second* variety is caused by impeded circulation from organic change of the more immediately related organs, the effusion taking place in a similar manner to other symptomatic dropsies. — *a.* But the variety now about to be described, is an attendant upon a very different and a more universal state of disease; usually comes on not long before death; is a consequence of the generally perverted or alienated conditions of life, occasioning deficient vital cohesion of this membrane, and lost tone of the extreme vessels and exhaling pores, in which changes the rest of the organisation more or less participates; and is frequently unattended by any prominent symptom. — *b.* It supervenes on the latter stages of some malignant or adynamic diseases, in the course of which the blood becomes contaminated by morbid matters, either absorbed from without, or generated in some part of the body. Thus, I have observed it in several cases of phlebitis, particularly in uterine phlebitis; in the true malignant puerperal fever; and in fatal cases of erysipelas, small-pox, and scarlatina. It likewise takes place after wounds from dissection, and in carcinomatous and some other maladies. In all these, the pericardium only participates more or less in a similar alteration taking place in other shut cavities, most frequently in the pleuræ, excepting in adynamic puerperal diseases, when the peritoneum is also the seat of effusion to a much greater extent. — *c.* On *dissection*, the tissues are found soft, flabby, easily torn, and of a dirty or dusky hue. In these morbid states, the heart and pericardium participate, but they are not inflamed. The blood is often dark, fluid or semifluid, or grumous; and the liquid effused is turbid, greenish brown, or brown, or sero-sanguineous, and seldom amounting to more than ten or twelve ounces. — *d.* In this variety of hydro-pericardium, the characters of the fluid, the state of the textures, and the manifestations of life, indicate that the vital cohesion, or

the organic contractility, and tone, of the membrane, and particularly of the extreme exhaling vessels or pores, are lost; and that the more watery parts of the blood, with a portion of the smaller globules, and even of the colouring particles, are thereby enabled to pass through them. It is evidently one of the ultimate lesions produced by contamination of the circulating fluids, and of the soft solids, in the manner pointed out in the articles BLOOD (§ 132—152.), and DISEASE (§ 148.) (See also HEART, and PERICARDIUM.)

151. C. DIAGNOSIS.—The difficulty of distinguishing dropsy of the pericardium from that of the pleuræ has been insisted on by every writer since MORGAGNI. This has arisen from the circumstances already alluded to; from the very frequent co-existence of effusion into both these situations; and from the extent to which the symptoms accompanying organic lesions of the lungs, heart, and large vessels, producing the effusion into the pericardium, obscure the phenomena caused by it. No opinion, therefore, can be formed from any one symptom; and even that founded on a careful investigation of the history of the case, and of the *tout ensemble* of the phenomena, must still be viewed with some distrust. Early disturbance of the actions of the heart, and irregularity of the pulse; a lesser degree of dyspnoea relatively to such disturbance (MORGAGNI); the sounds heard on percussion and auscultation; the sensations depending on the motions and impulse of the heart, felt either by the patient or by the examiner, as that of the heart swimming in water (REIMANN and SAXONIA), and that of an impulse transmitted through a fluid; a fluctuating tremor (SENAC) and fulness either felt or seen at the epigastrium and anterior parts of the left intercostal spaces; a sense of weight and oppression in the cardiac region (LANCISI); absence of the fluctuation upon concussion or succussion of the trunk observed in hydrothorax (MORGAGNI); an irregularity in the situation of the heart's pulse, it being felt, at different times, in different parts of an extensive circle; œdema, or fulness towards the left side of the chest (CORVISART); coldness and œdema of the feet, legs, and hands; and leipothymia and palpitations; have been severally insisted on, and are the signs most to be depended upon; but there is not one of them that is constantly present, or, when present, that is caused by hydro-pericardium only. When effusion is limited to the left pleural cavity, as in the cases recorded by Mr. HENDERSON and M. DESAULT, and in which paracentesis was performed, a correct diagnosis is most difficult.

152. D. CAUSES.—These have been noticed in the description of the different states of the disease, and are nearly the same as those giving rise to other forms of dropsy. The connection of hydro-pericardium with debility, especially of the vascular system, and with a softened and flabby state of the substance of the heart, is deserving of attention. I have seen it thus related, both in children and grown-up persons of all ages, living in cold, low, and damp places, or cellars, especially after the eruptive fevers and rheumatism; and, according to TESTA, it is most frequent in females, particularly after delivery (§ 150.). In the third form which I have described, it very often supervenes in the

last stages of the more fatal diseases of the puerperal state.

153. *E.* The PROGNOSIS must necessarily be very unfavourable. Yet it should not preclude the having recourse to a protracted treatment, as life may be prolonged by judicious measures perseveringly employed, and a cure may eventually be effected, particularly when the effusion has been consequent upon inflammatory action, or the metastasis of rheumatism to the pericardium. The prognosis should entirely depend upon the form of the disease: it is unfavourable in the first variety I have described; much more so in the second; and the worst in the third.

154. *F. TREATMENT.*—(*a*) The means of cure in the 1st variety should be the same as are advised for inflammation of the pericardium, as long as signs of phlogistic action exist. But as soon as this lapses into a passive or an asthenic form, no benefit will result from lowering measures. Energetic derivation and external counter-irritation ought then to be directed. In most of such cases, however, unless the vital energies are very greatly reduced, calomel with camphor, and small doses of opium, or the sublimate with sarsaparilla,—the former carried the length of salivation, the latter of affecting the gums,—and a seton, or issue, or open blister, kept discharging over the margin of the left false ribs, will be productive of benefit. Whilst these are being employed, the constitutional powers should be supported; and, if they be much depressed, medicines of a tonic and astringent operation, with light nutritious diet, ought to be prescribed. Care must, however, be taken that inflammatory disorder is subdued in the lungs and pleura, when the effusion into the pericardium is thus complicated, before tonics or stimulants of a heating kind are administered. In such cases, the infusion of roses, with small doses of the sulphate of zinc, and sulphuric acid, with digitalis, will be found the most appropriate. But the main reliance must be placed upon external derivation. When the effusion has been consequent upon the metastasis of rheumatism, or of gout, active counter-irritation, the combination of colchicum with camphor or ammonia or with both, the alkaline carbonates or subcarbonates in full doses, and tonic purgatives, with the rest of treatment already recommended, may be employed.

155. (*b*) In the 2d variety, or that depending upon organic change in the heart, lungs, or large vessels, but little benefit will be derived from diuretics or, perhaps, from any treatment that can be adopted. I believe that lowering measures, too generally resorted to in cases of this description, will only hasten a fatal issue. Much more advantage will be obtained from means which increase the secretions and excretions—the assimilating and eliminating processes. Very small and frequent doses of blue pill, with a tonic extract, or the soap and opium pill; bitter or tonic infusions and decoctions, with an alkaline subcarbonate, hyoscyamus, and extract of taraxacum; an issue in the side, kept freely and long discharging; and due attention to the development of vital power, by appropriate medicines, diet, and regimen, and a pure air, without heating or exciting the vascular system; are the most to be relied upon. The bowels and biliary secretions ought to be moderately acted on by

medicines of a tonic, deobstruent, and laxative operation, which will promote vital power, while they exert a derivative action on these viscera. With this view, diuretics of an analogous kind may be added to the other remedies. The treatment of the 3d variety must entirely depend upon the nature of the primary disease, of which it is merely a remote consequence. The indications of cure, in these maladies, and a review of the most efficient measures, will be found in the articles BLOOD (§ 156. *et seq.*), and DEBILITY (§ 37, 38.).

156. (*c*) *Paracentesis pericardii.*—The proposal of tapping the pericardium, made long since by RIOLAN and SENAC, and sometimes practised, is deserving of notice. It was attempted in the case published by Mr. HENDERSON, and in one of a similar kind by M. DESAULT; the existence of hydro-pericardium having been inferred in both. But it was found, in both instances, that the fluid had been effused into the left pleura, from partial pleuritis, and that the pericardium adhered to the heart. An opening, however, has been made into the pericardium by LARREY, RICHERAND, and ROMERO. The last named physician punctured the pericardium, and drew off the accumulated fluid, in three cases; and in two with success. (See *Dict. des Sciences Méd.* t. xl. p. 371., and *Medico-Chirurgical Review*, vol. i. p. 477.) He made an incision between the fifth and sixth ribs (but between the fourth and fifth in a short person), and carried it through the pleura. He then introduced his finger, and, having thereby ascertained the presence of the fluid in the pericardium, he made an opening into it with small crooked scissors; through this the fluid escaped into the left pleural cavity, whence it was discharged by placing the patient in a proper position. By this procedure, if the fluid be in this latter cavity, instead of the pericardium, as in the cases of HENDERSON and DESAULT, the first opening gives it exit, and nothing further is requisite. The plan of Dr. ROMERO possesses undoubted advantages, even in this last respect; and he has accordingly practised it in five cases of hydrothorax, and in three successfully.

157. It is evident that this operation can be productive of benefit only in those cases that belong to the first variety, or that consequent on inflammatory action, when effusion frequently is limited to the pericardiac cavity. In states of the disease depending upon organic lesions of the adjoining viscera and parts, when the effusion is rarely or never so limited, no advantage can be hoped from an operation. In itself, paracentesis, whether restricted to a simple opening into the thorax, or extended to the pericardium in the manner practised by Dr. ROMERO, is attended by no greater risk than when it is performed on the abdomen. The chief dangers from it are entirely the same as those pointed out above (§ 105.), when discussing the propriety of it in this latter situation. The fears of danger from the introduction of the external air causing the collapse of the lungs, is not well founded. If the wound be carefully closed after a deep expiration, the resiliency of this organ, and the absorption of the air, will overcome the difficulty. The mischief is occasioned in a different manner,—by the

action of the air upon the inflamed or otherwise diseased membrane; and hence the impropriety (and probable cause of failure in several cases) of leaving a canula in the opening, or of introducing a tent sponge. I state this from having seen this practice adopted in cases of paracentesis, and carefully observed the antecedent and consequent states of diseased action. I would, therefore, submit, when the last resource of an operation is attempted, that it should be performed with the utmost precautions against the introduction of the external air; and that the opening should be carefully and accurately closed, and kept closed, instantly upon the discharge of the fluid; and that, instead of preserving an opening for its continued flow, the operation should be repeated when it becomes really necessary. (See PERICARDIUM.)

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ii. DROPSY OF THE PLEURAL CAVITIES.—

SYN. *Hydrothorax* (ὕδωρ, water; θώραξ, the chest), *Hydrops Saccorum Pleuræ*, Auct. var.; *Dropsy of the Pleuræ*; *Hydropisie de la Poirine*, Fr.; *Brustwassersucht*, Germ.; *Idropisia di Petto*, Ital.; *Water in the Chest*.

158. DEFIN.—*Dyspnœa and oppression in the chest, increased by the horizontal posture and exercise, with œdema commencing in the eyelids and ancles; startings from sleep; the sounds on percussion being dull, and the respiratory murmur not heard on auscultation.*

159. *Hydrothorax* has been divided into *idiopathic* or *primary*, and *symptomatic*. It is very rarely primary, as M. LAENNEC has observed—that is, without pre-existing disease of the pleuræ, lungs, heart, or large vessels. But it is often *consecutive* of increased vascular action, or inflammatory irritation of the pleuræ, without any lesion of other parts, particularly when it follows

the eruptive fevers; and it may be a termination of pleuritis, especially in the lymphatic or phlegmatic temperament, and in the cachectic habit of body. Its *symptomatic* or *complicated* states are the most common. As the *consecutive* hydrothorax, in all its forms, is generally acute or sub-acute, or possesses more or less of the sthenic characters, it will be considered as such; whilst the *symptomatic* will be viewed as a passive, chronic, or asthenic disease.

160. *A. ACUTE AND SUB-ACUTE HYDROTHORAX; Inflammatory Hydrothorax, Hydro-pleuritis, or Hydro-pleurisy*, of RAYER.—That this form of pleural dropsy consists of increased exhalation from the pleuræ, depending upon increased vascular action and determination to this surface, will be admitted; but that it is identical with inflammation, of an acute and healthy kind, may be questioned. The symptoms, local and constitutional, in hydrothorax of the most acute kind, and in pleuritis—either the pulmonary or costal—are certainly not identical, particularly in respect of severity. Hence, although much similarity exists, as far as mere vascular injection, or determination of the circulation, is concerned; and although pleurisy may terminate in, or give rise to, serous effusion in many instances; yet the kind of organic action affecting the pleuræ, and the attendant constitutional disturbance, are not the same in both. The difference has already been alluded to (§ 18.); but I may here add, that the formative processes—the kind and grade of organic vascular action—characterising pleuritis, are not observed either in the local lesions or in the constitutional affection of acute hydrothorax, unless when the effusion supervenes on external injuries and inflammation, or is an earlier attendant on a modified condition of such disease. The consecutive states of acute pleural dropsy, as it may be studied after scarlatina, either during life, or in the morbid appearances, illustrate this view, and prove, that there is, as respects both the conditions of the effused fluid, and the changes in the pleuræ, a difference in the kind of organic action whence they have proceeded, from true inflammation, and that such difference is evidently connected with constitutional causes. It is very common to observe that, when an attack or attacks of either pneumonia or pleuritis have been removed by treatment, a slight exposure to their exciting causes, or irregularities on the part of the patient, before the diseased vessels have regained their healthy tone and action, will give rise to a less acute, or a smothering, state of disease, either attended by, or quickly terminating in, effusion; the reduced powers of the constitution, the lost tone of the exhaling pores, and the general or local excited action, favouring this particular malady—this morbidly increased serous exhalation—in preference to any other. In this way acute or sub-acute hydrothorax supervenes on a state of the frame which has not recovered from previous disease—more particularly from eruptive fevers—or which has been impaired by age, excesses, or irregularities; the powers of life, and the organic action thereon depending, being insufficient to develop sthenic or phlogistic inflammation. The *inferences*, then, from the causes, accession, phenomena, and concomitant changes observed in the *acute* or *sub-*

acute disease, are, that it is not identical with healthy inflammation, although frequently so nearly allied to it as to appear either as a termination, or as a lower grade, or as a modification of it; and that it is often connected with, even although it may not be dependent upon, the nature of the preceding malady, in which the secretions and excretions have been interrupted, and not sufficiently restored.

161. That inflammation of the bronchi, or of the substance of the lungs, will sometimes be propagated to the pleuræ, generally in consequence of constitutional fault or injudicious management, and give rise to effusion into their cavities, is well known; that inflammation of the surface of the liver, or of the peritoneum, or of both, will occasionally extend to the pleuræ, particularly in debilitated or cachectic subjects, and, having reached this situation, terminate in effusion, I have often remarked; and that the state of vascular action, whose similarity or connection with true inflammation has been noticed, but whose identity with it has been denied, will occur in the pleuræ in various states of sequence and of complication, has been a matter of daily observation, and may be readily illustrated from the pages of BONET, MORGAGNI, STOLL, LEPOIS, LIEUTAUD, LEROUX, and many other of the writers referred to. In some localities, also, and during certain epidemics, it has been remarked that peripneumony has evinced a remarkable tendency to terminate in this manner. Dr. ROMERO states, that, on the coast of Andalusia, hydrothorax and hydro-pericardium are endemic, owing chiefly to the prevalence of hot and humid winds, and sudden atmospheric vicissitudes, particularly among those who are ill fed, or live on unwholesome food, and are given to intoxication or irregularities; and M. PARISER observed this form of hydrothorax prevalent in Geneva, in 1803,—the symptoms being so slight that the patient's appetite and ability of attending to his affairs continued until the pleural collection induced violent oppression. He states, that the number who died among the French conscripts was very considerable,—the effused fluid being limpid and inodorous, and the pleura grayish and thickened, and the lung compressed, or condensed.

162. The *morbid appearances* in the acute form of hydrothorax, whether it has been connected with inflammation, or active congestion of the substance of the lungs; or has proceeded from a modified form of pleuritis, either occurring primarily, or consecutively on an eruptive fever, or after the suppression of some chronic disease of the skin, or of an accustomed discharge; are usually the following:—The *fluid* presents every shade of colour already remarked (§ 11.)—is sometimes turbid, muddy, reddish, sanguineous, whey-like, or sero-purulent; but more frequently transparent, of a citron tint, with filaments or numerous albuminous flocculi floating in it. The *membrane* is internally reddened, or injected, thickened and somewhat softened, and occasionally covered by an albuminous, granulated, or tuberculous exudation. The *lungs* are generally compressed, condensed hepatized, or tuberculated; and present appearances of chronic inflammation. The *causes* of this form of hydrothorax are the same as those described above (§ 8, 9, 19.)

163. *B. SYMPTOMATIC, PASSIVE, OR COMPLI-*

CATED HYDROTHORAX.—This state of disease is dependent upon some obstacle to the circulation of the blood, or lymph. Its connection with dilatation of the cavities; with hypertrophy, atrophy, &c. of the substance, and with alterations of the valves, &c. of the heart; has been long since pointed out by BONET, MORGAGNI, LIEUTAUD, MECKEL, SANDIFORT, &c. Disproportion between the capacities of the cavities, ossification of the valves, and various other lesions of this organ, have been still more minutely examined in relation to the production of hydrothorax, by CORVISART, LAENEC, TESTA, KREYSIG, BERTIN, and others. Varicose dilatation, also, of the veins of the lungs, and compression or obliteration of them, from chronic pneumonia, or tubercular and other productions, are sometimes the immediate causes of effusion. The dependence of this form of the disease upon alterations of the lymphatics, either in their glands or in their trunks, once so strongly insisted upon by the able pathologists already named in connection with this doctrine (§ 27.), although not improbable, has not been established, so as to admit it otherwise than as an occasional, and by no means frequent, occurrence.

164. The *fluid* effused in this form of hydrothorax is commonly transparent, colourless, or of a citron tint; in rarer cases, it is of a light brown, or reddish hue, or even sanguineous; its quantity varying from a few ounces to ten or twelve pounds, in both the cavities. In some cases, a quantity of æriform fluid is also present. (See art. PLEURA.) On the evacuation of the serum, the pleuræ are generally observed to be sound; or merely paler, or somewhat softer, than natural. When the accumulation has been great, the lungs are generally pushed up to the vertebral column, are hardly crepitous, and are occasionally pale as if macerated; but they sometimes admit of being distended by insufflation, when they have not been inflamed and hepatized. In this form of the disease, effusion frequently takes place into the pericardium, as a coexistent result of the same organic changes; and occasionally some fluid is also found in the abdomen, or even within the head; but more commonly in the cellular tissue, constituting a more or less complicated or general state of dropsy. M. RAYER justly remarks, that anasarca, hydro-pericardium, and ascites, are more frequently associated with hydrothorax when it is caused by organic lesions of the heart, than when it is consequent upon alterations of the lungs.

165. *C. DIAGNOSIS.*—As hydrothorax is generally produced by anterior disease, it follows, that it will not become manifest until some days, or even some weeks or months, afterwards; or, in cases of organic change of the heart or lungs, not until a few days or weeks previously to death. Even with the aid of percussion and auscultation, small collections of fluid are ascertained with much difficulty, and are marked by the symptoms of the lesions that cause them. But when the accumulation is considerable, it is generally evinced by phenomena which are proper to it. The patient feels an oppression and difficulty of breathing, great in proportion to its quantity. He generally lies upon the affected side, leaving the healthy one unincumbered in its functions. When the fluid is in both cavities, the respiration is still more difficult and short; the patient sits up in bed, and

calls in the aid of all the muscles of inspiration: his countenance assumes a cast of anxiety. CORVISART describes the chest as being more distended, and rounded on the side which contains the fluid; and, as the collection increases, the intercostal spaces are widened; the integuments of this side becoming œdematous, and, in a few instances, the arm on the same side. On *percussion* a dull sound is emitted, resembling that produced by striking the thigh on the side containing the fluid, or on both sides when effusion has taken place in both. When the patient sits, or stands up, and the fluid only partially fills the cavities, the lower part of the thorax only will give out a dead sound. This sound generally changes its place with the change of position, owing to the gravitation of the water to the depending part. This, as M. PRIORRY contends, is an important diagnostic between the dead sound of effusion and that produced by hepatization of the substance of the lung, which always retains the same situation. In the acute states of the disease, a feeling of soreness, tenderness, or pain, is often complained of in or over the seat of effusion.

166. Upon *auscultation*, the respiratory murmur is found to have ceased in the region corresponding to the fluid collection; and in its place is heard the tubular or bronchial respiration. In some cases ægophony is heard when the effusion is not very great. If the fluid be accumulated only in one cavity, *mensuration* of the thorax then becomes a useful mode of diagnosis; but the increased fulness of one side, and widening of the intercostal spaces already noticed, may be recognised at sight. When the collection is very great in one side, not only is the lung compressed, but the diaphragm and liver are pressed downwards; and, if it be in the left side, the heart is pushed towards the right. *Succussion* of the trunk cannot furnish any information, unless air accompany the effusion, in which case fluctuation may be distinctly heard. (See EMPYEMA, and PLEURA.)

167. *Passive hydrothorax*, in itself, frequently occasions but little general disturbance, the functions of respiration being only mechanically disordered by it, unless it exist to a very great degree. The lesions of which it is the consequence are the chief causes of both the constitutional derangement, and the disorders of the respiratory and circulating functions; and, upon the nature of these lesions, the ultimate result more intimately depends, than upon the effusion itself. The great diversity of the primary alterations—whether seated in the lungs, or in the heart and large vessels—is the chief cause of the very great differences remarked in the symptoms and progress of the malady. It becomes, therefore, important to ascertain the nature and seat of these alterations—the true extent of *associated disease*—on account of the diagnosis, and of the indications of cure. The early history of the case, and the immediately antecedent states of disorder, are among our guides in this inquiry. The investigation of these should, therefore, not be overlooked.

168. (a.) When the effusion has been consequent upon pneumonia, active congestion of the lungs, pleuro-pneumony, phthisis, or bronchitis, the oppression and dyspnoea, characterising the effusion, supervene without the irregularity of

the pulse and palpitations attending the cardiac complication. Either in addition to the symptoms of these diseases, or at an indefinite time from their partial or apparently total disappearance, the dyspnoea increases, particularly upon exertion; the patient requires his shoulders and head to be more elevated in bed than usual, and œdema is observed in his eyelids and feet. In this class of cases, the effusion is generally not very great, nor are the œdema and lividity of the countenance remarkable; but he is unable to lie on the side opposite to the effusion, which is most frequently limited to, or at least in greatest quantity in, one cavity; and ultimately he is often unable to lie down in any position. A fatal termination is commonly slow, and attributable more to the alterations of the lungs, which have been increasing with the effusion, than to the effusion itself.

169. (b.) When the accumulation of fluid has arisen from organic change about the heart and large vessels, the oppression and dyspnoea attending it are associated with irregularity and intermissions of the pulse, with leipothymia, palpitations; very disturbed sleep, sudden startings, and frightful dreams; a livid and œdematous countenance, sometimes anasarca; and sinking of the vital energies. The patient can often lie upon the side most affected, but, more commonly, there is fluid in both cavities, and sometimes in the pericardium also. When it is confined to both sacs of the pleura, he often lies upon his back; but, if all the thoracic cavities be affected, he sits up, leans forward, and brings all the respiratory muscles into action. The quantity of fluid collected is usually greatest in this class of cases; and a fatal issue, although frequently delayed or prevented for a longer or shorter time, is more apt to occur suddenly, particularly in fat or plethoric persons. But, occasionally, before this event takes place, the organic lesions of the heart superinduce congestions of the lungs, or brain, which may accelerate dissolution. Also, if, in either of these classes of cases, any important emunctory ceases to perform its functions, more especially the kidneys, whether from functional or organic change, the effused fluid may excite a low grade of inflammatory irritation or action in the pleura, giving rise to a modification of the effusion itself, as well as to some of the changes observed in the pleura and lungs after death, and which have been too generally viewed as the original disease, instead of being considered a consecutive and contingent occurrence. As to the state of the *excretions* in hydrothorax, they are generally either impeded or disordered. The *urine* is very different in different cases; in the acute and sub-acute forms, it is commonly scanty, high coloured, or deposits a thick lateritious sediment, and often contains albumen, particularly when it is consecutive of eruptive diseases and suppressed evacuations, or associated with acute disease of the lungs. But in the passive and chronic cases, it is often not materially diminished, and is seldom coagulable unless the kidneys become diseased. It should not be overlooked, that the primary lesions in hydrothorax are generally and often necessarily progressive; and that to this circumstance, as well as to the increase of the effusion, the exasperation of the symptoms and its fatal issue are to be imputed. (See also § 29, 30.)

170. *D. PROGNOSIS.*—The complicated nature of this malady, the advanced stages of the organic lesions producing it at which it supervenes, and the age and habits of those among whom it is commonly observed, will always influence the practitioner to give an unfavorable opinion of the ultimate issue, although the results of repeated observation will induce him to inspire hopes of affording great relief. But every return of the effusion diminishes the chance of even partial restoration. His opinion, also, will be founded on the nature and extent of the primary lesions, either of the lungs, or of the heart, &c., as made manifest by the auscultatory and rational signs. In every case, however, the prognosis should be guarded; for, under circumstances apparently favourable, an unexpected change may occur from the patient's conduct, or the progressive changes in the seat of disease: and his friends ought to be informed that, even in a state of no very apparent danger, he may be suddenly cut off.

171. *E. TREATMENT.*—The principles of treatment so fully described in the early part of this article are applicable to hydrothorax. In the acute and sub-acute states, *bleeding*, general or local—more frequently the latter—is required; but it must be practised with caution. The results of experience will confirm the inference at which I arrived above, that, notwithstanding the close resemblance of the morbid appearances, in acute hydrothorax, to those of true inflammation, yet vascular depletions are not nearly so well borne in the former as in the latter, evidently owing to the differences, particularly constitutional, on which I insisted. But the extent to which it should be carried, and mode of practising it, must entirely depend upon the nature of the original lesion, and the state of vital energy and vascular action. Generally, when the lungs are acutely affected, and their substance congested, or when the lesion of the heart is of an acute kind, as active enlargement of its cavities, moderate depletion is both requisite and beneficial. But in the more passive states of the malady, our reliance must be placed on digitalis, and other diuretics, with tonics, &c. In many instances, where depletion—especially local—is obviously indicated, the propriety of supporting vital power, even at the time of unloading the vessels, or immediately afterwards, by the exhibition of gentle tonics and diuretics, cannot be disputed, more especially when the vascular fulness, or morbid action, is secondary merely, and the consequence either of an excrementitious plethora,—in which cases, purgatives, and other medicines calculated to act upon the emunctories, should be also employed,—or of the irritation produced by the properties of the retained fluid. General bleeding is but seldom requisite in hydrothorax; for a sufficient quantity of blood may be taken by *cupping*, which possesses the advantage of producing a revulsive or derivative action. On this account, I have prescribed *dry cupping*, where the abstraction of blood was not indicated. In cases where congestion is superinduced in the lungs, or where hæmoptysis occurs, cupping, or even dry cupping, is a most important part of the treatment, assisted by digitalis, acids, and external counter irritation.

172. *Revulsants* are generally of great benefit, conjoined with antiphlogistic and diuretic remedies, in acute, and with tonics, &c. in passive,

hydrothorax. Setons, or issues, near the margin of the false ribs, on one or both sides, are among the best modes of fulfilling this intention. WENDT advises them to be inserted in the chest; and AUTENREITH directs a blister over the sternum to be kept constantly discharging. *Cathartics*, and *purgatives*, especially the hydragogues, above enumerated, often afford speedy relief; but they are admissible only when the powers of life are not greatly reduced, and in the more acute cases. *Diuretics* are more certainly beneficial in this species of dropsy than in any other; and of this class *digitalis* is the most efficacious, particularly in the form of infusion, and when combined in the manner already shown. The praises bestowed on it by LENTIN, WITHERING, DARWIN, HAMILTON, FRANK, MACLEAN, PERCIVAL, and many others, have been generally acknowledged to be just. *Squills*, rank next in utility; but they are not always appropriate, and are even injurious in some of the more acute states of complication, particularly in that with pneumonia or hydro-pleuritis. *Senega* and *ammoniacum*, and the *æthers*, may be used in the passive form of the disease. The propriety of exhibiting diuretics, with tonic infusions, and with antispasmodics, as already advised, is especially evinced in the more passive conditions of this disease. Camphor, ammonia, and the *æthers*, particularly the spirit. *ætheris nitrici*, and spir. *ætheris sulphur.*, are of great utility, when thus associated, or when given with purgatives and tonics. The importance of supporting the constitutional powers, in all the more passive states of the cardiac complication, cannot be too highly estimated. In such cases, purgatives should be given only in combination with tonics and antispasmodics; and digitalis will be best exhibited in a similar manner. Formulæ 400. 516. 781. 856. 859. 893. 894., and the following, as well as other diuretic preparations in the *Appendix*, exemplify some of the foregoing combinations:—

No. 190. R Hydrarg. Submur. gr. j.; Pulv. Digitalis gr. j.—ij.; Zinci Oxydi gr. iij.; Pulv. Opii Puri gr. ss.; Syrup. Tolutan. q. s. Fiat Pilulæ ij., bis terve quotidie sumendæ. (HUFELAND.)

No. 191. R Tinct. Digitalis ℥x.—xvj.; Tinct. Calumbæ ʒ jss.; Spirit. Æther. Sulphur. ʒ ss.; Tinct. Opii ℥v.; Mist. Camphoræ ʒ xj. M. Fiat Haustus bis quotidie sumendus.

No. 192. R Pulv. Scillæ gr. j.; Potassæ Nitratis gr. vi.—x.; Sodæ Sub-carbon. exsic. gr. viij.; Sacchar. Purif. ʒ ss.; Olei Anisi ℥ iij. Tere bene simul, et fiat Pulvis ter in die capiendus. (SELLE.)

No. 193. R Potassæ Sub-carbon. ʒ jss.; Potassæ Nitratis ʒ ss.; Tinct. Colchici ʒ iij.; Tinct. Aurantii Comp. ʒ iij.; Infus. Junip. ʒ vij. Misce. Capiat Coch. ij. vel iij. larga quartis horis.

When, in addition to diminished tone of the capillaries, the disease is complicated with atonic bronchitis and mucous expectoration, the first of the following recipes may be administered; and when it is associated with torpor of the liver, the latter may be exhibited:—

No. 194. R Pulv. Scillæ exsic. gr. xij.; Pulv. Fol. Digitalis gr. xvj.; Hydrarg. Submur. gr. vj.; Pulv. Gum. Myrrhæ ʒ ss.; tere bene simul, et adde Assæfœtidæ ʒ ss.; et Syrup. q. s. Fiat Pilulæ xxiv., quarum capiat unam quater in die, vel duas mane nocteque.

No. 195. R Gum. Ammoniaci, Saponis Venet., aa ʒ j.; Pulv. Scillæ exsic. gr. x.; Pulv. Hydrarg. gr. xv.; Olei Juniperi ℥ v.; Extr. Taraxaci ʒ j. Fiat massa æqualis, quam divide in Pilulas xxx. Sumantur due bis terve quotidie.

173. *Paracentesis thoracis*, once so strenuously advised, has now fallen into disuse, and is seldom

or never resorted to, excepting in empyema. In some states of the acute disease, especially when the effusion is principally in one cavity, and is not attended by organic changes in the lungs or heart, of a necessarily fatal or dangerous kind, the condition of the patient in other respects not contra-indicating the propriety of performing it, this operation may be as safely and beneficially practised on the thorax as on the abdomen; the same risks—and no greater—existing in respect of the one as of the other. It has been recommended by GOULA, DUVERNEY, BIANCHI, DELAPORTE, MORELAND, HUETTER, MORAND, LULLIER, J. P. FRANK, MURSINNA, BELL, ROMERO, and ARCHER, and practised successfully by nearly all of them. The chief danger proceeds from the introduction and action of the air; but not so much from its preventing the dilatation of the lungs, as from its action on the diseased pleura, and the fluid effused from it, as shown above (§ 157.). (See arts. LUNGS, and PLEURA.)

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VIII. DROPSY, CONGENITAL (*Hydrops Congenitus; Dropsy of the Fœtus and new-born Infant*).

174. DEFIN.—Effusion of watery fluid in the serous cavities, or cellular tissue, generally con-

sequent upon disease of the mother, or upon organic change in the appendages, or in some of the viscera, or the fœtus, or upon both causes.

175. Congenital effusions of fluid are found—(a) in the ventricles, or between the membranes of the encephalon; (b) between the membranes of or in the spinal cord; (c) within both the head and the spinal canal, in the same case; (d) in the abdominal cavity; (e) in the subcutaneous and other parts of the cellular tissue; (f) in the cavities of the chest—the pericardiac and pleural; and, generally, in the above sequence, as respects frequency of occurrence. They are observed in the fœtus at the full term of utero-gestation, and in abortions chiefly during the middle and latter months; and are, with the associated diseases either of the uterus or of the appendages of the fœtus, the cause of its death, or of its premature expulsion.

176. I. CONGENITAL HYDROCEPHALUS, (*Hydroceph. congenitus*) sometimes appears, as other forms of congenital dropsy, dependent upon disease of the uterus, or on constitutional taint in the parent or parents, or upon organic change in the placenta or umbilical cord. In rare instances it has been associated with ascites in the mother, or with dropsy of the amnion; but it more frequently occurs without any such connection. In these latter cases it may be imputed to a morbid action seated in, and more strictly limited to, the membranes, or internal cavities of the brain. It is often attended by an arrest of the formation of the encephalon at some stage of the process; but, in other cases, the brain is fully, if not more than usually, developed. When the fluid effused, either in the general cavity of the arachnoid, or in the ventricles, is considerable in amount, the ossification of the cranial bones is interrupted generally towards their sutures, but occasionally in other parts; and, in these situations, the membranes are often protruded to a greater or less extent, forming, with the scalp, a watery tumour (*hydroencephalocoele*), which may be large at birth, or scarcely perceptible, and may subsequently disappear altogether, or become larger. When the effusion is chiefly in the ventricles, the distended cerebral substance, and the membranes, with more or less of the fluid, constitute the tumour; unless the effusion has taken place previously to, and thereby prevented, the development of the cerebral substance and hemispheres. Hence the character of the rupture depends upon the situation of the fluid; and its form, upon the size of the aperture through which it presses. Some forms of the disease approach to hemicephaly; a large portion of the cranium being wanting, and the protruding brain being covered by a thin membrane. In other cases, the opening is small, narrow, or cleft-like, and the protrusion is either small or has a narrow neck; the fluid being, in such cases, usually effused between the membranes. These ruptures are most frequent in the back of the head, in different parts of the occipital bone, and in the lambdoidal suture; and less frequently in the top, sides, and front of the cranium. (See the Cases and Writers referred to.)

177. Congenital hydrocephalus arises at various epochs of fetal existence. At the earliest periods, it interferes more or less with, or entirely arrests, the formation of the brain, and cranial

bones. At a later epoch, or that most nearly approaching parturition, the brain and its envelopes may be not merely fully formed, co-existently with effusion, in the ventricles, but even more than usually developed for the period of existence. A very large proportion of cases of chronic hydrocephalus commences before birth; the effusion slowly increasing after this period, and expanding the sutures. MECKEL, indeed, supposes that all cases of the chronic internal dropsy of the head begins at this epoch; but certainly, in some, although the smaller number, the disease originates after birth. Not infrequently water collects to an extent that precludes delivery until the head of the fœtus is opened, and the water evacuated. Occasionally the collection is so small at birth, as to render its existence somewhat doubtful, the signs of its presence gradually disappearing with the growth of the infant. In a few cases, in which effusion is more evident, an equally favourable result takes place. Congenital hydrocephalus is often associated with congenital dropsy of the spine, and various malformations. (See DROPSY OF THE HEAD—Chronic.)

ii. CONGENITAL DROPSY OF THE SPINAL CORD.

—SYN. *Hydrorachis*, *Hydrorhachitis* (from ὕδωρ, water, and ῥαχίς, the spine), *Water in the Spine*, *Spina bifida*, *Cleft Spine*; *Hydrorhachia dehiscens*, J. P. Frank; *Hydrops Spinae*; *Wassersuch des Rückgrates*, Germ.; *Idrorhachitide*, Ital.

178. DEFIN.—A collection of a watery fluid between the membranes of the spine, generally occasioning a tumour through an aperture in the canal, occurring during fetal existence, or becoming apparent soon after birth, and observed either in the prematurely born, or in the full-timed fœtus, whether dead or living.

179. Congenital dropsy of the spine is often complicated with internal dropsy of the head, hemicephaly, and with hydrencephalocoele; and generally terminates fatally with paralysis. Cases, however, have occurred, of children living several years, and reaching puberty, with the disease. PALLETTA and ACREL met with one at seventeen years of age; HENDERSON saw it at eighteen; WARNER and HOCHSTETTER, at twenty; CAMPER, at twenty-eight; and COWPER, one who lived to thirty. I saw the disease, in 1822, in a female of nineteen, who menstruated regularly through ulcers in the thighs. The tumour was about thirty inches in circumference. The excretions were passed involuntarily; but, in other respects, she was then in good health. She died, however, in a few months afterwards. Although generally congenital, hydrorachis, with an aperture in the canal, has occurred after birth (FRANK and REYDELLET). In the most complete, but the most rare, form of the disease, the spinal marrow is entirely wanting; the membranes having fallen together, usually slit at one or more places, or more or less degenerated, and adherent to each other, forming sometimes a closed sac filled with lymph (OTTO). This condition may even occur without cleft of the vertebral canal. In the less complete states of this disease, the spinal marrow presents its rudimental forms, like pultaceous masses of medullary substance and blood; or loose and separate nervous bundles; or the anterior columns running parallel but separate from

each other; or, as in the early stages of formation, open, broad, and flat behind.

180. In the more common state of the disease, there is found only in one, or very rarely in two, distinct places in the spinal column, a more or less large swelling containing water: in some cases flat; in others, semilunar; and in several, necked; their parietes consisting of the expanded spinal membranes, often adherent and otherwise morbid, protruded through the cleft in one or more vertebræ; and connected with the thin and distended common integuments. This watery tumour most commonly appears in the lumbar region, more rarely in the dorsal and sacral, and still more rarely in the cervical, excepting in cases of coexisting hemicephaly or hydrencephalocoele, in which the *spina bifida* always occurs in the neck, and, from this point, protrudes more or less outwards. The dropsy of the cervical spinal marrow is merely, in this case, a process from that of the brain; the degenerated brain being directly connected with the diseased origin of the spinal marrow, which is sometimes perfectly natural below. The size of the cleft in the spine varies greatly: generally more than one of the vertebræ are open; and rarely there is found only a small round hole in one bone, by which the tumour is connected with the spinal canal. It is extremely rare to find the bones healthy, and the aperture merely through the intervertebral substance.

181. The seat of the water is originally or naturally in the spinal marrow itself; which, at the part affected, is very much expanded, broken up, and even entirely destroyed; and often exhibits the canal in the axis of the marrow open and expanded up to the brain. The water is also sometimes contained, at the same time, between the membranes of the cord; and, in rare cases, in them alone; whilst the cord itself is either healthy, or merely compressed (ACREL, PALLETTA, VACCA-BERLINGHIERI, URQUHART). In those cases where the fluid is contained between the membranes only, there is generally coexistent effusion between the membranes of the brain. When the fluid is in the marrow itself, there is likewise often effusion in the ventricles. Sometimes the swelling also contains hydatids. Dropsy of the spinal marrow occurs, in some rare instances, without any external swelling, and without cleft in the spinal column; so that the canal running in the axis of the spinal cord, and which is generally closed, becomes more or less widely expanded by the water, with coexisting increased thickness of the cord itself (SANTORINI, PORTAL, OTTO); or the water is effused only in the substance of the cord, and one part of the organ is distinctly swollen (P. FRANK). About one half of the hemicephalic monsters have also *spina bifida*.

182. Whatever may be the seat of the external tumour, it presents *three varieties* as to its aspect (BILLARD):—1st, That with the integuments covering the tumour in a healthy and uninfamed state; 2d, That with the skin discoloured, thinned, and sometimes permitting the exudation of a serous or sero-sanguineous fluid, indicating the approaching rupture of the parietes; 3d, That which is opened, and allows the effused fluid to escape through a fine ulcerated perforation, the vicinity of which is surrounded by a red, rugous,

and unequal elevation. The patient may live several months or years with the first variety of the disease; but death usually soon follows upon the second and third. The fluid effused varies in appearance with the state of vascular injection presented by the membranes. When these are injected, or apparently inflamed, the fluid is generally more or less turbid, or even flocculent; but this change may arise from the inflammatory action preceding the rupture of the external part of the parietes of the tumour. In other cases, the fluid is commonly limpid and pale.

183. The general symptoms of congenital hydrorachis, or cleft spine, are very diversified. They consist chiefly of debility, emaciation; paralysis, generally, of the lower extremities; resolution of the sphincters; anæsthesia; inability to take the breast; convulsions; and stertorous breathing. The tumour has usually a globular or pyriform shape; sometimes a broad base, and, at others, a narrow neck; and varies from the size of a hazel nut to that of the adult head, or even larger when the patient lives many years with the disease. Congenital dropsy of the spine, with external tumour, is sometimes associated with other congenital diseases or malformations; as dropsy either of the head or of some other cavity; vices of formation in the digestive canal (VOISIN, *Journ. de Méd.* t. xxi. p. 57.; REVOLAT, in *Ibid.* t. xxvii. p. 378.); umbilical hernia (PREUSS, in *Ephem. Nat. Cur.* vol. viii. p. 128.; SANDIFORT, *Observ. Anat. Pr.* t. iii. p. 1—41.; MECKEL, *l. cit.* p. 679.); malformations of the urinary or genital organs, or the absence of one or more of these (DELFINI, *Opusc. Scelti di Milano*, t. vi. p. 21.; LOBENWEIN, *De Monst. Genit. Difformitate*, in *Mém. de l'Acad. Imp. des Scien. de St. Petersb.* t. vi. 1817.); imperforate anus (LANARC, in ROUX's *Journ. de Méd.* t. xxxiii. p. 516.); and defect of various parts.

184. iii. CONGENITAL ANASARCA, AND DROPSIES OF THE CAVITIES OF THE CHEST AND ABDOMEN, are occasionally observed, particularly in the prematurely born fœtus, either dead or living; and under the circumstances already stated (§ 176.). The occurrence, unless when the effusion is very great, or associated with extensive visceral disease, should, however, not be viewed as necessarily fatal. Cases have been observed, wherein the collection of water in the abdominal cavity of the new-born infant has been very considerable, and yet recovery has taken place. In some instances, the effusion, in this situation, has been so great as to impede parturition; and, in very rare cases, it has been found necessary to puncture the abdomen of the fœtus before delivery could be effected. *Congenital encysted dropsy* is very seldom met with. The case recently recorded by M. PETIT-MENGIN is one of the most remarkable on record.

185. iv. CAUSES OF CONGENITAL DROPSIES.—(a) The remote causes of congenital dropsies are not frequently very obvious. They have been stated to consist of constitutional vice in the parents, particularly the mother; the syphilitic taint; the scrofulous and rickety diatheses; violent mental emotions, as fits of anger, fright, &c.; whatever inordinately excites the circulation in the uterine organs during pregnancy, as excessive venereal indulgences (KLINKOSCH, J. FRANK); external injuries affecting the uterus or its con-

tents; violent concussions of the trunk; and suppressions of urine in the mother (FRANK, BILLARD, &c.).—(b) The more immediate causes are organic changes, and hydatids, in the placenta; alterations in the umbilical cord; tumours or other lesions of the uterus; inflammations or congestions in the viscera of the fœtus, or inflammatory irritation in the serous membranes; tubercles in the liver and lungs; and tubercular thickening of the serous surfaces. The three cases recorded by Dr. R. LEE occurred in connection with dropsy of the amnion, and with disease of the placenta, and of some one of the viscera of the fœtus. In two, the effusion was seated in the peritoneal cavity, and in one of them it was associated with anasarca. It has been remarked by MICHAELIS and some other writers, that congenital dropsies, especially *spina bifida*, often occur in the same families with rickets.

186. v. TREATMENT.—Congenital dropsies may be somewhat benefited by medical treatment. When the aqueous collection is not great, and when the infant is well-formed, fully developed, and evinces little or no disease of any vital organ, we should not despair of success.—(a) Of the treatment of *congenital hydrocephalus*, particular mention will be made in that part of this article in which chronic hydrocephalus is discussed; and the same measures which will be recommended in dropsy of the spine with external tumour, are in great measure applicable to the congenital collection within the head, but more particularly to that form which is attended by imperfect formation of the cranial bones and protrusion of the membranes and other parts external to the seat of the collection (*Hydrancephalocoele*, see § 176.). In most instances of congenital hydrocephalus, bandaging the head, and continued but gentle pressure, aided by the rest of the means advised in the next paragraph, seem most appropriate.

187. (b) *Of dropsy of the spine, &c.*—The removal of this form of disease by ligature was practised unsuccessfully by HEISTER; and was more recently recommended by B. BELL. But what has been stated above relative to the pathological relations of the tumour, independently of the circumstance of its form being such as not frequently to admit of this treatment, will show that this method can be but seldom appropriate, and that it must be generally hazardous. Gentle pressure has been advised by Mr. ABERNETHY, and successfully employed in a case by Sir A. COOPER, who also resorted to puncture in another case, with a similar result. These methods have, however, been often practised in the dropsical tumours, both of the spine and of the head, but very rarely with advantage. In a case, however, of the latter kind, Mr. E. THOMPSON succeeded by applying a ligature. RICHTER recommends setons to be inserted at a short distance from the tumour; CAMPER and ACREL, the application of discutient lotions; DE HAEN, the employment of defensive plasters; and BILLARD, gentle and continued pressure. CAMPER, BORSIERI, the FRANKS, RACCHETTI, and OLLIVIER, are strongly opposed to repeated punctures; and state, that they excite inflammatory action in the membranes, and hasten an unfavourable termination. I believe that the tumour should be as little interfered with as

possible; that, if any local medication be resorted to, a simple discutient lotion—as one of vinegar, rose water, and spirit, or liq. ammon. acetatis—or a defensive and discutient plaster, with gentle pressure, will be found the safest and most successful;—that, in addition to this, the abdominal secretions and excretions should be promoted, by means the least calculated to lower the vital powers;—that a healthy wet-nurse should be provided, to whom a gentle course of iodine may be administered;—that change of air, or residence in a warm and dry air and locality, be directed;—and that the infant should wear soft flannel next the skin, and be warmly clothed. These have been the means I have employed in most of the cases of the disease I have treated; and they have often prolonged life, and diminished the tumour, although, in many instances, I was unable to learn the ultimate result. When the exterior of the tumour becomes inflamed, or the integuments thinned and disposed to ulceration, puncture may be then resorted to, as in the case recorded by Mr. ABERNETHY; but care should be taken to close the opening accurately after each operation, and to protect the part from the air and external injury by suitable applications. (See DROPSY OF THE HEAD—Treatment of Chronic.)

188. (c) As to the treatment of the other forms of congenital dropsy, but little need be added to the above. In some instances, it may be requisite to commence with the application of one or two leeches. Purgatives are generally requisite, and should be often repeated, and alternated with, or followed by, diaphoretics and diuretics, and assisted by the use of slightly alkaline baths, of a temperature ranging from 85° to 94°. Many of the cases of these forms of congenital dropsy are beyond the reach of medical aid; but, when the infant is in other respects well formed and strong, the existence of active congestion in, or of vascular determination to, some one of the viscera of the cavity in which the collection is formed, or of inflammatory irritation in the serous membrane, may be suspected, and moderate local depletions, and active alvine evacuations, aided by means calculated to relax the cutaneous surface, should be employed.

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IX. DROPSY, ENCYSTED.—SYN. *Hydrops Sacculus*; *Hydrops Cysticus*, Auct. var.; *Die Sackwassersucht*, Germ.; *Hydropisie enkystée*, Fr.

189. DEFIN.—The fluid enclosed in a cyst, generally of a serous structure internally, and of adventitious formation; giving rise to local symptoms resembling those caused by effusion into natural cavities.

190. The origin of serous cysts is discussed in the article DISEASE (§ 114.); it therefore remains only to notice those excessive collections of fluid in them, which are distinguished with difficulty from accumulations in natural cavities. The encysted productions, which either contain more or less consistent secretions, or are of so small size as not materially to affect the bulk of the organ in which they are seated, or the functions of parts adjoining, are considered in connection with the other lesions of their respective seats. In the view about to be taken of encysted collections of fluids, mention will be made only of those which possess, in many respects, a dropical character, and which have generally been considered as such by writers and practitioners, although even they may possess no true claims to this distinction.

191. A. CAUSES.—The causes of common dropsy have generally no influence in producing the encysted. The same state of action, to which the formation of the cyst in the first instance is to be attributed, evidently is the main agent in the secretion of its accumulated contents. Of what this state consists, and of the causes in which it originates, but little is really known. When remarking on this and similar changes (see DISEASE, § 111.), I stated that the origin of serous cysts cannot be considered as truly inflammatory; but that it may be imputed to a modified nutrition, frequently connected with a weak-

ened or depraved state of the constitution; modifications of the formative processes—of the organic actions of secretion and nutrition—being more apt to occur from causes which deflect them from their healthy course, in such constitutions, than in the sound and vigorous. This view is important, inasmuch as it is based on an attentive observation of a number of cases of this description, and as it leads to a more successful practice than is too frequently adopted.

192. *B. PROGNOSIS.*—Encysted collections of fluid, as long as they do not reach the extent of impeding the functions of adjoining organs, seldom occasion any serious disturbance. In this respect they are different from effusions into natural cavities; and, when they give rise to dangerous or fatal results, it is owing more to this injurious action on surrounding parts, than to any change they induce in the circulating, secreting, and natural functions. When not injuriously interfered with, and when the system is not improperly lowered, or if it be enabled to resist their increase, all the functions frequently proceed without any material disturbance, and these collections often remain long stationary. But, when the constitutional powers receive a severe shock from any cause; when the patient is imperfectly fed, or is made the subject of a meddling or active surgery; the cysts become the centre of a morbid determination of the organic actions; chronic inflammation supervenes in them; the accumulation of fluid advances rapidly, and the vital resistance is subdued. In some cases, the secretion proceeds in the interior of the cyst with greater rapidity than the cyst itself can either yield or be developed, and hence it is ruptured, and its contents effused. This circumstance may hasten an unfavourable issue; or, when the cyst is small, favour its disappearance or transformation.

193. Encysted dropsies are, with some exceptions, incurable when they have reached a large size, and when, either from this circumstance, or from their situation, they admit not of being removed entirely. But, in many instances, especially when they are seated in the ovaria, a judicious constitutional treatment will often prevent their increase for years,—sometimes during the greater part of a very long life,—or will even cause their entire disappearance, or transformation into an inert substance.

194. *C. TREATMENT.*—As to the indications of cure, only a few general observations are here necessary. In all encysted formations, particularly in those now under consideration, it may be viewed as a law, from which there are extremely few exceptions, that, in proportion as vital power, and its manifestations in the secreting, assimilating, and excreting organs are promoted, without materially exciting the vascular action, or heating the body, will the progress of these productions be overcome, or their diminution effected; whilst their increase will be both great and rapid in an equal ratio with depression of constitutional energy, or with disorder of any of the functions now alluded to. A healthy and vigorous performance of the various organic actions resists the progress of all adventitious formations; and an opposite state favours their increase. This rule holds in respect of all productions of a parasitic kind, and in all the kingdoms of organised nature, and is observed in both the

physical and moral manifestations. The parasitic formation or animal can grow only at the expense of the weak; the robust frame resists it, and denies it nourishment; whilst the weak furnishes it with means which are slowly but surely turned to its own destruction.

195. During the treatment of encysted dropsies, care should be taken not to resort to any measures that may irritate or inflame them, particularly when they have acquired a large size. On this account, *puncturing or paracentesis* should be resisted to the utmost—until extinction of life would follow on its being longer deferred; and, when thus made a *dernier ressort*, the operation should be performed by a scalpel and lancet, with which latter the sac should be opened; the utmost care being taken not to admit the air. I have seen, on numerous occasions, the ill effects of not attending to this injunction, and of leaving a canula, or tent, in the wound, the inflammation thereby induced in the cyst, giving rise to so extensive a secretion, and so much constitutional disturbance, that the patient has rapidly sunk.

196. The *preparations of iodine*, when judiciously exhibited, are the most generally applicable and efficacious means that can be employed in this class of diseases. But they ought to be exhibited in very small doses, much diluted or reduced, and long persisted in. They become injurious as soon as they give rise to the slightest indication of irritation of the digestive organs. I have employed them extensively and constantly since 1819, when I brought some of them with me from the Continent. At that time they could not be procured in London. They are most beneficial when prescribed internally; but they are also of use externally, if they be directed so as not to inflame the part to which they are applied (see F. 332. 766—769.). When the debility is considerable, the *ioduret of iron*, taken in any aromatic infusions, the secretions and excretions being at the same time promoted by an aperient pill at bed-time, will be of essential service. I have lately prescribed it in several cases of cachectic disease, with remarkable benefit. The *diet*, in all encysted dropsies, should be light and nutritious; and the patient's mind be agreeably engaged: *change of air*, or residence in a pure, temperate, rather warm, and dry air, ought also to be recommended.

197. THE SITUATIONS IN WHICH ENCYSTED DROPSY IS MOST FREQUENT, are numerous; and if all the places in which large serous cysts have been developed were taken into the account, it may be said that they comprise every part and organ of the body. Encysted dropsy, however, has been observed *under the integuments*, by SCHENK, VAN SWIETEN, CRUVEILHIER, and others, forming very large lymphatic tumours; *within the head*, as shown in the article BRAIN; *between the pleura and the intercostal muscles* (HALLER, DESAULT, &c.); *in the mediastinum*; *in the substance of the lungs* (STÖERK, MALOËT); *in the cavity of the thorax*, and in that of the *pericardium* (MERCKER, DUPUYTREN, ITARD, &c.); *between the peritoneum and abdominal parietes* (ACHOLZIUS, MORGAGNI, MORAND, and J. P. FRANK); *in the ovarium*, forming ovarian dropsy; *in the Fallopian tubes* (RIEDLIN, DOUGLAS, BLANKARD, BAILLIE, SEYMOUR, &c.); *in or connected with the uterus*,—*Hydrometra*, &c. (GRUNER, ODIER,

LAFOSSE, RAYER, THOMSON, &c.); connected with the liver (ALIX, CORVISART, LEROUX, FRANK, LASSUS); in the kidney (MORGAGNI, HOUSTON, WALTER, CORVISART, J. JOHNSON, HOWISON); in the omentum (HASENOERHL, DE HAEN, PORTAL); in the mesentery (HORSTIUS, TULPIUS, SAUVAGES, MORAND); and in the spleen (MORGAGNI, BAADER, &c.). Of the most important only of these, I now proceed to take a more particular notice. In some cases of very large encysted dropsy seated within the abdomen, the exact origin of the cyst can hardly be ascertained. Of this kind appears to be the instance recorded by Mr. COULSON (*Med. Gazette*, vol. ix. p. 577.), which was frequently tapped. Upon dissection, the cyst was found to adhere to the abdominal parietes, and to several of the viscera, and to consist of three layers. The ovaries were healthy. Similar cases are published by PORTAL and CRUVEILHIER (*Anat. Patholog.* vol. i. p. 268.).

1. DROPSY OF THE OVARIUM.—SYN. *Hydrops Ovarii*, *Ovarian Dropsy*, *Dropsy of the Ovary*; *Hydroophorie*, Boivin and Duges; *Die, Wassersucht der Eierstöcke*, Germ.; *Idropisia di Ovaria*, Ital.

198. DEFIN.—*Swelling, commencing with tenderness, pain, or weight in the iliac region of one or both sides, and irregularity of the menstrual discharge; the swelling gradually extending over the abdomen, and attended by obscure fluctuation.*

190. A. PATHOLOGY.—This is the most frequent species of encysted dropsy, and of the greatest importance in a practical point of view. It is very often complicated with other organic changes in the ovary (see article OVARIA—*Diseases of*), peritoneum, uterus, and tubes; but it also frequently consists only or chiefly of a collection of a greater or less quantity of fluid in one or more cysts, into which the substance of the ovary seems to have been converted; owing to the enlargement of one or several of them giving rise to atrophy of the proper structure of the organ. These cysts have been mistaken for hydatids, from which, however, they may be distinguished by their being nourished by vessels supplied from the parts in which they are formed; whilst hydatids are not thus supplied, but are nourished by their own vessels, and have an independent life. Sometimes "one or both ovaria are converted into simple cysts; the whole of the cellular substance and vesicles disappearing, that which was the fibrous coat of the ovary becoming the fibrous coat of the cyst." (Dr. SEYMOUR.)

200. The Graafian vesicles, which, in the healthy state, are of the size of millet seeds, frequently become as large as almonds, are filled with a limpid fluid, and their internal membrane is very vascular. This appears to be the commencement of the simplest form of ovarian dropsy; or, at least, a change, which may proceed no further, but which sometimes does proceed to an extent which constitutes this disease. When these vesicles enlarge to a greater degree than the size of a filbert or almond, it is always on the side nearest the proper coat of the ovary; the rest of the ovary, as shown by M. CRUVEILHIER and Dr. SEYMOUR, appearing, when the cyst reaches a large size, as if atrophied at the parietes of the cyst. In this manner is sometimes formed an enormously large single cyst, having the proper fibrous coat of the ovary and peritoneum for an

external covering; the internal membrane, or the parietes of the vesicle, secreting a prodigious quantity of fluid. In many of these cases, especially in those of long duration, the parietes of the cyst undergo various changes, and are thickened, hardened, cartilaginous in parts, or even ossified. Their external surface, in their earlier stages, are sometimes smooth, not infrequently inflamed or very vascular; and form adhesions with adjoining parts of the peritoneum and contiguous viscera, or with the fimbriated extremities of the broad ligament, or with the fundus of the uterus (BOIVIN, SEYMOUR, DUGES). In their more advanced states, also, their surface becomes the seat of chronic inflammation, of tuberculation, or both; and in this change the rest of the serous surface of the abdomen, or parts of it only, may participate. In some instances, the marks of associated inflammatory action in the peritoneum are indistinct; but this membrane not infrequently contains, in these cases, more or less fluid, the encysted dropsy thus being complicated with ascites. The interior of the sac, or cysts, is commonly smooth, and resembling a serous surface (MORAND, BURNS); or it is lined with a false membrane: it is, in some cases, irregular or mamelonated; and, in others, imperfectly divided by incomplete partitions (CRUVEILHIER).

201. The fluid contained in these cysts varies remarkably. In some cases, particularly when it is lodged in one, or a few cysts of a very large size, it is serous, or mixed with aropy or mucous matter. In others, it is dark-coloured and resembles coffee. Where the cysts are more numerous, their contents are generally thick, gelatinous, and of a brown colour of varying depths of shade. The fluid is also, but more rarely, of the appearance and consistence of custard; and occasionally it resembles honey. I have seen it, in some instances, where the accumulation was remarkably great, brown, thick, and gelatinous; and in others, its characters have changed at subsequent stages, especially after tapping; and it has become grayish, dissolved, ichorous, flaky, or puriform and even offensive. The quantity which collects, particularly when there is only one cyst, and when its contents are serous or watery, is sometimes very great. WEPFER, HALLER, MONRO, and FRANK have found as much as 120 pounds of fluid in a single cyst, and MÜLLER as many as 140 pounds. When the necessity of resorting to puncture has once become imperative, the rapidity with which the fluid is again formed is often remarkable. MORAND drew off 427 pints in ten months; and MARTINEAU nearly 500 in a twelvemonth; and, from the same patient, upwards of 6600 pints, by eighty operations, within twenty-five years. Sir A. COOPER thinks, with great probability, that the case of Mrs. Mumford, who was tapped 155 times in less than four years, was one of ovarian dropsy. When the ovary contains a number of cysts, is lobular, and irregular in its surface and firmness, each of the individual cysts often is filled by a different and peculiarly characterised secretion—which is either watery gelatinous, sanguineous, fatty, &c.; and, when the tumour has been punctured, partially decomposed or putrid, and mixed with gaseous fluids (DE HAEN, BOIVIN, DUGES, and myself). In rare instances, sebaceous matters with long hair have been found in the same ovary that con-

tained large dropsical cysts, and even in the same cyst with the watery collection: the cyst in which the hair and fatty substance had been formed having subsequently become the seat of dropsical effusion.

202. *B. CAUSES.*—(a) The *predisposing causes* are, the scrofulous diathesis; debility, however induced; frequent or excessive menstruation, and venereal indulgences. The disease occasionally commences as early as the first appearance of puberty. J. P. FRANK saw it at thirteen, and M. ITARD at fourteen years of age. MARJOLIN states, that it may begin before puberty; but I know of no such occurrence. It is most common between the ages of twenty and fifty. It may commence soon after the cessation of the catamenia; but, although chronic cases of it are found in very old females, yet it rarely originates at an age much beyond fifty. It often follows abortions.

203. (b) The *exciting causes* have not been satisfactorily shown: but it has been very generally imputed to external injuries, succussions of the pelvis, the mismanagement of parturition and abortions; or to cold, fright, and anxiety of mind. From much attention to this disease, I have inferred that it is occasionally consequent upon inflammatory action in the ovaria or uterus, or connected with this change in its earlier stages. Hence its causes may be considered to be, in some cases, those in which inflammatory action in these organs generally originates. Yet there are numerous objections to this view; for even when the tenderness and pain in the region of the ovaria, accompanying its commencement, are greatest, there is also a frequently recurring and copious menstruation, indicating an excited, rather than an inflamed, state of these organs. From various considerations, and a review of the circumstances in which the disease seemed to originate, it is not improbable that it is connected with an often excited, but an imperfectly gratified, sexual appetite. Hence its frequency in females who are sterile, or whose state of health is insufficient to the development of a healthy and vigorous orgasm, owing either to premature and illicit indulgences, or to previous disease.

204. *C. SYMPTOMS AND PROGRESS.*—Ovarian dropsy is very commonly far advanced before recourse is had to medicine. It usually commences with irregularity of the menstrual discharge, and disorder of the excretion of urine, which is either voided frequently, or is long retained. There is also severe pain in the loins, with pain, tenderness, and swelling in one or both iliac regions. In some instances, the pain shoots through the abdomen, and down the thighs; and occasionally there is numbness, hæmorrhoids, or complete strangury, owing to the pressure of the enlarged ovary before it rises out of the pelvis. The catamenia, at this period, is frequently either copious or of too frequent occurrence; but it is rarely altogether suppressed. Various hysterical symptoms also come on; and disappear at a later stage. The bowels are usually costive; but they are sometimes irregular, or relaxed. As the malady proceeds, the patient experiences various dyspeptic symptoms, and often nausea and vomitings, as in the early months of pregnancy. The mammae also enlarge, and the areolæ around the nipples assume a darker shade. Dr. SEYMOUR

states, that, when both ovaria are affected, the catamenia are always absent; but, when one only is diseased, this evacuation is either absent or irregular. This does not agree with my experience, the results of which I have just now given, as regards the early stages of the disease; but, as respects the last stages, particularly in the more chronic cases, the observations of this physician seem to be correct. With the increase of the tumour, various inflammatory phenomena, referrible chiefly to the peritoneum, and commencing in the pelvis, but often extending upwards to parts of the abdomen, supervene.

205. The *progress* of the tumour and abdominal enlargement is extremely various. Occasionally the ovary, whether it consist of a number of cysts, or of one or few, increases very slowly. It sometimes remains long stationary; afterwards augments rapidly, and fills, ultimately, the whole abdomen; and in rarer instances it recedes, or even entirely disappears. It proceeds more regularly, however, in most cases, until it gives rise to appearances rendering the diagnosis very difficult. The general health, as already stated in respect of encysted dropsies, continues but little impaired, until the morbid accumulation has advanced so far as to disturb the functions of adjoining viscera; but this is not uniformly the case; for the means used to cure it not infrequently are sources of disorder, deranging the natural functions, and thereby favouring the increase of the disease. When the collection rises as high as the epigastric region, and the abdominal distension is great, the functions of the stomach are often completely overturned, and the constitutional powers rapidly sink; singular and unexpected changes, however, sometimes occur, even in the most chronic cases. Dr. BAILLIE mentions an instance of its spontaneous disappearance, after it had existed thirty years; the patient remaining, subsequently, in good health. The accumulated fluid is also occasionally discharged into some part of the large intestines, having previously formed adhesions with it; or into the vagina, pressure on the tumour increasing the discharge. Instances of this have occurred to Dr. ELLIOTSON, Dr. MONTGOMERY, myself, and others. In a case treated by me some years ago, and put upon a course of iodine, the catamenia were profuse every fortnight or three weeks. The tumour, which filled the whole abdomen, remained long stationary, and ultimately burst into the large intestines. It did not return again until upwards of a twelvemonth: ultimately the patient was so much benefited as to leave off treatment. Dr. SEYMOUR adduces an instance, in which the morbid collection was discharged both by the intestines and by the vagina, and recovery took place. Sometimes it forms adhesions to the abdominal parietes, and bursts externally at the umbilicus. A permanent cure is often effected by judicious management under the foregoing circumstances. A case was seen by me, in which adhesion of the tumour took place, to the parts adjoining the puncture by which its contents had been drawn off. The cicatrix ulcerated, and the fluid was afterwards discharged by degrees through the opening, and the patient recovered. A nearly similar instance of recovery occurred in the practice of Mr. BARNWELL. When the fluid finds its way into the peritoneal cavity, the result

is, in my opinion, generally fatal, although some authors contend that the fluid may be absorbed from this situation, and the patient recover. This, however, is certainly a very rare occurrence. The best authenticated case of restoration from effusion of the contents of the ovarian tumour into the abdomen is recorded by Dr. BLUNDELL, in his published lectures.

206. *D.* The DIAGNOSIS of ovarian dropsy is not always easy. It may be mistaken for pregnancy, for ascites, for hydrometra, or for tumour or abscess of some adjoining part. The appearance of swelling and pain in one side, or both, of the pelvis, in connection with irregularity, without suppression, of the catamenia; this swelling being at first but little, or not at all, changed by position—by lying on either side or by the erect posture;—obscure fluctuation as it expands, with a sense of elasticity, and sometimes of irregularity in it;—the motions and activity of the patient not being very materially impaired, or not in proportion to the magnitude of the tumour;—the principal abdominal organs not having evinced much disorder, or signs of organic change, previously to the swelling, and their functions not being greatly disturbed during its course;—its slow increase, its situation, its direction to one side and limitation to the lower regions of the abdomen when the patient is supine, until a late stage of the disease;—the inefficacy of purgatives and of diuretics in producing any diminution of it, and the not materially lessened secretion of urine, until after the disease has advanced very far, or until the fluid has been drawn off by art;—the more healthy aspect of the patient than in ascites,—and pain, stupor, or oedema of the thigh, leg, and ankle, having been complained of, on the same side with that where the swelling commenced,—will serve, when carefully considered, either separately or in conjunction, to guide the practitioner. These phenomena, however, may not be uniformly present, but many of them will—and will be so associated as to leave little doubt as to the nature of the disease, particularly when aided by an examination *per vaginam*, and also *per rectum*. At the commencement of the malady, the local symptoms have sometimes been so manifest, and attended by so much pain in the back, and pain and oedema of the lower extremity of the same side, as to have been mistaken for *psoas abscess*. The disordered excretion of urine and strangury, and the evidence obtained by examination, will, however, generally indicate satisfactorily the nature of the disease. Dr. MACINTOSH states, that the tumour may sometimes be felt between the vagina and rectum, before it becomes much enlarged; the *os uteri* being, in such case, tilted forwards close to the symphysis pubis, so as to resemble *retroversion of the uterus*; but an examination by the rectum will make the nature of the affection evident. When the increase of the ovarian tumour is slow, and it rises in the abdomen by a narrow neck before it is perceived, it may be mistaken for *enlargement of some other organ*; especially if it have formed adhesions with the parts in contact with it. The difficulty of diagnosis is also increased by the presence of fluid in the peritoneal cavity,—a circumstance which occasionally occurs. When this is suspected, or when the diagnosis is difficult, the patient should be examined

in the recumbent posture, when the ascitic fluid will be found to gravitate towards the hypochondriac and lumbar regions; and the limits of the ovarian tumour may be ascertained. The history of the early stages of the case, and the recurrence of the catamenia during the greater part, or even the whole, of its course, its chronic duration, and the absence of the progressive changes of the *os uteri* characterising pregnancy, will sufficiently distinguish it from that state; the uterus being moveable and light upon examination *per vaginam*, pressure on the hypogastrium at the time not affecting, or propagating any movement to, this organ.

207. *E.* The PROGNOSIS will depend entirely upon the constitutional powers of the patient, and the progress the disease has made. Although it should be generally unfavourable, and always expressed with caution, and with much reservation, even in cases apparently the most favourable, yet we may entertain reasonable hopes that the progress of the disease may be checked by careful regimen and treatment, particularly when the energies of the constitution are unbroken, and the digestive and excreting functions are not materially disturbed, nor the progress of the swelling rapid. J. P. FRANK met with a case where it commenced at thirteen, and yet the patient reached the great age of eighty-eight years. The occurrence of tenderness in the abdomen, any manifest diminution of the patient's activity, its complication with ascites, emaciation, accelerated pulse, great disturbance of the functions of the stomach, and the necessity of having recourse to paracentesis, are all unfavourable circumstances.

208. *F.* TREATMENT.—The utmost care should be directed to the removal of all sources of irritation from the uterine and adjoining viscera. The urine ought to be drawn off, if its excretion be interrupted; and particular attention should be paid to the state of the bowels, the evacuation of which must be procured daily, by cooling aperients, or laxatives conjoined with gentle tonics, when they require it, or by means of tepid and emollient injections. In the early stages of the disease especially, and when pain, tenderness, and other symptoms of inflammation are present, particularly if the catamenia are deficient or delayed, local depletions by cupping on the loins or sacrum, or the application of leeches, or cupping about the tops of the thigh, are requisite. External irritation should afterwards be prescribed; and, as soon as the symptoms of inflammation are removed, the patient should be put upon a mild course of iodine. The mode of counter-irritation deserves attention. Blisters increase the strangury that is often present at this stage, and excite the vascular system. I have usually, therefore, had recourse to the tartarised antimonial ointment, or to the insertion of issues or setons in the insides of the thighs. When symptoms of irritation exist in the uterine and urinary organs, they must be removed, by the sub-carbonates of the alkalies, with nitre, taraxacum, and hyoscyamus given in the infusion of calumba, or the infusion of cinchona. The course of iodine should be assiduously persisted in, and the preparations adopted should be given in small doses, much diluted. The *hydriodate of potash*, or the *ioduret of iron*, are upon the whole the preferable combinations of this substance. Iodine, in some one of the preparations—liniment or ointment—may also be

used externally. In this case it should be rubbed upon the insides of the thighs; where, if it should produce irritation of the integuments, the effect will be the more salutary.

209. *Cathartics and diuretics* have no influence upon the disease, further than to accelerate its progress, if they be used in such a manner as to weaken the powers of life. Purgatives of a tonic kind, however, may be employed to evacuate faecal matters, and to promote the intestinal secretions; but such only, as are not calculated to excite or irritate the large bowels, should be selected; as the supertartrate of potash with confection of senna, or the infusion of calumba or of gentian with infusion of senna. As to *diuretics*, I have seen no benefit derived from them, with the exception of those which possess tonic and astringent properties, as the balsams and terebinthines; the latter of which have been productive of benefit, particularly when used in the form of liniment or epithem. Camphor and narcotics are also useful palliatives, especially opiates. The *liquor potassa*, and BRANDISH'S *alkaline solution*, in suitable vehicles, and aided by sarsaparilla, by local depletions when tenderness in the situation of the tumour is perceived, and by setons, have also been of great service in some cases in which I have prescribed them. The good effects of vomiting in swelled or inflamed testicle have induced some practitioners to have recourse to *emetics* in the early stage of this malady. Dr. PERCIVAL records a case in which they proved of service; but I have had no experience of the practice. Mr. ABERNETHY prevented the reaccumulation of the fluid after tapping, by repeated blistering. Dr. HAMILTON (*On Mercurial Medicines*, &c. p. 202.) states that he has cured seven cases by percussion, or patting, for a long time daily, on the tumour, using a bandage so as to make constant compression, giving a solution of the muriate of lime, and employing the warm bath. Many instances will, however, be found to confirm the opinion of Dr. W. HUNTER (*Med. Observ. and Inquiries*, vol. ii. p. 41.) "that the patient will have the best chance of living longest under it, who does the least to get rid of it." In addition to the above means, but little can be attempted with much hopes of success. The chief objects are to support the vital energies throughout the frame,—to promote a healthy assimilation, and the excretion of effete matters,—to ward off all irritation, physical and moral, from the uterine organs,—to adopt a light, cool, and moderately nourishing diet,—to engage the mind agreeably,—to reside in a dry, airy, moderately warm, or temperate locality,—to take regular but gentle exercise in the open air,—and to have frequent change of scene and atmosphere.

210. *Paracentesis* in some instances becomes imperative, owing to the urgency of the symptoms, particularly after it has been once performed; and the *extirpation of the tumour* has been recommended by VANDER HAAR, DELAPORTE, MORAND, LOGGER, SIEBOLD; and practised by L'AUMONIER, SMITH, LIZARS, BLUNDELL, GRANVILLE, M'DOWAL and DIEFFENBACH. Of these measures a brief notice is required.—(a) The observations which have been already offered on *paracentesis* apply to the treatment of ovarian dropsy even more fully than to any other. It often accelerates a fatal issue by inducing inflam-

mation of the sac. Of this I saw a remarkable instance many years ago in a near relative. Dr. J. JOHNSON has adduced an example of it (*Medico-chirurgical Review*, vol. xi. p. 258.). Dr. MACINTOSH refers to one in his practice (*Practice of Physic*, vol. ii. p. 374.); and many others have been recorded, and observed by experienced practitioners. I therefore agree with Dr. DENMAN, that *paracentesis* ought to be deferred as long as possible. In such circumstances, this operation occasionally gives temporary relief; but there is a frequently recurring necessity for its repetition until the patient sinks. It has been proposed to effect a radical cure by evacuating the matter, and either laying open the tumour, or keeping a canula inserted in the wound. LE DRAN mentions two cases which recovered from great suffering consequent on this measure; and analogous examples have been recorded by HOUSTON, VOISON, and PORTAL. But these are few compared with the numerous instances in which it has either failed, or accelerated a fatal issue by the severe inflammation and constitutional disturbance thereby induced. In two cases in which I was consulted, a canula had been left in the puncture, and rapidly produced these effects; the introduction of air and the mechanical irritation having inflamed the cyst and peritoneum, and converted the secretion to a foul, fetid, and ichorous discharge: both rapidly proved fatal. It has likewise been proposed to inject the cyst. Dr. DENMAN mentions a case in which this was practised, but the patient died on the sixth day afterwards.

211. The *extirpation* of the tumour, although entertained by the older surgeons, was discountenanced by MORGAGNI, DE HAEN, SABATIER, and MURAT. L'AUMONIER, of Rouen, however, performed this operation successfully towards the close of the last century; and it has recently been practised by Dr. SMITH and Dr. MACDOWAL, of the United States, with a like result. Notwithstanding the favourable issue of these cases, I stated, in the *Medical Repository*, at the time of their publication, reasons against resorting to this measure. The issue of several cases in which it has since been performed, both in this and other countries, confirms the opinion I then expressed. The operation has no chance of succeeding unless it be resorted to during that stage, at which a judicious constitutional treatment may either delay, or even remove the disease: and I believe that the cases in which it has succeeded are such as would have terminated favourably if they had been left to nature or to medical management. The results of the cases in which it was performed by Mr. LIZARS and Dr. BLUNDELL, are well known; and I may add that it has likewise been attempted at least five times at Berlin, by DIEFFENBACH, CHRYSMER, and MARTINI (GRAEFE and WALTHER'S *Journ.* b. xii. h. i.), and, excepting in one instance, it entirely failed. Three of the patients died in consequence of the operation. In one case the surgeon did not proceed in the operation, on finding the tumour adherent on all sides.

212. ii. DROPSY OF THE FALLOPIAN TUBE.—*Hydrops tubalis*—is not to be distinguished from ovarian dropsy; nor, indeed, does it differ from it further than that, instead of the cyst being in the ovary itself, it is developed in the fold of the ligament, near the uterus, or close to the ovarium, or to the fimbriated extremities of the tube; these extremities being either adherent to the ovarium, or

closed by coagulable lymph, or adhesions. In either case the cyst is solitary. The disease has been described by Dr. BAILLIE; by MUNNIK, who found the cyst contain as much as 110 pounds of fluid; by CYPRIANI, who found 150 pounds; by HARDER, who found 140 pounds; and by others, who have observed much smaller quantities. Dr. GOOD defines this variety of dropsy as commencing with a heavy elongated intumescence of the iliac region spreading transversely, with obscure fluctuation; but no distinction can be made between it and ovarian dropsy, in respect either of its causes or progress. The treatment of this variety is also the same as that of the ovarian disease.

213. iii. DROPSY OF THE WOMB—*Hydrometra*—*Encysted Dropsy of the Uterus*—has been doubted by some authors; but it has been not infrequently observed by physicians of the greatest reputation. The cysts which are, in rare instances, found attached to the exterior surface of the womb, do not belong to this disease, which consists of a collection of fluid in the cavity of the unimpregnated uterus, contained in a membrane or cyst. It has, however, been disputed whether the fluid is thus surrounded, or whether it has accumulated in consequence of inflammation having occluded the os uteri by the deposition of coagulable lymph, or of the development of some tumour or growth, plugging up this outlet; the morbid action which occasions the latter also giving rise to the secretion of a great quantity of serous fluid, which accumulates in consequence of this obstruction. It is very probable that this affection may arise from either of these causes, in different cases; and that, in its slighter grades, it is not so infrequent as some writers suppose,—the dilatation of the uterus, and the pressure of its parietes, overcoming or rupturing the obstruction at the mouth of the womb, and causing the fluid to escape. A considerable proportion of the cases vulgarly, but probably correctly, called false conceptions, is of this kind; they seldom becoming the object of medical attention, owing to the little disturbance produced by them, either during their increase, or afterwards, as well as to the deception to which they give rise. Some of these cases may also consist of hydatids, or other morbid productions, which may be associated with hydrometra, as in cases recorded by BAUDELOCQUE, BOVIN, DUGES, and others. (See OVARIA, and UTERUS.)

214. iv. ENCYSTED DROPSY OF THE PERITONEUM—*Extra-peritoneal Dropsy*—*Hydrops Peritonei* of TULPIUS, and some other authors—consists of the collection of water between the parietes of the abdomen and the peritoneum, enclosed in a cyst. It was first noticed by MORGAGNI, and accurately described by MORAND. Twenty-six cases of it have been adduced by LIEUTAUD, twenty-four of which occurred in females. It presents the same constitutional features as have been noticed in respect of encysted dropsies generally; and although, when the accumulation of fluid is very great, it can hardly be distinguished from ascites, excepting in its early stages, it may generally be suspected from the less uniform enlargement of the abdomen, the greater anterior prominence of this cavity, its much slower progress, and the less constitutional disturbance; the countenance and surface not presenting the cachectic appearances generally accompanying ascites, and the patient often retaining much

vigour and activity of all the natural and animal functions. Still the prognosis in this disease is unfavourable. The sac generally continues to enlarge, and sometimes forms adhesions with the contiguous viscera; and if not evacuated, it eventually bursts into the cavity of the peritoneum, as in the cases recorded by CHOMEL (*Mém. de l'Acad. Roy. des Scien.* an. 1728.), MORGAGNI (*De Caus. et Sed.* ep. xxxviii. art. 51.), and TAVERNIER (*Le Dran's Obs.* 65.); or externally, as in those of DEGNER (*Acta Cur. &c.* vol. v. obs. 2.) and LA MOTTE. M. CHANTOURELLE met with a case wherein the sac opened into the intestines after a puncture had been made for the discharge of the fluid, and fecal matters passed out at the external opening.

215. The treatment of this form of disease has not been satisfactorily illustrated. It seems not materially benefited by purgatives or diuretics; but it is stated, in some instances, to have been permanently removed by paracentesis. And cases have been adduced by NUCK, DEGNER, LE DRAN, LA MOTTE, and others, in proof of the propriety of the practice. But in cases of recovery from a disease of this description, there must still exist doubts of its nature. If puncture be resorted to when the tumour has reached a very large size, the opening should be valvular, and graduated pressure subsequently employed. The terrible effects occasioned by keeping open the orifice in order to drain the cavity, were fully demonstrated in M. CHANTOURELLE's case, the cyst having become inflamed, and gangrenous with the adjoining parts; as well as in two interesting cases recently recorded by Mr. C. HAWKINS.

216. v. ENCYSTED DROPSY OF THE LIVER is liable to be confounded with abscess of this organ, or with large accumulations of bile in the gall-bladder, from obstruction of its duct, or of the common duct. The cysts which are sometimes found in the substance of the organ, whether of a simple kind, or containing hydatids, are different from those encysted collections of fluid, which either form between the peritoneum and its proper covering, or are apparently attached merely to this viscus. These last evidently consist of hygomatous cysts developed on the adhering surface of the serous membrane, and reaching an uncommon size. When large cysts containing hydatids are formed near the surface of the liver, although essentially different from the simple cysts, and seldom reaching the same magnitude, they generally occasion similar symptoms, both local and constitutional, to those which attend the latter. In some instances, these cysts become inflamed; thereby occasioning great tenderness of the external surface, and changing the contained fluid to a sero-puriform matter, as well as increasing its quantity.

217. Encysted dropsy of the liver is generally accompanied with more disturbance of the general health than the other forms of encysted dropsy of the abdomen, and its progress is usually more rapid. Although a dangerous disease, recovery sometimes takes place from it. Cases terminating favourably have been recorded by several writers referred to in the *Bibliography*. This is most likely to occur if the cyst is attached to the anterior part of the surface of the organ. In this case, a large fluctuating tumour is commonly formed below the right false ribs, or near

the epigastric region, extending more or less downwards and in other directions, according to its size and situation. Inflammation may take place in the more prominent portion, and the cyst may discharge its contents through an external opening, either made artificially or occurring spontaneously. This latter termination, however, is rare; but it may be followed by recovery; two instances of which are adduced by M. ITARD. More frequently the cyst opens into the abdominal cavity, or into some part of the alimentary canal, or even into the thorax; and in either case a fatal result generally ensues. In some instances the rupture of the cyst has been occasioned by external violence. The difficulty of distinguishing this state of disease from abscess of the liver pointing externally, or from distention of the gall-bladder, is always great, or nearly impossible. In both these latter cases, however, there are generally more or less jaundice, more constitutional disturbance or greater pain in the region of the liver, more disorder of the bowels, and more interruption to the biliary secretion, than in the encysted collection; the purulent formation being preceded by the usual signs of chronic hepatitis, and distinguished in the manner pointed out in another place. (See LIVER—Diseases of.) Interesting cases of this form of encysted dropsy have been published by Mr. BRODIE, Dr. THOMSON, Dr. THOMAS, Dr. ABERCROMBIE, Dr. HASTINGS, and Mr. CÆSAR HAWKINS. In three of these cases, the early puncture of the tumour, before inflammation supervened, seemed to have been successful. But in nearly all the instances on record, where this operation was performed in a far advanced state of the disease, or when inflammation of the cyst was present, a fatal termination has occurred.

218. vi. ENCYSTED DROPSY OF THE KIDNEY is sometimes observed as a consequence of obstruction of the ureter, the pelvis of the organ becoming distended, and the glandular substance either atrophied or absorbed as the accumulation of fluid and distension are increased. This is evidently the manner in which the largest collections of fluid are formed in the kidneys, and interesting cases of it are recorded by BONETUS (*Sepulchretum*, l. iii. sect. xvii. obs. 22.), and by Dr. HOWISON and Dr. J. JOHNSON (*Medico-Chirurg. Review*, vol. iii. p. 657.). In this state of disease there have been observed great irregularity in the appearances, and in the excretion of the urine. The abdomen has been very much enlarged, chiefly towards the side of the diseased kidney, with obscure fluctuation and severe pain in the spine and lumbar region. Simple cysts may also be developed in the substance of the kidney, and contain a limpid or yellowish fluid. They are generally of small size, but occasionally they are found very large. PORTAL describes one which contained a pint of clear fluid; and M. ITARD another, in which there were found two cysts, the larger of which was a foot in diameter. This communicated with the pelvis of the viscus, the structure of which was absorbed, and contained a fluid of a urinous odour and colour; and most probably originated, as in Drs. JOHNSON'S and HOWISON'S cases, in obstruction of the ureter. This species of encysted dropsy generally terminates unfavourably in a shorter time than, perhaps, any other, probably owing principally to

the serious consequences always arising from an interruption to the urinary secretion. In an interesting case, which occurred to Dr. SEYMOUR, and is described by Mr. C. HAWKINS, a single cyst was found in the substance of the kidney, unconnected with its pelvis, and containing five pints of fluid, not possessing any urinous characters.

219. vii. *Encysted dropsies of the omentum, of the mesentery, and of the spleen*, are of rare occurrence, and can seldom be distinguished from some other diseases during the life of the patient. When fluid is found in the omentum, it is generally effused, or infiltrated between its laminae. But simple cysts, containing a watery or serous fluid, of various sizes, are, in rare instances, found in these situations.

220. viii. ENCYSTED DROPSY is very rarely seen in the thoracic cavity. HALLER observed it between the pleura and intercostal muscles, this membrane having become so distended by the fluid as to occupy nearly all that cavity of the chest; the pericardium being also filled with water. STÖERCK relates a case in which a female with consumptive symptoms experienced great difficulty in lying on the left side. On dissection, a large simple pellucid cyst, formed in the substance of the right lung, and containing eight pounds of a yellowish serum, was detected. MALOET found, in a person with all the symptoms of hydrothorax, and who was obliged always to sit up, a similar cyst, but not so large, in each lung; and the same productions have been observed by M. DUPUYTREN, in this situation, and in the pericardium.

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X. DROPSY IN THE HEAD.—*SYN.* *Dropsy in the Head and Brain; Hydrocephalus; Hydrocephalum; Hydrocephale* (ὕδωρ, water, and κεφαλή, the head); ὕδροκεφαλον, ὕδροκεφαλός; *Hydrops Capitis*, Auct. var.; *Hydropsie du Cerveau*, *Hydrocéphale*, Fr.; *Der Wasserkopf*, *Kopfwassersucht*, *Hirnwassersucht*, Germ.; *Idrocephalo*, Ital.; *Water in the Head*.

221. DEFIN.—*Sopor, with paralysis, anæsthesia, or convulsions, and often with slowly increasing size of the head, from a collection of watery fluid within the cranium.*

222. It is not my intention to notice the very rare and unimportant disease, called *external hydrocephalus*. My limits will be more profitably occupied with the consideration of the very common, dangerous, and somewhat imperfectly understood malady—*internal hydrocephalus*.

Dropsy within the head, internal dropsy of the head, or water in the head, as it is usually designated, may be divided into—(a) *dropsy of the membranes*, and (b) *dropsy of the ventricles*. Either may occur singly, but both may exist in the same case, in various degrees. The former variety is much rarer than the other, and takes place usually to a much less extent. In it the water is contained in the general cavity of the arachnoid, and is in some instances a congenital disease, producing watery tumours, protruding through apertures in the cranium (§ 176.). The fluid is rarely effused in any considerable quantity between the arachnoid and pia mater, and still more rarely between the latter and the brain. In dropsy of the ventricles, which is the most common, and which MECKEL designates the internal dropsy of the head, the water is collected in the bags of the arachnoid and vascular membranes, lining the internal cavities of the brain, and is contained in all or the greater number of these cavities in the same case.

223. Dropsy within the head is *idiopathic* or *primary*, and *symptomatic* or *secondary*,—more frequently the latter. It is also either *acute* or *chronic*, or of intermediate grades. It occasionally commences in an acute or sub-acute form, and insensibly and gradually passes into the chronic state. It is often congenital,—in which case it is usually chronic, or quickly becomes so; and it occurs at all periods after birth, particularly during the earliest epochs,—when it is generally acute or sub-acute. These circumstances are important in respect of its nature and treatment.

224. Hydrocephalus cannot be said to have been known to the ancients; this term having been applied by them chiefly to collections of fluid exterior to the cranium. HIPPOCRATES, however, in speaking of the maladies which arise from the head, notices one which has a marked resemblance to the symptoms of the acute or sub-acute form of this disease; and at the same time assigns water on the brain—ὕδωρ ἐπὶ τῷ ἐγκεφάλῳ,—as its cause (*De Morbis*, lib. ii. cap. 15. edit. *Vander Linden*, t. ii. p. 47.). From HIPPOCRATES to RHASES, no mention is made of internal hydrocephalus. But this latter writer states, in his book on the diseases of children, that the head sometimes acquires an increased bulk, owing to the collection of fluid within the cranium. The chronic form of this malady was described nearly a century before any notice was directed to its acute states; but, during the last fifty years, these states have attracted attention great in proportion to their prevalence and fatality in the early stages of life.

i. ACUTE DROPSY IN THE HEAD.—*SYN.* *Hydrocephalus Acutus; H. Acutus internus; Hydrencephalus* (from ὕδωρ, water, and ἐνκεφαλός, the brain); *Febris Hydrocephalia; Carus Hydrocephalus; Apoplexia Hydrocephalica*, Cullen; *Hydrencephalon*, Hufeland; *Hydrops Cerebri Acutus; Hydrocéphale aigu*, *Fièvre Cérébrale des Enfants*, Auct. Gall.; *Hydrocéphalite*, Brachet.

225. DEFIN.—*Fever, with sopor, headach, and morbid sensibility to light, &c.; inability to bear the erect posture; vomiting; costiveness; screaming; dilated pupils; squinting; convulsions and paralysis.*

226. LIT. HIST. — Acute hydrocephalus, notwithstanding the remark of Hippocrates already referred to, was formerly confounded with cerebral fever, or fever with determination to the brain. A case, in which it is accurately described, but considered as one of fever merely, was published by Dr. ST. CLAIR, in 1733, in the *Edin. Med. Essays and Observations*, vol. ii. p. 287. Mr. J. PAISLEY, of Glasgow, in the following year (in *Ibid.* vol. iii. p. 333.), recorded a case, with the *post mortem* examination, and first recognised it as a specific form of disease. It was not, however, until the appearance, in 1768, of Dr. WHYTT's "*Observations on the Dropsy of the Brain*," that the history of the malady and its nature were made subjects of investigation. The observations of Dr. FOTHERGILL (*Med. Observ. and Inquir.* vol. iv.) contributed something to the knowledge of its symptoms; but those of Dr. WATSON, in the same work, furnished evidence merely of its extreme danger. Dr. DOBSON's case, published in 1775 (*Ibid.* vol. vi.), was valuable, inasmuch as it showed the possibility — at the time, very generally doubted — of curing the disease; and of the influence of mercury in bringing about this result. HARRIS, however, had long before stated, as Dr. CHEYNE has remarked, that a physician of experience had saved children in fevers attended by unusual stupor, and even coma, by giving them *mercurius dulcis*, six times sublimed.

227. The opinion of WHYTT, that the disease depends upon laxity of the exhalants, or upon a watery state of the blood, had been generally received, until Dr. QUIN, in 1779, maintained that it is allied to inflammation, — a doctrine which had suggested itself to both Dr. WITHERING and Dr. RUSH, before Dr. QUIN's views had become known. Dr. WITHERING stated explicitly, that the malady originates in inflammation, and that the water found in the ventricles of the brain is not its cause, but its consequence. Dr. RUSH made an important addition to its history, by showing that it may be produced by other diseases, especially by fevers, rheumatism, pulmonary consumption, the exanthemata, and worms; and that death may supervene, preceded by hydrocephalic symptoms, and little or no water be found in the ventricles, — circumstances which will be fully enquired into in the sequel. Dr. PERCIVAL demonstrated its frequent connection with scrofula, and seemed impressed with the idea that it is not altogether identical with inflammation in its nature. Its inflammatory origin was afterwards supported by Dr. PATTERSON and Dr. GARNETT, although neither appeared to consider it advisable to carry the depletory and antiphlogistic treatment so far as such a doctrine might have warranted. This last writer believed that, in hydrocephalus, a local inflammation without much general sthenic diathesis obtains; and that a depletory treatment, injudiciously employed, may weaken the general tone of the system, and increase the effusion, without materially diminishing the local morbid action, for the removal of which such means are employed. Of the justice of this view there can be no doubt. The local action, which has been called inflammatory, merely because it is attended by injection of blood-vessels, has been too generally treated as true inflammation occurring in a

healthy constitution, and without reference either to the series of vessels affected, or to the grade, or the product of action; and, what is equally important, without regard also to the diathesis, or state of vital manifestation and power. It is unnecessary to notice here the opinions of more recent writers, as the chief of them are referred to in their proper places.

228. DESCRIPTIVE HISTORY. — The *Precursory* or *Early Symptoms* of acute hydrocephalus are remarkably diversified, owing to the circumstance of their dependence upon disorder of the digestive organs, or of the circulation in the brain and membranes: and it is chiefly owing to the predominance of the symptoms referable to one or other of these parts that the disease has been divided by some writers into the primary or idiopathic, and the secondary or symptomatic. The possibility, however, of making the distinction in practice is not so easy as some writers would make it appear. For the dependence of the functions of the liver, and digestive organs, upon the state of circulation in the encephalon, and of the latter on the former, is so very intimate, that it is often impossible to ascertain which is primarily affected. The majority of writers on the disease in this country consider that the digestive organs are the first to betray disorder; whilst the French pathologists and Dr. ABERCROMBIE believe that the morbid action very frequently commences either primarily or simultaneously in the brain itself. I am convinced, that the true acute hydrocephalus originates more frequently in the encephalon, than the abdominal functions indicate, and at a period anterior to the disorder which these functions manifest, — such disorder often proceeding from the silent morbid action in the brain, reacting on it, and promoting the evolution of those changes constituting the disease; and that, when hydrocephalic symptoms supervene more suddenly and violently, and without much previous disorder of the chylopoietic viscera, or nervous system, they have a more intimate relation to acute or sub-acute inflammation of the brain and its membranes, than to those states of morbid action which terminate in copious effusion, and to which the term hydrocephalus is more strictly applicable. The chief exceptions to these inferences will be found in those who inherit a peculiar morbid diathesis or predisposition to the malady — who are scrofulous or weakly constituted, — and in these the brain and its membranes will often coetaneously suffer, in a greater or less degree, with one or more of the digestive organs; the excited action it experiences being either attended, or soon followed, by deficient power, and by relaxation of the exhaling surfaces. In these cases, as well as in those in which it is ushered in, or predisposed to, by derangements of the abdominal viscera, it does not, as in true cephalitis, readily occur in a previously healthy constitution, but chiefly in states of pre-existing ailment, or as a consequence of inflammatory action arising under such circumstances, — in which not only the chylopoietic viscera imperfectly perform their functions, but also the organic nervous system is weak, and the capillary vessels and exhalants are so deficient in tone as to be readily relaxed, or exhausted when over-excited. In other words, that acute hydrocephalus is a consequence of

disease, which originates variously; — in some it is the result or termination of inflammatory action occurring in a weak or morbid state of constitution, — in others of general febrile excitement, affecting patients similarly constituted, or occasioned by accumulated morbid secretions and excretions, or by local irritation; — that it stands in the same relation to inflammation as other acute dropsies; and, even when most inflammatory, that it differs from encephalitis much in the same way as phlegmon differs from erysipelas, or as acute peritonitis differs from the true puerperal fever. From what I have now stated, it will appear important to be acquainted with the symptoms indicating the pathological states terminating in acute hydrocephalus. These may be referred to two principal seats, viz. the *head* and the *abdomen*, but with the understanding that, in many instances, although the more distressing ailments seem to proceed from the one, the primary and principal disease may exist in the other.

229. FORMS AND STAGES OF THE DISEASE.

— (a) The *Forms* have been chiefly referred to the mode of attack and symptoms of the first stage. Dr. CHEYNE has particularised three *varieties*; the gradual, the sudden and violent, and the secondary. These answer to the nervous, the inflammatory, and the consecutive, respectively, of HOPFENGÄRTNER and KUHN. GÜERSENT divides the disease into the ataxic or febrile, and the apoplectic; ITARD, and several writers, into the idiopathic and symptomatic. M. BRACHET designates three forms; the nervous hydrocephalitis, the inflammatory, and the gastric; but it is very difficult to distinguish the nervous from the gastric form. GOELIS distinguishes merely the acute, and the hyper-acute or waterstroke. The division recommended by CHEYNE and HOPFENGÄRTNER is, upon the whole, the best; it matters but little how the forms are named. The terms, however, used by the German writers seem to be the least objectionable — (b) Since the appearance of Dr. WHYTT's description, the disease has usually been divided into *periods* or *stages*. But much difference has existed as to the number of stages, and as to what symptoms indicate them. GOELIS points out four periods, viz. of turgescence, of inflammation, of effusion, and of palsy. WHYTT, QUIN, TISSOT, BAADER, SPRENGEL, CHEYNE, and others, mention three, according to the three different states of the circulating and nervous systems that obtain in the course of the malady. Some writers notice, with P. FRANK, RUSH, and CONRAD, only two stages; whilst FORMEY, VON PORTENSCHLAG, and GUERSENT describe none. This diversity depends chiefly on the irregular progress of the disease, its uncertain commencement, and the circumstances referable to the constitution and previous health of the patient under which it occurs. I shall adopt the division, employed by Dr. CHEYNE and others, into — 1st, that of increased sensibility; 2d, that of diminished sensibility; and, 3d, that with palsy or convulsions.

230. *A. The Nervous form* is generally preceded by, or rather commences with, a great variety of symptoms, which continue a longer or shorter time before the disease is so fully developed as to be recognised, or as to excite the attention or alarm of the friends. For several days or weeks, or even for months, the child is

vertiginous, liable to fall or stumble while at play or running about, is nervous, and starts or is fearful from slight causes, and more or less capricious in its appetite, or without appetite. The tongue is slightly furred, and white; the bowels are costive; the motions offensive, unnatural, clay-like, and indicating a morbid or deficient biliary secretion; the breath is foetid; the urine is somewhat diminished in quantity; the complexion fades; the features collapse; the sleep is disturbed and dreamy; the eyes become heavy, very sensible to light, have a dark line under them, and lose their animation; the hypochondria and abdomen are often tender or tumid; and the child complains of occasional pains, which resemble rheumatism, in these regions, particularly in the region of the liver, and sometimes in the limbs. Various other symptoms are conjoined to, or supervene upon the foregoing, which continue frequently for a considerable time, without additional ailment, or confining the patient. But sooner or later they become aggravated; the surface assuming a harsh, sallow, or unhealthy aspect. The movements are now languid; the sleep more and more disturbed and unrefreshing, and the disposition to it often greater. Giddiness, slight pain or noise in the head, tenderness of the scalp, and pains in the neck and limbs, are complained of. The countenance is heavy; the sense of sight and hearing often very acute; and the pulse is quicker, and more excitable than natural. The child is drowsy, silent, or appears as if in a reverie, and indifferent to those persons and objects he was formerly interested in. He is also irritable, or dejected, sighs often, and yet frequently makes no complaint, when questioned. Purgative medicines usually procure scanty, clay-like, pale, or greenish and slimy evacuations. These symptoms are very frequently removed by active purgatives; and although they often run into those indicating unequivocal disease within the head, yet they indicate nothing beyond a general and grave disturbance of the functions. But when they persist after proper treatment, or are neglected, the *first stage* may be considered as being actually present, although it should be rather viewed as commencing with the first signs of ailment; more pathognomonic symptoms supervening on the foregoing indefinite ailments. The above series of symptoms nearly agrees with the first period, or that of turgescence, of GOELIS.

231. (a) The pain in the head returns more frequently and acutely; and is often attended by severe ear-ache, by aching of the eyes, and more commonly by increased sensibility to light and noise, and alternate chills and flushes. The pulse is now quick, excitable, and of irregular strength and frequency. The gait is unsteady; the skin warm, dry, and unhealthy; the pains through the trunk and limbs more frequent and severe, and accompanied with sickness and vomiting, particularly on getting up in the morning. The tongue is loaded or furred. There is occasionally dragging of one leg, or a raising of the foot as if stepping over something in the way, or a painful crick in the neck. The stools, from being scanty, costive, and clay-like, pass to dark green, and a gelatinous or spinach-like state, exhale a sickly and peculiar smell, and are still

procured with difficulty, this change depending chiefly upon the morbid condition of the secretions poured into the digestive canal: the urine is scanty and turbid, and has often a milky appearance (ODIER, COINDET, and VIEUSSEUX). The erect posture or motion, particularly rotating the head, brings on sickness and retchings, without the appearance of offensive matters. There are also great fretfulness and restlessness; contracted pupils; frowning, or knitting of the brows; inability to sit up; a whining or moaning noise when lying down; and sometimes a slight cough, with irregular suspirious breathing. The sleep is short and restless; the infant rolls its head on the pillow, or often awakens with a scream or crying, and raises its hands to its head. The nostrils and lips are dry and cracked. This period is very variable in duration, but it usually continues from ten to fifteen days.

232. (b) *Second stage*.—The pulse, from being very quick, excitable, irregular, and weak, now becomes slower—sometimes as slow as natural, or even more so; but chiefly when the patient is in the horizontal position; for if he attempt to sit up, it generally acquires its former frequency. The sensibility is now remarkably impaired: sopor or stupor gradually supervenes, with dilated pupils, squinting, and imperfect or double vision. The eyes are dull, heavy, vacant, or staring; the eyelids drooping or half closed. Sickness or retchings are now less frequent, unless the child be raised up, when one or both often occur. The excretions are passed unconsciously, and are scanty, and procured with difficulty. The stupor is interrupted by exclamations, or shrill piercing screams; the hands, which are tremulous, being raised to the head or neck, or occupied in picking the lips or nostrils. Emaciation proceeds rapidly; but food is generally swallowed greedily when presented. These symptoms are, however, by no means uniform; for the pupil is frequently, particularly at first, oscillatory, or, although dilated, affected by light. The stupor, also, is not always constant; nor does the pulse always become slow. Deep inspirations, hectic flushings of the cheeks, cold extremities, low delirium, and an almost total suppression of urine, are occasionally observed. The duration of this period varies from four or five days to two weeks.

233. (c) *The third stage* has been generally recognised by the returning frequency of pulse, which is often remarkably rapid, thready, and weak; by the occurrence of general or partial convulsions; by paralysis of one side or limb; by twitching of one or more of the muscles; and by suffusion of the eyes, the eyelids being motionless, and the cornea becoming dim and filmy. Often, when one side is paralysed, the other is more or less convulsed. The patient is now either insensible or delirious. He rolls his head on the pillow, grinds his teeth, moves the unpalsied hand in the air, and moans or breathes heavily and hurriedly. Alternate flushings and pallor, or flushes of one cheek, the other being pale; irregular distribution of the circulation; partial sweats; cold extremities; irregular, or stertorous breathing; an eruption of vesicles about the mouth, or on the face and upper part of the chest (FORMEY, GOELIS, SCHMALZ, RAIMANN, and myself); collapse of the counte-

nance; blueness or paleness of the lips; and, more rarely, sphacelating sores; are remarked towards the close of the disease. The dilatation of the pupil and strabismus generally continue throughout this stage, which may terminate fatally (generally in a violent convulsion) in a few hours, or it may last for ten or twelve days, or even longer. Such is the common course of the most frequent form of the disease, which comprises the *Nervous* and *Gastric* of BRACHET; and which may either originate in the encephalon, or in the digestive organs. But it is seldom that the early history of the case is so precise as to enable the physician to draw a correct inference as to its commencement. In some instances, I have observed slight symptoms of cerebral disease, for some weeks, or even months, after repeated attacks of congestion or of inflammatory action within the head, of a well marked character, but supposed to have been removed by treatment. In some of these cases, the disorder of the digestive organs was so evident as to give rise to the idea of the primary affection of these viscera, indicating the difficulty of ascertaining the parts first deranged. The information furnished, in most instances, seldom enables us to carry our pathological analysis sufficiently far back to connect the early ailments with their causes; and, consequently, we often fail in ascertaining the quarter where disease commences.

234. B. *The Inflammatory variety*, or the second form of Dr. CHEYNE, of M. COINDET, and of HOFFENGÄRTNER, is more acute than the preceding. The *precursory* symptoms are generally of short duration, and sometimes so slight as to be overlooked. This variety nearly resembles fever, with predominant affection of the head; and in many cases it is not to be distinguished from inflammation of the brain and its membranes (see BRAIN, § 174. *et seq.*), the disease being merely a modification of inflammatory action, depending upon diathesis, and previous state of health; and, owing to these circumstances, giving rise to effusion. After the child has been drooping for a short time, fever, with slight, short, and irregular remissions, flushings, severe headaches, increased heat and sometimes soreness of the scalp, augmented sensibility, thirst, hot skin, brilliancy of the eyes, and tenderness over the abdomen, supervene; the pulse being rapid, hard, or small; and the tongue white or loaded. Stupor or unwillingness to be roused, alternating with violent screams, and complaints of the head and belly; great irritability of the stomach; retching readily brought on by changes of position or by sitting up; a morbid and scanty state of the alvine evacuations; a vacant, dejected, or heavy expression of the eyes; a pained and terrified look; and diminution of all the secretions and excretions; commonly characterise this form of the malady. This *first stage* is usually accompanied with many of the phenomena of the first period of the foregoing variety: the chief difference being in the more febrile condition of that now under consideration, in the earlier and more evident connection of the symptoms with the brain, and in the shorter continuance of this stage. As soon as the changes which attend the *second period*, *viz.* dilated pupils, strabismus, stupor, diminished frequency of pulse, &c., appear, the progress of this is in all respects the same as that of the first variety;

the stages being more distinctly marked, but frequently of shorter duration, than in it. This form is generally idiopathic, whilst the foregoing is often symptomatic of disease of the liver and digestive organs.

235. *C. The Consecutive variety* is observed in an advanced stage of some acute disease, or soon after its decline, assuming either of the foregoing forms. It may follow the disappearance of some scrofulous affection; in which case it generally presents the characters of the first variety. It may come on after scarlatina or measles, and early in whooping cough; and it then commonly makes its attack with all the violence of the second variety. When it appears during remitting fever, difficult dentition, and in the latter periods of pertussis, it often steals on so imperceptibly, as not to be recognised until dilated pupil, strabismus, convulsions or paralysis, and other symptoms of the advanced stages, are remarked. In such cases, the symptoms of the early period are liable to be confounded with those of the malady of which it is consecutive. Pain, which is one of the most prominent features of hydrocephalus, is sometimes but little felt in this form.

236. *Remarks.*—The varieties now pointed out can be recognised only during the first stage, and chiefly by the mode of *attack*, which, in the *first*, is always slow and insidious. This is the most frequent form of the disease. In the *second*, the attack is more sudden and tumultuous; its first stage lapsing into the second in from two to four or five days. This, however, is the least frequently observed in practice, and is hardly to be distinguished in its first stage from inflammation of the brain and its membranes, of which it is only a modification or termination, when affecting the more central and internal parts of the encephalon. It occurs in more healthy children than the other forms do, and is commonly idiopathic or primary. The *third* variety often proceeds not only insidiously, but rapidly; and is generally the most fatal. It may present very unequivocal inflammatory characters in some cases, particularly when it follows the exanthemata; and in others, neither the symptoms, nor the appearances upon dissection, of true inflammatory action, may be observed; as when it is consecutive of whooping cough, remitting fever, and other affections, chiefly referable to the digestive organs. During the progress of all the forms of the malady, especially the first and third, the febrile symptoms are very irregular, and often only occasionally present. The thirst and appetite are also various; and the breathing is sometimes calm and soft, and, at others, laborious, quick, and suspirious. The circulation is at times irregularly distributed, the head being hot and the cheeks flushed, while the lower extremities are cold; and at other times it is more equable, the countenance being pale, the skin warm, and even perspirable throughout. The bowels are generally as already described; but, in some cases, a bilious purging attends the vomiting. In a few instances, after the delirium, insensibility, and convulsions in the last stage, a return of the senses and intellect has ushered in dissolution.

237. In *young infants*, hydrocephalus is ascertained with much difficulty, and is liable to be confounded with disorder of the digestive organs. The knitting of the brows, watchfulness, moaning, feverishness, the throwing back of the head, start-

ing from sleep with a cry of alarm, frequent vomiting, aversion from light, the peculiar character of the stools, the half-closed eyelids, the full or distended fontanelle, and hanging or rolling of the head on the nurse's arms, are the chief symptoms. The expression of pain is not violent at this epoch; and there are not, in this disease, the drawing up and flinging out of the legs, with screaming and crying, as in colic or griping pains. It seldom, however, appears before the period of dentition; but, when it occurs about this period, it is often ushered in by convulsions, or convulsions appear at an earlier stage of the malady than in older children.

238. The *duration* of acute hydrocephalus is extremely various. When it has reached the second stage, its duration is very uncertain; for death may supervene in a few hours, or not until after two or three weeks. In young infants, it frequently advances most rapidly. FOTHERGILL, COINDET, SPRENGEL, CHEYNE, GOELIS, &c. consider that it commonly runs its course within three weeks. WHYT, FRANK, C. SMYTH, YEATS, and others, believe that it may be protracted much beyond that period. The consecutive form may terminate in about a week; and the inflammatory seldom lasts longer than three weeks; but the first or nervous variety may continue for four, five, or even six weeks, or longer, if the earliest symptoms be taken into the account. In some instances, especially of the first form, the disease may assume a nearly chronic character, or a state intermediate between the acute and chronic, or may pass altogether into the latter, especially in young children; a slight separation of the sutures, enlargement of the head, sallowness, marasmus, palsy, &c. taking place; and a larger collection of fluid being found in the ventricles than in the more acute states, although less than in the congenital and chronic. The most common duration of the disease, according to my experience, is from two to four weeks. There is great difficulty, as respects the first and third forms particularly, in determining the period at which the malady giving rise to the effusion begins. As to the effusion itself, it may commence coetaneously with the second stage, or not until a subsequent period.

239. *Appearances on dissection* vary remarkably, even in cases belonging to the same form of the disease.—(a) In the *first form*, the veins of the membranes are generally found congested, with dark-coloured blood. In a few instances, I have observed inflammatory appearances in the longitudinal sinus; and a similar observation has been made by BUCHOLZ. The ventricles usually contain from two to six or eight ounces of limpid serum. The substance of the brain is soft and blanched, especially towards the central parts; and in the vicinity of the ventricles it is often very much softened, the fornix and septum lucidum being more or less disorganised, and soft like curd. The choroid plexus is pale, sometimes granulated. The pituitary gland is occasionally infiltrated, or otherwise slightly altered (MORGAGNI and myself); a slight watery infiltration of the substance of the brain has also been noticed. Tubercular formations have been found in various situations within the cranium (LAENNEC, MERAT, &c.). Several other slight lesions of the encephalon have been observed; but they are by no means constant, and may be viewed as merely contin-

gent changes. The *liver* is often inflamed, somewhat enlarged, and extensively adherent to the adjoining surfaces. Dr. CHEYNE has remarked small white tubercles on the surface of this organ; and I have seen them in this and other parts of it, as well as in the *spleen*. The *mesenteric glands* are frequently enlarged, and contain caseous depositions. The *stomach* and *intestines* are sometimes inflamed, the latter constricted, and even intussuscepted. The mucous follicles of the digestive canal are often enlarged.

240. (b) In the *second*, and in most of the *third*, forms of the disease, the brain and its membranes, particularly towards the base and central parts, present many of the usual appearances of inflammatory action, especially injection of the vessels, and thickening and opacity of the membranes, in addition to effusion of serum. The fluid is not so generally limited to the ventricles in these forms as in the first, is usually in less quantity in these cavities, but is effused also between the membranes, especially in the general cavity of the arachnoid, or between this membrane and the pia mater, elevating the former, and thereby exhibiting a gelatinous appearance. BONET and GREDING observed effusion between the cranium and dura mater; and Dr. ABERCROMBIE thinks this not a rare occurrence, and that it is the source of the fluid which escapes upon opening the head. The fluid itself is much less limpid in these varieties, than in the first; it being often turbid, or whey-like, containing minute shreds of lymph, and presenting evident traces of albumen. In many of the cases belonging to the second form, the cerebral substance retains its consistence, its cut surface indicating increased vascularity. In some cases, the surface of the ventricles is covered by a fine film of lymph, which hardly adheres to it. In several instances of the disease consequent upon scarlatina, I have observed the effused fluid of a turbid, brownish, and sanguineous appearance.

241. D. HYPER-ACUTE HYDROCEPHALUS; *Apoplexia Hydrocephalica*; *Wasserschlag*, Germ.; or *Waterstroke*.—The sudden effusion of water on the brain, although noticed by some other writers, was first described by GOELIS. He states that it may take place either idiopathically, or in consequence of various diseases. Although I have met with many cases of its consecutive occurrence, I have seen none that could be strictly called idiopathic. It most commonly appears in the advanced stages of the exanthemata, after the repulsion of chronic eruptions, as *tinea capitis*, *crusta lactea*, discharges from the ears; or after the arrest of habitual evacuations and excretions, as chronic diarrhoea, dysentery, the choleric fever of infants, habitual perspirations, &c., and when the powers of life are much reduced. In all such instances, it is to be considered merely as a more rapid form of the *third*, or consecutive, variety of hydrocephalus already described; taking place, in some instances, with surprising suddenness, and terminating fatally with great rapidity—sometimes in from twelve to twenty-four hours. The attack, under these circumstances, is seldom or ever recognised until the symptoms of the second or third stage of acute hydrocephalus supervene. GOELIS supposes, from the appearances of vascular turgescence observed in some cases after death, that a degree of inflam-

matory action may suddenly supervene, and be coincident with effusion. But it is very rare that marked vascularity of the membranes and brain of children is not observed upon dissection, whatever may have been the disease of which they died. It is very probable that increased determination of the circulation has preceded, or accompanied, the effusion in these cases; but the vascularity is no proof of inflammation. The effusion, in the several instances of this kind that I have examined, was chiefly in the ventricles, although partly also between the membranes; was generally in less quantity than in the common acute disease,—in all the cases, under four ounces; was less turbid than stated by GOELIS; and occurred in children who were of an unhealthy habit, lax fibre, and much reduced by disease.

242. E. SUB-ACUTE HYDROCEPHALUS.—This form of dropsy in the head, already alluded to, is deserving of more particular notice, from the frequency of its occurrence. I have met with it most commonly as a slighter grade of the *first variety* described above (§ 230.). It generally occurs between the second month and the commencement of the second year of age. After the continuance of many of the symptoms characterising the first stage of that form, the head begins to enlarge, with slight separation of the sutures, and imperfect development of the symptoms of the second stage. In many cases, the disease is slighter, and the duration longer, than in the first form; but, in others, the symptoms are quite as severe for several days, when the yielding of the cranial parietes before the effused fluid seems to abate their violence. In some cases, the malady is prolonged merely for a few days; in other cases, for a much longer period, so that it runs into the *chronic*. In rare instances, recovery is slowly and insensibly established, the patient—especially if nature be judiciously assisted by art—outgrowing, as it were, the disease. During its progress, the symptoms vary but little in kind from those already described. The bowels are generally irregular after having been long torpid, and they sometimes become lax, the stools being mucous, unnatural, and offensive. In some instances, diarrhoea comes on during the advanced stages; and if this be not checked, and if the powers of life be supported or promoted, and appropriate remedies prescribed, recovery may take place. But more frequently the loss of flesh, general cachexia, disorder of the bowels, sopor, paralysis, &c. advance slowly, until convulsions or exhaustion terminate life.

243. Dissections.—In all the cases I have examined, the fluid effused was altogether in the ventricles, has exceeded eight ounces, and was either entirely or nearly limpid. The brain surrounding the ventricles was frequently softened; but, excepting a common injection of the membranes, there were no remarkable inflammatory appearances in the encephalon. A thin film of mucous lymph covered the surface of the ventricles in some instances. An increased quantity of fluid was occasionally found about the medulla oblongata, and in the spinal canal. The *liver* was often more or less inflamed or enlarged, the digestive mucous surface also inflamed in various parts, and PEYER's glands were enlarged—in some cases ulcerated. The mesenteric glands were frequently diseased in the manner stated above (§ 239.).

244. **DIAGNOSIS.**—Although the disease is readily ascertained in its far advanced stages, when it is nearly or wholly beyond the reach of medical aid, it by no means admits of easy recognition at an earlier period. Indeed, as will be hereafter shown, the effusion being often an occurrence contingent on a variety of ailments, and often arising out of a morbid condition of the system, and of the parts contained within the cranium, no early diagnosis can be formed; for the functional disturbances and general febrile commotion characterising the commencement of the disease, are readily removed in many instances, whilst, in others, apparently as slight, or even slighter, the symptoms commonly attributed to the effusion will rapidly supervene, notwithstanding the most judicious treatment: and, after all, it remains very questionable, whether or not the symptoms commonly attributed to the effusion are not rather the results of the changes which have taken place in the organic nervous influence, in the circulation, and in the structure of the brain, upon which changes the effusion is merely contingent, than the consequences of the effusion itself; for I have observed, in several cases, as much fluid effused within the cranium, there having been no hydrocephalic symptoms during life, as in the most marked form of the disease. We have, moreover, seen that, in many of the cases of inflammation of the brain, or of its membranes (see BRAIN, § 175.), very nearly the same train of symptoms appear as in acute hydrocephalus, and yet little or no effusion takes place; and that, in the more inflammatory variety of this malady, where the symptoms characterising the advanced stages are most marked and uniform, the quantity of the fluid effused is generally the least. Where, however, we see a child in a state of insensibility, rolling his head upon the pillow, frequently grinding his teeth, screaming acutely, moving one hand in the air, while the other is palsied, with a hectic on the cheek, drooping eyelids, heavy vacant stare or strabismus, dull filmy cornea, dilatation of the pupils, collapsed features, general emaciation, partial sweats, suspicious, laborious, or rapid breathing, and convulsions, after having been ailing for some time, and more recently affected by febrile action, with marked disorder of the digestive organs and of the head, it may be inferred that effusion has taken place within the ventricles, and at the base of the brain, chiefly in the former; but of this there is no complete certainty, for very nearly the same phenomena may arise from extensive encephalitis, or from inflammatory softening of the brain, at their most advanced stages.

245. (a) I have already stated that the disease, in its inflammatory form, is nearly related to *inflammation of the brain and its membranes*; and I may now add, that, in the first form described, it is often equally closely connected with *softening of the organ* (see BRAIN, § 214.). In many cases, the distinction is made with great difficulty, and in some it is not to be made at all; for the effusion is, in such, merely one of several coexistent changes either immediately consequent upon, or more remotely following, the inflammatory act in the former class of cases, and the softening in the latter. When, however, any diagnosis can be established by the close and experienced observer, it is most important to be guided by it. The tur-

gescence, which attends inflammation of the brain, often gives rise to symptoms which nearly resemble those produced by watery effusion: and it is only by estimating the history of the case in connection with the causes and a number of existing phenomena, that an opinion can be formed as to the exact state of disease.—*α.* *Encephalitis* occurs more frequently in previously healthy children; its attack is sudden, and the progress of its early stage rapid and tumultuous; *hydrocephalus* appears in the unhealthy; and consecutively either of previous attacks of congestion or inflammation of the brain, or of disease of the digestive and chylopoietic viscera,—generally in a gradual, slow, or insidious manner: the former being commonly an idiopathic, the latter often a symptomatic disease.—*β.* In *encephalitis*, pain is constant and throbbing, increased by any excitation of the circulation, frequently preceded, or attended, or followed, by distinct chills or rigours: in *hydrocephalus*, pain is intermittent or remittent, shoots with great violence, occasioning anguishing screams, wants the pulsating character, is not increased by what excites the circulation, often alternates with pains in the abdomen, and is seldom attended by chills or rigours.—*γ.* The sickness and vomiting, symptomatic of the former, are unaccompanied by the fulness and tenderness of the hypochondria and epigastrium which commonly precede and attend these symptoms in the latter malady.—*δ.* The countenance in *encephalitis* is tumid and injected, the features enlarged, the attendant fever of a sthenic or phlogistic character, and its progress very acute: in *hydrocephalus*, particularly its first and most common form, the countenance is not very sensibly tumid; the cheeks only are irregularly flushed; the thirst is not so great, nor the anorexia so complete; the febrile heat is not so high, so general, or so constant; the surface is not so full and animated, nor is the pulse so steady and strong as in the former disease. The pulse is more excitable, irregular in strength and frequency, in the respective stages; more rapid and weak at the commencement, and partakes more of the asthenic character, in the latter malady; the emaciation is also greater and more rapid.—*ε.* The stools in *encephalitis* are devoid of the peculiar characters they present in acute *hydrocephalus*; they are not of the same dark greenish colour, have not the gelatinous consistence, with the oiliness and glossy appearance, of those in the latter; nor do they possess the peculiar sickly, but not foetid smell.—*ζ.* The contractions and spasms of particular limbs and muscles, often observed in *encephalitis*, are seldom met with in *hydrocephalus*; whilst, in the latter, paralysis is more common. From the circumstance of inflammatory appearances in the membranes, as well as of softening in the central parts of the brain, having been often found in hydrocephalic cases, in addition to the effusion of fluid, it may be legitimately inferred, that the disease will often partake more or less of the symptoms usually caused by these lesions (see BRAIN, §§ 146—182. 214. *et seq.*); and that cases will occur but slightly modified in their characters from those consisting of inflammation on the one hand, and of softening on the other; the former commencing suddenly and acutely, the latter slowly and insidiously.

246. (b) Acute hydrocephalus may be distinguished from fever, by the somnolency, knitting of the brows, the great irritability of the stomach, which is increased by motion and the erect posture; by the raising of the hands to the head, the throwing back the neck, the excitability and irregularity of the pulse, the peculiar character of the evacuations, and obstinate costiveness; by the pains shooting in various parts, and the overpowering headach which admits not of the head being raised, — the pain darting at intervals through the centre of the brain, and not throbbing as in phlogosis, nor being increased or brought on by excited circulation; and by the starting, peculiar scream, and the expression of anguish when the child is awakened by it from the constant dozing, into which he instantly afterwards falls.—*a.* The infantile remittent fever is distinguished from this disease by the absence of the above symptoms, by the expression, by the regular morning remissions, and by the feculent, brown, and more easily procured evacuations.—*β.* Typhoid or adynamic fever is rare in children, and is to be distinguished from this malady, by the more equable pulse, by the dark and foetid stools and diarrhoea, low muttering delirium, supine posture, tumid abdomen, sometimes by petechiae; by the dark brown, tough sordes on the teeth and gums; by the slipping down in bed; and by the absence of acute pains, convulsions, paralysis, and of the other remarkable symptoms of hydrocephalus.—*γ.* The febrile disorders produced by worms are generally more protracted than this disease; are without distinct stages, but with manifest remissions,—the sleep being sound, and pulse uniformly quick. In worm fever, the pains in the head and abdomen are dull and not much complained of; the appetite is ravenous, the stools spontaneous and copious, the urine abundant and pale, the perspiration free, the cheeks generally pallid, the sight and hearing are unaltered, the mouth and nose moist, the abdomen is constantly tumid, and the body but little or not at all emaciated; and if convulsions occur, they are not followed by paralysis. It should not be overlooked, that either of these states of fever may give rise to aqueous effusion on the brain, the early symptoms proceeding insidiously, or being masked by the primary disease, and thus often escaping detection until some of the characteristic symptoms of hydrocephalus supervene.

247. (c) Various organic lesions within the head may occasion very nearly the same series of morbid phenomena as constitute this disease; but generally they are of much longer duration, and are not attended by so much emaciation, or such overpowering pain in the head. The stages of the malady are not so well marked. Rarely, however, do organic changes occur in the encephalon or its membranes, in children, without the effusion of more or less fluid.

248. (d) The strangulating or crowing inspiration, with purple complexion, not followed by cough (see LARYNX—*Spasm of*), but often accompanied by clenching of the hand on the thumb, with spasms of the toes, has been considered by many as connected with acute hydrocephalus. Without denying that this affection may occur as a symptom at an early stage of the disease, it should be recollected that it often disappears after scarifying the gums, or cutting the

teeth, or removing morbid secretions. The convulsions attendant on hydrocephalus are generally characterised, as Dr. CHEYNE justly remarks, by a greater affection of one side of the body than of the other: one arm or leg is, with some regularity, retracted and flung out, while the other is affected with spasmodic catchings; the eyes are suffused; there is often a circumscribed flush on the cheeks, and the breathing is slow, or irregular and sobbing.

249. (e) Exhaustion of vital power may occasion symptoms often closely resembling acute hydrocephalus. The circumstance of exhaustion giving rise to hydrocephalic symptoms—in some cases without any effusion, in others with the collection of more or less fluid—has been well known to me, and acted upon in my practice at the Infirmary for Children for many years. It was first very imperfectly alluded to by Dr. CHEYNE; and subsequently by Dr. ABERCROMBIE, Dr. GOOCH, Dr. DARWALL, and others, who appear not to have clearly understood it. These writers consider this consecutive affection as one of exhaustion of nervous power only: but I infer that something approaching to hydrocephalic is occasionally connected with it; for the benefit afforded by nutrients, stimulants, or tonics, is no proof that the exhaustion has not been attended by some degree of effusion. Indeed, the physical condition of the brain renders it most probable that some fluid is collected, owing to exhaustion, diminished nutrition, and the state of the cerebral circulation; and that it is absorbed as the pathological states that occasioned its effusion are removed by appropriate treatment. The appearances observed in the fatal cases fully confirm this view. I am at this time attending two cases of this affection that fully illustrate its nature. It is generally consequent upon weaning, improper or imperfect feeding, protracted diarrhoea, and exhausting treatment; and is usually attended by loss of flesh, increased sensibility and irritability, a feeble quick pulse, transient and irregular flushings, quick breathing, sometimes sighing or moaning, a white loaded tongue, scanty urine, and a mucous diarrhoea,—the evacuations being flatulent, unnatural, greenish, or gelatinous. Sometimes there is increased heat of the head towards night, but seldom any pain or screaming. In addition to evidence of preexisting or attendant irritation of the digestive mucous surface, the bronchial lining, also, often indicates irritation by a dry hacking cough. This first, or irritative stage of the complaint is followed by one of more marked exhaustion, with stupor or torpor, particularly if the causes continue in operation. The pupils become dilated; the eyes vacant, and sunk in their sockets; the eyelids half shut; the countenance pale and cool; and the extremities, especially the lower, cold. If the complaint occurs during dentition, sometimes squinting, with partial convulsions, or with crowing or croupy inspirations; slow, irregular, or suspirious breathing; clenching of the hands, or spasms of the fingers and toes; are observed. The feet and legs are always cold, and with difficulty kept warm, especially if the head be hot. The fontanelle is sometimes depressed, or nearly natural. The pulse seldom or never loses its frequency. This torpid stage may terminate fatally with increased coma, a rattling respiration, sink-

ing and disappearance of the pulse, and profound exhaustion. Convulsions occasionally occur, but at no particular period of the complaint. A favourable issue frequently follows an appropriate treatment. In some of the cases which have ended fatally, I have found, on *dissection*, more or less fluid in the ventricles. The membranes were even less vascular than commonly observed in young subjects. In these cases, death is more to be imputed to disease in other viscera, and the attendant exhaustion, than to any change within the head.

250. (f) When acute hydrocephalus is consecutive of scarlatina, measles, small-pox, &c., it becomes important to detect it as early as possible. These diseases may terminate fatally, in their latter stages, copious effusion having taken place in the ventricles, and between the membranes of the brain; or the symptoms of this malady may not commence until a few days or even weeks after they have disappeared, more particularly after scarlatina. Severe and frequently recurring pain in the head at this period should always receive attention; and when this is attended with other symptoms of the first and second stages, decided measures should be adopted. When it follows scarlet fever, the occurrence of headach, stupor, or convulsions, either with or consequent on anasarca, may be viewed as evidence of approaching or commencing effusion in the head, which may be averted by antiphlogistic and other appropriate remedies.

251. PROGNOSIS.—This disease is not now so fatal as it was viewed by the first writers on it. If recognised early, a large proportion of cases will recover; even in the most advanced periods, the patient should not be despaired of. I have repeatedly seen recoveries take place, although strabismus, paralysis, convulsions, blindness, unconscious evacuations, and other unfavourable symptoms, had existed some time. Data furnished by the writings of ODIER, CHEYNE, MILLS, BRICHETRAU, GOELIS, and others, show that from a sixth to a third of the cases has recovered. But a perusal of the cases they have adduced, has convinced me, that some of those which recovered, as well as of those that died, belonged to acute or sub-acute encephalitis—little or no effusion having taken place—several of them presenting, on dissection, this as the least important change; the fluid sometimes amounting only to two or three drachms,—a quantity not nearly sufficient to warrant the designation given to the disease.

252. Although the prognosis should always be given with much caution, and be generally unfavourable; yet in few circumstances, indeed, ought the anticipation of such a result to paralyse our treatment. Dr. CHEYNE justly observes that, whilst the pulse continues steady, and the breathing natural, the most alarming symptoms should not prevent the use of active remedies. I would even go beyond this, and say, that the supervention of hurried breathing is the only symptom that should lead us to despair of the case. We should be cautious not to be misled by the falling in the frequency of the pulse in the second stage; and not to be induced to give a favourable prognosis from this circumstance. The coming down of the pulse should, therefore, be viewed in connection with the state of the eyes,

and of the evacuations, and with the other symptoms, before any opinion should be formed from it. More copious and more readily procured bilious stools, and their more feculent appearance and natural smell, an increased flow of urine, mucous or watery discharges from the nose, and an abundant warm perspiration, are favourable signs. The occurrence of the disease in comparatively sound constitutions, in an inflammatory form, or after scarlatina, admits of greater hopes of recovery. This opinion is accordant with that of GOELIS and ABERCROMBIE, although it is different from that expressed by Dr. CHEYNE. The idea of effusion in the head being necessarily fatal, has operated unfavourably in the treatment of the disease. I believe, from extensive and attentive observation, that, notwithstanding the uncertainty of the existence of this change, it may be removed, when the powers of the constitution are not sunk too low.

253. When hydrocephalus follows protracted ill health, in scrofulous constitutions, in families where others have died of it, after remitting states of fever, during protracted convalescence, or when it steals on so as not to be recognised until it is far advanced, an unfavourable opinion of the result may be entertained. The breaking out of a vesicular eruption about the lips and face; total insensibility of the retina; great rapidity, smallness, and feebleness of pulse; dryness of the mouth, lips, and nostrils; boring of the finger in the ears; hurried respiration, and partial sweats, particularly on the neck and back of the head; indicate approaching dissolution. Even when the treatment is followed by very striking amendment, we have no certainty of the recovery of the patient; for most of the unfavourable symptoms have been removed; but, in one or two days, they have recurred, and death ensued. Even when an improvement has become more permanent, we cannot be sure of the result, until the actions of the iris return, and the alvine excretions, and other functions, become natural,—until then, a cautious opinion of the issue should be given.

254. CAUSES. — (a) The *predisposing causes*. — GOELIS and several others suppose that the disease is more common now than formerly, owing to the less frequency of eruptions on the heads of children. He also believes, and refers to facts in support of the opinion, that terror and anxiety in the mother during the last months of pregnancy predispose to it,—the disease often appearing in the child soon after birth. The *epochs of infancy and childhood* are, however, the most remarkable predisposing causes. At these periods, the rapid developement of the encephalon, and the great susceptibility of the nervous system, dispose the cerebral circulation to frequent excitement; and in proportion as the cerebro-spinal system acquires a predominancy in capacity and function over other parts, is the predisposition to vascular determination, to inflammatory action, to increased exhalation of serum, and other disorders of the cerebral vessels, augmented. The more frequent occurrence of the disease, often in an inflammatory form, in children with precocious intellects and large heads, is a common observation, and is confirmed by the experience of GARDIEN, HOPFENGÄRTNER, GUERSENT, and others. The more usual period of attack is from the first to the eighth year; its frequency dimin-

ishing as we depart from this epoch, down to the period of birth on the one hand, and up to puberty and manhood on the other. I believe, that, previous to the tenth year, the disease is most frequent in boys. Dr. CHEYNE thinks, with LUDWIG, that, after ten, girls are more subject to it. A *scrofulous diathesis* is also one of the most remarkable predisposing causes,—sometimes several children being carried off in a family where it exists. CHEYNE, SPRENGEL, and others, consider that hydrocephalus and scrofula are convertible into each other. That the former sometimes follows the disappearance of other scrofulous affection, admits not of doubt; but it rarely happens that the latter is influential in the removal of the former; indeed, effusion on the brain much more frequently proceeds simultaneously with tubercular and other strumous diseases in other parts of the body.

255. *Hereditary disposition* has also been viewed as a cause by QUIN, ODIER, FORMEY, P. FRANK, PORTENSCHLAG, BAADER, GOELIS, &c.; some, however, with CHEYNE, imputing such disposition to the scrofulous diathesis. But I have repeatedly remarked the hereditary tendency, without its dependence on scrofula. GOELIS, BRACHET, COINDET, and GIRTANNER ascribe this disposition to a peculiar connate irritability of the nervous system; this, however, does not advance the question much further. The children of parents addicted to drunkenness, particularly if the mother be given to the use of spirituous liquors during suckling, are also, according to my experience, prone to be attacked. In addition to these, may be enumerated a syphilitic taint of the parents (THOM); frequent congestions in the head, however induced; the use of too stimulating food and drink in early age; keeping the head too warm; the premature and excessive exercise of the senses and of the intellects; violent mental emotions, as terror, anxiety, anger, fear; the exhibition of anodynes to the child by nurses, or in the treatment of other diseases; repeated falls; injuries during parturition (STOLL, ARANTUS, GOELIS); rocking in cradles (BLANCARD, *Anat. Prat. c. i. obs. 18.*); the early and repeated application of cold to the head or other parts (PERCIVAL); concussions of the body; too frequent motion and depending positions of the head; whirling round on the toes; the injudicious use of emetics; the continued irritation of worms in the prima via, and of dentition during both the second and first periods; congestions, inflammations, and enlargements of the liver and spleen; previous attacks of encephalitis, or of cerebral congestion; interruptions to the secretion and discharge of the bile; disorders of the stomach and bowels; enlargement and obstruction of the mesenteric glands; long continued costiveness; remittent and exanthematous fevers; pertussis; previous diseases imperfectly cured; and affections much disordering the respiratory functions. Dr. THOMPSON, of Jamaica, observed it frequently consequent on worms in the dark races.

256. (b) The *exciting causes* are, cold to the head of young infants; external injuries from falls, blows, &c.; concussions or agitations of the brain, from jumping, whirling, or depending positions of the head; the suppression of eruptions on the scalp, and behind the ears (CONRADI, GÖE-

LIS, &c.); the extension of inflammation from the ear (ITARD, LALLEMAND, &c.); the retrocession of acute eruptions, and suppression of chronic evacuations or discharges; the extension of irritation to the membranes or brain, from inflammations of the organs of sense, from the throat, scalp, face, &c., and from erysipelas of those parts; too copious general depletions in the exanthemata and acute diseases, in relation to the form of the malady and strength of the patient; the too liberal use of narcotics in young children, or their employment too early in several diseases, particularly in whooping cough, spasmodic croup, spasm of the larynx, and flatulent colic; whirling, tossing, or rudely rocking children in order to quiet them, when crying from disorders of the digestive organs, or erethism or irritation of the encephalon; insolation; the early use of fermented liquors; carrying heavy loads on the head (J. JOHNSON); allowing children to sit on stones or other cold seats; and the metastasis of various maladies. RUSH, LETTSOM, GOELIS, and COINDET mention its occurrence from metastasis of rheumatism. I have seen this take place in a grown-up person,—the effusion being chiefly between the membranes,—but not in children; although I have met with metastasis to the heart in many cases of children—in one case now under treatment, which is the second in the same family. (See also BRAIN, §§ 182, 183.)

257. *PATHOLOGICAL OPINIONS.*—Acute hydrocephalus has been generally classed as a dropsical disease, although its claims to be thus arranged are somewhat equivocal. Its similarity, however, to other acute dropsies, particularly those of the chest, is most striking. Indeed, it seems to hold such a relation to inflammation on the one hand, and to chronic dropsy on the other, as to entitle it to be viewed as an intermediate disease, and as identical in most cases with other acute dropsies; in some instances approximating more nearly to the one than to the other. WHYT considered it as altogether a dropsical malady; and Dr. CULLEN, in designating it *apoplexia hydrocephalica*, did not seem to entertain a very different opinion. PINEL fell into the same views, after having described it as a species of cerebral fever; which was the idea conceived of it by Dr. MACBRIDE. Contemporary with, and subsequent to, the appearance of Dr. QUIN's work, numerous authors, particularly RUSH, RAND, WITHERING, WHITE, ACKERMANN, GARNETT, MARTINI, HEINECKEN, GARDIEN, GOELIS, and RAIMANN, treated it as inflammatory in its origin; and a number of French pathologists, especially MARTINET and PARENT-DUCHÂTELET, have viewed it as arachnitis of the ventricles and base of the brain. Others, again, have supposed, with LALLEMAND and ABERCROMBIE, from the frequency of disorganisation of the cerebral structure in the vicinity of the ventricles, that it is a consequence of inflammatory softening or cerebritis; the disease either commencing in, or extending to, the arachnoid of the ventricles. ROSTAN (*Clin. Méd. t. ii. p. 321.*) has stated it to be a result of inflammation or other lesions of the brain and membranes, and seldom or never an essential disease. This is doubtless the case, if we consider all sensible lesions as sequences of anterior changes; but when the nature of the early changes cannot be readily inferred from the alterations they induce, we must

be contented to grapple with the obvious malady, until we know more of its antecedent pathological states. If we adopt the views of M. ROSTAN, no changes, excepting those immediately consequent upon remote causes, will be considered essential.

258. Several writers, observing the history and lesions of hydrocephalus to differ in several respects from inflammation, yet still to resemble it very closely, have viewed it as a peculiar form of inflammatory action affecting the more interior surfaces and substance of the brain. Thus, CONRADT termed it *Encephalitis exudatoria infantilis*; BRACHET, *Hydrocéphalite*, or watery inflammation of the brain; and COINDET, *Céphalite interne hydrocéphalite*. Other writers, particularly ABERNETHY, CURRY, CHEYNE, YEATS, THOMSON, &c., have considered it as most commonly proceeding from disease in the digestive organs, and seldom arising from primary inflammatory action in the brain or its membranes. This opinion has been carried too far; for I have often had evidence to convince me, that morbid action had been proceeding in the brain long before it was suspected, and that one of its chief effects was to disorder the liver and digestive canal; this sympathetic disorder being frequently considered as primary, and its reaction on the brain as the sympathetic production of hydrocephalus. I believe that the malady often originates in the substance of the brain; and that, conformably with what is observed in respect of lesions of this structure, the digestive viscera, frequently at one time the most remarkably deranged, are merely sympathetically affected. FORMEY and Dr. SHEARMAN have viewed the effusion as a consequence of simple excitement of the cerebral circulation, entirely independent of inflammation. The latter writer has considered it to be contingent on various diseases, and to arise from a diversity of causes; but that its occurrence is chiefly owing to the predisposition or previous state of the membranes, — the essential character of the disease consisting in that previous state or predisposition which, in connection with an excited state of the circulation, gives rise to increased exhalation or effusion. Dr. C. SMYTH has argued against inflammation, and in favour of debility, as the cause of the effusion; but whilst he has strenuously contended for the latter pathological condition as respects the tone of the extreme vessels, he has admitted the existence of accelerated circulation, and its influence in producing the disease. There is one inference, however, in which nearly all modern pathologists agree, viz., that the effusion itself does not constitute the malady, but is only its consequence, — contributing to the production of the more advanced symptoms, but in a less degree than many suppose.

259. *Pathological Inferences.*—(a) The first or nervous form of acute hydrocephalus is frequently consequent upon changes in the substance of the brain, in the membranes lining the ventricles, and in the vessels and circulation of the encephalon, probably arising from the state of the organic nervous influence supplied to this quarter, and to the perversion of the vital actions. (See DISEASE, § 87—92.)—(b) That these changes often commence gradually, or almost imperceptibly, and proceed far before they disorder the functions, either of organic or of animal life, in a remarkable degree; and when such disorder becomes manifest,

it is often difficult to trace the quarter in which it has originated, owing to the intimate dependence of both classes of functions upon the organic nervous system.—(c) That the changes observed on dissection in this variety have evidently been in progress a considerable time before effusion has taken place; the effusion being the consequence of these changes, assisted by the physical condition of the encephalon.—(d) That nervous, as well as inflammatory and consecutive, hydrocephalus being merely contingent upon lesions of the organic nervous influence, of the circulation, and of the substance and membranes of the brain, such lesions actually constitute the disease during its early periods.—(e) That the nature of the cerebral affection, and the exact state of vascular action, in these periods, are not manifest: but if it be at all inflammatory — which admits of dispute — the vascular action possesses more of an asthenic or ataxic, than of a sthenic, character; or is attended by a perverted, rather than by a dynamic, state of vital power; and by imperfect performance of the digestive and assimilating functions.—(f) That, although the first form of the disease be consecutive of changes in the circulation, or in the organic nervous influence of the brain, the resulting phenomena may be such as to be mistaken for the exciting causes; the organs of locomotion may be so enfeebled as to occasion falls, which will aggravate the primary affection, and develop a state of sub-inflammation, or of vascular reaction in the encephalon, and its usual consequences, viz. determination of blood, injection of vessels, and effusion of serous fluid; or the viscera of digestion and sanguification may become so congested, or otherwise disordered, as to appear the parts primarily affected.—(g) That when this form is coincident with, or consecutive of, congestion, inflammation, or other disorders of the digestive and chylopoietic viscera, effusion into the ventricles cannot be viewed as the earliest changes that take place within the head; but that this effusion is merely consequent upon similar changes to those which have been already alluded to (d, e); the lesions in the digestive organs, as well as the earlier alterations in the brain, being, very probably, coetaneous results of pre-existing disorder of the system, or of constitutional vice.—(h) In whatever quarter disorder commences, it is probable that, sometimes at least, the sensorial power becomes exhausted, possibly coetaneously with the superintention of the second stage, and the cerebral tissue itself more or less wasted; but it is difficult to say whether this wasting be the consequence, or the cause, of the effusion into the ventricles, — possibly the latter.—(i) That, in the early stage of the disease, as well as in its progress, the vascular excitement, or febrile disturbance, attending it, is characterised by general adynamia or perversion of vital power.—(k) That great cerebral excitement does not necessarily imply the existence of inflammatory action in the encephalon; for accelerated circulation in a weakened state of the frame, and susceptible condition of the sensorium and nervous system generally, will produce cerebral excitement, particularly towards the close of febrile or protracted diseases; but this, instead of being inflammation, is a state very different from, or sometimes even opposed to, it, as shown by the *ludentia* and *juvantia*, and by

the *post mortem* appearances.—(l) In the *second form*, and in many of the *third*, particularly as occurring after the exanthemata, the symptoms, as well as the appearances after death, are more manifestly inflammatory; cases varying in grade from such as are described in the article BRAIN (§174.), until the characters of the nervous form of the disease are nearly approached; the inflammation differing in kind accordingly from sthenic inflammation, owing to the diathesis and the state of vital power.—(m) That the *waterstroke* or *hyperacute* disease, in every case in which I have observed it, has arisen independently of inflammation, although generally consequently upon determination to, or congestion in, the head.—(n) That hydrocephalus, particularly its nervous form, may assume intermediate states or grades between the acute and chronic, which grades may be denominated *sub-acute*.—(o) That the disease may, in some instances, commence in an acute or sub-acute form, and become *chronic*, especially in infants whose cranial sutures have not closed.—(p) In some cases, also, the acute or sub-acute may supervene on the chronic state.—(q) That acute dropsy in the ventricles, although most common previously to puberty, may occur at any subsequent period, especially during the decline of life, and in old age.—(r) That it is, in such circumstances, generally attended by inflammatory appearances in, or softening adjoining, the surface of the ventricles; but it sometimes is unattended by any of these lesions.—(s) That in these cases it often terminates fatally in a short time, with apoplectic or comatose symptoms; constituting the *Serous Apoplexy* of authors, which is sometimes consequent upon other forms of dropsy in persons advanced in life; they being cut off by the effusion into the ventricles, without any other material change within the head,—the coma, or apoplexy, gradually becoming more and more complete until life is extinguished.*

260. TREATMENT.—*Lit. Hist. of.*—The opinion of Dr. WHYTT, as to the nature of acute hydrocephalus, and which was for a time very generally adopted, led to an inefficient treatment. Dr. WATSON, who adduced one of the first successful cases, trusted chiefly to blisters, purgatives, means to lower the attendant fever, and to the powers of the constitution for a cure. Drs. HAYGARTH and DOBSON were the first to prescribe mercury in the disease, particularly calomel,—a medicine which had been very largely employed about a century before, but had fallen into disuse; and which, having proved extremely efficacious in many of the maladies incidental to Europeans in the East Indies, was then finding its way, through means chiefly of Dr. LYSONS, Dr. HAMILTON, and Dr. CLARKE, into the practice of this country. Dr. DOBSON exhibited mercury with the intention of thereby increasing the function of absorption; and Dr. HAYGARTH, in order to induce salivation, with the expectation that, by procuring an aqueous evacuation from the neighbourhood, it

might be the means of removing the fluid accumulated in the ventricles. Drs. A. DAWSON, SIMMONS, and WHITE placed their chief reliance on blisters and opium,—means which, in the present state of our knowledge, amount merely to useful adjuvants. The views of Drs. QUIN, WITHERING, and RUSH caused a revolution in the treatment of acute hydrocephalus. Dr. QUIN, observing in dissection, evidences of inflammatory action in the membranes of the brain, advised bloodletting, and cold applications to the head, in the first stage, and mercury afterwards; Dr. WITHERING used digitalis, but his cases were not sufficiently demonstrative of its efficacy; and Dr. RUSH placed confidence chiefly in large bloodlettings and active purgation.

261. Dr. PERCIVAL was amongst the first who appears to have been aware of the fact, that, however nearly acute hydrocephalus may approach true inflammation, it is no more identical with it, than the adhesive form of inflammation is the same as the diffused, or as erysipelas. He directed the means which had been previously recommended, according to the circumstances of the case; and combined the use of blisters, mercurials, and opiates, with that of squills, musk, and other diuretic and nervine medicines. Consistently with these views, he was cautious in the employment of bloodletting. Dr. PATERSON prescribed calomel and opium, and a more antiphlogistic treatment than was risked by Dr. PERCIVAL; but Dr. GARNETT, although he believed in the inflammatory nature of the complaint, hardly ventured beyond local depletions; and confided more in digitalis conjoined with mercurials, than in other internal remedies.

262. It is impossible for the experienced reader to have perused the writings on the disease, as far as I have now proceeded, without being forcibly struck with the circumstance, that great misapprehension prevailed as to the succession and *ensemble* of morbid phenomena, on which the name acute hydrocephalus has been imposed. This is shown by many of the cases adduced by authors in support of the inflammatory nature of the disease; these cases exhibiting the usual results of inflammation only: whilst those who observed the fluid collection unattended by very remarkable inflammatory appearances, limited their idea of this malady to such as these only, and considered them as distinct from those evincing changes strictly referrible to inflammation, without any, or with but little effusion; which latter cases they viewed as constituting true inflammation of the brain and its membranes, and not falling within their definition of hydrocephalus, however nearly the symptoms of the one resembled (in consequence of the physical condition of the brain) those of the other. The fact is, that the larger number of writers down to the present day applied the term acute hydrocephalus to a certain succession of phenomena, without regard to the different pathological states giving rise to it, and the shades of diversity by which each may be recognised; and were either unaware of, or unheeded, the circumstance, that an inflammatory state of the brain and its membranes in young subjects may terminate without effusion, or may give rise to effusion to an extent warranting the denomination of hydrocephalus; and that, moreover, water may

* Since the above was sent to press, the fifth volume of M. ANDRAL'S "*Clinique Médicale*" has appeared. It contains a few cases of idiopathic and acute effusion of fluid into the ventricles, occurring in adults, both without and with slight inflammatory changes or softening of the surfaces of these cavities, or parts adjoining. The symptoms, in these cases, were those of *waterstroke*, or of *serous apoplexy*. Two cases occurred in persons who were labouring under dropsy of other cavities.

be collected within the cranium, without any truly or sthenically inflammatory action of the vessels; and, nevertheless, the most experienced observers often will hardly be able to distinguish, by means of the symptoms, between these classes of cases.

263. The *intentions* with which the treatment of acute hydrocephalus should be conducted, are resolvable into the following:—1st. To remove all causes of irritation or morbid action operating either directly or sympathetically on the brain.—2d. To lower vascular excitement in the head, and equalise the circulation.—3d. To guard against effusion, by fulfilling the above objects, by diverting the morbid determination of fluids from the head, and by changing the action of the extreme vessels.—4th. To restore discharges and eruptions, when these have been suppressed.—5th. To alleviate pain and sickness.—And, 6th. To support the powers of life, and to recruit them when they are sinking. It is obvious that the means which will accomplish one of these intentions, will often also fulfil one or more of the others.

264. The physician, having considered the origin, pathological states, the constitutional relations, the form, history, and stage of the disease, as well as the means which may have been already employed, should cause the patient to be placed in a well-aired chamber, and to be screened from strong light. The bed or couch should approach a slightly inclined plane, from which he ought to be slowly raised, and on which gently placed, when removal is necessary. All quick motions or changes of position, as well as excitement of the senses, and irritation of the temper, must be carefully avoided. The temperature should be rather cool than warm, and the bedclothes only sufficient to preserve the natural heat. With these preliminaries, the remedies determined upon should be promptly and faithfully administered. During both the first and second epochs of dentition, the patient's *gums* and *teeth* ought to be carefully examined, and the former freely incised, or the latter removed, as often as may be requisite.

265. *A. Vascular Depletion.*—In estimating the reported success of treatment in this disease, it is very necessary to keep in recollection that often no distinction has been made between it and encephalitis: indeed, many modern writers consider inflammation of the brain and its membranes, occurring in children, to be identical with acute hydrocephalus,—or, in other words, that this latter is the same as the phrenitis of adults. Now this sophism, so general and injurious in medicine—this affirming as true of the genus, what is true merely of the species—has had a most baneful influence on the treatment of this disease, inasmuch as it has led practitioners greatly to over-estimate the advantages of sanguineous depletions; a large proportion of their cases of imputed acute hydrocephalus being acute and sthenic meningitis or encephalitis, in which this evacuation may be carried much further than in the former malady; and has induced them to commend, and others to employ, the practice with too little reservation. This circumstance is especially manifest upon perusal of the histories and treatment delineated by RUSH, MAXWELL, and several others, who have carried bloodletting as far as it is admissible in sthenic inflammation

of the membranes. Having perused these authorities, after the experience derived from the treatment of very many hundred cases of cerebral diseases in children, I am convinced that the larger proportion of those which they considered hydrocephalus, was neither that malady, nor would have given rise to effusion in such quantity as to have justified the designation: the details they have furnished are decisive of the fact in the mind of the competent judge. Therefore, let not the inexperienced practitioner be led astray by the circumstance of its having been recorded by authors, that arteriotomy, large bloodlettings, &c, cured half the cases in their practice; I am convinced that the majority of such cases were simple encephalitis, or inflammation of the membranes of the base of the encephalon. Dr. MAXWELL avers that he cured sixty cases out of ninety—two thirds—by bleeding them in the horizontal posture until insensibility—occasionally for some hours—afterwards ensued. Would the most heroic practitioner of the present day attempt such practice in an undoubted case of acute hydrocephalus? I believe not.

266. (a) In the more *inflammatory states* of the disease, and especially in the *first stage* (§ 234.), the same means, as are fully described in the treatment of inflammations of the BRAIN and its membranes (§ 191. *et seq.*), should be employed; and to an extent which the pulse, the febrile excitement, and previous health and strength of the patient, will point out. These means consist of general or local bleeding, active purging, the application of cold to the head, derivatives and counter-irritants, mercury, sedatives, and diuretics, &c. In the inflammatory form, as it occurs either primarily or consecutively, these remedies may be prescribed very nearly in the manner explained in the article referred to. When the disease supervenes suddenly on any of the exanthemata, as decided depletory measures, as are advised for encephalitis thus occurring, must be pursued. (See BRAIN, § 191.) In children under three or four years of age, leeches, or cupping behind the ears, on the occiput, or on the nape of the neck, will be preferable to venæsection; but, after this age, the latter method may be practised in the first stage of the disease. I have observed no greater advantages obtained by bleeding from the jugular, than by bleeding from the arm. Many Continental physicians consider depletion more derivative when it is practised in the feet, and numerous facts favour the inference. In the *second stage*, local depletions, if they have not been already employed, or carried sufficiently far, and if circumstances indicating the propriety of the practice exist, may still be resorted to; but with strict reference to the pulsation of the carotids, the pain and temperature of the head, to the warmth of the extremities, and to the state of vital power. I have often derived advantage from repeated local bleedings even in this stage, aided by the other remedies enumerated, when employed in the manner about to be described.

267. (b) In the *first form*, as well as in such of the *third* as partake chiefly of the same character, *vascular depletion* must be employed with greater caution, and as early as possible in the *first stage*. I have seen hardly any benefit from it when the *second period* of this variety had com-

menced. When the disease has been detected sufficiently early, and when it has followed previous attacks of congestion or inflammatory action in the head, the febrile excitement being neither general, continued, nor well marked, the application of blisters behind the ears, and of leeches around, or close to, the blisters, has been of much service. But it will be requisite to repeat this practice every second or third day, or oftener, and to carry it as far as the circumstances of the case may warrant. If the cerebral affection appear to have been induced by disease of the digestive and chylipoietic viscera, a blister should be placed on the epigastrium or right hypochondrium, and leeches applied around it, as soon as redness is caused by it; when it ought to be removed. This method may be repeated, according to circumstances, after intervals of one, two, or three days: it possesses great advantages in this state of the disease, inasmuch as, whilst it relieves the gastric symptoms and the affection of the liver, it is a most energetic derivative from the head, without reducing vital power so far as general depletion does; for general bleeding, however early employed in this variety, is seldom productive of much benefit. Indeed, I have seen it detrimental in many instances; and I consider both it, and local depletion, if carried to any considerable extent, as decidedly injurious in some states of this form, particularly in weak and cachectic children.

268. *B. Cathartics.*—The discharge of morbid secretions and fecal collections should be procured as early as possible by remedies calculated, at the same time, to derive from the brain, and to diminish vascular plethora and excitement. The fulfilment of this intention is appropriate to all the states of the disease. A large dose of calomel, either alone or with James's powder, ought to be immediately exhibited, and, after three hours, repeated with the addition of toasted jalap, or scammony; and its operation should be promoted by an active terebinthinate enema. If the irritability of stomach be such as to prevent the retention of medicine taken by the mouth, vascular depletion, a blister or mustard cataplasm on the epigastrium, and an active cathartic enema, will often remove it. Calomel, in full doses, will generally be retained, under any circumstances; but, in conjunction with cathartics, it is frequently ejected, unless after the measures now stated. *Elatarium*, in small and repeated doses, has been suggested by Dr. ELLIOTSON; but it, as well as *croton oil*, will seldom be kept on the stomach. When retained, they are occasionally of use. I have seen most advantage derived from the latter, when it has been added to the terebinthinate enema, or applied over the abdomen as a rubefacient. Dr. CHEYNE found a drachm or two of magnesia saturated with lemon juice, given every two or three hours, most useful in such circumstances; and I believe that this will act more certainly than irritating purgatives, particularly if a full dose of calomel have been taken a few hours previously. A gruel or broth enema containing some purgative salt may also be administered two or three times in the course of the day; and if the bowels be very torpid, and the sopor considerable, the terebinthinate enema should be repeated daily, or even oftener. Saline purgatives may also be given in the infusion of

senna, when they can be retained. Active catharsis at the commencement of the disease, after vascular depletion has been instituted to an extent which the nature of the case demands, will have a more decided effect than any other means whatever.

269. *C. Cold applications* to the head, the hair having been removed from it, should be employed in the manner, and with the precautions, directed in the article BRAIN, § 192., whenever the temperature of the head will admit of them. But, like the measures already advised, it is only early in the disease, and in the inflammatory states more especially, that they are productive of much benefit. In these states they may be used simultaneously with the tepid semicupium or pediluvia, salt and mustard having been added to the water. RUSH, QUIN, CONRADI, FORMEY, GOELIS, and nearly all the writers on the disease, are favourable to cold applications in its treatment; and, in some form or other, they are appropriate to most of its states.

270. *D. Mercurials.*—These are, perhaps, the next important means that can be employed. They have been very generally prescribed since they were first adopted by DOBSON and HAYGARTH, and subsequently by EASON, MACKIE, REEVE, LETTSOM, HOOPER, HOPFENGÄRTNER, FERRIAR, and more recent writers. Early in the first stage of the disease, calomel, given every three or four hours, in full doses, either alone or with James's powder, in small quantities, is, in ordinary circumstances, the best preparation. In children under one or two years, neither salivation, nor much intestinal disorder, will be produced by it. In those above three or four years, its specific action may be obtained, but with little certainty, even although it be conjoined with opium or the compound ipecacuanha powder. When no essential benefit has accrued from the foregoing means, and the bowels have been fully purged as directed above (§ 268.), then calomel may be given with digitalis and narcotics, or with the latter only, particularly opium or hyoscyamus, with the view of fulfilling the third and fifth intentions of cure (§ 263.). But in young children, especially when the bowels are griped or are irritable, the *hydrarg. cum creta*, with small doses of compound ipecacuanha powder (F. 653.), will be most serviceable. The bowels, however, should always be kept sufficiently free by either of the enemata recommended (§ 268.). I may add, that calomel has been prescribed with cantharides, by DOBSON; with James's powder, by CAMPBELL; with opium, by LEIB and others; with digitalis, after local depletions, by WEAVER, GOELIS, and FISCHER; with digitalis and arnica, by J. P. FRANK; and with active purgatives (in which form I believe that it is most generally beneficial), by HUFELAND, CHEYNE, ABERCROMBIE, and many others. Dr. MERRIMAN and myself have given very small doses of the *oxymuriate* of mercury, every four or five hours, with advantage. In the second stage, this is one of the best preparations that can be prescribed; but it requires much caution; and, in this period of the first and third forms of the disease, it should be prescribed in tonic and diuretic infusions. The utmost care should be taken in exhibiting mercurials in these forms, particularly in cachectic subjects, and where the powers of life are much

reduced. The state of the gums, mouth, and tongue, should be always carefully observed during their use; for I have seen fatal sloughing of these parts follow from them in such cases. The external employment of mercurials has also been recommended by CAMPBELL and others. The ointment may be rubbed into the scalp, or between the shoulders, in the more urgent cases; but I have seldom seen advantage derived from this method. Mercurial ointment may also be employed in dressing blistered surfaces; or the liniment may be applied to them on warm bread and water poultices. This plan has sometimes been productive of benefit, particularly in children of two or three years of age or upwards.

271. *E. Derivatives and Counter-irritants* are often serviceable, especially in the second stage. They are also admissible in the first stage of the first and third forms, when there is little febrile heat, or when the lower extremities are cold or cool. Blisters have been very generally preferred by MONDSCHIEEN, RUSH, ODIER, PERCIVAL, CHEYNE, HOPFENGÄRTNER, GOELIS, &c.—Much difference of opinion, however, exists as to the places to which they should be applied. They may be placed between the shoulders, on the thighs or legs, on the epigastrium, and on the neck and occiput, and behind the ears, in the earlier stages of the disease; and in infants they should be removed as soon as they produce redness. In the first stage, they ought to be preceded or accompanied by depletions (§ 266, 267.); and in older children they may be kept discharging for several days, or be repeated. Some writers, and especially PORTENSCHLAG, WHITE, HOPFENGÄRTNER, SIMMONDS, GARDIEN, and ELLIOTSON, have advised them to be placed upon the head or occiput; but I have never seen benefit derived from them in the former of these situations, unless in cases where the disease has followed the suppression of tinea capitis, or in the second or third stages, when the sopor has been great; and then the blister may be large, and the part over the occiput kept discharging for some time subsequently. In infants, sinapisms to the epigastrium, or lower extremities, are often preferable to blisters in these situations. The tepid or warm semicupium and pediluvia, salt and mustard having been put into the water, are often of use in the second stage, or in the first, when the extremities are cool; but when there are general febrile excitement, and much heat in the head, they are seldom of service, unless in a tepid state, and in conjunction with cold applications to the head after evacuations have been directed. The warm bath is less serviceable than the semicupium, and is as often detrimental as beneficial in the early periods of the more inflammatory states of the disease. The vapour bath has been proposed by Dr. A. HUNTER. M. ITARD advises it to be impregnated with vinegar. This practice is admissible chiefly in the second stage. Setons and issues are too slow in their effects for this disease; and the same may be said of the tartarised antimonial ointment. But I have seen benefit result from producing erubescence by croton oil. In the latter stages, urtication may be practised. Moxas have been applied to the occiput and behind the ears, by M. REGNAULT. Dr. MERRIMAN has had recourse, in several instances, to the tinctura lytta

in doses of from five to ten minims, given every four hours, until severe strangury was caused by it; and in three of these cases the disease was arrested. It may act beneficially, not merely as a derivative, but is an excitant of nervous power.

272. *F. Sedatives and Narcotics.*—(a) *Digitalis* has been much employed in this disease since it was first recommended by WITHERING. BROWN, WHITE, CHEYNE, and others, have mentioned it favourably. Any of its preparations may be used. GARDIEN prefers the ætherial tincture, which he directs both internally, and externally in liniments. GOELIS and MERRIMAN prescribe half a grain of the powder with a grain of calomel every four or six hours; and WENDELSTATT, any of its formulæ with opium. KLEBER advises that it should be rubbed in over the scalp, with the *vinum scillæ*. It may be given in both the first and second stages;—in the former as a sedative of vascular excitement; in the latter, to modify the state of the capillary circulation, and prevent effusion. Much discrimination, however, is necessary in distinguishing the effects of this medicine from the symptoms of the second stage—particularly the vomiting, slowness of the pulse, and dimness of sight. Dr. CHEYNE points out certain differences between them; but they cannot be relied on. The sopor and strabismus, however, of this stage will generally distinguish it from the depression produced by digitalis. When this substance is prescribed in the first stage, it should be given at once in a full dose, and be repeated every four or five hours. In the second stage it may be conjoined with squills, the spiritus ætheris nitrici, or with serpentaria, or the decoction of the flowers of arnica, as advised by several German physicians. Colchicum has also been employed in this disease, within the last few years, with the same intentions as digitalis. I am unable to speak of its effects, as I have considered it less appropriate than this and some other remedies. It may, however, be prescribed in the same stages as digitalis. Little benefit can be hoped from it, especially in the second period, unless it act upon the kidneys or bowels.

273. (b) *Opium.*—PERCIVAL, ODIER, CRAMPTON, BROOKE, and many of the writers already referred to, recommend this substance in the second and third stages, particularly when the pain in the head, the convulsions, and irritability of the stomach and bowels, are very prominent symptoms. In the earlier part of the second stage it may be given with calomel, James's powder, or antimony. When the bowels are very irritable, without sickness at stomach, it is preferable in the form of DOVER's powder, with hydrarg. cum creta; and, when the general irritability is great, or the convulsions violent or frequent, with full doses of digitalis. Later in the disease, I have seen benefit from it in small doses given in the terebinthinate enema directed above, or with serpentaria, or diuretics. Hyoscyamus may be employed with the same intentions, and in similar states of combination, as opium; but I doubt its being equally efficacious.

274. *G. Antimonials.*—The tartarised antimony, in large doses,—in from five to twenty grains in the twenty-four hours,—has been advised by the followers of the new Italian doctrine, and employed successfully by M. LAENNEC in a

few instances. Although long in the habit of having recourse to this practice in pulmonary and some other diseases, I have had no experience of it in acute hydrocephalus. Small doses of James's powder with calomel, or with calomel and active cathartics, or with calomel and opium, as prescribed by Dr. CHEYNE, appear the most judicious mode of directing this mineral. I have seen, however, benefit follow moderate doses of the tartarised antimony, either with or without opium, as recommended by Dr. MILLS, in the first stage of the disease, when vascular action and febrile excitement were great.

275. *H. Diuretics, &c.* can be but little confided in; yet I have believed them to have been of much service in the second and third stages of some cases. The most energetic is certainly the spiritus terebinthinæ, in the form of enema, or of liniment rubbed on the scalp. Squills, digitalis, spiritus ætheris nitrici, spiritus juniperi, or hydrochloric æther, — formerly CLUTTON's febrifuge spirit, — may be used, in these periods, with small doses of opium, or with a weak infusion of serpentaria, or decoction of the flowers of arnica. FLAJANI and KLEBER prefer squills to other diuretics; and I believe that they are not altogether without efficacy.

276. *I. Paliatives and Restoratives.* — The pain in the head and vomiting are to be relieved by the local depletions, — behind the ears and from the epigastrium, — and blisters in these situations; by the cold affusion on the head; by calomel with opium, and by the terebinthinate enema; or a warm terebinthinate epithem or sinapism placed over the stomach, till redness is produced. *Convulsions*, in the earlier periods, will be abridged by the cold affusion, and most certainly by the enema just recommended. A tobacco enema ought not to be hazarded. The oxide of zinc, or musk with ammonia, or with small doses of opium, may also be employed to relieve this symptom in the latter stages. I believe that practitioners in this country* have been too often deterred from the use of restoratives in the advanced periods, particularly of the nervous form, of the disease. I have, in several instances, seen benefit follow the cautious exhibition of them along with diuretics, and enemata with assa-fœtida. The preparations of ammonia with tincture of squills; or camphor mixture with magnesia, the tincture of valerian, and syrup of roses; or the weak infusions of arnica or of serpentaria, with liquor ammoniæ acetatis, digitalis and syrup of squills; or a weak infusion of green tea, either alone or with digitalis, and spiritus ætheris nitrici; and either of these, with a drop or two of laudanum, in small doses at short intervals, are the medicines I have most frequently had recourse to in the latter stages; allowing the patient beef tea,

warm jellies, &c. in addition. In several cases approaching the sub-acute form of the disease, I have prescribed a solution of the hydriodate of potash in distilled water, with or without a little iodine added to the solution, in small but frequent doses, and with evident advantage. In a few cases, the compound infusion of roses, or a weak infusion of cinchona, or of valerian, have been given with some aromatic water, and with squills or spirits of nitric æther.

277. *TREATMENT OF THE HYPER-ACUTE HYDROCEPHALUS.* — But little can be done in this form of disease, owing to the circumstances under which it usually occurs, and to its severity as well as rapidity. In cases consequent upon exhaustion, the sopor or coma being profound, a blister on the head, the terebinthinate enema, and the treatment advised for the advanced stages of the acute hydrocephalus, are most likely to be useful. When it appears with less evident signs of exhaustion, leeches to the occiput or behind the ears, or cupping between the shoulders; active derivatives; a cold terebinthinate epithem applied around the head, and a blister on the epigastrium, with such internal medicines as the circumstances of the case require, conformably with what has been above stated; seem to be the most active and appropriate measures. The bowels should be energetically acted on, by medicines given by the mouth and exhibited in enemata, whenever the malady has not been consequent upon diarrhœa. When it supervenes during, or soon after, the eruption of any of the exanthemata, particularly scarlet fever, it is more or less inflammatory, and requires very decided treatment. Bleeding from behind the ears, or nape of the neck, should be carried as far as an attentive observation of its effects will indicate, particularly in children that have been well fed; and the rest of the remedies now advised, and especially the active enemata already directed, should be promptly, or even simultaneously, employed.

278. *IN THE SUB-ACUTE FORM* of hydrocephalus, a similar treatment to that which has been recommended for the acute, should be adopted early in the disease; vascular depletions being then practised, according to the circumstances of the case: and, when it seems disposed to pass into a more chronic state, small doses of iodine, or of any of its preparations, should be given during the day. A few grains of hydrargyrum cum creta, with digitalis, may be also taken at bedtime, and blisters be applied behind the ears, and kept discharging for some time. The bowels ought to be freely opened by the means already advised, especially the terebinthinate enema; and, in the latter stages, the same measures as have been directed for these stages in the more acute states of the malady, should be prescribed. If the disease assume a *chronic* form, the treatment about to be recommended (§ 297.) will then be necessary; but I have seldom seen benefit derived from any mode of treatment in such cases, probably owing to the disorganisation that has taken place in the brain.

279. *DIET, ETC.* — During the early periods of the disease, cooling diluents only, given frequently and in small quantities at a time, are required; but in the latter stages, particularly when the emaciation and debility are consider-

* The following is an abstract, made in my note book many years since, of the practice of the most able German physicians in this disease. In the *nervous or typhoid variety*, cold applications to the head, sinapisms to the arms and legs, and purgative clysters. If these fail, digitalis, with the decoction of flores arnicæ or infusion of serpentaria; blisters from the occiput to between the shoulders to be kept open, the innunction of mercury three or four times a day; and, if the vomiting persist, sinapisms on the epigastrium. Subsequently musk and ammonia, chiefly on account of the convulsions. In the *inflammatory form*, and in that consequent on the exanthemata, local bleedings, digitalis, calomel and jalap, and, in the latter stages of these forms, the treatment directed for the nervous or typhoid variety.

able, suitable nourishment is necessary. If the child be still at the breast, the milk of the mother, or of a healthy nurse, in moderation; or asses' milk, beef tea, jellies, and the various farinaceous articles of food suitably prepared, are generally the most appropriate. During *convalescence*, the same kind of nourishment must be adopted for some time, but in more liberal quantities; and animal food should, at first, be cautiously and sparingly employed. Gentle tonics may also be exhibited, as a weak infusion of cinchona, or the compound infusion of roses. German writers prefer a weak infusion of valerian; and my experience leads me to concur with them. Either it, or the infusion of cinchona, may be given with magnesia, which will render it less unpleasant, and gently aperient; and, if the urine be not sufficiently copious, a little tincture of squills, or ammoniated spirit of colchicum, may be added; or the compound infusion of roses may be taken with a neutral salt. In the latter stages of the disease, or during early convalescence, if the secretions and excretions be morbidly increased, suitable nourishment, as well as restorative medicines, should be administered more liberally than in other circumstances; but, in every instance, the influence of the diet and of the remedies, upon the pulse, the temperature of the head, and the general surface, ought to be carefully watched. *Change of air* to a warm and dry situation, or, in summer, to the sea side, will have a very beneficial effect, and should be adopted as early in convalescence as possible.

280. *PROPHYLACTIC TREATMENT.*—We are frequently consulted, in the cases of children who are drooping in health, or who evince incipient symptoms of cerebral disorder; and even respecting those who have no manifest ailment; but for whom, owing to the circumstance of one or several of the children of the family having had the disease, measures of prevention become absolutely requisite. The best of these are,—1st, the increasing of the abdominal and cutaneous secretions and excretions—2d, the establishing an artificial irritation and discharge;—3d, strict attention to diet and regimen;—and, 4th, change of air.—(a) The evacuations should be carefully examined; and, when the bowels are sluggish, or the bile deficient, hydrarg. cum creta, or calomel, with rhubarb or jalap, should be given at bed-time, in gentle doses. James's powder should also be prescribed, whenever the skin becomes dry, either alone, or with small doses of calomel.—(b) Issues, moxas, or repeated blisters, may be employed, with the second object. Blistering behind the ear, the discharge being kept up for a considerable time, is very beneficial. Issues, either in the usual way, or by means of the inner bark of the mezereon, or scraped horseradish, will also be very efficacious. Dr. CHEYNE refers to the circumstance of ten children in one family having died of the disease; the eleventh, for whom this means was employed, having been preserved. The nape of the neck, the occiput, or the upper arm, are the most suitable situations for issues.—(c) Moderate diet, and that chiefly farinaceous, of a bland quality, and easy of digestion, is extremely requisite. All stimulating aliments or drinks; warm opiates, and too much animal food, are very injurious. Children should also be instructed not to retain

any of the excretions, after the first intimations to evacuate them; and their limbs and trunk should be freed from all close cinctures. Premature, or too great, exertion of their intellectual powers, particularly in forward or quick children, should be guarded against; and sufficient exercise in the open air should be imposed on them.—(d) In recommending change of air, the nature of the locality should not be overlooked. A dry, warm air is the most appropriate to hydrocephalic cases.

ii. CHRONIC DROPSY IN THE HEAD.—*Chronic Hydrocephalus.*

281. *DEFIN.*—*Effusion of a limpid fluid in the ventricles, commencing previously to, or soon after birth; frequently with enlargement of the cranium; and generally either unaccompanied by acute symptoms, or supervening gradually, with signs of debility.*

282. Chronic hydrocephalus has been stated above (§ 177.) to occur most frequently before birth, and sometimes to occasion the death of the fœtus. Some females have given birth to a succession of hydrocephalic fœtuses, either dead or alive, at some time during the latter months of utero-gestation. In such cases, the effusion is usually connected with defective development of the cerebral organs, and with some other malformation or congenital disease. When it comes on after birth, it either commences so insensibly as to escape notice, until far advanced, or it is attended by symptoms of increased excitability of the nervous system: it seldom is consequent upon the acute disease, or upon other maladies. BOEHME and WIGAND believe that an hereditary disposition to be affected by chronic hydrocephalus after birth exists in some children; and ROSENSTEIN, STRUVE, LODER, GOELIS, and BRESCHET consider, that, when not congenital, it usually begins a few days or weeks after birth, and very rarely after some months or years. It may, however, occur in old age. GOELIS mentions a few cases of this kind; but they seldom are of long duration. Instances are not uncommon of considerable collections of fluid having formed in the ventricles of the brain, consecutively either of chronic diseases of the thoracic or abdominal viscera, or of prolonged affections of the brain itself, in persons far advanced in life; but these usually take place a short time only before death.

283. *A. The CAUSES* of chronic hydrocephalus are chiefly those assigned above as productive of congenital dropsies (§ 185.); family and constitutional predisposition, and a scrofulous and rickety diathesis. GOELIS states the circumstance of a mother having had successively six dead-born hydrocephalic children, at the sixth month; and three which became hydrocephalic after birth; and J. P. FRANK mentions another, who had seven children similarly diseased. The frights, passions, and diseases of the mother during gestation, have apparently some effect in producing this disease of the fœtus; and weakness of constitution in either parent is evidently not without a similar influence. M. BRESCHET thinks that the old age of the father is an influential cause; and I believe that both it and drunkenness in the mother may be included in the enumeration. This writer states, that a drunken man of about sixty, married to a young and healthy woman,

had three hydrocephalic children. Independently of diseases of the appendages of the foetus, something, perhaps, may be imputed to the dress of the mother, particularly if it be such as may embarrass the development of the uterus; for it has been observed by several pathologists, particularly GOELIS and BRESCHET, that hydrocephalus has occurred more frequently, either previously to, or soon after, birth, in the children of unmarried, than in those of married, females. Injuries experienced by the mother during pregnancy, and by the infant during parturition; improper diet and regimen of the infant; exhausting affections of its digestive organs; difficult, delayed, and disordered dentition, particularly when attended by disease of the *prima via*, and emaciation; as well as the causes assigned for the acute disease; may all occasion this species of it. GOELIS states, that a physician in Vienna, an ardent admirer of the doctrines of BROWN, allowed his children wine and other stimulants from their birth; they all rapidly became emaciated, and died with chronic hydrocephalus.

284. *B. VARIETIES.*—Chronic hydrocephalus is most frequently *idiopathic* or primary; commencing during the latter months of foetal life, and sometimes after birth; and is occasionally consecutive or *symptomatic* of severe and exhausting diseases of the abdominal or thoracic viscera. It may be accompanied—(a) by a diminution of the size of the head, a variety which is always congenital; the fontanelles being frequently closed, and the sutures united, at birth;—(b) by a normal size of the head;—and (c) by more or less increase of the volume of this part.—a. In the *first variety*, the head has a conical form, being depressed laterally and anteriorly. The eyes are in constant motion, insensible to the light, and the pupils dilated. Most of these infants die in convulsions, either soon, or a few weeks after birth, and but very few live a few months, or a year or two. Those who live so long are entirely deprived of sense, and of every intellectual manifestation. Their appetite is generally voracious, but nutrition is very imperfect. Their legs are crossed and drawn up, and the feet distorted. The excretions are all involuntary, and life with them is entirely vegetative.

285. *β. The second variety*, or that in which the head is not materially increased in size, is supposed, by GOELIS and BRESCHET, to be the most common; but I think that such is not the case. It may be congenital, or may appear any time subsequently to birth. The writers now referred to believe that it is most frequent during youth and puberty, but that old age is not exempt from it. When chronic hydrocephalus occurs after the closure of the fontanelles, this necessarily is the form it most frequently assumes. SELLE has termed it *cephalic dropsy*. The symptoms of this, are the same as those of the next variety.

286. *γ. The third variety*, or that with increased volume of the head, according to my own experience, is the most frequent. It is very often congenital, the size of the head even in the foetus being enormous. More commonly, however, the volume of the cranium is not much augmented at birth, but becomes so very rapidly afterwards. When the patient lives so long, the increase of size is slower after the third or fourth year, and ceases at the age of manhood, at which period the cranial

bones are firmly united. When the cranium is very much enlarged, the countenance presents a nearly triangular form, owing to the bones and the lower features of the face retaining their natural size, or being smaller than usual. As the disease proceeds, the sutures are more and more separated—sometimes so far as to admit of fluctuation being felt, as remarked by TULPIUS, DREYSSIG, MONRO, and others. The veins of the neck become enlarged, (LENTIN saw them varicose); the carotid arteries pulsate with much force; and the head generally hangs on one side, or on the breast. Owing to the unequal yielding of the cranial parietes, some one part of the head is occasionally more prominent than another. The eyes are generally watery, covered by the eyelids; the pupils dilated, directed upwards,—occasionally downwards, (FEILER, GOELIS, SCHMIDT),—and sometimes horizontally to either commissure of the eyelids. The senses, the intellectual faculties, and the locomotive organs and functions, betray more or less disorder. Sight is first impaired, and all the other senses subsequently fail; the countenance is pallid and without expression; the complexion of the surface is unhealthy; the body emaciated; the gait unsteady; and the power over the muscles ultimately lost.

287. *C. SYMPTOMS.*—(a) It is important to ascertain the *symptoms* indicating the commencement of the malady, in such cases as occur, or seem to occur, after birth. In many instances, however, these are so slight as to be overlooked both by the nurse and the physician; and the age of the patient generally precludes many of them from being discovered. According to GOELIS, the nervous system is unusually excitable, the temper irritable, and the sense of smell perverted. At this period the eye is brilliant (FRANK, MICHAËLIS, SCHOEFFER), but the sight soon becomes more and more imperfect. VOGEL and MONRO have noticed pains in the globe of the eyes, that subside as the effusion is increased. The nose is dry, subject to itching, and is frequently picked by the patient. Hearing is, at first, morbidly acute, sudden noises sometimes inducing convulsions; but it soon becomes obtuse, and often altogether lost. Discharges from the ears are rare. The senses of touch and taste remain the longest. Rotation of the head occasions vertigo, or stupefaction; and, if the fontanelles be not closed, pressure on them produces convulsions, which sometimes supervene spontaneously at night. Sleepiness, or stupor; dull pain, or heaviness of the head; grinding of the teeth during sleep, the patient sometimes uttering a piercing or peculiar cry upon being awakened; and defect of memory; are also observed. Thus early in the disease, the appetite is often irregular or voracious; there is sometimes vomiting; the bowels are commonly constipated; and the urine diminished. Articulation is generally slow, nasal, or difficult. During this period, if the patient be old enough, he commonly is able to go about; but he is very feeble, and loses flesh. He walks, however, with great difficulty; totters; places one leg in the way of the other, and turns the toes inwards. Anger, and joy, are expressed with great vehemence; and the mental manifestations are more or less weakened or deficient. Such is the *first period* of chronic hydrocephalus; but it most frequently comes before the physician when the second stage has supervened.

288. (b) SCHMALZ, FEILER, GOELIS, and others, consider the copious flow of saliva from the mouth—which is always open—as indicating the *second* stage of the disease. When the patient can speak, he is now at a loss for words, or forgets them as he is about to utter them, and his voice is sad and monotonous. He is no longer able to go about; and is often sick. The bowels continue sluggish, and the urine scanty. The erect and sitting postures are attended by retchings, or vertigo, or pain in the head and stupefaction. The pupils are dilated; sight is more or less completely lost; the eyes roll from side to side; and squinting is sometimes observed. The pulse is small, irregular, and occasionally intermittent. Respiration, which was, in the first stage, scarcely affected, is often somewhat difficult, in some cases suffocative, and attended by a nervous cough. The position is often with the head very low, or drawn backwards; or upon the abdomen, with the face sunk in the pillow (FEILER and BRESCHET); and automatic movements of the limbs are frequent. Deglutition becomes difficult; but the appetite is still unimpaired, or even increased. All the senses and mental powers are more or less injured, or nearly lost.

289. (c) The *third and last period* may be said to commence with the involuntary discharge of the excretions, and abolition of all the senses; the patient lying with the lower limbs paralysed, or drawn up to the abdomen. Towards the close of the malady, the extremities become cold, damp, and often œdematous; the whole body extremely emaciated; and, if the patient has all his teeth, they are frequently worn to the stumps by the constant grinding of them in the early stages. Ultimately, either the symptoms of acute hydrocephalus, sometimes with convulsions, or those of apoplexy or coma, come on, and terminate life. Occasionally the patient is carried off by a paroxysm of convulsive or suffocative cough. The duration of these periods, especially the second and third, is extremely uncertain; and not infrequently very prolonged.

290. (d) Such is the usual progress of the disease, especially when it has seemed to have commenced after birth. But in these, as well as in such as have been congenital, modifications or anomalies present themselves. The senses and intellects may be quite unimpaired; or certain senses or faculties, only, may be impaired or lost, although the head is remarkably enlarged. The moral emotions, in such cases, are sometimes affected; the patient being passionate and vindictive; and fits of anger often excite convulsions. The sexual organs are sometimes prematurely developed, and the venereal desires strong even in children of both sexes. Great differences also exist as to the closure of the sutures and fontanelles; which very frequently remain much longer open than natural, especially when their separation has been considerable. CAVALLINI mentions a case, in which the fluid continued to ooze from between the sutures for some time before death; and Dr. BAKON and Mr. MILLER have recorded instances wherein it dribbled from the nostrils, the *dura mater* having been ruptured, some days or weeks before dissolution.

291. (e) The *size* of the cranium is sometimes enormous, both previously, and subsequently, to birth. It is frequently, in the fœtus, increased to

fifteen, seventeen, or twenty inches in circumference. WRISBERG records an instance in which it reached thirty inches and a half. MECKEL has in his museum the skeleton of a hydrocephalic fœtus of seven months, the horizontal diameter of whose cranium is sixteen inches, and the vertical diameter—from the occipital hole to the vertex—fifteen, being a circumference of forty-eight inches. And cases in which the head had acquired the volume of seventeen, twenty-five, twenty-nine, thirty, and thirty-one inches, soon after birth, have been recorded by LECHER, MALACARNE, WILLAN, BARON, BÜTTNER, and MILLER respectively. It is only, however, the cranial part of the head which is thus distended; the bones of the face generally retain the natural size, or are developed in an inferior degree, especially in those cases which are prolonged to, or which pass the period of, puberty. The only instance in which the contrary was observed, is recorded by HARTELL,—the bones of the face having in that case acquired such a size as to resemble those of a giant. The form of the head is often not materially different from that of the fœtus; but, as the collection becomes greatly increased, it commonly extends in the direction of those parts where ossification is the least advanced. In some cases, one side either is more elevated, or is protruded more anteriorly or posteriorly, than the other, or both, the cranium assuming an oblique form in all its aspects.

292. (f) The *DURATION* of the disease varies extremely. It has already been stated to terminate fatally in the fœtus at any time during the latter months of pregnancy, or immediately, or shortly, after birth. Whether it commence previously, or subsequently, to birth, its duration may be indefinitely prolonged from some weeks to a number of years. HARTELL, MALACARNE, MILLER, and GOELIS adduce instances of hydrocephalic patients having lived seventeen years; LODER mentions one aged twenty-two years; BRESCHET, another who was twenty-eight; MICHAËLIS saw a case aged thirty; BÜTTNER, one at thirty-one; SCHNEIDER, one at forty-three; AURIVILL, another at forty-five; SCHOMBERG, an instance of its having been prolonged to forty-eight years; and GALL, another, where life was prolonged to fifty-four years. A patient died a few years ago, in Guy's Hospital, at the age of thirty-two years: his head was thirty-three inches and a half in circumference; his appetite and digestion were undiminished; and his mental powers not much impaired. Walking induced vertigo; and costiveness, convulsions. Coma came on a few weeks before death, and passed into fatal apoplexy.

293. *D. APPEARANCES ON DISSECTION.*—The cranial bones are generally found very thin, flexible, sometimes transparent, occasionally wider than usual; and the osseous fibres imperfect and radiated. In very young subjects, the bones are separated from each other by a greater or less interval; which is filled up, in somewhat older cases, by distinct points of ossific deposit, which ultimately constitute the *ossa Wormiana*. In rarer instances, the bones are thicker than natural, as in those recorded by HARTELL, REIDLIN, ALBINUS, MOLLINEUX, SANDIFORT, and LODER. The *ossa Wormiana* are, at first, scarcely in contact with the margins of the normal bones; but when the case has been protracted, they fully occupy the

space, and ultimately become indented into, or nearly consolidated with, them. Entire obliteration of the sutures is very rare. The fluid is generally effused in the ventricles,—always when the disease commences after birth; and but seldom in the general cavity of the arachnoid, excepting in the congenital disease; when the cerebral hemispheres are sometimes either partially or entirely wanting, the base, the *pons Varolii*, &c. only existing. When much fluid is effused into the ventricles, the brain is distended, its convolutions are unfolded, and it is reduced to a sac, thin in proportion to the distension; its structure with difficulty, or not at all, admitting of being distinguished into cineritious and medullary substance. The corpus callosum is much raised, and thinned, and the septum lucidum torn; the lateral ventricles communicating freely with the third, and this with the fourth, the whole forming one cavity. The cineritious substance is of its usual consistence; but the medullary is generally firmer than natural. The brain, however, does not appear to be diminished by interstitial absorption, as its weight is not materially less than the healthy brain at the same age. The arachnoid is occasionally whitish, opaque, and in some places thickened. The choroid plexus often contains small cysts; and the corpora striata, as well as the thalami optici, are small and flattened. The parts near the base of the brain, in some cases, present only slight alterations, varying with the duration of the disease, and the extent of the effusion; and, in other instances, they are so much changed, as hardly to be distinguished the one from the other. The cerebellum is seldom materially altered. The quantity of fluid varies from ten or twelve ounces to as many pounds; and cases are recorded of as much as ten or twelve quarts having been found. FABRICIUS HILDANUS (cent. i. obs. 10.) found eighteen pounds; and BONET (*Sepulchret.* l. i. sect. xvi. obs. 11.; see also *Ephemer. Nat. Cur.* dec. iii. an. i. obs. 10.) twenty-four pounds. The analyses of BOSTOCK, MARCET, BANRUEL, BERZELIUS, and JOHN, agree in showing that this fluid is of the lowest specific gravity, and contains the smallest quantity of albumen, and of saline ingredients, of all the dropsical fluids (§ 11.). Although, in the congenital form of hydrocephalus, the formation of the brain may have been so early arrested, as to occasion the absence of a great part, or of the whole, of it, yet its envelopes—the cranial bones, the dura mater, the arachnoid, and even the pia mater—may exist nevertheless. In some cases, the *falx cerebri* is wanting (BRESCHET), and, according to some authors, the pia mater also; yet it seems to be generally present, but so thin, from the distension of the fluid, as to be detected with difficulty. The arachnoid is more dense, and less transparent, than natural.

294. In the case that occurred, some years ago, at GUY'S Hospital, upwards of ten pints of fluid were contained in the great sac of the arachnoid, with which the ventricles communicated freely, the corpus callosum being wanting. The brain was lodged at the bottom of the immense cranial cavity; was somewhat flattened; and its convolutions unobliterated and unfolded. In a case recorded by Dr. BARON, the dura mater was found ruptured; a tumour of the cranial integuments having taken place over the seat of rupture

some time before death. In a case described by Dr. DUNCAN (*Trans. of Med.-Chirurg. Soc. of Edin.* vol. i. p. 205.), the dissection of which was made by Dr. GORDON, the circumference of the head was twenty-nine inches and a half, and the fluid was contained in the general sac of the arachnoid, with which the ventricles freely communicated; the corpus callosum and fornix being entirely wanting, as in the case noticed above; the brain thus having a bifid or cleft appearance. A nearly similar instance is recorded by Mr. LOFTIE, in the *Medical Observations and Inquiries* (vol. v. p. 121.). In the one published by Mr. MILLER (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. ii. p. 245.), the dura mater was ruptured, and water seemed to have been lodged between it and the cranial bones, as well as in the general sac of the arachnoid. But it seems probable, from the appearances observed, that the fluid had been originally in the ventricles, from whence it had escaped by a lacerated opening, caused by their uncommon distension; nearly nine pints of fluid having been found.

295. Chronic hydrocephalus, especially the congenital, is often associated with other vices of conformation (MECKEL, OSIANDER, MURRAY, DESLANDES, OTTO, AUTENRIETH, BRESCHET, &c.); as with cleft palate, single or double hare-lip, spina bifida (§ 178.), imperforate anus, distorted or club foot, and absence of one or more of the abdominal viscera.

296. E. PROGNOSIS.—When the disease is congenital, as it most frequently is, even although it may not become manifest until some days or weeks after birth, or when it appears soon after birth, little or no hope of benefit from treatment can be entertained; for, in such cases, it is often dependent upon imperfect or arrested development of the brain. When, however, it is either obviously, or very doubtfully, not congenital, I agree with RICHTER, DREYSSIG, BLANE, PORTEN-SCHLAG, GOELIS, CONQUEST, and some others, in considering that it often admits of cure, particularly if it be treated early, if it be uncomplicated, and if the powers of the constitution be not much impaired. J. P. FRANK states, that he has seen it disappear upon the occurrence of scrofulous disease in another part. GOELIS and most other writers have seen more or less advantage accrue from spontaneous eruptions and sores, particularly behind the ears, and from chronic discharges from the bowels and skin, if they do not much reduce the patient's strength. When the disease occurs in those of a manifestly scrofulous or syphilitic taint; or follows the acute; or is far advanced; strangulating cough, difficult or suffocative respiration, coma, frequent convulsions, delirium, or other symptoms of the last period being present; hardly any hopes of recovery should be entertained. The exanthemata or hooping cough occurring in its course, generally induce a fatal termination in a short time. Its complication with hydrorachis, or with other forms of dropsy, is also very unfavourable.

297. F. TREATMENT.—The indications of cure are,—1st, to subdue irritation in the encephalon, when the symptoms of the first stage indicate its existence; 2d, to counteract the disposition to aqueous effusion into the ventricles; 3d, to remove the fluid, and prevent its re-circulation; and, 4th, to palliate urgent symptoms.—a. The first of

these intentions applies chiefly to those cases which occur subsequently to birth, and when evidence of nervous excitement or vascular irritation can be detected. In such cases, one, two, or more leeches, according to the age and strength of the infant, should be applied behind the ears, and means used to derive the irritation to some part of the cutaneous surface, or to the intestinal canal. In the majority of instances, the same measures as will subdue irritation, will also tend to the fulfilment of the *second* indication; more especially mercurials, aperients, purgatives, and artificial eruptions and discharges. In the use of this last, much circumspection is requisite; for tartar emetic ointment, or blisters kept open, may produce sloughing sores in young and delicate children.

298. *b.* To fulfil the *second intention*, various measures have been recommended. — *a.* GOELIS places most reliance upon small doses of *calomel*, — from a quarter to half a grain twice a day; and on the mercurial ointment applied to the head, either alone or with an ointment of juniper berries. He advises a flannel cap to be, at the same time, worn constantly upon the shaved scalp, to promote the insensible perspiration. This covering, in a few days, becomes charged with the ointment or ointments employed, and thereby tends to bring the system more quickly and fully under the influence of mercury. But affecting the constitution with mercury will rarely remove the disease; and, in very weak children, will only reduce more rapidly the powers of life, to which we should chiefly trust, as the more immediate agent by which this indication is to be fulfilled. My experience leads me to confide more in the *hydrarg. cum creta* than in *calomel*, in most cases of this disease. The best part of the treatment resorted to by GOELIS is the daily use of *mildly stimulating baths*. I have seen considerable advantage derived from them, especially when those first employed contained an alkali. Various tonic, astringent, diuretic, or slightly stimulating substances or infusions may be directed in this manner; as well as the preparations of *iodine*, or the *nitro-muriatic acids*, in very weak solution. M. RECAMIER states, that benefit has been derived from baths holding *tartar emetic* in solution; this substance being gradually increased to three or four times the quantity first employed; and that it acts as a diuretic.

299. In those cases, especially, which have commenced after birth, all morbid secretions and fecal accumulations having been removed from the *prima via*, by purgatives and cathartic enemata, from one to two or three grains of *hydrarg. cum creta* should be given night and morning, and the scalp shaved. If the head be quite cool, and without signs of vascular excitement, it should be kept moderately warm, and washed daily with a weak, tepid solution of the *nitro muriatic acids*; the *baths* now recommended being also employed. This treatment, with proper diet and regimen, should be tried for some days, especially in delicate children; but in those who are stronger, it is preferable to exhibit, once, twice, or thrice a day, from five to ten or twenty minims of *oleum terebinthinæ*, with from twenty to forty or fifty of *oleum ricini*, according to the age of the patient, and effects produced upon the bowels and urinary organs. For infants, these oils may be mixed in

syrup; but, by older children, they will be most easily taken on the surface of fennel water, or of milk. When this medicine does not act fully on the bowels, it may irritate the kidneys or produce strangury. In this case, it should either be intermitted for a few days, or given in larger doses, at longer intervals — or sometimes only twice or thrice a week — so as to act as a gentle purgative. An *enema* containing from one to four or five drachms of each of these oils, according to the age of the child, may also be administered every third or fourth day, in a suitable vehicle, either in addition to the above medicine, or when it is not prescribed; and the *liniment F. 311.* may be rubbed once daily upon the loins, or over the shaved scalp, the head being covered by a thin flannel cap. The *hydrarg. cum creta* should also be taken night and morning; and, if these oils be not employed so as to act sufficiently upon the bowels, as they ought, a full dose of *calomel*, or an active cathartic, should be occasionally given at bed-time. The above treatment was, for thirteen years, very generally adopted by me in chronic hydrocephalus, at the Infirmary for Children; and, in many instances, with marked success.

300. *β.* In other cases, particularly in private practice, and where the measures now detailed are not regularly pursued, owing to their unpleasant nature, a course of *iodine* should be entered upon, and continued for some weeks; but the preparations of this substance ought to be exhibited in doses which will not gripe or otherwise irritate the digestive canal; the alterative mercurial being taken at bed-time, and an occasional cathartic, or a terebinthinate enema, administered in the morning, during the course. If evident advantage follow not the *iodine* within a fortnight or three weeks, a *liniment (F. 302.)* or ointment (*F. 767 — 769.*) of it, or an ointment of the *ioduret of mercury*, should be rubbed upon the head twice or thrice a day. If it occasion irritation in the scalp — which will seldom be the case with the preparations now referred to — the circumstance need not be considered unfavourable. If the internal course of *iodine* be not adopted, gentle aperients and diuretics, with mild tonics, should be taken in the course of the day. The above plans of treatment I have found more successful than any other; but they require great discrimination, and nice adaptation to the circumstances of the case: — that by the terebinthinated medicines has appeared most beneficial in the stronger children; and, whilst it has acted freely on the bowels, it has often greatly increased the quantity of urine: that by *iodine* is better borne by delicate children, but its operation is slower, than the former. The mouth sometimes becomes affected by the mercurial preparation during either of these courses, particularly in the older children; but this is to be viewed as a favourable occurrence. As long as the powers of the system continue but little impaired, and the patient does not lose flesh, either the one or the other course should receive a full trial; light and suitable nourishment being given, and the bowels kept freely open, always avoiding the supervention of diarrhoea.

301. *γ.* When these internal and external means fail of affording evident benefit in a few weeks, or when they cannot be satisfactorily tried, *blisters* should be applied, or *issues* inserted behind the ears, or over the occiput; and *tonics*, with laxatives and

diuretics, exhibited internally. Of these last, the *acetate of potash*, with *oxymel of squills*; and the *spiritus ætheris nitrici*, with a small addition of nitric acid; are amongst the best, and should, in the more debilitated, be given in tonic infusions. After the mercurial alterative has been continued sufficiently long, and the modes of treatment now detailed have been fairly but ineffectually tried, a very weak solution of the *nitro-muriatic acids*; or of the *hydro-chloric acid*, with the *chloric æther*; or of the *aromatic sulphuric acid*, with *Hoffmann's anodyne*; may be prescribed internally: but the exhibition of mercurials should be fully relinquished, and their effects satisfactorily ascertained, before any of these be taken, otherwise very serious disorder of the stomach and bowels may be occasioned by them. A succession of blisters to different parts of the head, the one side or part being allowed to heal whilst the other is discharging, is sometimes serviceable; but the blisters should not remain on after they have produced redness of the part, and the practice should be persisted in for some time.

302. *δ*. If acute symptoms supervene in the course of treatment, *leeching* or *cupping*, sometimes followed by *dry cupping*, and generally by calomel, and active purging, must then be resorted to appropriately to the strength of the patient, with such of the measures recommended for the acute disease, as the peculiarities of the case may require.

303. *ε*. If debility, languor of the circulation, and flabbiness of the soft solids, be considerable, in addition to the *hydrargyrum cum creta*, as advised above, the powder or infusion of *calumba*, or of *cascarilla*, or of *valerian*, or of *cinchona*; or small doses of the *sulphate of quinine*, or of the *sulphate of iron*, with the neutral sulphates — as the sulphates of *magnesia*, *soda*, or *potass*; or the sulphate or oxide of *zinc*; will be sometimes beneficial early in the second stage. The *ferrum tartarizatum* also should not be overlooked in the treatment of these cases. I have lately seen the *ioduret of iron* of service in two such instances. Several years ago, the *oxide of zinc*, or the *sub-nitrate of bismuth*, was frequently prescribed by me, in doses which would not offend the stomach, either alone or with mild vegetable tonics, and taken during the day; the mercurial alterative being continued night and morning, and a terebinthinate enema exhibited twice in the week. Some patients certainly improved, or recovered, under this treatment. But as most of these cases occurred in dispensary practice, the result in several of them was not ascertained. During the exhibition of tonics in chronic hydrocephalus, the secretions and excretions — both abdominal and cutaneous — ought to be freely promoted by means of slighty alkaline baths, and laxatives, otherwise the disease may assume an acute form, or pass rapidly into the *third* and *irremediable* stage.

304. *ζ*. Warm and other *diaphoretics* are directed by several writers: *Hoffengärtner* advising the flowers of *arnica*, and *serpentry root*; and Dr. *Temple*, the *doronicum Germanicum*, with the more common medicines of this class. *Digitalis*, and the internal use of *cantharides*, are recommended by many respectable authorities. These two may be conjoined; for the former will be given, with greater benefit, in this state of disease, with tonic infusions and stimuli, than in any other combination; but its effects must always be care-

fully watched. The internal use of the *muriate of baryta* and *muriate of lime* is suggested in the more manifestly scrofulous cases, by *Autenrieth*. The repeated exhibition of irritating enemata is enjoined by *Mellin* and *Michaëlis*, and has proved of great benefit in my practice, particularly the one already named (§ 299.). *Sialagogues* are favourably noticed, especially by the older authors. They deserve more attention than has been lately paid to them, and are certainly useful adjuvants, especially about the period of dentition, when the gums and teeth should be frequently examined; irritation of the former being removed by *incisions*. — *Errhines* are also prescribed, particularly by *Heister*, *Forestus*, and *Mondschiën*.

305. *η*. *Various applications* — some of them the most opposite in their natures and effects — have been directed to be applied to the head, with the view either of promoting exhalation from its surface, and thereby transferring this action from the interior of the head; or of diminishing effusion in this situation, by restoring the healthy action of the capillary and exhaling vessels. *Blancard* and *Fabricius* recommend that the head should be kept warm by bladders filled with hot sand, or by sponges squeezed out of hot water; and *Mondschiën*, that bags containing either unslacked lime, or roasted salt, be applied to it. *Boerhaave*, *Borsieri*, and *Hecker* advise *fomentations* with aromatic wines; *Flajani*, *Plenk*, *Itard*, and *Kleber*, *epithems* with the wine or vinegar of squills; and *Psab*, *Deleurye*, and others, *dry fomentations* with warm aromatic plants. *Zwinger*, *Sorbaît*, and *Mellin* direct the scalp to be rubbed with *ointments* containing the ethereal oils, especially the oil of turpentine or naphtha with alcohol; and *Perdulcis*, *Johnstone*, *Monro*, &c. favour the use of woollen caps which have imbibed the essential oils. Besides these, a variety of *plasters*, especially such as possess a deobstruent and tonic quality, are mentioned by writers. Of this class of means, the *plasters* F. 116, 117, 118. and the *liniments* F. 300. 311. are the most efficient. Acrid applications, and *scarifications* of the scalp, are likewise noticed by *Heister* and *Diemerbroeck*; and the actual or potential *cautery*, and *moxas*, by *Chesneau*, *Tanaron*, and several other Continental authors.

306. *θ*. *Gentle and continued compression* by bandages is recommended by *Riverius*, *Forney*, *Pitschel*, *Blane*, and *Hood*; and has manifestly been of service in some instances. Compression by means of strips of plaster, composed of equal parts of the *emplastrum picis comp.*, and of the *emp. ammoniaci cum hydrarg.*, or of these and the *emplast. cumini*, and spread on stiff linen, has been found by me preferable to the common method by bandages, and has commonly been employed in addition to the means detailed above (§ 298. *et seq.*). The plaster, thus composed, should be cut into slips; and, whilst each should partially surround the head, the number applied ought to be sufficient to cover the whole scalp, which must be kept closely shaven. In the case treated by compression, by Sir *Gilbert Blane*, leeches and purgatives were also employed; and a favourable termination resulted. Mr. J. F. *Barnard* resorted to pressure successfully in nearly the same manner as I have now advised, and used for the purpose broad strips of adhesive plaster. He also kept the head covered by linen wet with cold

water; a practice which should not be omitted whenever the temperature of the head rises above natural.

307. *c. The removal of the fluid by puncture* has been recommended from HIPPOCRATES to the present time. But it has never been practised with success until recently; and it is doubtful whether some of the cases which have been said to have recovered by the operation, have ultimately been cured. Indeed, great difference of opinion has existed as to the propriety of performing it. LE CAT, JUNKER, SORBAIT, REMMETT, and many recent writers, have advised and practised it; whilst HEISTER, BOERHAAVE, MORGAGNI, MONRO, BORSIERI, MERCATI, RICHTER, FLAJANI, PORTENSCHLAG, GOELIS, BRESCHET, HECKER, &c. are opposed to it, on the grounds that it has never cured the disease, but has often accelerated a fatal termination. After the medical treatment above detailed has been appropriately, sufficiently, and ineffectually tried, this operation, as it is not attended by any immediate risk, when cautiously performed, may be resorted to. In such circumstances, I have concurred in it, where it has been, in several instances, performed by my able colleague, Mr. DENDY, at the Infirmary for Children; but I recollect no case in which it has ultimately succeeded, although the management of the cases could not have been in more experienced hands. Many of the older writers, who advised the operation, conceived the water to be collected in the sac of the arachnoid, and not in the ventricles, and, consequently, that, in making the puncture, the cerebral substance would not be penetrated; but such is not often the case. Instances of its performance are adduced by TULPIUS, FABRICIUS HILDANUS, DE LA MOTTE, PETIT, WEPFER, E. FERDINAND, G. FABRICIUS, D. PANAROLIUS, and several recent writers. The following is a brief notice of those which are the most instructive.

308. *a. LE CAT* (*Philosoph. Trans.* vol. xlvii. p. 267.) operated on a child three months and a half old, affected subsequently to birth, thrice in three successive days; death occurred on the fifth day after the first puncture. The pineal gland was found nearly destroyed, and the ventricles much expanded. Dr. OPPENHEIM (*Rust's Mag. für die Gesamte Heilk.* b. xxiv. 1827.) operated on an infant of seven months with a trocar, leaving the canula in the puncture. It died on the seventh day. The membranes were somewhat thickened, and the brain soft and pulpy. Dr. WHITMORE (*Amer. Med. Recorder*, July, 1821.) punctured the head of an infant of six months, hydrocephalic after birth; and in eight days withdrew, without a canula, 116 ounces. Death followed on the tenth day, the membranes being found inflamed. Dr. HOOD (*Edinburgh Med. and Surg. Journ.* Oct. 1821.) operated on a child of nine months by a trocar. Death took place on the third day. The brain was softened and the *tubercula quadrigemina* were suppurated. Mr. DENDY (*Lond. Med. Repos.* vol. xix. p. 446.) operated on a congenital hydrocephalic case, aged ten weeks, with a large, deeply grooved needle, and removed eight ounces at three operations, with three days interval between each. Death occurred on the tenth day. The fluid was lodged in the left ventricle, over which the brain had not been formed. The membranes were found inflamed, and the brain surrounding

the effused fluid softened. Mr. BROWN (*Med. and Phys. Journ.* vol. li. p. 102.) punctured the head of an infant of five months, on five occasions, in the course of thirty-six days. The last puncture was followed by great hæmorrhage and dissolution. Mr. GRAY (*Ibid.* vol. liv. p. 204.) from a child whom he had cured of *spina bifida* by compression, but who became hydrocephalic soon afterwards, drew off forty-five ounces of fluid at threeappings. The symptoms were mitigated for a time; but death followed on the thirty-first day. Dr. FRECKELTON employed five successive punctures with a trocar, in the course of fifty-six days. Death occurred on the fifty-ninth day. Mr. CALLAWAY (*Amer. Med. Recorder*, July, 1821.) operated on an infant five weeks old, and repeated the punctures on four successive weeks; but it died of marasmus and gradual exhaustion on the seventieth day. Mr. REMMETT (*Edinburgh Med. Comment.* vol. vi. p. 422.) in a congenital case, punctured the head with a lancet, two months after birth; and in the first six days, on three occasions, drew off thirty-six ounces in all. He repeated the operation twice subsequently, with a month's interval between each. The infant died of atrophy ninety-three days after the first puncture. On dissection, the fluid was surrounded by the membranes; the rudiments merely of a brain, in a softened state, being lodged at the bottom of the cavity. Mr. MONEY (*Med. and Phys. Journ.* vol. lii. p. 462.) operated on a congenital case ten months after birth, by a small trocar, on ten different occasions, during seventy-four days. The child died on the eighty-fourth day after the first operation. The membranes were inflamed, and the brain dilated into a large sac. Mr. SYM (*Edin. Med. and Surg. Journ.* vol. xxiv.) in an infant of eleven weeks, punctured the head, and repeated the operation five times in the course of ninety days, withdrawing about seven ounces of fluid each time. Death occurred on the 104th day. The arachnoid was thickened. The fluid was contained in its general cavity, and the brain imperfectly developed. Dr. GLOVER (*New York Med. Repos.* vol. iv.) operated in a congenital case, nine months after birth; and, in four months, withdrew 156 ounces at eightappings; but death took place, after a considerable period of amendment, on the 120th day. Mr. LIZARS (*Edinburgh Med. and Surg. Journ.* April, 1821.) operated on an infant four months old; and in the course of 90 days repeated the puncture fifteen times, at intervals of from three to seven days, taking away each time from three to ten ounces of fluid. The child did well until convulsions occurred during teething; and the head was again enlarged. Puncture was again tried; but it died on the following day, and on the 171st after the first operation. Dr. VOSE (*Med.-Chirurg. Trans.* vol. ix.) in a congenital case, operated seven weeks after birth, and thrice subsequently, at considerable intervals. The sutures afterwards ossified; and, three months later, when he published the case, the child was doing well. Dr. MONRO, however, states (*Morbid Anatomy of the Brain*, &c. p. 146.), that symptoms of pressure appeared after the sutures were ossified, and the child ultimately died.

309. *β. Mr. GREATWOOD* (*Lancet*, No. 299. p. 238.) records a case of a hydrocephalic child of fifteen months, who, falling on a nail, punc-

tured the head at the upper third of the lambdoidal suture. The wound continued to discharge fluid for several days, and it afterwards perfectly recovered from the disease. In the same work, for April and November, 1830, the operation of puncture is stated to have been successfully performed in St. Bartholomew's Hospital. GRAEFE (his *Journ.* for 1831, b. xv. p. 3.) punctured the head of an infant hydrocephalic from birth, in the fourth month, and repeated the operation about eleven times during six months. The fluid was allowed to escape slowly each time; the canula being removed, and the wound closed, as soon as the pulse became weak. After the last puncture, the sutures closed. The child could walk and speak when a year old. At the age of two years and a half, it was shown to the Medico-Chirurgical Society of Berlin. Mr. RUSSEL (*Edin. Med. and Surg. Journ.* July, 1832, p. 43.) operated on a girl eight months old, hydrocephalic from birth, and whose head was twenty-three inches in circumference when he first punctured it. The operation was repeated four times, after intervals of about ten days; but the quantity of fluid withdrawn each time was small. After the last puncture, calomel was given so as to affect the mouth; when the hydrocephalic symptoms disappeared, and ossification of the sutures proceeded. The case is stated to have been cured. Dr. CONQUEST is reported, in a contemporary work, to have operated in nine cases, — successfully in four of them. The greatest number of punctures in one case were five, and the intervals between them from two to six weeks. The largest total quantity of water removed was fifty-seven ounces, by five operations; and the largest quantity at one time, twenty ounces. The trocar was introduced through the coronal suture, below the anterior fontanelle, and the wound carefully closed after each evacuation. Pressure was made by means of strips of adhesive plaster.

310. The cases in which I have been concerned in directing the operation, have all been unfavourable to its success. Medical treatment had been actively and perseveringly employed in all of them; and it is therefore probable, that such of them as admitted of recovery were amongst the number that was cured. Whilst in those in which the operation was resorted to, and which were mostly congenital, either the state of the brain and its envelopes precluded recovery, or the circumstances in which out-door patients of public charities are placed were such as to render this operation less successful than it otherwise might have been.

311. γ . Having stated the evidence we at present possess of the success of the operation, inferences as to the propriety of performing it may be easily drawn. Those who argue against it contend — (a) that it is apt to induce an irritative state of inflammation in the substance or membranes of the brain, particularly in the weakened and otherwise predisposed systems of such subjects — 1st, by the mechanical injury done to those structures; and 2dly, by the entrance of air through the puncture; — (b) that the collapse consequent upon the removal of the fluid is injurious to the organ and system; — (c) that the operation cannot change the state of the organ or function giving rise to accumulation; and hence that it cannot be permanently successful; — and (d) that the in-

stances of success from it are not so numerous as those from medical treatment.

312. Those in favour of the operation, on the other hand, argue — (a) that greater injury than that by the puncture is often done to the brain and membranes, without bad consequences; — (b) that the air may be prevented from entering by the aperture; — (c) that danger from collapse is readily obviated; — (d) that cures from medical treatment, in an advanced stage, and when the head has become greatly enlarged, are very rare, and are then most likely to be obtained by an operation; — (e) that the instances of success on record are sufficient to warrant its performance.

313. δ . From much experience, I conclude that inflammatory irritation of the brain and its membranes does follow the operation in some instances; that the state of these parts, and of the system, favours its occurrence; and that the encephalic structures are in a very different condition in this disease, both mechanically and vitally, — but especially as to proneness to inflammatory action, and softening, — from what they are in health. — (a) Whilst, therefore, I so far agree with those who argue for the operation, as to advise it to be tried after the measures I have detailed above have failed, yet I would not recommend its performance early in the disease — 1st, because medical treatment has then sometimes effected a cure, especially when the head has not been very greatly enlarged; and, 2dly, because, when the fluid is in the ventricles, as it generally is in cases commencing after birth, a greater depth of brain must be penetrated to reach it at an early, than at a later, period. — (b) When punctures are resorted to, medical treatment must not be abandoned, or even relaxed; for we should still endeavour, according to the principles explained above, to remove the disposition to effusion, as well as to promote absorption; and, as a certain degree of pressure is requisite to the healthy performance of the cerebral functions, strips of plaster, as are already directed (§ 306.), should be applied around and over the whole scalp, in order to prevent the collapse consequent upon the operation. — (c) I believe that the punctures ought not to be frequent, nor much fluid withdrawn at one time; that gentle pressure should be made around the cranium during the discharge; that the discharge ought to be stopped, and the puncture accurately closed, so as to prevent the entrance of air, as soon as the pulse begins to sink; and that restoratives should be exhibited, in order to prevent convulsions, or other nervous symptoms. — (d) The operation seems to be best performed by a small trocar, or grooved needle; but it is difficult to withdraw any fluid with the latter, as the surrounding pressure fills up the groove. The application of a cupping glass may, however, procure a discharge. A thin trocar, with a two-edged or lancet-shaped extremity, — not a thick triangular pointed instrument, — is preferable, upon the whole.

314. d . *Urgent symptoms*, especially convulsions, and inflammatory action, require to be palliated or removed. — *a*. *Convulsions* should be treated according to the manner described in that article, particularly by the terebinthinated medicines and enemata already prescribed (§ 299.); by these, conjoined with the syrup of white poppies, or this latter with the oxide of zinc; by

fortid enemata; by cold or tepid affusions on the head; and by dry cupping on the nape of the neck, or between the shoulders.—*β*. The appearance of acute symptoms requires the treatment stated above (§ 302.); with mustard pediluvia, or mustard poultices to the legs and thighs; cold affusions and applications to the scalp, &c.—*γ*. In the third stage, the disease is generally beyond the influence of medicine; the disorganisation which has then frequently taken place in the encephalon not admitting of restoration; and it is chiefly in it that the palliation of urgent symptoms is required. But little beyond the fulfilment of this intention can then be attempted, unless puncture be resorted to as a last resource.

315. *e*. Diet and regimen form no unimportant part of the treatment. The diet should be light and nutritious, and care should be taken not to allow the patient to eat so much at a time as to load the stomach. For infants, the milk of the nurse is sufficient; but she should be healthy, and fed upon digestible and nutritious food, and her bowels carefully regulated. Children who are weaned should have a small quantity of animal food; and be debarred from all acescent vegetables. Change, particularly from the close parts of a city, to a country air, which is warm and dry; and frequent exposure to the open air and to sunshine, in mild weather, are very serviceable. Many children have ravenous appetites, especially as the disease advances; these require sufficient nourishment, but more than that is injurious. In these cases, the terebinthinated medicines, more than any others, allay the insatiable craving, symptomatic of the malady, and tending to aggravate it when indulged; whilst they exert a very favourable influence on the disease. The drink allowed to the patient should be ordered with strict reference to the treatment pursued at the time, and should be as much as possible adjuvant of it.

316. *f*. The prophylactic Treatment may be comprised in a few words.—When any one of a family has had the disease, particularly if there exist a scrofulous or rickety diathesis, the state of the secretions and excretions ought to be carefully watched, and the earliest deviation of them from health combated by appropriate means. Cutaneous eruptions should not be interfered with, unless with great caution; all external medicaments to them should be avoided, and internal remedies, of an alternative, deobstruent, and diuretic kind only, be prescribed. The skin ought to be kept clean and perspirable. External injury of the head, and premature exertion of the mental faculties, must be avoided. Free and daily exposure to the open air and sunshine; moderate, light, and suitable diet; an open state of the bowels; a healthy nurse, whose mind is not liable to anxiety; and what has been already advanced above (§ 279, 280.); are all requisite to the prevention of the malady, particularly under the circumstances alluded to.

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DRUNKENNESS — INTOXICATION. — SYN.

Temulentia, Pliny, Plater, &c. *Paraphrosyne temulenta*, Sauvages. *Ebrietas*, Lat. *Ivresse*, Fr. *Trunkenheit*, *Rausch*, Germ. *Ebbro*, Ital. *Ebriety*, *Inebriation*.

CLASSIF. III. CLASS, I. ORDER (*Author*).

1. DEFIN. — Mental excitement, followed by stupor or coma, from the excessive use of fermented or distilled liquors.

2. The frequent occurrence of intoxication, either casually or as a confirmed habit, would justify the notice I am about to take of it, even independently of its influence in causing and modifying disease. But it is chiefly to the more complete states of intoxication, and especially those demanding medical care, that attention will

be here directed. Drunkenness, in its various phases—from the daily indulgence in more vinous or spirituous fluids than is required, but short of effecting the nervous system in a very evident manner, up to that degree of excess by which the senses and intellects become obscured or entirely lost—predisposes to many diseases, and directly causes others. Slighter excesses in the use of fermented liquors—particularly wine and malt liquors—occasion piethora, with all the consequent ills, especially gout, apoplexy, paralysis, and congestion of the abdominal viscera. Greater excesses, and the too free use of spirits, exhaust nervous and vital power, inducing tremors, nervousness, delirium tremens, encephalitis, paralysis, and insanity; occasion affections of the digestive organs, particularly anorexia and dyspepsia, diarrhoea and dysentery, inflammation, and structural changes of the biliary organs; and produce disorders of the urinary and sexual functions, even sterility and impotency; and ultimately, lesions of the kidneys, and dropsies.

3. Drunkenness is not a vice of recent date, although it may have become more common with the progress and diffusion of luxury. We find it mentioned in the early history of the Jews; and *TACITUS* informs us that it was prevalent amongst the ancient Germans. It is tolerably evident, from the ancient lyric and dramatic poets and satirists, that it was by no means infrequent amongst the higher classes in Greece and Rome. *HIPPOCRATES* notices its worst states, both in his *Aphorisms* and in his *Prognostics*: and it does not appear to have been considered a very culpable sort of indulgence even by some of the sages of antiquity. *PLATO* cautions against allowing wine to youths at an earlier age than eighteen years, and against becoming intoxicated before forty; but, after this age, he considered some degree of indulgence in this way pardonable. This was possibly, also, the opinion of *SOCRATES*.

"Hoc quoque virtutem quondam certamine, magnum
Socratem palmam promeruisse ferunt."

CORN. GALL. Eleg. i. ver. 49.

And *HORACE* states, that *CATO* the Censor often warmed his virtues by wine.

"Narratur et prisci Catonis
Sæpe mero caluisse virtus."

It is evident that the vice increased amongst the ancients with the diffusion of luxury; until, at last, even the ladies occasionally followed the example so generally set them. *VALERIUS MAXIMUS* (l. ii. cap. i.) states, that, in the earlier periods of Roman history, the women seldom drank; and *SENECA* (*Epist.* 95.) remarks, that, at a later period, they indulged so freely in this way, that they became nearly as subject to the diseases occasioned by the practice as the men. Erroneous opinions as to the effects of intoxication upon the frame seem to have been very early entertained, and were generally prevalent in the fifteenth and sixteenth centuries. *MONTAIGNE* mentions, that the celebrated *SYLVIUS* informed him that an occasional debauch was beneficial, inasmuch as it roused the energies of the stomach; an opinion long entertained by medical men, but zealously combated by *MM. HOMMETS* and *LANGLOIS*. There can be no doubt, however, that, as expressed by the late *Dr. GREGORY*, an occasional excess is, upon the whole, less injurious to the constitution, than the practice of daily taking

a moderate quantity of any fermented liquor or spirit.

4. i. CAUSES.—This destructive habit, not many years ago but too prevalent even in the upper classes in the more northerly countries of Europe, fortunately now no longer exists, or not nearly to the same extent as before: but it is still as general as ever amongst the lowest orders, and those of weak constitutions, who have been indulged in youth, or uncontrolled, or accustomed at that age to taste cordials and spirituous liquors, or who possess little force of character or firmness of resolution. The unfortunate and unhappy, those of uncertain occupations, or whose homes are made miserable; also tavern-keepers, coachmen, commercial travellers, singers, working mechanics, persons whose parents have been drunkards, and those who are idle and unoccupied, and frequent clubs or meetings of lodges, &c.; often have recourse to it. The weak, good-natured, and social, not infrequently become addicted to it, from the manners and indulgences of those with whom they associate, until the want of the accustomed stimulus becomes distressing, and the resolution gives way before the desire of gratifying it, and thus the habit is confirmed.

5. ii. SYMPTOMS.—A. *The earlier phenomena* of ebriety are, mental exhilaration, joyousness, dissipation of care, with talkativeness, flushed countenance, increased animation of the features, especially of the eyes; a more copious transpiration from the cutaneous and pulmonary surfaces, and secretion of urine; augmented thirst; and full, frequent, and strong pulse. If the intoxicating fluid be more largely partaken of, vertigo, tinnitus aurium, double vision, and unconnected trains of ideas, generally uncontrolled by the will, supervene. During slight intoxication, the prevailing disposition and pursuits are made manifest; and hence the saying, "*In vino veritas.*" The irritable and ill-tempered become quarrelsome; the weak and silly are boisterous with laughter and mirth, and profuse in offers of service; and the sad and hypochondriacal readily burst into tears, and dwell on mournful topics. In a more advanced state, the excitement approaches nearly to that of delirium: the conceptions become disordered, the ideas confused, and various hallucinations sometimes are observed; the voice is thick; the eyes vacant; the face pale; the voluntary motions imperfect and unsteady; and the limbs tremulous, or incapable of their offices. Vomiting occasionally occurs in this state, and either diminishes or shortens the consecutive state of stupor. In a still more advanced stage, all the phenomena about to be described sometimes occur—occasionally with convulsions, and signs of dangerous coma, or even of asphyxy. The phenomena of drunkenness are happily and briefly expressed by LUCRETIVS:—

— "Cum vini penetravit—
Consequitur gravitas membrorum, præpediuntur
Crura vacillanti, tardescit lingua, madet mens,
Nant oculi; clamor, singultus, jurgia gliscunt."

6. B. *The phenomena of deep Intoxication* have been very closely and accurately studied by Dr. OGDON; whose opportunities of witnessing them, particularly in their more dangerous associations, and as following the use of ardent spirits, have been unusually great. I shall, therefore, follow, in great measure, the description he has given of

them. It should be recollected that the effects of spirits or other intoxicating liquors on the frame will vary with the habits of the individual; with his state of body, especially as respects vascular plethora; with the kind of inebriating agent indulged in; and the existing condition of stomach, chiefly as respects the presence of alimentary matters. But the most powerful modifying agent is temperature. Warmth increases the nervous and vascular excitement characterising the early stage; and diminishes the consequent exhaustion. Cold suppresses and shortens the early excitement, and hastens as well as augments the oppression and exhaustion of the advanced stage.—a. In the larger proportion of cases, however, after a longer or shorter period of unusual mental vigour, nervous excitement, and increased action, varying according to the surrounding temperature, the brain becomes oppressed; the powers of voluntary motion, which are early impaired, fail entirely; the mental manifestations are suspended; and, in the most severe cases, sensation is lost completely. In most instances, this state supervenes gradually; but sudden exposure to cold will often induce it rapidly. The person feels drowsy, and appears to fall into a sound sleep; but it is discovered, when the attempt is made, that he cannot be aroused to consciousness by any effort, or, if it partially succeed, he is hardly sensible of surrounding objects, and immediately lapses into his former state; the limbs remaining in whatever position they may be placed. At this period the face is pale, with or without nausea; or it is flushed; the eyes are vacant and suffused, sometimes glazed; the pupils dilated, and contracting very imperfectly, or not at all, by exposure to light. The temperature of the head is generally above natural; but that of the extremities, and often of the surface generally, is considerably lowered, or but little affected in the milder cases. The pulse, which was at first quick and excited, becomes feeble, small, and ultimately slow, and entirely wanting at the wrist, according to the degree of intoxication. Respiration is usually infrequent; the separate acts of inspiration and expiration, particularly the former, occupying a very short time; and is wholly or chiefly abdominal. The breathing is often laborious in the most advanced states; and, in these, the inspirations are convulsive, the chest expanding by the rapid contractions of the associated muscles of respiration. Strabismus, or tetanic convulsions, or spasms of particular parts, sometimes supervene in the more advanced states, and are unfavourable signs.

7. b. Such is the more common state or form of drunkenness: but alcohol occasionally causes modified effects; and, without much previous excitement, but always with more or less mental disturbance, produces prostration of the functions of the brain; the intellects, volition, and sensation failing almost simultaneously. In these cases, the face is pale, the eyes are more or less lively or injected, the pupils contracted; the pulse frequent, full, and soft; the respiration laborious or stertorous; the temperature uniform, and either at or above the natural standard, but seldom below it. The circulation, respiration, and generation of animal heat, may go on for a considerable time, in these, notwithstanding the paralysis of the brain; or continue until this organ has

recovered from its torpor, provided the body be not exposed to a cold atmosphere, or placed in unfavourable circumstances.

8. *C. Appearances after death.*—These very nearly resemble those produced by asphyxia. The countenance presents marks of anxiety or of convulsion; the eyes are prominent, the pupils dilated; the face livid or swollen; the lips blue; the cellular tissue injected with dark fluid blood; the air-passages reddened; the lungs dilated, and loaded with fluid dark blood, and more or less frothy mucus in the air-cells. The right cavities of the heart, the *venæ cavæ*, and the pulmonary artery, are filled with blood of a similar appearance. The left ventricle, aorta, and coronary veins, also contain a little dark blood; and the liver and kidneys are loaded with it. Blood possessing the same characters also fills the sinuses, veins, and even the smaller vessels of the encephalon. The cerebral structure is generally firmer than usual. More or less serum is found in the ventricles and between the membranes of the brain. Dr. OGSTON confirms the testimony of WEPFER, VOIGHT, CARLISLE, and others, as to the effused fluid being impregnated with alcohol. In describing the appearances in one of his cases, he states, that about four ounces of fluid were found in the ventricles, having all the physical qualities of alcohol; as proved by the united testimony of two other medical men, who saw the body opened, and examined the fluid. He thinks that the effusion takes place previously to the coma of intoxication; as he found it in considerable quantity, in two cases of drowning in the stage of violent excitement from spirits. MÜLLER states, that he found air in the sinuses of the encephalon. The mucous coat of the *stomach*, particularly in habitual drunkards, is thickened and softened; this latter change sometimes existing throughout the whole extent of the small intestines. In rarer cases, the coats of the stomach are remarkably thickened and hardened. Injection, and sometimes ulceration, of the *small intestines*, are also met with. The *liver* is frequently mottled, enlarged, and otherwise diseased. The *kidneys* are often enlarged, softened, paler than usual, granulated, &c.: the *urinary bladder* greatly enlarged and thickened.

9. *iii. PATHOLOGY.*—That a portion of the alcoholic constituent of the intoxicating fluid is absorbed and carried into the circulation, is proved by the odour of the expired air, and by the physical properties of the fluid effused within the head of persons who have died soon after having taken spirits to excess; and it is probable, if the urine were analysed, that a considerable quantity would be found to have passed off in this excretion. Deep intoxication seems to be occasioned as follows:—During the general nervous and vascular excitement consequent on the stimulus, increased determination to the head takes place, attended by excited vascular action; which soon terminates in congestion, as the excitement becomes exhausted, and gives rise to drowsiness, sopor, or coma. With this state of disorder, effusion of serum takes place in the ventricles and between the membranes, heightening the sopor and coma. When the congestion or effusion amounts so high as to impede the functions of the organs at the base of the encephalon, and of the respiratory nerves, respiration becomes infrequent

and laborious; and, consequently, the changes produced by it on the blood insufficiently performed. In proportion as the blood is less perfectly changed in the lungs, the circulation through them is retarded, and the phenomena of asphyxy—congestion of the lungs, right side of the heart, brain, and liver; the circulation of the unarterialised blood; the imperfect evolution of animal heat, and sedative effects upon the brain and nervous system generally—follow in a more or less marked degree, according to the quantity of intoxicating fluid which has been taken; and either gradually disappear after some time, or increase until life is extinguished. These phenomena are heightened by cold, which depresses the vital actions in the extremities and surface to which it is applied, and increases the congestion of the above organs. The fatal consequence of intoxication is often averted by the occurrence of vomiting; the stomach thereby relieving itself from a great part of the poison; and the person recovering, after some hours of the above state of comatose intoxication. If the intoxicating fluid has been thrown or drawn off soon after its ingestion, the recovery of consciousness is more immediate. When intoxicating liquors are taken frequently, and to an amount short of intoxication, the digestive canal and liver are the first to suffer:—first in their functions, and subsequently in their circulation and organisation; this being one of the most fruitful sources of all the diseases, functional and organic, of these viscera, as well as of the nervous and vascular systems.

10. *iv. The DIAGNOSIS* of intoxication is not always easy. It is difficult to distinguish it, in its more profound states, from—(a) *apoplexy*, or *concussion of the brain*; (b) *asphyxy*; and (c) the extreme effects of cold. The odour of the breath is one of the best means of diagnosis; but is not to be depended upon alone: for a person may be apoplectic, asphyxied, or exposed to severe cold, after having taken only a small quantity of spirits; and apoplexy, asphyxy, and the effects of cold, often come in aid of the intoxicating agent, and heighten its effects: apoplexy, in those of a plethoric habit; asphyxy, from positions interrupting respiration, in addition to the operation of the poison as above explained; and cold, in the manner already mentioned. It will be very difficult to distinguish those cases of intoxication, where stertorous breathing is present, from apoplexy, unless by the smell of the breath, and of the matters thrown off the stomach. (See APOPLEXY, § 67.) It will readily be distinguished from *syncope*, by the laborious, infrequent breathing, by the smell of the breath, by the suffused eyes, and the livid or tumid features.

11. *v. The PROGNOSIS* is unfavourable, when the pulse is indistinct, or nearly gone from the wrist; when the respiration is laborious, stertorous, or puffing; when the countenance is pale, or livid and tumid; the pupils either much dilated or much contracted; the coma profound, and the extremities cold. Strabismus and tetanic spasms are also very dangerous symptoms; the former having been observed in three out of four fatal cases recorded by Dr. OGSTON. When these symptoms do not appear, the ill effects pass off, in a great measure, within twenty-four hours, although it is often much longer before all the functions regain their healthy tone.

12. vi. TREATMENT.—*A. Of deep Intoxication.*—*a.* The propriety of immediately removing the intoxicating liquor from the stomach cannot be disputed. This ought to be instantly done by the stomach-pump; for, in extreme cases, the stomach has become too torpid to be readily acted on by emetics. Mr. MACNISH advises the fauces to be tickled, and the sulphate of copper, or the sulph. of zinc, to be used as an emetic. Pressure on the epigastrium, when this organ is full, will insure the effect of emetics, when the pump is not at hand. When the stomach is not distended, the introduction of warm water will be often necessary before its contents can be withdrawn by this instrument; and, when it contains much solid food, the same measure will be requisite; the distension thus produced, often of itself causing the reaction of the organ, which may be assisted by pressure on the epigastrium. Sometimes the glairy state of the contents will render their removal by the tube somewhat difficult; but this may also be overcome by dilution, and the mechanical means now noticed. When the temperature of the head is high, or not below natural, and that of the surface generally not greatly reduced, the affusion of cold water on the head is both a safe and efficacious remedy.

13. *b.* I agree with Dr. DARWIN, Dr. TROTTER, Mr. MACNISH, and Dr. OGSTON, in reprobating indiscriminate bleeding in deep intoxication. Cases which seemed urgently to require it, were injured by it in the practice of this last physician. Dr. DARWIN remarks, that, when drunkenness "is attended with an apoplectic stupor, the pulse is generally low; and venæsection has sometimes destroyed those who would otherwise have recovered in a few hours." The *antidotes* most to be relied upon are the preparations of ammonia (MASURER, BROOMLEY, MACNISH, and OGSTON), particularly the carbonate and liquor ammonia acetatis, and cold or tepid affusion on the head. M. GERARD prescribes the liquor ammonia, in repeated doses of seven or eight drops. Vinegar has little effect; and it, as well as other acids, are considered injurious by ALBERTI. Coffee and green tea are much more efficacious; and have been very generally recommended. ALBERTI advises the application of camphorated spirit to the crown of the head.

14. *c.* When the temperature of the surface is at all reduced, means should be used to raise it. In many cases, the removal of the contents of the stomach, and the preservation of the natural temperature, with elevation of the head and a proper position of the body, all ligatures being removed from it, are the only measures required. In the more profound states of intoxication, however, external warmth to the extremities and epigastrium must not be dispensed with. It should always be kept in recollection, that a degree of cold which would not be injurious in other circumstances, may prove fatal to a person in this condition. As long as coma continues, the patient should not be left, lest he get into a position that may induce asphyxy. When violent delirium follows drunkenness, the shower bath, or cold affusion, and afterwards the exhibition and frequent repetition of tartar emetic, will often calm the patient.

15. *d.* The removal of the distressing symptoms consequent upon intoxication is sometimes a matter of medical duty. The principle contended for

by the celebrated BROWN, and but too uniformly practised by him, of keeping up the excitement, was inculcated, and no doubt followed, by the monks of the *Schola Salernitana*; they, good souls, recommending—

"Si nocturna tibi noceat potatio vini,
Hoc tu mane bibes iterum, et fuerit medicina."

If there be no sickness, black and green tea, mixed, may be taken, as advised by ALBERTI; but where nausea exists, soda water, spruce beer, Seidlitz powders, the citrate of ammonia in a state of effervescence, and any neutral aperient salt in effervescing and aromatic draughts, will speedily remove disorder. Afterwards, moderate doses of sulphate of magnesia in compound infusion of roses, with a little additional sulphuric acid, will restore the digestive functions. If diarrhoea exist, the liquor ammonia acetatis, and spirit. ammonia aromat., with infusum calumbæ, and tinct. camphoræ comp., will soon remove disorder. When headach is distressing, and the skin hot and dry, the shower bath, cold sponging the head, saline aperients in an effervescing state, and tea, are, upon the whole, the safest means. Tonics, in conjunction with purgatives, may also be taken.

16. *B. Prophylactic means.*—*a.* The propensity to drunkenness, or even to that degree of excess which falls far short of intoxication, is seldom or ever removed when once established. In early life, and when the evil begins to manifest itself, the possibility of checking it may be indulged; but even then it is a difficult matter to succeed. Success will mainly depend upon the constitution and character of the individual, and the society he is allowed to keep. But instances have occurred, where there appeared to have been a growing addiction to it, of the evil having been arrested, by tartar emetic and other nauseous matters having been given to persons in a state of intoxication, or soon afterwards. I have, in several cases, advised some tartar emetic to be put into a glass in which soda water was about to be taken, in order to remove the disorder and sickness occasioned by extraordinary excess. The distressing sickness thus induced, and which may, in the helpless state of such persons, easily be prolonged, has occasioned such disgust at, and dread of, all intoxicating beverages, as to cause them to be shunned for a long time afterwards. But this plan, or even repetitions of it, will generally fail with those who have become habituated to this species of indulgence; particularly those who drink spirits, and who resort to it before dinner, and when unallured by conviviality: these are either altogether irreclaimable, or to be reclaimed only by careful management, and a very gradual diminution of the daily quantity of the intoxicating agent. The use of sulphuric acid in tonic infusions is sometimes of service in such cases as are checked at their commencement, the mind being actively and agreeably occupied. But medical means cannot be much relied upon, unless in conjunction with a judiciously managed moral restraint.

17. *b.* It may be gathered from PLUTARCH, PLINY, and others, that various substances were sometimes taken by the ancients, with a view of counteracting the intoxicating effects of wine. Some of these were both disgusting and ridiculous enough. Others, as olives and olive oil, absinthium, crocus, and resinous purgatives, were, perhaps, not altogether destitute of some influence. The Greeks

are said to have used common salt for this purpose; and the Romans surrounded their heads by wreaths, formed of various refreshing plants. Nothing further, however, may be said on this topic, than that intoxication, and perhaps various consecutive ill effects, will not so readily be produced when wine is taken upon a very large meal; but if this become a habit, it will very speedily induce gout or apoplexy. Cold applications, or cold sponging the head, will also delay or prevent intoxication, unless excess be carried to a worse than beastly length.

BIBLIOG. AND REFER.—*Hippocrates*, Aph. v. 5.; *De Morb.* ii. xxii. 2—4.; *Prædict.* ii. 24—26.—*Horace*, Ode 21. l. iii. v. 11.—*Lucretius*, l. iii. v. 475.—*Stromer*, *Decreta Medica de Ebrietate*. Lips. 1531.—*Willich*, *Problem. de Ebriar. Affect. et Morib.* Fr. 1543.—*Montaigne*, *Essais*, l. ii. cap. 2.—*Magirus*, *De Vinolentia ejusque Malis*. Fr. 1618.—*Honmets*, *Non ergo singulis Mensibus semel repetita Ebrietas salubris*. Paris, 1643.—*Langlois*, *Non ergo unquam Ebrietas salubris*. Paris, 1665.—*Rolfinck*, *De Ebrietate et Crapula*. Jen. 1667.—*Wepfer*, *Observ.* p. 7.—*Waldschmidt*, *De Ebrietate et insolentibus aliquot ejus Affectibus*. Gees. 1677.—*Ettmüller*, *De Temulentia*. Lips. 1678.—*Hannemann*, *De Usu et Abusu Inebriantium*. Kiel, 1679.—*Rast*, *Ebrietas medicè considerata*. Reg. 1682.—*Alberti*, *Therapia Medica*. Halle, 1721, 4to. p. 1033.; et *De Ebrietate Fœminarum*. Halle, 1737.—*Cartheuser*, *De Noxa et Utilitate Ebrietatis*. Fr. 1740.—*Darwin*, *Zoonomia*, vol. iii. p. 497.—*Platner*, *De Ebriositate*. Lips. 1799.—*Trotter*, *Essay, Med. Philosoph. and Chemical, on Drunkenness, and its Effects on the Body*, 8vo. Lond. 1804.—*Voight*, *Mag. für den Neuest. Zustand der Nat.* b. iii. p. 326.—*Gerard*, *Med. and Phy. Journ.* Aug. 1821.—*R. Macnish*, *Anatomy of Drunkenness*, 3d ed. 12mo. 1829.—*F. Ogston*, *On the more advanced Stages of Intoxication*. Edin. Med. and Surg. Journ. vol. xl. p. 276.—*J. Frank*, *Præc. Med. Univ. Præcepta*, vol. i. pars ii. sect. i. p. 671.

DUODENUM—ITS DISEASES.—1. That the duodenum performs an important part in various diseases, and that it is itself the chief seat of serious ailments, which are with great difficulty, or not at all, distinguishable from disorders of the stomach, pancreas, gall-ducts, liver, or right arch of the colon, cannot be doubted. Some writers, especially Dr. YEATS, BROUSSAIS, and his followers, suppose that affections of this viscus may be ascertained by attentive observation. They may in some cases; but with no degree of certainty; for, after the most diligent investigation of a train of phenomena apparently emanating from this organ, the inferences we shall arrive at will often possess only a certain degree of probability; for the same, or very similar symptoms, may proceed from the other viscera now named. It must, however, be admitted, that serious disorder of the duodenum will seldom exist without the functions of these organs being more or less disordered, as well as those of the stomach and small intestines; and ultimately organic change may be propagated to a greater or less extent from this viscus to one or more of them. It becomes, therefore, a matter of great importance to be acquainted with the symptoms occasioned by the more common pathological conditions of the duodenum, although we are at the same time convinced that these symptoms may be produced by changes in some one or more of the immediately adjoining organs. With all this uncertainty, however, the experienced observer will often come to just conclusions as to the seat and nature of the disease, founded on his knowledge of the functions and morbid relations of this and the surrounding parts. The duodenum is liable to all the functional and organic changes described in the article DIGESTIVE CANAL; but in different relative degrees of frequency.

I. FUNCTIONAL DISORDER OF THE DUODENUM

CLASSIF.—I. CLASS, I. ORDER (*Author*).

2. i. PATHOLOGY.—(a) It is extremely probable that *impaired function* of this viscus gives rise to various symptoms of *indigestion*; warranting the designation of *duodenal dyspepsia*, if they could be distinguished from those proceeding from the stomach. But, granting that they can, we have no proof that the duodenum is the sole, or the chief seat of disorder, even in those cases which seem to admit of the least degree of doubt of such being the case. For, owing to the intimate structural connection—by continuity of tissues, blood-vessels and nerves—even functional disorder cannot exist to any sensible amount in it without being extended to the stomach, intestines, pancreas, and biliary organs. *Asthenia*, or deficient vital action of the duodenum, may be inferred in cases characterised by an unimpaired, irregular, or ravenous appetite; by constipation, and a deficient secretion and excretion of bile, the stools being light coloured, greyish, or foetid; by a loaded sedimentous urine; by a feeling of languor and drowsiness, with fulness at the right epigastrium, and oppression and sense of distension towards the right hypochondrium, or right shoulder-blade or loin, two or three hours after a full meal; occasionally by headach or vertigo; by absence of fever, and a pale, or foul lurid appearance of the cutaneous surface. But, in this state of disorder, the collatitious parts are coæteaneously, and some of them even co-ordinately, affected. In attempting a fine series of pathological analysis, let us not be carried away either by flights of imagination or by efforts at mathematical precision, and attribute to a single organ what proceeds from several. But let us merely endeavour to interpret the phenomena of nature aright, according as they actually exist, and not as we suppose, or would have them to be. (See INDIGESTION.)

3. (b) Accumulations of *sordes*, the presence of *acid* and *acrid matters*, of *worms*, or of *morbid bile*, may very probably take place in the duodenum as a consequence of indigestion, or atony of the stomach, or of torpor of the liver, or even of the preceding affection; may irritate more or less its mucous surface; and, from its nervous and other structural connections, disorder the functions of digestion, chylication, assimilation, and fæcation; but the *ensemble* of symptoms that result can seldom be distinguished from those proceeding from disease of the stomach, pancreas, and biliary organs, owing to the reasons already assigned. These reasons will also explain the fact, that irritations seated primarily in this part may be propagated, along the digestive tube, to the stomach on the one hand, and to the intestines on the other; and along the ducts, to the liver and gall-bladder on the one side, and to the pancreas on the other: and I believe further, that frequent repetitions of such irritations, occasioned either by the nature of the ingesta, or by the state of the secretions poured into it, may take place without this viscus suffering materially in structure; and yet the disorder propagated from it to its collatitious organs may terminate in structural change of them. Such results are most likely to supervene in those who partake of a highly seasoned and stimulating diet; who indulge in vinous or spirituous liquors, or take too much or improper food. Irritation of the duo-

denum very probably constitutes a part of certain forms of dyspepsia; and even *pyrosis*, and other ailments frequently imputed to the stomach and the biliary apparatus may, with equal justice, be referred to this viscus; but it cannot be said to be the only part in fault, or even that primarily disordered; for it may be affected simultaneously with its related organs by changes primarily implicating its nerves and circulation.

4. ii. TREATMENT.—But little need be here added to what is advanced on this topic in the article INDIGESTION. It is obviously of importance to promote the functions of the duodenum by those means which are the best calculated to procure a due secretion of bile; as this fluid is essentially requisite both to the performance of those functions, and to the preservation of the tissues of the viscus in their healthy condition. But at the same time accumulations of fecal or morbid matters in the bowels should be removed. A full dose of blue pill, or of hydrargyrum cum creta, should be given at bedtime with the common purgative extracts, and in the morning any of the aperient medicines in the Appendix, particularly F. 266. 382. 872. Dr. YEATS recommends either the infusion of chamomile flowers with the wine of aloes and liquor potassæ, or an infusion of quassia and senna with sulphate of potass, taken morning and mid-day. These, or F. 506. 547. 562., will be appropriate in most cases. But in those in which irritation is presumed to exist, I have preferred the following, which may be given daily, or on alternate days, until the evacuations become natural.

No. 196. R Pilul. Hydrarg. gr. iij. ; Pulv. Ipecacuanhæ gr. ss.—j. ; Extr. Colocynth. Comp. ; Extr. Hyoscyami, aa gr. ij. ; Saponis Duri gr. j. M. Fiat Pilulæ duæ horâ somni sumendæ.

No. 197. R Sodæ Sub-carbon. gr. xij. ; Extr. Taraxaci ʒj. ; Infus. Calumbæ et Infus. Sennæ Comp. aa ʒss. ; Spirit. Ammon. Arom. ʒss. ; Tinct. Cardam. Comp. ʒj. M. Fiat Haustus primo mane capiendus.

5. When these fail of fully evacuating the bowels, the stools still continuing unnatural, or devoid of healthy bile, it will be advantageous to exhibit a full dose of calomel at bed-time, with the extracts of colocynth and hyoscyamus, and a grain of ipecacuanha; and a draught with the compound infusions of gentian and senna, with some neutral salt, in the morning. Having evacuated morbid matters, it will be requisite to give tone to the digestive organs, and to preserve a healthy secretion of bile, by prescribing two or three grains of hydrargyrum cum creta, or one or two of blue pill, at night, with extract of taraxacum, or with soap; and the infusion of columba or any other tonic, or the decoction of sarsaparilla with taraxacum, in the course of the day. When the mercurial is relinquished, small doses of the nitro-muriatic acids, with the spiritus ætheris nitrici, or the chloric æther, may be taken in the infusion of cinchona. A course of Carlsbad, or of any other alterative and aperient waters, either alone or assisted by the above alterative pill, particularly when the biliary secretion continues disordered, will often be adopted with advantage.

6. As much benefit will often accrue from a well-ordered diet and regimen, as from medicine in this complaint. The patient should be careful to partake only of light food, in moderate quantity, and at regular hours. He should masticate slowly and perfectly, avoid malt and spirituous liquors, and partake sparingly of wine. He ought to establish regular and habitual evacuations of

the bowels, and take active exercise in the open air. Horse exercise, and the energetic employment of the muscles of the trunk and upper extremities, are preferable to walking. The shower-bath, or cold plunge bath, followed by frictions of the surface, will also prove of great service.

II. INFLAMMATIONS OF THE DUODENUM, AND THEIR RESULTS.

CLASSIF.—III. CLASS, I. ORDER (Author).

7. i. Inflammatory Irritation of the Duodenum.

(a) The uneasiness or sense of fulness and weight which sometimes follows a meal in the course of two, three, or four hours, occasionally with a deep-seated, dull pain, or feeling of distention in the right hypochondrium, and extending to the right epigastrium, and backwards to the right shoulder-blade, may depend upon *chronic* or *sub-acute inflammatory irritation* or action in the duodenum; and, if nausea or vomiting, or pain on firm pressure directed towards the situation of the intestine, accompany these symptoms, the latter state very probably exists, either as a primary affection, or as a consequence of the disorders already noticed, and of affections propagated from the stomach or adjoining organs. The above inference will be further confirmed, if the tongue be loaded or furred at its root, its edges and point being red, and the papillæ erect; if the appetite be unimpaired, or even sometimes ravenous; if the palms of the hands and soles be hot, and the countenance and cutaneous surface more or less unhealthy; and the bowels relaxed, griped, and the stools crude or offensive. *Chronic Inflammation* of the duodenum, especially affecting its mucous surface, is generally associated with disorder of the stomach, biliary organs, and intestines; and often with chronic eruptions of the skin, particularly *herpes*, *psoriasis*, *pityriasis*, and *acne*. The bowels are in these cases usually irritated or irregular, the evacuations offensive and otherwise disordered, very rarely natural, occasionally containing much unhealthy bile, or evincing a deficiency or obstruction of this secretion. The skin is dry or harsh. There are also frequently slight fever, sometimes with chilliness, increased thirst, a gnawing sensation at stomach, or cravings for food, and variable capricious appetite. The spirits are often dejected, and occasionally disturbed by hypochondriacal or fanciful feelings. This state of disorder is not infrequent in females, and is in them often complicated with scanty, painful, and difficult menstruation, especially in unmarried females; and with headaches and various nervous complaints. (See INDIGESTION—*Irritative and Inflammatory States of*.)

8. (b) It has been supposed that *cholera* and *bilious diarrhæa* are chiefly owing to the acute inflammatory irritation of the internal surface of the duodenum by the morbid secretions poured into it; and doubtless such is the case in a great measure. But it should not be overlooked, that the organic nerves supplying the digestive tube are morbidly impressed at the same time by these secretions, and that the same agents quickly affect, by their presence, the whole canal, although the impression is more directly and powerfully made upon the mucous surface and nerves of this part. In *cholera*, and certain kinds of *poisoning*, therefore, where the internal coats of the stomach are violently irritated, the consequent phenomena are not to be imputed altogether, or even chiefly, to

this circumstance; but in a great measure, and sometimes chiefly, to the change produced in the nerves of the organ, and propagated throughout the system to which they belong, as well as to the parts which they directly or indirectly influence.

9. ii. *Acute Inflammation of the Duodenum.*—*Duodenitis* (*Duodenite*, Fr.) may be inferred with much probability, but with no certainty; for acute disease of the liver and of the gall ducts, or of the pancreas or of the pylorus, will give rise to very nearly the same phenomena. I believe that acute inflammation is not frequent in this viscus, or, if it be, that it does not so often give rise to disorganisation, as in other parts of the digestive canal. There can be no doubt that acute, sub-acute, and chronic inflammations are sometimes propagated to it from the stomach on the one side, and from the intestines on the other, as well as from other adjoining parts; and it would appear, from cases which I have examined, and from some recorded by M. ANDRAL (*Archives Gén. de Méd.* t. vi. p. 161.; and *Clinique Médicale*, t. iv. p. 344.), that inflammation may commence in the mucous surface of the duodenum, extend along the ducts, giving rise to obstructions of their canals, either with or without *jaundice*, and even advance to the organs to which they belong. We more frequently, however, meet with the consequences of inflammations of these parts, in *post mortem* examinations, than with the early inflammatory appearances themselves; whilst some of the associated lesions admit of doubts being entertained whether they be the results of inflammations, or of some other state of action; but that inflammation, in one or other of its forms, often attends these alterations, cannot be denied. Thus we occasionally observe thickening and injection of the mucous and submucous coats of this viscus, with obliteration of the common ducts, and these alterations with lesions of the biliary organs, a scirrhus or enlarged state of the pancreas, or adhesions of this last with the duodenum, or of the duodenum to other adjoining parts. Scirrhus of the pylorus not infrequently extends a considerable way along this intestine; and enlargements of its mucous glands, or ulcerations, to which it is less liable than almost any part of the digestive canal, are also observed in some instances in the parts more nearly adjoining it; but we very rarely meet with a case presenting evidence of acute inflammation, and its undoubted results, upon dissection, confined altogether to the duodenum.

10. SYMPTOMS.—*a.* *Duodenitis*, in any of its forms, is, therefore, very seldom limited, unless at its commencement, to this viscus; and, owing to the varied connections of this part of the canal, it may implicate more than one part of very different structures and functions. It may originate in any of the functional disorders already noticed; or may directly proceed from the kind and quantity of the ingesta, whether food, drink, medicines, or poisons; or from the irritating effects of the secretions poured into it from the liver or pancreas. Admitting, with BROUSSAIS, ANDRAL, BOISSEAU, ABERCROMBIE, ROSTAN, and others, the difficulty of recognising the disease during life, the existence of a dull, deep-seated, and dragging pain, in a direction from the epigastrium to the right hypochondrium, right shoulder-blade, and loin, increased upon pressure made on these

regions, or upon torsion of the spine; sometimes but little felt, excepting in these circumstances, and two or three hours after a meal, when it occasionally becomes severe, and is attended or followed by sickness or vomiting; a sense of heat, or of gnawing, or of a foreign body in the region of the duodenum; great thirst; unimpaired or even a ravenous appetite; and an irregular or relaxed state of the bowels, the evacuations being copious, crude, unnatural, and offensive, are strong evidences of inflammatory action in the duodenum, especially when attended by febrile commotion of the system, similar to that already described (§ 7.), and by emaciation: but, in such cases, the immediately collatitious organs may also be diseased. Even in the more severe states of inflammation of this viscus, the pain and sickness may be very urgent a few hours after a meal, and yet but little complained of at other times, as in the rare case related by Dr. IRVINE, where the duodenum only was inflamed and extensively ulcerated.

11. *b.* More frequently, acute duodenitis is *consequent* upon gastritis; or *complicated* either with it, or with a similar change in the jejunum and ilium, or with both. When it has arisen from the extension of inflammation from the inferior surface of the liver, or biliary apparatus, or when this latter proceeds from it, the stomach generally participates in the disorder, at least of function. When an irritative or inflammatory state of action extends from the inflamed duodenum to the liver, the pain rises often high in the right hypochondrium, sometimes to the right side of the thorax, especially after a meal; and is attended by bilious vomiting, occasionally with bilious stools or diarrhoea, followed by constipation, nidorous eructations, prolonged digestion, a bitter taste in the mouth, a yellow coated tongue, and a slight yellowness of the conjunctiva, and unhealthy or yellow appearance of the skin. (See JAUNDICE.)

12. *c.* The *consequences* of inflammatory action in the mucous surface of the duodenum are, its extension — 1st, to the stomach or small intestines, or to both; and, 2d, to the ducts, occasioning, first, obstruction or obliteration of them; and, ultimately, congestion, engorgement, enlargement, or various other lesions either of the liver or of the pancreas, or of both, with *jaundice*, and other contingent changes. When the inflammatory action attacks the whole thickness of the parietes of the intestine, whether originating in its mucous coat, or extended to its more exterior tunics from collatitious parts, the pancreas, pylorus, duodenum, ducts, and even the liver and colon, not infrequently become accreted or welded into one mass; in which the pancreas is often remarkably enlarged, hardened, or scirrhus, the ducts obliterated or obstructed, and the accreted serous surfaces and cellular tissue hypertrophied, or indurated, or granulated and tuberculated. A case of this description, of which I kept notes at the time, occurred in a dispensary patient, in 1820; since when, I have met with several others — two of them with Mr. PAINTER and Mr. BYAM. In three cases of this description, recorded by Dr. BRIGHT, and in one by Mr. LLOYD, fatty matters were voided in the stools; but this phenomenon either did not exist, or was overlooked in those which occurred in my practice. The instances adduced by Dr. BRIGHT presented ulceration of the duodenum, which this able

physician considered of a malignant kind; the pancreas presenting the same diseased appearances as in the cases observed by me.

13. *d. Thickening* is one of the most frequent lesions to which the coats of the duodenum are liable; and occurs often in connection with a similar or more remarkable change in the pylorus. *Softening* of the interior tunics is equally if not more common. *Gangrene* is very rare; as also are *thinning* or atrophy of the coats, *ulceration*, and *erosion* or destruction of the villous membrane. Although enlargement of the mucous glands is more common in the duodenum than in the stomach, yet ulceration is, according to M. BOISSEAU, ten times more frequent in the latter than in the former.

14. *e.* In the cases of *ulceration* of the duodenum on record, most of the symptoms accompanying chronic inflammation (§ 7.) were present, with diarrhoea; and, in Dr. BRIGHT'S cases, a discharge of fatty matters from the bowels. In M. C. BROUSSAIS'S case, fatal hæmorrhage took place into the intestinal canal, owing to the extension of the ulcer to the coats of a large artery. In a case detailed by Dr. HASTINGS, the patient had complained, for two months, of occasional vomiting and costiveness; with pain and tenderness, on pressure, in the epigastrium and right hypochondrium, below the margins of the right ribs, and extending to between the shoulders. The pulse was ninety-six, the countenance anxious, and the skin yellow; and the body much emaciated. The liver and stomach were healthy. In the duodenum, beyond the part into which the ducts entered, a cancerous ulcer was found, larger than a crown-piece, with ragged and everted edges. Its surface was irregular from fungous excrescences. The coats of the intestine, around the ulcer, were much thickened. The rest of the bowels were natural.

15. *f. Perforation* of the duodenum may occur from ulceration, and give rise either to fatal peritonitis, as in the cases adduced by Dr. ABERCROMBIE and M. ROBERTS, or to adhesions and communications with other viscera; but these occurrences are rare. A case has been described by Dr. STREETEN, in which a communication took place between this viscus and an external opening between the seventh and eighth ribs, through which articles of food and drink were frequently discharged. The duodenum was found much contracted beyond the perforation in it, which communicated by a canal, two inches and a half in length, through thickened cellular tissue to the external aperture. This lesion was complicated with extensive disease of the liver and thoracic viscera. The most common changes consequent upon inflammatory action in this viscus, are, jaundice, and adhesions to the adjoining parts (§ 12.); its coats becoming thickened, hardened, and otherwise changed; the morbid mass forming a tumour, which sometimes may be recognised towards the right of the epigastrium, near the end of the eighth rib, upon a careful examination.

16. *iii. TREATMENT.*—*A.* In the *slighter forms of duodenitis*, local depletions by cupping or leeches will frequently suffice; but when they are associated with manifest plethora and congestion of the portal circulation, a moderate bleeding from the arm will be preferable, in the first instance. A blister, or rubefacient plaster, applied over the epigastrium and hypochondrium,

after depletions have been carried sufficiently far, will act beneficially on the seat of disease, and will favour the secretion and excretion of bile. A full dose of calomel may also be given, and be followed either by a moderate dose of castor oil, or by a purgative enema. The effect of calomel upon the upper part of the alimentary canal is satisfactorily shown, both by direct experiment and therapeutical observations, to be sedative of inflammatory action in that situation. As the bowels are generally freely open in this disease, the object will be rather to correct than to increase the secretions from them. With this view, small or moderate doses of hydrargyrum cum creta, with pulv. ipecacuanhæ comp., or pulv. Jacobi, may be given at night; and the nitrate of potash, with subcarbonate of soda in the infusion lini comp., or decoctum althææ comp., with either extractum humuli or extr. taraxaci, according to the state of the bowels, during the day. After the alterative pills have been continued a few nights, a teaspoonful each of fresh castor oil and olive oil may be taken on the surface of some aromatic water; and, if the stomach does not nauseate it, this dose may be repeated at bedtime, or in the morning, for some days. If the biliary secretion be not improved after a few days, a full dose of calomel should be given again, and the milder preparations continued in small doses for some time, and conjoined with ipecacuanha, extract of hop, or hyoscyamus, or taraxacum, according to the state of the bowels. Where the bowels are very irritable, and the secretions morbid, the mercurials may, at first, be given with the extract of lettuce, or opiates, or Dover's powder; laxatives being subsequently resorted to for the removal of morbid collections.

17. *B.* In the more *acute states of inflammation*, one or more of the allied organs are often implicated, and both general and local bleedings, blisters, and other counter-irritants, and a full dose of calomel, or of calomel and opium, are requisite; after which purgative and emollient enemata may be thrown up, and gentle and cooling laxatives be given internally with anodynes, demulcents, and diaphoretics. If fever, or a sense of heat, be felt, the nitrate of potash may be given, with the subcarbonate of soda and the sweet spirits of nitre, in camphor mixture, to which either the extract of taraxacum, or of hop, or of lettuce, may be added, according to the state of the bowels; the mild mercurial alterative being taken at bedtime. Afterwards the solution of acetate of ammonia and camphor mixture, with the wine of ipecacuanha, and tincture of henbane, in small doses, may be resorted to through the day. If diarrhoea prevail, or supervene, the hydrargyrum cum creta should be given twice or thrice in the twenty-four hours, with small doses of rhubarb, or of compound ipecacuanha powder, in the form of pill; with small doses of magnesia in the compound infusion of orange-peel, or in any aromatic water. If costiveness occur, a full dose of calomel, with rhubarb or jalap, may be taken at bedtime, and the oils, as directed above, or the compound jalap powder, the following morning; their operation being assisted by enemata, or by any gentle aperient conjoined with emollients and anodynes, as may be found requisite. If much disorder still continue especially of the biliary and other se-

cretions, a large plaster, consisting of the ammoniacum plaster with mercury, and the compound pitch plaster, in equal proportions, or of the former only, should be placed over the epigastrium and right hypochondrium, and renewed after a week. In some cases, the opium plaster may be substituted for the latter; particularly if the bowels be irritated. When there is much irritation of the nervous system accompanying the disorder of the digestive canal, much benefit will accrue from the hydrocyanic acid exhibited in demulcent or diaphoretic vehicles, as the camphor or almond mixture, or in both; and from the following, especially after morbid secretions have been evacuated by the foregoing means:—

No. 193. R Camphoræ rasæ et subactæ gr. vj.—viij.; tere cum Magnes. ustæ ʒj., et Sodæ Subcarbon. (vel Potassæ Subcarb.) ʒj.; olei adde, Infus. Valerianæ (vel Aq. Ment. Virid.) ʒj.; Spirit. Colchici Ammoniaci ʒss.; Syrup. Papaveris ʒij. M. Fiat Mist. cujus coch. ij. larga bis terve quotidie sumantur.

18. Having removed the inflammatory state, by these and other medicines appropriate to the peculiarities of the case, a similar treatment to that recommended in functional disorder of this viscus (§ 4.) may be adopted, and nearly the same diet and regimen pursued. At first, however, very light, and chiefly farinaceous, articles of diet should be taken, and the beverage should consist of small glasses of spruce beer, or Seltzer or soda water, and the bowels regulated by an aperient and tonic pill (F. 558. 561, 562.), or by lavements of warm water. As the general health improves, a more generous diet, and a small quantity of wine, may be taken; regular and active exercise in the open air being enjoyed. After the more protracted cases, or when the secretions and alvine evacuations still continue, or readily become disordered, a course of taraxacum, with minute doses of a mild mercurial, subsequently of the nitro-muriatic acids, with compound decoction of sarsaparilla; or a course of either the Harrowgate, or the Marienbad, or the Carlsbad mineral waters may be tried.

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DYSENTERY. SYN.—*Δυσεντερία*, Gr. *Dysenteria*, (from *δύς*, difficulty, and *έντερων*, an intestine). *Difficultas Intestinalis*; *Tormina*, Celsus. *Rheumatismus intestinalis cum Ulcere*, Cælius Aurelianus. *Fluxus Cruentus cum Tenesmo*; *Fluxus Dysentericus*; *Flumen Dysentericum*; *Tenesmus*, Auct. Var. *Dyssenterie*, *Flux de Sang*, Fr. *Die Ruhr*, Germ. *Dissenterie*, Ital. *Bloody Flux*.

CLASSIF.—1 Class, 5 Order (Cullen).

3 Class, 2 Order (Good). III. CLASS, I. and II. ORDERS (Author, in Preface).

1. NOSOL. DEFIN.—*Tormina*, followed by straining and scanty mucous and bloody stools, containing little or no fecal matters; and attended by febrile disturbance.

2. PATH. DEFIN.—*Inflammatory action of a sthenic or asthenic kind, seated in the mucous surface of the intestines, chiefly of the large intestines, accompanied with more or less constitutional disturbance, and retention or disorder of the natural secretions and excretions.*

3. LITT. HIST.—Dysentery, owing to its prevalence in ancient as well as in modern times, has attracted a large share of the attention of medical writers. HIPPOCRATES (*Opera*, edit. VANDER LINDEN, vol. i. p. 252., vol. ii. p. 101. 176. *et passim*) notices it in various places, both as a sporadic and as an epidemic disease; and in such a way as shows that he was acquainted with several of its pathological states and relations, and even with its complication with functional and organic disease of the liver. CELSUS (*De Med.* l. iv. cap. 15.) mentions it by the name of *tormina*, as distinct from *tenesmus*, from *lientery* (*levitas intestinalis*), and from *diarrhœa*. ARETÆUS (*De Sig. et Caus. Morb. Diut.* l. ii. cap. 9. ed. Boerhaave, p. 59.) attributed the complaint, with HIPPOCRATES, to ulceration of the intestines; and was the first to describe it in an accurate and connected manner. GALEN (*De Caus. Sympt.* l. iii. cap. 7.), although, perhaps, not the first to distinguish the different forms of the disease, has furnished us with the earliest attempt of this kind that we possess. He particularises a *sanguineous*, an *hepatic*, an *atrabilious*, and an *ulcerated* variety. Subsequent writers, — Greek, Latin, or Arabian, — down to the commencement of the sixteenth century, when the writings of the celebrated FERNEL first appeared, added but little to the materials scattered through the works of GALEN. From FERNEL to the present age, the disease has been nearly as well understood, as respects both its nature and treatment, as at the present time. The numerous epidemics, however, that have occurred, and been described by experienced writers, from the time of this physician, have furnished diversified facts, illustrative of its varied forms, and of its treatment.

4. I. SEAT AND FORMS OF THE DISEASE.—A. The ancient writers, from HIPPOCRATES to AVICENNA, considered dysentery to be seated in the internal coats of the intestines — particularly the large intestines — and attributed it too generally to erosion and ulceration. CÆLIUS AURELIANUS, AËTIUS, ALEXANDER TRALLIANUS, and others, who wrote between GALEN and AVICENNA, entertained the same view as to its nature and seat, and imputed the modifications it presented to the particular part of the bowels chiefly affected. They even attempted, and not without some degree of justice and even of accuracy, to point out, from the character of the discharges and the appearance of the blood in the stools, its seat in the small intestines, in the colon, or in the rectum. AËTIUS (*Tetrabibl.* iii. s. i. cap. 43.) believed that the jejunum is sometimes the part chiefly diseased, and described the symptoms — many of them really concomitants of inflammation of the mucous surface of the small intestines — that characterised this variety. Similar views were

entertained, also, by ALEXANDER TRALLIANUS, PAULUS ÆGINETA, and ACTUARIUS. An attentive consideration of the various manifestations of the disease, especially in an epidemic form, will show that these opinions are not without foundation. How far they are consistent with the results of modern researches, will appear in the sequel.

5. *B.* The forms of dysentery are extremely diversified:—(a) As respects its *Origin*, it is—*a. primary*; *β. consecutive*; and *γ. symptomatic*.—(b) In regard of the *Circumstances* under which it occurs, it is—*a. sporadic*; *β. endemic*; *γ. epidemic*; and, *δ. both endemic and epidemic*, in the same locality, on certain occasions.—(c) As to its *Type*, it is—*a. remittent*; and, *β. continued*; most commonly the latter, especially in temperate climates.—(d) As regards its *Character*, it is—*a. inflammatory*; *β. bilious-inflammatory*; *γ. simply asthenic*; *δ. bilious-asthenic*; *ε. adynamic or typhoid*; *ζ. malignant or putrid*; *η. scorbutic*; and, *θ. complicated*.—(e) As to *Intensity* and *Duration*, it is—*a. hyperacute*; *β. acute*; *γ. sub-acute*; and, *δ. chronic*. These modifications, or varieties of character and intensity, are, however, merely arbitrary distinctions, founded on the more prominent symptoms of the malady, and adopted chiefly in order to guide us in the appropriation of remedial measures. Indeed, it should not be overlooked in this, more than in other diseases which possess very specific and distinct features in a majority of cases, that it will frequently assume forms intermediate between *cholera* on the one hand, and *diarrhœa* on the other; between *fever* with enteric characters, and *colic* or simple *tenesmus*; that it may be but very slightly different from some one of these complaints; and that, in one or other of its forms, it may be *consecutive of*, or *lapse into*, any one of the maladies now named. This connection between disorders of parts intimately associated in function and structure, is merely what may be expected *a priori*, conformably with the pathological principles developed in the article *DISEASE*. The diversified forms and close relation of dysentery to other maladies are readily explained on these principles; especially if considered in connection with the nature of the different causes in which it originates; with the condition of the vital actions, the circulating fluid, and the secretions and excretions, at the time when its causes make their first impression; with the changes which concurrent causes induce from the commencement, and with the circumstances modifying the state of the circulating and secreted fluids in the progress of morbid action.

6. In describing the *varieties* or *states* of the disease, it is of the utmost importance—considering its great prevalence and fatality in certain circumstances, on many occasions—not to multiply distinctions beyond such as are well ascertained and are practically important; nor to neglect to notice such as have been accurately described—as are contingent on certain combinations of causes of occasional, but not of common occurrence; and, although neglected or overlooked, from an injurious spirit of simplifying or generalising, as nevertheless exist, and may be manifested in a prominent manner whenever the causes in which they originate prevail. Taking my own experience merely as a guide since 1812, when I first treated the disease—as I subsequently observed it in the tracks of the great

armies which traversed Europe at the close of the Continental war—and as I was brought in constant intercourse with it for a time, in the most sickly climate within the tropics, in both European and native constitutions—independently of the graphic delineations of it in many of the works referred to, I consider dysentery neither so simple in its nature, nor so unvarying in its seat and forms, as some recent and contemporary writers in this country have stated. That writer will but imperfectly perform his duty who, in giving a history of a most prevalent and dangerous malady, confines himself to the particular form it has assumed during a few seasons, within the single locality or the small circle of which he is the centre, and argues that it is always as he has observed it; thereby affirming as true of the genus, what may be hardly true of the species, and even of it only under certain circumstances.

7. The different forms of dysentery are so entirely dependent upon certain states of the organic or vital actions, and of the secreted and circulating fluids, that these constitute the true basis of all distinctions between them, and of all rational indications of cure. These states, which are so important, are so difficult to ascertain and estimate truly, even by the most profound and experienced observers, and are so continually varying, that attempts to describe them must be received as approximations only to some of those which will frequently present themselves in practice: for the one will so insensibly pass into the other, both in different persons, and even in the same person at different stages, when certain agents are in operation, that the forms of the disease are not to be viewed as constant, but as changing according to circumstances, so as frequently to assume characters intermediate between those which are described. Although the features of the disease are so numerous and so changeable—as may, indeed, be expected from the operation of numerous agents in ever-varying states of combination upon the economy—yet the necessity of delineating certain of them which are the most prominent and the most common, as guides for the inexperienced, must be apparent. In our inquiries into the nature of, and the means of removing, morbid actions, the conditions of life are the chief subjects of interest; for these conditions constitute not only the chief changes, but also the sources, whence those which are organic spring. They are, moreover, the most directly and energetically impressed by remedial agents, and are the chief media by which structural lesions are removed. I shall, therefore, describe the forms of this malady, conformably with these views. It was evidently with a conviction of the practical importance of early and exactly recognising the states of organic or vital action, that J. P. FRANK and HORN divided the acute states into (a) *sthenic*, and (b) *asthenic*; the former comprising the *simple*, the *inflammatory*, and the *bilious* varieties; the latter the *malignant* or *putrid*, the *scorbutic*, and the *nervous* of RICHTER, KREYSSIG, and some other authors. Without adverting to the divisions by SAGAR and SAUVAGES, which are formed upon no consistent principle, but chiefly upon the causes that produce the disease, I will notice such as have been adopted by some of the most experienced writers. Whilst they agree in the more general division into *acute* and *chronic*, they differ mate-

rially in the arrangement of the acute states. ZIMMERMANN particularises the *inflammatory*, *malignant*, *putrid*, and *chronic* states. RICHTER describes the *simple*, *inflammatory*, *bilious*, and *nervous* forms; and KREYSSIG adds to these the *typhus* or *mucous*, and the *putrid* or *malignant*. MM. FOURNIER and VAIDY adopt nearly the same division as KREYSSIG, but they adduce, in addition, the association of the disease with *typhus* and *ague*. SCHMIDTMANN distinguishes the *simple*, the *inflammatory*, the *bilious*, and *bilious-inflammatory*, the *nervous*, and the *putrid* varieties. M. VIGNES, one of the most recent and experienced writers on dysentery, considers, first, its *benign* or *purely inflammatory* states, under the denomination of *mucous* and *bilious*; and, next, its *malignant* forms, comprising the *typhoid*, *adynamic*, *ataxic*, and *complicated*. In the description I am about to give of the disease, I shall follow a nearly similar arrangement to the most approved of those adopted by the ablest and most experienced of my predecessors. In the *first* place, those *acute* forms will be noticed which are the most simple, which are more or less *sthenic* or *inflammatory*, and in which the vital energies are either not materially affected, or not perverted to the extent of subduing the natural tendency of the economy to resolution and to a restoration of the healthy action. *Secondly*, the *asthenic*, or more unfavourable and complicated states, which have been variously denominated, according to the predominance of certain characters, arising out of particular circumstances and epidemic influences, will be considered. *Thirdly*, the *chronic* and *complicated* forms will be described.

II. OF ACUTE DYSENTERY.—i. ITS SIMPLE, STHENIC, OR PURELY INFLAMMATORY STATES.

CLASSIF.—III. CLASS, I. ORDER.

8. DEFIN.—*Tormina, tenesmus, mucous or bloody stools, and a sense of heat or pain in the colon and rectum, with tenderness on pressure, and symptomatic fever; the nervous, circulating, and muscular functions not indicating vital depression until late in the disease.*

9. A. CAUSES.—(a) The *predisposing* causes of the *sthenic* states of the disease are chiefly high ranges of temperature following wet and cold seasons; whatever favours the production and accumulation of morbid secretions in the biliary apparatus and *prima via*; debility of the digestive organs, particularly of the intestinal canal; a plethoric state of the vascular system; unnatural flexures of the colon favouring fecal accumulations in the bowels; neglect of the functions of digestion and fecation; the habitual use of spirituous liquors, or other inebriating beverages in excess; rich food, and highly seasoned cookery. Dysentery is generally most common in autumn and in the beginning of winter; in persons of the rheumatic diathesis; and in those who have undergone great fatigue; or who have been recently affected by continued, remittent, or intermittent fevers; but, in such circumstances, it is as often of an *asthenic* as of a *sthenic* kind.

10. (b) The *exciting* causes of the *sthenic* forms of the disease are drunkenness; exposure to vicissitudes of climate or of temperature, and especially to cold and moisture, or to the night-dews; sleeping in the open air, and more particularly on the

ground, without sufficient protection intervening, or without requisite covering, as in the case of armies in the field; wearing damp or wet clothes, or too thin clothing; acerb, acid, unripe, or overripe and stale fruit and vegetables; raw, cold, and indigestible fruit, &c., as cucumbers, melons, pine-apples, &c.; the stones and seeds of fruit; unwholesome food, especially unripe or blighted corn or rice; and acid or unwholesome drink, as sour or bad beer and wine. The exhalations from wet, cold, and clay soils and marshes, or from the banks of lakes, rivers, and canals; and the use of marsh, stagnant, or brackish water for drink, with many of the causes mentioned in connection with the other forms of the disease (§ 22. b.), will also produce this form in persons of a sanguineous and plethoric constitution. Mr. ANNESLEY states, that dysentery became, at one time, remarkably prevalent amongst the British troops in India to which he was attached, and that, upon investigation, he traced it to their eating the pork of the country with their breakfasts. Upon a stop being put to this practice, the disease altogether disappeared.

11. B. SYMPTOMS AND PROGRESS.—*Sthenic* dysentery presents various states and grades of severity, depending upon the nature of the cause, the state of the secretions, and the degree of inflammatory irritation or of spasmodic action of the bowels resulting therefrom. It is often preceded by constipation when occurring sporadically, and frequently by diarrhoea when arising from endemic or epidemic causes; but in many instances the dysenteric symptoms appear from the first, and are attended by chills or rigors. When it is caused by endemic causes, or is epidemic, the inflammatory symptoms may be very slight, and yet the constitutional disturbance and morbid action of the bowels very considerable; or the irritation and inflammation may be along the small as well as the large intestines.

12. (a) The *milder* state of the complaint, especially as it occurs sporadically in Europe, commences either with liquid and feculent, or with mucous stools, the latter being occasionally streaked with blood, and always becoming so in a few days. Generally, horripilations or chills precede, accompany, or follow these evacuations, which are consequent upon gripings and a sense of increased action in the course of the colon; and are often passed with heat or scalding in the rectum, followed by straining or tenesmus. The stools are frequent; commonly from eight or ten to more than double this number in twenty-four hours, and are streaked with more or less blood. They subsequently become less mucous, more watery, and sometimes contain traces of feculent matter. There is little or no pain in the abdomen between the calls to stool, but often an irksome sensation is felt in the situation of the sigmoid flexure of the colon and of the rectum. The pulse is either very slightly affected, or quick and small; the tongue is generally loaded or furred; and the thirst increased. The appetite is frequently not much, or even not at all impaired. This slightest grade of the disease may terminate favourably in from six to nine days, or it may pass into a *chronic* form.—*Relapses*, and organic changes in the large bowels, sometimes also follow it.

13. (b) In its *more severe* states, dysentery is preceded either by diarrhoea, or by disorder of the stomach and bowels; or by nausea, flatulence, constipation, and occasionally vomiting. These

symptoms may be of two or three days' duration, before the characteristic evacuations are observed, or be accompanied or followed by distinct chills or rigors, ushering in increased heat and frequency of pulse. In other cases, very frequent, scanty, mucous, and gelatinous motions, streaked with blood, preceded by gripings and tormina, and attended by straining, at once introduce the disease. Frequently the horripilations or chills continue to alternate for some time, with increased heat, and other febrile symptoms. The pain at first is often limited to the rectum and sigmoid flexure of the colon, occasional griping only being felt in the abdomen. The pulse is slightly accelerated, and the tongue white and loaded. If the disease be not subdued or mitigated in this early stage, the calls to evacuation become more frequent; are preceded by more severe griping and tormina; are attended by greater straining; and are sometimes ineffectual. The tongue is more loaded, and the pulse more frequent and small. In many cases, however, little or no pain is felt, excepting when the patient is about to pass a motion, although the matters discharged are most morbid, and the constitutional affection severe. This, however, is no evidence of the absence of inflammation; for the mucous surface of the large bowels may be inflamed, and even ulcerated, and yet but little uneasiness, unless upon firm pressure, will be complained of. Often, where pain in the intervals between the tormina is absent, a sense of heat in the course of the colon, or of soreness in the abdomen, is felt, and indicates, even more than acute pain, the existence of inflammatory action. As long as disease has extended no farther than to the mucous surface of the large bowels, the patient seldom feels more than the above sensations, or a dull aching pain, not increased on pressure, which he describes as shooting, at times, through the abdomen; but when the region of the cæcum is minutely examined, pain or fulness is generally detected in that situation, even when neither can be felt over the sigmoid flexure.

13. As the disease proceeds, the stools become more frequent, the tenesmus more severe, the discharges of blood greater and more mixed with the matters evacuated, which gradually pass from a mucous, slimy, or gelatinous, to a watery and dark muddy appearance, either with an intimate admixture of feculent matter, or occasionally with hardened feces, and even with pure and unmixed blood. The tenesmus is now attended by a feeling as if the bowels themselves would pass off; and, in children and delicate persons, *prolapsus ani* not unfrequently occurs. In some instances, as the disease advances, substances resembling fat or pieces of flesh, and consisting chiefly of masses of coagulable lymph, or of the fibrine of the blood poured out in the bowel, come away. The urine is now, and often early in the complaint, of a high colour, voided frequently, always with scalding pain, or difficulty; and sometimes the dysuria amounts to strangury, owing to the vicinity of the chief seat of disease. The tongue is at this period loaded towards the base, and its papillæ are excited. The pulse is quick and small; the skin harsh, hot, and dry, especially over the abdomen; the tormina and tenesmus increase, and the calls to stool are more incessant, especially during the night and early in the morning, when the febrile symptoms are also much aug-

mented. The thirst is urgent and the appetite lost; every thing taken to assuage the thirst being followed by tormina, and a desire of evacuation, as if it had rapidly passed through the bowels; and the patient desponds. Subsequently pain becomes more fixed in the hypogastrium, the abdomen more tense, full, or tender; the strength sinks; and dyspnoea sometimes supervenes,—indicating the extension of inflammatory action to the peritoneum. If no amelioration take place before the appearance of these latter symptoms, the pulse becomes more quick and feeble, the extremities cold; the tongue either brown, or dry and hard, or glazed, red, and aphthous; the strength more reduced, the emaciation great; the discharges dark, watery, offensive, cadaverous, and like the washings of flesh; and the spirits dejected. Hiccup sometimes occurs; with delirium, relaxation of the *sphincter ani*, leipothymia, and death, at a period varying from a fortnight to three or four weeks. In other instances, the disease is arrested some time before dangerous symptoms supervene, or is mitigated only, and thence passes into the chronic form.

14. Simple dysentery presents every grade of severity between the two now described; and such are the most common appearances which it assumes in this and in temperate climates; but the symptoms often vary much, according to the causes, the age, and strength of the patient; the parts of the canal first affected; the pre-existence of collections of morbid secretions or fecal matters, the external agents operating during treatment, and the means employed. To some of these *modifications and their pathological relations* it is necessary to advert. When it arises sporadically, febrile action, ushered in by chills or rigors, seldom is observed until the dysenteric symptoms are formed, and is merely symptomatic of the local disease, which may commence in the cæcum, or in the colon and rectum, or in this last, and be there in a great measure limited, or may extend more or less to other parts. Thus patients are frequently affected with diarrhoea, uneasiness and fulness of the abdomen, particularly in the region and vicinity of the cæcum, several days before mucous and bloody stools or straining are complained of, especially when the disease is consecutive of fever; and occasionally they experience tenesmus some days before the disorder is fully formed. In these cases, the progress of affection from the cæcum, or even from the small intestines, along the colon to the rectum, as well as in the opposite direction, may be traced by the symptoms, when the patient comes early under treatment. In other instances, especially those consequent upon fever, and in some epidemics, febrile action may co-exist with, or even precede, the earliest symptoms. It is, therefore, important, in a practical point of view, to ascertain the early seat and extent of morbid action, as well as its constitutional relations; as, together, they furnish the chief basis of therapeutical indications; for, in proportion as constitutional disturbance is great, previously to the formation of the bowel affection, the less should antiphlogistic or depletory measures be relied upon in the treatment. In general, although the straining be severe, and the calls to stool frequent, yet if uneasiness or pain be not occasioned by pressure over the region of the cæcum and sigmoid flexure of the colon, if heat in the course of the colon be not felt, and if tormina be not

violent, nor the abdomen tense or tender, the rectum may be considered the chief seat of the disease; the secretions poured out in the upper parts of the intestinal canal having produced, first, irritation, and afterwards, inflammation of this part. But, if there exist much primary constitutional disturbance, this inference should not be drawn; for, in such cases, the mucous surface of both the small and the large bowels may be seriously affected, and yet these symptoms may not be present in any evident degree. Cases will also occur, characterised by tormina, twisting pains about the umbilicus, borborygmi, tension of the abdomen, more or less febrile commotion, and frequent calls to stool; the evacuations being mucous, bloody, and subsequently watery, &c.; and yet little or no tenesmus will exist. In these, the seat of disease is chiefly the ilium, the cæcum, and upper part of the colon; which often become speedily ulcerated if the morbid action be not arrested. When, in addition to these symptoms, tenesmus is urgent, the rectum and sigmoid flexure of the colon are also affected.

15. In this form of disease, the quantity of matters evacuated from the bowels is extremely various. In severe or advanced cases, from twenty to thirty, or even forty, efforts at stool are sometimes made in the twenty-four hours, and often without any further discharge than a little mucus and blood; but occasionally much serous or watery matter, with broken-down fæces, slime, mucus, and blood, is voided, exhausting and emaciating the patient. In some instances, the evacuations are muco-puriform, more or less streaked with blood, without the least trace of fæces; and in others, they contain scybala. It would seem, that the retained fæces are frequently broken down or semi-dissolved by, and mixed up with, the serous and sero-sanguineous fluid exhaled from the irritated mucous surface; and hence the infrequency of scybala in many states of the disease. The evacuations are often very offensive from the commencement, but as frequently they are not manifestly so. They generally become fetid, or have a peculiar raw cadaverous odour in the last stage of the worst cases; especially when portions of the mucous surface are sloughed off. They are sometimes of a singularly variegated hue; consisting of glairy mucus, with a greenish or gelatinous substance, resembling morbid bile; seldom with pure bile; often without any trace of this secretion; occasionally with large pieces of albuminous concretions of coagulated lymph or fibrine, formed upon the internal surface of the bowel, and afterwards detached; and either with streaks of fluid blood, or with small dark coagula. When the blood is in large quantity, and is fluid and distinct from the other matters, it is evidently poured out by the lower parts of the large bowels. When consisting of dark grumous clots, intimately mixed with the discharges, it probably proceeds from the cæcum, or upper portion of the colon. It may, or may not, even when most copious, depend upon ulceration; but it most commonly is exuded from the irritated mucous surface, especially early in the disease. It may be very abundant, even at this stage, and continue so till death, particularly in drunkards; or it may be trifling throughout; or be copious only at the close of the disease.

16. The state of the *abdomen* also varies. In

some, tension with fulness, proceeding generally from fecal accumulations; and flatus is much complained of from the commencement. In others, the abdomen is natural in size. *Pain* and tenderness on pressure are uncertain symptoms in the early stage of the disease. When it is fixed in one place, we should suspect inflammation or disorganisation to be proceeding there. It is, in the plethoric, most frequently complained of in the hypogastrium and region of the cæcum; and it may often be traced up the right side and in the course of the colon. Often there is little or no pain, nor even soreness; the patient bearing pressure without expressing any uneasiness, and yet, upon examination after death, the morbid appearances will be as extensive, in respect of the inner surface of the bowel, at least, as in those who complained of the greatest pain; the chief difference being in the more complete limitation of the lesions to the mucous surface in those cases wherein no pain was felt. It is chiefly in the last stage, when inflammatory action has extended to the serous surface of the bowels, that fulness, pain, and tenderness of the abdomen have been complained of.

17. (c) *Hyper-acute dysentery*, or *dysentery in Europeans removed to warm countries*, is generally occasioned by a too rich and stimulating diet, and a regimen entirely unsuited to the climate; by the too free use of ardent and intoxicating liquors; by exposure to the night air, or to cold and moisture; and by the endemic and other causes mentioned above (§§ 9, 10.). It often assumes the severe character now described; and, in persons who are plethoric, who have neglected their bowels, have lived highly, or are of a phlogistic diathesis, or who possess rigid fibres and great irritability, it puts on a still more violent or a *super-acute form*. In them, the sense of heat and soreness; the tormina, fixed pain of the hypogastrium, the tension of the abdomen, the continual calls to stool, and the straining, are most distressing. The region of the cæcum is full and tender. The tongue is white, loaded, excited; sometimes clean and natural, but afterwards dry. The skin and pulse are frequently, at first, and for some time, very little affected; the constitutional disorder not being commensurate with the severity of the local symptoms; but the former subsequently becomes dry or hot, and the latter quick, hard, and small. In many cases, the disease begins as common diarrhoea; in others, it comes on suddenly, and rapidly reaches its acmé; and then the thirst is excessive; the urine scanty, voided with great pain, or altogether suppressed; the testes drawn up to the abdominal ring; the stools mucous, slimy, streaked with florid blood, sometimes attended by *prolapsus ani*, and rapidly passing to watery, serous, or ichorous discharges, resembling the washings of raw beef, in which float particles, or even large shreds of coagulable lymph, thrown off from the acutely inflamed surface, often with copious discharges of blood. Great depression of spirits, nausea, vomiting of bilious matters, and distressing flatulence or borborygmi, which aggravate the tormina, are also present, and, in many of the fatal cases, continue to the last. In some of these the inflammatory action extends to the sub-mucous coats, and detaches portions of the mucous tissue, which come away in the stools, in the last stage, or even hang from the rectum; any effort

to withdraw them occasioning a remarkable increase of suffering. The constitutional disturbance has now become very severe, and a fetid or cadaverous odour proceeds from the patient. Detached portions of the mucous membrane will be recognised by their sloughy appearance; by the ichorous character and putrid smell of the discharges which contain them; and by the period at which they are observed, the albuminous exudations that resemble them being thrown off at an earlier stage.

18. In somewhat less violent and more protracted cases, especially as the disease approaches an unfavourable close, the motions are sometimes streaked with a puriform sanies, or with a whitish, opaque, or greyish matter, apparently depending on ulceration; and they frequently are involuntary, owing to the paralytic state of the sphincter, the anus being excoriated, livid, relaxed, and widely open. The surface of the body, also, is shrunk, occasionally yellowish; the superficial veins deprived of blood, and the extremities moistened with a cold sweat. At last, the patient is affected by leipothymia, or stupor, or by delirium, and other nervous symptoms, and dies in from four, five, or six days, to three weeks, unless the disease is of a milder or more chronic form, or is arrested by treatment.

19. In Europeans, long resident in an inter-tropical or hot country, the disease assumes either a less inflammatory form than the preceding, or some one of the asthenic states about to be described; it also frequently becomes chronic in them, and is often consequent upon, or associated with, ague, remittent fever, or with diseases of the liver, spleen, and other abdominal organs. (See § 20. *et seq.*, and *Complications*.)

ii. THE ASTHENIC FORMS OF DYSENTERY.

CLASSIF.—III. CLASS, XI. ORDER (*Author*).

20. DEFIN.—*Depression of the organic actions; of the tone of the circulating, nervous, and muscular functions, preceding or accompanying the occurrence of tormina and tenesmus, with mucous, bloody, and offensive stools, and giving rise to fætid exhalations, and infection in confined places and predisposed persons.*

21. The asthenic forms of the disease have been variously denominated, according to the more prominent features assumed by them under certain circumstances, endemic as well as sporadic, and especially in different epidemics. Whilst the foregoing states are generally attended, especially in their early stages, by sthenic vascular action, those about to be noticed are usually characterised by *fever*, of a low, nervous, or adynamic kind; by greater prostration of the constitutional powers than the preceding; by an earlier manifestation of febrile commotion or constitutional affection, which may even precede the dysenteric symptoms; and by a much more remarkable affection of the whole economy: and while the above forms are generally sporadic, sometimes endemic, and seldom epidemic or infectious, those about to be described are commonly epidemic and infectious, under circumstances favourable to this mode of propagation; sometimes endemic; and more rarely sporadic, excepting in the darker races of the species, in which it is extremely apt to become infectious, when occasions promote its spread in this manner.

22. A. CAUSES.—(a) *The predisposing causes*

of the asthenic forms of dysentery are, chiefly, epidemic states of the atmosphere; cold and variable weather after long heats, or after hot and moist seasons; prolonged heat and humidity; accumulations of morbid secretions in the *prima via*; a cachectic habit of body; deficient and unwholesome food; pre-existing debility, especially that caused by low fevers; an impure and miasmatic state of the air, especially when connected with humidity; worms in the *prima via*; and the predisposing causes already enumerated (§ 9.).

(b) *The exciting causes* are, famine or prolonged fatigue; exposure to a moist cold; the excessive use of intoxicating liquors; exhalations from animal and vegetable matters in a state of decay; the use of marsh, stagnant, or river water holding decomposed animal and vegetable matters in solution, or containing, either with or without these, animalculæ and minute insects, or of brackish waters; the flesh of diseased animals, or meat kept too long, or tainted; stale fish; blighted, unripe or ergoted rice, rye, &c.; unwholesome or insufficient food; breathing the stagnant or infected air of low, crowded, and ill-ventilated places, especially when a case of the disease occurs in such circumstances — as in hospitals, camps, prisons, ships, barracks, &c.; and the exhalations proceeding from the discharges, and from the sick, either confined and concentrated in a stagnant, or floating in a warm, moist, miasmatic, or epidemic atmosphere. But there is reason to suppose, that the concurrence of two or more of the causes enumerated in connection with the sthenic states of the malady will also produce some one of its asthenic forms, during certain conditions of the air which have been called epidemic, especially in persons of a weak frame and depressed vital and mental powers. The least energetic, also, of the above causes, acting on persons already affected by the preceding form of the disease, will convert it into some one of the asthenic states. Owing chiefly to the diversity of the exciting causes, to their concurrent operation, and to the difference in the state of constitutional predisposition, &c. are to be imputed the modifications which the disease presents when epidemic, or at different seasons.

23. α. Of the influence of exhalations from animal bodies in a state of decomposition, in causing the low forms of dysentery, I could produce, if my limits would permit, numerous proofs. One of the authors of the article *Dysentery*, in the *Dictionnaire des Sciences Médicales*, states, that, having been detained on horseback in a field of battle, in August, 1796, where several hundred men and horses lay in the first stage of decomposition, he was seized with a dangerous dysentery on the following day; that three out of four of those who accompanied him were similarly infected; and that his horse died of the same disease soon after. Similar facts are adduced by ZIMMERMANN, OSIANDER, DESGENETTES, and others. Of the agency of impure water, in producing dysentery, proofs are likewise numerous. I have myself seen several instances, in a warm climate, where it was the cause of the disease being endemic there. In temperate countries, waters containing decayed animal matters, or an excess of uncombined alkali, cause diarrhœa more frequently than dysentery, or the former passing into the latter. But in warm climates, especially where water is collected and

preserved in tanks, and in autumn, after warm summers, in colder countries, dysentery is the most common result. The water of the Seine at Paris, from this cause, often produces the disease; and Dr. M. BARRY states, that such of the inhabitants of Cork as used the water of the river Lee, which receives the contents of the sewers, and is, moreover, brackish from the tide, are subject to a very fatal dysentery; and that, at the time to which he especially refers, at least one in three of those affected died of it. I have no doubt that the dysentery epidemic in London, during several successive autumns after the great plague, was owing to the same causes, as well as to the exhalations from the burying grounds, which received the bodies of those who died of that pestilence; and that the prevalence of the disease in besieging, as well as in besieged armies, is caused by the exhalations from the decomposition of the dead; by the impure state of the water, from decomposed animal matter carried into it; by night exposure; irregular living, deficient food or clothing, and the other contingencies on encampments and operations in the field; and by crowded and ill-ventilated barracks, &c. The frequent occurrence and fatality of dysentery in fleets, in former times, evidently arose from the putrid state of the water, and the foul and stagnant air between decks, sometimes breathed by several hundred persons. During the slave trade, dysentery was, and even now is, among the numerous small vessels engaged in this disgusting traffic, the chief pestilence; one half of those conveyed in these floating receptacles of misery, on some occasions, having died of it during the passage across the Atlantic. It may be here mentioned, that the dark races, particularly negroes, are more liable to dysentery than to any other disease; that it assumes an extremely low or putrid form in them, when confined in ill-ventilated situations; and that, when a number, even of those in health, are shut up in such places, the cutaneous secretions, which are so abundant and offensive in these races, accumulate in and vitiate the surrounding air, so that if it be not frequently renewed, the systems of those thus circumstanced are thereby infected, and, instead of an infectious typhus, which would be the result in the European constitution, a putrid dysentery, spreading rapidly through all breathing the impure air, is developed. I had, in 1817, an opportunity of witnessing what I now state. The disease is considered by the native Africans as infectious as small-pox, and is dreaded by them equally with it; these two being the most fatal diseases to which they are liable.

24. *β.* The *contagion* of dysentery has been much disputed; chiefly owing to the circumstances of the different forms of the disease not having been distinguished with any degree of precision, and of the loose notions attached to the words *contagion* and *infection*, by those who espoused different sides of the question. In the article *INFECTION*, these terms, and their true value, are attempted to be estimated with more precision than heretofore. As respects this malady, it may be stated, as the result of observation and acquaintance with what has been written, that the sthenic forms are seldom or never infectious—and chiefly for this reason, that the circumstances in which they occur are unfavourable both to the generation of infectious emanations, and to their accumulation,

concentration, and operation in healthy persons—that, in short, they, like all other sthenic maladies, do not evolve infectious effluvia, because the vital energies are not depressed nor perverted to such a degree, even in their advanced stages, as to give rise to the depravation of the circulating and secreted fluids requisite to the production of infectious emanations, these changes taking place only when some one or more of the causes which produce these effects—the causes of the asthenic states—come into operation;—that febrile diseases, attended by depravation of vital power and of the fluids, evolve effluvia capable, under favourable circumstances, of infecting or contaminating those disposed to be impressed by them;—and that, as the asthenic forms of dysentery are characterised by these properties, and as the emanations disengaged in their advanced stages become cognisable to the senses, as well as by their effects, it must be inferred, that these forms are infectious on occasions favourable to the action of the emanations which proceed from them. These inferences, founded on an important pathological principle, are confirmed by enlightened and most numerous observations; and, independently of such confirmation, this principle must be shown to be unfounded before the inferences drawn from it can be denied. Thus it will appear that the great difference of opinion that has existed on this subject is to be referred, first, to the fact that certain states only of the disease are infectious, and these chiefly in circumstances favourable to the development and operation of the infectious emanation; and, secondly, to the incorrect notions entertained respecting contagion and infection; many believing, because the disease is not propagated by mediate or immediate contact of the diseased person, or of a palpable secretion or virus, that therefore no contagion nor infection is produced by it. But the spread of dysentery very closely resembles that of scarlatina or measles, which cannot be propagated by inoculation, or by the application, either direct or indirect, of the morbid secretions to a confined part of the external surface; and yet the effluvia from the sick or the faecal evacuations, floating in a close or stagnant air, will readily induce the disease, in persons who, constitutionally, or from the influence of concurrent causes, are disposed to it, and who breathe the air thus contaminated. In such cases, the effluvia operates, as in other infectious diseases, chiefly through the medium of the respiratory organs; the system being affected, although not very manifestly, before the dysenteric symptoms are developed. Several respectable authors, however, have conceived it to be propagated, when persons repair to the water-closet or night-chair used by dysenteric patients, by the action of the infected air or effluvia upon the anus, the affection extending upwards, along the rectum. HUFELAND and some others state, that they have seen the complaint communicated by the pipe of an enema apparatus. But, in most of the instances of the infectious disease that I some years ago had an opportunity of seeing, constitutional disturbance, and often diarrhoea, preceded the fully-formed dysentery.

25. *B. FORMS AND SYMPTOMS.*—*α.* The *simple sthenic or adynamic dysentery*. This variety is one of the most common, particularly in this country. It may occur sporadically in delicate persons,

owing chiefly to the more debilitating causes assigned above. It is also frequently epidemic, especially among the poor in times of scarcity, and after very wet and warm seasons; it often follows attacks of adynamic fevers, or prevails at seasons when they are prevalent. It was epidemic in Glasgow in the autumn of 1827; and is described by Mr. WILSON, Mr. BROWN, Dr. MACFARLANE, and Mr. WEIR (*Glasgow Med. Journ.* vol. i. pp. 39. 48. 99. 223.) It generally commences with diarrhoea, succeeding a constipated state of the bowels; and very frequently, especially in the more severe cases, coldness, chills, or rigors are observed, attended by griping pains about the lower part of the abdomen, with frequent calls to stool; and sometimes followed by fixed pain in the hypogastrium, particularly at its right and left sides. Want of appetite, increased thirst, furred tongue, clamminess of the mouth, and acceleration of pulse, usually are superadded. As the disease becomes fully formed, the pulse is more or less frequent, small, weak, and soft; the skin is sometimes but little warmer than natural, or only hotter over the abdomen: it is commonly harsh and dry. The countenance is pale, shrunk, and anxious; sickness and vomitings occasionally occur; and singultus is not infrequent in the latter stages, when the tongue, from being white, slimy, furred, and yellowish, generally becomes red, glazed, and chapped, and occasionally dark red and dry. The stools sometimes are not mucous, slimy, or bloody, although very frequent, until the second, third, or fourth day; but, in other instances, they present these characters from the first. They are always of this description as soon as chilliness or rigors are felt. The evacuations vary greatly in frequency and quantity; but they are generally characterised by a deficiency of bile, by great fœtor, and by the absence of scybala, excepting in a very few cases. Remissions of the symptoms, and of the urgent calls to stool, often occur about the middle of the day. The tormina and straining are sometimes followed by prolapsus ani, especially in children and delicate females. In a few instances, a puriform fluid is voided towards the close of the disease. The urine is usually scanty, passed with pain, and rarely retained. This is the least infectious of any of the states of the disease comprised under this species; unless in close and crowded places; and then it manifests this property, and passes into some one of the states next to be described, particularly the typhoid.

26. *β. The nervo-dynamic, or typhoid.*—Asthenic dysentery sometimes appears in a modified form under certain circumstances, especially where numbers are collected in a close and impure air, as in barracks, garrisons, crowded ships, &c.; and in years of scarcity among the poor. The patient complains at first of general depression, vertigo, violent headach, increased sensibility to light, pains in the limbs and joints, and of gripings and purgings; followed by anxiety at the præcordia, stupor; foul, clammy tongue and mouth, which soon becomes dry and covered by a brownish coating; a penetrating, offensive odour of the breath; and intense thirst. The pulse, at first, is very quick and small; and, afterwards, weak and irregular. The stools are, from the commencement, very frequent, in small quantity, preceded by tormina and tenesmus; and

glairy, or serous, very foetid, and contain more or less dark blood. The urine is scanty, thick, and dark-coloured. About the fourth or sixth day, a miliary eruption, or petechiæ, sometimes appear about the neck, breast, arms, or abdomen; and, occasionally, epistaxis occurs, between the fourth and eighth days, in young and robust subjects, but without becoming critical. The intensity of the tormina and tenesmus generally diminishes with the progress of the disease; and often, about the ninth or eleventh day, is replaced by a colliquative diarrhoea. The stupor is now attended by low delirium; the soft solids waste and become flaccid; the surface assumes a dirty hue; and an offensive penetrating odour issues from the body and the evacuations. If not ameliorated, or arrested in its progress, this form terminates fatally from the sixth to the twenty-fourth day, the symptoms described (§ 13. 18.) as indicating a fatal issue supervening. Such are the characters it usually assumes; but they are modified by age, constitution, and concurrent causes. It is less frequently epidemic than the other asthenic states, but is more evidently infectious than they.

27. *γ. The malignant, or putrid.*—This form is most common amongst the poor, especially in years of scarcity; in soldiers, during campaigns; in besieged towns, and in countries laid waste by war, &c. It also arises from the existence of endemic causes in full force, especially those which occasion malignant fevers—as animal and vegeto-animal exhalations floating in a warm and moist air; foul water, and other septic agents. It usually commences with a general feeling of debility, lassitude, and aching pains, referred particularly to the limbs and joints; with anorexia; foul, loaded tongue; sometimes nausea, borborygmi; relaxed bowels; pale, sunk, or anxious countenance; giddiness; and with a small, soft, frequent, and sometimes slow or natural pulse. To these supervene griping pains in the abdomen, followed by foul, offensive, scanty, and bloody stools; sometimes without tenesmus, particularly at first. Horripilations, or chills, rarely rigors, sometimes occur, at irregular intervals, during the early progress of the disease; but they are often absent. The mental energies are greatly depressed, especially as the disorder advances; when the tongue, which was moist and slimy, becomes covered by a dark, mucous, or fuliginous sordes; the breath is foetid; and a dark mucus occasionally collects about the sides of the tongue and on the lips; or aphthæ form in this situation. Tenesmus is now complained of; and the stools are cadaverous, watery, dark, and bloody; the soft solids flaccid; and the skin harsh, dry, and of a sickly, dirty, sometimes approaching a yellowish, hue. The patient afterwards sinks into a state of complete apathy; but stupor or delirium seldom comes on until shortly before dissolution: the position in bed is supine; the dejections are involuntary, frequent, and mixed with dark blood, often followed by syncope or leipthymia; the temperature of the extremities sinks rapidly, whilst it continues much higher over the abdomen; the urine is scanty, dark, and foetid; and the body exhales an infected odour. Anxiety at the præcordia, singultus, and difficult deglutition supervene; and the patient sinks in from five to sixteen or twenty days, according to the violence of the symptoms. This form of the disease is frequent in the most miasmatic

localities in hot climates, both among natives and seasoned Europeans, particularly when remittent fevers are prevalent or malignant; and it occasionally assumes a remittent type, when it may be prolonged to twenty-eight or thirty days. I saw many cases of it in Africa, in 1817 and 1818.*

28. *Δ. The bilious adynamic.* — When bilious, remittent, and gastric fevers are prevalent, a form of dysentery often also prevails, very nearly resembling the first or simple variety; and differing from the foregoing or third form, chiefly in presenting more evident attempts at vital and vascular reaction than it. The present variety sometimes appears, sporadically, in autumn and winter; it is often endemic, in hot climates, among Europeans, arising from the same causes as endemic fevers, aided by cold and moisture; and it occasionally prevails, or becomes epidemic, in temperate countries, during autumn and the beginning of winter, especially after hot summers. This and the immediately preceding variety frequently co-exist, in the same localities, in warm climates, or after hot seasons in temperate countries: this, in the plethoric, sanguine, and robust; that, in the debilitated, ill-fed, and weakly constituted. Bilious adynamic dysentery is generally caused by a less intense operation, relatively to the powers of the constitution and to the predisposition, of the same exciting causes, particularly such as are endemic, as those which occasion the malignant form. I have seen it prevalent in Europeans, in warm climates, in the same locality and in the same season as when that form was most destructive in the dark races. Many epidemics recorded by authors belonged to the present variety; although, during an epidemic dysentery, more than one form or state of the disease will be met with, owing to the different circumstances, intrinsic and extrinsic, as respects those affected, in which it will occur.

29. This variety generally commences with bilious or serous diarrhoea, which may continue for several days; with debility, pain in the forehead, vertigo, and a mucous yellow coating on the tongue. To these supervene horripilations, chills or rigors, tormina, very frequent calls to stool, a sense of scalding at the anus, and tenesmus. The chills often return during the early stages, and are followed or accompanied by a frequent, hard, or irritable pulse, great thirst, and an acrid heat of the trunk, especially over the abdomen. Nausea, sometimes vomiting, want of appetite, loathing of animal food; a sense of heat in the abdomen; fulness in the seat of the cæcum; pain above the pubis; complete prostration of strength, referred chiefly to the spine and lumbar region; and scalding on the passage of urine; are commonly present at an early period. The pulse, from being quick and irritable, becomes soft; subsequently, small, irregular, and very weak. The stools sometimes continue copious and yel-

lowish for two or three days; but they are usually streaked with blood at the time when tormina and tenesmus are complained of, or soon afterwards. As the disease advances, the blood is more abundant: either mixed with the stools, or fluid and distinct, or in large coagula, and usually of a dark colour; and the abdomen becomes tense, or tumid and tympanitic. The frequency and the quantity of the stools vary greatly; but the distress and tormina are worst at night, the abdominal pain and uneasiness occasionally remitting in the morning, or subsiding for a short time after each evacuation. The odour of the discharges is, from the first, fætid; and, in very severe cases, it becomes putrid and cadaverous. With the progress of disease, emaciation proceeds rapidly, the surface being harsh, and of a dirty appearance. Towards an unfavourable state, the temperature sinks; the tongue being dry, dark-red, or raw; and anxiety, restlessness, singultus, delirium, leipthymia, with other symptoms described as characterising the last stage of the preceding variety (§ 27.), supervene. This form is seldom prolonged beyond twenty-six or thirty days; unless it assumes a milder aspect in its progress, when it often passes into the chronic state. It is frequently epidemic after hot and moist seasons.†

† Epidemic dysentery often presents various modifications, in respect both of violence and of the occurrence of phenomena not commonly observed. Of these latter, the most frequent are burning pains or great heat in the abdomen; whilst the extremities and surface are cool or even cold, and the pulse sometimes not much affected; boulimia; very copious, mucous, bloody, or gruelly and frothy, or, more rarely, oleaginous, evacuations; great weakness of the lower extremities; gangrenous eschars; a parchment-like or scaly state of the skin; hæmaturia, or entire suppression of urine; an aphthous state of the mouth and throat; retraction of the abdomen, or the great tension, fulness, or meteorismus of this cavity; frequently the excretion of worms in the stools or by vomiting; miliary, petechial, phlyctenous or tubercular eruptions on the trunk; catarrhal or pneumonic symptoms; and rheumatic pains in the muscles and joints. Generally, as the quantity of fluid matters evacuated from the bowels are increased, the excretions by the kidneys and skin are diminished. In most epidemics, especially those of the asthenic forms, constitutional symptoms, characterised by lassitude, debility, foul tongue, disordered state of the stomach and bowels, unhealthy aspect of the countenance and skin, and weak, quick, and soft pulse, with evident disorder of the circulating and secreted fluids, precede the pathognomonic symptoms, which appear after these have continued a longer or shorter time. It will be instructive to review the characters of, and the remedies employed in, those epidemics of which we have authentic accounts, as valuable illustrations of the nature and treatment of this destructive malady will be thereby furnished. It will, moreover, appear, even from the very meagre account to which my limits oblige me to confine myself, that our knowledge of the disease, even at the present day, is but little in advance of what existed two centuries ago; and that even the most recent writers on the subject are distinguished rather by confined or exclusive ideas as to its nature and treatment, than by comprehensive views of its forms and manifestations, as well as of the means of removing it, in connection with the various combinations of causes producing it, and the diversified circumstances in which it prevails. Exclusive notions of a disease are the result of a knowledge merely of what has occurred within the sphere of the author's observation; whilst more extended ideas are acquired from what he has remarked in various climates, on different occasions, and at distant periods, and from an acquaintance with what has been observed by others: believing, truly, that nothing is constant but change; that what has occurred or prevailed formerly will recur again; and that one form is as likely as another to appear in future, whenever the concurrence of causes, of which it is a necessary or contingent result, shall take place.

1. GREGORY of Tours states that dysentery ravaged the whole of France in 534.

2. Its destructive effects in the army of HENRY the Fifth, before and after the battle of Azincourt, are well known.

3. FERNEL says that, in 1538, it was so general through Europe, that neither village nor town escaped, although the seasons had been regular.

* Most of the crew of the ship in which I was a passenger to that country were treated by me, for seasoning and remittent fevers, soon after their arrival. They all recovered before I reached my destination. The vessel subsequently went in pursuit of traffic up one of the rivers in the bay of Benin, where the crew there became ill of this form of dysentery: of which all died excepting the second mate and carpenter, whom I chanced, long afterwards, to meet in England. Not one third of the crews of the many vessels that proceed up these rivers survive this disease and fever. The men, who are often deceived into undertaking the voyage, have not even the benefit of medical aid; for none of these vessels is provided with, or is within reach of, this kind of assistance.

30. *r. In the Dark Races*, dysentery is perhaps the most prevalent and fatal disease; and in

negroes it generally takes the place of fevers; being, in the language of SYDENHAM, a low fever

4. CAMERARIUS observed it, in the autumn of 1583, in Germany, where it was malignant and destructive. The preceding summer had been hot and dry.

5. ZACUTUS (*Curat. cent. iii.*) notices an infectious and destructive dysentery in Lisbon, in 1600, for which fumigations were employed.

6. LAMMONIERE describes it as it occurred in Lyons, in 1607, 1624, and 1625, where it had been imported with the troops from Italy. In proof of its infectious nature, he states that the medical attendants and nurses were nearly all attacked. Marks of inflammation and gangrene were found from the pylorus to the anus, the liver and omentum being also disorganised.

7. SENNERT (*Méd. Pr. l. iii.*) mentions an epidemic which pervaded all Germany in the summer and autumn of 1625; and HOFFMANN states, that it reappeared in autumn 1626, after a wet and warm spring, and a dry and hot summer; that it was contagious; and was best treated by bleeding at the commencement, in some cases, by laxatives and demulcents, by nitre and absorbents, and by milk with Seltzer water.

8. DIEMERBROECK records, that the disease was most fatal in Brabant, in 1635, then the seat of war. It first appeared amongst the troops, and afterwards among the inhabitants. The prostration of strength was great; and infection was proved by the attendants having been all affected. The most successful remedies were rhubarb, and, afterwards, one or two drachms of wax melted in warm milk.

9. BARTHOLIN relates, that a malignant dysentery succeeded to ague in Copenhagen, in 1652, and carried off many thousands. The odour of the evacuations was most offensive.

10. The plague of London, in 1665, was followed, in the autumn of 1666, by an epidemic and infectious dysentery. MORTON was attacked, and escaped with difficulty. It appears to have been occasioned by the infected air emanating, in the summer, from the numerous bodies buried in and about London during the preceding year. The fatality was very great; and cinchona seemed to have been the chief remedy.

11. In an epidemic described by W. WEDEL (*Act. Nat. dec. ii.*), and which occurred, in 1669, at Gotha, the evacuations were fetid and sanguinolent; and yet, in many instances, unattended by pain or tormina. Those in whom the tormina was most severe, recovered; but those who experienced no pain, died suddenly, the disease having passed rapidly into gangrene.

12. SYDENHAM states, that the cholera which prevailed in London, in the summer of 1670, having ceased, dysentery took its place. The disease commenced with chills or rigors, followed by increased heat. The treatment was directed to remove inflammation, and evacuate morbid humours.

13. BRANDT notices the occurrence of dysentery, in an epidemic form, in the Danish army, and in Copenhagen, in the summer of 1677; and attributes it to the use of stagnant water and of bad beer, and to an atmosphere loaded with impure exhalations.

14. Dysentery prevailed in Zurich in August, in 1680, after a hot summer. It appears from MURALTO to have been of an inflammatory type.

15. An epidemic, observed by F. HOFFMAN, in 1684, in Westphalia, was also inflammatory. Favourable cases terminated by the fourteenth day; those that were prolonged beyond it, generally terminated unfavourably. Persons in communication with the sick were infected. Bleeding at the commencement, and nitre with camphor, were the chief remedies: astringents and stimulants were injurious.

16. LOESCHER states that the epidemic dysentery of 1709, in Misnia, was attended by acute fever, petechiæ, lividity of the countenance, meteorismus of the abdomen, and depression of strength and of the pulse; followed, in many instances, by delirium, convulsions, and death. Clysters, ipecacuanha, laudanum, and sometimes bleeding, were employed.

17. In August, 1718, the disease appeared, in a malignant form, among the Prussian military in Berlin and Pomerania, and extended to the inhabitants. Aphthæ were a common and an unfavourable symptom. A change usually occurred towards the fourteenth day. Relapses were fatal. Evacuants and diaphoretics, followed by tonics and antiseptics, were the most successful means.

18. MARGRAAF details the history of an epidemic which, in some cases, was mild and remittent; but, most commonly, of the bilious-adynamic and malignant forms. Ipecacuanha was the most useful medicine.

19. A similar visitation took place at Nimeguen, in 1736 (DEGNER). The malignant cases were frequently fatal on the third or fourth day, and were contagious. Ipecacuanha, rhubarb, and, subsequently, simarouba, were chiefly confided in.

20. Dysentery was epidemic in Plymouth, in 1744 (HUX-

HAM), in an inflammatory form. Early bleeding, ipecacuanha, rhubarb, and, at the close, opiates, were the chief remedies.

21. It prevailed in Zurich, in 1747, and was attributed to bad water (GRUBER). Diaphoretics, emollients, opiates, and tonics were most generally prescribed.

22. It was the most destructive disease in the British army in Holland, in 1748; and was acutely inflammatory, often rapidly terminating in gangrene (GRAINGER, &c.). Bleeding, emetics, and purgatives were employed.

23. The epidemic, in several parts of France, in 1750, was chiefly of the simply asthenic and malignant forms. Astringents were injurious, evacuants, emollients, and antiseptics being most serviceable (MARTEAU and NAVIER).

24. That which occurred in Hanover (LENTIN) was attended by a burning heat in the abdomen, without much attendant general fever; and by fetid or purulent stools. Antimony, rhubarb, mucilages, and, afterwards, simarouba or copoba in the yolk of egg, were usually directed.

25. STRACK states that the French army brought with them, and communicated to the inhabitants of the parts of Germany through which they passed, in 1757, dysentery of a malignant form; which was entirely similar to the description I have given of that variety. It was also prevalent in various other quarters of Germany. Women in the puerperal state, and their infants, were also attacked. Ipecacuanha, followed by rhubarb, the tartrate of potash, and, lastly, simarouba, was chiefly employed. The too early use of astringents, absorbents, and narcotics were said to have been dangerous. Isolation of the affected, and lime, as a disinfectant, were resorted to.

26. Dysentery was epidemic, in the autumn of 1760, in Gottingen; and of an inflammatory and asthenic character, the local inflammatory action being attended by deficient vital power. The cæcum and rectum were ulcerated and gangrenous. Bleeding, vomits, laxatives, emollients, and antiseptics, with opiates and bark, were principally trusted in (ROEDERER).

27. According to GRIMM, the same epidemic was observed in Thuringen, where it was infectious. A similar treatment to that now stated, with the addition of camphor, was adopted.

28. LECLERC describes the dysentery to which the Tartars of the Ukraine were subject, in consequence of a meagre and indigestible diet, consisting of much salted or smoked fish and meat, and the use of ardent spirits. It seems to have been simply asthenic or malignant; and to have been most successfully treated by ipecacuanha, rhubarb, nitre with camphor, opium, mucilaginous clysters; and, in the last stage, balsam of tolu, &c. *Procidencia ani* was cured by conveying to the part the vapour from turpentine thrown upon burning coals.

29. Dysentery succeeded, in July and August, to the catarrh which prevailed in London in 1762; attacked chiefly the poor and children; and assumed the bilious adynamic form. Bleeding, at the beginning, in the more inflammatory cases; emetics and diaphoretics; laxatives and emollient injections; mucilages and astringents, &c., were successively prescribed (G. BAKER).

30. This disease also followed catarrh, at Vienna, in the autumn of 1763 (DE MERTENS); and was attributed to cold and moisture consequent upon great heat. Bloodletting was borne by very few. Ipecacuanha, rhubarb, mucilages, and, afterwards, bark, were exhibited.

31. The epidemic in Berne, and adjoining parts, in autumn, 1765, was in all respects the same as that which I have denominated the bilious adynamic, according to the description of ZIMMERMANN; who states it to have been infectious in circumstances favouring the action of this property; and that females, far advanced in pregnancy, in some instances gave birth to infants affected by it. Ipecacuanha emetics, gentle purgatives, diluents and emollients, mucilaginous enemata; subsequently, camomile tea and opiates, were chiefly confided in: astringents were injurious.

32. In an epidemic observed, in the same year, by M. CREYSSOL, camphor, blisters, sinapisms, dry-cupping, and cinchona were most beneficial.

33. According to Dr. SIMS, the disease was very prevalent in London in the autumn of 1768; it having succeeded rheumatism, and continued during 1769 and 1770. One form proceeded chiefly from cold, was ushered in by rigors, and required bleeding and ipecacuanha emetics. The second and most common form prevailed among those who lived on poor diet. The pulse was low, quick, and unequal; the skin cold; the face pale and haggard; and the stools fetid and putrid. In this, ipecacuanha, opium, astringent bitters, bark, aromatics, and claret, proved most successful.

34. Malignant dysentery was prevalent in Jamaica, in 1771. Dr. WRIGHT found antiseptics, especially a saturated solu-

turned in upon the bowels. It commonly arises, sporadically, from cold and moisture — from sup-

pression of the function of the skin, which is in them a much more important excreting organ than

tion of common salt in lime juice, taken in aromatic or sweetened water, most serviceable.

35. MM. MARET, DURAND, and CAILE state, that the epidemic throughout France, in the autumn of 1779, was an illustration of the aphorism of HIPPOCRATES,—"Hiems sicca et aquilonia, ver autem pluviosum et australe; necesse est fieri febres acutas et dysenterias maxime,"—and assumed an inflammatory, bilious, and malignant form; the second and third being very infectious. In many places, children, females, and the aged were principally affected. Blood-letting, which was repeated in some cases; laxatives, with tamarinds and manna; mucilages and emollients, in the form of drink and in clysters; camphor and anodynes, lime, and gum-water; cinchona, with camphor and the anodyne liquor, were prescribed according to the form and stage of the disease.

36. BIRNSTIEL records that diarrhoea prevailed, in the spring and summer of 1730, on the Rhine; and was followed, in autumn, by a violent dysenteric epidemic of a bilious adynamic form—the symptoms being entirely the same, but more intense than I have described them. Evacuations by ipecacuanha and rhubarb, mucilages and diaphoretics, and, towards the close, cascarrilla and opium, were confided in.

37. In the years 1785 and 1786, the disease, in simply asthenic and malignant forms (§ 25, 27.), was general through the Venetian states—chiefly in females and children (CAPOVILLA). Fomentations, mucilaginous injections, emollient drinks, ipecacuanha, rhubarb, almond oil, absorbents, and, afterwards, cinchona, wine, opiates, and astringents, were most beneficial.

38. The epidemic in Champagne, especially in the French, Prussian, and Austrian armies, during the autumn of 1792, assumed inflammatory, bilious, malignant, and typhoid forms, according to the causes and circumstances in operation; and was remarkably fatal among both men and horses (CHAMSEUR). Bleeding in some; ipecacuanha, antimonials, emollients, cinchona, rhubarb, tamarinds, lemonade, &c., were principally employed.

39. The dysentery that prevailed in the army of Italy (DESGENETTES) was rarely inflammatory; but very generally malignant, arising from endemic causes concurring with extreme fatigue and exposure. Aromatics vegetable acids, and opiates; antiseptic and anodyne enemata, cinchona, and simarouba, were most frequently prescribed.

40. HUFELAND states that it was epidemic at Jena, in 1795, in the simply asthenic and malignant forms. He treated it most successfully by ipecacuanha and extract of nuxvomica. It was infectious in favourable circumstances.

41. SCHMIDTMANN states that dysentery was epidemic, through the north of Germany, in 1800; and so prevalent in the town in which he resided, that very few escaped. It assumed inflammatory, bilious, nervous, and malignant forms, according to circumstances, and the constitution, &c., of those affected. Bleeding in some cases; gentle emetics in others; opium nearly in all; and camphor, decoction of bark, various astringents, tonics, and antiseptics were employed. Arnica was given in the malignant cases, but with little benefit; and tamarinds, cream of tartar, manna, or other mild purgatives, were also exhibited.

42. Dysentery, chiefly in the bilious-inflammatory, passing into the adynamic form, was remarkably prevalent and fatal, at the Cape of Good Hope, in 1804 (LICHTENSTEIN); and was often associated with inflammation and structural change of the liver. This epidemic was at first very injudiciously treated by stimulants, astringents, and antispasmodics; and one in four died. The mortality was subsequently reduced one half, by means of small doses of calomel and opium, given every hour or two; sometimes with camphor and rubefacients.

43. This disease was very prevalent in Holland, in 1809, particularly in the British troops composing the Walcheren expedition; and proceeded chiefly from endemic causes, and often either followed, or was converted into, intermittent or remittent fever (DAVIS, DAWSON). It was frequently associated with disease of the liver and spleen; and presented the inflammatory, asthenic, and bilious forms. Bleeding, purgatives, calomel, and sudorifics were chiefly employed; but the disease was too generally injudiciously treated.

44. Dysentery became epidemic, in and around Vienna, in autumn, 1809, particularly in the French army; and assumed, according to circumstances, an inflammatory, bilious, adynamic, typhoid, or malignant form (VIGNES). It often was infectious; and few of the medical officers escaped. Ipecacuanha, opium, emollients, clysters, sinapisms, and blisters: camphor, ether, arnica, serpentaria, cinchona, valerian and aromatics, variously combined, appear to have been chiefly employed.

45. The more simple asthenic states of dysentery were prevalent in Flanders, in July, 1810 (TONNELIER); and, in

the summer of 1811, in various parts of the north of France (CARON). In some villages, nearly all the inhabitants were attacked the same day. Ipecacuanha, gentle purgatives, rhubarb, calumba, simarouba, mucilaginous clysters, opiates with diaphoretics, warm baths, arnica, aromatics, HOFFMANN'S anodyne, &c., were generally employed. Favourable changes occurred between the tenth and fifteenth days. The disease sometimes passed into enteritis, and was occasionally followed by dropsy.

46. Dr. PISANI states, that dysentery of an asthenic kind, but presenting either inflammatory, malignant, or nervous symptoms, was so prevalent in the garrison of Mantua, in 1811 and 1812, that about 1000 cases were received into the hospital. It first appeared in some felons; from whom it extended to the soldiers in the wards, and by them was conveyed into the barracks. The medical attendants and assistants were attacked; but those who had no communication with the sick escaped. Small depletions, ipecacuanha, laxatives, emollients: with nitre, fomentations, mucilaginous clysters, neutral salts, rhubarb, HOFFMANN'S anodyne, camphor, and wine, according to the features of the disease, were most employed. Ventilations and fumigations were also resorted to.

47. In the expedition to New Orleans, dysentery, owing to cold, moist, and miasmatic air; wet clothing, and the use of foul brackish water, and fatigue, was the most fatal disease, assuming inflammatory, bilious, asthenic, and malignant forms. Bleeding, emollients, fomentations, opium, Dover's powder, and very large doses of calomel, appear to have been principally confided in. In fatal cases, the liver was frequently found diseased; and the colon very slightly ulcerated, but not sphacelated. (*Edin. Med. Journ.* vol. xii. p. 136.)

48. Dysentery, although it may not be said to have been epidemic in the strict sense of the word, was the most fatal disease in the British army during the Peninsular war. It was often connected with intermittents and remittents, and frequently supervened on these and other forms of fever (Sir J. McGRIGOR); and attacked convalescents. It assumed inflammatory, bilious, typhoid, or malignant and chronic forms, according to the causes and concurrent circumstances. It was most prevalent and fatal at Ciudad Rodrigo, which was obliged to be made an hospital station for a time; and where, shortly before, "near 20,000 bodies were calculated to have been put into the earth, either in the town or under its walls, in a few months." It was unhealthy, independently of this circumstance. It was commonly treated by venesection, in the first stage; and by the warm bath, full doses of Dover's powder every hour, calomel and opium at night, sulphate of magnesia, in broth, in the morning; in the second stage, by demulcents, aromatics, opium, astringents, tonics, and flannel rollers.

49. This disease has been more or less prevalent in some part or other of Ireland, owing to the presence of endemic and even of epidemic causes. During 1817, 1818, and 1819, it was, conjointly with fever epidemic throughout the island. The seasons were cold and wet; and, with this cause, famine, unwholesome food, and infection concurred. It was very often consequent upon the early stage of fever, or it appeared as a crisis of fever, or it occurred during convalescence. It was infectious in circumstances favouring this property; and presented inflammatory characters, but often associated with the asthenic diathesis. It was treated chiefly by moderate bleeding, ipecacuanha, the warm bath, opium in doses of four or five grains, calomel with opium, copaiivi mixture, and farinaceous diet (CHEYNE).

50. It was prevalent in several parts of Ireland, in 1722, at the same time with low fever, owing to scanty and bad food. It commenced with debility, pain about the umbilicus, mucous dejections, general cachexia, rapid and weak pulse, &c.; on which the pathognomonic symptoms supervened in an adynamic form. It was very fatal until wholesome and nutritious food was obtained (Dr. GRAVES, in *Trans. of Irish Col. of Phys.* vol. iv. p. 429.)

51. It was again prevalent in Dublin and the vicinity, in the autumn of 1825 after great heat and drought; affected first the better classes; sometimes appeared as fever for two or three days, and then passed into dysentery; or it occurred during convalescence from fever, and was infectious (Dr. O'BRIEN). It was of an asthenic and complicated form; the skin being of a dirty or dark hue, and harsh to the touch; and was very generally treated by bleeding, in robust persons, at an early stage; by the warm bath, and friction of the surface with camphorated oil; by calomel gr. x., and opium gr. ij., repeated in eight hours, and followed by purgatives, especially castor oil with a few drops of laudanum; by flannel rollers around the abdomen; and by Dover's powder, and the repetition of one or more of these means, according to circumstances.

in the white races; from insufficient and unwholesome food; and, *endemically*, from bad water, marsh effluvia, and animal and vegetable emanations floating in a moist atmosphere. It assumes some one of the asthenic forms, according to the causes which produce it, and the circumstances which influence it in its progress. Even when it appears sporadically, it is more liable to become infectious than in Europeans, owing to its passing more readily into a low, malignant, or putrid form, on occasions of imperfect ventilation or crowding of the sick. In such circumstances, it is sometimes quite pestilential in the rapidity of its dissemination and the extent of its fatality. In its sporadic states, it is frequently associated with rheumatism, or the one passes into the other; both generally arising from the same exciting causes—*from cold and moisture*. It is also very often complicated with worms, especially the round worm, in the *prima via*; these being passed with the stools in the advanced stage of the more severe and dangerous cases; and, in its less severe grades, it sometimes assumes intermittent or remittent types.

31. When dysentery attacks the dark races *sporadically*, and sometimes, when it seizes Europeans who have resided very long in a warm climate, it frequently commences with chills and much febrile reaction or irritation, the vascular excitement rapidly passing into an adynamic state—into great prostration of the vital and animal actions, and depression of spirits. The pulse is, at first, more or less quick and irritable—sometimes sharp and full; but it always becomes, in the space of one, two, or three days, small and soft. The rapidity of the change is seldom owing either to the loss of blood from the bowels, or to the quantity of matters evacuated, but rather to these conjoined with the exhaustion produced by the causes of the complaint, by the severity of the tormina, the want of sleep, and by the febrile irritation of the system, in less vigorous constitutions than those of the white race. In this class of patients, flatulence, nausea, sometimes porracious or bilious vomiting, quick small pulse, and occasionally scybalous evacuations, often containing worms,

52. The disease was epidemic, in some parts of France, in the autumn and winter of 1825 (MM. DENOYER, LEMERCIER, and BIENVENU); and was, in several places, propagated by the exhalations from the sick and the evacuations; children, females, the weak, ill fed, the aged, and those living near unhealthy and moist localities, being chiefly attacked. It assumed inflammatory, asthenic, and malignant forms; and, in several places, the small intestines and stomach were also affected. It was treated chiefly by local depletions, opium, repeated application of blisters, and demulcents. Tonics and antiseptics were required in the advanced stages and chronic states.

53. It again prevailed, in some parts of that kingdom, in October, 1827; and was, in several localities, attributed to the water, which abounded with decayed animal and vegetable matters, animalculæ, &c. (M. COMPAGNY). It presented either inflammatory, mucous, asthenic, and malignant characters; and was treated by leeches, opiates, demulcents, and, afterwards, by camphor and cinchona.

54. The disease was epidemic in Glasgow, in the autumn of 1827 in a simply asthenic and mild form. Opiates, calomel and opium, ipecacuanha, demulcent enemata, blisters, warm baths, astringents, and bitter tonics were most serviceable. Bleeding, unless by leeches, was very seldom required, and was often injurious (WILSON, BROWN, and MACFARLANE).

55. Infectious dysentery, in adynamic or typhoid forms, has frequently appeared in ships, in prisons, and wherever many persons have been collected in ill-ventilated, and particularly in moist and miasmatic situations. Instances of such occurrences are so numerous, have been so often noticed, and are so well known, that it is unnecessary to refer to them.

are very early observed; the surface of the body being shrunk, the superficial veins deprived of blood, and the extremities moistened by a colligative sweat. In these persons, however inflammatory the disease may be at its commencement, it soon exhausts vital power, and passes into the asthenic form; and, in seasoned Europeans, is sometimes contingent on, and complicated with, disease of the liver, or of the spleen, or even often of the absorbent glands; or is consequent on fevers, both periodic and continued, either in their course, or during convalescence from them.

32. III. OF THE TYPE OF DYSENTERY.—The inflammatory typhoid, and more malignant forms of the disease, are generally continued, or obscurely remittent. But the other forms may assume an obviously remittent, or even an intermittent type, owing rather to the concurrence of those causes to which periodicity in fever is owing, with those on which the dysenteric phenomena are more immediately dependent, than to the production of two distinct kinds of disease. We have seen, that dysentery often arises from endemic causes, very nearly similar to those which produce periodic fevers; the causes of the latter chiefly impressing the nervous system, those of the former vitiating the secreted and circulating fluids, and disordering the functions of the bowels. Therefore, when both kinds of causes concur, as they frequently do, in unhealthy situations and seasons, a form of disease is directly produced, in which many of the characters of both disorders are blended. In such cases, the ingestion of foul water, or of unwholesome food, and cold and moisture, contaminate the fluids, determine them to, and irritate, the *prima via*; whilst malaria, concurring with these causes, impresses the nervous system so as to impart a certain degree of periodicity to the morbid actions resulting from the combined agents. It also not unfrequently occurs, that, during the progress of agues and remittents, the secretions accumulated in, or poured into, the intestines will acquire such irritating or morbid properties as to superinduce dysentery, which will often for awhile retain the periodic character; but, in most instances, a continued or obscurely remittent type will be the consequence of this change. A distinctly intermittent type is incompatible with either a considerable extent of inflammation, or much depravation of the circulating fluid; and one or other, or even both, of these changes, obtains in those forms of this disease which I have stated to be generally exempt from this character. It is frequently observed, that, when animal or infectious emanations enter largely into the causes of this disease, it assumes a continued and more or less of a malignant character. Numerous instances, illustrative of these views, came before me in warm climates; and the histories of the epidemic occurrences of the disease, when examined in their details, further confirm them. Sir J. M'GRIGOR, in his excellent review of the diseases of the army during the Peninsular war, states, that, in the hospitals in the Alemtejo and Estremadura, the type of dysentery was intermittent; that it became remittent in July, August, and September, when the army advanced rapidly, and remained some time stationary in the two Castiles; and that it was continued, typhoid, and very fatal, at Ciudad Rodrigo, where the sick were exposed to the effluvia extricated by 20,000 dead bodies. Here we see the disease pre-

senting increased grades of severity as the causes augmented in intensity.

33. IV. COMPLICATIONS.—Having considered the forms of dysentery depending more directly upon the nature of the predisposing, exciting, and concurrent causes, I now proceed to notice those complications occasionally observed, especially in unhealthy seasons and localities. Many writers conceive that the asthenic varieties described above are complications of simple dysentery with different kinds of fever; and that, when they are infectious, it is not the dysentery but the fever which possesses this property. Some authors suppose that the typhoid variety especially is a complication of this description. But, if such be the case, wherefore should the disorder which is communicated be always dysentery and not fever? Moreover, this form of dysentery is often present where a case of typhus cannot be found. The fact is incontrovertible, that the asthenic forms, some of which are considered as complications by many writers, are direct, and necessary, and uniform results of certain diversified but concurrent causes; and not contingent associations of two diseases capable of separate existences, such as those about to be described: thus, cold and moisture will of themselves sometimes occasion simple inflammatory dysentery—as frequently occurs, where no other causes can be in operation; but when, with cold and moisture, there concur malaria, unwholesome food or water, or emanations contaminating the fluids, as is often the case, the disease assumes some one of the more severe and asthenic forms; the nervous and circulating functions having been thereby more seriously impressed. The local affection is occasioned, in these cases, by the nature of the ingesta, or by the morbid secretions consequent upon the action of the exciting causes, or by the retention of morbid or fecal matters, or by two or all of these combined. (See § 70—72.) The complications of which more particular notice will be here taken are most commonly occasioned by the endemic causes of dysentery, and are those—(a) with diseases of the liver, spleen, and some other abdominal viscera;—(b) with jaundice;—(c) with scurvy, or scorbutic dysentery;—(d) with worms in the *prima via*;—(e) with hæmorrhoids;—and (f) with rheumatism.

34. A. *Dysentery complicated with Disease of the Liver, Spleen, &c.—Hepatic Dysentery* of writers on intertropical diseases.—(a) I have already noticed an asthenic form in which the bile is excreted more or less in excess, or is otherwise disordered. In this form, which is frequently epidemic, there has generally taken place, for some time previously, an accumulation of this fluid in the biliary apparatus, without any actual disease of the liver; the discharge of much altered or acrid bile contributing, probably, with other morbid secretions and actions, to the production or perpetuation of the dysenteric symptoms. But, in the complication now about to be considered, the liver is generally inflamed, enlarged, or otherwise altered in structure, either previously to, coëtaneously with, or consecutively on, the dysenteric affection. Although this association of diseases of distinct but related organs is most frequent in the sub-acute and chronic states, it sometimes also occurs in any of the acute forms, as well in temperate as in warm climates; but oftener in the latter than in

the former. It is also consequent upon agues, remittents, and continued fevers; and it is evidently often produced by endemic causes, especially in persons addicted to ardent spirits. When hepatic dysentery proceeds from these causes, the spleen is sometimes also diseased, as well as the pancreas, and mesenteric glands. Sir J. M'GRIGOR states, that, in the fatal cases of dysentery that occurred in the Peninsula, the spleen was as often diseased as the liver; and that both the pancreas and mesenteric glands were also frequently enlarged or otherwise changed. When acute dysentery is complicated with disease of the liver, this latter is frequently, likewise, of an acute or sub-acute character; and consists chiefly of inflammation of the substance of the organ; abscess and the chronic changes of this viscus being more commonly associated with sub-acute and chronic dysentery than with the acute.

35. a. *Acute hepatic Dysentery* generally commences with horripilations, chills or rigors, followed by pains in the forehead; bilious vomiting; bilious and variously coloured stools, voided with scalding at the anus, and urgent tenesmus. The discharges are often at first greenish, greenish black, or reddish brown and ochre-like; or watery, with a greenish frothy slime on the surface. A fixed pain, weight, or uneasiness, increased on pressure, is generally felt in the epigastrium, frequently extending to the right hypochondrium, right scapula, or top of the right shoulder; with a sense of pressure or tension in the right side of the thorax, anxiety at the præcordia, fits of dyspnoea, or a dry teasing cough, vertigo, and an accelerated and irritable pulse, particularly at night, when the patient becomes very restless, and the calls to stool more frequent and distressing. The tongue is at first white, the papillæ erect, or covered by a yellowish fur. At an advanced stage, it is clean, dry, smooth, red, or lobulated; or it is covered at the root with a dark crust. The skin is dry, harsh, of a dirty appearance, and hot; or it is covered by a greasy perspiration, copious sweats sometimes occurring in the last stage of the malady. There is great thirst, and desire of cold fluids. In other respects, the progress of the disease is similar to the more inflammatory form described above (§ 13.); but it often presents a greater range of symptoms in different cases, or at different stages of the same case.

36. b. In the above form of hepatic dysentery, the affections of the large bowels and liver seem to be nearly coëtaneous; but, more frequently, the hepatic disease follows dysentery, or does not appear until this latter begins to decline. In these cases, the patient is irritable, the cheeks present a hectic flush, and, upon examining the abdomen, the right *rectus abdominis* muscle resists pressure by an involuntary action. Little or no enlargement of the organ is at first felt; but either enlargement or tenderness becomes manifest, especially when blood has entirely disappeared from the stools, which are generally scanty, viscid, and dark. This form of the complication is evidently caused by the sudden cessation of the dysenteric affections; which, being very intimately dependent upon the excretion of morbid matters from the circulation and the economy in general, cannot be abruptly suppressed, without inducing continued or remittent fever, or inflammation, congestion, or enlargement of excreting organs. Both these mo-

difications of hepatic dysentery are often attended by much pain about the umbilicus, by irritability of stomach, and other indications of severe associated disease of the internal surface of the small intestines, and even of the stomach; particularly in warm climates, or in hot seasons when dysentery is epidemic, and in persons addicted to spirituous liquors. In some cases of hepatic dysentery, the liver is the only viscus, besides the large bowels, which is diseased; but, in many, the spleen, or the pancreas, and the mesenteric glands, are also affected.

37. (b) The complication with enlargement, thickening of the envelopes, or softening or other disorders, of the spleen, is of frequent occurrence where dysentery depends chiefly upon endemic causes, and when it is consequent upon agues or remittents. Thus, in places abounding with malaria, the splenic association of dysentery is much more frequent, especially among the natives of India, than the hepatic; the pancreas and lacteal glands being often also changed, and the disease assuming an intermittent or remittent type. Like the hepatic, the splenic affection may precede, may be coëtaneous with, or consequent upon, the bowel disease; but it is a more common result, particularly when the dysentery presents a periodic type, of the suppression of the discharges by means of astringents, before evacuations have been carried sufficiently far, or morbid matters evacuated. Thus I have seen dysentery consequent upon ague or remittents, when abruptly suppressed, to have been followed by a return of these forms of fever, and by enlargement of the spleen, in localities abounding with malaria; and nearly similar occurrences appear, from the comprehensive account furnished by Sir J. M'GRIGOR, to have been observed in the peninsular war. In this complication, the symptoms are but little different from the simple states of dysentery above described; but they more frequently assume a sub-acute and chronic, than an acute, form. In the cases that have come before me, the splenic affection could seldom be detected unless it consisted chiefly of enlargement, when a careful examination readily disclosed the state of disorder. In all endemic maladies, where we suspect disease of the spleen, the examination should be made with caution, as this organ may be most seriously injured by roughness. In some cases, as well, indeed, as in those in which the pancreas and mesenteric glands have been enlarged, the countenance and skin have presented a dirty or leaden hue, and the limbs have been much emaciated. But these complications are more common in chronic dysentery.

38. *B. Jaundice* is sometimes observed associated with dysentery, especially when the liver is diseased. But it may occur without any structural change of this viscus, owing to obstruction of the ducts, or to occlusion of the orifice of the common duct by inflammatory tumefaction of the mucous surface of the duodenum. It may possibly also arise from the absorption of morbid bile from the intestinal canal; or from the state of the soft solids themselves; these having acquired during disease the power of separating the colouring principles of the bile from the blood. (See DISEASE, § 108., and JAUNDICE.)

39. *C With Scurvy, or Scorbatic Dysentery.*—This complication of dysentery was formerly much more frequent than at the present day;

particularly in ships on long voyages, before lime juice was introduced as an antiscorbatic. When, however, the particular concurrence of causes whence it proceeds takes place, and is not counteracted by appropriate means, we must expect this form of the disease to prevail. Its destructive prevalence among the troops—British and native—employed in the Burmese war; and its occurrence in a modified form in the Penitentiary at Milbank; prove this position. On occasions of long navigation, and the transport of troops; in campaigns, sieges, or active military services, when there is a scarcity of fresh and wholesome provisions, with the usual causes of dysentery; this complication sometimes presents itself at the same time as the more malignant states of the disease; and in such circumstances, it is occasionally the prevailing and most destructive form.

40. *a. The Causes* which usually give rise to the disease are generally the concurrence, or subsequent operation, of those which produce dysentery, with such as occasion, or have already occasioned, scurvy,—especially living long on salted provisions, particularly pork, without a due supply of vegetables or farinaceous substances; innutritious, deficient, or unwholesome food, or the prolonged use of a fluid and greatly diluted diet; debility from previous disease; excessive fatigue; stagnant and foul water; concentrated marshy exhalations, or night-fogs in low situations and places bordering on the sea, or banks of rivers or lakes; confinement, or want of exercise in the open air and in the light of day, especially in miasmatic localities; nostalgia; anxiety of mind, disappointments, and depression of spirits; and, in some circumstances, particularly in the natives of warm climates, an insufficient supply of salt, or of warm spices and aromatics; or living on a poor, watery, and vegetable diet. Persons who have had dysentery, are very liable to this complication when subjected to the causes of scurvy. These causes lower the nervous and vital power, contaminate the circulating and secreted fluids, and ultimately deteriorate the vital properties of the soft solids; favouring serous or sanious exudations from the mucous surfaces, and those capillaries which derive the least support from the cohesion or density of the tissues they supply. Hence result the phenomena of this complication, when the weakened bowels are irritated by the morbid secretions poured into them from the collatitious viscera, and from their own glands and mucous surface; or by injurious ingesta.

41. *b. Symptoms.*—In this complication, very evident signs of scorbutic cachexia generally precede, for a longer or shorter time, the dysenteric symptoms, which, when they are developed, resemble the malignant variety above described (§ 27.), excepting that they are not attended by any febrile commotion; the antecedent contamination of the system being much more manifest than in the variety referred to, and symptoms indicating increased vascular action being usually absent: the countenance is pale, heavy, dark, dejected; in some cases sunk, in others slightly œdematous; the abdomen is drawn inwards, or sore upon pressure; the lower extremities are œdematous, with livid patches extending to the hams, frequently with ecchymoses, or petechiæ, or the breaking out of old ulcers, and with coldness of the sur-

face. The gums are spongy, dark, livid, tumid, and bleed upon the slightest pressure; the tongue is flabby, often raw, red, or reddish brown. The pulse is small, weak, and soft; and afterwards quick, feeble, and undulating. Sometimes, nearly coëtaneously with the above appearances, but more frequently after they have commenced and proceeded some length, diarrhœa occurs. The evacuations soon assume a serous or sanious appearance, with mucus, and grumous dark blood, mixed with feculent matters; and they are usually accompanied by griping and tenesmus, but in a much less degree than in the more simple forms of dysentery. Fæcal matters are seldom retained, the stools being free and sometimes copious. The biliary secretion is often more or less disordered; it being either copious or morbid—and then it increases the excoriation of the intestinal mucous surface; or diminished, or altogether obstructed. The urine is scanty, of a dark muddy appearance, or sanguineous; and a peculiar fœtor is often exhaled from both the alvine and cutaneous excretions. In the more severe cases, or towards the close, there is occasionally vomiting of a bilious, bloody, or dark and grumous fluid, with distressing flatulence, and pain or soreness in the hypochondria. The functions of the stomach are generally disturbed; and there is much disrelish of salted meat, or of the food on which the patient has been subsisting, with great desire for vegetable acids, vegetables, fruits, warm spices, fresh meat, milk, &c. In the progress of the more dangerous cases, copious effusions of fluid dark blood, with detached portions of the mucous surface, are seen in the dejections; with coldness and lividity of the surface, leipothymia, and sometimes with paralysis of the *sphincter ani*, and excoriations about the anus. Discolouration of the surface, breaking out of old sores, falling out of the teeth, great loss of flesh and prostration of strength, and extreme despondency, further characterise the advanced stage.

42. *D. Dysentery is so frequently complicated with Worms in the prima via*, that many writers consider them to predispose to it; and with much probability. The large round worm is the species most frequently observed; but others are occasionally seen. The excretion of worms has been viewed by many as an unfavourable symptom; and I believe that it often is so, as it indicates a grave affection of the system, or the extension of disease to the small intestines. When dysentery is prevalent among the inhabitants of unhealthy localities, or the natives of hot climates, this complication is observed in a large proportion, sometimes in more than one half, of those attacked; and, in the latter class of subjects especially, it is characterised by more or less asthenia, and assumes some one of the forms arranged under this head, according to the nature of the exciting and concurrent causes.

43. *E. The disease may also occur in a person liable to, or affected by, Hemorrhoids; especially in those of a plethoric or sanguine constitution, or who are subject to vascular determination to the prostate gland and rectum, from too frequent sexual congress.* In such cases, the tenesmus is often the chief symptom; and, in consequence of the tumefaction of the vessels, and coats of the rectum, a complete retention of fæcal matters and constant straining are present. The disorder is commonly local, chiefly simple, and inflammatory,

and often subsides upon a copious discharge of blood from the internal hæmorrhoidal vessels, which takes place after longer or shorter suffering, and frequently oftener than once. In some cases, *prolapsus ani* occurs, and aggravates the symptoms. In other respects, this complication differs but little from the mild or inflammatory forms (§ 12.) described above.

44. *F. The association of Rheumatic Symptoms with Dysentery* has been so frequently observed, that many authors (§ 74.e.) have contended for the rheumatic nature of the disease. The connection of rheumatism with dysentery occurs in one or other of the following ways:—1. Rheumatism may be prevalent either before, or at the same time as, or subsequently to, dysentery:—2. It may also precede, accompany, or follow, the bowel disease in the same person. In all these forms the connection has been observed by authors, and in some of them by myself,—but chiefly in the slighter or more inflammatory forms, which are most frequently occasioned by the same causes as those which produce rheumatism, viz. cold and moisture, or vicissitudes of temperature, with terrestrial emanations: dysentery attacking those who are predisposed to it by the accumulation and stagnation of morbid secretions or acrid fæcal matters in the digestive viscera, &c.; and rheumatism, those who possess the rheumatic diathesis, or in whom the morbid secretions are not set loose, or the balance of circulation and exhalation is not thrown in upon the intestinal canal. Conformably with this view, it will be evident that both affections may occasionally co-exist, and that either may supervene upon the disappearance of the other, especially when the above causes continue in operation.

45. *V. SUB-ACUTE AND CHRONIC DYSENTERY, AND CHRONIC DIARRHŒA.*—i. Dysentery may occur primarily in the mild and *sub-acute* form described above (§ 12.); and yet, in consequence of neglect, or of the continued exposure of the patient to its endemic or other causes, it may run on to a very chronic duration, or assume the form of chronic diarrhœa or lientery. It may lapse into either of these forms from the acute, in a gradual manner; or either of them may commence as diarrhœa; the characters of sub-acute or *chronic* dysentery appearing gradually, or more or less suddenly, in their progress. When the disease arises chiefly from malaria or other endemic causes; or follows agues, remittents, and diseases of the liver or spleen; it more generally assumes a sub-acute and chronic form, or passes into chronic diarrhœa, than in other circumstances. In other respects, the *causes* of the chronic states of dysentery, even when occurring primarily, are the same as those that produce the acute forms. These states, however, are oftener met with in those who have had disorders of the stomach, liver, or bowels, in long residents in warm climates or unhealthy localities, and in the natives of such places, than in others; and they are more frequently complicated with diseases of the liver, spleen, omentum, pancreas, &c. in persons thus circumstanced. In most cases, these states of the disease differ from the acute, chiefly in the greater mildness of the symptoms, in the absence of a few of the more violent phenomena, and in the much more uncontrollable and persistent nature of such as are present. Besides following upon, or being rather prolongations

of, the acute, they may be the sequelæ of any of the forms of diarrhœa, of common or pestilential cholera, and of fevers that have been neglected in their early stages, or improperly treated. When it occurs primarily, which is comparatively rare, it may, after a considerable time, assume the acute characters.

46. *a.* The *Symptoms* of chronic dysentery differ chiefly in degree from those characterising the more simple inflammatory form of the acute disease (§ 12, 13.). The fever of the latter generally subsides, especially during the day; and the appetite and strength frequently return for a time. Tormina and tenesmus either altogether disappear, or are present in a slight degree; but sharp griping pains, and soreness in the abdomen, are often complained of. The stools are more or less serous, mucous, muco-puriform, or gelatinous; contain some fluid feculent matter, or ill-digested substances; and vary from a white albuminous, or white of egg, appearance, to a dark olive green or greenish black; being sometimes marbled; or one day like chalk and water, and on another like a dark jelly, or the green fat of a turtle. Blood is often either so intimately mixed with the evacuation as to give it an uniform brick-red colour, or is quite distinct and fluid, or partially coagulated. The puriform or muco-puriform matter generally exists as small streaks; but this matter may not be detected, although ulceration of the large bowels is present. The discharges are more copious than in acute dysentery, but much less frequent; being commonly from three or four to ten or twelve in the twenty-four hours. The pulse is not accelerated in the early part of the day, but it usually becomes quicker towards evening; and is feeble, unequal, sometimes slow, or intermitting. The tongue is often dark red or glossy; the countenance sunk and anxious; the surface cold, lurid, dirty, harsh, dry, or even scaly; the body emaciated; and the abdomen hard, tumid, not very painful on pressure, excepting about the cæcum or sigmoid flexure of the colon, with griping pains in the course of the colon. In the more advanced stages of the disease, the feet and legs become œdematous; the lips and surface exsanguineous; the surface and the evacuations exhale a peculiar, offensive, and sub-acid odour; sometimes jaundice or ascites supervenes, and the patient at last sinks under the irritation and hectic symptoms, after many weeks or even months of continued or remittent suffering.

47. *β.* Chronic dysentery sometimes assumes a modified character, which is essentially the same as the ulcerated and lenteric forms of DIARRHŒA (§ 11, 12.). In these cases, the mucous follicles and coat of the small, as well as of the large, intestines are affected; but in warm climates and unhealthy situations, disease extends much further, and generally comprises lesions either of the liver, spleen, pancreas, mesenteric glands, or of two or more of these. Repeated attacks of dysentery, in these places, frequently terminate in chronic dysenteric diarrhœa in a simple or complicated state; and I have seen cases where it has continued for years, with slight remissions; the stools being lenteric, copious, and crude, and the appetite ravenous. In some cases of this protracted state of disease, especially where the stools are gleety or mucous, and

voided with tenesmus, but without tormina, the rectum only is affected; one or more ulcers being seated at a greater or less distance from the anus. The sub-acute and chronic forms are not infrequent in *children*, are in them often accompanied by *proclivitas ani*, and are generally inflammatory, particularly when occurring sporadically. *Chronic dysentery* in the *dark races* assumes the appearance of a gleety discharge from the bowels, and depends upon deficient tone of the vessels and follicles of the intestinal mucous surface, rather than upon inflammatory action.

48. *ii.* *Complications of Chronic Dysentery* are most frequent in countries within the tropics, and in places abounding with terrestrial emanations.—*(a)* When chronic dysentery is complicated with *disease of the liver*, the symptoms often approach those of diarrhœa; and the hepatic affection is generally latent, insidious, and also chronic; the internal structure of the organ being chiefly implicated. In this state of disease, the evacuations are frequent; attended by griping pains about the umbilicus; and are of a dark green colour, indicating a morbid state of the bile; or of a pale clay colour, showing torpor of the liver or obstruction of the ducts. In some cases, they are dirty, watery, and offensive; and in others, of a whitish appearance; whence has arisen the term "*white flux*." These last seem like chalk or lime mixed in a dirty fluid, or intermediate between this and whites of eggs; occasionally they resemble cream or yeast; and they are often slimy, and contain broken down, clay-coloured feces, and half-digested substances. These sometimes continue for a long time; or they change to a darker colour, apparently from a partial discharge of bile or the medicines taken; and afterwards return to their former hue. This state of the dejection is evidently owing to the obstruction of bile, to the consequent impairment of chylification, and to the increased and morbid secretion of the follicular glands and mucous surface. In addition to these, the patient complains of tightness, fulness, or oppression at the epigastrium and lower part of the thorax, particularly on the right side; and of slight evening exacerbations of fever. The eyes have frequently a pearly appearance; and the countenance is livid or sallow. This complication is often caused by the excessive use of spirituous and other intoxicating liquors; and by the concurrence of the causes of hepatitis with those of dysentery; and it frequently is consequent upon hepatitis; upon intermittent, remittent, or continued fevers; and upon the acute disease, when it arises from endemic causes. The dysenteric symptoms are manifestly occasioned or perpetuated either by a morbid condition, or by deficiency, or total obstruction, of bile: this secretion being indispensable to the due performance of the assimilating processes, and to the healthy state of the mucous surfaces and follicles. In other cases of this complication, the enlargement of the liver, or the symptoms of hepatic disease, are less equivocal, and approach more nearly those stated above (§ 35.). (See, also, LIVER — *Abscess* in.)

49. *(b)—a.* When chronic dysentery follows the diseases just now mentioned, or the prolonged or intense operation of endemic causes, it may become associated with *scorbutic* symptoms; or

dysentery, in a sub-acute or chronic form, may be consequent upon scurvy, as in the scorbutic complication already described (§ 39.). The chronic states of the disease may also associate with them changes of other viscera beside those of the liver. In the hepatic complication, especially in hot countries, the internal surface of the *small intestines* is very frequently also inflamed or ulcerated, and the *spleen*, *pancreas*, *mesenteric glands*, or *omentum*, may be affected in addition. When chronic dysentery follows periodic fevers, the spleen and mesenteric glands seldom are altogether sound. I have never witnessed an inspection of a case, either in temperate or in warm climates, that did not present lesions in one or more of these organs, beside those in the bowels; but some of these were manifestly consequences of the disease, and not associated with its early stages. With the exception of the complications with disease of the liver and spleen, the exact pathological state can seldom be ascertained during life. When the patient is very much emaciated, enlargement of the pancreas or of the mesenteric glands may be suspected, from hardness and fulness in the abdomen—usually between the pit of the stomach and umbilicus; and from aching pains in the back.—*β*. In the *dark races*, the complication of chronic dysentery or diarrhoea with disease of the liver is very rare; but those with enlargement of the *spleen* and of the *mesenteric glands*, with *worms*, and with *rheumatism*,—especially the last two,—are very common.—*γ*. In *children*, the association of the complaint with enlargement of the mesenteric glands, or with worms, is not infrequent; and the complication of the slighter or sub-acute states with *bronchitis* is sometimes also met with among them.

50. VI. TERMINATIONS AND PROGNOSIS.—i.

The Acute varieties of the disease may terminate—1st, in a return to health;—2d, in periodic or continued fever, or some visceral disease;—3d, in ulceration, and the extension of inflammatory action to the peritoneum, or perforation of the bowels;—4th, in sloughing of the internal tunics, and gangrene of portions of the intestinal tissues;—and, 5th, after having assumed a *chronic form*, in constriction of the colon, and other organic lesions; or in gradual exhaustion of the powers of the constitution.—

(a) A *favourable issue* may be expected, if the stools become less frequent, more copious and feculent, and the biliary secretion more natural; if the termina and tenesmus abate, and the patient be less disturbed in the night; if the abdomen be less painful, especially on pressure; and if tumefaction or tension be not present; if the febrile phenomena be alleviated, the pulse, tongue, and skin becoming more natural, between the sixth and seventeenth days in the asthenic forms; and if the symptoms indicating the other terminations be not observed.

51. (b) When the disease is suddenly arrested by astringents, or otherwise injudiciously treated, particularly when it arises from endemic and epidemic causes, it may pass into ague, remittent or continued fever; or into inflammation and abscess of the liver, or into peritonitis or enteritis. These results evidently arise from the stoppage of the discharge of morbid matters that require elimination from the system, and the consequent irritation these matters produce upon the nervous and circulating

systems, or upon the organs chiefly concerned in excreting them. But, on some occasions, these maladies may supervene, without any aid from the practitioner. When dysentery occurs in the *puerperal state*, particularly soon after delivery (and, when the disease is epidemic, females thus circumstanced are very liable to it), it is very apt to pass into peritonitis; or to be followed by effusion into the peritoneum, and even by inflammation of the womb. In 1832, I treated a case of sporadic dysentery in a lady who had not been pregnant for several years. It was followed by hysteritis; which, in its turn, was followed by phlegmasia dolens, first in one thigh, and then in the other. She is now in good health. In some instances, particularly in hot climates and in young children, intussusception of portions of the intestines may take place, and give rise to grumous or feculent vomitings, and all the symptoms of ileus. I have sometimes seen children seized, during dysenteric complaints, with convulsions, obstinate vomiting, distressing colicky pains in the abdomen, and stupor, followed by various sympathetic phenomena, and death; and, upon dissection, the only lesion, besides signs of irritation in the digestive mucous surface, has been invagination of more or less of the intestinal tube, and the usual consequences of this occurrence. In a case of this kind, which was supposed to have died of acute hydrocephalus by the medical attendant, and which was opened by Mr. ALCOCK in my presence, the greater part of the ilium had passed into the cæcum; and the cæcum, with its contents, into the transverse arch of the colon.

52. (c) If a favourable change take not place, in the more sthenic varieties, before the twenty-fourth day; and in the asthenic states, previously to the eighteenth or nineteenth days; or if only a partial change be observed; the disease usually either passes into the *chronic form*, or assumes still more severe characters.

53. (d) An *unfavourable termination* may be looked for, if the foregoing symptoms (§ 50.) be aggravated; or if no impression have been made upon the complaint, about the time stated above; or between the ninth and fourteenth days in the severe asthenic forms; if the abdomen become enlarged, tense, or tender, or preternaturally hot, especially about the umbilicus; or if pain increase rapidly, and be constant and fixed in one part; if the watery discharges, loss of blood, or the harassing frequency of the calls to stool, particularly at night, sink the powers of life, or be attended by cramps in the lower extremities, leipothymia, or syncope; if the face be anxious, or Hippocratic, and the body emaciated; if stupor, delirium, picking of the bed-clothes, startings of the tendons, supervene; if the extremities or surface be discoloured, or the former be cold or clammy, or the latter of a lurid hue, or exhale a cadaverous or an offensive odour; if drinking be followed by termina and a desire to go to stool; if the tongue be raw, glossy, or very dry, and dark red; or dark sordes collect about the teeth, or aphthæ appear in the mouth or on the lips; if the pulse be very weak, irregular, or intermittent, or rise in frequency to upwards of 120; if respiration be rapid, laboured, or difficult; if the breath be fetid and cold; if the matters vomited be offensive or grumous; if ecchymoses or sphacelating ulcers appear on the surface; if sight or hearing be partially lost; if paralysis of

the *sphincter ani* take place, and the stools be involuntary, or grumous, or like washings of meat, cadaverous, or mixed with small black coagula, or with light muco-puriform streaks, and especially if they contain sphaclated portions of the mucous coat; if the stomach be so irritable as to reject whatever is taken; and if complete strangury or suppression of urine take place. Hiccup is not an unfavourable symptom, if it occur early in the disease; but when it comes on at an advanced stage, it is often an indication of the extension of the disease to the peritoneum, or of the sphaclation of the mucous membrane.

54. *a.* *Ulceration* may take place early, even in the mildest forms of the disease, without causing any decided change. Most frequently, however, it is attended by aggravation of the symptoms; the stools passing from a mucous to a serous, sero-puriform, or grumous state. At its commencement, especially in the less inflammatory cases, little fixed or constant pain is felt; but as it advances through the coats, pain, in some form, is experienced. At an advanced period, especially when sphaclating ulcers exist, the stools become dark brown, muddy, or watery, and smell like washings of meat. The blood discharged is often of a darker colour, and sometimes mixed either with an ichorous sanies, or, in the more sub-acute or chronic cases, with purulent streaks. When the blood is in large quantity, and unmixed with the rest of the dejection, ulceration low in the canal may be inferred.

55. *β.* *Extension of inflammatory action to the peritoneum, or the omentum, or to the mesentery,* is generally owing to ulceration, and may occur either previously, or subsequently, to *perforation* of the intestinal parietes. If great increase of pain, with heat, fulness, and tension of the abdomen, distressing anxiety, restlessness, inability to sleep, frequent retchings, and copious discharges, *per anum*, of morbid secretions and faecal matters which had been retained while the spasmodic action of the bowel was in full force, supervene at an advanced stage, extension of inflammation to the peritoneal coverings may be inferred; and, if these symptoms take place suddenly, and are quickly followed by very painful meteorismus, hiccup, cold sweats, sunk countenance, jactitation or delirium, rapid and laborious breathing, a very wiry or small, irregular, and weak pulse, cold extremities, &c., they may be imputed to perforation of the bowel. Inflammation may also extend, generally with ulceration of the tunics, from the cæcum to the *appendix vermiformis*, and thence to the peritoneum; or to the external connecting cellular tissue, giving rise to abscesses in the right iliac fossa, that may open either into the cæcum, or externally. (See CÆCUM, § 19. 21.) A case of this description was treated by me in a warm climate, in 1817. It had been neglected in its early stages, and a very large abscess had formed and burst into the cæcum; extensive ulceration and sphaclation of this part being found on dissection.

56. *γ.* *Gangrene* seldom proceeds, even in the most severe cases, further than the mucous and submucous tissues; excepting in warm climates, where sloughing ulcers, sometimes of large size, penetrate all or most of the coats. This change is commonly occasioned by the extension of the inflammatory action to the tissues underneath,

and the consequent detachment and death of the portion of this coat covering the parts particularly affected; as the cuticle is detached by the effusion of fluid underneath it, when the vascular tissue of the skin is acutely inflamed. In such cases, portions of the partially sphaclated membrane hang loose in the canal, whilst the more external tunics are altered in colour, and softened. The symptoms indicating the commencement of sphaclation of portions of the mucous coat, are those detailed in the preceding paragraph, followed by leipthymia, or syncope when the patient is raised; a sudden remission of the tormina, abdominal pain or heat; singultus; cold, shrunk, and bedewed countenance and extremities; sense of cold in the abdomen; involuntary motions; lividity of the lips and cheeks; partial convulsive movements; extreme prostration, and the supine posture; glassy, inexpressive state of the eyes; cadaverous or very fetid smell from the evacuations, and the body; and, lastly, insensibility.

57. *ii.* *The Chronic forms*, besides terminating in ulceration and extension of inflammatory action to the serous surfaces, often superinduce thickening of the coats, and stricture, in some part of the colon or rectum, or of both, frequently with dilatation of the portion above the contraction; ultimately terminating, in some instances, in rupture of the more dilated and attenuated or ulcerated part, and effusion of the intestinal contents into the peritoneal cavity. In some cases, ascites comes on, or œdema of the lower extremities, or both, and the patient sinks in an exhausted and dropsical state.

58. VII. APPEARANCES ON DISSECTION vary with the form of the disease. In the inflammatory varieties, they are limited to the large bowels, and parts immediately connected with them; but in the asthenic and complicated states, especially in the scorbutic, the changes are much more extensive. — *a.* Upon opening the abdomen, the *omentum* is sometimes adherent to the superficial convolutions of intestines, or to the brim of the pelvis, or to some part of the abdominal parietes; but it is oftener drawn up to the arch of the colon, or to one side. The *bowels*, externally, present merely changes of capacity and colour, unless partial or general peritonitis have supervened. They are commonly distended by flatus, and variously coloured in different cases or parts, and frequently without the external colour having reference to the state of internal change. The large bowels feel in one place thick and doughy, in another thin and membranous. The colon is sometimes displaced or elongated, from relaxation of the longitudinal bundles of fibres; the transverse arch hanging down in a loop, or the sigmoid flexure passing over to the right side (ANNESLEY, &c.). Contractions of a considerable part of the colon are frequent, and sometimes the constrictions resemble those made by a ligature,—the parts above being distended and thinned; they are firm and almost cartilaginous in some chronic cases, and seated chiefly about the sigmoid flexure and arch of the colon, and more rarely in the rectum. Adhesions of the peritoneal surface of the colon to the adjoining parts, and effusions of lymph, or of serum, into the peritoneal cavity, also, are often seen.

59. *b.* Internally, the bowels present extensive and numerous changes. The villous coat is differently shaded in different parts; and varies

from a pale grey or sea green to a bottle green or violet colour; or from a pale pink to a bright red, or reddish brown, shaded with black. In some, the most opposite colours pass abruptly into one another. Large portions of coagulable lymph are sometimes found partially adherent on this surface. *Excoriations* of the mucous epithelium, the excoriated parts presenting a chocolate tint; detachment of portions of the villous coat, sinuosities existing underneath the parts intervening; *softening* of the internal tunics; *ulcerations*, in all the forms described in the article DIGESTIVE CANAL (§ 36—40.); and *sphacelation* of portions of the mucous and submucous tissues; are the most frequent appearances, and are met with, in various grades, in all the forms of the disease. The *ulcers* are either small, numerous, and clustered, or large, distinct, and few. They are often dark, extensive, and sloughy; the parts in which they are seated, as well as those surrounding them, being softened, or very easily torn, particularly in the asthenic varieties, and in the scorbutic complication. They are frequently elevated on a thickened or hardened base, in the more chronic cases, as described in § 36. *e.* of the article now referred to; or they present exuberant fungous or fleshy granulations on their surfaces. In some instances, their centres are very dark or blackish (PRINGLE, MONRO, &c.). Deficient vital cohesion of the coats of the bowels, they being occasionally torn as easily as wetted paper, is very common in the more asthenic varieties. In prolonged inflammatory cases, thickening and almost cartilaginous induration of a considerable part of the colon are not infrequent, the thickened or indurated portion being also contracted in calibre. In such cases, the parts above the contractions are greatly distended, the coats being thinned, ulcerated, and even lacerated; the contents of the bowel having passed into the peritoneal cavity, and occasioned rapidly fatal peritonitis. The *cæcum* is extensively disorganised; and the parts surrounding it are, in some cases, inflamed, or in a state of suppuration, or sphacelation (ANNESLEY and myself). The *appendix vermiformis* is also occasionally inflamed and ulcerated. The *small intestines* are very often inflamed, especially in the internal surface; and ulcerated in their lowest third, particularly in the asthenic varieties, and in the hepatic and scorbutic complications. In some instances, the ileo-cæcal valve having been ulcerated, extensive intus-susception of the ilium takes place into the cæcum and colon. Invaginations occur also in other portions of the intestinal tube, especially the ilium. (See DIGESTIVE CANAL, § 18—48.)

60. *c.* The *collatitious viscera* are generally diseased in the asthenic and complicated states. The *mesentery* and *mesocolon* are more vascular than usual; and the *glands* of the former are inflamed or enlarged, more rarely suppurated, especially in situations corresponding to large ulcers. A dirty-coloured fluid is occasionally effused in the peritoneal cavity in malignant or typhoid cases; and sometimes, also, in the thoracic cavities. The *spleen* is either enlarged or softened in the asthenic varieties, or when the disease is consequent upon periodic fever; and the *liver* is congested, inflamed, suppurated, or otherwise disorganized, in the hepatic and scorbutic complications. Congestion of the portal vessels is very common in

both the asthenic and sthenic forms. Injection and changes of colour of the internal surface of the *stomach* and *duodenum*, and accumulations of viscid thick bile in the *gall-bladder*, are frequently observed. The *pancreas* is sometimes enlarged, and presses upon the common duct. The *urinary bladder* is occasionally inflamed about its neck, or in its external tunics; and the *prostate* somewhat enlarged. In the dysentery recently epidemic in Ireland, Dr. O'BRIEN found the liver diseased in one half the dissections; the spleen in one fourth; the small intestines in two thirds; and the colon and rectum in all. In chronic cases, in the British army in the Peninsula, the spleen, liver, pancreas, mesenteric glands, &c., or any two or all of these, were more or less diseased (Sir J. M'GRIGOR, Dr. FERGUSON, Dr. SOMERS, Dr. FORBES, &c.).

61. *d.* In the most malignant varieties, and in the scorbutic complication, the internal surface of the whole digestive tube is of a livid, purple, or dark colour; with patches of ecchymoses, excoriation, ulceration, and sphacelation. The villous coat, particularly in the seat of ecchymoses, may readily be rubbed off; and the ulcers have a foul and dark appearance. The liver is sometimes large, soft, and spongy; at others, pale and soft, especially in cases where the loss of blood has been very large. The spleen is sometimes so softened as to appear semifluid or sphacelated. The heart is often partially softened or flaccid; the pericardium and pleural cavities containing a bloody, dark, and dirty serum. The lungs are often congested; the bronchial lining dark, or ecchymosed; and the blood in all the large vessels is semifluid, black, and of a very loose texture. Indeed, the vital cohesion of all the tissues is, in these forms of the disease especially, more or less lost. In the *dark races*, the digestive mucous surface is usually paler and softer than natural, or discoloured or sphacelated; the follicles enlarged or ulcerated; the coats of the cæcum and colon very easily torn; the liver pale, soft, and small; the spleen enlarged and softened; the pancreas occasionally enlarged, and the mesenteric glands always enlarged, or otherwise diseased.

62. VIII. DIAGNOSIS.—Dysentery often very nearly approaches either *fever*, *diarrhæa*, *cholera*, or *colic*; and it frequently supervenes upon one or other of these diseases; fever, diarrhæa, &c. almost insensibly passing into it.—(a) *Fever*, especially some of its endemic and epidemic forms, sometimes assumes an enteric character, closely resembling the asthenic states of dysentery, particularly as respects both the frequency and character of the evacuations; a circumstance which led SYDENHAM, BLANE, JACKSON, and others, to consider the latter as fever turned in upon the bowels. Although, in some cases, the one may insensibly pass into the other, yet idiopathic fever, with predominant enteric affection, will be distinguished from dysentery by the more marked constitutional affection before the bowels become disordered, by the much less pain and difficulty in the excretion of urine, by the absence of severe tormina and straining, and by a more feculent state of the evacuations, than in any of the forms of the latter disease. It has been supposed by many writers, that the more asthenic or malignant states are mere associations of dysentery with adynamic or typhoid fever: but, instead of

viewing these states as complications of two diseases distinct from each other in their nature and seat, it would be more philosophic to consider them as coexistent results of the operation of certain concurring causes upon the economy; which causes, according to their natures, and the predisposition and habits of the affected, induce effects partaking more or less of the characters of either fever or dysentery. In most instances, where the disease seems to have been thus mixed, animal emanations, a close and impure air, or other depressing and contaminating agents, acting either internally or externally, and aided by epidemic influence, have manifestly existed. But it is rather to the presence of those agents, in such a form as to act upon the excreting viscera and *prima via*, or in such combinations as to determine their effects to this quarter, assisted by antecedent disorder or predisposition of the digestive and excreting viscera, that the adynamic states of dysentery are to be imputed. Thus an impure or infected air—either short of inducing, or even sufficient to induce, the worst forms of fever—may produce a malignant or typhoid state of dysentery, when aided by unwholesome water or diet; and this latter cause, unassisted by the former, may also occasion the same disease, in a similar or a less severe form, in those greatly predisposed. Hence, according to the nature and concurrence of causes, will effects upon the frame be induced; which will insensibly approach fever on the one hand, and the most simple and perfect dysentery on the other.

63. This modification of the disease, with the nature of the disposing and exciting causes, is further illustrated by the intermitting and rheumatic characters occasionally assumed by it, in both its endemic and its epidemic states of prevalence. In localities where marsh miasmata abound, and where the water or the food are unwholesome, or other causes of dysentery prevail, this disease often either assumes, in both its acute and chronic forms, in warm climates especially, an intermitting or remittent type—most frequently the latter—or supervenes upon or passes into these, or into continued fever. Of this I have seen numerous instances; and similar facts have been recorded by nearly all the writers on the diseases prevalent in the armies engaged in the last wars. In certain of its epidemics, especially those which prevail in cold and moist seasons, dysentery sometimes follows, or is otherwise connected with, catarrhal affections, as observed in those recorded by STRÖM, G. BAKER, and NEUMANN; and it occasionally is complicated with rheumatism, particularly in one or more of the joints or extremities, the amelioration of the one affection being often followed by aggravation of the other. The association of dysentery and rheumatism, and their conversion one into the other, are stated by Dr. SIMS to have been remarkable, in the epidemic in London, during 1769 and 1770. A somewhat earlier and a more distinguished writer, —Dr. AKENSIDE,—likewise alludes to this subject, in a manner worthy of the most philosophic of our poets, and observes:—"Novimus præterea, eadem tempestate et ob easdem causas rheumatismum quoque frequentissimum fieri;" whilst he states, in another place, that, although these diseases prevailed separately, they were, owing to the similarity of their causes, often coexistent,

or consequent the one on the other: a circumstance not confined to this climate, and occasionally observed in certain seasons, but also remarked amongst the natives of intertropical regions.

64. (b) *Diarrhœa* is so very closely allied to dysentery, that they may be viewed as varieties or grades of the same morbid actions. Nosologists, in their rage for drawing distinctions, which exist only in extreme cases, have wittingly overlooked the fact, that, between both diseases, there often scarcely exists a shade of difference; whilst, between the extremes, the distinction is sufficiently wide, and easily made. Dysentery frequently follows simple diarrhœa, or diarrhœa attended by fever; and is itself also followed by diarrhœa, in some one or other of the forms in which it is described; and both diseases may be merely the sensible phenomena either of the irruption and excretion of morbid secretions, or of inflammatory irritation, affecting somewhat different portions of the alimentary canal. Yet, although thus very closely allied in nature and form, they are very often distinct, as respects—1st, the seat of disease; 2d, the affection of the system generally; and, 3d, the symptoms resulting from each.—*a. Diarrhœa* is generally sporadic, and never infectious;—*β.* It occurs at any season, and is more commonly a chronic disease than dysentery;—*γ.* It is usually neither preceded nor attended by fever;—*δ.* It is unaccompanied by severe tormina and straining;—*ε.* In it, the evacuations are more or less abundant, and not bloody;—*ζ.* It is seldom attended by vomiting or heat of skin, or by early depression of the powers of life, as observed in dysentery;—*η.* The history of the disorder, particularly in relation to its causes and constitutional disturbance, will point out many points of dissimilarity between it and dysentery.

65. (c) *Cholera* differs from dysentery,—*a.* In appearing only during the latter part of summer, and in autumn;—*β.* It is a most acute disease, running its course in from one to two or three days;—*γ.* It is unattended by straining, or blood in the stools;—*δ.* In it, the stools are abundant, very frequent, and the vomiting almost constant;—*ε.* Spasms of the legs and abdominal muscles, characterising cholera, are seldom met with in dysentery, excepting towards an unfavourable termination of the super-acute cases. It should not, however, be overlooked, that cholera sometimes runs into dysentery, evidently owing to the irritation excited in the large bowels by the morbid secretions poured into the digestive canal.

66. (d) Dysentery can hardly be confounded with *colic*, if due attention be paid to the history of the case.—*Colic from lead, bilious colic*, and *ileus* from hardened substances in the bowels, or from invagination, sometimes present features of resemblance to dysentery; particularly the violent pains in the abdomen, vomiting, and occasionally abortive efforts at evacuation, with very scanty watery or bloody discharges. But, in these, there is neither antecedent diarrhœa, nor attendant fever, nor frequent calls to stool, nor tenesmus, nor any considerable evacuation in the aggregate, nor fixed pain in the hypogastrium, nor scanty, difficult, and painful excretion of urine, or *tenesmus vesicalis*,—all which characterise dysentery. In these, also, vomiting is much more urgent, sometimes becoming feculent, and the paroxysms of

pain more violent, particularly around the umbilicus, than in this disease; the matters received into the stomach being ejected from it without exciting either a desire for stool, or tenesmus. It should, however, be kept in recollection, that the bilious or endemic colic of warm climates (see COLIC, § 16.) in some cases differs but little from dysentery, and that chiefly as respects the more complete retention of the morbid secretions and excretions, as will be seen from the history of both diseases.

67. (e) *Internal Hemorrhoids* sometimes give rise to symptoms resembling dysentery, — or rather to tenesmus, an affection entirely of the rectum, the seat of these internal tumours. The tenesmus of hemorrhoids, whether attended by discharges of blood or not, is strictly a local complaint, is seldom severe or preceded by tormina, or frequent calls to stool, or much constitutional disorder; and is a simple obstruction to the passage of consistent stools, which are not mucous, and not streaked with blood, which, if passed at all at stool, is entirely distinct from the fecal evacuation; the hemorrhoidal tumours often protruding at the time. These, independently of the different circumstances under which both diseases occur, and the history of their progress, are sufficient to distinguish them from one another.

68. IX. PATHOLOGICAL INFERENCES. — I. THE MODES OF OPERATION OF THE CAUSES. — There is, perhaps, no other disease which requires a more accurate analysis of its pathological conditions, with strict reference to their causes, than dysentery; for these causes induce so very different states of morbid action in connection with that which especially constitutes the malady, that the practitioner will often attempt in vain either to limit its spread, in circumstances requiring this precaution, or to arrest its progress in particular cases, without being acquainted with the operation of its diversified causes upon the system, and the nature of the effects they induce.

69. 1st. *Operation of causes which dispose to the disease* (§ 9. 22.). — These, when their nature is known, and their mode of operation ascertained, may be sometimes averted, and an attack thereby prevented, especially when the malady is prevalent. — (a) High ranges of temperature, and consequently hot seasons (PISO, HILLARY, STRÖM, HUFELAND, &c.) and climates, so very generally predispose to dysentery, that it most commonly occurs either during, or subsequent to, these states of atmosphere. The effects of a high temperature upon the pulmonary functions, and consecutively upon the blood, and the biliary and other secretions and excretions, are such, as fully explained in the article DISEASE (§ 32—34.), as greatly to increase and disorder these latter, especially when the circulation is determined towards the abdominal organs by exposure to cold, or when assisted by other concurrent causes. — (b) Peculiar states of air, connected with the epidemic manifestations of the disease (HUXHAM, HORN, SCHMIDTMANN, &c.), and with certain features which different epidemics often present, whether referred to noxious exhalations floating in this fluid, or to extreme humidity, or to electrical conditions of it affecting the electro-motive states of our frames, most probably influence the organic or vital actions, especially the circulating and secreting functions, in such a manner — although slightly or latently — as to render them re-

markably liable to this species of disorder upon exposure to any of the exciting causes. And it is not improbable that these states, as well as high ranges of temperature, favour the production and accumulation of morbid secretions in the biliary apparatus and in the prima via; and that these secretions, aided by consecutive causes, induce that form of action constituting the disease, although tending to their evacuation from the frame. — (c) An asthenic or exhausted state of the constitution, and of the digestive canal in particular, insisted upon by MARCUS, has certainly no mean influence as a predisposing cause, as shown by the greater prevalence of the disease in persons of this description in all climates and in most epidemics, in soldiers after very fatiguing marches, and in convalescents from fevers and other diseases. — (d) To these may be added the use of intoxicating fluids, as disordering both the digestive mucous surface and the secretions poured into the intestinal canal.

70. 2d. *Of the operation of causes which, either individually or conjointly, excite the disease.* — A. *Those which act locally, or affect chiefly the large bowels.* — (a) Many of these irritate or inflame the mucous surface of the cæcum, colon, and rectum. These bowels perform chiefly an excreting function; and consequently, when the excretions which are proper to them, as well as those which are poured into them from the small intestines, are allowed to accumulate, irritation or inflammation of the mucous surface, with inordinate action of the muscular coats, may be expected to occur. Irritating purgatives, injudiciously prescribed; a dose of rancid castor oil; foreign bodies lodged in the intestines; the too liberal use of fruit, especially that which is unripe (HORST, GIRTANNER, M'GRIGOR, &c.), or the fruit of hot climates (BÜCHNER, TWINING, myself, &c.); various indigestible substances; uncooked or imperfectly cooked meat or other food; pork; sour or bad wine; minute insects, or their ova and animalcules, in the water used for drink (LINNÆUS, SEBASTIAN, MAY, LATREILLE); and intestinal worms (constituting the *Dysenteria verminosa* of BONET, MAY, and BAUME); seem to act in this manner. — (b) Several agents determine inflammatory irritation of, and an inordinate flux of fluids to, the mucous surface of the large bowels, and their usual results. The causes just enumerated necessarily act in this manner, although not so immediately, nor to the same extent, as the following: — Exposure to cold, or cold and moisture, especially during or immediately after great atmospheric warmth, has been considered by BÜCHNER, STOLL, FISCHER, LARREY, and others, to produce the disease, and at the same time to impose on it a rheumatic character; whilst OSIANDER considers that, of itself, cold will not have this effect; and that the presence of morbid matters in the prima via, or the concurrence of some other cause, is necessary to its operation. The influence of the causes of common catarrh, insisted on by STRÖM, SCHLEGEL, and NEUMANN, although not so great as these writers suppose, is often well marked, especially in sporadic cases, and in some seasons. These, and several other authors, consider that the disease is catarrh, or catarrhal inflammation, of the large bowels, from remarking its prevalence about the same time as that affection. The suppression of other evacuations, or the drying up of accustomed discharges, and

misplaced gout (MUSGRAVE, STOLL, &c.) — the *Dysenteria arthritica* of SAUVAGES — are probably also concerned in its production in some instances; contingent circumstances causing the determination of morbid action to this quarter.

71. *B. Causes which disorder the secretions poured into the intestinal canal, and thereby affect its mucous surface.*—(a) Suppression of the secretions and excretions poured into the large bowels, especially the biliary fluid, and accumulations of mucus in the follicles, are not altogether without effect in causing or prolonging the disease, especially some of its protracted states; and several of the exciting agents, particularly cold, moisture, and malaria, partly act in this way. In many cases, both sporadic and epidemic, the absence of bile from the stools is a prominent symptom; the free discharge of this fluid being generally followed by more or less rapid amendment. Deficiency of this secretion evidently renders the chyle irritating or otherwise hurtful to the bowels; their mucous surface and follicles being moreover deprived of the salutary influence which a healthy state of this secretion exerts upon them; whilst accumulations of mucus in these glands irritate or inflame them, and favour the changes they usually present in fatal chronic cases.—(b) Other causes may operate by changing one or more of the secretions poured into the large bowels, either in quantity or quality. Thus, excess, and acridity with excess, or even with diminution, of these secretions, may irritate or excoriate the villous surface of the large bowels, during a prolonged retention of them occasioned by the conformation of the cæcum and colon, and by the spasmodic action of the muscular fasciculi of the latter. Many endemic causes act by disordering or vitiating the abdominal secretions and excretions, especially those of the liver (FORSTER, WENDELSTADT, FISCHER, BRÜNING, &c.); and antecedent diseases, as agues, remittents (PRINGLE, HUNTER, J. M'GRIGOR, FERGUSON, &c.), and continued or epidemic fevers (CHEYNE, O'BRIEN, &c.), operate in a similar manner. Preexisting affections, also, of the collatitious viscera, particularly of the liver (PISO, MENJOTUS, JUNCKER, BOAG, BIANCHI, J. JOHNSON, &c.) and pancreas, have a still more common and manifest agency; and it is probable that the influence of imagination, fear, and terror, mentioned by HOFFMAN, VOGEL, HARGENS, and NAUMANN, is exerted through the medium of the secreting organs, as well as upon the bowels themselves.

72. *C. Other causes seem to affect the intestinal mucous surface, the secretions poured into the canal, and the circulating fluids, disordering, also, the organic nervous influence by which these are controlled or modified.*—(a) The use of unripe and blighted grain (WRIGHT, GEDNER, &c.); of the flesh, and especially the viscera, of diseased animals (HOEFFNER, &c.); famine and unwholesome food (MUHLIUS, DESGENETTES, VIGNES, GRAVES, &c.); water holding putrid animal and alkaline substances in solution (PROCOPIUS, RHODIUS, MOEGLING, BIRNBAUM, BELL, &c.); and stale fruit or vegetables, act in this complex manner; putrid water especially exerting a septic action upon the digestive mucous surface, upon the circulation, and, ultimately, upon the soft solids.—(b) The causes which pro-

duce scurvy also give rise to scorbutic dysentery (§ 39.), by a nearly similar mode of operation.—(c) Morbid matters absorbed from ulcerating surfaces and parts, especially from sloughing, malignant, or phagedenic ulcers, by contaminating the blood, disorder the secretions poured into, and those elaborated by, the intestinal canal, so as frequently to occasion asthenic dysentery or diarrhœa. Of this form of the disease, numerous instances occurred in naval and army hospitals during the war. Mr. COPLAND HUTCHISON has devoted a chapter of his able "*Practical Observations on Surgery*," to this procession of morbid action, as it occurred in the navy, during his extensive public service.

73. *D. Lastly, some causes, and these the most energetic, affect the circulation, and, through it, the secretions poured into the bowels; ultimately contaminating, more or less, the solids as well as fluids, and disorganising the intestinal canal, if the disease be not arrested in its progress.*—(a) Miasmatic exhalations (LIND, KREYSIG, MICHAËLIS, &c.); the emanations from animal exuvie (OSIANDER, &c.); or a mixture of both (ANNESLEY, myself, and others); and the effluvia proceeding from the bodies of a number of persons confined in small space, and in a close air (ATCHESON, &c.); by vitiating the air used in respiration, affect the whole mass of blood as it circulates through the lungs; those organs, especially the liver, whose office it is to eliminate injurious matters from the circulation, and thereby to preserve the purity of this fluid, necessarily forming, from the morbid elements furnished them in it, acrid, septic, or otherwise morbid secretions, which, as actually proved by experiment, irritate and excoriate the tissues with which they remain any time in contact.—(b) No doubt can be entertained by any one whose range of observation has embraced the more asthenic varieties of the disease, of the emanations which proceed either from the bodies of the affected, or from the fecal discharges in circumstances of concentration, and of predisposition on the part of those exposed to them, being capable of producing and spreading the malady, either in the manner now stated in respect of other animal emanations, or through the medium of the saliva and upper portion of the digestive canal. The contagious properties of dysentery have been keenly disputed: WILLIS, PISO, STOLL, HORN, VANDER HAAR, RENTON, BALLINGALL, &c., asserting that it does not possess these properties; and HORSTIUS, FORESTUS, HILLARY, MORTON, PRINGLE, BARBOU, BRÜNING, BALFOUR, J. HUNTER, CHISHOLM, OSIANDER, NEUMANN, BONER, HARTY, HARGENS, G. BLANE, HUFELAND, PENADA, MICHAËLIS, HALLORAN, POOLE, CHEYNE, C. HUTCHISON, RUTHERFORD, JONES, and others, contending that it generally is infectious, especially when epidemic, or when occurring in camps, crowded ships, and under circumstances contended for above (§ 24.), and more fully illustrated in the article INFECTION. I believe that the views exhibited at these places are conformable with those entertained by every well informed and experienced observer and writer at the present day.

74. *ii. MORBID CONDITIONS.*—A. It is impossible to contemplate aright the changes constituting the various forms and stages of the disease, apart

from its causes and their modes of operation.—(a) Many of these affect more or less immediately the large bowels, without any previous constitutional derangement (§ 70. A.); and accordingly the morbid action is chiefly local, sthenic, or phlogistic in its character, as described under the first species of the disease (§ 12, 13.), and, in many instances, is simply inflammation of the cæcum and large intestines.—(b) In cases produced by suppression or vitiation of the secretions poured into the bowels (§ 71. B.), previous disorder, of either a latent or manifest kind, is necessarily present; diarrhoea frequently ushering in the disease; and the local affection, as well as the constitutional disturbance, evincing more or less of sthenic or asthenic characters, according to the state of the patient and the nature and concurrence of the causes. Some of these are also consecutive, complicated, chronic, or even symptomatic, hepatic dysentery belonging to this class of cases.—(c) In most such cases, and in many of the simple as well as of the most severe forms, congestion of the portal vessels, and obstruction of this part of the circulation, are concerned in the production and perpetuation of the dysenteric symptoms.—(d) Although dysentery is frequently occasioned by offending matters in the *prima via*, as believed by SYDENHAM, and many others, yet these matters are not so generally retained, either in the form of scybala, or in any other state, as CULLEN, and many more recent writers, seem to have supposed.—(e) There appears not to be sufficient evidence of the inflammatory forms being rheumatic in their nature, as suggested by VOGLER, STOLL, RICHTER, FISCHER, SIMS, SCHMIDTMANN, HUFELAND, HARGENS, &c.; although both complaints are sometimes allied, especially in respect of the exciting causes, as justly remarked by AKENSIDE, &c., and are occasionally associated, or consecutive the one of the other.—(f) In cases that proceed from unwholesome food or water (§ 72. C.), and in those caused by animal exhalations and infectious effluvia (§ 73. D.), although there may be at the commencement excited vascular action, the circulating and secreted fluids, and ultimately the soft solids, become more or less contaminated, and the disease assumes either a simply asthenic, or malignant form, disorganization of the internal surface of the large bowels often taking place earlier than in other cases, with the exception of the hyperacute inflammatory form met with in hot climates. In most of these malignant cases, the vitiated or morbid matters either conveyed into, or generated in, the circulation, in the process of their discharge by the emunctories give rise to an acrid or excoriating state of the excretions (or the morbid action excited in the secreting organs and surface occasions this change in the fluids they elaborate, as occurs in coryza, &c.), together with an increase of their quantity; but these changes frequently occasion at the commencement merely diarrhoea; the dysenteric symptoms being consequent upon the evacuation of the intestinal contents, and caused by the excoriation of the mucous surface, by the vitiated secretions, and by the irritation of the muscular coat; the local disorder reacting upon the constitutional disturbance.

75. B. In the early stage of most forms of the disease, the irritating effects of the morbid secretions and excretions are first exerted upon the

cæcum and rectum; the latter being often so spasmodically constricted as not to allow the discharge of the more solid matters that may exist in the bowels; the retention of these and of the fluid secretions increasing the diseased action in the large, and ultimately in the small, intestines; ulceration, excoriation, sphacelation, &c. being frequently the result.—(a) In those cases which originate in a morbid state of the secretions, &c. (§ 74. b. c.), fecal matters are generally fully evacuated before the tenesmus, distinctive of this affection of the rectum, comes on; the only morbid matters retained being those thrown out upon the mucous surface of the intestines, and poured into them from the collatitious viscera; but these are so vitiated and injurious, that their correction or evacuation becomes indispensable.—(b) In the asthenic varieties, to which most of such cases belong, the dysenteric symptoms are consequences chiefly of the vitiated secretions poured into the large bowels; this vitiation resulting from constitutional disorder, and the state of the circulating fluid: these morbid conditions should, therefore, be made objects of primary attention in the treatment of the disease.—(c) The matters poured into, and retained in, the large bowels, in asthenic cases especially, are to be considered as formed of elements which would be speedily noxious if retained in the circulation: they are excretions, in the strictest sense of the word, removed chiefly by the liver and digestive mucous surface; occasioning, from the morbid elements of which they are composed, and acrid properties they possess, severe irritation of the parts upon which they are retained, or along which they pass, in the progress of their discharge from the body.—(d) Granting that the dysenteric phenomena are thus produced, and that the morbid matters causing them are thus formed, it is manifest, that the mere suppression of these phenomena, or the retention of the morbid excretions, must be followed by disorganising effects upon the large bowels; and that the suppression of the secretions, being an arrest of the depurating functions, must be productive of a still more serious change in the circulating fluid, and ultimately in all the soft solids.—(e) In many cases of all the forms of the disease, the excreting function of the skin is more or less completely put a stop to, and that of the kidneys materially impeded; the excretions of the intestinal canal, and frequently those of the liver, being in excess, as well as otherwise disordered,—conditions, equally with the foregoing, requiring to be made the basis of therapeutical indications.—(f) Whilst, therefore, the cutaneous and urinary excretions are interrupted, the sudden arrest of those poured into the intestinal tube would endanger the patient, by increasing the morbid state of the circulation, and by superinducing either fever of a bad form, or inflammation and its consequences in the abdominal organs, or dropsy.—(g) In the varieties consequent upon a morbid state of the secretions poured into the bowels, the small intestines are frequently also diseased, but in a less degree than the large, as they present no obstacle to the speedy transit of these secretions along them, excepting near the cæcum, where they are usually more altered than in any other part.

76. C. The most frequent association of dysen-

tery, and one often very imperfectly manifested by symptoms, is that with *disease of the liver*. —(a) The hepatic affection may be *primary*, in which case it is either *functional* or *structural*; the *functional disorder* consisting—*a.* of torpid or suppressed function and passive congestion; or, *β.* of increased secretion, and of the vascular determination requisite to such increase;—the *structural disease* being—*α.* *acute*, or consisting of active congestion, or inflammation, or of abscess in the substance of the organ; or, *β.* *chronic*, with various alterations, occasioning obstructed circulation through the portal vessels, and an insufficient as well as a morbid biliary secretion: in these states, the bowel complaint may be viewed as *symptomatic* of the hepatic disease.—(b) The affection of the liver may be a *coëtaneous effect*, with that of the bowels, of the same causes: in this case, the former will be of the *functional* and *acute* kinds enumerated above; *abscess* occasionally supervening in the advanced stages of the associated malady. This form of complication is most common in warm countries, where, the causes of both diseases being nearly the same, these associated results may reasonably be expected.—(c) The hepatic change may be *consequent upon the dysenteric malady*, especially in its more chronic states. In cases of this description, the substance of the liver is either inflamed, softened, and discoloured; or it contains one or more purulent collections, with or without any surrounding cyst; the matter being sometimes infiltrated into the softened, and apparently not inflamed structure of the organ. Here the hepatic change is contingent upon the bowel disease, in its advanced stages, and is favoured by constitutional vice or injudicious treatment, or both; and occasionally by the nature of the predisposing and exciting causes, as by habits of intemperance. In these three states of this important complication, the symptoms are often obscure. In the *first* and *second*, they are frequently very manifest; but, in the *third* especially, they seldom admit of more than suspicion, arising from the obstinacy of the disease, the lurid and lightly jaundiced appearance of the surface, the morbid state of the biliary and other secretions, and the irregular or hectic form of febrile disturbance; chills, rigors, or even horripilations, being seldom felt. The severity, also, of the dysenteric symptoms sometimes masks, or draws off the attention of both patient and physician from, the hepatic disorder.

77. The frequency of the *third, latent, or superinduced form* (§ 76. c.) of hepatic complication, especially in the more chronic cases of dysentery, has given it much practical importance; and, as a knowledge of the manner in which it arises is necessary both to its prevention, and to its removal, several attempts at explaining the occurrence have been made. These have been remarkably vague and unsatisfactory. I shall therefore state, with but little reference to them, the only ways in which it can be brought about.—1st. The irritation and increased vascular action in the intestinal canal must necessarily be followed by augmented circulation through the portal vessels, by a more copious secretion of bile, and, if at this time the liver be congested, or its ducts loaded, and especially if the blood abound with excrementitious elements, by an acrid and morbid, as well as augmented, secre-

tion.—2d. The absorption of injurious ingesta, or of morbid matters formed or retained in the *prima via*; or of puriform matter from the inflamed or ulcerated mucous surface, into the mesenteric veins and portal circulation, must necessarily be productive of the following effects:—*α.* A vitiated, or an increased, or both a vitiated and increased, secretion of bile;—*β.* Irritation of the structure of the liver, followed by inflammation or softening, often rapidly passing into suppuration, without much tumefaction or previous sthenic or phlogistic action;—*γ.* The deposition or infiltration of puriform matter in the substance of the organ, especially when a puriform fluid is carried from the diseased bowels;—*δ.* Inflammatory action, and its consequences, in the vessels along which the morbid matters pass, and on the blood they contain.—3d. It is extremely probable that inflammation extends from the ulcerated mucous or submucous membranes to the radicles of the veins, and from thence along their ramifications and trunks, the product of the morbid action mixing with and contaminating the blood which circulates to the liver, as in the foregoing—the 2d—case, and producing the same effects, the inflammatory action extending more or less to the ramifications of the portal vessels. It seems most probable that the above are the chief modes in which disease of the liver is superinduced in the course of dysentery; and that one or all of them more or less obtain, in different cases, or even in the same case. Without, however, denying that the procession of morbid action contended for by some writers, and about to be noticed, sometimes takes place, I may state, in support of the preceding, that M. RIBES (*Revue Méd.* 1825, t. iii. p. 5. *et seq.*) found puriform matter in the veins, and inflammation of their coat, in several cases where purulent collections had formed in the liver after ulceration of the inner surface of the bowels. M. GENDRIN (*Hist. Anat. des Inflamm.* t. i. p. 707.) observed similar changes in the veins in the vicinity of intestinal ulcers; and M. ANDRAL (*Anat. Pathol.* vol. ii. p. 421.) detected false membranes lining the ramifications of the vena porta, in a person who died from disease of the bowels and liver. The very frequent collections of pus, and puriform infiltrations in the mesenteric glands, in the protracted states of dysentery, should also not be overlooked, as supporting the above inferences, especially if we take into account the intimate connection of this part of the absorbent system with the veins contributing to form the portal system.—4th. It has been supposed by M. BROUSSAIS and his followers, that inflammatory action extends from the small intestines, along the bile ducts, to the liver; and some cases, that have been observed by him, Mr. ANNESLEY, M. ANDRAL, and myself, where inflammatory action or its results were seen in the common and cystic ducts, would seem to favour this view, if they could not be otherwise accounted for. It may be admitted, that the extension of disease to the small intestines is very frequent in the hepatic complication; but it is most probably excited, as stated above (§ 75. c.), by morbid bile, which also may have produced the inflammatory appearances occasionally observed in the ducts by which it is excreted.—5th. The irritation in the bowels, or the operation of substances given

to cure the disease, may be sufficient to excite a sympathetic irritation, and its occasional consequence—suppuration—in an asthenic state of the system, in an organ so intimately connected, in its circulation and nervous influence, with the bowels, as the liver is. This, certainly, may possibly occur, but we have no proof of it; nor, indeed, does it admit of unexceptionable evidence. It is, however, very likely that the constant, or injudicious, use of calomel and irritating purgatives, when the substance of the liver is congested, and the bowels in a state of irritation, may give rise to abscess or other structural change in the liver; whilst, on the other hand, a similar practice during hepatic disease, may superinduce dysentery, without removing the primary complaint.

78. *D. Chronic* as well as other forms of dysentery may be associated with disease of the spleen, pancreas, or mesenteric glands; either, or even all, of which may occur, and indeed often does occur, in the same case, especially where endemic causes are in operation,—the hepatic complication being sometimes also superadded.—(a) As respects the disease of the *spleen* and *pancreas*, the procession of morbid phenomena is not often manifest; but these lesions are most frequently seen where dysentery has arisen from these causes, or has been consequent upon periodic or continued fevers; the splenic enlargement having often preceded the bowel affection.—(b) In respect of the lesions of the *mesenteric glands*, there can be no doubt of their being the results of intestinal irritation or ulceration; the most remarkable changes, especially purulent collections, having been seen in those corresponding to the seat of large ulcers.

79. *E. Relapses*, or repeated attacks after the patient has once had the disease, are very common, especially if he remain exposed to the endemic or other exciting causes, as in hot climates and during campaigns or sieges; or if he be addicted to intoxicating liquors. They are also frequent when the complaint has been associated with affections of the liver, or spleen, or consequent upon obstinate intermittents, and when recovery had not taken place until after it had assumed a chronic state. In such circumstances, slight errors of diet, or exposure to cold, and noxious emanations, will often speedily reproduce it. The numerous *relapses* observed in unhealthy localities, and amongst soldiers and sailors, are chiefly attributable to a too early discharge from medical care, and return to irregular habits and injurious exposures; and to the abrupt resumption of a stimulating diet.

80. *X. TREATMENT.*—Towards the close of the last century, and at the commencement of this, the treatment of dysentery, as set forth in various papers and works, by authorities confided in at the time, was absolutely below the standard furnished by the ancients, and by writers in the sixteenth and seventeenth centuries, not merely in respect of the knowledge and appropriation of therapeutical means, but even as regards the justness of pathological views; without which, indeed, no medicinal agent can be even safely prescribed. If any one think this assertion paradoxical, let him refer to the sources pointed out to him in the sequel; and, with a slight allowance for phraseology, he will perceive that, as to this disease, as well as to many others, knowledge has

not been always progressive; and that the unsound and narrow doctrines in medicine, that sprang up soon after the middle of the last century, have contributed not merely to its retardation, but to its retrogression. The cant about experience, so recently raised, and kept up by those the least entitled to the distinction it should rationally confer, threatens an equal, although very different, obstacle to the progress of medical knowledge, by being made without reference to the fact, that experience in medicine consists not in opportunities, or the number of objects seen, or even in the repetition of the same experiments or observations; but in the qualities of the mind of the observer; in due preparation for the task by literature, philosophy, and science; and in the application of them to the object successively investigated. Thus qualified, opportunities will seldom be wanting, and the results will soon accumulate so as to enrich the mind of the inquirer to an extent to which the empirically—the ignorantly experienced, will ever remain a stranger; and will be of such a description, as can be attained only by a mind so constituted and so instructed.

81. *i. OF ACUTE DYSENTERY.*—*The general indications of cure*, are—1st. To remove the causes, predisposing, exciting, and concurring; and, when it is requisite, or circumstances will permit, to place the patient in a pure and open air.—2d. To subdue inflammatory action by antiphlogistic measures, when its presence is rationally inferred, or when the state of the attendant constitutional affection will admit of them, or to the extent to which it may be benefited by them.—3d. To promote the excretions of the skin and kidneys, and to determine the circulation to the cutaneous surface.—4th. To remove, by gentle and appropriate means, the morbid matters that may remain or collect in the *prima via*, and to dilute and correct them.—5th. To protect the mucous surface of the bowels from their irritating and excoriating action.—6th. To correct the morbid condition of the circulating and secreted fluids, in the asthenic and malignant varieties, or whenever this condition may be inferred, conformably with the views explained in the articles *BLOOD, DEBILITY, DISEASE, and SYMPTOMATOLOGY.*—7th. To support vital power, if it fail in the progress of the sthenic forms, and early in the asthenic varieties, as being indispensably requisite to the correction of a morbid state of the fluids.—And, 8th. To palliate urgent symptoms, or to arrest such as are attended by immediate danger, as soon as they appear. An appropriate use of energetic means will generally accomplish, simultaneously, two or more of these intentions.

82. *A. TREATMENT OF THE STHENIC FORMS.*—(a) *Bleeding*, general or local, or both, according to the severity of the disease and constitution of the patient, and repeated accordingly, is generally requisite. The application of a number of leeches to the abdomen, in the slighter cases, or after venesection in the more severe attacks, and of fomentations, or warm poultices, frequently renewed, after the leeches have fallen off, will give much relief. If tenesmus or dysuria be urgent, and pain be felt along the sacrum, the leeches may be placed there or on the perineum, or cupping on these parts may be directed. Although vascular depletion is most serviceable early in the disease, yet it should not, in these forms, be

neglected in the advanced stages, when it has been either omitted, or directed in too small a quantity, unless the symptoms are such as contraindicate it. When fixed pain is felt in the region of the cæcum, or in the course of the colon, leeches should be repeatedly applied until it is removed.

83. (b) *Purgatives and laxatives* have been long recommended, and employed with a most injurious want of discrimination, on the supposition that the disease is caused, and kept up, by the lodgment of fecal matters in the colon; and yet, notwithstanding the general fallacy of the views which led to their employment, when judiciously selected and combined, they are often of much service. It must be obvious that such purgatives as act principally on the colon and rectum are not suited to an inflammatory disease of these parts; and that, when there can be no collection of fecal or morbid matters to remove, the exhibition of them will merely aggravate the symptoms. It is, therefore, most important to ascertain, upon entering on the treatment of a case of the disease, as far as may be done, whether or no such matters may exist to the extent of requiring these remedies. If the patient has been seized after a constipated or even natural state of the bowels, if hardness and fulness can be felt in any part of the colon or cæcum upon careful examination of the naked abdomen by the hand; if, together with these, the tongue be much loaded, and the matters evacuated offensive from the commencement; if the patient complain of a sense of stuffing or fullness in the course of the large bowels, and if pellets of feces be evacuated; suitable evacuants are indicated. But, if the disease has been preceded by diarrhœa, or by free fecal discharges, as it frequently is, they should either be withheld for a time, or very cautiously employed; the selection, also, being made with much care. When the patient is well informed, his sensations and account of the early symptoms should be duly weighed and attended to. Much mischief may arise, and discredit be reflected on the practitioner, by neglecting this very obvious indication—by following blindly the dictates of either unsound theory or worthless authority, instead of being guided by common sense. I have repeatedly known persons who have been accounted ignorant, but who were not necessarily without sound sense, complain bitterly, and lose all confidence in their medical attendant, and hopes of recovery, when directed to take cathartics, after, as they have expressed it, their insides had been nearly purged out of them.—When, however, the patient has not had any feculent discharges for a considerable time, during the progress of the disease, although they may have been copious and frequent before the accession of the dysenteric symptoms, a mild purgative should be prescribed, as being much less irritating than the retention, even for a short time, of morbid excretions; and its operation should be promoted by an emollient enema. Cooling or oleaginous purgatives are preferable to others; and perfectly sweet castor or olive oil; or the following preparation, recommended by VOGEL, and praised by SCHMIDTMANN; or Formulæ 144. and 790.; or either of the subjoined electuaries; may be tried:—

No. 199. R Extr. Jalap. Resin. gr. xij.; Sap. Venet. gr. vj.; tere probe cum Olei Olivæ (vel Ol. Lini. vel Ol. Amygdal. Dulc.) ʒij. Capiat ʒss. omni nocte.

No. 200. R Pulv. Jalap. ʒss.; Potassæ Supertart. ʒij.; Pulv. Ipecacuanhæ gr. j.; tere bene simul, et adde Pulv. Rad. Glycyrrh. ʒjss.; Syrup. Zingiberis (vel Theriac. Commun.) ʒss. M. Fiat Elect., cujus sumatur dimidium.

No. 201. R Potassæ Supertart. in Pulv. trit. ʒjss.; Potassæ Nitratis ʒj.; Confect. Sennæ ʒij.; Syrup. Aurantii q. s. ut fiat Electuarium, cujus capiat coch. j. vel ij. minima; super bibendo dose mist. seq.

No. 202. R Magnes. Ustræ ʒj.; Camphoræ subactæ gr. ij.; tere et adde Vini Ipecacuanhæ ʒjss.; Aquæ Menth. Virid. ʒvijss.; Syrup. Aurantii ʒij. Fiat Mist., cujus capiat coch. ij. larga, cum dose Elect. supra præscripti.

If castor oil be employed, it will be advisable to exhibit it on the surface of some mucilaginous or emollient vehicle, and to add to it a few drops of laudanum. Whatever may be the purgative prescribed, it should be assisted by emollient and laxative injections, such as F. 144.; or of tepid water; or fat mutton broth, well strained; or linseed, or sweet, or almond oil. Tenesmus is sometimes aggravated by large enemata. They should, therefore, be of small bulk; or the irritation should be first allayed by an opiate, or an opiated and litharge (see F. 682, 683.), or a belladonna, suppository.

84. (c) *Refrigerants* may be exhibited, either alone, or with diaphoretics and diuretics, and in emollient and mucilaginous vehicles (F. 866.); especially after the above means have been employed, and when there are much fever and sense of internal heat. The nitrate of potash may be given with ipecacuanha and opium (F. 642.), or with small doses of camphor (F. 36. 460.), and of ipecacuanha (F. 39.); or, in solution with spirit. æther. nit. (F. 436.), liquor ammoniæ acet., and opiates. The muriate of ammonia may likewise be exhibited, as in F. 352. and 431.

85. (d) *Opiates, &c.* are productive of the greatest benefit, after depletion; and should be prescribed in large doses. If fecal matters have been carried off, during the diarrhœa often ushering in the disease, they ought to be exhibited directly after depletion; and, in all cases, after the operation of a purgative. But much will depend upon the medicines that may be given with them. Of these, *ipecacuanha* is the most important. From two to four grains of opium with as much ipecacuanha should be prescribed for a dose; and, if not retained, repeated in a short time. These should be taken in the form of pill, which may be washed down by a refrigerant and emollient draught; or the ipecacuanha may be given in a similar vehicle, with from thirty to forty drops of the *tinct. opii comp.* (F. 729.), and repeated according to circumstances. This medicine will ameliorate the symptoms and determine to the cutaneous surface, especially if its action be promoted by the slightly warm bath, or semicupium or hip-bath; and by frictions of the surface subsequently. After a decided effect has been produced by these, DOVER'S powder may be prescribed at short intervals, so as to keep up the action on the skin; and the abdomen should be swathed in flannel. Opiates may be employed also in the mucilaginous enemata already recommended (F. 143. 147. 152.), and in the form of suppository.

86. (e) *External derivatives and rubefacients* are sometimes of service after depletion and the above means have been duly employed. A large blister may be placed upon the abdomen; but it should be removed as soon as it has produced redness, and be followed by warm bread and

water poultices. The turpentine epithem will be found still more generally of use, and will not so much increase the irritation experienced in the urinary passages as the blister frequently does. In cases where this symptom is severe, mucilages with soda, nitre, small doses of camphor, and opium, will give relief. When it is urgent, tenesmus is also a prominent feature; the means already advised, especially local depletions, either from the sacrum, or from the perineum, small emollient and cooling injections, and opiate suppositories, being the principal remedies. If the sthenic forms of the disease yield not to the treatment now advised, or if it pass into the chronic state, recourse must be had to such of the methods of cure, and medicines, hereafter to be noticed, as may seem most appropriate to the circumstances of the case. When much debility is complained of, after tormina and tenesmus have been removed by an antiphlogistic treatment, mild bitters, as the infusion of calumba, or infusion of cinchona, with liquor ammoniæ acetatis, tinctura camphoræ compos., and small doses of the vinum ipecacuanhæ, will be productive of much benefit. Costiveness should be carefully guarded against, by the occasional exhibition of a gentle purgative, as directed above (§ 83.), and of aperient and emollient enemata.

87. *Among Europeans in hot climates*, the disease requires a prompt and decided use of antiphlogistic remedies, inasmuch as the inflammatory action is, in these cases, more intense, and arrives more rapidly at an unfavourable termination. The treatment, however, in principle, is the same as that advised above. The good effects of large doses of ipecacuanha and laudanum — from half a drachm to a drachm of each — after bleeding, have been shown by Mr. PLAYFAIR; and of smaller doses — from three to seven or eight, with an equal quantity of some bitter extract — also after requisite depletions, have been found equally beneficial by BALMAIN and TWINING; whilst the impropriety of an indiscriminate use of mercury, especially calomel, in this disease even as it occurs in India, has been acknowledged by these writers, Mr. ANNESLEY, and others. Although dysentery, in persons thus circumstanced, assumes the inflammatory form, or that of *colonitis* (as it has been improperly called by some writers, as the rectum, cæcum, and often the small intestines, are also affected), especially soon after their migration to a hot climate; yet the attendant constitutional affection is not always of a sthenic kind, but frequently assumes either the simple asthenic (§ 25.), or the bilio-adyne (§ 28.), or malignant forms; especially in those who have resided long in the country, and where the endemic causes abound. In many cases, also, the symptoms are acutely inflammatory at the commencement, and rapidly pass into a very asthenic state, even before either of the unfavourable changes pointed out above have begun. In such, the antiphlogistic treatment should be early employed, and exhaustion met, as soon as its signs appear, by the remedies about to be recommended for the asthenic varieties. In some instances, also, particularly in persons circumstanced as now stated, the dysenteric affection is entirely symptomatic, either of abscess in the liver, or of interrupted circulation through the ramifications of the vena porta, — pathological

conditions which should be carefully investigated, as they require very different plans of cure. (See LIVER — *Chronic Inflammation and Suppur. of.*)

88. *B. OF THE ASTHENIC FORMS.* — (a) In the simple asthenic form, ipecacuanha with opium, the warm bath, and gentle purgatives with aperient and emollient enemata, conformably with the views now stated (§ 83.), will frequently remove all disorder. In most instances it will be requisite, and particularly if the biliary secretion be obstructed or vitiated, to give a full dose of calomel (from ten to fifteen grains) with two or three grains of opium, and one of ipecacuanha, a few hours before the purgative is exhibited; and, when dull and constant pain is felt in any part of the abdomen, or tenderness on pressure, a number of leeches should be applied, and be followed by the warm turpentine epithem. Venæsection has been found injurious in this form of dysentery, especially when epidemic during very moist seasons. An ipecacuanha emetic will often be of service at the commencement; but if retching become urgent, opium in the form of pill, sinapisms on the epigastrium, croton oil rubbed on the abdomen; the warm bath, or hip bath, or semicupium; and nitre, with emollients; will both relieve this symptom, and allay the tormina and tenesmus. Mucilaginous mixtures, with paregoric elixir and vinum ipecacuanhæ, are generally serviceable. Emollient clysters and suppositories, with opium, are also requisite. I have seen the preparations of *hop* productive of great relief in this form. They may be prescribed with camphor mixture and liquor ammoniæ acetatis, or with emollients (F. 839, 840, 871.) and diuretics. In the more severe cases, or when the disease does not yield to the above remedies, full doses of camphor, with opium, or with DOVER'S powder, or with the addition of nitre (F. 36, 39.), may be given every five or six hours, and pieces of flannel made warm and moistened with either of the liniments, F. 297, 307, 311., be kept upon the abdomen until relief is obtained. Although fecal matters and disordered secretions may have been evacuated before the dysenteric symptoms had appeared, yet it will be necessary to have recourse to mild purgatives, from time to time during the progress of the disease, in order to excite the functions of the excreting organs, and to evacuate such morbid secretions as may have collected. The purgatives and aperient enemata recommended above (§ 83.) may be exhibited, or the compound infusion of senna with an equal quantity of infusion of calumba or gentian, and a little soluble tartar and compound tincture of cardamoms. If the disease be likely to become obstinate, equal quantities of turpentine and castor oil, taken on the surface of milk, or of an aromatic water, and repeated every second or third day, will be most efficacious. After the tormina and tenesmus are removed, mild bitters and tonics; and, in some cases, astringent tonics and absorbents, with the treatment advised in the article DIARRHŒA (§ 29—33.), will generally remove all remaining disorder, if the state of the secretions and of the bowels be duly attended to. If the complaint degenerate into a chronic form; or debility become a prominent feature; and if the excretions indicate, with the state of the surface and tongue, a progressive deterioration of the fluids and soft solids;

the means about to be directed for these conditions must be employed.

89. (b) In the nervous or typhoid, and malignant forms (§ 26.), the sixth and seventh indications of cure should be particularly entertained, and with due reference to the third, fourth, and fifth. From one, to three, four, or even more grains of camphor may be given every three or four hours, with three of *hydrargyrum cum creta*, two of *ipecacuanha*, and one of *opium*, in the form of pill; and if it be thrown off the stomach, it should be persisted in nevertheless. The patient should also be put into a warm bath; the temperature of which ought to be gradually raised while he is immersed in it; and, having been well rubbed upon coming out of it, be placed between warm blankets, in order to promote the action of this medicine on the skin. This intention will be furthered, if the stomach be not very irritable, by draughts containing liquor ammoniac acetatis, potassæ nitras, or any other appropriate neutral salt. — The action on the skin should be kept up for a considerable time by the medicine, and promoted by emollient diluents, such as the decoction of liquorice or of linseed, &c. If these means fail of giving relief, flannel wrung out of hot water, and moistened with spirits of turpentine, should be applied to the whole abdomen, and allowed to remain as long as the patient will endure it. The usual effects of this epithem are, a most copious perspiration, with burning heat of the skin where it is applied; and, consequently on these, a total remission of the tormina and tenesmus, followed by sound repose procured by the pills which have been taken. In advanced stages of the complaint, when the internal congestion or determination is very great, and the skin is harsh, dry, and livid, repeated applications of this epithem, as warm as the patient can endure it, are sometimes requisite to its full effect. In a case which I lately treated under very unfavourable circumstances, it having been consequent upon continued fever, in a lady long subject to disorders of the colon and rectum, a quart of the spirit was thus employed before redness of skin was produced; although it was warmed by immersion in warm water before the flannel was moistened with it. This patient ultimately recovered. To these means may be added, the emollient and anodyne enemata already recommended; and suppositories of opium, if tenesmus and dysuria be urgent, and the rectum very irritable.

90. In these dangerous forms, notwithstanding full evacuations of fecal matters may have ushered in the disease, it will be requisite to carry off, from time to time, by suitable purgatives, such morbid matters as may have accumulated. To many cases, the purgatives and enemata prescribed above will be appropriate; but where the stools are very offensive, or contain much dark blood; when the powers of life are depressed; or when stupor is present; and more especially if petechiæ or discolouration of the skin be observed; the draught with castor oil and turpentine directed above (§ 88.), or F. 216., should be exhibited, and its effect promoted by either of the enemata, F. 135. 150. and 151. In this state of disease, it is important to evacuate morbid matters by such means as will at the same time restore the tone of the digestive mucous surface,

and of the vessels opening on it; and I believe that there is none that exerts this influence more efficaciously than those now named. Next to these, rhubarb in powder, with camphor, and calomel, or hydrarg. cum creta; or cinchona, with senna (F. 86.); or the infusion of gentian and senna (F. 266.); or infusions of cinchona and rhubarb; or the preparations of cusparia and rhubarb; will be found the most efficacious.

91. If the powers of life be much depressed, the circulating and secreted fluids will generally become more and more vitiated. Our chief efforts should then be directed to counteract this tendency. With this view, the decoction or infusion of cinchona and serpentaria, with camphor, and small doses of nitrate of potash, or of muriate of ammonia, or with the chlorate of potassa, or of soda, may be prescribed; and either of these, or the chlorate of lime, may likewise be administered with camphor in mucilaginous enemata, especially when the stools are very offensive; taking care to prevent the accumulation of morbid secretions by occasionally resorting to the aperient draught and enema directed above (§ 90.). The infusions of cascarilla, of calumba, or cusparia (F. 201.), or the decoction of tormentilla (F. 78.), may likewise be taken, with these or similar additions. When the evacuations are copious, as well as morbid, their excess occasioning vital depression, it will be necessary to control them by adding opium, and the usual astringents, to the tonics now mentioned; and to excite the functions of the skin by the warm bath, frictions of the surface, and the application of the turpentine epithem to the abdomen. The terebinthinated medicines, also, already mentioned, are the most active aperients, and astringents at the same time, in this complaint, as well as the most certain and beneficial in their effects. Upon the whole, these severe states of the disease require similar remedies to those enumerated in the articles BLOOD (§ 157. et. seq.), and DEBILITY (§ 38.), and in the sections on the treatment of the adynamic and malignant forms of FEVER.

92. (c) The bilio-adynamic form presents considerable diversity of character in different seasons and epidemics, and requires a modified treatment accordingly. When there is no tenderness or fulness at the epigastrium, an *ipecacuanha* emetic will generally be serviceable; but its operation should be followed by a full dose of calomel; and that, in a few hours, if fecal matters have not been already evacuated, by either of the mild purgatives prescribed above (§ 83.), and by emollient injections. When the patient complains of a burning sensation in the colon, or of scalding in the rectum, with great irritability, nitrate of potash, or muriate of ammonia, should be given in emollient or mucilaginous vehicles; and an opium and litharge suppository (F. 683.) administered; a similar combination of refrigerant and mucilaginous medicines being afterwards exhibited in enemata. In some cases, this form approaches nearly to that of sthenic vascular action, and then leeches are required to the abdomen; and will be most advantageously followed by the turpentine epithem. After these remedies, small doses of camphor, hydrargyrum cum creta, and DOVER'S powder, or simple *ipecacuanha*, may be taken every two or three hours, and the warm bath, in

the manner above directed (§ 89.), occasionally resorted to. If this variety be characterised by great vital depression, the treatment already directed (§ 91.) must be employed. In all its states, and stages, it will be requisite to evacuate the morbid bile that is secreted, and to correct the diseased action in the liver; but beyond one or two full doses of calomel, either with or without opium, this medicine should not be persisted in; as it increases the irritation of the colon and rectum, and depresses vital energy. The hydrargyrum cum creta, as now directed, will be more efficacious; especially when assisted by the above means, and by emollient and mucilaginous diluents.

93. *In the Dark Races*, dysentery assumes the simply asthenic or malignant forms. In them, the treatment may safely be commenced by an ipecacuanha emetic, and followed by a purgative, the warm bath, and warm diaphoretics. Early in the disease, calomel with rhubarb and ginger; or powdered jalap with cream of tartar and some warm spice, will be appropriate; but enemas are also required. The habits and modes of living generally adopted by these races, independently of their more lax fibre, and much less tendency to inflammatory action, require an earlier and more active use of tonics, stimulants, astringents, and aromatic spices, with opium, than can often be safely attempted among Europeans. Purgatives, also, should be of a more stomachic and warm kind, and the functions of the skin especially promoted. The combination of ipecacuanha with tonics, astringents, opiates, and absorbents, according to the peculiarities of the case, is generally extremely efficacious after fecal matters have been evacuated. Camphor, catechu, the hot spices, and warm clothing, with the rest of the tonic and astringent treatment advised for the chronic state, and in DIARRHŒA (§ 37.), should be resorted to, as soon as exhaustion supervenes, or when the disease becomes protracted. To Europeans long resident in hot climates, a nearly similar method to that now recommended is applicable, if the hepatic functions be regular; but, as in them the liver is very seldom unaffected, the means directed for the chronic form, which it usually assumes, is more generally appropriate; and the treatment should chiefly depend upon the nature of the primary or attendant hepatic disease.

94. *C. TREATMENT OF THE COMPLICATED STATES.* — (a) The association of acute dysentery with inflammation of the liver (§ 34.) requires decided and early general or local depletion, or both, followed by cooling purgatives, sufficient merely for the evacuation of morbid secretions. In this complication, the morbid state of the bile, and the rest of the hepatic symptoms, are the consequence of inflammation, and can be removed only by antiphlogistic treatment, and not by inordinate doses of mercury, which will merely over-excite an already excited organ, and accelerate supuration. Refrigerant, therefore, and cooling aperients, as the supertart. and tartrate of potash, tamarinds, manna, or the soda tartarizata; antimonial or ipecacuanha diaphoretics; small doses of camphor, with nitre and opium; cooling and emollient enemata, and a very low diet; constitute the principal means of cure. When the patient complains much of burning heat or soreness in

the abdomen, with scalding, &c. in the anus and urethra, the nitrate of potash, with sub-carbonate of soda, and spirit. ather. nit., in emollient vehicles; the muriate of ammonia in mucilaginous mixtures; suppositories of opium; and local depletions, followed by the warm terebinthinate epithem over the abdomen; are chiefly to be depended upon. If blisters be applied, they should be surrounded by a number of leeches, the former being removed as soon as they have produced redness, and succeeded by warm poultices. As the substance of the liver is generally more or less acutely inflamed in this complication, and as mercurials will not readily produce their specific effects, or act beneficially, whilst this state continues, but will rather increase it, the exhibition of them with this intention can only occasion abscess, irritative fever, and exhaustion; and furnish one of the most injurious proofs of the "nimia diligentia," which is but too common in the treatment of this as well as of hepatic disease. Can any practice be more empirical, than to give the same substance to subdue over-excitement, which we find the most active in rousing torpid function, of an organ? Having removed the acute symptoms by the above means, the insertion of one or two setons in either side, and keeping up a free discharge from them for a long time, with appropriate diet and regimen, and change to a healthy air, will generally complete the recovery. When the dysenteric affection is merely symptomatic of abscess in the liver, the treatment advised for this condition (See LIVER — suppurat. of) should be employed.

95. (b) The complication with disease of the spleen is most common after intermittent and remittent fevers, and in unhealthy localities; and the symptoms are either but little inflammatory, or more or less asthenic. Local depletions even are seldom required in its treatment. Warm stomachic aperients, as cinchona with rhubarb, ipecacuanha, and aromatics; emollient enemata with anodynes; the warm bath, followed by frictions of the abdomen with either of the liniments, F. 297. 311., upon coming out of it; ipecacuanha with strichnine, or sulphate of quinine, or sulphate of iron, or with tonic extracts; camphor with warm diaphoretics, and the medicines directed for the more chronic states, which it more frequently assumes, or passes into; are the most appropriate in this state of the complaint. When dysentery follows continued or periodic fever, disease of the liver or spleen, or of both, should be dreaded, as well as its rapid termination in ulceration; and means, conformably with what has now been advanced, should accordingly be promptly put in practice. The most efficacious of these, are early local depletions — but only when the symptoms clearly indicate the propriety of resorting to them; the terebinthinate epithem applied to the abdomen, or large blisters, followed by poultices, and repeated according to the urgency of the case; with the rest of the treatment directed for the asthenic states, according to the peculiarities of the case.

96. (c) The association of acute dysentery with scurvy, requires the removal of the exciting causes; a suitable diet, especially fresh meat and vegetables; the liberal use of lime juice, with sugar, mucilage, and opium; the carbonate of potash or soda in effervescence, with an excess of lime juice, particularly when the secretions re-

quire evacuation by gentle means; the decoction of cinchona with muriatic acid, or citric acid, or chloric ether; and the draught and enema consisting of turpentine and castor oil, when the hæmorrhage is considerable, and the abdomen tumid or tympanitic, or when the state of the discharges indicate the propriety of exhibiting a purgative. If lime juice is not to be procured, lemon juice or citric acid should be substituted. When the debility and oozing of blood from the bowels are great, the tincture of the muriate of iron may be given in the infusion of quassia, or the infusion of catechu may be exhibited with other astringents, and with aromatics, warm spices, and the tinctura opii comp. (F. 729.). Carbonate of ammonia may also be taken in effervescence with an excess of citric acid, or lime juice; ipecacuanha, aromatics, and the above preparation of opium, being added. In the more urgent or obstinate cases, the warm *nitro-muriatic solution* should be daily applied over the abdomen, or added to mucilaginous and emollient enemata. It may likewise be used as a gargle, when the state of the mouth requires such means. The *nitro-muriatic acids* may also be taken internally with small doses of the compound tincture of opium, when citric acid or lime juice cannot be obtained. The *chlorates* may be prescribed with camphor, and opium, in mucilaginous vehicles; and administered, in a similar form, as enemata. During treatment, the diet should be regulated, and the excretions carefully observed. When the bile is scanty, and the stools without feces, a few grains of blue pill may be given at night, and a full dose of magnesia in aromatic water the next morning, followed immediately by a glass of lemonade, or a draught with lime juice or citric acid,—the combination thereby formed in the stomach proving an agreeable purgative; or the *hydrargyrum cum creta*, with rhubarb, may be taken at bedtime, and the oily draught and enema already mentioned the following day. Aromatic confection, with magnesia; or cretaceous and other absorbents, with ipecacuanha or DOVER'S powder; are also serviceable, when the bowels are much relaxed and griped, and the stools become frothy and acid. Cretaceous medicines should not be given while the citric acid or lime juice is continued; but subsequently, in the form now directed, or with astringents, tonics, and warm spices, when the disease seems disposed to assume a chronic form, they are often beneficial, assisted by warm clothing, suitable diet, and the occasional exhibition of mild purgatives, so as to prevent the injurious retention of morbid matters, and promote the digestive and secreting actions. In the early stage of convalescence, a similar treatment, with vegetable tonics; and the exhibition of these with aperients, when the bowels become sluggish; should be persisted in. The daily use, for some time, of either of the balsams, according to the peculiarities of the case, combined with a sufficient quantity of magnesia to form a pilular mass, will more effectually restore the tone of the digestive mucous surface, and keep the bowels open, than any other means. Removal to a dry, pure, and warm air will accelerate and establish recovery.

97. (d) Dysentery is less frequently complicated with worms, in this country, than, perhaps, in any other. Worms are either so extremely

common in the inhabitants of low and moist localities, and still more so in the dark races, especially among those who have not a sufficient supply of salt as a condiment; or they predispose so remarkably to the disease—or rather, the state of the digestive organs that favours their generation disposes to it; that a very large proportion of dysenteric cases in the former, and nearly all in the latter, are thus complicated. The judicious use of anthelmintics—the decoction of the bark of the pomegranate root; the male fern, &c., followed by castor oil; and especially the terebinthinated draught and enema already recommended (§ 90.),—will generally remove the disorder. When it has arisen from the want of salt, this substance in sufficient quantity, with warm spices, vegetable tonics, and subsequently chalybeate preparations, will soon have a decided effect; but, without salt, other means cannot be depended upon. This complication is not infrequent in children; the above remedies, or such as are most appropriate of those mentioned in the article WORMS, being also suitable to them; but when the disease is removed, a course of chalybeates and change of air should be prescribed.

98. (e) The hæmorrhoidal complication is most speedily relieved by local bleeding from the sacrum or perinæum, followed by fomentations; the hip-bath; full doses of DOVER'S powder, especially at bedtime; opiated, or opium and litharge, suppositories; and by the supertartrate of potash, with nitre and confection of senna, when an aperient is required. Cooling diaphoretics, and various refrigerants in mucilaginous or emollient vehicles, taken by the mouth, and injected *per anum*, in small quantity, are often useful adjuvants. When the disorder is attended by much pain about the anus, a cooling and anodyne ointment, after having recourse to warm fomentations, will often give relief. The extract of *belladonna*, in an ointment of this description, will be most effective, as it subdues the morbid sensibility, and removes the spasm of the sphincter, which aggravates the pain in these cases.

99. (f) The complication with rheumatism (§ 44.), or catarrh, requires the frequent use of the warm bath or semicupium; and full doses of camphor, and ipecacuanha, or DOVER'S powders, in oleaginous or mucilaginous vehicles; or antimonial diaphoretics with opium, if there be much febrile excitement and heat of skin. If the symptoms are inflammatory, general or local depletions, or both, should precede the exhibition of these; and, if the biliary secretion be either obstructed or vitiated, a full dose of calomel, or of the milder mercurials, should be given, and be followed by a gentle purgative, and that by an aperient and emollient enema. When the disordered secretions are evacuated, warm diaphoretics, especially camphor with opium; small anodyne injections; opium suppositories, and the constant use of flannel next the skin; will remove the disorder. When severe rheumatic pains are felt in the lower extremities, opiate suppositories, after morbid matters are evacuated, will give great relief. In some instances, the pains in this situation depend upon the retention of fecal or hardened substances in the cæcum, or about the sigmoid flexure of the colon. In this case, fulness or hardness will be felt in these regions, on a careful examination of the abdomen; and appropriate

purgatives, aided by laxative clysters, will be required, and should be repeated until the collection is evacuated.

100. II. TREATMENT OF THE SUB-ACUTE AND CHRONIC FORMS.—*A. Of the more simple states.*—The intentions of cure by which we are guided in the acute, should, with little modification, be entertained in the chronic, forms. When the symptoms continuing after an acute attack consist chiefly of either frequent or copious evacuations, without tormina or straining, the appetite, pulse, and strength improving, or remaining unimpaired, astringents or opiates should not be prescribed; for the discharges are the means of bringing about a resolution of the inflamed and tumefied viscera. In such cases, the stools are usually of a good colour, and are feculent and fluid. But, if the motions be attended by abdominal soreness, increased on pressure; or by a sense of heat; or by griping, tormina, or tenesmus; if they be slimy, or sanguineous; and if the patient complain of thirst, with fever and restlessness at night; nature requires the judicious assistance of art. Here vascular depletion, most frequently local, although it may have already been practised, and more especially if it have not been resorted to, is required to an extent which the constitutional symptoms will indicate. If, however, the strength is too far sunk, or the asthenic characters are too prominent to admit of this measure, the warm epithem already described (§ 89.), or blisters to the abdomen, followed by a succession of poultices, and these by the warm bath, a thick flannel bandage around the abdomen, and stimulating frictions of the surface, and of the lower limbs, will sometimes be serviceable.

101. In all cases, the state of the biliary secretion and of the liver should be carefully examined. If the investigation furnish no proof of acute disease, or of abscess of this viscus, and if the bile be scanty or altogether obstructed, camphorated mercurial frictions on the hypochondrium, blue pill or hydrargyrum cum creta, with ipecacuanha or DOVER'S powder at bedtime, and a mild purgative, such as cream of tartar, with confection of senna and extract of taraxacum in the form of electuary, in the morning, will often increase and improve the bile. If mercurials have not been previously used, and if no tenderness or soreness be felt in the region of the liver, nor oppression of breathing, dry cough, nor recurring chills or horripilations alternating with hectic flushings, &c., one or two full doses of calomel, with or without opium, may precede these medicines; the operation of which may be assisted, and the state of the large bowels improved, by emollient and oleaginous injections. After these means have been tried without benefit, the emplastrum ammoniaci cum hydrargyro may be placed over the abdomen; and one or two grains of hydrarg. cum creta, or of blue pill, with one of ipecacuanha, and as much camphor, taken thrice daily, with a draught containing a drachm of the extract of taraxacum, or consisting of the decoction of the recent root. As long as the stools are deficient in bile, astringent tonics will seldom prove permanently serviceable; but if the above medicines run off too rapidly in the stools, the compound tincture of opium should be added to them.

102. When the foregoing means have failed, nitric acid with opium or laudanum; and the ap-

plication of the *nitro-muriatic acid* lotion over the hypochondria and abdomen; may be tried; or, instead of the nitric, the nitro-muriatic acid may be taken internally, in a very weak state of solution, or employed as an enema, with the laudanum, F. 729. Enemata consisting of a weak infusion of ipecacuanha, or of the decoctum lini, with mucilage, or of both, may be administered once or twice a day, while the acids are taken. If these fail, and if the debility be great, the *chlorates*, especially those of potassa or lime, may be given by the mouth, or in clysters.

103. In the advanced stages, the infusion of cinchona, of cinchona and rhubarb, either with or without laudanum, or of catechu with aromatics and warm spices, are generally requisite, more especially in the dark races; the same preparations being also advantageously administered as enemata, either with or without mucilaginous substances. When the disease, like a gleet discharge, proceeds from relaxation of the internal surface of the large bowels, and a habit of increased secretion, these means will prove of essential service. In many cases, the disorder is kept up either by too great indulgence in food, or by the use of stimulating liquors. The diet should, therefore, be restricted; and the digestion of what is taken promoted either by the above medicines, or by the sulphate of quinine or the sulphate of zinc in the form of pill, with inspissated ox-gall, or other medicines suited to the case. If we succeed in controlling the increased action of the bowels, an opposite state should be carefully guarded against, by the occasional exhibition of the means directed above (§ 83.); or of the draught and enema already mentioned (§ 90.). Inattention to this precaution, and errors in diet and regimen, are frequently productive of relapses.

104. If diarrhoea continue after the acute symptoms longer than seems sufficient for the resolution of inflammatory action in the large bowels, and of congestion of the portal vessels, we may suspect that the quantity or kind of aliment is such as the digestive organs, and the biliary and other secretions, are incapable of changing into healthy chyle,—a large proportion of it entering into such acid or acrid combinations as its constituents dispose it to form. In these cases, the stools are frothy, have a sour odour, or are lienteric; and tonics, with mild mercurials and antacids; the sulphate of quinine, as above recommended; the balsams with magnesia, and the liquor potassæ, or the sub-carbonate of ammonia, with tonic infusions, aromatics, and small doses of SYDENHAM'S laudanum (F. 729.); are required; whilst the abdomen and hypochondria are sponged with the nitro-muriatic solution; and the large bowels fortified by the tonic and mucilaginous injections already mentioned.

105. In the cases denominated "*White flux*," from the muco-purulent and gleet appearance of the discharge from the muciparous glands, and the absence of bile, a similar treatment to the above is required; with an occasional dose of calomel, or frequent and small doses of the mildest mercurials, as above directed. (§ 101.) The infusion of either cusparia, catechu, simarouba, calumba, rhubarb, cinnamon, &c., with vinum ipecacuanhæ, aromatics, absorbents, and astringents, according to circumstances; the chlorates, or nitre with soda and emollients, in aro-

matic vehicles, and in clysters; assafoetida, with camphor and mucilage, in enemata; and the daily use of the salt-water warm bath, followed by frictions of the surface with a rubefacient and deobstruent liniment (F. 311.), and a flannel roller around the abdomen; may also be resorted to.

106. If the evacuations indicate *ulceration* (§ 54.)—which, indeed, is seldom altogether wanting in protracted cases—the above treatment, or mucilaginous mixtures with either of the balsams; emollient clysters, and the repeated applications of large blisters, or rubefacients, to the abdomen, or the insertion of setons, are chiefly to be relied on, with the other means advised in the treatment of DIARRHŒA (§ 32.), arising from this pathological state.

107. A form of chronic dysentery depends upon, or is kept up by, *ulceration*, or even by a single large ulcer, in the rectum, with or without *prolapsus ani* (§ 47.), the abdominal symptoms being slight, but the tenesmus constant and painful. For it, small injections of a solution of the sulphate of zinc, or nitrate of silver, or dilute nitric acid with opium, or superacetate of lead, with pyroligneous acid and laudanum; or of paregoric elixir with mucilage; or of simple camphor mixture; the balsams, or sulphur with cream of tartar, and tonics with deobstruents, being taken internally, and a gently open state of the bowels preserved; will remove the disorder. In nearly all the more simple states of chronic dysentery, also, the same treatment may be appropriately employed as is recommended in the chronic states of diarrhœa, lientery, &c. (See DIARRHŒA, § 29—33. and § 41. *et seq.*)

108. *B. The complications of chronic dysentery* are much more common than the simple states; and the most frequent are those with chronic affections of the liver, with disease of the mesenteric glands, and with enlargement of the pancreas and spleen.—(a) If the liver be free from acute disease of its substance, or from purulent formations (See LIVER—*Inflam. and Suppurat. of*), mercurials are often essentially requisite. But, even in such cases, they have been much too liberally employed, on the supposition that salivation is indispensable to the cure of this complication. Where, however, these forms of hepatic disease exist, they should almost altogether be proscribed; and also, where the powers of the system are much reduced, even in the simple states of the disease, the extension of inflammatory irritation to the mesenteric and portal veins, or the absorption of morbid matters from the bowels (§ 77.), and consequent disease—especially purulent collections—in the liver, may be favoured or induced by prescribing them so as to produce their specific effects.

109. (a) We often have little or no proof of the presence of chronic change in the liver, beyond the torpid state of its functions already noticed (§ 48.), viewed in connection with the habits of the patient, and the history of his former complaints, and of his present attack; but, in these, mild mercurials, in frequent and small quantities, in conjunction with alteratives and deobstruents (§ 101.), especially minute quantities of antimony, with ammoniacum, soap, and opium; or these with taraxacum in full doses; or this latter with the infusion of calumba; will be found the safest as well as the most efficacious remedies, parti-

cularly when assisted by a camphorated mercurial ointment or liniment applied over the hypochondria; or by the nitro-muriatic acid solution, employed either as a wash, a lotion, or on the surface of warm poultices; or by repeated blisters; or by issues or setons, and the ammoniacal and mercurial plaster over the abdomen, or a combination of it with other deobstruent and warm plasters. In these cases, we must be guided by the evidence we may have of change of the liver, and direct our treatment to its removal, conformably with the views stated in the article on the diseases of that viscus. When the stools are frothy, and deficient in bile, the hydrargyrum cum cretâ, or the blue pill, will be advantageously combined with inspissated ox-gall, extract of taraxacum, and small doses of DOVER'S powder, or opium. The sub-carbonates of the alkalies, or borax, may also be given with vegetable tonics, ipecacuanha, and the preparations of hops; either of the liniments, (F. 296. 311.), alone, or with the mercurial liniment, being daily rubbed upon the abdomen, or applied by means of a piece of flannel moistened with it and placed under wash-leather,—which will protect the clothes from it, and prevent its evaporation. In the foregoing states of hepatic complication, change of air, horse exercise, or travelling, and a regulated diet and regimen, will materially assist the treatment.

110. *β.* A sub-acute, slight, or chronic form of dysentery is sometimes merely *symptomatic* of the advanced states of hepatic abscess, and occurs more frequently than the very acute complication alluded to above (§ 94.). It requires either a similar treatment to that now stated, or simply support of the powers of life, in order to enable them to overcome the disease. The arrest of the discharges in this state of the complaint frequently increases the hepatic malady, or occasions severe constitutional disturbance. Gentle tonics and restoratives, light or farinaceous food, and such astringents, anodynes, and emollients as will merely control and soothe the bowel affection, until the above treatment, or that recommended for *suppuration of the LIVER*, shall remove the principal or primary disease, are the most deserving of confidence.

111. *γ.* When *purulent matter collects in the liver, in an advanced stage of dysentery*, the occurrence can be explained only as attempted above (§ 77.); and, during the life of the patient, the symptoms will seldom warrant more than a supposition of its having taken place. The facts, that a bad habit of body, and an asthenic state of the powers of life, are the chief causes of the absorption into the blood of morbid matters from the seat of disease, and of the extension of inflammation from an ulcerated part along the veins; and that these changes induce those observed in the liver in such cases, should be kept in view in the treatment of the advanced stages of dysentery,—particularly as it has been satisfactorily shown that a large proportion of unfavourable cases terminates fatally, owing to the contamination of the circulating fluid produced in this manner, either with or without the concomitant lesions of the liver, of which particular notice has been taken. Conformably, therefore, with these facts, the remedies I have shown, in the article VEINS, to be most efficacious in arresting the extension of inflammation along them, in preventing or counteracting the contamination of the blood, and in supporting the vital

powers, will be most beneficial, not only where this complicated state is inferred, but also in an advanced stage of the malady, and especially in its asthenic forms, where it is most desirable to prevent or arrest these very dangerous occurrences. When the disease is *symptomatic* of the absorption of morbid matter from carious bones, foul ulcers, &c. (72. c), the principles and treatment now stated should be adhered to, and the chlorurets applied to the ulcerated parts.

112. (b) The complication with *disease of the mesenteric glands* frequently cannot be distinguished from that with chronic change in the liver; but, when the stools are *lienteric*, and the abdomen hard and tumid, the former association may be inferred, although the hepatic complication may also be present; the means now recommended being equally appropriate to both. I have seen benefit derived, in some cases of the mesenteric complication, occurring in *children*, from *liquor potassæ*, or BRANDISH'S *alkaline solution*, in tonic infusions, with *syrupus papaveris* or *tinctura opii*; and from the chlorate of potassa with DOVER'S powder, a terebinthinate draught and enema being administered every third or fourth day. More recently, the ioduretted solution of the *hydriodate of potash*, with very small doses of laudanum, or the *ioduret of mercury* in minute quantities, has also been prescribed with advantage, especially when assisted by the warm bath, and some one of the liniments or other external applications enumerated above. If the patient, however, complain of tormina, or if the stools be bloody, the daily application to the abdomen of some one of the ointments containing the preparations of *iodine* (F. 766. *et seq.*) will be preferable to the internal exhibition of this substance. In this class of subjects, change to a dry and pure air, and the prolonged use of these medicines in very small doses, are requisite to success. The same treatment may be also employed in the hepatic complication. But in the acute maladies of the liver, the preparations of iodine are often injurious.

113. (c) The complication with *disease of the pancreas* is even more difficult to be ascertained than that with mesenteric enlargement; but, even when confidently inferred, it does not seem to require a different treatment from that now recommended.—In the *splenic association*, nearly similar measures to those already stated are also applicable. The preparations of bark; the sulphate of quinine, and of the metals; and stomachic purgatives; are more especially indicated in it; particularly when aided by emollient clysters, and the external applications described above (§ 109.).

114. (d) *Chronic dysentery in the dark races*, being characterised by relaxation of the mucous surface of the large bowels, and an adynamic state of the system, and differing not materially from chronic diarrhoea, will be most successfully treated by tonics conjoined with astringents, absorbents, aromatics, and hot spices; by the warm bath; by injections with lime water and other astringents; and occasional stomachic or warm purgatives, in order to prevent fecal matters from collecting. Its principal complications, in these races, are with *enlargement of the spleen*, with *worms*, and with *mesenteric disease*; the two latter especially. In the association with enlargement of the spleen, the sulphate of iron or other chaly-

beates, with rhubarb, and occasionally stomachic purgatives, are the most efficacious medicines. To the other complications, the treatment already prescribed (§ 97. 112.) is also appropriate. (See also DIARRHŒA — *Treatment of, in the Dark Races*, § 37.)

115. iii. TREATMENT OF CERTAIN STATES AND CONTINGENT CHANGES.—A. When dysentery is prevalent, a recognition of the *early symptoms*, particularly those *premonitory* of an attack, as sunk pale countenance, gripping pains with borborygmi, and irregular chills or horripilations, with or without diarrhoea or tenesmus, should lead to the adoption of means which will often ward off the disease or cut it short. Of these, the most efficacious is an ipecacuanha *emetic*; which may even be repeated until its free operation is procured, followed by a single full dose of calomel; and that, in two or three hours, by a purging draught, and a laxative enema. After these, a warm bath, the patient being well rubbed upon coming out of it, and placed between warm blankets; and pills with camphor, ipecacuanha, and three or four grains of opium, repeated subsequently in smaller doses; will frequently remove all disorder. This plan, if employed sufficiently early, is equally applicable to all the varieties of the disease.

116. B. (a) *Extreme irritability, want of sleep*, and distress at night, during the most acute attacks, often exhaust the strength of the patient, and require either very large doses of opium, or opiate suppositories, or small opiate injections, especially after coming out of a tepid or warm bath—a tepid bath if there be much heat of skin or attendant sthenic diathesis, and a warm bath if the constitutional affection be of the asthenic kind.—(b) *Excessive irritation in the rectum, and dysuria*, may be alleviated by the treatment directed above (§ 84, 85.), and by small injections—from three to five ounces—containing either opium, or the extract of hyoscyamus, or the extract of belladonna, or F. 137.; recollecting, however, that this latter will often produce much disorder, if too freely employed. In a case where I prescribed it, in 1826, with remarkable benefit, it affected the head, and caused a most copious scarlet eruption on the skin.—(c) *Very copious effusions of blood* alarm the patient; and although they frequently relieve the sthenic forms, yet, if often repeated, or occurring too largely in the asthenic varieties, they require to be moderated, or arrested. In the former states, general or local depletions will be the best means of removing them; but in the latter, or when they sink the vital energy, the terebinthinated draught and injection prescribed above (§ 90.), or the superacetate of lead, in draughts with acetic acid and laudanum, or in enemata; or the muriated tincture of iron in the infusion of quassia, by the mouth, or in clysters; or lime juice and opium, similarly prescribed; will generally prevent further discharge.—(d) *Distressing flatulence and meteorismus* will often be relieved, especially in the adynamic states, by a terebinthinated or an assafoetida injection (F. 136.), and by the warm epithem; or by the infusion of the leaves of rue, employed as fomentations over the abdomen; or by the bruised macerated leaves applied warm to the same situation.—(e) *Leipothymia* or *sinking*, or even full *syncope*, may follow the efforts at evacuation—particularly if the

patient get up to the night-stool, at an advanced, or in an adynamic state of the disease; and death may even take place from this circumstance, especially in the scorbutic complication, or when the patient has been kept too low, or has been addicted to spirituous liquors. Restoratives, the supine posture, and the use of the bed-pan, should not be neglected in these cases.

117. C. (a) *Prolapsus ani* indicates severe irritation about the sigmoid flexure of the colon, and upper part of the rectum, and requires the careful replacement of the part, local depletions from the sacrum, astringent fomentations with opium to the anus, astringent lotions, and injections with an urethra syringe, especially if the rectum be ulcerated; small injections of the dilute black wash, if sloughing of the bowel be suspected; and the belladonna plaster over the sacrum, or above the pubis, in order to remove the spasm of the muscular coats of the intestine. When this symptom occurs in chronic dysentery, we may infer the existence of ulceration. In such cases, injections of a solution of nitrate of silver will give permanent relief. — (b) *Excoriations about the anus* often occur, in all the forms of the disease, but most frequently in the hepatic complication, and require warm anodyne fomentations and poultices; small narcotic injections; and ointments with opium and mineral astringents, as the sulphate of zinc or the acetate of lead. — (c) *Abscess in the vicinity of the anus* should be treated at first by local depletions and cooling discutient applications; and if these fail, by warm poultices, and early external openings, in order to prevent internal fistula. If the suppurating part assume an unhealthy aspect, injections with the dilute disinfecting fluid, and a tonic constitutional treatment, should be adopted. — (d) *Ulceration in the bowels*, of a sloughing kind (§ 54.), is a very unfavourable occurrence in the acute forms, for which a tonic and an emollient treatment—the internal use of the chlorates with opiates, and mucilages, clysters of the same description, and the other measures directed for the malignant variety (§ 89.)—should be employed.—The ulceration that takes place in the progress of the chronic form ought to be treated by the remedies recommended for the obstinate states of that form (§ 105, 106.).

118. iv. OF CERTAIN CONSEQUENCES OF ACUTE AND CHRONIC DYSENTERY.—A. (a) In the acute varieties, and occasionally in the chronic, the *extension of inflammation*, with or without previous ulceration, from the internal to the external surface of the bowels, or to the omentum, or mesentery, is one of the most dangerous results; and requires very decided treatment, as soon as the symptoms of this change (§ 55.) appear. General or local depletion, if the state of the circulation and of the constitutional affection permit either or both, should be practised; a full dose of calomel, camphor, and opium being exhibited immediately afterwards. These may be followed in a few hours by the terebinthinated draught, or enema, or by both; but more especially by the warm turpentine epithem (§ 89.), which ought to be repeated until the peritoneal inflammation is subdued. Nothing short of these means, promptly practised, will, in such cases, save the patient; but these will sometimes be successful, if properly employed, and not left to ignorant or careless

persons. — (b) *Adhesions* of various parts of the serous surfaces sometimes remain after these attacks; as shown upon dissection of cases that have been carried off a long time subsequently by other diseases. The signs of this *sequela* are very obscure and uncertain. But I believe, that these adhesions will gradually diminish, and ultimately almost disappear, if we succeed in restoring the natural functions to a healthy state; all adventitious productions being removed by a due manifestation of the vital energies in the assimilating and absorbing organs; and by derivation to, and counter-irritation in, distant parts. Either with, or without, the effusion of lymph necessary to these adhesions, a copious *effusion of serum into the peritoneal cavity* may take place, the dysenteric affection being suppressed, or very rarely persisting. This occurrence is most frequent when there is coexistent disease of the liver, or when the dysentery has followed fevers. The treatment, in such cases, must be much the same as that directed in *Dropsy of the Abdomen*. The application to the abdominal surface, twice daily, of about a drachm of an ointment consisting of from six to twelve grains of *veratria* to an ounce of prepared lard, as first recommended by M. MAGENDIE, and very recently adopted in this country, promises to be extremely beneficial, as being more especially appropriate, in dropsy occurring in these circumstances.

119. B. *Contractions or strictures of the colon* are among the most unfavourable changes, attending the advanced stages of the chronic disease, or remaining as its *sequela*. It is important, in respect both of the diagnosis and treatment, to form some idea, although we cannot often be certain, of their existence during life. Yet I have seen the diagnosis fully established, in some instances, by rational inferences from the phenomena of the case. The use of bougies, for the purposes of diagnosis or cure, is entirely out of the question: the legitimate exercise of medical science is here only required. If there be great difficulty or impossibility of procuring full or feculent stools, the patient not complaining of tenesmus or the acute symptoms of dysentery; if the evacuations be scanty, or contain semi-dissolved faeces, with shreds of white mucus or of albuminous exudation, and if they be preceded by an uneasy sensation in the course of the colon, with that of load or fulness about the cæcum and right hypochondrium, or between the epigastrium and umbilicus; if there be distension of the abdomen, with flatulent eructations and a foul or feculent odour of the breath; if an injection cannot be fully thrown up, or if it return immediately, or before the last part is thrown up, although the pipe is fully introduced and carefully guarded; and particularly if these symptoms occur in an advanced stage of the chronic disease, or in persons who have had previous attacks; then stricture in the left and sigmoid flexures, or even in the transverse arch, should be dreaded. In such cases, the patient will occasionally complain of a sense of tearing, scraping, gnawing, or of dragging in some part of the colon, previously to the operation of the bowels; the regions of the cæcum and ascending colon being hard and tumefied.

120. The chief objects in these cases are to preserve the contents of the large bowels in a

fluid state, and prevent thereby the accumulation of faecal matters above the stricture, and the consequent irritation and distention; endeavouring, at the same time, to subdue the chronic inflammation and ulceration frequently existing in the strictured part. These intentions are to be fulfilled by gentle and cooling laxatives; by refrigerants with anodynes and emollients, and by injections of a similar kind, slowly and carefully thrown up by the improved apparatus. Gentle friction, also, of the abdomen, with oleaginous or antispasmodic liniments, following the exhibition of these medicines, will also be serviceable. As to the particular remedies that may be employed, the supertart. of potash with borax, or with magnesia; soda tartarizata; manna; olive oil, or oil of almonds, either alone, or with sweet castor oil; ipecacuanha with soap, small doses of blue pill or hydrarg. cum cretâ, and extract of hyoscyamus or of conium; the nitrate of potash with subcarbonate of soda and small doses of camphor; the confection of senna with sulphur, and cream of tartar; the decoctum lini in enemata with olive oil, or with borax; the common soap injection; the emplastrum ammoniaci cum hydrarg. either alone, or with extract of belladonna, placed on the abdomen; or the linimentum hydrargyri, with the linimentum saponis cum opio, and the linimentum camphoræ compositum, rubbed assiduously on this part; or external irritation of it by F. 311., or by citron oil; and a regulated farinaceous diet; have appeared to me the most successful remedies. Aloetic, saline, resinous, or irritating cathartics are obviously injurious. During this treatment, febrile excitement of the system should be guarded against, and removed by cooling diaphoretics. The occurrence of *stricture in the rectum*, as a sequela of chronic dysentery, is not infrequent, and should be treated upon the same principles and in the manner explained in the article RECTUM.

121. V. NOTICES OF METHODS OF CURE AND REMEDIES RECOMMENDED BY WRITERS.—In the treatment of no other disease, perhaps, has the baneful influence of exclusive medical doctrine been more fully exerted than in that of dysentery. This is fully evinced by the much less rational measures very generally employed, towards the end of the last century and at the commencement of this, wherever the theory of BROWN was adopted.—A. *Vascular depletions* have been directed in dysentery from the earlier periods of medical history. They were recommended by AETIUS, ALEXANDER, and RHazes; and by GORION (*Ergo Dys. Phlebotomia*. Paris, 1604.), RIVERIUS, PROSPER ALPINUS, LESPICIER, BOTALLUS, SYDENHAM, ELLAIN, ZACUTUS, and many other writers of the sixteenth and seventeenth centuries; but had fallen into disuse, when Dr. JACKSON and Dr. WHYTE (*Med. and Phys. Journ.* vol. ii. p. 283.) revived the practice. During the Peninsular campaigns, general and local bleeding were freely employed by Drs. SOMERS, FERGUSON, FORBES, and other physicians of the British army. Indeed, it had never been altogether neglected by judicious practitioners during the last century, notwithstanding the injurious influence of theory upon medical observation and practice; for we find it directed by HILLARY, AKENSIDE, CLEGHORN, PRINGLE, BAKER, STOLL, M'GRIGOR, &c., and strenuously conten-

ded for by JUNCKER (*De Util. Venæsect. in Dys.* Hal. 1770.) in the early stages of the inflammatory disease. From what has been stated above, it is apparent that bloodletting, although applicable to certain forms of dysentery, should be employed with much discrimination, and with due reference to the exciting causes, and to the prevailing epidemic constitution. This is well illustrated by its injurious effects in the asthenic forms; especially those proceeding from depressing causes and contaminating sources; and by the history of dysenteric epidemics (§ 29.). Mr. BACOT states that, when the malady was consequent upon fever, in the Peninsula, or arose from the same exciting causes, bleeding could seldom be borne. It would also appear, that from 1817 to 1827, during which period the seasons were tolerably regular and the summers dry and warm, this disease was attended by more or less of the inflammatory diathesis; and that, from this latter date, when they became less regular and much more wet and cold, it has assumed more of the asthenic characters. The application of *leeches* to the anus, advised by NEUMANN, HUNNIUS, and many French writers, is often productive of benefit; but irritable sores, owing to the excretions coming in contact with the bites, are apt to follow.

122. B. *Evacuants*.—(a) *Emetics* are extolled by some writers, and considered injurious by others. The circumstances in which they may be employed (§ 92. 115.) have already been pointed out. They are certainly more beneficial in some seasons and epidemics than in others; as, indeed, admitted by CHOMEL (*Ergo Dysent. Vomitus*. Paris, 1698.), FISCHER, GOEDEN, MICHAËLIS, and SCHMIDT (*De Emet. Usu in Dysent.* Jenæ, 1803.), and HUNNIUS (*Horn's Archiv.* 1811. p. 151.), who are amongst the most strenuous believers in their efficacy. HIPPOCRATES directs early recourse to be had to them. CLEGHORN advises them in the bilious form: WENDELSTADT in the same variety, or when the disease is complicated with rheumatism; and he prescribes diaphoretics and opium after their operation. STOLL very justly considers them most appropriate where there are little fever, and no constant pain or tenderness in the abdomen. In these cases, they generally promote diaphoresis, especially if opiates be given soon afterwards. As to the choice of emetics, some difference exists. Antimonials are preferred by PRINGLE (*Edin. Med. Essays*, vol. v. art. 15.), BAKER, ADAIR, and SAUNDERS; and ipecacuanha by HARGENS, WEBER, ANNESLEY, and the great majority of the most recent writers. Dr. WRIGHT found ipecacuanha emetics, followed in succession by cream of tartar and castor oil; afterwards by DOVER's powder, as soon as the digestive tube was evacuated; and, lastly, by cinchona or cascarilla; the most successful method in West Indian dysentery.

123. (b) *Purgatives*, generally of a mild description, are directed by DU BREVIL, J. HUNTER, LOMBARD, MÜLLER and HESSE (*De Usu Evacuantium in Dys.* Jenæ, 1800.). SYDENHAM prescribes those of an active kind, after bleeding and a full dose of laudanum. JACKSON and ANNESLEY adopt a nearly similar practice. HUNNIUS and WENDELSTADT prefer laxatives, or mild and cooling purgatives, and consider them most serviceable in the bilious variety; whilst

LIND, VOGEL, THOMANN, WEBER, and NEUMANN believe all purgatives injurious, and advise only the gentlest *oleaginous laxatives*. The circumstances in which these medicines are most appropriate will be apparent from what has been stated above; as well as those which should be selected. *Calomel* is preferred by JACKSON, BALLINGALL, BAMPFIELD, and ANNESLEY, when assisted in its purgative operation by other medicines, either combined with it, or given subsequently. *Sulphur* is recommended as a laxative by WEDEKIND and LANGE (*Miscel. Verit.* p. 30.); and certainly full doses of the precipitated sulphur, with one or two drachms of cream of tartar; or these with confect. sennæ, in the form of electuary, are amongst the gentlest and most certain aperients that can be exhibited, in an advanced stage of the acute, or in the chronic disease; and may be given every two or three hours, until the effect is produced. The *neutral salts* are, in general, not so serviceable as the laxative oils, although CLARKE, BALMAIN, and MURSIMA are favourable to the use of the sulphate of soda. STOLL recommends the saline aperients only in the bilious variety; and anodynes after their operation; and several writers extol them when conjoined with antimonials. The supertartrate and tartrate of potash, or the soda tartarizata, are, upon the whole, the most serviceable of this class of purgatives. The *supertartrate of potash*, finely levigated, and given to the extent of three or four drachms every six hours, in the form of electuary, with the pulp of tamarinds and syrup of ginger, will often open the bowels and procure the excretion of bile, when other means fail. The practice is recommended by SELLE (*De Curandis Morbis*, &c. p. 157.), and was found to succeed in some hopeless cases by Dr. CHEYNE. It is the more efficacious after the exhibition of mercurials; and, when the substance of the liver is acutely affected, may be depended upon as an appropriate refrigerant purgative. But, in ordinary circumstances, there can be no doubt of the propriety of the decision of CULLEN, BANG, TODE, CLARK, and PIDERIT, in favour of oleaginous laxatives given by the mouth, and in mucilaginous enemata. When we suspect, from the existence of scybala, or the appearance of the stools, or from fulness or hardness in the course of the colon, the accumulation of fecal matters in the cells of this bowel, the oleaginous draught prescribed above (§ 83.) may be exhibited; or the following pills may be given every two hours until a full evacuation is procured.

No. 203. R Scammoniae, Pulv. Rhei (vel Pulv. Jalap.), ʒʒ gr. ij.; Potassæ Sulphatis gr. iv.; tere probe simul, et adde Olei aut Syrupi q. s. ut fiant Pilulæ duæ.

124. (c) *Enemata* are amongst the most efficacious means for either the evacuation of morbid matters, or the removal of the diseased action going on in the large bowels, or both. Those with the *laxative and emollient oils* are preferred by CELSUS, CULLEN, BANG, HORN, RADEMACHER, and some others, when the first intention requires to be fulfilled; and to these substances may be added laudanum or hyoscyamus, according to circumstances. *Amylaceous, emollient, or mucilaginous injections*, with or without anodynes, are directed by HIPPOCRATES, ALEXANDER, PAULUS, LIND, SCHLEGEL, DUNCAN, NEUMANN, THOMANN, &c., chiefly with the second

of these intentions. Small *acetous clysters* with opium are prescribed by VANDER HEYDE, BIRNSTIEL, and BRÜNING; decoction of *linseed* with laudanum, by CELSUS, CLARK, and HORN; decoction of *quince seeds*, by WENDT; the decoction of the root of *marsh mallows*, by PAULUS ÆGINETA, and ECKER; *milk*, by CELSUS, ALEXANDER, and FORESTUS (lib. xxii. obs. 36.); and milk with theriaca, in the acute varieties, and with Venice turpentine, in the chronic, by SYDENHAM. Injections, as directed in the foregoing sections, should have strict reference to the state and stage of disease, and not be bulky. HUNNIUS considers large enemata injurious; they are very seldom long retained. Many substances, besides those now mentioned, may be thus administered; especially in the chronic states. GALEN, and the Arabian physicians, exhibited nearly all the vegetable and mineral *astringents*, the *anodynes*, and even the *escharotics*, as the preparations of *arsenic* and *copper*, in this way. Dr. JACKSON advises a weak solution of *corrosive sublimate*, with myrrh, and demulcents; and Mr. ANNESLEY, the black or yellow wash, to be thrown up in enemata, in the chronic complaint.

125. *C. Emollients and Demulcents* are baneficial, not only in themselves, prescribed in the form of draught or injection, but also as the vehicles of more active substances. They constitute one of the chief means employed by HIPPOCRATES in dysentery. Several *oils* are exhibited in this manner, either in the state of *emulsion*, or on the surface of other fluids. *Linseed oil* is preferred by RULAND (*Curat. Erup.* c. iv. n. 40.); *almond oil*, by HEUERMANN; and *sweet oil*, by numerous writers. This last, in sufficiently large quantity, is one of the most efficacious remedies that can be administered as an enema. *Mucilages*, prepared chiefly from the gums, either alone (GILBERT, *Advers. Pract. Prim.* p. 417.); or with absorbents and opium (PFENNINGER and STAUB); the *decoctions* of marsh mallows or of the common mallow (PAULUS, KORTUM, ECKER), drunk warm, in large quantity; saleb (WEBER and HARGENS); and the decoction of the Carageen moss, or of Iceland moss (HARGENS, l. c. and HERZ, *Briefe*, b. ii. n. 2.); are useful medicines.

126. *D. Anodynes*, especially after vascular depletions where they are required, and alvine evacuations, are very generally recommended. — (a) *Opium* is the most to be depended on, and the most generally appropriate in some combination or other, according to the intentions to be fulfilled. If its sedative effect chiefly be desired, and if inflammatory fever be present, it may be given in doses of from one to four grains, either alone or with nitre, or with antimonials, as directed by BLANE, HIMLY, JAWANDT, CHEYNE, NEUMANN, and HORN (*Archiv.* b. vi. p. 103. et seq.). When it is desirable to procure a diaphoretic operation, it is best conjoined with ipecacuanha (CARDIN, MÜLLER, &c.), or small doses of camphor and nitre; or in the state of laudanum, with considerable quantity of the spiritus ætheris nitrici, or with other diaphoretics (HINZE, JACKSON, &c.), especially in the asthenic forms. If the biliary secretion be scanty, the liver not being actively diseased; or if the intention be to excite salivation; opium may be conjoined with moderate doses of calomel, and given every four or

six hours, as directed by J. JOHNSON, LEIDENFROST, RENTON, and others—particularly in the sub-acute and chronic states. If the powers of life be depressed, and the circulating and secreted fluid vitiated, it will be necessary to exhibit it with tonics and antiseptics (MORTON, WEDEKIND, &c.), as cinchona, the chlorates, &c.; and with astringents (RIEDLIN), when the evacuations are profuse, the digestive mucous surface relaxed, or the disease chronic. CONSRUCK considers opiates injurious, unless preceded by emetics; and SYDENHAM, MURSINNA, and others, either premise evacuations, or alternate them with anodynes. The opinion of WENDELSTADT, that opium, as well as astringents, are injurious in the bilious variety, until morbid secretions are evacuated, is judicious, and may be extended to most forms of the disease. In the nervous or typhoid variety, they should be given with great circumspection. MORTON found that, when mainly depended on, in the epidemic of 1666, they augmented the exhaustion and muttering delirium frequently attending it. Opium, in *suppositories* (BATEMAN, &c.), and in *liniments* rubbed on the abdomen, or externally in other forms (HARGENS and THOMANN), has been already recommended in various states of the malady.

127. (b) Amongst those substances which act most energetically in removing spasm of the intestinal fibres, and diminishing morbid sensibility, hyoscyamus, belladonna, and tobacco, are the most deserving of notice. *Hyoscyamus* is recommended by MATTHÆI, WITHERING, and HUNNIUS; and, in the acute and febrile states of the disease, may be exhibited in the same manner and forms of combination as opium. The recent juice of *belladonna* is praised by GESNER (HALLER's *Biblioth. Med. Pract.* vol. ii. p. 55.), and ZIEGLER (*Beobachtung.* p. 35.); but the powder of the root, and the extract of this plant, are equally efficacious when properly preserved. A strong infusion of *tobacco* is prescribed as a fomentation to the abdomen, by Drs. GRAVES and O'BEIRNE. These narcotics are appropriate only to the early stages of the sthenic states of the disease, and require much discrimination and caution. The *prussic acid*, with camphor, ipecacuanha, and mucilages, is of benefit when judiciously prescribed.

128. E. *Diaphoretics* are extremely beneficial in the early stages of the disease. Those of a cooling and relaxing kind are most suitable to the sthenic forms, and such as are warm and exciting in the adynamic states.—(a) *Antimonials* are preferred by PRINGLE, SIMS, FISCHER, BAKER, VOGEL, ADAIR, RICHTER, and HUFELAND; whilst HEUERMANN (*Bemerk.* b. i. p. 184.) considers them injurious,—an inference, which I believe to be correct as respects their exhibition in the advanced stages, or in the asthenic states. Of these preparations, the most serviceable is JAMES's powder, given with calomel, or with calomel and opium in the first stage. *Liquor ammoniæ acetatis*, with mucilages, emollients, and opiates (HARGENS); or with small doses of camphor and nitre, and either with (RICHTER and SAUNDERS) or without anodynes, is more generally appropriate; and, in persons who have been addicted to spirituous liquors, or in the asthenic forms, with camphor mixture, the *spiritus ammoniæ aromaticus*, or the *spiritus ætheris nitrici*

and laudanum, is very beneficial. The infusions of *serpentaria* or of *arnica*, either alone, or with liquor ammoniæ acetatis, or with camphor and opium, are indicated chiefly in the malignant or nervous varieties, or in the advanced stages of the other asthenic forms. The infusion or powder of the root of *arnica* (MICHAËLIS, COLLIN, BIRNSTIEL, and FISCHER), may be employed in similar combinations and states of the disease, as advised by RICHTER. STOLL (*Rat. Med.* vol. ii. p. 421.) recommends it after emetics, depletions, and evacuations, in the acute; and in the chronic complaint. *Ipecacuanha* is, however, the most certain in its effects, when combined with opium, and the most to be depended upon, in arresting the train of morbid actions. The injunction of Sir G. BLANE, to have recourse to diaphoretics after evacuations have been procured, should not be overlooked.—(b) The importance of restoring the functions of the skin has been duly estimated by GRUBER, JACKSON, NEUMANN, VOGLER, and SCHLEGEL, and should not be confined to internal remedies merely. *Tepid* or *slightly warm baths*, in the highly inflammatory states, and *warm baths* (BLANE, HORN, RICHTER, KÖNIG, GOEDEN, &c.), or baths with aromatic and stimulating herbs infused in the water (THOMANN, *Ann.* ad 1800, p. 237.) are also important means. *Vapour baths*, and the application of *dry heat* (HEISTER, VOGLER, and HARGENS,) are also deserving of notice. Frictions of the surface, or, as PROSPER ALPINUS and others advise, frictions with sweet oil, upon removal from the bath to a warm bed; and the internal use of diaphoretic diluents, are useful adjuvants.—(c) *Warm poultices* (ANNESLEY and Author) and *epithems* or *fomentations* frequently applied to the abdomen, as directed by ALEXANDER, RIVERIUS, BRÜNNER, STOLL, RICHTER, &c., are often serviceable, when they are so managed as not to wet the bed-clothes. Warm cataplasms of aromatic and antispasmodic herbs, &c., are praised by HEISTER, BLANCHARD, THOMANN, BRÜNING, KLINGE, (in HUFELAND, *Journ. der Pr. Arzneyk.* b. vi. p. 900.), HINZE, (HORN's *Archiv.* b. iv. p. 516.), GOEDEN (*Ibid. Mart.* 1812, p. 331.), and HORN (*Ibid.* b. vi. p. 263.). These also act as derivatives, as well as diaphoretics.

129. F. *External derivation* is very generally prescribed. MOSELEY and MATTHÆI recommend it chiefly in the complication with rheumatism, for which PAULIZKY (*Beobachtung.* st. ii. n. 1.), directs *blisters* to the thighs; where, also, they are generally ordered to be applied by MÜLLER, ECKER, and AMELUNG. SCHLEGEL, LIND, STOLL, BLANE, FISCHER, MURSINNA, NEUMANN, and ANNESLEY advise large blisters to the abdomen; and HUNNIUS to the sacrum; whilst other writers think that they increase the dysuria. *Sinapisms* are noticed by BLANE and FISCHER; and camphorated *liniments* rubbed on the abdomen, by LIND. These are less rapid in their effects, and much less efficacious, than the turpentine *epithem* described above (§ 89.), or friction with *croton oil*, either of which may be also applied to the insides of the thighs and legs in urgent cases.

130. G. *Astringents* form a principal part of the means employed in dysentery by GALEN and the Arabian physicians. Various substances of this kind are recommended. Dr. WRIGHT advises *citric acid* and common salt, which are often of

much service either with or without opium, especially in the asthenic states, and as they occur in the dark races. GOEDEN (in HORN'S *Archiv.* Mart. 1812, p. 284. and 323.), prescribes *tartaric acid* with refrigerants, and opium; BANG, *sulphuric acid* with mucilage; ANNESLEY, the *nitro-muriatic acids*, with anodynes; and M'GRIGOR and HOPE, *nitric acid* with opium; this last being chiefly appropriate to chronic cases, and those associated with disease of the collatitious viscera. BIRNSTIEL directs *alum* conjoined with camphor; LOOS (HORN'S *Archiv.* Jan. 1810, p. 193.) *alum* with *tormentilla root*; HUNNIUS, MICHAËLIS (HUFELAND, *Journ. der Pr. Arzneyk.* b. vi. p. 280.), and HARGENS (*Ibid.* b. vii. p. 137.), *alum* with mucilages, opium, &c., chiefly in the chronic and atonic states; MOSELEY and JACKSON, *alum* with sulphate of zinc, by the mouth and injections; and ADAIR, *alum* with *spermaceti*, or gum, opium, and aromatics, in epidemic dysentery occurring among negroes. *Lime water* with milk, or with mucilages, is praised by GRAINGER, BREFELD, and LANGE; but is most serviceable in the chronic and asthenic states, and in the form of enema; in which cases, various other astringents are recommended, especially after morbid matters are evacuated. In this manner the preparations of *catechu* are directed by BRANDE (TODE'S *Med. Journ.* b. x. n. 1.) and others; *kino*, by WEBER; *hamatoxylon* with cinnamon and other aromatics, by PRINGLE and WENDT; the *tormentilla root*, by HOFFMANN; the *lythrum salicaria*, by QUARIN and GARDANE; the root of the *ledum palustre*, by BIORNLUND; *betel*, by PERON; the inner bark of the *brucea antidysenterica*, by several writers; and the decoction of the *pomegranate bark*, or of the rind of the fruit, by the ancients, and by many modern authors. All these, especially *tormentilla*, *catechu*, and *betel*, are advantageously combined with *ipecacuanha* or DOVER'S powder. Several mineral astringents are also exhibited, especially in the asthenic and chronic states, or in far advanced stages; internally as well as in enemata. *Arsenic*, and the rust of *copper*, are prescribed by GALEN, RHazes, and most of the ancients; and the *sulphates of zinc*, of *copper*, and of *iron*; and the *nitrate of silver*, either with or without opium; by the authorities referred to in the article DIARRHŒA (§ 50.). The *superacetate of lead* is recommended by FERNELIUS, CAMERARIUS, and NARDIUS, and is now frequently employed, in pills, draughts, or injections, generally with opium and *ipecacuanha*, both in the acute and chronic forms; particularly the latter. It should be recollected, when prescribing astringents in this disease, that they are injurious when exhibited early in the acute states, and whilst there is much fever, or when morbid matters remain to be evacuated. In other circumstances, they frequently are of much service; particularly when altered secretions and accumulated excretions are discharged from time to time by a judicious exhibition of mild purgatives; and when they are conjoined with demulcents, with *ipecacuanha*, or with absorbents, or with anodynes, according to the forms of the disease and the state of the patient. MORTON found them injurious, although they diminished the discharges; in the malignant or colliquative epidemic of 1666; and similar results have been remarked by others.

131. *H. Tonics* are required in nearly the same states of the disease as astringents; but they are less frequently injurious, as they do not so completely suppress the discharge from the intestinal mucous surface as astringents usually do. They admit, also, of similar combinations with anodynes, demulcents, and absorbents, to those found most serviceable with astringents; and possess the additional advantage of promoting the operation, and, in some instances, counteracting the ill consequences that might result from the exhibition, of purgatives or aperients. In the asthenic forms, they may be exhibited as early as the morbid matters are evacuated, particularly in conjunction with *ipecacuanha*, or diaphoretics and opiates; and when evacuation should be promoted, they are beneficially associated with laxatives. *Cinchona* is praised by WHYTT, LINKE, CLARK, and DOUGLAS (*De Dysent. Putrida*, ed. 1766, p. 35.). BANG prescribes it with *rhubarb* (*Act. Reg. Soc. Med. Haun.* vol. i. p. 105.); SCHMIDTMANN, with *ipecacuanha*; WHYTT, QUARIN, and PRINGLE, with *catechu* and *ipecacuanha*, after bleeding and alvine evacuation; and MORTON with opium. HEUERMANN restricts it to dysentery following fevers; and CULLEN advises it chiefly when the disease assumes an intermitting or remitting character. HUXHAM and PRINGLE prescribed an *infusion of it* and *serpentaria*, with great benefit, in the asthenic and malignant states, and during convalescence. MARCUS considers the bark injurious; which it doubtless is in the early stage of the inflammatory forms. Most of the other tonics are recommended by authors, and admit of similar forms of exhibition, in the states which require the lighter preparations of bark; for where the infusion or decoction of *cinchona*, with liquor ammoniæ acetatis, vinum *ipecacuanhæ*, and anodynes, are of service, the other tonic infusions will also be of use. Indeed, some of them, as the infusion of *calumba* (PERCIVAL and MERTENS), or of the *cusparia bark* (BRANDE, in *Hannover Magaz.* b. xxviii. p. 1101.), will be preferable in certain forms of the disease, especially in the combination now stated. In the advanced stages of the acute, or in the chronic and more asthenic forms, where tonics are chiefly required, *simarouba* (WRIGHT, GOOCH, WENDT, QUARIN, BAUMES, DEGNER, and SUMEIRE) will be also found an excellent remedy, either alone, or with the medicines just enumerated. Dr. O'BRIEN found it very serviceable in the advanced stages of the dysentery that was lately epidemic in Ireland, in conjunction with opium. The *willow bark* (LOEFFLER and OSIANDER), and *cascarilla* (WEBER, and HORN, *Archiv.* July, 1820, p. 301.) may be employed in similar circumstances, and in the same combinations. It should not be overlooked, that tonics ought to be preceded by vascular depletions, or alvine evacuations, where either is required; that the promoting of the latter, by suitable laxatives conjoined with, or intervening between them, or exhibited in enemata, will occasionally be required; especially when the disease proceeds from a morbid state of the secretions; and that they should be very cautiously resorted to in the asthenic or phlogistic varieties, even in their advanced stages.

132. *I. Aromatics and Absorbents* are often useful adjuvants in the advanced periods, or asthe-

nic forms of the acute, or in the chronic affection; more especially when occurring in the dark races. — (a) BLANE prescribes *aromatics* with bitter infusions. HORN (*Archiv. b. iii. p. 317.*) prefers the *calamus aromaticus*; and PRINGLE, the preparations of *cinnamon*. The hot spices, especially *Cayenne* and *black pepper*, are most commonly used in warm countries, and are best suited to the natives, combined with tonics, absorbents, or mucilages. Active *stimulants* are too indiscriminately recommended by BROWN, MARCUS, and ZINCKE; but VÖGLER justly considers them injurious, unless in the adynamic or malignant states, in which, as well as in many of the chronic, the hot spices, thus combined, or given with ipecacuanha, camphor, and opiates; or with honey and small doses of the chlorates, or even of borax, in the chronic; will frequently be of great service. — (b) The ammoniacal, calcareous, and magnesian *absorbents* are most serviceable in the chronic and asthenic conditions, in the states of association here mentioned. In the phlogistic varieties, the subcarbonates of the alkalies, with refrigerants, anodynes, and diaphoretics, are most appropriate.

133. *K. Mercurials* are prescribed — 1st, as chologogue purgatives or laxatives — 2d, as simple alteratives; and, 3d, to procure their specific effects, whereby their alterative operation may be better secured, and a derivation from the seat of the disease established. — CLEGHORN, LYSONS, CLARKE, WRIGHT, SAUNDERS, RICHTER, JACKSON, BAMPFIELD, and ANNESLEY direct *calomel*, either alone, or with some purgative, generally at bedtime; and sometimes oleaginous laxatives and enemata subsequently, in order to accomplish the first of these intentions; and DUNCAN and LEMPRIÈRE combine it with rhubarb. The chief objection to this practice is, that, however appropriate it may be in respect of the hepatic functions, a full dose of calomel generally increases the tenesmus; and the more, the oftener it is repeated, or the larger the dose.* This I have often remarked; and Sir J. M'GRIGOR states that calomel, given in the early stage of the acute unmixed disease, aggravated the symp-

toms. A similar observation is also made by Dr. CHEYNE. HARGENS and CONSRUCH prescribe calomel as a purgative in the verminous complication; whilst HORN and some others consider it, as well as mercurials generally, when frequently repeated, or, in large quantity, very injurious. LIND recommends the exhibition of the pure quicksilver with sulphur, gum acacia, and ipecacuanha, after emetics, with the view of removing obstructions in the large bowels. LEIDENFROST directs small doses of calomel with opium. JOHNSON and RENTON give four or five grains, every four or six hours, or much larger doses less frequently, also with opium, until salivation is produced; and Dr. FERGUSON, half a grain with a grain of ipecacuanha, every hour, till the gums become affected; bleeding having been premised in the early stage of the inflammatory disease. *Inunction* is preferred by BOAG (*Med. Facts and Observ. vol. iv. n. 1.*), CLARKE, and HOULSTON, for procuring the specific effects of this medicine, in the chronic and complicated forms of dysentery. The observations already (§ 101.) offered respecting mercurials, will show the circumstances in which they may be employed, and the preparations that may be preferred. They are most appropriate to the sub-acute and chronic states, after depletions, when the substance of the liver is not actively diseased; and are best combined with James's powder, or ipecacuanha, or DOVER's powder. *Calomel*, or the *hydrargyrum cum creta*, should then be given; and if their specific effects soon follow, the circumstance may be considered favourable; but the former should not be persisted in. The latter, however, may be continued longer; particularly in conjunction with ipecacuanha, as being much less liable to increase the tenesmus than calomel; especially in the chronic disease. When dysentery proceeds from endemic sources, or when it assumes a very adynamic form, little benefit beyond its chologogue operation is produced by it; as I have had sufficient reason to believe, that, when given with the view of affecting the system, it favours relapses, and protracts convalescence.

134. *L. Ipecacuanha* was first employed in the cure of this disease by PISO, who brought it from the Brazils (*De Med. Braz. lib. ii. de India utriusque Re Naturali et Medica, &c. Amst. 1658, fol. p. 231.*), and had given it in drachm doses, and in the form of infusion. But it was not until HELVETIUS, who had come from Holland to Paris, gave some of it, with a knowledge of its virtues, to the physician of LOUIS XIV., who employed it successfully in the case of the Dauphin, then dangerously attacked by dysentery, that it came generally into use. MARAIS (*Ergo Dysent. affect. Radix Brasiliensis. Paris, 1690.*) and soon afterwards, SLOANE (*Philos. Trans. No. 238.*), HEISTER, VATER, &c. further demonstrated its good effects. It has subsequently been very generally recommended, more particularly by ARENSIDE, LIND, HILLARY, DESBOIS, LINNÆUS, DUNCAN, RICHTER, and HUNNIUS. Since its exhibition by PISO, in very large quantities, Mr. BALMAIN* seems to have been the earli-

* A most important fact was determined by the experiments performed by Mr. ANNESLEY (*Sketches of Dis. of India, 2d ed. 8vo. p. 374.*), in order to ascertain the operation of calomel: and these experiments presented uniform results, viz. that, whilst the stomach and duodenum of dogs that had taken large doses of this preparation were much paler and less vascular than in ordinary circumstances, the colon and rectum, from the cæcum to the verge of the anus, were most acutely inflamed: thereby explaining the results of clinical observation; namely, that, although large doses of calomel calm those symptoms usually caused by increased vascular action, or inflammation of the mucous surface of the stomach and duodenum, they lower the vital energy of these important organs, and occasion tenesmus, gripping pains in the course of the colon, mucous or bloody stools, hæmorrhoids; and, if persisted in, many more of the symptoms of dysentery, or even structural change of the colon and rectum. I am confident that dysentery becomes chronic; that an occasional indigestion lapses into a constant dyspepsia; and that habitual constipation often passes into strictures of the rectum, and hæmorrhoids into fistulæ; from the frequent exhibition of large doses of this medicine. Ingenuity cannot possibly devise a more successful method of converting a healthy person into a confirmed invalid, of destroying many of the comforts of existence, and of occasioning hypochondriasis and melancholy, than the practice of prescribing large doses of calomel on every trifling occasion, or when the bowels require gentle assistance; or because the patient erroneously supposes himself to be *bilious*, or is told so by those who should know better. The unfortunate word "*bilious*" is the scape-goat of the ignorant.

* The importance of the subject has induced me to give the substance of Mr. BALMAIN'S communication. He states: — "I found the ipecacuanha, in small doses, always useful (in dysentery); and, in an accidental conversation with a Mr. WENTWORTH, who assisted me, I formed the design of

est to employ it in this manner, in conjunction with large doses of laudanum. A few years afterwards, Mr. PLAYFAIR adopted this practice in India; he giving from half a drachm to a drachm, with as much laudanum, and directing this dose to be repeated again and again if it should be rejected. Mr. ENGLISH prescribed from a scruple to half a drachm, with double this quantity of laudanum; and Dr. BATEMAN confirmed the propriety of this method in all the stages and forms of the disease, as he had observed it in this country. More recently, Mr. TWINING has modified this practice, and directed from four to eight — more frequently six — grains of ipecacuanha, with nearly as much extract of gentian, and occasionally also with blue pill or calomel, twice or thrice daily; premising bleeding and alvine evacuations in the acute disease, and resorting to mild purgatives, once a day, during the treatment. I had, in 1817 and 1818, given from eight to ten grains of ipecacuanha with opium, and sometimes also with calomel or blue pill, with the best results; having at first, by mistake, prescribed the simple powder for the compound; and afterwards continued the practice when the circumstance and the effects became known to me. FISCHER directs ipecacuanha, when opiates fail of affording relief. RHANOE (*Act. Reg. Soc. Haun.* vol. i. p. 33.) combines it with rhubarb; and CLARKE, SCHLEGEL, and ANNESLEY give it in the form of infusion, which may also be exhibited as an enema. Dr. DICK praises it in the dysentery of India; the bowels being freely opened by clysters, whilst it is frequently given by the mouth. It may be conjoined with nearly every other medicine that can be exhibited in this disease — with refrigerants and evacuates in the inflammatory states, and with tonics and antiseptics in the malignant; and it will occasion as much nausea in one or two grains, as in sixty; this effect being less remarkable after its exhibition in the form of pill, and with bitters or opium, or even with calomel, than when taken in simple powder.

135. *M. Rhubarb* may be given either as a mild purgative, or as a gentle astringent. It is approved of by BORELLUS (*Cent. ii. obs. 82.*), HEISTER, RIEDLIN, PRINGLE, JACOBS, and BAKER; is considered injurious by KORTUM, JAWANDT, WEBER, NEUMANN, and MURSINA; and is prescribed only in the most advanced stage by LIND, STOLL, and RICHTER. It is much praised by PRINGLE, in the camp dysen-

giving it in larger quantities. He informed me, that a man, who lived in the same town where he did, was uncommonly successful in the cure of dysentery, by using from a drachm and a half to two drachms of ipecacuanha, with laudanum. Mr. W. had, just previously to this conversation, given ninety grains of the powder, with forty drops of tinct. opii, to a man whose life was apparently near a close, and with whom evacuations had been used. There was a wonderful abatement of every symptom in the course of one night; and a repetition of the medicine, in smaller quantities, completed the cure in a few days. I did not hesitate to follow this practice; and gave the ipecacuanha frequently to the quantity of two drachms, with the addition of sixty drops of tinct. opii: and, in many cases, found that a dose or two was sufficient to remove every dangerous symptom. It answered the purpose best when given in the form of pills; and if the patient kept still, and lay on his back, with the head and chest tolerably elevated, nausea seldom or ever followed it; and oftentimes it happened that he had not a stool the succeeding day, although, previously, the gripings were violent, and the discharges of blood frequent and in large quantities." (*Mem. of Med. Soc. of Lond.* vol. v. p. 210.)

tery; especially when exhibited in large doses after emetics; and it is often of much service in the dysentery of *children*, conjoined with hydrargyrum cum cretâ, and minute doses of ipecacuanha, or with absorbents and DOVER'S powder. It is one of the best purgatives in the more asthenic forms; but it is injurious in the early stages of the inflammatory disease, or when the bile is obstructed; and it then often increases the tenesmus, as remarked by WENDELSTADT and myself. It is apt, in many constitutions, to suppress the excretion of bile, even although it may open the bowels; and, upon the whole, it requires much discrimination in its use.

136. *N. Camphor* is favourably noticed by BREFELD, MARCUS, SPONIZER (HUFELAND, *Journ. der Pr. Heilk.* b. v. p. 546.), and MENDE (*Ibid.* Aug. 1810, p. 88.). CHAMBERLAIN directs it to be dissolved in oil; MICHAËLIS conjoins it with opium; and OSIANDER and THOMANN (*Annalen*, 1800, p. 258.) employ it freely, both internally and externally. It is an excellent adjunct, in small doses, to refrigerants or diaphoretics, in the inflammatory or acute states; and, in large doses, with other antiseptics or tonics, in the malignant variety, and in the verminous and rheumatic complications. It is particularly serviceable in the nervous or typhoid state; and in the advanced stage, when nervous symptoms supervene. It may be given with ipecacuanha, either in pills, or in demulcents; and in emollient enemata. In the infectious conditions, it should seldom be omitted; and may in these, especially such as are malignant, be given in doses of ten or twelve grains.

137. *O. The terbinthines* are valuable remedies in the asthenic and chronic forms. They were recommended by the Author (*Med. and Phys. Journ.* vol. xvi. p. 107.), and have since been employed by several physicians. The circumstances in which they may be resorted to, and the manner of prescribing them, are manifest from what has been stated. They are not contraindicated in the inflammatory varieties, although bleeding should be premised; and, when exhibited so as to act gently on the bowels, or in small enemata, they counteract the tendency to sloughing or ulceration; particularly in the asthenic varieties. Any of the *balsams* — but more particularly the Peruvian (F. 843.), Canadian, and copaiba — may be given with aromatics, magoesia, and demulcents; or with opiates; and be administered in enemata. They are most serviceable in the chronic disease, especially when assisted by frictions of the surface, deobstruent plasters, flannel bandages, and regulated diet. When the stools are frequent, and without pain, they are particularly serviceable, the hydrargyrum cum cretâ being taken with DOVER'S powder at night; or they may be alternated with either the hæmatoxylon, catechu, or kino, in mucilaginous or absorbent vehicles.

138. *P. Antiseptics* are praised by WEDEKIND. With a view to its antiseptic as well as to its aperient operation. JACKSON and CRAWFORD advise the use of *charcoal*, in doses of half a drachm or a drachm, frequently repeated. It may be advantageously given rubbed up with camphor. But the *chlorates* are much more powerful agents. The chlorate of potash is prescribed by GARNETT, and the hydro-chloruret of lime by REID. This

latter, and the hydro-chloruret of soda, have been employed by me in this disease since their introduction into practice (see communication from the Author to Mr. HOULTON, in the Appendix to this gentleman's excellent translation of MAGENDIE'S *Formulary*), and may be given with demulcents, or in various other states of association, and in enemata; especially in malignant states, or when sloughing is dreaded.

139. Q. Besides the foregoing, various other remedies have been recommended.—(a) All the ancients, and DIEMERBROECK (*Observ. et Curat. Med. C. n. 29.*), BREFELD, and PAULINI (*Cent. iii. obs. 76.*), among the moderns, prescribe cold applications to the abdomen, in the phlogistic states of the disease. Lotions and poultices, with the *nitro-muriatic acid solution*, are directed to this quarter by Mr. ANNESLEY.—(b) The *nitrate of soda* (NIEMANN, MAYER, &c.) has been recently exhibited in dysentery, in doses of about a drachm, every four or five hours; or half the quantity each hour or two, in demulcent mixtures, with ipecacuanha (F. 929.). It acts as a refrigerant sedative and laxative, and is suited to the phlogistic states. The *sub-nitrate of bismuth*, particularly with ipecacuanha and opium, is extremely serviceable in some acute, as well as chronic, forms of dysentery. M. LOMBARD, and several others, had employed it with or without opium; and, more recently, MM. RÉCAMIER and TROUSSEAU have found it to possess much efficacy as an antispasmodic sedative and astringent in this disease, and deserving adoption after depletions and evacuations have been practised in cases requiring them (*Gaz. Med. Feb. 26. 1833.*).—(c) *Nux vomica*, or its extract, and its active principle, *strychnine*, are recommended in the chronic disease by HUFELAND, FISCHER, HAAKMANN, GOEDEN, KLINGE, ODHELIUS, HAGSTROEM, GRAVES, and OSWALD; but HARGENS, WEBER, MICHAËLIS, and HORN state that they derived little or no benefit from it. In the particular condition now mentioned, either of the above preparations is often of use; more especially the extract, or strychnine, with ipecacuanha.—(d) *Hedera arborea* and *h. terrestris* are prescribed by CAMERARIUS (*Memorab. cent. iii. n. 79.*); the fruit of the *Adansonia*, by L. FRANK; *Armenian bole*, and the *terra lemnia*, or *sigillata*, by many of the older writers; *castor*, with nitre, by SCHLEGEL; *musk*, with camphor and absorbents, &c., in the malignant states and last stages, by HUNNIUS; *wax*, with gum acacia, by WEDEKIND; the decoction of *vaccinium myrtillus*, or bilberry, with burnt spirit, by FRASER; and the preparations of the *hop* (F. 871. 900.), and of the *diosma crenata* (F. 231. 396.), by the Author. In the complication with rheumatism, BAKER recommends *valerian*, *castor*, and *musk*; and, if there be little or no fever, the preparations of *guaiacum* with ipecacuanha and opium.

140. The chronic form of the disease will occasionally baffle every method of cure. Mr. HOOPER states, that, in the cases of chronic dysentery, forming a large proportion of the sick which reached this country from Corunna in 1808, emetics, purgatives, calomel to salivation, DOVER'S powders with aromatics; opium in large doses, alone or with acetate of lead; starch injections with astringents, and various other medicines, were given without benefit. Balsam of

copaiba, with aromatics and opium, rhubarb being also prescribed occasionally; and, in other instances, the decoction of bark with acids, opium, and a small dose of calomel being taken at night; were, upon the whole, most successful; a small quantity of wine having been allowed. The chronic disease is frequently prolonged by too much food, especially in children, and sometimes also in adults. The following are formulæ of a few medicines not commonly prescribed, but occasionally beneficial in the chronic states of the disease:—

No. 204. R Infus. Cuspariæ ʒ xi.; Acid. Boracici gr. x. — ʒ j.; Vini Ipecacuanhæ ℥ xx.; Tinct. Camphoræ Comp. ʒ j.; Syrup. Papaveris ʒ jss. Fiat Haustus.

No. 205. R Sodæ Nitratis ʒ ss.—ʒ j.; Pulv. Acaciæ ʒ ij.; tere simul, et adde Aq. Pimentæ (vel Cinnam.) ʒ vi.; Vini Ipecacuanhæ ʒ iij. M. Capiat Coch. unum, secundâ vel tertiâ quâque horâ. (MAYER.)

No. 206. R E tr. Nucis Vom. gr. vj.; Pulv. Ipecacuanhæ gr. xij.; Extr. Humuli ʒ j. Misce probe, et divide in Pil. xxiv., quarum capiat binas, quartâ vel sextâ quâque horâ.

No. 207. R Extr. Nucis Vomiciæ gr. x.; Mucilag. Acaciæ ʒ j.; tere bene, et adde Mist. Amygdal. Dulc. et Mist. Camphoræ ʒâ ʒ iij.; Vini Ipecacuanhæ ʒ ij.; Tinct. Camphoræ Comp. ʒ ss.; Syrup. Althææ ʒ ss. M. Sumatur Cochleare unum omni bihorio.

No. 208. R Strychninæ gr. ij.; Pulv. Ipecacuanhæ gr. xij.; Conserv. Rosar. ʒ ij. Misce probe, et divide in Pilulas xxiv. Capiat duas, quartis horis.

141. R. *The Diet and Regimen*, in all the states of dysentery, should be strictly regulated. In the phlogistic variety, abstinence must be strictly enforced. In the more asthenic, gentle nourishment should be tried, and its effects upon the bowels and the constitutional affection carefully observed. *Milk*, either recent or boiled, is recommended by ALEXANDER TRALLIANUS, and most of the ancients. CÆLIUS AURELIANUS directs it with *honey*. This last is both an excellent article of diet, and vehicle for medicines, in many instances, and it may often be advantageously given with small doses of borax. Milk is praised both as food and medicine by SCHMIDT (*Ergo Dysen. Lac. Monsp. 1649.*), BORELLUS, and DE HAEN. SYDENHAM gave it by the mouth and in enemata. The celebrated BOYLE (*Works*, vol. v. p. 113. *the Advantages of Simple Remedies*) directed milk, boiled with an equal quantity of water, until there remained as much as the milk first amounted to. A decoction of the leaves and flowers of the *verbascum thapsus* in milk is a popular remedy in Ireland. MURSIGNA and VANDER HEYDE prefer buttermilk; and RICHIER, whey. Milk may also be taken with the gums, honey, and lime water. Animal gelatin (GAUTIERI, in HUFELAND'S *Journ. d. Prac. Heilk. b. xviii. p. 137.*), in the form of jelly, or beef-tea may be tried with spices, in the asthenic and chronic forms; but they are not always found to agree. Farinaceous articles, as sago, tapioca, rice, biscuits soaked in beef-tea, mutton or veal broth, &c., are the most generally useful. If the patient have been habituated to a liberal use of wine or spirits, a little burnt brandy or wine may be given with these or with his beverages; and in the more urgent cases, aromatics may be added. For *drink*, he may have weak gruel, or barley water, or either of the beverages prescribed in the Appendix (F. 588. *et seq.*) that will suit the case, and the treatment employed. He ought, from the first, to be placed between warm blankets; the bed-pan being used, to prevent his getting out of bed to the night-chair, and the chills consequent

thereon. In chronic cases, a large warm deobstruent plaster (§ 109.) should be applied over the abdomen, which ought to be surrounded by a flannel roller (DEWAR, &c.). During convalescence, also, the diet and clothing should be carefully attended to; as an error in the former, and insufficiency of the latter, particularly at night, will often occasion relapses, to which there is a greater tendency in this, than in almost any other disease. Change of air, exercise on horseback, and travelling, with due precautions against cold and other injurious contingencies, are also very beneficial. After repeated attacks, or after the chronic disease, the Harrowgate water, or the artificial mineral waters of Carlsbad, or of Marienbad, in quantity sufficient to act gently upon the bowels; and subsequently those of Eger, Pyrmont, or Spa, with the occasional alternation of those of Seidschutz or Pullna; this plan being varied according to the peculiarities of the case; will often prove of service. Warm or tepid salt-water bathing, or the affusion of tepid salt water over the abdomen, will also promote a perfect recovery.

142. *S. Prophylactic measures* are sometimes necessary; particularly where the endemic causes abound, in autumn after rains, or in cold and wet seasons in warm climates; and when the disease is epidemic. These measures consist chiefly of avoiding the predisposing and exciting causes, especially injurious ingesta (§ 10. 22.); of filtering or boiling impure water, and of purifying it, by mixing with it antiseptic absorbents, as lime, the chlorates, &c.; of regular habits, and wholesome and digestible food; of wearing flannel next the skin, and shunning exposure to the night dews, or to cold and moisture; of sleeping in warm beds and airy chambers, elevated far above the soil; of avoiding the air of close apartments in which the sick are confined, and the emanations from the bodies of those thus circumstanced, or from the evacuations, when the disease presents any of the asthenic characters; of not using the water-closet or night-chair resorted to by those affected; of having recourse to the chlorurets, to destroy the noxious effluvia; by sprinkling the apartments with them, or throwing them into the vessels containing the evacuations, or into the water-closets; and of the absence of all dread of being affected.

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DYSMENORRHEA. See MENSTRUATION.

DYSPHAGIA. See DEGLUTITION, DIFFICULT.

DYSPNŒA. See RESPIRATION, &c.

DYSURIA. See URINE, &c.

EAR—NERVOUS AFFECTIONS OF THE.

1. *Certain diseases of the ear* will be here considered; which, although sometimes attended by disorder of *hearing*; and often terminating in impairment, or loss of this sense; are not necessarily accompanied by either.—In the article *HEARING*, the affections of this function will be viewed with reference to the lesions producing them, seated in different parts of the organ.

I. NOISES IN THE EAR. SYN.—*Tinnitus*, *Susur-*

rus, *Sonitus*, *Sibilus*, *Syrigmus*, *Bombus*, *Aurium*, Auct. *Paracusis illusoria*, Good. *Das Ohrentönen*, *Ohrenklingen*, Ger. *Tintement*, *Bourdonnement de l'Oreille*, Fr. *Singing in the Ear*.

CLASSIF.—4. Class, 2. Order (Good).—

I. CLASS, IV. ORDER (Author).

2. DEFIN.—*A sense of ringing, whizzing, or beating sounds in one or both ears, without external causes.*

3. i. These sounds vary in their characters.

They are sometimes sharp, shrill, ringing, and successive; occasionally whizzing, roaring, acute, and continuous; and in other instances, beating or throbbing. They may be recurrent or intermittent, or devoid even of remissions, and be heard either in one or in both ears. M. ITARD—the highest authority on diseases of the ear—divides them into,—1st, the *false*, or those which have no existence whatever; and, 2nd, the *true*, or such as are seated in the interior of the head, or of the ear, but without being caused by external sonorous bodies. *Tinnitus aurium* is most frequently attended by a slight degree of deafness, which, in some cases, it produces, and in others is merely coincident with it. (a) *True tinnitus* may proceed from—*a.* cerebral plethora, congestion, or determination;—*β.* the impeded or obstructed return of blood from parts within the head;—and, *γ.* mechanical obstacle to the free circulation of air in the different compartments of the ear; but without completely preventing its entrance, for then the noise would be replaced by simple deafness. When the noises depend upon the state of the cerebral circulation, they are generally beating, heavy, hissing, or whizzing; frequently correspond with the pulsation of the carotids, which also is often strong; and are arrested by pressure of these vessels. (b) *False tinnitus* is—*a.* *idiopathic*, as when a very loud noise has injured the function of the auditory nerve; and, *β.* *symptomatic*, when allied to some nervous affection, often unappreciable in respect either of its cause or of its nature, or sympathetic of disorders of some other organs. Thus, this affection often attends indigestion, and hypochondriasis, especially in persons devoted to prolonged and exhausting mental exertions; sometimes debility or hysteria, particularly in delicate females, who have suffered from excessive discharges, or who are addicted to venereal indulgences or masturbation; and occasionally disorders of the *prima via*, as worms, torpid states of the colon, &c. In this variety, the noises are, in some cases, of a very unusual and even singular kind; and in hypochondriacal, nervous, or melancholic persons, give rise to various fancies or even hallucinations. In the case of a lady, for whom I was lately consulted at the same time with two other physicians, and who complained of noises in the ears after having suffered in her general health from too frequent returns of the catamenia, in excessive quantity, there gradually arose in the mind of the patient, an idea that persons were engaged whispering behind her; and ultimately it took so firm a possession of her mind, that it amounted to an hallucination, influencing both her judgment and her actions.

4. ii. Noises in the ears are most frequently caused by interruption to the free circulation of air through the Eustachian tube. Hence they are common attendants on catarrhs, and on enlarge-

ment of the glands, &c. in the vicinity of the tube; and are often produced by currents of cold air falling on one side of the head or directed towards the ear, as by travelling in an open carriage, or with a carriage window open; or by having the hair cut, when abundant, in cold weather. When caused by partial obstruction of the eustachian tube, a loud noise or crack is heard upon yawning; and the sounds often cease, or are diminished for some time afterwards. They are frequently a troublesome symptom during convalescence from fevers; and are sometimes attendant upon rheumatic affections of the head or neck; in both which circumstances, they are probably dependent on morbid sensibility of the auditory nerves, or on determination of blood to the head, or on both. Mr. TOD imputes them chiefly to a faulty state of the secretions of the ear, in respect either of quality or quantity; Mr. BUCHANNAN, principally to an imperfect secretion of cerumen. Their dependence upon derangements within the head, as well as upon affections of distant organs, should always be kept in mind, whilst investigating their nature and relations; and hence the propriety of viewing them in the comprehensive manner adopted by M. ITARD.

5. iii. TREATMENT.—The ancients, especially CELSUS, paid considerable attention to this affection; many of these remedies are active and appropriate. It is obvious that the means of cure should be directed to the pathological conditions on which it depends. In the *true tinnitus*, especially when it is of a beating kind, vascular depletions should be prescribed. M. ITARD has seen it instantly vanish upon opening the jugular vein. Active and continued purging, with due attention to the digestive organs, is also requisite in these cases. *Symptomatic false tinnitus* should be treated according to the nature and seat of the primary affection. When it is connected with rheumatism, GRAPENGISSER and RITTER advise having recourse to electricity or Galvanism. For the *true nervous* or *idiopathic affection*, tonics, nervines, blisters behind the ears, stimulating gargles, and antispasmodics may be prescribed. HEISTER recommends in such cases fumigations of the ears with the vapour of a hot vinous infusion of rosemary and lavender; M. ITARD, fumigations with æther directed to the meatus, frictions of the scalp, and warm applications, with the view of promoting an abundant transpiration in this situation; and Mr. BUCHANNAN, two drops of the mixture of equal parts of pyroligneous acid, spirit of sulphuric æther, and spirit of turpentine to be introduced into the ear. The digestive organs should be assisted by stomachics, aperients, or purgatives; and transpiration promoted by gentle diaphoretics, and moderate exercise in the open air. When tinnitus arises from cold, the same means, or those usually resorted to in CATARRH, with attention to the state of the bowels, will be appropriate. Gargles also with the muriate of ammonia, or nitrate of potash, or this latter and the sub-borate of Soda, will also be useful. In this form of the affection, little further should be attempted, unless it become *chronic*, from partial obstruction of the tube, or diminished secretion of cerumen, in which cases it is generally associated with some degree of deafness, when it will require the treatment advised, in such circumstances, in the Article HEARING—*diminution of, &c.*

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II. EARACHE. SYN.—*Otalgia* (from *οὖς*, *ōros*, the ear, and *ἀλγία*, *algiā*, I pain); *Ohrenschmerz*, *Ohrenzwang*, Germ.; *Otalgie*, Fr.

6. DEFIN.—*Violent pain, generally in one ear, suddenly supervening, and often abruptly departing, without fever.*

7. i. *Earache* is most frequently symptomatic of inflammation of the ear, or of the presence of foreign bodies, or of insects in the meatus, or even of congestion or inflammation within the head. It sometimes also attends inflammation of the pharynx, or of the tonsils and fauces, or of the parotid gland; and is occasionally consequent upon small-pox, scarlet fever, and erysipelas of the adjoining parts. More rarely it is *idiopathic*, or a *purely nervous affection*, seated either in the nervous filaments sent to the internal parts of the ear, or in that part of the facial nerve passing through the aqueduct of FALLOPIUS, or in the filaments of the acoustic nerve, which seems the least probable seat. The *idiopathic*, or true nervous otalgia, is at its maximum of intensity on its invasion; and, unlike the pain attending otitis, does not gradually increase in severity, nor is it attended by throbbing, and inflammatory fever. Its duration is very uncertain. Sometimes it disappears abruptly in a very short time, occasionally being followed by neuralgic or rheumatic pains in some part of the face or head, or even in a remote part of the body—an occurrence further distinguishing it from otitis—and frequently again returning to the same ear, and very rarely to the other. When the pain is excessive, it often irradiates along the nervous filaments over the same side of the cranium, or of the face, or both, the eyes sometimes becoming red and watery; but it seldom or ever occasions delirium or convulsions (ITARD), unless it be connected with inflammation of the internal ear, or is produced by insects or foreign bodies in the meatus. When, however, the pain proceeds from this latter cause—an occurrence which is not unfrequent, particularly in children, and of which I have seen several instances amongst the poor and squalid—dangerous and repeated convulsions often supervene. Noises in the ear, and often a slight deafness, accompany otalgia; indicating the coincidence of extreme exaltation of sensibility in the parts composing the ear, with a diminished power of perceiving sounds; and evincing that the acoustic nerves are not the seat of the exquisite pain that is felt. Like all nervous affections it is never constant in its course: it may be continued, or intermittent; may recur several times, after irregular intervals; or it may appear once and never return.

8. ii. The CAUSES of earache are those of all other nervous affections. Otolgia is much more common in females than in males; and it sometimes attends the early periods of pregnancy. It is often symptomatic of disorder in the *prima via*, and is frequently connected with rheumatism, particularly of the face, head, or neck; as well as with facial neuralgia and toothache. M. ANDRAL treated a case, in which it alternated with sciatic neuralgia. M. FAUCHARD records an instance where it long resisted all treatment, until a carious molar tooth on the same side as the affected ear was extracted; and Mr. PETTIGREW, in the case of a lady suffering excruciating agony from this affection, directed the wisdom tooth to be drawn, which he correctly inferred to be its cause, and the pain was instantly abated. Various writers have seen otalgia consequent upon the disappearance of rheumatism and gout. A case following rheumatism occurred in my own practice; and another, produced by a current of cold air falling on the ear. This last is, perhaps, one of its most frequent causes. Earache may exist for some time, and either excite, or be merely contingently followed by, otitis, which, however, may have commenced long before its usual signs were fully developed.

9. iii. TREATMENT.—If this affection be symptomatic, the means of cure must be directed to the primary disease. (See EAR—Inflammation of.) If it arise from a foreign body, this should be extracted without greatly increasing the irritation; but if that cannot be accomplished, it will be better to wait its spontaneous discharge by means of the increased secretion which will be occasioned. Insects may be dislodged by injecting a sufficient quantity of an emollient oil into the meatus; or by introducing a small piece of sponge or cotton, with oil, by means of a probe. Infusion of tobacco, various other narcotics, and even acrid substances, have been directed to be employed for this purpose; but I believe that they may sometimes prove injurious,—an opinion also entertained by M. ITARD. For the more obviously nervous or idiopathic otalgia, the ancients recommend the injections of warm emollient or stimulating oils; or these conjoined with anodynes. CÆLIUS AURELIANUS advises tepid oil to be dropped into the ear, and wool to be stuffed into it; he also directs fomentations, poultices, scarifications, and leeches, — remedies often serviceable, and generally safe. M. ITARD states, that he has seen opiates introduced into the meatus for this affection followed by cerebral symptoms: he therefore prescribes the injection of tepid emollients, such as milk, the decoction of marsh-mallows, &c.; means but little different from those mentioned by the authority just referred to. In addition to these, he recommends the mouth of a phial containing three drachms of HOFFMANN'S anodyne, and half an ounce of water, to be directed to the meatus, the phial being kept immersed in warm water; and an abundant transpiration from the surface of the head to be excited, by sponging it with warm water for a quarter of an hour, afterwards rubbing it for some time with warm flannel, and lastly covering it by an impermeable or gummed silk cap. Blisters behind the ear, or on the temple, and medicines to promote the alvine secretions and excretions, are also suitable. Dr. LEHMAN directs a mild purgative, and the introduction of cotton into the meatus, charged

with tincture of digitalis. Dr. KENNEDY prescribes an emetic as early as possible in this affection; and after vascular depletion, if inflammatory action seem to be present. I found an active emetic almost immediately abate the excruciating pain, in the case of the wife of a celebrated author. After free vomiting, which may in some cases be promoted by the warm infusion of chamomile flowers, a dose of calomel, either with, or followed by, a purgative; and gentle diaphoretics; will be of much service. In every case, the state of the gums and teeth should be examined. Where the head is free from congestion, warm baths, vapour or fumigating baths, and narcotics with antispasmodics internally, may be tried. Tonics, especially the sulphate of quinine, the preparations of iron in large doses; valerian, or serpentaria with cinchona; or an infusion of valerian with the ammoniated spirit of colchicum; may also be prescribed, more particularly if the otalgia be of an *intermittent type*, or of a *rheumatic character*, and if morbid secretions have been evacuated by an emetic and purgatives. In the rheumatic or gouty state of the complaint, the decoction or infusion of cinchona with valerian, the subcarbonate of soda, and the ammoniated spirit of colchicum, will be most efficacious. On the first indication of inflammatory action in the ear, or within the head, the jugular vein on the affected side should be opened, or other modes of depletion instituted, and active cathartics administered.

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EAR—INFLAMMATION OF THE. SYN.—Otitis; Empresma Otitis, Good. Ohrenentzündung, Germ. Otite, Fr.

CLASSIF.—3. Class, Diseases of the Sanguineous Function; 2. Order, Inflammations (Good). III. CLASS, I. ORDER (Author).

10. DEFIN.—Ingravescent pain in the ear, with tenderness on pressure, or on moving the lower jaw; with inflammatory fever, and frequently impaired or confused hearing.

11. Inflammation may affect both the external and internal ear at the same time; and it may commence in either, and be thus confined, or extend to both. It assumes various grades of severity; its duration being equally indefinite. The more acute states of the disease will be first considered; and next, those which are chronic, and which, from being characterised by a discharge from the external meatus, have been called *Otorrhœa*.

12. I. ACUTE INFLAMMATION OF THE EAR—*Otitis Acutus*—has been accurately observed only in modern times; and more especially by J. P. FRANK, ITARD, and LALLEMAND.—(a) Sometimes the external conduit or meatus is the chief seat of inflammation—*External acute otitis*.—(b) Frequently the cavity of the drum, with its dependencies, the membrane of the tympanum, Eustachian tube, and mastoid cells; or the internal ear, strictly speaking—as the vestibule, the semicircular canals, and the cochlea; either separately or conjointly, is the seat of the disease,—

Internal acute otitis. These will be described separately, but with reference to their mutual relations.

13. I. SYMPTOMS.—A. Of *External Otitis*.—Inflammation of the external conduit frequently commences with slight pain, or a sense of heat, or of intense itching or irritation, gradually increasing to an acute or distressing degree. It is sometimes lancinating, or is increased at intervals; and it occasionally gives rise to various nervous symptoms. In other cases, the disease runs its course without being attended by much pain. But pain is always augmented upon pressure; by the motions of the lower jaw; and by the contact of cold air, and too warm fluids. Hearing is also impaired or confused; and noises are heard in the ear. Upon examining carefully the meatus, several of the changes about to be noticed (§ 17.) are observable. From a few hours to three or four days after the commencement of the symptoms, a fluid begins to be discharged from the meatus, that is generally at first thin, limpid, or sanguinolent; but gradually becomes thicker, and assumes puriform characters; being whitish, yellowish, or greenish; inodorous, or fetid; and sometimes so acrid as to irritate the part with which it remains for some time in contact. With the increase of the discharge, the pain usually abates, unless inflammation extends to the inner ear. Afterwards, as inflammation declines, the fluid passes into a consistent or caseous matter, that accumulates in the meatus, and requires to be removed; and is followed by a more abundant secretion of wax than usual. Occasionally, as the discharge from the interior of the meatus decreases, a serous exudation from behind the ear supervenes.

14. B. *Internal Otitis* is sometimes attended merely by local symptoms: but whenever the inflammation is very acute, and the pain great, more or less fever is present, with headach, watchfulness, and disorder of the natural functions. The chief difference between the course of this and external otitis is contingent upon the parts of the internal or middle ear chiefly affected. Thus, the matters secreted by the inflamed surface of the cavity of the tympanum can be discharged externally only with great difficulty, owing to the extension of inflammation to the adjoining portion of the Eustachian tube, and its consequent obstruction; their retention giving rise to a most distressing sense of distension, with painful throbbing, febrile reaction, and nervous disturbance.—a. *Internal otitis* often commences with severe headach or hemicrania; and an intense, acute, continued, and deep-seated pain, with clanging, loud, or beating noises, in the ear. These symptoms become more severe, and are generally attended by heaviness in the head, and often with a sense of bursting or distension in the ear. The eyes are now injected and watery; the face anxious or red; the skin somewhat hot; the pulse frequent, but not full; the tongue loaded or white; and all the natural functions disordered. In some cases, particularly when the more interior parts are inflamed, it requires attention to connect the cerebral symptoms with their origin; but the pain is generally referred more especially to the internal ear; is attended by severe tinnitus; and is increased on mastication, and on moving the head, and on the least noise. In other instances,

the pain is felt at the bottom of the meatus, which is seen, on examination, exempt from lesion; or in the mastoid process. Delirium, especially at night, often attends the complaint at its acmé; or convulsions, in children. The fever often assumes a nervous or typhoid character, if the inflammation do not readily terminate in resolution. The above may be called the *first stage*, in the most severe cases: but those which are less violent, or *sub-acute*, or actively treated at the outset, subside partially in from twenty-four to forty-eight hours; and afterwards more slowly; the functions of the organ still remaining more or less impaired for some time, but without passing into the next stage.

15. b. When the disease does not thus terminate in *resolution*, the products of inflammation accumulate in the cavity of the drum and dependencies, and force their way externally, their appearance commencing the *second stage*. These matters may be discharged—*a.* through a spontaneous perforation of the membrane of the drum;—*β.* along the Eustachian tube; and, *γ.* through a fistulous opening in the mastoid apophysis. The first of these is the most common—its frequency being to that of the second in the proportion of six to one (ITARD); and the third comparatively rare. The discharge by perforation of the tympanum generally takes place suddenly; a large quantity of matter being voided, as if an abscess had burst; and the patient experiences relief, which increases with the continuance of the evacuation. Sometimes the great consistence of the secretion prevents its passage through the opening in the membrane, and causes its reaccumulation in the cavity; and occasionally the irritation and inflammation produced by it in the meatus, or the incrustation of it on this passage, obstructs this outlet, and has the effect now stated, with the consequences of prolonging or augmenting both the local and general symptoms. It is necessary, therefore, to ascertain the permeability of the meatus, as well as that of the Eustachian tube, which most frequently is obstructed in these cases. This is to be done both by inspection of the external conduit, and by causing the patient to expire forcibly whilst the mouth and nose are shut. If the Eustachian tube be permeable, bubbles of air mixed with the fluid will escape at the meatus. In the much less frequent cases of the discharge of the accumulated fluid along the Eustachian tube, a sensation is felt in the posterior fauces or throat, as if an abscess in one of the tonsils had burst; a sudden expectoration of a muco-puriform, sanious, or purulent matter taking place, and continuing, in smaller quantity, for some time afterwards, or returning after indefinite intervals.

16. C. From what has been stated, it is evident that the inflammation may extend from the external to the internal ear; but rarely from the latter to the former, unless matter finds its way through the tympanum. The *duration* of the disease varies from two to thirty, or even forty, days; but the symptoms lose their severity before a month is elapsed, and become *chronic*, generally in the form of *otorrhœa*, which may, however, follow a sub-acute or an originally slight or chronic affection. After acute otitis has terminated, as above (§ 14.) in resolution, or by the discharge of matter externally (§ 15.), hear-

ing often remains impaired, owing to the lesions consequent upon it; and is either recovered after some time, or permanently diminished. These lesions are thickening of the cartilaginous parts of the conduit; permanent thickening of the skin or dermis of the meatus, and narrowing of its canal; thickening, opacity, or perforation of the membrane of the drum; loss of one or more of the small bones; and obstruction of the tube of EUSTACHIUS. Caries of the mastoid apophysis, and of the petrous portion of the temporal bone, with destruction of the internal organisation of the ear, and disease of the adjoining membranes and portions of the brain, may also be caused by internal otitis; sometimes at a period very remote from the first manifestation of disease in this organ.

17. ii. THE STRUCTURAL CHANGES produced by acute otitis are, injection of the delicate dermis lining the auditory conduit, with more or less tumefaction, and entire or partial obliteration of the canal. Pustular formations, at first red, after whitish and filled with pus, are seen in the surface of this tissue, varying in size and number: sometimes transparent vesicles are met with instead of these. The fluid contained in these pustules or vesicles either is absorbed, or escapes through their parietes, giving rise to ulcerations of variable depth and size. The lining of the meatus, when inflamed, presents a striking resemblance to an inflamed mucous membrane; and the fluid which it secretes undergoes the same changes as that proceeding from an inflamed mucous tissue. Thus, in the slighter grades of inflammation, a mucous fluid fills the meatus; in an advanced stage and grade, purulent matter is formed; and occasionally, in children, a membranous or albuminous exudation forms upon the surface of the canal. The osseous parts of the internal ear are seldom affected excepting in otorrhœa; but the cartilaginous portion is not infrequently softened, or even perforated, in the acute disease. In rare instances, the perforation takes place from without, owing to an abscess formed between the mastoid apophysis, the angle of the jaw, and the conduit. The inflammation may be limited to the mucous membrane of the tympanum, and give rise to the collection of a mucous, serous, sanguinolent, purulent, or curd-like fluid in the cavity. From the mucous surface of this cavity, inflammation may extend—*a.* to the surface of the Eustachian tube, causing obstruction of it, either by the diseased secretion, or by the temporary swelling of the inflamed part;—*β.* to the mastoid cells, producing tumefaction of the mastoid apophysis, and occasionally a fistulous opening through it;—*γ.* to the membrane of the tympanum, which, often in a very short time, is softened and perforated, allowing the discharge of the matters collected in the cavity, sometimes with one or more of the destroyed small bones.

II. CHRONIC INFLAMMATION OF THE EAR—*Chronic Otitis; Otorrhœa* (from *ὠτίς*, *ὠτός*, the ear, and *ῥέω*, I flow); *Ohrenflus*, Germ.; *Otorrhée*, Fr.

18. i. HISTORY, &c.—A discharge from the ears may be seated in the external, or in the internal, ear, or in both; or may proceed from an abscess opening into the ear. It has been distinguished into—*a.* *Mucous*, or *Catarrhal otorrhœa*; and, *b.* *Purulent otorrhœa*, from the appearance of the discharge; the former often preceding the latter,

which is much more serious, as being generally dependent upon caries of the bone. Otorrhœa is often a termination of acute otitis; but it is frequently a primary disease, and not preceded by any acute symptom, not even by pain; the discharge being the only phenomenon.—*a.* *Mucous otorrhœa* may be confined to the external ear, the lining membrane being either scarcely altered, or red, tumefied, covered with vegetations; or partially adherent, and the canal partially or altogether obstructed or obliterated. This species of otorrhœa is most common among children of a delicate, lymphatic, or scrofulous constitution; frequently resisting treatment for years, and yet subsiding spontaneously, or disappearing at puberty. Serious symptoms seldom accompany it; but sometimes hearing is somewhat impaired. The discharge varies greatly in colour, odour, and quantity; but little importance need be attached to these variations. It is often scanty at one time, and copious at another; or even disappears for awhile, and returns in greater or less abundance. The obstructions already noticed (§ 15.) in respect of the discharge in acute otitis, also occasion this change. In some cases, the sudden interruption of the discharge may be followed by pathological phenomena in some other quarters. M. IRARD has seen engorgements of the lymphatic glands of the neck, tumefaction of the testes, affections of the eyes, porriginous eruptions on the scalp, and dangerous diseases of the brain, follow its disappearance. I have likewise seen the same results, as well as partial paralysis of the nerves of the same side of the face, in three instances, two of which were referred to Sir C. BELL, in illustration of the discoveries of this eminent physiologist. M. LALLEMAND has remarked the alternation of otorrhœa with an attack of rheumatism, with catarrhus vesicæ, and with leucorrhœa. Mucous otorrhœa may also be seated in the cavity of the drum: in this case, the membrane is perforated, and the symptoms are nearly the same as now described.

19. *b.* *Purulent otorrhœa* may, like the preceding, but much more rarely, be the result of a porriginous inflammation of the lining membrane of the meatus; or the matter may, in the first instance, proceed, as stated above (§ 15.), from acute otitis, the tympanum having been spontaneously perforated; and, owing to the access of air whilst it lodges in the cavity of the drum, mastoid cells, and other parts, become more and more acrid; inducing ulceration in the membrane lining these parts, and ultimately inflammation and caries of the osseous structure itself. As soon as these changes take place, the discharge is more sanious than purulent—or of a greyish tint, mixed with red; exhales a peculiar odour, and stains a silver probe of a bronze colour; carious portions of bone being sometimes also detached at an advanced stage. The patient, in these cases, generally complains of a dull pain in the ear, extending over the side of the head; of impaired hearing; with dullness, and a heaviness of expression. The caries is, in most instances, as here stated, the consequence of the disease of the mucous membrane lining the several auditory canals; but it is also, although much more rarely, the primary disease. In both cases, the otorrhœa is *idiopathic*. Abscess formed in the brain may form a passage through the petrous bone, which

had become secondarily affected and destroyed; the caries being, in this case, *symptomatic*. This occurrence, however, seldom takes place.

20. The mastoid process is more frequently the seat of caries than any other part; and is, consequently, the source of purulent otorrhœa in most instances; disorganisation proceeding also most rapidly in this situation, which is painful and tender on pressure, the external parts being swollen and œdematous. After some time, the mastoid cells are perforated; the skin reddened; and an abscess forms, bursts, and becomes fistulous. On injecting a fluid through the external opening, which is generally close behind the ear, it frequently escapes by the meatus, or the Eustachian tube. Instead of an opening in this situation, the pus sometimes penetrates between the muscles attached to this process, and the abscess opens low in the side of the neck. The diagnosis is then more difficult. In some instances, the carious mastoid apophysis is not perforated, but the pus collected in its cells is evacuated through the cavity of the tympanum and the external meatus. Occasionally the carious part of the process is gradually melted away in the sanio-puriform discharge, without any disease of the soft parts covering it; the gradual destruction of it causing the disappearance of the prominence it occasions. M. LALLEMAND, therefore, directs the comparative state of both mastoid regions to be examined in cases of purulent otorrhœa. The bony parietes of the external auditory conduit is sometimes the seat of caries; but much more rarely than the preceding. The part of the petrous portion of the temporal bone, which contains the semicircular canals, is, according to ITARD and LALLEMAND, that which is most frequently diseased after the mastoid process. In other cases, caries is seated in the parts forming the aqueduct of the cochlea, or the aqueduct of FALLOPIUS; or, lastly and more rarely, the internal auditory canal. But if, in some instances, the disease is thus limited, it is not so in others; various portions of the osseous structure being either simultaneously or successively attacked. The petrous portion may be altogether destroyed, and the adjoining bones also invaded, and more or less injured. M. LALLEMAND has seen, in the same case, caries of different parts of the temporal and of the occipital bones, and even of the first vertebra also.

21. *a.* Caries of the petrous portion of the temporal bone, in some one of the states now noticed, necessarily induces disease of the membranes, and frequently also of the brain.—(*a*) It sometimes happens, that acute cerebral disease suddenly supervenes during otorrhœa, and death quickly follows; the petrous bone being found carious upon dissection, and the membranes adjoining extensively inflamed; but the brain itself sound.—(*b*) In other cases the cerebral symptoms take place more slowly, or assume the characters of chronic meningitis or cerebritis (see BRAIN, § 160. *et seq.*); either partial separation of the dura mater, with or without adhesion of the two lamellæ of the arachnoid, or softening of the brain, or abscess seated in the cerebral structure, or both these alterations of the membranes and brain, being found after death. These lesions are observed more frequently at the anterior, than at the posterior, aspect of the petrous bone.

Sometimes, instead of this portion of the temporal bone, a large collection of pus communicating with the middle ear is only found. The abscess formed around, or in the vicinity of, the petrous bone, consecutively upon disease of this part, often makes its way externally to the meatus; a similar channel of evacuation also being formed, but much more rarely, when caries of this bone follows the formation of cerebral abscess (ANDRAL).

22. *β.* The *Symptoms* which indicate the extension of disease from the ear to the brain, or its membranes, are nearly the same as characterise the idiopathic states of inflammation of these structures (BRAIN, § 146. *et seq.*), according to the acute and chronic states they may assume. Whilst the ear only is diseased, the pain in the head appears to proceed from the ear as its source; but when the parts within the head become affected, the cerebral symptoms are most prominent, and often obscure or altogether mask the disease of the ear. If, at an advanced stage of chronic otitis, the discharge be suppressed, or even much diminished, these symptoms are very liable to come on in a very severe form; and if some time elapse between the disappearance of the one, and the supervention of the other, and if the history of the case be not attentively investigated, the disease of the ear may be altogether overlooked; and what is strictly a symptomatic affection of the brain, or its membranes, treated inappropriately as an idiopathic seizure.—When inflammation extends to the parts within the head, the patient complains of a deep-seated, and often throbbing pain, towards one side, with heaviness of the eyes, stupor, and slight delirium. The pulse is small, sharp, and quick; the tongue furred; and the febrile symptoms, which are usually slight, increased in the evening. There are also tenderness of the scalp near the affected ear, so that the patient prefers to lie on the opposite side, thereby favouring the lodgment of the morbid secretion in the ear; and sometimes convulsions with paralysis. During the progress of caries of the bony structure, even before the disease has extended to the membranes and brain, more especially when the parietes of the aqueduct of FALLOPIUS are implicated, neuralgic pains in the face, inflammation of the conjunctiva of the eye, convulsive motions, and ultimately paralysis, of the muscles of that side of the face, &c. take place, owing to lesion of the trunk of the facial nerve. Since attention was directed to these associations by Sir C. BELL, numerous cases illustrative of them have been observed by LALLEMAND, and others; and several have been seen by myself.

23. *γ.* The *duration* of otorrhœa is most indefinite. It may continue for several weeks or many years; and may resist all means. Sometimes it disappears either spontaneously, or during medical treatment. In other cases it presents a somewhat intermittent form, continues long to do so, and ultimately terminates either favourably or fatally, as stated above. In two instances which terminated in this latter manner,—at upwards of forty years of age in the one, and about thirty in the other,—I ascertained that otorrhœa commenced in early childhood, and had continued, with various remissions and intermissions, to that age, when cerebral symptoms came on. In these prolonged cases, the discharge varies much in quantity. When the Eustachian tube is not obstructed, it often

passes into the throat, and discolours the sputum; or is at one time evacuated by this route, at another by the meatus. During catarrh or sore-throat, the symptoms are generally aggravated, chiefly in consequence of obstruction to the discharge of matter.

24. ii. THE PROGNOSIS of otorrhœa depends — 1st, on its cause, — thus the syphilitic is much less dangerous than the scrofulous disease; — 2d, on the nature of the discharge, — the puriform being much more unfavourable than the mucous; — 3d, on the age, — it being much less serious in childhood, than at or after puberty; — 4th, and most especially on the presumed extent of disorganization, and caries; the occurrence of local paralysis, but particularly of the cerebral symptoms alluded to (§ 22.), being very unfavourable. All chronic discharges from the ear, however slight they may seem, should be viewed in a serious light, not merely as they generally lead to deafness, but as they are also liable to be followed by fatal cerebral disorganization.

25. iii. CAUSES. — A. The predisposing causes of otitis and otorrhœa are, delicacy and susceptibility of frame; the scrofulous diathesis; the periods of dentition and childhood; the syphilitic poison; and disorders of the prima via and digestive organs generally. — B. The exciting causes are chiefly a current of cold air; exposure to cold air after the removal of the hair; the introduction of foreign bodies into the meatus; accumulations of wax in this part, or the use of irritating injections; herpetic eruptions on other parts of the body, or porriginous eruptions on the scalp, and the suppression of either; inflammatory affections of the throat, tonsils, and fauces; and determinations of blood to the head. Either the acute, sub-acute, or chronic states of the disease may supervene in the course, or after the subsidence, of any of the exanthemata, or even of continued fever, but more especially scarlet fever, small-pox, and erysipelas. Difficult dentition, the irruption of the wisdom teeth, caries of the teeth, and injuries of the head, are more rarely exciting causes. M. ITARD thinks that falls upon the head may occasion otitis without producing disease of the brain. It may follow even slight attacks of catarrh in children; and in some instances its cause is by no means evident.

26. III. TREATMENT. — The means of cure differ according to the acuteness, the seat, the stage, and the particular characteristics of the inflammation; and the results to which it has given rise.

27. i. OF THE ACUTE. — A. *Acute external Otitis*, whilst the pain is moderate, and febrile symptoms are absent, requires chiefly the removal of all sources of irritation, the injection of tepid and simply emollient fluids, and the application of poultices. When the pain is severe, and febrile commotion is present, general or local *bleeding* — the former in patients who are more than a few years of age, either from the arm, or from the jugular vein — should be prescribed; and, if there be not much fulness of blood in the head present, an *emetic*, as recommended by Dr. KENNEDY, exhibited. After its operation, a full dose of *calomel* with *James's powder* ought to be given, and followed in a few hours by an active *cathartic draught*. If the symptoms be not greatly relieved by these, a number of *leeches* should be placed behind the ear, or *cupping* performed on the nape of the neck, a *blister* being subsequently applied in this situation.

In this stage and state of the disease, the introduction of any substance into the meatus beyond simple emollient injections occasionally, is more injurious than beneficial. Some writers recommend the use of *narcotics*; but unless the harmless decoction of poppy heads, they are as well abstained from. M. ITARD advises two or three grains of *camphor*, rolled in cotton, to be placed in the meatus, if there be no discharge; but this appears more suitable in sub-acute and slight cases, than in those that are very acute. Dr. LEHMAN directs the tincture of *digitalis* to be dropped into the ear, or cotton impregnated with it to be introduced. When a discharge takes place, the simplest tepid injections only should be employed; and, during the course of treatment, a free action on the bowels kept up. The blister on the nape of the neck should also be preserved open; and leeches again applied behind the ear. When the pain has subsided, a mucous discharge only remaining, M. ANDRAL prescribes slightly astringent injections, and particularly those consisting of the waters of Barrèges. I believe that the less they are employed the better; attention to the functions of the stomach and bowels, and change of air, with such means as may promote the general health, being the safest and best means.

28. B. *Acute internal Otitis*, demands the prompt and decided use of the above remedies. After general *depletion*, the repeated application of leeches behind the ear, at short intervals, is often requisite, with external *derivation*, &c. If the exhibition of an *emetic* after these fails of removing the acute symptoms, *antimonials* should be given, so as to produce nausea and keep down vascular action; the bowels being also freely acted on. For this purpose, *calomel* with small doses of *tartar emetic* or *James's powder* should be prescribed every three or four hours. These means will generally be followed by resolution of the inflammation, and subsidence of the symptoms, if resorted to at an early period. But if the disease pass on to suppuration, the patient will complain of a throbbing pain, with a bursting sensation in the ear, and persistence, or even aggravation of his sufferings. In this case, an additional indication must be fulfilled, viz. the speedy evacuation of the matter collected in the cavity of the drum, as its retention will materially aggravate the disease, and endanger the bony structure of the ear. Several authors have advised, in such circumstances, the application of fomentations and *poultices*, to accelerate the ulcerative perforation of the tympanum and the external evacuation of the matter. These are, however, often inefficient. In order to remove obstruction of the Eustachian tube usually existing in such cases, *gargles* with a solution of the sub-borate of soda, or of nitre and it, may be employed. Some writers recommend the smoke of tobacco to be forced into the tube whilst the mouth and nose are shut. But these means do not often succeed. Instead of waiting for the spontaneous evacuation of the pent up matter, which insinuates itself under such circumstances into the various sinuosities of the ear, M. ITARD advises, and has in many instances practised with benefit, *perforation* of the membrane of the drum. Having performed this operation, it is generally requisite to inject mild tepid fluids in order to procure the full evacuation of the matter, which has often become more or less consistent.

If inflammatory symptoms either continue or return, after the perforation of the tympanum, antiphlogistic measures should be directed; but if the discharge continue, the patient should sleep on the side on which the ear is affected, diluent and *emollient injections* being occasionally employed, so as to prevent any clogging of the meatus, and accumulation of matter in the middle ear. M. ITARD directs, with this view, an injection formed of a drachm of caustic potash to the pint of rosewater. Light tonics and mild laxatives, with change of air, ought also to be prescribed, so as to prevent the disease from degenerating into the ulcerative and chronic states.

29. ii. OF CHRONIC OTITIS.—When otorrhœa becomes established after acute otitis, as above, or follows a slight or imperceptible state of inflammatory irritation, the treatment may be divided into the local, and general,—the latter more especially being directed against the state of constitutional disorder. *Local depletion* is required only early in those cases which present more of a sub-acute character, or when this, or even acute symptoms supervene from obstruction to the discharge, or any other cause. *Blisters* behind the ear, stretching to the occiput, or on the nape of the neck, and either kept discharging or repeated, are often very serviceable. M. ANDRAL notices *setons*, or cautery of the nucha, or issues in the extremities. M. ITARD directs, in addition, the head to be shaved, rubbed assiduously with stimulating substances, and kept constantly covered with a gummed silk cap. He very judiciously forbids the use of any other than simply *diluent or emollient injections*. Even gently astringent fluids ought not to be resorted to until the discharge begins to diminish; if its diminution be not attended by any aggravation of the local or constitutional symptoms. In this case, the mildest *astringents* may be commenced with, and those which are more and more active successively employed. A weak infusion of roses, or of chamomile flowers, may be first prescribed, and subsequently a weak solution of the sulphate of zinc, or of *kreosote* in distilled water. Oily injections, in cases of otorrhœa, should not be used, as the oil speedily becomes rancid when any part of it remains in the ear. Whenever the discharge is suddenly suppressed, means should be taken to restore it. Warm bread and water *poultices or fomentations*, frequently renewed, may be resorted to with this intention. M. ITARD directs bread warm from the oven, and deprived of its crust, to be applied every three hours, and an injection of a solution consisting of three grains of corrosive sublimate in eight ounces of water. Care should also be taken to remove any obstruction that may present itself in the meatus. If the suppression be attended by the accession of acute symptoms, leeches must be applied; but the powers of life ought not to be much reduced by these or any other means. Mercury in this state of disease is injurious. If matter form in the vicinity of the mastoid process, an early outlet should be given to it by a free *incision* down to the carious bone, and the powers of life supported by *gentle tonics*, light nutritious diet, and change to a healthy air. When caries is obviously present, and there is no increase of sensibility, or any other symptom of acute inflammatory action, M. ANDRAL advises injections of a strong solution of potash to be fre-

quently thrown into the ear. When, however, there is evidence of the caries having induced disease within the head, the simply diluent injections should only be used, in order to prevent any interruption to the discharge.

30. By the constant use of simple diluent or *emollient injections*—of warm water, or milk and water merely—and careful attention to the general health, the disease may be kept stationary, from youth to old age, although it may not be cured. In scrofulous and lymphatic subjects, the *bitter tonics*; the infusion or decoction of bark; the *kreosote* internally; the preparations of *iodine* in gentle doses; the *ioduret of iron*, or the ammoniated or tartarized *iron*; and mild purgatives, once or twice a week; will be extremely serviceable, if there be no acute symptoms, or febrile action. I have also seen much benefit accrue from *sulphur* given daily in sufficient quantity to keep the bowels freely open. If the disease seems connected with a syphilitic taint, or has come on after syphilitic sore-throat, or an inefficient course of mercury, the *oxymuriate* of mercury should be given in gentle tonics, or with a course of *sarsaparilla*. Where there is fever, with a loaded tongue, or pain in the head and ear; in addition to those appropriate local means above stated, (§ 28.), a course of mild and cooling *purgatives* or aperients, external derivatives, diaphoretics, and a mild farinaceous diet, should be employed. Change of air, and such mineral waters as may suit the peculiarities of the case—the chalybeate, aerated, and sulphureous, in cases devoid of fever and other acute symptoms; the aperient and refrigerant in those thus accompanied—will be very powerful adjuvants. (See Art. HEARING.)

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ECLAMPSIA. See CONVULSIONS (§ 24. 27.).

ECSTASY. See CATALEPTIC ECSTASY, &c.

ECTHYMA. SYN.—*Ἐκθύμα* (from *ἐκθίω*, I break forth), Willan. *Τίγκυρδος*, *terebinthus* of the Greeks, according to Hoffmann; or *Ἐκθύρδος*, *Cicer.*, as it is read by others with more reason, Turner; also *Ἐκθύρτις* (from *ἐκ* and *θύρτις*), owing to its appearing or being aggravated at night, according to Celsus, Galen, Paulus, and Aëtius. *Terminthus*, Wiseman, Turner, &c. *Phlysis Ecthyma*, Young. *Ecpyesis Ecthyma*, Good. *Psydracia*, J. P. Frank, Chiarurgi, and J. Frank. *Phlyzacion*, Paget. *Dartre Crus-*

tacée, Furuncle Atonique, Fr. Erbsenblattern, Eiternde Flechte, Germ. Papulous Scall.

CLASSIF. — 5. Order, Pustular Eruptions (Willan). 6. Class, Dis. of Excrement Functions; 3. Order, Affecting the Skin (Good). III. CLASS, I. ORDER (Author, in Preface).

1. DEFIN.—An eruption of large, round, and distinct pustules, seated on a hard, elevated, red base, and terminating in a thick, hard, and dark-coloured scab, leaving a livid spot or superficial cicatrix; not contagious.

2. I. DESCRIPTION.—These pustules are always discrete, scattered sparingly, and appear successively in different parts of the body; and rarely terminate in ulceration or tuberculous induration. They may appear in any part of the body; but they are most frequently observed on the limbs, abdomen, shoulders, breast, and neck—rarely in the face or scalp. They present modified states, according to the causes, the age of the patient, and the severity of the eruption. These WILLAN has arranged into, *Ecthyma Vulgare, E. Infantilis, E. luridum*, and *E. Cachecticum*. To these may be added the *Ecthyma Syphiliticum* (FRANK, BIETT, CAZENAVE, SCHEDEL, TODD, &c.), the syphilitic affection sometimes assuming the ecthymatous form. M. RAYER has adopted a simpler and more correct division, viz. into the *Acute* and *Chronic*, which I shall here follow.

3. i. ACUTE ECTHYMA; *E. Vulgare*, WILLAN.—In its simpler and rarer form, ecthyma appears in some one part of the body, most frequently on the neck and shoulders, in the form of circumscribed reddish elevations, firm to the touch, and distant from each other. Pus soon is formed at the summit of these elevations; and the pustules are completely developed in three or four days; their bases being much inflamed, elevated, large, hard, and circular,—of a bright red in young persons, and of a livid red in the aged. Their suppurating summits generally break in one or two days after their formation; the purulent matter giving rise to a brownish, or greenish, and very adherent scab. After one or two weeks, the scabs are detached, and leave a livid red mark, or occasionally very superficial cicatrices, of the size of those of small pox, but much less deep. The eruption of the pustules is attended with stinging pains in them; sometimes with tumefaction of the adjoining lymphatic glands, and is often preceded or accompanied by chronic inflammation of the digestive mucous surface, which may continue after the healing of the pustules. This variety is seldom attended by fever.

4. ii. CHRONIC ECTHYMA is much more frequent than the preceding, and always consists of several successive eruptions on the limbs, neck, breast, &c., at periods more or less distant. The pustules present the same characters, and follow individually, and independently of each other, the same course as above described; some making their appearance whilst others are suppurating, or even healing. During several months, divers eruptions are thus formed. Besides the successive eruptions, the pustules themselves may be more chronic, their bases assuming large dimensions, approaching those of boils, and being tense and prominent. In these cases, the subjacent cellular tissue is inflamed, their areolæ becoming

hard and violet-coloured—*Ecthyma luridum* of WILLAN. Their summits break in eight or ten days, and discharge a little sanious or bloody matter, sometimes ulcerate slightly, and are covered by hard and black crusts or scabs, which adhere firmly, and are surrounded by livid red areolæ, which sometimes remain after the crusts have fallen off; this taking place in the course of a few weeks; leaving dark red spots, or livid cicatrices, after them. If the scabs are torn away before the period at which they usually fall off, small indolent ulcers, with callous borders, giving issue to a sanious fluid, are often produced. When the pustules remain long stationary without ulcerating, they are occasionally followed by violet-coloured tubercles, which may ultimately suppurate or ulcerate, and more deeply mark the skin. A *symptomatic* form of this eruption, which is often tedious and severe, sometimes attends the cachexia consequent on measles and other eruptive fevers; but it differs in nothing from the disease now described, excepting in the number of the pustules, and the marked constitutional disorder.

5. The successive eruptions characterising this variety are observed chiefly in feeble and ill fed children—(*Ecthyma Infantile* of WILLAN).—When the number of pustules is small, and the successive eruptions are distant from each other, there is generally little or no fever. But when the pustules are numerous, their bases very large and much inflamed, or if they ulcerate, there is usually present a co-ordinate degree of fever—*Ecthyma Febrile, E. Cachecticum*.—The febrile symptoms sometimes precede, and at other times accompany, the severer forms of the eruption, particularly in unhealthy and aged persons; and are also attended by gastric and intestinal disorder,—by anorexia, pain at the epigastrium, irregularity or constipation of the bowels, a morbid appearance of the tongue, gums, and fauces, and of the evacuations, headach, pains in the limbs, lassitude, and by great depression of spirits,—with heat, stinging, tingling, or itching in the pustules. In such cases, as well as in other chronic states, this eruption is often complicated with swellings of the lymphatic glands, with inflammation of the conjunctiva, or of the fauces, or of the pharynx; with œdema of the lower extremities; and with other cutaneous eruptions, especially with *rupia* and *furunculus*. It is also frequently associated with, or rather symptomatic of, chronic inflammation of the digestive or respiratory mucous surfaces, and biliary derangement. The duration of chronic ecthyma is always subordinate to the successive eruptions of pustules, to the habit and constitution of the patient, and the treatment employed. It is usually from two to four months; but it may be longer or shorter.

6. When syphilitic disease gives rise to eruptions with the characters of ecthyma—*E. Syphiliticum; Psudracia Venerea*, J. FRANK; *Syphilide pustuleuse Phlyzacie*, BIETT, RAYER, &c.; *Pustular Venereal Disease*, CARMICHAEL—the pustules are always surrounded by broad, dark, copper-coloured areolæ, and are very large, indolent, and inclined to ulcerate. The ulcerations, when the scabs are detached, are deep, greyish or pale, unhealthy, with abrupt and violet-coloured edges; but they seldom extend, the scabs gradually reforming over them, and being successively detached, until they heal under appro-

priate treatment, leaving permanent, round, copper-coloured cicatrices. This form of the syphilitic eruption is most common in children born with the infection, the pustules being numerous, flat, and sometimes oval, followed by ulcerations; the skin foul and dingy; and the body emaciated (CAZENAVE and SCHEDEL.)

7. II. DIAGNOSIS.—The pustules of ecthyma are easily recognised, by their form, their size, their inflamed base, and mode of developement; and distinguished from those of acne, of impetigo, mentagra, or porrigo. — *a.* However, when the pustules of *mentagra* or of *acne* present, as they occasionally do, hardened red bases, they may be mistaken for the *phlyzacious* pustules of ecthyma, if the induration, rather than the inflammation, were attended to; but the specific characters of these eruptions are sufficiently distinct. — *b.* The umbilicated pustules of *small-pox*, the multilocular pustules of *vaccinia*, independently of their contagious properties, cannot be mistaken for those of ecthyma. — *c.* The inflammation in *furunculus* begins in the sub-cutaneous cellular tissue, and extends outwards; in ecthyma, it commences in the skin, and proceeds inwards; the former being either single, or much less numerous, and much larger. — *d.* *Rupia* sometimes is coëtaneous with ecthyma, in its chronic form — *E. luridum* and *Cachecticum*; the latter seeming to be converted into, or appearing to be an earlier stage or less severe grade of, the former, more especially in cachectic children, as correctly alluded to by Mr. DENDY, whose experience in cutaneous diseases, as my colleague at the Infirmary for Children, has been most extensive. But the early stages of both will sufficiently distinguish them from each other, independently of the prominent and thick crusts, with the deep ulcerations, characterising *rupia*. — *e.* The *itch* presents only a few analogies with ecthyma, when it is complicated with, or when its vesicles are accidentally transformed into, pustules. In ecthyma, the pustules are rarely numerous; they appear successively, the course of each being independent of the rest. But in *itch*, the accidental pustules form on the most inflamed points; are always intermixed with the small vesicles, by which it is characterised; are more agglomerated than in ecthyma; are seated chiefly on the hands, between the fingers, especially between the thumb and forefinger; and are attended by itching; whilst the pustules of ecthyma produce a stinging pain; the *itch*, moreover, being vesicular and contagious.

8. III. CAUSES. — Ecthyma attacks all ages and constitutions; but it is most common in adults of a sanguineous temperament and bad habit of body; or in persons who have prematurely exhausted the powers of the digestive organs, and vital energies of the system generally. It occurs at all seasons; but is most frequent in spring and summer. Unwholesome and insufficient nourishment; cold and moist habitations; want of personal cleanliness, especially among those who wear foul woollen next the skin, or who are scantily clothed; and the irritation of various mineral and pulverulent substances; are its most common causes. Hence it is prevalent chiefly among the poor, and mechanics (*Psydracia Artificum*, J. FRANK), whose occupations subject them to these contingencies. Great fatigue, pro-

longed watching, anxiety or distress of mind, inattention to the states of the stomach and bowels, and whatever lowers the digestive and assimilating powers, and energies of life, inducing general cachexia, will occasion this form of eruption. The *chronic states* of the eruption are most frequent in the indigent; in persons living on stale, smoked or salted provisions; or whose constitutions are broken down by imprudence, misfortune, drunkenness, age, and irregularities; or in ill-nourished and debilitated children, living in low, damp, dark, and close cellars, &c. Ecthyma often also follows small-pox, the *itch*, scarlatina, measles, the bites of leeches, and the application of irritating plasters or unguents. The tartarized antimonial ointment produces pustules of this kind. It may be symptomatic of pregnancy, and of several diseases of internal organs, especially of the *prima via*. Indeed, it may be in most instances considered as one of those infinitely diversified expressions of morbid action on the external surface, attendant upon prolonged disorder of the digestive and assimilative organs. Hence it cannot be a matter of surprise to find it sometimes associated with other chronic diseases of the skin. From the foregoing it follows that this eruption is dependent upon the general state of the system, to which our treatment should be chiefly directed in all its forms. This state is evidently one of debility, accompanied frequently with erethism, or morbid irritability, and essentially with altered sensibility and deficient tone of the vascular ramifications in the cuticular and sub-cuticular tissues.

9. IV. TREATMENT.—*A.* In the *Acute form*, when the pustules are few, little more is requisite than a mild diet, tepid baths, cooling aperients, and two or three grains of hydrarg. cum creta with dried sub-carbonate of soda or potash, at bed-time. Whey is the best beverage; and, if the patient be robust and the pustules numerous, a small bleeding, or leeches to the anus (CAZENAVE, &c.), may be resorted to. If the stools be morbid, the soda tartarizata, or the soluble tartar, should be given with infusion of senna, and afterwards the compound infusion of roses may be taken with small doses of either of the sulphates; or these latter may be taken in tonic infusions, with the addition of a little dilute sulphuric acid.

10. *B.* The *Chronic states* generally require gentle tonics, with alteratives, and light nourishing diet. — *a.* When they occur in *infants*, the nurse should either be changed, or the treatment directed chiefly to her. Where this cannot be done, asses' or goats' milk should be substituted or given in addition; and the regimen strictly regulated. Change of air, warm salt water bathing or sponging, and gentle alteratives, will also greatly assist the cure. Hydrarg. cum creta, and the sub-carbonate of soda or potassa at night; the liquor potassæ in tonic infusions twice a day, and an occasional purgative in the morning; small doses of the chloruret of potash, or of the hydriodate of potash; warm salt-water bathing, and afterwards the ferrum tartarizatum; have been the most efficacious remedies, in these states, in my practice among *children*. The chlorate of potassa, and the other chlorates, were first employed by me, in this disease, many years ago, at the Infirmary for Children.

11. *b.* In grown up or aged persons, we should

always suspect disorder of the digestive and assimilating functions; and, if there be little or no fever, have recourse to deobstruent alteratives, as PLUMMER'S pill, with soap, or taraxacum, at night; a stomachic purgative every second or third morning, and the decoction of sarsaparilla; or mild tonic infusions with soda or potash, in the course of the day. If we suspect congestion of the liver, or find tenderness of the stomach on pressure, small local depletions should be employed, and repeated according to circumstances, whilst the above depurating and mildly tonic remedies are continued. Mercurials should not be given in large doses. PLUMMER'S pill, blue pill, or hydrarg. cum creta, with taraxacum, inspissated ox-gall, guaiacum, and sarsaparilla, are the most beneficial. The occasional exhibition of purgatives, or the association of them with tonics, is also necessary, especially if the stools be morbid, and the abdominal viscera require to be excited. In such cases, a prolonged course of tonic or stomachic purgatives is often necessary.

12. c. When the cachectic state is complicated with some degree of febrile action (§ 5.), the mild mercurials now particularised should be conjoined with James's or Dover's powder; and saline diaphoretics exhibited at short intervals; the morbid secretions and faecal accumulations being evacuated from time to time, by cooling purgatives. If there be tenderness at the epigastrium, a few leeches applied there will materially assist these remedies. After these, the infusion or decoction of cinchona with liquor ammoniæ acetatis, or with the pyroligneous acid, or with nitrate of potash and sub-carbonate of soda; a course of tonic infusions, with alkalies and the extract of taraxacum; tepid or warm bathing; the mineral acids with anodynes; and the other means particularised in the last paragraph; may severally be exhibited. Having removed fever, and evacuated morbid matters, more active tonics, as the quinine in the compound infusion of roses, with tinctura opii; the decoction cinchonæ with the mineral acids, or with camphor and ammonia; chalybeate preparations, sarsaparilla and guaiacum, the balsams and terebinthines with magnesia, common tar made into pills with this absorbent, the bark of the *madar* root, &c., may be prescribed.

13. d. The syphilitic form of ecthyma should be treated in the manner described in the article ACNE (§ 30.). MR. CARMICHAEL does not consider this eruption as being truly syphilitic, and therefore confides chiefly in sarsaparilla with antimonials and guaiacum. In a case of this form of syphilitic eruption, lately attended by my friend Mr. C. HUTCHISON and myself, oxymuriate of mercury, given in sarsaparilla, was required for its cure, milder means not having succeeded. Dr. A. T. THOMSON advises this preparation in minute doses to be given in the decoction of elm-bark, or in the emulsion of bitter almonds. In the cases of infants, some French physicians recommend the milk of a goat on which mercurial ointment has been rubbed. When the child is at the breast, the nurse should enter upon a gentle course of the oxymuriate in the decoction of sarsaparilla, or in almond emulsion.

14. e. External means are sometimes required to remove the irritation attending the eruption, and to heal such as ulcerate. With these inten-

tions, tepid alkaline baths; fomentations with a decoction of poppy-heads; a weak solution of the chlorurets of lime or of soda, especially when there is ulceration; or solutions of chlorine, or of sulphate of zinc with hydrocyanic acid, or of the nitro-muriatic acids, or of nitrate of silver, &c.; may severally be employed. Dr. A. T. THOMSON recommends the following:—

No. 209. R Plumbi Acetatis ℥ss.; Acidi Hydrocyanici ℥ij.; Unguenti Cetacei ℥ij. M. Fiat Unguentum partibus cutis nudis applicandum.

15. f. The diet in the acute form ought to be bland and farinaceous, whey and emollient fluids, or water with a little vinegar, being the chief beverages.—In the chronic states, light and nourishing food, if there be no fever, or after fever is removed, is always requisite. In the more cachectic cases, a small quantity of wine should also be allowed. The patient will always derive benefit from the internal use of tar-water, which may be taken as the common drink in these cases. This medicine, which was formerly so inordinately praised, and, owing to this circumstance, now so undeservedly neglected, is most serviceable in this and many other chronic affections of the skin. In addition to these, frequent tepid and warm baths, and subsequently salt-water bathing, exercise in the open air, change of air, mental recreation, warm and suitable clothing; regularity in eating, drinking, and sleeping; early rising, and a regular state of the bowels, are important adjuvants.

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ECZEMA. SYN.—Eczemata (from *ἐκζεω*, I effervesce). Ecsesmata, Blancard. Hidroa, Sauvages, Vogel. Ecphlysis Eczema, Good. Cytisma Eczema, Young. Hydrargyria, Alley. Mercurial Lepra, Mercurial Disease, Moriarty and Mathias. Hitzblatterchen, Germ. Dartre Squameuse humide, Dartre Vive, Hydrargyrie, Fr. Heat Eruption.

CLASSIF.—6. Order, Vesicular Eruptions (Willan). 1. Group, Eczemata (Alibert). 6. Class, 3. Order (Good). III. CLASS, I. ORDER (Author).

1. DEFIN.—An eruption of minute vesicles, uncontagious, crowded together, and terminating in the absorption of the fluid they contain, or in superficial excoriations, with more or less serous exudation, concreting into thin flakes or crusts.

2. I. DESCRIPTION.—This eruption may be confined to a single part of the body, or it may attack several parts, or even the whole surface. It most frequently appears in the axilla, the insides of the thighs, the groins, hams, &c. When it is more general, it often extends over the backs

of the hands, the face, scalp, neck, and fore-arms. It often occurs on the scrotum and verge of the anus, on and around the nipples, and in the vulva. Eczema presents various modifications, distinguished by Dr. WILLAN into the *E. solare*, *E. impetiginodes*, and *E. rubrum*. MM. BIETT and RAYER have, I think more correctly, divided it into the ACUTE and CHRONIC—a division which I shall partially adopt.

3. i. ACUTE ECZEMA. — The eruption of the vesicles of this form is preceded and accompanied by a sensation of heat and tingling of the affected parts, aggravated to smarting on being exposed to heat — *A*. In its most simple form — *Eczema simplex* — the skin still preserves its natural colour; and the vesicles are very small, very crowded, and hardly inflamed at their bases. The serum which they contain is at first limpid, afterwards opaque, milky, or turbid; and is ultimately absorbed, or dried on the summit of the vesicles after their rupture. In this latter case, which is not frequent, small epidermic flakes, and minute crusts of the size of a pin's head, are observed. These are soon detached; and often, in the space of one or two weeks, no traces of the eruption remain. Such is the usual course of the slightest state of eczema, as when it follows the action of the sun's rays, or of topical irritants, &c. It occurs most commonly in young persons, particularly females; is attended by no fever; but is sometimes complicated with lichen, and with psora.

4. *B*. When the inflammation is more acute, the skin becomes red and shining, as in erythema or erysipelas, at the same time that it is covered by minute vesicles — *Eczema rubrum*, WILLAN. — It commonly appears about the parts provided with hair, as the organs of generation, the margin of the anus, bends of the arms, wrists, and neck; and is more frequent and much more severe than the foregoing. The vesicles are small, crowded, or confluent, transparent, slightly shining, surrounded by red areolæ, especially in young, plethoric, and strong persons. They remain limpid until they burst, — about the fifth or sixth day, — frequently giving issue to a milky or reddish serum; and are replaced by small, yellowish lamellæ or flakes. In the *slighter grades* of this variety, the fluid is often absorbed, and the cuticle forming the vesicle exfoliates; but in the *severer grades*, the contents of the vesicles, when they burst, irritate the already inflamed surface, occasioning superficial excoriations, with a more or less abundant exudation of serum, which ultimately lessens, becomes thicker, and at last concretes, forming, with the detached cuticle, thin lamellæ or crusts.

5. *C*. The vesicles of eczema may be associated with small psyracious pustules — *E. impetiginodes* of WILLAN. — The inflammation is then carried to its highest degree, is preceded by a sensation of tension in the affected part, of burning heat, or attended by smarting, and intense itching, and considerable tumefaction. The vesicles are confluent or agglomerated, — at first transparent, assuming, in three or four days, an opaline hue, and passing into a sero-puriform state, being moreover interspersed with psyracious pustules. They all discharge a fluid having a faint unpleasant odour, and irritating the parts with which it comes in contact.

6. *D*. — *a*. In the *simple acute Eczema* there is

usually at first not much disorder beyond that of the affected part. But in the *E. rubrum* and *E. impetiginodes*, there is generally febrile action, the intensity of which is proportionate to the local irritation. Not infrequently the eruption is preceded by gastro-intestinal irritation or disorder, the symptoms of which are often very manifest both before and at the time of the eruption. The lymphatic glands in the vicinity of the eruption are often swelled and painful. This form of the disease is almost always consequent upon appreciable external causes (§ 15.). — *b*. Its *duration* is commonly from two to three weeks. But the simplest variety may be a week less, and the severest form a week longer; the affected parts not losing their red colour for a considerable time longer.

7. ii. CHRONIC ECZEMA — may present the three grades of *acute eczema* particularised above, — the *E. simplex*, *E. rubrum*, and *E. impetiginodes*, whatever may be the causes which produce them. — *a*. When the inflammation is aggravated after the breaking of the vesicles, it may be extended to the deeper layers of the skin, and even to the sub-cutaneous tissue. The skin becomes very painful, is excoriated, its cuticle fissured; and, when it is very much irritated, resembles a blistered surface in a state of suppuration — the *Dartre Squameuse humide* of ALIBERT — and constantly exudes an ichorous fluid, which resembles drops of dew, and is often so abundant as to penetrate all the linen wrapped around the part. It is chiefly when the eruption has reached this height, that it is attended with the most insupportable itchings. The skin is then so acutely inflamed as to be as red as carmine in some parts. Repose at night is impossible, unless at intervals, when the smarting, stinging, or itching subsides; but this symptom suddenly returns without any obvious cause; when scratching of the part, sometimes until blood is poured forth with the exuded serum, cannot be longer forborne.

8. *b*. After a time, varying from a few weeks to many months, the inflammation subsides. The exuded serum becomes less abundant, thickens, and forms into thin, soft, yellowish brown, and semitransparent crusts, but little adherent, often very large, leaving beneath them, when detached, an inflamed and a slightly moistened surface. These crusts form more slowly, become drier, &c.; and then, without any obvious cause, the inflammation and the serous exudation resume their former intensity; or, when the healing process has proceeded further, the surface again becomes red, vesicles reform, break, and the affection follows the same course. Lastly, in some cases, no further exudation takes place: the crusts become drier, less yellow, and more adherent; often thickened, fissured, or chopped, and easily detached, leaving the surface but little inflamed. Sometimes, however, in the more extensively diffused state of the disease, the skin remains, even for several months, of a bright red; is covered in parts by dry and thin scales or flakes; and is in some places cracked, but without any perceptible exhalation. In this case, the eczema resembles certain scaly affections, especially *psoriasis*, — the more, as these scales arise, not as heretofore, from an exhalation and concretion of lymph, but are, as in the scaly eruptions, the lamellæ formed of diseased epidermis. In some cases, especially on the limbs, there remain but two or three small

places, the skin of which seems thin, stretched, shining, and smooth; its surface being covered by whitish and extremely thin scales, as if formed of epidermis, but without the least appearance of vesicles; the diagnosis being difficult, if the previous history, or the appearance of vesicles about the circumference of the excoriated part, did not render the nature of the eruption evident.

9. *c. Chronic Eczema*, although generally at first very limited, may extend over a wide surface, so as even to cover a whole limb, or the greater part of the body.—*a.* When it attacks the *face*, the redness and swelling, with œdema of the eyelids, are considerable; and sometimes associated with inflammation of the conjunctiva.—*β.* It occasionally is seen in the *ears*, especially when it affects the scalp, and is then often mistaken for a variety of porrigo, and it is sometimes associated with otorrhœa.—*γ.* When it attacks the *scalp*, it exudes a viscous fluid having a faint and nauseous odour. As it subsequently diminishes, it concretes into lamellated or furfuraceous crusts, which are easily detached. At last the secretion entirely subsides, the skin passing into a scaly state, and becoming the seat of an abundant and constant desquamation, the removal of the scales leaving the skin red, shining, and irritated. Eczema of the scalp may continue many months. It is generally attended by swelling of the posterior cervical lymphatic glands; and it occasions change or loss of the hair.—*δ.* When it is seated in the upper parts of the *thighs*, it often spreads to the anus, the scrotum, and to the vulva, occasioning, as indeed in its other severe forms, the most insupportable stinging and itching. If it extend to the penis, the prepuce is often fissured; painful itching, irritation, and erections, being caused by it.—*ε.* Eczema may be complicated with lichen, with scabies, with impetigo, and with ecthyma.

10. *iii. SPECIFIC ECZEMA — Mercurial Eczema, Mercurial Disease*, SCHREIBER, MORIARTY; *Hydrargyria*, ALLEY; *Exanthema Mercuriale*, J. FRANK — is, in its slighter grades, and as respects the characters of the eruption, in every respect the same as the acute and chronic *Eczema rubrum*. But the constitutional symptoms are much more severe, and the disturbance of the nervous system much greater, in the former than the latter; whilst the eruption is much more generally and more frequently diffused over the surface. Both in these lesser grades, and in the severer states about to be described, it is ushered in by much constitutional disturbance — especially furred tongue, accelerated circulation, and increased sensibility and irritability.

11. The more severe states of this affection were first described by BENJAMIN BELL, SPENS, MORIARTY, PEARSON, M'MULLIN, CHISHOLM, and ALLEY. Besides being preceded by a well-marked febrile paroxysm, these grades are often accompanied by difficult respiration, tightness across the chest, and dry cough, the skin being very hot, and the seat of a smarting and stinging sensation. When the disease is consequent on mercurial inunction — for it may also follow the internal use of mercurials — a diffused redness, with numerous crowded vesicles, supervenes in one or two days, generally on the thighs, scrotum, fore-arms, &c. In some cases, the eruption proceeds no further than the parts where frictions have been applied, and, after one or two weeks,

subsides. But in the severer grades, the skin is extensively studded with vesicles, which soon break, discharging an irritating and offensive fluid, which concretes into large incrustations of a dark colour. At the same time the fauces, and frequently the conjunctiva, are greatly inflamed; and the face itself covered with incrustations, fissured in different directions. The eruption extends over a large space, and spreads in succession over most of the body; the excoriated surface being the seat of constant irritation, which is increased by the pressure of the body, and by the substances which imbibe the exuded fluid. The incrustations crack, and expose the raw surface in several places, upon change of posture. If the disease increase in severity, or be still more intense from the commencement, the attendant fever assumes a more adynamic form; diarrhœa is readily induced; the pain in the chest, and difficulty of breathing, increase, and are attended by anxiety at the præcordia; a dirty, bloody expectoration, indicating an analogous affection of the respiratory mucous surface, is observed; and ultimately, if relief be not obtained, the tongue and fauces become dry and dark, and the pulse frequent, small, feeble, and irregular. Sometimes sphacelation of the skin, with delirium or convulsions, takes place, and death ensues.—Such are the intense states of this disease, according to the physicians now referred to; but it more frequently assumes the milder grade described by Dr. BATEMAN; and which is characterised chiefly by a less severe and less extensive eruption and excoriation; by less remarkable constitutional disturbance, and by the entire absence, or the slight nature, of the pectoral symptoms.

12. The *duration* of this particular variety is very uncertain. When a limited part is affected, it may terminate in ten or twelve days; but when it is more universal and more severe, recovery seldom takes place in less than as many weeks, or even longer. The whole epidermis is destroyed by the more intense grades of the inflammation; and when the discharge ceases, it lies loose, and, with the concremented matter, assumes a pale brown colour, changing to black, before it falls off in large flakes. The red cuticle afterwards formed is liable, as in some other diseases, to desquamate again and again, even for a third or fourth time, but in smaller branny scales, of a light colour, a roughness long remaining like slight psoriasis. After the intenser forms, the nails and hair fall off; the former, when renewed, being thickened, furrowed, and incurvated.

13. *II. DIAGNOSIS.*—*a. Eczema simplex* may be mistaken for *scabies*, especially when affecting the wrist, and the sides of the fingers, or attended by much itching. But the vesicles of the former are flattened and agglomerated; those of the latter acuminated and isolated. The irritation or pruritus of eczema is rather a smarting or stinging; whilst that of scabies is rather agreeable than painful. Moreover, the latter is essentially contagious, the former is non-contagious.—*b. Eczema rubrum* may be mistaken for *miliaria*; but the vesicles of the latter are never confluent, as in the former; and are symptomatic of much constitutional disturbance, of which the eruption is a less important symptom than in eczema.—*c. E. impetiginodes* differs from *impetigo* in always occupying a large space, the latter being much more

confined. The pustules of impetigo have a larger base, and contain a thicker fluid, than this variety of eczema, which is always vesicular at its commencement, its secretion never consisting of true pus. Impetigo also gives rise to thicker, rougher, and more unequal crusts than it; and is never surrounded by the vesicles of eczema rubrum, as the *E. impetiginodes* always is.—*d.* Eczema, in its chronic state, may be confounded with *lichen agrius*; but the crusts formed by the latter are not so large, nor so thin, as the scales of the former; and when they fall off, they leave not a red, smooth, and shining surface; but a certain roughness, owing to the small prominent papulæ, which are generally evident to the eye, and always to the touch. Also, when lichen becomes dry and scaly, the skin is thicker, and more rugose, than in eczema; and there are commonly some papulæ scattered about, which, by their peculiar characters, further distinguish lichen.—*e.* The vesicles of the early stages, and their presence around the patches of excoriation in the latter periods, as well as the less dry and less friable scales of chronic eczema, will generally distinguish it from *psoriasis*; in which also the skin is more elevated or thickened, and more fissured in parts not influenced by the motions of the joints, than in any of the states of chronic eczema.

14. III. PROGNOSIS.—In its acute form, this affection is generally of no great importance; but in many of its chronic states, it often becomes most distressing; and sometimes even embitters existence; opposing, for many months, every known means of cure; and often returning after having been apparently altogether removed. When occasioned by mercury, especially if this mineral have been employed in large quantity, it may assume, as shown above, a most dangerous form; it therefore requires a guarded, and in some instances an unfavourable, prognosis, particularly when pectoral and nervous symptoms are present.

15. IV. CAUSES.—*a.* Eczema is most common in adults; is somewhat more frequent in females than in males; and oftener occurs in spring and summer, than in winter. Susceptibility of frame seems to dispose to it; and there appears to be a predisposition in some constitutions, generally connected with vascular plethora, favouring its passage into a severe and chronic form.—*b.* It is most frequently excited by solar or artificial heat; by the contact of either mineral, vegetable, or animal irritants,—especially the oxides of the metals; by mineral or other powders; by lime, alkalies, dust, and want of cleanliness; by sugar, &c. I have seen it produced on the insides of the thighs and parts adjoining, by the contact of the leucorrhœal discharge, and by the catamenial fluid. Draughts of cold water when the body is overheated, acid, acid fruits, pickles, and shell-fish, will also occasion it, especially in some constitutions. Blisters and plasters, and rancid oils or grease applied to the surface, are also among its usual causes. It sometimes, however, appears without any obvious reason; at other times, it seems attributable to indigestible and unwholesome food, to spirituous liquors, and similar errors in diet; it being, in such cases, most obstinate. It is not contagious: but M. BIETT supposes that it may be communicated in some cases, as when the exudation continues in contact with a healthy surface. He states, that he has seen it trans-

mitted from, and to, the organs of generation, by sexual intercourse. The *specific form* is always caused by the use of mercurials—internal or external—but most frequently the latter; and by exposure to cold during their influence. Whether or not the eruption, in such cases, may be in some measure produced by a change in the fatty substance used in oxydizing the metal, is very difficult to determine.

16. V. TREATMENT.—The remedies recommended by WILLAN and BATEMAN, viz. heating tonics and acids, I have found more generally injurious than beneficial. The treatment directed by BIETT in his clinical lectures at the "*Hôpital Saint Louis*," and by his pupils, RAYER, CAZENAVE, and SCHEDEL, in their works, is decidedly more rational and successful.—*A.* The *slighter grades* of the acute disease are readily removed by simple *refrigerants* and *emollient diluents*, with cooling aperients, and tepid bathing. But when the eruption is more extended, is accompanied by smarting, or assumes the form of the *Eczema rubrum* or *E. impetiginodes*, *tepid alkaline* or *sulphuretted baths*—made by adding from four to eight ounces of the sub-carbonate of soda or of potash to the water of a whole bath, for an adult; or four ounces of the sulphuret of potash;—an antiphlogistic regimen; general *blood-letting* in young plethoric or robust persons; *local bleedings* in the vicinity of the excoriations; and small doses of the *nitrate of potash*, with *soda*, in mucilaginous diluents; will be required in addition to the above more gentle means. Emollient and *soothing applications* should also be resorted to. I agree with Mr. PLUMBE, in avoiding all greasy applications; and with M. BIETT, in forbidding the use of sulphur, or repeated doses of mercury, in this state of the disease; an antiphlogistic and soothing treatment being in every respect the most appropriate. I have prescribed with much benefit the *sub-borate of soda*, with or without the nitrate of potash, in emollients, in the acute form; and after the bowels have been evacuated, the *nitrate of soda* in similar vehicles. In all cases, the exciting causes should be ascertained and removed.

17. *B.* In the *chronic states* of this eruption, the antiphlogistic treatment recommended above should be employed, where it has been either neglected, or insufficiently tried. *Purgatives* also ought to be frequently resorted to, where the tongue is loaded and the evacuations unnatural, and repeated daily until they assume a healthy hue. For this purpose a mercurial preparation may be exhibited at night, and a purgative draught in the morning. If there be signs of asthenia and a cachectic state of the frame, the purgative should be of a tonic and stomachic kind; the bark of the *madar root*, or *tonic infusions*, with the nitrate of potash, or with the mineral acids, being taken through the day, but not until mercurial medicines have been relinquished. Dr. ELLIOTSON advises, in addition to bleeding and a low diet, the exhibition of mercury until the mouth is affected; but the latter part of this practice does not agree with my experience; the former I have always directed. It is chiefly when the excoriations are extensive, and the exudation copious, and after depletions have been employed, that *acids* seem to be indicated; morbid secretions having been

evacuated from the *prima via*. The infusion of roses, with sulphuric acid and small doses of the sulphate of potash, or of quinine, or the infusion of cinchona with nitrate of potash, nitric acid, and the spiritus ætheris nitrici, is most conformable to the treatment advised by other writers; but I have seen more benefit accrue from the decoction or infusion of bark, with nitrate of potash and sub-carbonate of soda; from the compound decoction of *sarsaparilla* (the mezereon having been omitted in its preparation) with liquor potassæ; and from the decoction of *dulcamara*, or of *elm bark*, with very minute quantities of the oxy-muriate of mercury, than from mineral acids. I have found FOWLER'S arsenical solution of service in some very chronic cases, but the affection often returned. It is requisite, in inveterate cases, that the diet should be strictly regulated, and confined chiefly to farinaceous food, and broth, with emollient diluents, in order to derive lasting advantage from any plan of treatment.

18. *a. External means* are especially requisite in most chronic states of the complaint. In addition to those directed above, poultices or cold cream with a solution of the acetate of lead, or lint moistened in a dilute solution of this substance, may be applied to the excoriated parts. When smarting and stinging are great, Dr. A. T. THOMSON recommends them to be washed with a mixture of a drachm of hydrocyanic acid in eight ounces of the emulsion of bitter almonds. M. GUILLEMINEAU advises the application of a solution of the nitrate of silver. When the excoriations are extensive, and the exudation copious, the *linimentum calcis*, either alone, or with a little of the *linimentum camphoræ*, will be very serviceable. The external use of *camphor*, in all such cases, is productive of advantage. Much benefit will often accrue from vapour baths, from tepid and warm alkaline, or sulphuretted baths; and, in the more chronic cases, from sulphureous fumigating baths: but this result will seldom be obtained—more particularly in plethoric and robust persons—until after morbid secretions have been fully evacuated, and bloodletting has been carried as far as circumstances will permit. Indeed, any of the numerous applications or combinations of moist heat, in the treatment of acute or sub-acute eruptive diseases, is more or less injurious, unless preceded by these measures.—When the eruption passes into a scaly and indolent state, some writers have prescribed blisters, or an ointment with the red precipitate, with the view of exciting a new action in the part; but these and similar means are inferior to the baths mentioned above. Ointments with the *protioduret* (3j to 3j) or the *deuto-ioduret* (gr. x. to 3j) of mercury, promise, however, greater benefit. When the disease has been of long duration, the arrest of it should not be risked, unless with the precautions of occasional vascular depletions, alvine evacuations, and the insertion of either an issue or seton, otherwise internal disorder may supervene, or the eruption return,—illustrations of both these results having come before me in practice.

19. *b. Mercurial eczema* requires, according to the grade it assumes, a nearly similar treatment to the above. BRIETT judiciously prescribes bloodletting at the outset; PEARSON, diaphoretics; and BATEMAN, frequent warm baths, with diaphoretics

and opiates; and subsequently tonics and mineral acids. Dr. MORIARTY, however, found opium to be a somewhat doubtful remedy. Mercury ought to be immediately relinquished, and a return to it either avoided, or ventured on with caution. When the symptoms are severe, and the attendant fever of an adynamic kind, *camphor*, *ammonia*, the *liquor ammoniæ acetatis*, or *pyroligneous acid*, or the *chlorates*, are the most appropriate remedies. Either of these should be associated with such other substances as may be appropriate to the circumstances of the case; and, when the discharge from the excoriated surface is either abundant or offensive, employed externally as well as internally; the strength of the patient being supported by appropriate means.

20. *c. When convalescence* from either of the states of the complaint is advanced, change of air, regular exercise, avoiding the ingestion of cold fluids when the surface is warm; a spare, light, and regular diet, with the occasional use of deobstruent or sulphuretted mineral waters; will generally tend to confirm the recovery.

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EDUCATION, PHYSICAL.—This subject is fully treated of in the article AGE, where measures for the healthy development of the organs and tissues, and for strengthening the constitution, are succinctly stated in connection with the epochs of early life in which they should be adopted (see AGE, § 5—28.). In the article DISEASE, the numerous causes which impede, counteract, or entirely subvert, physical development and strength are described, and their mode of operation explained (see DISEASE, § 11—62.); and in the article on INFANTS, various observations not comprised under the foregoing heads are adduced.

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ELEPHANTIASIS OF THE ARABIANS.

SYN.—ELEPHANTIA, *Elephantiasis Arabum*, Auct. Var. *Hernia Carnosa*, Prosper Alpinus. *Glandular Disease of Barbadoes*, Hendy. *Barbadoes Leg.* *Cochin Leg.* *Egyptian Sarcocele*, Larrey. *Bucnemia Tropica*, Good. *Elephantiasis tuberosa*, and *Scrotalis*, Alibert. *Oelschenkel*, *Drusenkrankheit*, Germ. *Lépre tuberculeuse élephantine*, Fr. *Dal Fil*, Arab. *Elephant Leg*, *Elephant Disease*.

CLASSIF.—7. Order, Tubercular Affections (*Bateman*). 6. Group, Leprous Affections (*Alibert*). 3. Class, 2. Order (*Good*).
IV. CLASS, IV. ORDER (*Author*).

1. DEFIN.—*Hardness, lividity, and great tumefaction of one or both limbs, or of the scrotum, &c., with an irregular glabrous, or scaly state of the skin; endemic chiefly in warm countries.*

2. Although this disease was first described by RHazes, it has been very generally confounded, in modern times, with the elephantiasis of the Greeks, from which it is quite distinct. Its resemblance, even, to the latter affection, does not sufficiently justify M. ALIBERT in arranging it under the same genus. It is seated most frequently in the lower extremities, but is also met with in the upper extremities, in the scrotum, the vulva, the breasts, and more rarely in other parts of the body. The countries in which it is most common are, Barbadoes, and all the West India Islands; various parts of South America; Egypt, and several parts of inter-tropical Africa; Ceylon, the neighbourhood of Cochin on the coast of Malabar, and other parts of Hindostan; Japan, and some districts of China; the Polynesian isles; and the provinces of Asturias and Castile, in Spain. Cases, however, occasionally occur in all the countries of Europe. According to Dr. GRAVES and Dr. EVANSON, a variety of it is common in Ireland. I have seen one case in the Infirmary at Edinburgh; five in London, one of them very recently under the care of Mr. MORLEY; and several, many years ago, in Africa, and on the Continent of Europe.

3. I. CAUSES.—a. The predisposing causes are not sufficiently known. It appears not to have been a very old disease in the West Indies, where it seldom occurs in Europeans. It is most frequent in Creoles and in imported Africans, and in places near the sea-coast. In the East Indies, it attacks only the natives. It seems in some instances hereditary, and in others derived from the habits or circumstances of the individual.—b. The exciting causes are also obscure. HILLARY and HENDY attribute it to sudden vicissitudes of temperature. It has been considered that the use of fermented beverages, especially those prepared in warm climates from the sap of several species of palm, occasions it, as acid wines give rise to gout, with swelling of the extremities, in this country. The remarkable case of it in both lower extremities, under the care of Mr. MORLEY, is that of a man in good circumstances, who has lived well, and resided constantly in London.

4. II. SYMPTOMS AND PROGRESS.—The disease often commences without any premonitory signs; the patient experiencing rigors or chills, with nausea, headache, and intense fever, followed or attended by acute and burning pain, extending in the course of the lymphatics. Subsequently a tense, knotted, and hard cord, very painful to the touch, may be traced to enlarged glands in the groin or armpits. The surface of the part is soon affected by an erysipelatous inflammation, attended by a burning and smarting sensation, and by great tumefaction; the cellular tissue being implicated as well as the skin, which presents no appearance of vesication. These local symptoms are accompanied by fever, ardent thirst, burning heat of surface, &c., alternating with copious perspirations. All these symptoms are diminished in the course of two or three days, and, excepting the tumefaction, disappear in a short time; but they return again after irregular intervals, each successive attack leaving the limb more tumefied and hard, until the disease reaches that pitch to which the term elephantiasis has generally been applied. After each of these seizures, the redness of the surface, and particularly that in the course of the absorbents, disappears; but the part at last becomes irregular, altered in colour, sometimes fissured or cracked, hard and elastic, pressure leaving no impression after it. The progress of alteration varies extremely—from a few months to many years. Sometimes the disease remains stationary for several years, and without any return of the attacks now described. The cutaneous surface is occasionally pale, more frequently yellowish, of a dirty hue or livid. It is often also scaly, resembling ichthyosis, rugose, or fissured; is in some instances covered with soft vegetations; or with hard, horny excrescences; and is more rarely ulcerated. In other cases, the surface is traversed by enlarged veins; and very frequently enlarged or varicose veins are seen ramifying from the seat of enlargement,—a circumstance which evidently induced the Arabian physicians to notice this affection in connection with, and indeed as depending upon, a varicose state of these vessels. At a far advanced period, the hard and engorged glands sometimes suppurate, or even sphacelate; and more rarely, indolent abscesses, or deep-seated suppuration, with offensive discharges, supervene in the midst of the enlarged mass. When the disease is seated in the scrotum, this part often becomes very remarkably enlarged. In Egypt and the East, tumours of this description are not infrequent, and sometimes weigh from 30 to 80 lbs. Several of these have been removed in Egypt by CLOT-BEY. One of enormous size was lately operated upon in London, but unsuccessfully. M. DUPUYTREN met with an instance of this alteration in the labia majora vulvæ.

5. III. PATHOLOGY.—i. On dissection, the integuments of the part are found thickened and hardened:—1st. The epidermis is very thick, adherent, and fissured;—2d. The mucous layer is very distinct;—3d. The papillary body is greatly developed, and readily distinguished from the cutis vera or dermis, the papillæ being elongated, enlarged, and prominent (ANDRAL, CHEVALIER);—4th. The cutis vera is much thickened, it sometimes being half an inch in thickness;—5th. The sub-cutaneous cellular tissue is either thickened, the cellular areolæ containing a semiliquid, gela-

tinuous matter; or it is hardened, presenting an intermediate state between a lardaceous and a scirrhous structure, and is more and more dense as it approaches the skin. The muscles underneath are pale, thin, or softened. The lymphatic glands and vessels present evidence of disease, but not uniformly; and one or more of the principal veins are generally obstructed or obliterated, as observed in the cases inspected by MM. BOUILLAUD and GAIDE.

6. ii. *Nature, &c.* — The structural alterations to which elephantiasis is strictly applicable, are evidently remote effects of various states of morbid action, which have either repeatedly returned, or have long continued in the diseased part. From the history of cases, and the changes observed on dissection, the skin, subjacent cellular tissue, the absorbents, and the veins, are evidently more or less implicated; but it is very difficult to ascertain which of these is primarily or chiefly affected. The principal characteristics of elephantiasis have manifestly resulted, in several instances, from disease of the absorbents, or veins, or both. They have also followed, within the scope of my own observation, a chronic affection of the skin, which has extended to the subjacent tissues, and, sooner or later, to either the veins or the absorbents, or perhaps to both. I was lately consulted by a female of middle age, who, during convalescence from a dangerous attack of continued fever, more than ten years previously, experienced hard and painful swelling of one of the lower extremities, depending on disease of the absorbents or veins, or both, according to the account she gave. When I saw her, the limb, below the knee, was very hard, and enormously swollen; and had all the characters of elephant leg; the skin being irregular, scabrous, livid, and fissured. I directed bandages, and the internal use of iodine; but after two or three visits, I saw no more of her, and consequently know nothing of the result. Some time previously, a similar case, as respects its origin and history, although not so severe, came before me. It had been of several years' duration; and had increased gradually after the acute attack in which it originated. The limb was hard, dark red, and livid in parts, somewhat irregular, slightly scaly, and the veins above the tumefied part enlarged. The affection of the skin was here consecutive. Considerable advantage was procured from bandaging, and the internal use of iodine; but the enlargement is not entirely removed. The patient is still under my occasional observation. More than one of the cases I saw in Africa, seemed, on the other hand, to originate in a very manifest alteration of the cutaneous surface.

7. M. ALARD considers elephantiasis essentially to depend upon inflammation of the cutaneous and sub-cutaneous absorbing vessels and lymphatics. Dr. MUSGRAVE also views it, as it occurs in the West Indies, as a consequence of inflammation of the lymphatics, the inflammation being accompanied with pungent heat, and with redness of the skin, and characterised by great tendency to metastasis. He states, that it usually betrays itself in the scrotum, the mammae, or in some part of the extremities, most frequently about the ancle, or high up the thigh; and, although at first circumscribed, it often diffuses itself over the limb. When the glands are not involved, painful

and indurated cords can be traced to the nearest cluster; but, whatever may be its original seat, the patient is never secure, while the constitutional disturbance subsists, from a sudden retrocession to some vital organ. He has seen it translated from the scrotum to the head; from thence, after a few hours, descend rapidly to the abdomen; again migrate to the chest; and return, perhaps, to the encephalon, and prove fatal there; or resume its more harmless situation, and there run its course. While occupying an internal viscus, it gives rise to the usual symptoms of acute inflammation. Dr. HILLARY and Dr. MUSGRAVE view the local affection as a consequence of fever, which commonly precedes it for two days. Dr. HENDY, however, contends that the fever is symptomatic of the inflammation of the lymphatic vessels and glands. During the acute stage of the disease, either, perhaps, may precede the other; but it is most conformable with just views in pathology, to consider the local change as a consequence of the constitutional disorder; the advanced or chronic state being the result of repeated attacks of inflammation of the lymphatics or veins, and of the integuments, generally existing together, but often originating in, and continuing more or less confined to, either.

8. *Inferences.* — According to the descriptions furnished by TOWNE, HILLARY, HENDY, MUSGRAVE, BOUILLAUD, and GAIDE, and to my own observations, this disease should be viewed — (a) as consisting of certain *acute*, as well as far advanced or *chronic*, states, generally connected with a bad habit of body, and each requiring an appropriate method of cure; and, (b) as arising — *a.* most frequently from inflammation of the lymphatic system and skin, particularly in warm climates; *β.* from inflammation and obstruction of the veins, in some instances, with irritation of the skin in various grades at an advanced period; and, *γ.* from the extension of inflammation from the skin to the veins or lymphatics, in other cases. The tumefaction and hardness are necessary consequences of thickening of the *cutis vera* and sub-cutaneous tissue, with deposition of inspissated lymph in the areolæ of the latter, whether arising from chronic inflammation of these structures, or from inflammation and obstruction of the lymphatics or veins, or from both these species of alteration.

9. IV. *a.* The DIAGNOSIS of elephantiasis is very easy in the chronic and far advanced state. In the earlier stages, when commencing in either of the parts noticed above, it should be viewed as inflammation of that part, which, in countries where the disease is endemic, may be followed, if not properly treated, by the organic changes constituting its fully formed condition. When this takes place, the great tumefaction and hardness, and especially the circumstance of pressure not being followed by pitting, with the alterations already described (§ 4.), will sufficiently mark the nature of the disease. — *b.* The PROGNOSIS is unfavourable, as respects the removal of the disease, when it is fully formed, although relief may be obtained, and persons may live very many years with it. But it tends generally to shorten life, and always to render it much less comfortable. When it is not far advanced, it may be nearly or altogether removed by treatment. The result, however, will very much depend upon the

habit of body, and vigour of constitution, of the patient.

10. V. TREATMENT.—i. RHazes and others of the Arabian physicians recommended, in the *Acute stage* of elephantiasis, general bleeding, emetics, aperients, confinement to the horizontal posture, and spare diet, with cooling epithems to the part, and subsequently bandages. A similar treatment is very generally adopted in the East; and I believe that it cannot be much improved upon. Dr. MUSGRAVE advises, in addition to the local application of warmth, and to febrifuge and purgative medicines, the exhibition of mercury until the mouth is affected, in order to prevent the metastasis of the disease, which, in the West Indies, is so common and dangerous; as well as the deposition of lymph, to which the hardness and swelling are chiefly owing. The employment of a number of leeches or incisions, as recommended by Mr. COPLAND HUTCHISON in erysipelas, followed by poultices, or other emollient applications, may also be resorted to with advantage at this period.

11. ii. In the *Chronic stage*, the above treatment will seldom be productive of benefit. M. RAYER, however, states, that general bleeding will be of service when the constitutional powers are not much impaired; and M. LISFRANC advises scarifications, local bleedings, and compression. Bandages, and frictions with various resolvent substances, are more to be depended upon in the most chronic cases, and where the vital energies are too far depressed to admit of depletions. But even in these, active purging is indispensable. M. ALARD records a case of twelve years' duration, that was cured by the repeated exhibition of cathartics. When the skin is in a state of irritation—is fissured, erythematous, or exudes a fluid concreting into scales or crusts—frictions, or even bandages, are not endured by the patient, and are not appropriate. In these, scarifications and blisters may be employed with the view of giving issue to the fluid infiltrated into the sub-cutaneous tissues. Caustics and moxas have also been directed with this intention. Several writers advise douches of vapour—simple or medicated; and fumigating baths—either local or general. From my experience of iodine, I am inclined to think favourably of it in this disease. In one of the two cases, in which I employed it, manifest benefit was derived. It should be prescribed chiefly internally, as its external application is apt to increase the local irritation: and the bowels ought to be freely and frequently acted upon by deobstruent and stomachic purgatives. The limb should be kept as much as possible in the horizontal position. Amputation of the affected part has been advised, and practised in a few instances with success.

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EMPHYSEMA. SYN.—*Emphysema* (from *ἐμφύω*, comp. *ἐν*, in, into, and *φυάω*, I blow), *Εμφυσματώσις*, Gr. *Pneumosis*, Lat. *Windgeschwulst*, Germ. *Emphysème Boursoufflure*, Fr. *Enfisema*, Ital. *Inflation*, *Wind Dropsy*.

CLASSIF.—3. Class, 2. Order (Cullen).
6. Class, 2. Order (Good). IV. CLASS,
II. ORDER (Author).

1. DEFIN.—Soft, elastic tumefaction, occasioned by the presence of air, or of any other gaseous fluid, introduced or developed in cellular parts.

2. Although the sub-cutaneous cellular tissue is the most frequent seat of emphysema, yet other parts of the cellular structure may be also affected, either separately and independently, or in connection with it. Those parts of this tissue, which are the most lax and the least loaded with fat, are most frequently and extensively inflated; and parts pressed upon by unyielding structures, or by the action of muscles, although they may give passage to the air, admit not of its accumulation.—J. P. FRANK thinks that lean persons are most liable to emphysema: this may or may not be the case; but there can be no doubt of these persons being more generally and extensively affected than those who are fat. When air is infiltrated into the cellular tissue, it may be diffused or conveyed, by the motion of contractile parts, to places remote from that at which it was introduced.

3. Emphysema may be divided, according to its seat, into—(a) *External*, or of the sub-cutaneous cellular tissue; and, (b) *Internal*, or of internal viscera. The former may be more or less general, as regards that situation; the latter is commonly limited in respect of these viscera, but is often the source in which the former originates; the admission of air into the cellular tissue of the respiratory passages, by a solution of continuity in the lining membrane, or by rupture of the air cells, being the cause of the great majority of cases of external emphysema. It may also be considered, in connection with the modes in which it is produced—with reference, a. to its spontaneous evolution; and, b. to its origin in a solution of continuity in some part of a surface communicating with the external air—to its *intrinsic*, and *extrinsic* forms. The division into *symptomatic* or *traumatic*, and *idiopathic* or *spontaneous*, is faulty; inasmuch as the spontaneous secretion of air from the blood into the cellular tissue, is merely a rare phenomenon contingent on far advanced states of disease; and as the introduction of air from without into this texture is not a symptom, but an accidental occurrence—is not a necessary or even a frequent consequence of a wound or injury, but dependent only upon certain circumstances or changes connected with such injury.—I shall therefore consider, *firstly*, the *Intrinsic*, or spontaneously contingent form

of emphysema; and, *secondly*, the *Extrinsic*, or the accidental traumatic conditions.

4. I. The *INTRINSIC*, or *Spontaneous Contingent Emphysema*, is evidently dependent upon a more advanced state of the same general condition of the frame which gives rise to collections of air in other parts, and which, in its slightest grades, often occasions similar accumulations in the bowels and uterus; the air in such cases being secreted from the blood, and consisting, most probably, of certain combinations of hydrogen and azote, or of carbonic acid. Dead bodies become emphysematous from the gases disengaged during the process of decomposition; and a part which is gangrenous, is often also emphysematous from this change. But in these, the colour and cohesion of the parts are remarkably altered, and other proofs of decomposition are also present. In all diseases affecting the circulating fluid, as typhoid or adynamic fevers, especially those usually called malignant, and where the blood is contaminated by the absorption or introduction of morbid secretions or fluids, the exhalation of air into the cellular tissue and hollow viscera often takes place immediately after death; and, in some instances, it is observed in parts before life is extinct. MORGAGNI remarked it in an advanced stage of fever following the repulsion of a chronic eruption (*Epist. xxxvii. sect. 22.*); FABRICIUS HILDANUS notices its supervention after small-pox; and WILMER, from the absorption of putrid matters. I saw lately an instance of its appearance under the integuments in the vicinity of carious dorsal vertebrae, in a young lady. It was limited in extent, but elastic and crepitating. It is most frequently met with in warm and unhealthy countries, and in certain epidemics. I have seen it in the malignant fevers of warm climates; it has occasionally been noticed in epidemic yellow fever. Dr. W. HUNTER (*Med. Observ. and Inquiries*, vol. ii.) and J. P. FRANK (*De Cur. Hom. Morbis*, l. vi. p. 38.) observed it very generally in an epidemic affecting horned cattle: the latter physician refers to its frequency in the last stage of an epidemic fever that raged in some parts of Germany in 1772, and of a similar fever that prevailed in Italy in 1789; the emphysema appearing about the neck and face, and sometimes extending to other parts of the body. HUXHAM (*Med. Observ. and Inquiries*, vol. iii. p. 33.) remarks its connection with putrid fever and sore throat, as well as with scurvy; and records a case where it supervened, the patient recovering nevertheless. I saw a case of it in scarlet fever that terminated fatally, and another that recovered; and I agree with HUXHAM in considering its appearance about the neck and upper part of the breast as not rare in this and similar diseases. The only question as to these cases was, whether or not the air was evolved or secreted from the blood, or was introduced from without at some part of the respiratory passages in the manner about to be explained. FRANK and some other writers likewise notice its supervention upon erysipelas, when the latter is prevalent in crowded hospitals. MM. RULLIER and DELAROCHE have seen it occasioned by poisoning.

5. The *intrinsic* or spontaneous appearance of emphysema in such cases may be imputed to the partial decomposition or alteration of the circulating fluids consequent upon failure of vital

power. This is evidently the case in some instances, especially when the swollen parts are discoloured, and when it comes on near the period of dissolution. But cases sometimes occur where no evidence of decomposition can be traced, depression only of vital power being present. J. HUNTER, FRANK, BAILLIE, HOME, DAVY, and others, have adduced evidence of the evolution of air from the blood-vessels independently of such change. The experiments of Dr. EDWARDS prove that azote, and the other constituent gases of the atmosphere, are more or less absorbed into the circulation, and afterwards discharged from it, chiefly by the mucous surface of the respiratory organs and digestive canal; and that these actions are regulated by the state of the vital energies of the system. It therefore cannot appear surprising that air should be extricated into the areolæ of parts of the cellular tissue, as well as from mucous surfaces, in certain states of morbid vascular action connected with depressed vital power. Besides, we know that air is secreted into the sound or air-bladder of numerous species of fish. As to the chemical constitution of the air which is spontaneously evolved in cellular parts, we have very imperfect information. It is very probably nearly the same as that found in the digestive canal, and which consists chiefly of azote, carbonic acid, hydrogen, and certain of its combinations. In a case recorded by M. BALLY (*Lond. Med. and Phys. Journ.* for June 1831.), in which general emphysema occurred immediately after death, with signs of dissolution of the blood, the air was evidently of the last description; it having taken fire from the flame of a taper, and burnt with a blue and white flame; and the edges of the aperture through which it escaped having been consumed. Gaseous fluids may be evolved also in the cavities of the peritoneum and pleura: but generally in consequence of the decomposition of fluids, &c. previously affused in these situations; although they may likewise be secreted by these surfaces; or common air may accumulate in the pleural cavities, owing to a communication with the vesicular structure of the lungs. (See PERITONEUM, and PLEURA.)

6. II. *EXTRINSIC*, or *Accidental Traumatic Emphysema*, sometimes appears in the course of various diseases, and from external injuries—of those maladies in which the respiratory functions become especially affected, more particularly the expiratory actions; and from laceration, rather than from puncture or incision, of parts concerned in these functions. It always proceeds, unless in a remarkably rare form of this species, from the passage of common air into the cellular tissue, through a breach of continuity in some part of the respiratory apparatus.—(a) It may take place from rupture of the membrane lining the *nasal fossæ*, or from wounds communicating with the lachrymal sac or duct; the air passing into the cellular tissue, upon forcibly blowing the nose. M. MENIÈRE instances two cases of this description. J. P. FRANK mentions its occurrence from playing on wind instruments, whilst the insides of the cheeks are abraded or lacerated. M. RULLIER states that the prisoners in the *Bicêtre* at Paris produced it by puncturing the inside of the cheek, and forcing the breath into the puncture.

7 (b) Emphysema is not infrequently occasioned by injuries of the *larynx* or *trachea*, especially when the parts are lacerated by wounds perforating them, particularly when the external outlet is partially obstructed; and by surgical operations on the neck (A. BURNS). Rupture of the rings of the trachea will also produce it. SCHREGER adduces an instance of it from fracture of the thyroid cartilage. Ulceration in these situations, with sthenic vascular action, can hardly be followed by this contingency, as the lymph effused in the areolæ of the surrounding cellular tissue quickly coagulates, and prevents the introduction of air. But when ulceration occurs in connection with asthenic action, emphysema may supervene; as the lymph thrown out in this state of the system is not coagulable, and consequently cannot prevent the air from being forced into the cellular structure.

8. (c) Emphysema often proceeds from *rupture of the air-cells*, and interlobular cellular tissue, the air escaping into the latter, and passing along it to the superficial parts of the body, owing to the entire state of the pleura. When the rupture is confined to the air-cells, the air passes no further than the lobule in which the lacerated cells are situated; but when the connecting tissue is also torn, the air escapes into it, and along its areolæ, by the root of the lungs and mediastinum, until it reaches the cellular tissue of the throat, producing a crepitating and an elastic swelling above the clavicles, which is soon diffused over the face, chest, and trunk. This form of emphysema is occasioned chiefly by violent efforts, and straining, as lifting heavy weights (HICKS, MENIÈRE), and child-labour (HAMILTON, HALLIDAY, BLAGDEN, BLAND, SIMMONS, &c.), and by obstacles to respiration, as in whooping cough, pneumonia, bronchitis (DESBOIS, IRELAND, &c.), hysteria, &c., and in cases where a foreign body has fallen into the trachea (LOUIS, &c.). I have seen it occur in the advanced stage of measles complicated with severe pulmonary affection. I lately attended a case of this description with Mr. AUSTIN, in which the only matter of doubt was as to its having arisen spontaneously, or from the interruptions to respiration in the way now explained. But the great difficulty of breathing that was present in consequence of infiltration of air into the interlobular tissue and mediastinum, readily pointed out its origin in this case, as it will in all others of the same kind. Dr. DRUMBRECK has recorded a similar instance, in which he could find no appearance of rupture in the bronchial lining; but it is in the vesicular structure where it should have been looked for; and there it is manifested chiefly by the effects in question. The emphysema that is rarely observed in the course of diseases of the lungs characterised by dyspnoea, and of rabies, hysteria, &c., is evidently of the kind now described.

9. (d) *Lacerations or perforations* of the *pleura*, *costalis* and *pulmonalis*, and *lung*, by fracture of the ribs, and penetrating wounds, are the most frequent causes of emphysema. When the fractured end of a bone lacerates both *pleura*, and the superficial portion of lung, the inspired air sometimes passes from the vesicular structure of the latter, accumulates in the pleural cavity, and is forced, by efforts at expiration, through the breach in the costal *pleura*, into the cellular

tissue. Frequently, in consequence of the effusion of blood or lymph, the wound in the lung is in a short time so far closed as to prevent the further escape of air into this cavity; that which was effused being absorbed, and respiration becoming less laborious. In this case, the emphysema soon subsides, owing to the absorption of the infiltrated air. But it occasionally happens that the wound in the lung continues open; and, upon each dilatation of the chest, air is drawn into the pleural cavity, and forced by each expiration into the cellular tissue of the thoracic parietes, until the inflation becomes enormous. When this occurs, respiration is remarkably laborious; inspiration is very rapid; expiration is slower, and, more forced, and is quickly succeeded by inspiration; the whole process being short, and apparently attended by an effort to expand the lungs, which are compressed by the air accumulated in the *pleura*. Emphysema is less frequently occasioned by penetrating wounds of the thorax and lungs, than by lacerations from fractured ribs; owing to the more constant effusion of blood or lymph from the wound in the lung after the former than after the latter, as shown by the experiments of HEWSON; and to the escape of the air from the pleural cavity by the external outlet in the thoracic parietes. It sometimes, however, arises from this cause; closure of the wound in the integuments, or some other obstruction in its more external part, occasionally allowing the air accumulated in the chest to be forced into the cellular tissue during expiration. Penetrating wounds of the chest very seldom produce emphysema, unless the lungs be wounded, and then the reason of its occurrence is obvious. But they may occasion it without any injury of the lungs, owing to the air being more readily drawn into the pleural cavity during inspiration, than expelled from it during expiration.

10. (e) *Ulceration* of the *pleura costalis* and *pulmonalis*, and of the lung, has in rare instances produced emphysema, chiefly as a consequence of circumscribed empyema, that has opened into the bronchi. In this case, a communication is formed by ulceration between the cellular tissue of the thoracic parietes and the vesicular structure of the lung, the surrounding *pleura* being generally adherent. An abscess in the parietes of the chest likewise may point internally, and, having produced adhesion of the *pleura*, burst into the lungs, and be followed by emphysema. But this last result will not occur in either of the above cases, unless the surrounding tissue is permeable by air, owing to coagulable lymph not having been formed in it. If this tissue be impermeable, then the air will only replace the matter that is evacuated, and give rise to circumscribed emphysematous swelling or swellings, as in a case recorded by Dr. DUNCAN (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. i. p. 455.) A still more rare form is that following empyema which has opened externally through the thoracic parietes. Ulceration may also take place in the lungs, and through the investing membrane, either from a vomica or tubercles, and the air be drawn into the cavity of the *pleura*; and, having accumulated there, forming *pneuma-thorax*, be forced through an ulcerated opening in some part of the costal *pleura*, into the cellular tissue of the thoracic parietes, and be thence diffused to a greater

or less extent over the body. Cases of this kind have been described by KELLY and HALLIDAY.

11. (f) The rarest form of *extrinsic* emphysema is that consequent upon the escape of air, through a rupture or ulcer of the internal coats of some portion of the alimentary canal, into the sub-serous cellular tissue, and the diffusion of it through this tissue. HALLER (*Opusc. Pathol.* vol. iii. obs. 31. p. 309.) met with a case of this kind in a female; and M. MARJOLIN (*Archives Génér. de Méd.* t. xi. p. 112.) records an instance of it after a contusion of the abdomen which had ruptured the small intestines. MM. CHABERT and HUZARD (*Observ. sur les Animaux Domest.* &c. 8vo. Paris, 1792.) state that this form is not rare in ruminating animals.

12. III. DIAGNOSIS.—Emphysema of the subcutaneous cellular tissue is readily recognised by the uniform, light, elastic, and crepitating swelling constituting it. But it is often by no means so easy to determine the manner in which it has arisen. What has been adduced above on this subject will generally enable the inexperienced practitioner to recognise the different forms of its origin.

13. IV. PROGNOSIS.—Our opinion of the termination of emphysema will necessarily depend upon the causes that have produced it, and the state of the respiratory functions. The inflation is, in itself, but of little consequence, as air may be introduced to a great extent into the subcutaneous tissue without giving rise to any serious results,—unless, indeed, in a cachectic and asthenic state of frame, when puncture or laceration of this tissue, or of the integuments is very liable to be followed by gangrene of the part, as in the case recorded by M. MENIÈRE. ARISTOTLE and PLINY allude to a practice of inflating the subcutaneous tissue of animals, with the intention of rendering them speedily fat. SCHULZE states, that this process makes them first dull; and that the emphysema generally disappears in two or three days, after which they recover their spirits, acquire a voracious appetite, and, in a few weeks, become very fat. HALLER, GALLANDAT, and SOEEMMERRING, adduce similar facts in proof of the introduction of air into the cellular tissue being in itself perfectly innocuous; and ACHARD contends that the insufflation of carbonic acid gas into this tissue is the best mode of administering this fluid in the treatment of disease. FABRICIUS HILDANUS (*Cent. iii. observ.* 18. p. 369.), DIONIS, AMBROSE PARÉ, and KERAUDREN (*Bullet. des Scienc. Méd.* t. iii. p. 422.), mention instances of the insufflation of air into the subcutaneous cellular tissue of children, with the intention of exciting compassion, or of showing them as curiosities. SAUVAGES states, that a soldier was similarly inflated during sleep, to an enormous extent, without any further inconvenience than the impediment it occasioned to the respiratory actions. I therefore infer, with M. BRESCHET (*Dict. des Scienc. Méd.* t. xii. p. 20.), that the prognosis in emphysema is altogether dependent upon the disease or injury on which it is contingent, and not upon itself, or even upon its extent; the degree to which the respiratory functions are disordered being the chief indications of danger, as evincing the effusion of air either into the sac of the pleura, or into the interlobular cellular tissue of the lungs. Spontaneous intrinsic em-

physema may be viewed as generally a fatal occurrence.

14. V. TREATMENT.—i. Of *Intrinsic Emphysema*.—This species can be remedied only by restoring the depressed vital power, and removing the morbid condition of the local and general circulation on which it depends (§ 4, 5). The means most appropriate to these ends have been described in the articles BLOOD (§ 157.), and DEBILITY (§ 38.), to which the reader is referred. Scarifications and punctures have been recommended when the inflation is considerable; but there is great danger, in this state of disease, of gangrene following puncture of the skin, especially if it be resorted to in hospitals, or in confined or ill-ventilated habitations. More benefit will follow gently stimulating and astringent liniments and epithems applied to the emphysematous surface and vicinity, and active stimulants, tonics, and antiseptics employed internally.

15. ii. *Contingent Extrinsic Emphysema* must be treated with strict reference to the nature of the injury that has occasioned it, and the state of the respiration.—When it has arisen from penetrating wounds of any part of the respiratory apparatus, enlargement of the external wound will generally be requisite, in order that the air may have a direct external outlet. If it proceed from fracture of a rib, the application of a bandage may be serviceable, if the breathing be not materially oppressed; but when respiration is difficult, and pneumonia-thorax is present, a bandage is generally injurious, by preventing that degree of dilatation of the lungs which is absolutely requisite to the continuance of life. If the pneumonia-thorax from this species of injury, in addition to the external emphysema, be so great as to threaten suffocation, it will be necessary to make an opening directly into the pleural cavity as much as possible in the situation of the lacerated pleura costalis. If the inflation be so extensive as to prove, of itself, an impediment to the respiratory actions, and if the vital powers be not greatly depressed, and the frame not cachectic, several punctures, at a considerable distance from each other, may be resorted to. When the emphysema is more obviously dependent upon rupture of the air-cells, and the escape of air into the interlobular tissue, &c., *anodynes* should be administered in order to lower the force of the respiratory action; and *bloodletting* practised, to lessen the quantity of blood to be acted on by the inspired air. In most instances of traumatic emphysema, the abstraction of blood is requisite, unless the patient is sufficiently reduced by hæmorrhage consequent on the accident. If inflation take place to a very great extent, punctures sufficiently deep to reach the cellular tissue may also be practised in this class of cases, but only in the circumstances and with the precautions now stated. M. DESBOIS advises, in preference to scarifications or punctures, the surface to be enveloped in cloths moistened with camphorated spirit, or a slightly astringent lotion. Unless the inflation by its extent greatly embarrass respiration, little need be attempted beyond the means now mentioned. In cases, however, characterised by great difficulty of breathing consequent upon penetrating wounds of the chest, or fractures of the ribs, or on ulceration, and which are generally preceded by pneumonia-thorax, paracentesis of the chest some-

times cannot be dispensed with. But it is necessary, previously to performing this operation, to observe and determine early and accurately, by auscultation and percussion before the inflation becomes extensive, in which pleural cavity the air has accumulated; because an opening made on the sound side, by causing collapse of the lung, would have a fatal result, as in a case recorded by Dr. HALLIDAY. The seat of the injury, and the part at which the emphysema first appeared will generally indicate the situation where it should be performed. (For *Emphysema of the Lungs*, see *Lungs—Emphysema of*.)

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EMPHYEMA. See *PLEURÆ—Diseases of*.

ENDEMIC INFLUENCE AND DISEASES.

CLASSIF. — GENERAL PATHOLOGY. —
Ætiology.

1. This subject is considered in many of its more general relations, in the articles *CLIMATE*, and *DISEASE*; but there remain a few observations, which do not fall under these heads, to be made at this place. The word *endemic* has usually been applied to that *influence* exerted by the geology, soil, water, and air of a particular district or country, and by occupations and modes of living, upon the constitution and health of its inhabitants; and the more common and uniform results, or the consequent forms of morbid action, have been denominated *endemic diseases*. Although HIPPOCRATES directed attention to endemic influences in his *Treatise on Airs, Waters and Localities*, but little notice was taken of the subject by medical writers until about the end of the seventeenth and commencement of the eighteenth century, when several works on the maladies prevalent in particular districts, and a few on endemic diseases generally, made their appearance. Before this period, however, CAIUS had offered some observations connected with endemic influence in his work on the *Sweating Sickness*. A few remarks of the same kind are to be found in ANDREW BORDE'S *Dietary of Health*; and in RAMESEY'S *Origination of Worms*, &c. The earliest work that treated of the general en-

demic diseases of England was published in London in 1672, by CLAROMONTIUS, a native of Lorraine, and dedicated to James Duke of Ormond, to whom he was probably domestic physician. In an address to the London College of Physicians, he apologises to that learned body for having encroached, he being a foreigner, upon a province which peculiarly belonged to them. The apology, as remarked by Dr. DUNCAN, was a tacit rebuke, and the severest he could have given, to a body which, even to the present day, has hardly interested itself in the advancement of medical science. In his enquiry, he enters upon the consideration of the extent to which venesection is required by the nature of the endemic diseases of this country; and concludes that, although well-timed bloodletting is a judicious practice, yet purging is, upon the whole, oftener required, and better adapted to their cure. After the treatise of this enlightened writer, others appeared, which comprised subjects connected with endemic influences and diseases, either incidentally or specially. But sufficient reference will be made to them at the end of this article.

2. A reference to the topics treated of in the articles *CLIMATE*, and the *Causation of DISEASE*, will show that endemic influences are recognised rather by their effects than by positive characters, or manifest and demonstrative properties; and that they are results of several coincidences of physical phenomena and moral conditions, which often vary, and consequently give rise to modified effects. When we reflect that they are consequences of the geology, soil, elevation, temperature, prevailing winds, vegetation, and the vicinity of wood and water; and not of these merely in their various states and associations, but of these in connection with the avocations, the modes of life, and the quality of the food of the inhabitants, modified by moral agencies; we cannot be surprised at the diversity and importance of the resulting effects, and at the general uniformity they frequently present, in certain circumstances or combinations of these causes. In estimating endemic influences in relation to the resulting maladies, there are other agents, besides those now enumerated, that should be taken into consideration. The indolence or activity of the inhabitants; their privations and comforts; their states of filth or cleanliness; their habits of life, and employments; their ignorance and mental improvement; and their social, moral, religious, and political conditions; are most material elements in the general amount of endemic causation. It should not, however, be overlooked, that these diversified agencies act and react in developing, counteracting, or entirely removing each other; that the circumstances of locality will modify the moral and social conditions of its inhabitants; these latter, in their turn, giving rise to numerous collateral changes, and to important alterations even in the conditions of surrounding nature, as demonstrated by the march of civilisation and social improvement in both the old and new worlds. A casual view of the influence of elevated and mountainous situations upon the physical and moral condition of its inhabitants, in relation to those of the plains, or of low, confined, and miasmatic localities, especially within the tropics, and in some of the more southern countries of Europe, will sufficiently

prove the importance of this subject; and if we take a closer view, so that the individual effects upon the frame and on the mind become apparent, the propriety of studying it in its practical bearings must be evident.

3. It was stated in the article *CLIMATE*, that the constitutions of the natives of a particular country should be considered in many respects as products of the soil and climate, more especially when its physical circumstances are different from those which most generally obtain on the face of this globe, and are productive of disease in the more civilised races of our species. In such a country the human frame has become adapted to the climate to so great a degree as to render it a distinct variety from the rest of the species. We observe this in most low and swampy districts within the tropics, and eminently in Africa, many places of which could not be long habitable to others of the species constituted in any respect differently from the negro. The native frame, being thus assimilated to the climate, and modified by, and suited to, its endemic influences, is not injuriously impressed by them. But when persons whose constitutions are formed by influences of a different, or even of a modified, character, migrate to a country differently circumstanced, disease will sooner or later ensue. This susceptibility to endemic influences different from those to which the constitution has been accustomed, and by which it has been most remarkably modified, is evident in all the races of man, and is evinced more or less in all changes of climate;—by the inhabitant of elevated situations, when he visits the low grounds and plains, even under the same latitude; by the native of northern Europe, when he visits the shores of the Mediterranean—still more manifestly when he migrates to hot climates—and much more remarkably when he resides in low and marshy inter-tropical districts; by the negro, the Malay, and the Hindoo, when they pass from the warm, moist, and low plains, on which they have been reared, to more elevated situations, or to temperate or cold countries; and so on, as respects all classes of our species, when the change involves a change also of the physical conditions of surrounding nature. This susceptibility is most remarkable in youth and early manhood, and diminishes gradually until age advances, and then the powers of life more readily sink when the change is made to a more unhealthy locality.

4. As endemic influences are frequently the result of certain conditions of locality independent of difference of latitude, or even of temperature; and often depend upon one or two circumstances connected with wood and water, or with the nature of the soil, or with elevation merely above the level of the sea; a change of situation apparently slight, may be essentially great, owing to these or other circumstances, and be followed by the injurious impression of the resulting influences upon persons not accustomed to them. The waters of large towns, that are, to a certain extent, impregnated by decomposed animal matters, seldom materially disorder the bowels of those accustomed to them, unless their impurity be very great, although they may otherwise affect the health; but they will seriously derange the bowels of persons, even in the vicinity, who have not been in the habit of using them, as

shown by the different effects of the water of the Seine, at Paris, upon the inhabitants, and upon strangers in that city. Impurity of the water is, in all climates, an important source of endemic diseases, particularly of those seated in the digestive canal and circulation, as dysentery, diarrhoea, and fever; but the soil and vegetation, in connection with the extent to which they are watered, with high ranges of temperature, and with situation particularly in respect of elevation, adjoining acclivities, woods, &c., are the chief sources of these and all others of this class of maladies. The inhabitant of the high lands in the interior of Mexico is seldom affected by fever; but if he remain any time in the low grounds on the coast, in the same latitude, as at Vera Cruz, he is as liable to be seized by the malignant remittent endemic in that place, as the person who has migrated from Europe.

5. *i. Of the chief Sources of Endemic Influence.*

—Low marshy places, and grounds subject to inundations, or saturated with moisture, and abounding with the exuvie of organic substances; thick woods and jungles, particularly in warm climates; argillaceous soils, and the deep alluvial earth in the bottom of valleys, on the banks of rivers, or near the level and shores of the sea or of large lakes, or the embouchures of rivers, especially if subjected to a high temperature; are most productive of endemic diseases, which vary in character with the range of temperature, in connection with the degree of humidity, the extent to which the soil is exposed to the direct rays of the sun, and the prevailing states of the atmosphere. It may be inferred from the writings of the ancients, particularly those of HIPPOCRATES, LIVY, TACITUS, PLUTARCH, and DIONYSIUS of Halicarnassus, that the insalubrity of these places was well known to them, and that the means of removing and counteracting it were as well understood then as at the present day. HIPPOCRATES, in his *Epidemics*, states that the city of Abydos had been several times depopulated by fever; but the adjoining marshes having been drained by his advice, it became healthy. The lake Averno, mentioned by VIRGIL, is, probably, a poetical exaggeration of the effects arising from marshes; and the deeds of Hercules, the metaphorical record of his success in removing these sources of disease.

6. Pools and ditches containing stagnant water, or nearly or altogether dry, after warm weather; and grounds used for the cultivation of rice; are also important sources of endemic influence. The former, in the vicinity of villages, frequently receive animal exuvie, which render the exhalations from them much more noxious; and the latter are especially injurious to white cultivators. The extent of disease proceeding from this source has been shown by LANCISI, BAILLY, MONTFALCON, IRVINE, TARGIONI, GROTTANELLI, and others, to be, in many places of Italy, Sicily, and Greece, so great, as to occasion more than two thirds of the average mortality. The exposure of a rich, wet, and low soil, abounding with vegetable matters undergoing decay, after repeated irrigations and inundations, to a powerful sun, is the circumstance to which the insalubrity of rice-grounds, and many other places, chiefly is owing. In all intertropical regions, where the nature of the locality admits only of a rice culti-

vation, Europeans are more or less subject to endemic disease; and although the dark races are much less liable to it, owing to the adaptation of their organisation and functions to this particular soil and climate, yet they are occasionally affected by it in a slighter degree, and in a modified manner. Inundations, whether from the sea, or from the swelling of rivers, or from an admixture of sea with river water, render low grounds particularly insalubrious upon their being exposed to the action of the sun's rays. Sea water, owing to the quantity of animal matter it contains, soon becomes offensive when it stagnates on a soil abounding with vegetable substances; and the inundated grounds and islets in the course, or at the mouths, of rivers, are generally left covered, when the waters subside, by mud and slime, which become an additional source of miasmata. The inundations by the sea, which have occurred in many places in Holland, have been the cause of much disease, upon the exposure of the soil to the sun during the following summer and autumn.

7. When low and moist grounds, and deep or rich soils, which have been covered by large trees or by water, are cleared, or exposed to the action of a warm sun, especially in a hot country, they emit more noxious emanations than in their unreclaimed states; and they generally continue so to do, particularly during moist and warm weather, and after long continued droughts following heavy rains, until they are completely brought under cultivation, and even for ages afterwards, in warm countries, near the level of the ocean, or the sea-shore;—circumstances which combine to make so many places in the West and East Indies productive of disease. Rich soils covered by large trees, and other bulky vegetable productions, are thereby protected from the action of the sun; and the exhalations which are given off from them, during warm and moist states of the air, are confined by these productions to the situations which produce them. Dr. RUSH states, that the endemic disorders of Pennsylvania were converted, by clearing the soil, from intermittents and mild remittents, to bilious and malignant remittents, and destructive epidemics; and that it was not until the soil had been subjected to cultivation for a number of years, that a tolerable degree of healthiness was procured. The district of Bresse, in the Lyonnais, when well wooded, was comparatively healthy; but now, deprived of its woods, the low and wet soils being exposed more to the action of the sun, the exhalations from these, and from its numerous marshes and stagnant pools, are no longer confined by surrounding forest trees; and, consequently, endemic diseases of a severe character are very prevalent. Similar instances are to be found in the works of DEVÈZE, MONFALCON, and BAILLY.

8. There are various circumstances connected with the production and diffusion of exhalations given out from the soil, that require attention from the medical practitioner. Some of them are noticed at another place (See DISEASE, § 55, 56.); but it seems fully established, that dead animal matter and exuvie in situations producing these exhalations, contribute most remarkably to their noxious effects. In warm countries, or in hot seasons in temperate climates, the places which

are most productive of malaria, generally, also, abound the most in animal substances undergoing decomposition. The circumstances which render vegetation quick and luxuriant, generate immense swarms of insects and reptiles, the exuvie and dead bodies of which mingle with vegetable matter in a state of decay, and give rise to miasms, particularly during moist states of the air, much more noxious than those resulting from vegetable matter alone. I have always considered the number of insects and reptiles, with which a place abounds, as more indicative of its insalubrity, than almost any other circumstance. Malaria may be conveyed a considerable distance from its source, and be condensed in the exhaled vapour, when attracted by hills or acclivities in the vicinity, and when there are no high trees or woods to confine it, or to intercept it in its passage. Owing to this circumstance, high grounds, near exposed marshes, are often more unhealthy than the places immediately adjoining, that are on a level with them.

9. There are no circumstances that tend more to increase the sources of endemic influence, than high ranges of temperature, and calm states of the air. The effects of these vary remarkably with the quantity of humidity exhaled, and with the conditions of the air, in respect of horizontal and vertical currents, and of electricity. However productive the sources of malaria may be, and however rapid the evaporation from them, the effects will be comparatively slight, if there be a quick renewal of the atmosphere passing over their surfaces, preventing the stagnation and concentration of the effluvia emitted by them. A high temperature, particularly with exposure of the soil to the sun's rays, penetrates to the lower alluvial strata; and, if it be attended by protracted dryness, occasions wide fissures in the upper strata, through which the moisture of the lower passes in the form of vapour, which is often more noxious than the emanations from a wet or marshy situation, especially when the soil is argillaceous or absorbent. It is also indirectly owing to temperature, and the greater capacity it gives the air for moisture, that the marshes of warm, or even of temperate, climates are infinitely more unhealthy than the bogs and peat mosses of northern countries. High temperature and humidity, together with richness of soil, generate succulent plants which contain saccharine and oleaginous principles, and carbonaceous and hydrogenous elements, with a portion of azote; and which rapidly pass, either altogether or partially, through the alternate processes of growth and decay. The vegetable productions, also, of hot countries, especially those which are most abundant, possess much less of the antiseptic principles, with which those of cold climates abound, particularly tannin, creosote, the terebinthines and their associated resins, the gallates, &c., which are found largely in the plants contributing to the bogs and peat mosses of the latter. Besides, the marshy places, and the surfaces of alluvial soils, in warm countries, contain more animal matters undergoing decomposition, than in cold and temperate regions; and are subject, in alternate succession, to periodical rains and long droughts—are alternately inundated, and exposed to the direct action of the sun. Stillness of the atmosphere, by favouring the accumulation of malaria

in the lower strata, and in circumscribed limits, increases the injurious influence of this agent upon the human economy. Hence the danger of exposure to its sources during still and humid states of the air, at the close of the day, when it is condensed in the descending moisture; or at night, or approaching dawn, when it is unrefined by the solar heat, and not yet carried to the higher regions by the ascending or vertical currents of the atmosphere, and when the system is most exposed to its impression. During moist states of a warm atmosphere, also, the equilibrium of its electrical conditions is disturbed; the relative electrical states of this fluid, and of the body, is also considerably modified; and the changes produced upon the blood in the lungs, by respiration, are somewhat retarded. These effects are materially influenced by the situations and circumstances now adduced, and the respiratory functions remarkably impeded by them.

10. The good effects of a quick renewal of the air, in unhealthy places—of high winds, hurricanes, and thunderstorms—in dispersing and altogether sweeping off the exhalations from the soil, and from decayed animal and vegetable matters, must be apparent. The more violent commotions of the air are the means employed by Providence to dilute, or entirely dissipate, those noxious agents, and to prevent their pestilential accumulation in the situations which have been described. It has been observed, especially in warm climates, and in hot seasons in temperate countries, that, when the air has been long undisturbed by high winds or thunderstorms, and at the same time hot and moist, endemic diseases have assumed a very severe, and even epidemic, character. Numerous facts illustrative of this have been adduced by RUSH, WEBSTER, CHISHOLM, CLARK, DEVÈZE, BANCROFT, and others. It is generally in hot miasmatic countries, and after prolonged seasons of drought and still states of the air, that tornadoes occur in hot climates, and thunderstorms in temperate countries, purifying and refreshing all the objects exposed to them, and preventing the occurrence of these severer forms of disease which would otherwise supervene.

11. Although the localities and related conditions described above are sources of diseases, chiefly in warm climates, and in temperate regions during hot seasons, they are not entirely destitute of influence in cold countries; their ill effects being generally in proportion to the height and duration of the summer temperature, and to coincident circumstances. In northern temperate latitudes, and inland situations, the dryness of the air, especially during low ranges of the thermometer, and when the surface of the earth is sealed by an icy congelation, not only does the human frame enjoy a perfect immunity from terrestrial emanations, but it experiences an accumulation of positive electricity, and increased activity of all the functions. The changes produced by respiration are most complete; the nervous and circulating systems evince increased tone; animal heat is rapidly generated to replace that carried off by the surfaces, the body acquires the phlogistic diathesis, and diseases present the sthenic forms.

12. ii. *Effects of Endemic Influence.*—A. The exhalations from the situations now described, at the commencement, during, and after heavy rains

and moist states of the air, generally occasion agues, dysentery, scurvy, scorbutic dysentery, enlargements of the liver and spleen, cretinism, scrofula, rickets, &c.; and if the temperature be high, the various forms of remittent and continued fevers, in addition to these. The same localities during warm and dry seasons, and after protracted drought, produce bilious and malignant fevers, of a remittent and continued type, cholera, diseases of the liver, and inflammations of the alimentary canal; the intermittent and remittent fevers prevalent during the colder seasons, passing into a more continued type, and bilious or malignant form, after great or continued heat. This change in the character of the endemic with the temperature and seasons, was well illustrated by the history furnished by M. KIRCHOFF (*Journ. Complément. des Scien. Méd.* Jan. 1827.), of the diseases following the partial inundations by the sea of some parts of Holland, in the winters of 1825 and 1826. He states that the waters used for domestic purposes were brackish; and the ponds and ditches, which were usually limpid during the spring, became greenish on the surface, and offensive. At this time, agues prevailed amongst workmen exposed to the exhalations from these sources. As the summer advanced, and the waters were more completely drained off, the effluvia were more concentrated, and fevers assumed a remittent type. In the months of August and September, fever presented more of the continued character, with periodical exacerbations, particularly of the pains in the head and back, and closely resembled the endemic of low and moist situations within the tropics,—the circumstances occasioning it having been in every respect similar. In the majority of cases, the liver was affected. It has been shown by writers on the fevers endemic in Hungary, that agues are most prevalent during spring; and that remittents, continued fevers, and dysentery, become more common during summer and autumn. Indeed, endemic fevers are modified, from the more simple form of ague to the most malignant remittent or continued type, by the particular circumstances in which they originate,—as the miasms become more concentrated, or consist more of the effluvia of decayed animal substances,—by the warmth of the season and climate,—by the humidity and dryness of the air,—and by the constitution and predisposition of the patient. As these vary, so does the particular character of the disease. Intermitents present every type, and various complications; and remittents, numerous grades and forms—the bilious or gastric, the inflammatory, the bilious inflammatory, and the asthenic or malignant. Continued fevers, also, assume a mild, an inflammatory, a gastric, or an adynamic form. Not infrequently, the intermittent passes into the remittent, and this latter into the continued type; and either may be followed by dysentery. Each of these states of fever may be simple or complicated; the principal local affection being different, as well as diversified in kind, in different cases, and appearing sometimes so early as to seem the primary disease, frequently in the advanced progress of the fever, and occasionally not until its latter periods. Either of these forms of fever may commence mildly and insidiously, and yet soon pass into dangerous local derangement and disorganism.

ation: others may begin with great excitement, rapidly terminating in exhaustion and depravation of the circulating and secreted fluids; some present great depression from the beginning, the powers of life never rallying throughout, or very imperfectly, with an unnatural state of all the secretions and soft solids, and a tendency to dissolution of their cohesion, which rapidly advances, especially in warm countries, as soon as respiration ceases. In certain circumstances, particularly when great vicissitudes of temperature and weather cooperate with the strictly endemic causes, or with improper living, impure water, &c., dysentery becomes as prevalent as fever, or entirely usurps its place; or the fever assumes a dysenteric character, or passes completely into dysentery; this latter malady producing even a greater rate of mortality than fever itself. (See art. DYSENTERY.)

13. *B.* Whilst rich soils, and warm, low, moist, and marshy situations, are productive of disease affecting chiefly the circulating and secreted fluids, and the abdominal viscera, by lowering vital power, especially as manifested in the nervous systems; elevated, cool, or temperate and dry districts favour the developement of vital energy, especially as expressed in the nervous, muscular, and circulating systems, and in the thoracic viscera; and produce diseases of a phlogistic character, as sthenic inflammations of the lungs and circulating organs, of the membranes of the brain, and of the other serous and fibrous structures, hæmorrhagies, rheumatism, and fevers of an inflammatory type.—These diseases, however, although the most prevalent, can scarcely be said to be endemic in these latter localities, they being much less frequent than the maladies of the former situations. It should, however, be recollected that the respective endemic influences of districts are not so deleteriously exerted on the native inhabitants, as upon those who have lately removed to them; and that, though they may affect the constitutions of the former class, and give rise to certain diseases, in preference to others, yet those diseases are not so acute or violent in them, as in the latter. This circumstance is well illustrated by what is constantly observed in warm countries productive of terrestrial emanations. There, the native inhabitants are either scarcely affected by them, or are liable only to agues, bowel complaints, enlargements of the spleen, or slight ailments referrible to the large secreting organs, excepting on occasions of these exhalations becoming more concentrated or energetic than usual. But persons who have removed thither from healthy localities, in cold or temperate climates, sooner or later are seized by fever, generally of a remittent, or continued type, often assuming an inflammatory or malignant form, and frequently associated with violent local determinations; and it is not until after the frame has been assimilated to the climate by such attacks—usually called the seasoning fever—that agues, dysentery, and the milder forms of disease, appear in such persons. On the other hand, the inhabitants of low or miasmatic situations, who have removed to elevated and mountainous districts, are much more liable to diseases of the lungs, to rheumatism, and to inflammations of a sub-acute or chronic form, than the natives of these latter places; and if the change at the same time involves a change from

a high to a low temperature, the liability to pectoral maladies is still further increased.

14. *C.* When persons have migrated to a country abounding with the sources of endemic diseases, a period of longer or shorter duration, according to the activity and concentration of the malaria, and the predisposition of the individual, usually elapses before they are attacked by these maladies. In Rome, and other malaria districts in the south of Europe, as well as in many of those in the eastern and western hemispheres, where the exhalations are not very active, several months, or even a year or two, pass before the unacclimated are seized by fever, unless the exposure and predisposition (see *DISEASE—Predisposing Causes of*) be great. Whilst in many situations, where the emanations are more concentrated, or consist of an admixture of those given off both by vegetable and by animal matters in a state of decomposition, particularly in warm climates and seasons, the first exposure to them is often productive of the most active forms of fever, and in a very short time after the exposure occurs. This is commonly observed in respect of young unseasoned sailors and soldiers, who, coming from a pure air, in a state of high predisposition, are often subjected to these emanations in their most active states. Persons arriving in warm miasmatic districts, from temperate and healthy places, are affected with a celerity and severity generally in proportion to the fulness of their vascular systems, to the rigidity of their fibres, and to their nearness to the epoch of early manhood; but various exceptions to this occur, arising out of the habits of individuals, the susceptibility of their nervous systems, the extent of their exposures, and the states of their minds and moral emotions.

15. *D.* Although the white races of the species will live to an advanced age in warm districts productive of endemic disease, especially if they have removed thither after the constitution has been fully developed; yet their offspring will very seldom reach maturity, or survive the epoch of childhood, if they continue to reside in such situations; or, if they arrive at manhood, they will very rarely reach an advanced age. Dr. JACKSON states, that white persons, born and residing in the more unhealthy districts of Lower Georgia, seldom live to forty; and that, at Petersburg, in Virginia, they rarely reach twenty-five. He saw, at this latter place, a person who was only twenty-one; and although he had never been confined by severe sickness, yet he was weak and decrepit: so injuriously does endemic influence operate upon the constitutions of the white variety, even when it fails of inducing acute disease. BRUCE records similar instances among the white natives of the banks of the Nile, in Abyssinia; and other illustrations have been observed by myself in some parts of Africa. Children born of European parents in India require to be sent to Europe to acquire due maturity and strength; for they very seldom arrive at puberty in India. The case, however, is different when one of the parents belongs to the indigenous inhabitants; but there can be no doubt, that, were a colony of the white races conveyed to the low miasmatic localities within the tropics or in more temperate regions liable to very hot seasons, it would, in a very few generations, become extinct, if intermarriage did

not take place with the natives, or if it were not supplied from time to time from more salubrious places. Whilst a change to a more unhealthy climate is best endured by those who have arrived at full maturity, change to an equally or a more healthy climate is especially beneficial to very young persons, unless in the case of removal of individuals belonging to the dark races to a temperate country, from the hot climate in which they are indigenous.

16. *E.* Besides fevers, dysentery, and the slow blight of the constitutional powers, the localities above described induce, in the white races, diseases of the spleen, liver, and pancreas, both in unassociated forms, and as complications with fevers and dysentery. Among their less obvious effects may be enumerated scurvy, and foul ulcers of the lower extremities. The great prevalence and obstinacy of these latter in miasmatic situations have not been sufficiently attended to, although BAGLIVI had noticed the circumstance in Rome, and CLEGHORN in Minorca. Indeed, in all low places productive of malaria, injuries and sores of the legs heal with great difficulty, whilst those of the head recover rapidly. HIPPOCRATES and CELSUS seem to have been aware of this fact. They both notice the frequent association of indolent ulcers of the legs with enlargement of the spleen,—which is remarkably common among the cultivators of rice-grounds, both in the south of Europe, and in other quarters of the globe.

17. There are some situations, which do not fall within the description given above, productive of diseases almost proper to them; or which are comparatively rare elsewhere; as *cretinism*, *bronchocele*, *plica* or *matted hair*, *Guinea worm*, *tarantulum*, *pellagra*, &c. These depend in great measure on the water, in conjunction with modes of living, and various other circumstances.—(a) *Cretinism* (see this article) is endemic in the deep ill-ventilated valleys of the Alps and Pyrenees, in Carinthia and the Vallais, in the mountainous parts of Tartary and China, in some parts of the south of France, and in Salzbourg. It seems not to have been unknown in this country, two or three centuries ago, in the situations where bronchocele and rickets—very nearly allied diseases—have continued to be common.—(b) *Bronchocele* is very frequent in the situations now particularised, especially in the valleys of the Alps, where it was equally prevalent in the times of PLINY and JUVENAL; in Derbyshire; in Behar, and some other mountainous districts of northern India; in similar situations in Java (S. RAFFLES) and Sumatra; in Bambara, in the course of the Niger (M. PARK); and in Mexico, and some other parts of South America (HUMBOLDT). It is most prevalent in females after puberty; and is, in my opinion, often connected with interrupted or irregular catamenia.—(c) *Plica*, or *matted hair*, is not noticed by the ancients, and it is doubtful when it first appeared—probably some time between the thirteenth and fifteenth centuries. It is most common in Poland and Lithuania; but it is met with occasionally in Transylvania, Hungary, the southern parts of Russia and Tartary, and more rarely in Switzerland, Belgium, and Prussia: but it is not so frequent, even in Poland, as it was a century ago. It proceeds chiefly from want of cleanliness, especially in respect of the hair, and to wearing too warm

coverings on the head (KERCKHOFFS, LARRY, ALIBERT, &c.). There appears to be frequently an hereditary predisposition to it; but the cause now assigned is evidently the most influential in producing it, assisted by the use of unwholesome water (VICAT). It is most common amongst the poorest classes. According to Dr. L. KERCKHOFFS (*Med. Trans. of Coll. of Phys.* vol. vi. p. 27.), it is not infectious (see art. HAIR).—(d) *Tarantulum* (see CHOREA, § 18.) was formerly endemic in Apulia, but is now by no means so frequent (LAURENT and MERAT). This species of irregular convulsive or hysterical affection, in which the moral emotions seem more disordered than the physical powers, was imputed by Sir T. BROWNE, BOYLE, KIRCHER, BAGLIVI, MEAD, and SAUVAGES, entirely to the bite of the tarantula spider, which probably is an exciting cause, in certain states of the nervous system, although neither the only nor the chief cause. CORNELIO, SERAO, and CIRILLO, physicians in Naples, and M. NOLLET, have taken juster views of its origin; and refer it rather to the state of the nervous system in connection with the moral emotions, than to this insect. Indeed, it is extremely probable that it is often feigned, or frequently occurs, without any such accident as that to which it is so commonly imputed; for very nervous and fanciful females may persuade themselves that they are stung by this insect, in order to account for their ailments, conformably with the vulgar opinion, and may thereby induce that form of irregular chorea or hysterical affection to which the term tarantulum or tarantismus has been applied. M. MERAT (*Dict. des Sciences Méd.* t. liv. p. 345.) infers that the inhabitants of Apulia, owing to situation and climate, are liable to nervous and spasmodic affections; and that, among others, this is apt to supervene,—from their ardent and choleric dispositions, and their love of dancing and music. In Calabria and the Apennines, where chorea and convulsive affections are common, tarantulum also occurs (FERRUS).—(e) The *Guinea worm* (*Dracunculus*), the long thin worm which is sometimes found in the inhabitants of certain localities, generally under the integuments, and so named from the circumstance of its having been first accurately observed in the natives of Guinea, is now seen in other countries. It appears from PLUTARCH to have been met with in the inhabitants near the Red Sea. It occurs among the negroes in most of the low marshy situations of intertropical Africa (WELSCH, BRUCE, PARK, &c.); in the slaves, and sometimes in the whites, in the West India islands (CHISHOLM, THOMAS, &c.); in Bombay, and along a great part of that coast, as well as in some other maritime districts of India (M'GRIGOR, MILNE, H. SCOTT, GRANT, &c.); and in the islands of the Persian Gulf (KÆMPFER).—It is observed chiefly during the months of November, December, January, and February, in both the East and West Indies. M. DUBOIS found, in parts of the Carnatic and Madura, more than one half of the inhabitants of some villages affected by it. Dr. CHISHOLM (*Edin. Med. and Surg. Journ.* vol. xi. p. 145.), Dr. SMYTTAM *Trans. of Med. and Phys. Soc. of Calcutta*, vol. i. p. 179.), Dr. ANDERSON, and several others, state that it is met with chiefly in those who use wells made in argillaceous soils, impregnated with salt or percolated

by sea water. M. DUBOIS adds, that the inhabitants of villages who take water from one well are subject to this worm, whilst those at the distance of only half a mile, who resort to a different well, are not affected by it. Other writers, in addition to those named above, agree in ascribing it to brackish waters containing the ova or embryo of this worm. The circumstance of this animal having been rarely found out of the human body has induced Dr. MILNE (*Edin. Med. and Surg. Journ.* No. 106. p. 112.) to suppose that the substance taken for it has been a diseased lymphatic vessel; but the evidence of its independent existence furnished by Dr. H. SCOTT (*Med.-Chir. Rev.* vol. iv. p. 182.) and Dr. R. GRANT (*Edin. Med. and Surg. Journ.* No. 106. p. 114.) has set the matter at rest. As to the manner in which this worm becomes lodged in the sub-cutaneous cellular tissue, much doubt exists. It must either insinuate itself through the skin from without; or its ova escape the action of the alimentary juices, and pass along with the chyle into the circulation, and thence into the cellular tissue, where, having attained a certain growth, it excites the irritation preceding its expulsion. But if it pass by this latter route, how is it that it is never found in the cellular or other parts of internal organs, where it may be expected to produce dangerous, if not fatal, effects?

18. *F.* In low, moist, and cold districts, liable to frequent vicissitudes of weather and temperature, catarrhal and rheumatic affections, croup, bronchitis, scrofula, rickets, and tubercular diseases, are more or less prevalent; and in those similarly situated on the sea coast, where the inhabitants live chiefly on fish—particularly on stale or dried fish, or the grey kinds—chronic eruptions on the skin are common. In large towns and cities, where a confined and impure air cooperate with the anxieties of business, the exhaustion of mental exertion or of dissipation, the luxuries of refinement, the conflict of the passions, and the excitement of the different moral emotions, disorders of the nervous system frequently implicating the manifestations of mind, are more common than in the country, and much more so than in imperfectly civilised states of society.—My limits will admit only of a simple reference to other endemic diseases—to the prevalence of trismus and tetanus in the West Indies; of elephantiasis in these islands, and in the East, as well as in Africa; of the yaws in the negro race; of the pellagra in Lombardy and the Milanese; of the beriberi in the East Indies; of hepatic colic (see COLIC, § 20.) in Spain and the West Indies; and of ophthalmia in Egypt. Some of these may be imputed to obvious physical causes; as the ophthalmia of Egypt to the reflected heat, and the dust in the air; or pellagra and some cutaneous diseases, to dirty habits and unwholesome food: but there are others that cannot be explained without ascribing them to the cooperation of a variety of circumstances, as shown in the articles on these maladies. In illustration of the influence of occupations in producing a certain train of morbid actions in those similarly circumstanced, it may be stated, that amongst the children and young persons employed in cotton mills, more especially in Manchester, chorea, which is comparatively a rare disease, is one of the most common; scrofula, tubercles, and debility in all its states, being

likewise very prevalent; and that, in the somewhat older work-people, chronic rheumatism, in all its forms, is remarkably frequent. The protracted periods of occupation in a very hot and moist air, and generally in a standing posture; the sudden exposure to a cold atmosphere on every occasion of leaving the factory; and the want of due sleep, of exercise in the open air, and often of sufficient nourishment, independently of various moral causes; sufficiently explain the endemic prevalence of these diseases in the large manufacturing town now mentioned. (See ARTS AND EMPLOYMENTS—*as Causes of Disease.*)

19. iii. *Of the Mode of Operation of Endemic Influence on the Economy.*—The endemic causes productive of the more acute and malignant diseases were supposed by CULLEN to be direct sedatives, not merely lowering vital power, but also inducing spasm of the extreme capillaries; and that, if the vital energy of the system is not entirely overpowered by them, reaction supervenes in order to overcome this spasm, and thus fever becomes developed. Other pathologists suppose that marsh effluvium acts as a stimulant or irritant; and that the debility which it obviously occasions, is either consecutive, or a state of exhaustion. Neither of these hypotheses accounts for the whole phenomena which diseases, arising from this cause, evince throughout their course, although either explains many of their symptoms. That malaria depresses vital power, contaminates the circulating and the secreted fluids, and weakens the vital affinity or cohesion of the soft solids, is shown by its more immediate, as well as by its consecutive, effects upon the living body, and by the fact of dead animal matter running faster into putrefaction in situations where it abounds. Its septic operation on sores and wounds is often evinced during life. It has been repeatedly proved, that substances fabricated of silk, woollen, and even of cotton and flax, exposed to marsh exhalations, very rapidly undergo decay; silk and woollen becoming putrid, and cotton and linen assuming a dingy or yellow hue, and afterwards losing their cohesion. These effects are generally rapid and complete, in proportion to the moisture and warmth of the air, and the concentration of malaria in it; and so well are they known, M. MONFALCON states, that they are generally recognised by the more intelligent inhabitants of Italy and the south of France, as indications of the insalubrity of particular places and seasons.

20. iv. *Of preventing the Production of Endemic Causes, and of counteracting their Effects.*—A. *Of preventing the generation of malaria.*—(a) *Draining* marsh grounds is one of the most efficient modes of preventing the formation of malaria; but it should be recollected, that uncovered drains and ditches are fruitful sources of endemic influence.—(b) *Embankments* thrown up against inundations from rivers and the sea, are also important means of prevention; but, if they be not quite adequate to the purpose, they may aggravate the evil, by preventing the water from retiring with sufficient rapidity.—(c) In situations admitting of neither of these means being employed, then advantage will often be derived from *covering them entirely with water*; for lakes do not exhale miasmata until after the mud and soil of their bottoms and sides have appeared above the surface. SENAC states, that the outskirts of a

large town became unhealthy as soon as the mud at the bottom of some adjoining morasses was exposed to the sun and air; but that disease disappeared when they were completely inundated. Dr. ROLLO mentions, that mild intermittents prevailed in St. Lucie during the rains, when the pools and marshes were filled; and that dangerous fevers appeared after their slimy surfaces became exposed and completely dry. Mr. ANNESLEY records similar facts in relation to various places in the East Indies. The ditch round the ramparts of Geneva was once drained, and sickness prevailed in the vicinity, but disappeared when it was again filled. And the water-courses and beds of rivers that are dried up in summer, particularly in warm countries, and thereby become sources of malignant fevers, are quite innocuous when filled (FERGUSON, &c.).—(d) *Clearing the soil* from its more bulky vegetation will be beneficial only when an assiduous cultivation is adopted, without the necessity of having recourse to a very abundant irrigation. In many circumstances, however, this measure will greatly aggravate the insalubrity of a district, as shown above, especially in respect of low swampy places within the tropics, or near the sea. Facts illustrative of this, have been often observed in both the old and new worlds.—(e) Protecting the soil in which large cities are built, particularly when situate near the embouchures of rivers, &c., from the action of the sun, by a closely laid pavement; intersecting the strata of earth by large deep sewers, conveying the exuvie and other impurities beyond the reach of the inhabitants, and in such a way as to prevent the escape of emanations from them, in the midst of a dense population; and removing places of sepulture beyond the outskirts of cities and towns; are measures of the utmost importance to the health of the community.

21. It is established beyond a doubt, that the narrow winding streets of towns built in low situations, or in the vicinity of marshes, are, especially when the houses are high, actually conducive to health; inasmuch as the exhalations transported from thence, have a less ready access to all parts of them, the horizontal currents of air being more completely intercepted by the nearest buildings: also, when the streets are narrow, and the houses high, the sun cannot act upon the soil, which necessarily becomes saturated with animal exuvie, unless deeply intersected and purified by drains and sewers. The importance of this consideration was not overlooked by the ancients, as appears from the remark of TACITUS, on the rebuilding of Rome after its destruction by Nero. "Erant tamen, qui crederent, veterem illam formam salubritati magis conduxisse, quoniam angustie itinere, et altitudo tectorum non perinde solis vapore perrumperentur. At nunc patulam latitudinem, et nullâ umbrâ defensam graviore æstu ardescere." (*Ann.* l. xv. 43.)

22. B. Whilst the above measures have reference chiefly to the prevention of the formation of terrestrial exhalations, there are others that may be employed to *confine them to the sources whence they issue*, when the former means are ineffectual, or cannot be put in practice. It is very probable that many places, the insalubrity of which was recognised and guarded against by the ancients, have actually become more unhealthy in modern times, owing to the accession of alluvial

soil washed down from the higher grounds in the vicinity; to the accumulation of decayed organised matter and mineral detritus at the mouths of rivers, and in the bottoms of lakes, which have been thereby converted into marshes; to the neglect of the drainage and cultivation which a former crowded population was enabled to preserve; and to the removal of those screens of trees which confined the exhalations to the place that generated them. The importance of these considerations has been insisted on by LANCISI and BROCCHI, in respect of Italy; by MONFALCON, with reference to France; by ANNESLEY and myself, in regard to warm climates; and by M'CULLOCH, as respects this country. It was remarked by PLINY, and some others, among the ancients, that trees absorb the exhalations which prove injurious to man; and the observation is perhaps just: but whether trees simply obstruct the transit of malaria from its source, and confine it there, or actually absorb it along with the moisture in the air, and dew which rests on their leaves; or whether they act in both ways, in addition to their shading the soil from the action of the sun; the power they possess, in low and marshy situations, of moderating the generation of malaria, and confining it to its source, is indisputable. It is, therefore, important to plant trees around, and more especially to leeward of, unhealthy places (§ 5.), in order to screen persons living in their immediate vicinity from their influence. Owing to the extent to which trees, high houses and walls, and intervening water not liable to become stagnant, protect places near the sources of malaria from its effects, is to be explained the fact of the inhabitants of one side of a street, or road, often escaping ague, whilst many of those living on the other side are affected; and of the crew of one ship being seized with fever, while those of another, somewhat further removed from the shore, escape.

23. C. There are other means, besides those enumerated, *which both destroy and counteract, or otherwise remove, the causes of endemic maladies*.—(a) In the case of impure water, filtering it, especially through charcoal; boiling it before it is used, or passing it through lime; preserving it in iron tanks on board ships; and adding to it a small quantity of either of the chlorurets, when it cannot be otherwise deprived of a portion of animal matter; are very important precautions. When sewers, drains, ditches, and other confined sources of impure air cannot be removed, or covered so as to prevent the emission of effluvia, the chloruret of lime should be thrown into them from time to time. A solution of the same substance, or either of the other chlorurets, ought also to be liberally employed in the wards of crowded hospitals, whenever the air becomes close and foul, in order to prevent the prevalence of fever, dysentery, erysipelas, and gangrene; and should also be poured down the privies. Similar precautions ought also to be employed in crowded transports and ships of war, as well as in camps and besieged towns, more especially if disease appears. But this means is only subsidiary to free ventilation; and is most to be confided in when the latter cannot be established. By having recourse to these disinfectants, the sickness that sometimes arises from the leakage of sugar, or the decomposition of vegetable matter collected

in the hold or between the timbers of ships, and from the action of bilge water on chips or shavings, as recorded by Sir W. BURNETT and other able observers, and the ill effects contingent on the steeping of flax and hemp, may be entirely prevented.

24. (b) Whatever progress is made in civilisation, in the cultivation of the soil, and in the useful arts of life, tends to diminish the prevalence of endemic diseases. Improved modes of culture introduce a greater abundance of wholesome nourishment, and, together with a more extensive commerce, render subsistence much less precarious than in the ruder states of society. It is chiefly owing to these circumstances that scurvy, dysentery, and diseases of the skin, are much less common now than formerly. These, also, aided by personal and domestic cleanliness, much better clothing, and a freer ventilation of houses, hospitals, prisons, &c., have tended greatly to diminish the general amount of mortality. As respects prisons, the diminution of disease, chiefly resulting from stricter attention to cleanliness, ventilation, and diet, shown to have taken place in those of France, by M. VILLERIE, is most striking. At Lyons, from 1800 to 1806, the annual mortality in the prisons was 1 in 19; from 1806 to 1812, it was 1 in 31; from 1812 to 1819, it was 1 in 34; and from 1820 to 1826, 1 in 43. A similar amelioration has also been remarked in the prisons of Rouen, and some other large towns in that kingdom. Although other diseases may appear, there can be no doubt that those that are more strictly endemic diminish before the progress of civilisation and the increase of the comforts of life.

25. (c) The healthiness of the inhabitants depends much upon the choice of residence. This obtains, especially in warm climates, in respect of both casual and permanent residents. Where the winds blow from particular quarters, at certain seasons and hours of the day, buildings or encampments should be placed so as to be, during the night especially, to windward of the principal sources of endemic disease. Ships, also, should be anchored, as much as possible, with a regard to this precaution, or at a distance from an unhealthy coast sufficiently great to admit of the dilution of the malaria, or of its absorption by the water, before the winds conveying it reach them. When a temporary residence must be to leeward of a swamp, then some advantage may accrue from lighting fires between it and this source of disease, particularly during night, and from double tents, within which gauze or fine net curtains are kept spread. Buildings either near, or to leeward of any source of malaria, or standing on a deep, moist, or argillaceous soil, should be very high; the ground floor should be left unoccupied, and be open on every side to permit complete perfusion; and that side ought to be always shut, on which the prevailing night or land winds blow, or towards the place from which unhealthy exhalations proceed. The inhabitants should also sleep near the tops of the houses, where, if built high, they will generally be placed above the more concentrated vapour and miasms, and, in great measure, beyond their influence; for, although gentle acclivities or hills in the vicinity will often attract malaria, or be swept by currents of air conveying it, yet pre-

cipitous elevations and high houses, even near its sources, will frequently escape, as, from its specific gravity, it is confined chiefly near the surface of the earth.

26. (d) The diet of persons exposed to noxious exhalations should be easy of digestion, and nourishing, but not heating. Animal food should be taken sparingly, and spirituous liquors and strong wines laid aside. The lighter and thinner wines may be used in moderation. In hot climates or seasons, exercise in the heat of the day, or while exposed to the sun's rays, ought to be avoided; but it should be regularly taken without causing fatigue. Such medicines as will promote the secretions and excretions, particularly those of the liver and bowels, may be resorted to when these functions require aid. For this purpose, two or three grains of blue pill, with the aloes and myrrh pill, may be taken at night, and equal parts of the compound infusions of gentian and senna in the morning. When exposure to malaria, either at night, or early in the morning, is to be dreaded, a moderate dose of bark or sulphate of quinine, with camphor or some warm spice, as Cayenne pepper, may be taken previously to such exposure. A fire should be lighted in the apartment, or near it; and care be taken to exclude the raw night air, especially in the direction of the sources of miasmata. On occasions of this kind, smoking cigars will be serviceable. The tenour of the mind should also be duly regulated. The depressing passions and ideas, and all undue excitement, as being liable to be followed by depression, ought to be avoided. A calm, confident, and well-employed mind—moderately occupied, and interested with its pursuit,—unruffled by gusts of temper or passion—not weakened by inordinate indulgence of the desires—with a sufficient gratification of the wants and wishes to give a foretaste of more perfect enjoyment, and to leave still more to aspire after, so that the capacity of gratification be not exhausted,—is that state which most successfully opposes the impression of endemic influence, which, assisted by the sensual indulgences of some, the ill-regulated passions and dispositions of others, and the carelessness of many, prove so destructive to human life.

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ENTERITIS. See INTESTINES — Inflammation of.

ENURESIS. See URINE — Incontinence of.

EPHELIS. SYN.—*Ἐφελίς* (from *ἐπι*, and *ἥλιος*, the sun). *Maculæ Fusæ*, Plenck. *Epichrosis Ephelis et Lenticula*, Good. *Ephelides*,

Alibert. *Ephélide*, Fr. Spotted discolouration of the Skin.

CLASSIF.—10. Gen. 3. Order, 6. Class, (Good). 1. Gen. 8. Order, Maculæ (Bateman). I. CLASS, V. ORDER, (Author).

1. DEFIN.—Discolourations of the skin, varying from a yellowish grey to a dark brown, and from minute points to large patches, and either scattered, confluent, or corymbose.

2. I. FORMS AND HISTORY.—HIPPOCRATES applied the term ephelis to the freckles produced by the sun; but he also extended it to the spots sometimes seen in the faces of pregnant females. This extension of the term was adopted by ORIBASIIUS, AETIUS, ACTUARIUS, and GORREUS; and carried even much further by PLATER, SAUVAGES, and ALIBERT. Other words have been employed by modern writers, as a designation either for ephelis generically, or for certain of its varieties, as will be stated hereafter; but, as this appears to have been the original one, I shall adopt it here. The change of colour characterising it, is not seated in the cuticle, but in the pigmentum which gives the hue to the skin. It seems, in some instances, connected with a deficient tone of the extreme vessels; and is very variable in its progress, occasionally coming on slowly, sometimes rapidly and extensively. It is often of long duration, or even permanent; and in other cases it soon disappears, either spontaneously, or after the application of some lotion. In itself, it cannot be considered to require medical interference; but certain of its forms are important, as symptoms of internal disorder. It may be divided into two species—the *lenticular* and *diffused*.

I. LENTICULAR EPHELIS. SYN.—*Ephelis Lenticularis*; *Lentigo*, *Lenticula*, Auct. Lat.; *Ephelis Lentigo*, Sauvages and Todd; *Lentigo Ephelis*, Frank; *Pannus lenticularis*, Paget; *Ephélide lentiforme*, Alibert; *Freckles*.

3. This species is characterised by its fawn or brown colour, the spots being generally very small, and always under the size of a lentile, disseminated, or in clusters; and without any elevation of the cuticle, or attendant irritation. Dr. Todd has very properly divided it into two varieties—viz. that which is congenital or dependent upon the complexion, and consequently sometimes hereditary; and that which is caused by the sun.

4. A. Congenite Ephelis; *Φακός*, Gr.; *Tâches de Rousseur*, Fr.; *Ephelis Lentigo materna*, Todd; *Congenite Freckles*.—This variety occurs most frequently in persons of a very fair complexion, with a delicate skin, and yellowish or reddish hair; and sometimes in those with a very white skin, and dark hair and eyes. The spots are lenticular, persistent, and not confined to the parts exposed to the light; but are in some cases disseminated over the body. They frequently do not become very apparent until some time after birth, or even not until the child is five or six years old. The darkness of the discolouration varies as above (§ 1.), with the colour of the hair or eyes, and usually remains till old age.

5. B. Solar lenticular Ephelis; *Lenticulæ Solares*; *Maculæ Solares*, Plenck; *Ephelis a Sole*, Sauvages; *Lentigo astiva*, J. Frank; *Summerflecken*, *Sonnensprossen*, Ger.; *Evanescant Freckles*.—This is a common lenticular discolouration, occurring in young persons, especially females,

during spring and summer, and disappearing in winter; and limited to parts exposed to the sun. Those who live in cities, or keep much within doors, are very liable to it when exposed to the sun and fresh air. The deepness of the discolouration generally varies with the colour of the hair; and the spots are most numerous in the face, particularly of those who go bareheaded, or insufficiently shaded from the sun's rays.

ii. DIFFUSED EPHELIS.—*Ephelis Diffusa*, Todd.

6. This species is characterised by the irregular, diffused, and large patches, which vary more widely in colour than the foregoing species; and are sometimes distinct, sometimes confluent. It has been made to comprise certain discolourations, arising from various causes, and presenting very different appearances. Some of these proceed from the direct action of heat and light, and others are symptomatic of an internal affection.

7. *A. Idiopathic diffused Ephelis*—*Ephelis diffusa Idiopathica* (TODD)—presents two very distinct forms; that caused by the heat of fires, and that by the sun and air.—(a) The blotches produced by artificial heat—*Ephelis ignealis* (SAUVAGES), *Ephelis spuria* (J. P. FRANK), *Lentigo ab Igne*, (J. FRANK), *Taches de Brûlure*, Fr.—are generally seen on the legs, arms, and thighs of persons who sit near the fire, without any covering intervening between these parts and it. They are usually of a mottled character, and often assume a livid, or purple, or purplish red, colour, especially when the surface is exposed to cold. They are met with chiefly in females.—(b) *Sunburn*, or the diffused and general discolouration—*Nigredo a Sole* (SENNERT), *Fuscedo Cutis* (PLENCK), *Ephelis umbrosa* (J. FRANK)—is merely the dark colour acquired by the skin after the protracted action of a high range of solar heat and atmospheric temperature, aided by the influence of the air, more especially sea air, and salt water.

8. *B. Symptomatic diffused Ephelis*, *Hepaticizon*, *Maculae Hepaticae* (SENNERT), *Vitiligo Hepatica* (SAUVAGES), *Kelis fulvescens* (SWEDIAUR), *Chloasma* (the FRANKS), *Ephelis diffusa Symptomatica* (TODD), *Pannus Hepaticus* (PAGET), *Ephélides Hépatiques* (ALIBERT), *Taches Hépatiques* (Fr.), *Leberflecken* (Germ.). This form of discolouration varies much in shade, and in the size of the patches. It is usually of a pale dirty yellow, or of a yellowish brown, or a light tawny shade; or it passes from a saffron to a rhubarb hue. The patches are occasionally preceded by itching, are sometimes very slightly elevated, and then terminate in desquamation of the cuticle. They appear most frequently on the neck, over the regions of the liver and kidneys, on the groins, on the forehead, and sometimes about the mouth; and are generally distinct; but they usually run into each other as they extend, and often form groups or wide blotches. When slightly elevated, and followed by desquamation of the cuticle, they nearly approach the *Pityriasis versicolor* of BATEMAN; and in this state are very dry and unperspirable, while the surrounding skin is soft and moist. They are either persistent, or of short duration. The transient form of this discolouration is very common in delicate females, particularly those whose uterine functions are disordered, and at the period of the catamenia. They occasionally appear suddenly, and disappear as speedily after a few hours; but they often

remain a very considerable time, especially when they are connected with suppression of the menses (the *Chloasma Amenorrhæum* of J. FRANK), or with conception (the *Ephelis Gravidarum* of PLENCK, and the *Chloasma Gravidarum* of FRANK).—This form of ephelis is also sometimes connected with chronic disorders of the liver; but more frequently with those of the stomach and large bowels, and with those of the uterine organs. It is occasionally attendant upon hæmorrhoids; and is very readily excited in those liable to it, by vexation and anxiety of mind. It is also very generally connected with a state of the digestive organs, characterised by a craving appetite, and imperfect digestion and assimilation.

9. II. TREATMENT.—The *Lenticular Ephelis* is frequently a matter of serious consideration to the fair sex; and ingenuity has been often tortured for means of removing it.—(a) In respect of the *congenite variety* (§ 4.), the remark of CELSUS, as to the folly of those who attempt to remove it, is perfectly just.—(b) That variety, which is caused by the summer heat—the *solar lenticular ephelis* (§ 5.)—may be prevented by the use of veils and wide-brimmed hats; which will frequently assist its removal, when already produced. The articles—nostrums, cosmetics, &c.—which have been recommended for it, are beyond the possibility of enumeration; every perfumer, &c. being possessed of a panacea. Gently astringent and discutient lotions and poultices have been most commonly employed. From the time of HIPPOCRATES to the present, lotions and liniments with bitter almonds have been recommended. CELSUS advised a liniment of resin with a little fossil salt and honey; ACTUARIUS, one with vinegar, honey, and bitter almonds; and GEOFFREY, ox-gall, either alone, or with liquor potassæ. Dr. THOMSON mentions a weak solution of corrosive sublimate in the emulsion of bitter almonds; and Dr. BATEMAN, a drachm of either sulphuric or muriatic acid, in half a pint of water, in the form of lotion. Dr. J. FRANK prescribes the chloric acid in rose water (M) xij.—xx. to 3 vj.; and Dr. WITHERING, an infusion of horseradish in milk. Sour buttermilk is frequently employed in country places as a cosmetic wash. Besides these, a decoction of powdered lupines, or tares, or of the narcissus root, or of the seeds of the garden cucumber; also poultices prepared from these, and from a great variety of roots; have been recommended. The balsam of Mecca, with superacetate of lead, in the form of pomatum; washes with the juice of sorrel, or with lime-juice and camphor mixture; also this last, with nitrate of potash, or with milk of sulphur, or with Venetian soap dissolved in lemon-juice; rubbing the parts with a slice of lemon or sour apple; solutions of zinc sulphas, in emollient vehicles; and of the sub-borate of soda in rose water or orange-flower water (F. 334.); have also been employed, and frequently with success. Most of these are best applied at night, and washed off in the morning.

10. ii. The *Diffused Ephelis*, when proceeding directly from artificial or solar heat (§ 7.), disappears gradually upon the removal of the cause; and requires no further consideration. The *symptomatic states* are important only as symptoms of internal disorder; and, as being generally

connected with imperfect secretion, excretion, and assimilation, these functions should be assisted by mild, cooling, and alterative purgatives, light diet, and moderate exercise. Very small and frequent doses of blue pill or hydrarg. cum creta may be given with Castile soap and taraxacum, or with the aloes and myrrh pill, if the catamenia are scanty; or with ox-gall, in addition. The internal use of the *kræosote* may also be tried. I have prescribed it, in one case of this kind, with great benefit. Sulphurous mineral waters may also be taken; and lotions with the sulphuret of potash, or with nitre and camphor julap; or sulphuretted fumigating baths resorted to.

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EPIDEMICS.—*Epidemic Diseases*; *Επιδημία*, *Ἐπίδημος*, *Ἐπιδήμιος* (from *ἐπὶ* among, and *δῆμος*, people). *Epidemia*, *Epidemius*, *Epidemicus*, *Morbi Epidemici*, *Morbi Publici*, *Morbi Populares*, Auct. Lat. *Epidémie*, Fr. *Volkskrankheit*, Germ. *Epidemia*, Ital. *Epidemy*, *Epidemic Influence*, *Epidemic Constitutions*.

CLASSIF.—GENERAL PATHOLOGY.

1. EPIDEMICS are such diseases as occasionally prevail more or less generally in a community, at the same time or season, and depend upon a common cause.—They recur at uncertain periods; and continue to prevail for a time varying from two, three, or four months, to as many years, or even longer. When their spread is most extensive, or throughout countries differently circumstanced as to climate, &c., or when they are universal in their attack, they have often received the appellation of *Pandemic* (*πανδημιος* or *πάν δῆμος*, from *πᾶς*, all, and *δῆμος*, people). When, together with their very general prevalence, they occasion a very great mortality, they have usually been denominated *pestilential* (see art. PESTILENCE). They are commonly acute and febrile, and often rapidly run their course. They appear at any season of the year; but most frequently in autumn, summer, and spring. They are distinguished from endemic maladies by the circumstance of these latter being occasioned by peculiarity of situation. But it should be recollected, that endemic diseases may be converted into epidemics of a very fatal kind, by those influences, either obvious or inferred, to which attention will be directed in this article; and which, acting either separately or in combination, modify the character, whilst they cause the prevalence, of disease.

2. I. CAUSES, &c.—The Influences, whence epidemics proceed, may be traced in many instances; and in others, particularly those that are pestilential, they cannot be inferred with the same

degree of probability. Certain epidemics have manifestly arisen out of combinations of circumstances, the nature and operation of which admit not of dispute, whilst some have presented only certain elements of their causation, others being wanting to explain fully all the phenomena observed.—4. Amongst the most important elements of epidemic influences, are those endemic sources which are amply described in the articles CLIMATE (§ 3—32.); DISEASE—Causation of; and ENDEMIC INFLUENCE (§ 5.). These sources often perform very important parts in the causation of epidemics, upon the addition of some other cause, either manifest or concealed; epidemics being sometimes the parent stock upon which epidemics are engrafted: the latter varying in character with the nature of the superadded cause, or causes, especially those which are about to be noticed. Several of these additional causes may consist merely of certain changes from the usual course of the seasons, which obtain in these localities; as prolonged drought, or protracted rains; and still more, the former following the latter; and particularly if conjoined with increased temperature. As long as the temperature continues low, very material changes in the state of the seasons may not be productive of any increase of disease in unhealthy situations, unless other causes come into operation, as infection, deficient or unwholesome food, &c. HUFELAND states that, in 1815 and 1816, in the north of Germany, the seasons were remarkably wet, and the temperature low, and yet the public health was very good; that intermittents and low fevers were rare, even in marshy localities; inflammations and rheumatism being the predominating maladies. In warm countries, however, protracted and heavy rains generally occasion epidemic disease, especially in low and marshy places, during the subsequent hot or dry season, or when great numbers of persons are crowded in a small space; and, moreover, impart to it an asthenic and infectious character. Of diseases originating in local sources, becoming infectious and epidemic, I could adduce several instances in modern times. LIVY (l. xxv. 26.) states, that, during the siege of Syracuse by Marcellus, 213 years B. C., a pestilence broke out in both armies; and that it occurred in autumn, and in a situation naturally unhealthy. "At first," he observes, "persons sickened and died, owing to the unwholesomeness of the place; afterwards the disease spread by infection, so that those who were seized were neglected, or abandoned, and died; or their attendants contracted the disease." He further adds, that the dead affected the sick, and the sick those in health, with terror and pestiferous stench; that the disease was more fatal to the Carthaginians than to the Romans, who, in this long siege, had become accustomed to the air and water; and that, in the same year, an epidemic visited Rome and the adjoining country, which was remarkable rather for passing into chronic affections, than for the mortality it occasioned. Although some of the sources of endemic disease may, by the aid of concurrent causes, as in the instance now quoted, give rise to epidemics, yet pestilential epidemics otherwise originating, as in infection, have sometimes spared places which have seemed to abound the most in certain causes of insalubrity; but this has occurred only when

those places have emitted a powerful stench, and ammoniacal vapours, or other strong odours, which have either counteracted, or neutralised, the exhalations or miasms which have spread the infection.

3. *B. The seasons* have a very remarkable influence upon certain epidemics, as those of yellow fever and plague; and but little on others, as pestilential cholera, influenza, &c. As respects those epidemics which are less universal and fatal, the influence of the seasons is more or less manifest. — In *spring*, various forms of angina, croup, bronchial affections, inflammations of the lungs and pleura, catarrhs, rheumatism, hooping cough, tertian or quotidian agues, and the febrile exanthemata, as measles, &c., are usually most prevalent. — In *summer*, certain of the above diseases will often remain, with continued fevers of various forms, erysipelas, smallpox, stomach and bowel complaints, &c. — In *autumn*, the diseases of summer either continue, or become more prevalent, especially cholera, dysentery, and colicky affections; and quartan or irregular agues, remittents, sore throat, scarlatina, inflammations, or obstructions of the abdominal viscera, &c. are also frequent. — In *winter*, inflammations of the thoracic and respiratory organs, rheumatism, and low or typhoid fevers, are most common; and in close or crowded places, infectious effluvia, either from the sick or from accumulated filth, are readily generated, when the air in heated apartments becomes stagnant. HIPPOCRATES had remarked that, when the seasons are regular, diseases are also more regular in their course; and, unless during the prevalence of epidemics, the observation appears just.

4. *C. The weather* has a considerable influence on the prevalence of the more common diseases. Protracted droughts are unfavourable to pulmonary diseases, with the exception of bronchorrhœa, and frequently excite inflammations and inflammatory fevers. During, and soon after, very wet seasons, gastric, remittent and intermittent fevers, catarrhal and rheumatic affections, dysentery, diarrhœa, and sore throat, are often epidemic. The frequent recurrence, or the continuance, of high and cold winds, occasion catarrhal, pectoral, inflammatory, and rheumatic diseases; and warm or hot winds induce remittent and bilious fevers, cholera, ophthalmia, &c. Calm humid states of the air promote the spread of continued fevers, and all infectious and contagious maladies; and similar conditions of the atmosphere, conjoined with great heat, favour the prevalence of adynamic and malignant fevers of a continued or remittent type; whilst very hot and dry seasons give rise to synochal and ardent fevers, to bilious remittents, cholera, and inflammations of the liver, stomach and bowels.

5. Although the states of the atmosphere here enumerated, very frequently produce the effects ascribed to them respectively, yet other causes aid their operation. Writers, from HIPPOCRATES downwards, have attributed too much to irregularities and sudden vicissitudes of season in the production of epidemics, more especially of those which are very general or pestilential. I believe that this cause is instrumental chiefly in augmenting the number of cases of the diseases common to a country; and that it is very seldom the only, or even the chief, source of wide-spreading or pestilential maladies, although it may aid their gene-

ration and diffusion. On this point I cannot agree with Dr. HANCOCK, M. FODÉRÉ, and some other modern authors. That this dictum of Hippocrates was not altogether believed, even in ancient times, may be inferred from the frequent exceptions to it adduced by historians and medical writers. TACITUS (*Annalium*, l. xvi. 13.), when noticing the epidemic that raged at Rome in the year 68, states, that there was no irregularity of season, or weather, to account for it. The plague that prevailed so long, and spread so generally, between the middle and end of the sixth century, and which has been fully described by PROCOPIUS and EVAGRIUS, who were witnesses of it, was in no way dependent upon irregularity of season, but was evidently propagated by infection. The following remarks of EVAGRIUS are, according to the experience of every candid observer, perfectly characteristic of an infectious pestilential epidemic: — "Some perished by once entering into, or remaining in, the infected houses; some, by touching the sick. Some contracted the disease in open market: others, who fled from infected places, remained safe; while they communicated the disease to others, who died. Many who remained with the sick, and freely handled the dead bodies, did not contract the disease." (*Eccles. Hist.* l. iv. cap. 29.) The pestilence called the Black Death, which visited nearly all the then known world in 1347, 1348, 1349, and 1350, was equally independent of irregularity of season, or deficiency of food. PARKER (*Antiq. Brit.* p. 360.) states, that it first appeared in the south of England, about Christmas, 1348, and amidst the greatest abundance of provisions. THUANUS and RIVERIUS, when noticing the epidemic that broke out in France in 1580, remarked, that the crops that year were plentiful, and the sky serene; so that it was thought that the disease was produced rather by the influence of the stars than by the malignity of a corrupt air. WEBSTER (*On Epidemic Diseases*, vol. i. p. 323.) admits, that the summer in 1665, in England, when the plague commenced in London, was very temperate, the weather fine, and the fruits good. All the writers of the day agree that no cause of pestilence could be observed in the states of the seasons. The epidemics of our own days also prove that, although irregularities of seasons and weather, particularly in the endemic sources of disease, may aid in the diffusion of pestilential maladies, or give rise to increased prevalence of the common diseases, they are by no means amongst the chief causes of the former.

6. *D. In connection with, and often resulting from, irregularity and inclemency of seasons, unwholesome and deficient food* sometimes performs an important part in the production of epidemics, — a fact which seems to have been well known and guarded against by the inspired lawgiver, MOSES. In *Deuteronomy* (ch. xxviii.), the Israelites are warned against transgressing his laws; and are threatened, as a consequence of disobedience, with the diseases of Egypt — the botch, the scab, and the emerods; maladies known at present, by the names of elephantiasis, leprosy, and plague, respectively, to prevail in that country; and in *Numbers* (ch. xi.), they are stated to have been seized by pestilence from eating a great quantity of the flesh of quails, which had fallen in surprising numbers around their camp, after having been

long destitute of animal food,—a consequence of the circumstances in which they were placed, and of the unwholesome nature of their food. FODÉRÉ states that, during 1815, 1816, and 1817, in several parts of Italy and France, the inhabitants were obliged to have recourse to such roots and herbs as they could procure, the grain having been remarkably scarce and of bad quality; and that, in consequence, scurvy, diseases of the skin, and malignant and infectious fevers, became very prevalent among the lower classes. A similar circumstance was observed at Marseilles in 1812 and 1813; and in Ireland, on several occasions since the commencement of the present century; typhoid and low fevers, and dysentery, being the most prevalent results. Diseased or unripe grain, or alterations which it may have undergone in granaries, and the admixture of seeds which are injurious with it, are also very influential agents of disease. In years of scarcity, both grain and roots are often prepared for food before they have acquired due maturity; and in that state derange not merely the alimentary canal, but also the nervous and circulating systems, at a period when want and debility have rendered them more than usually susceptible of disorder. Malignant fevers, dysentery, convulsive affections, scurvy, ergotism, raphania, &c. have, in numerous instances, proceeded chiefly from diseased or altered grain. M. FODÉRÉ mentions, in addition to the more specific effects of ergoted rye (see *ERGOTISM*), its causing abortions to become epidemic.

7. (b) Flesh of animals, and fish, when diseased, or tainted, are not infrequently productive of most dangerous maladies. Epidemics often commence among the lower animals; especially horned cattle and sheep; and the use of the diseased flesh may occasion malignant diseases among the human species. Whether or not infection may be conveyed from these animals whilst alive, to man, during epizooties, has not been ascertained, nor, indeed, has the question been fully entertained. That it can be thus conveyed in respect of some maladies, has been proved in modern times. FODÉRÉ adduces a very convincing proof of the ill effects of diseased flesh in the production of dysentery and typhoid or adynamic fevers. At a period when the French troops, in the late war, were in want of provisions, over-driven cattle, some of them diseased chiefly from this circumstance, were killed before time was allowed them to recover their fatigue. Their flesh was remarkably red, and passed quickly into decomposition. Most of those who partook of it were seized with febrile and malignant dysentery. During the French war in Prussia, Germany, and Italy, the sound meat and grain were often carried off by the victorious armies, leaving the unhealthy animals, &c. to the inhabitants, who became, from the nature of their food, the prey of epidemic fever and dysentery. The blood and viscera of these animals are generally most noxious, from being especially affected; and it is fully established that these parts become principally diseased in the persons who are seized by these maladies from this cause. The muscular flesh of cattle attacked by an epizooty much sooner presents appearances of alteration after death, than that belonging to such as are healthy. It cannot, there-

fore, fail of being productive of disease in those who partake of it, notwithstanding the effect of cookery in counteracting its noxious tendency.

8. (c) The agency of unripe, stale, or otherwise unwholesome fruit, and of stale and diseased fish of any kind, in the production of certain epidemics, is fully shown in the article *DISEASE* (§ 46.), and in the sequel.—(d) The operation of unwholesome water, although especially manifested in the causation of endemic distempers, is also productive of those that are epidemic, particularly on occasions of inundation of the sea; as observed on several occasions in Holland, Italy, and many places within the tropics.—(e) M. FODÉRÉ states, that during a tour lately made in the Low Countries and French Flanders, he learnt that functional and organic affections of the stomach were sometimes epidemic there, from the use of spiced spirits and cordials, and the practice of adding lime and alkaline substances to the beer to prevent it from becoming acid. The well-known exclamation which SHAKESPEARE puts in the mouth of FALSTAFF would lead to the inference that lime was very generally used, in the sixteenth century, to remove or prevent acidity in the white wines then drunk. This, however, is a cause rather of endemic than of epidemic diseases. The ill effects of adding deleterious narcotics to beer—even to the small-beer—in this country, although satisfactorily shown in the production of a great variety of disorders, chiefly of the digestive organs and nervous systems, seldom manifest themselves in a form so specific as to be recognised as epidemic or even endemic.

9. *E. a.* Several writers on the epidemic appearance of certain diseases, finding that neither of the foregoing description of causes could account for them, have had recourse to various supposititious agents, of the nature of which they are entirely ignorant, and even the existence of which they have not been able to demonstrate. These agents have been supposed by some to be a malaria or principle of a peculiar kind, generated by the prolonged action of the sun, or by heat, upon low absorbent soils, and exerting a very noxious operation on the human constitution; and by others, to be a peculiar aura, or fluid, which has escaped from more deep-seated parts of the earth; and, although altogether incognizable to the senses, yet most destructive to human life. The former opinion is maintained by many, especially by JACKSON, FERGUSON, DEVÈZE, O'HALLORAN, DICKSON, ROBERTSON, &c.; the latter, also, by a numerous body of physicians. NOAH WEBSTER endeavoured by most laborious research to connect the appearance of epidemics with volcanoes, earthquakes, and comets,—supposing that they all depend upon the same cause, or that the changes produced by the latter give rise to the former, either directly by their action on the human frame, or indirectly by blighting the productions of the earth, and thereby deteriorating the chief articles of food. In struggling through a dry and meagre enumeration of epidemics—slight as well as pestilential—furnished by this writer, the reader is often amused by the attempts to connect an influenza, or some other epidemic, in Europe, with an earthquake in America or in Asia, or with a comet that had appeared two or three years either previously or subsequently, or with some such phenomenon, as the fall of meteoric stones.

10. *b.* Other authors have ascribed an unusual prevalence of disease, or the appearance of pestilential epidemics, chiefly to the states of electricity in the air, and on the earth's surface. That certain conditions of this agent should affect the animal economy, and either predispose it to be infected by the exciting causes, or of itself be a principal cause, of disease, is probable; but we have no direct proof of any connection between epidemics and known changes in the electrical states, either of the air, or of objects on the earth's surface; and even granting that such connection exists, there is no evidence that this agent can produce the morbid effects ascribed to it. It is impossible to reconcile the modes in which epidemics are observed to diffuse themselves, or the peculiar and novel characters they often assume, or the very opposite physical circumstances in which they occur, merely with changes in the electric fluids, often of inappreciable and insensible kinds. Indeed, experience rather shows that the body may be made the medium of a very energetic electrical, or electro-motive, action, without any injury being inflicted on it; and it is only when a very powerful and very manifest current of either the negative or positive electricities strikes, or passes through it, that life is thereby in any way affected.

11. *c.* Numerous instances have occurred of the lower animals participating in the fatal effects of an epidemic constitution, and they have been adduced by modern authors as proofs of the existence of a noxious effluvium in the air, however it may have been generated. Thus it has been observed, that epizooties have preceded the prevalence of fevers; that catarrhal affections in horses have been followed by influenza; that birds have either forsaken the vicinity of a town ravaged by a pestilence, or have fallen dead when flying over it; and that numerous species of animals, particularly domestic animals, have died in houses visited by pestilential maladies. These phenomena have been adduced as proofs of the existence of some one of the agencies placed under this head. Without disputing their actual occurrence, or attempting to reduce them to their exact dimensions, from which they had been exaggerated for the purposes of argument, I will receive them as they have been described by those who have adduced them in support of their views. —1st. As respects epizooties in connection with epidemic fevers, LANCISI, RAMAZZINI, and still more modern writers, have furnished much information. It has very frequently been observed, when the prevailing fevers have been an exaggerated form of the endemic of the country, or when endemic sources have been manifestly concerned in their causation, that the lower animals, especially horned cattle and sheep, which derive their sustenance chiefly in places productive of malaria, are the first to experience its effects, when it is more than usually active or concentrated. This is nothing more than what might be inferred *a priori*. We know that remittent and continued fevers, in various forms, are frequently epidemic, especially in marshy countries in the south of Europe; are chiefly dependent upon local sources, aided by heat, crowding, imperfect ventilation, neglect of cleanliness, and the state of society; and are often either preceded or accompanied by epizooties.

Such occurrences are as old as the records of history extend; and have been adverted to in the Books of MOSES, as well as in those of the PROPHETS. HOMER has signalled the connection, and EUSTATHIUS and SPONDANUS have explained it, in their commentaries on the Iliad, as satisfactorily as any philosopher of the present day. EUSTATHIUS, the celebrated critic of the twelfth century, ascribes the disease that broke out in the Grecian camp, in the tenth year of the siege of Troy, to immoderate heat and gross exhalations; and DE SPONDE, or SPONDANUS, as he is commonly called, conceived the circumstance of the mules and dogs having been affected before man, to have been owing to their natural quickness of smell, rendering the exhalations sooner perceivable and operative; and to their feeding on the earth with prone heads, whereby effluvia are more readily inhaled, and before they rise so as to affect man, or become diffused in the air.

12. A connection similar to the above, and evidently proceeding from the same sources, especially in warm or dry seasons, consequent upon the inundations of low grounds or marshes, is mentioned in various places by LIVY. That the epidemics, which were thus consequent upon or attended by epizooties, were of the nature I have contended for, may be inferred from the following notice he has recorded of an epidemic fever which was remarkably destructive in the year of Rome 576:—"Pestilentia, quæ priore anno in boves ingruerat, eo verterat in hominum morbos. Qui inciderant hand facile septimum diem superabant; qui superaverant longinquo, maxime quartanæ implicabantur morbo. Servitia maxime moriebantur; eorum strages per omnes vias insepultorum erat. Ne liberorum quidem funeribus Libitina subiciebat. Cadavera intacta a canibus ac vulturibus, tabes absumebat; satisque constabat nec illo, nec priore anno, in tanta strage boùm, hominumque, vulturium usquam visum." (L. xli. 21.) Here the commencement of the disease amongst the cattle, its subsidence into the intermittent type, its greater prevalence in the lowest classes, and the absence of birds of prey from the infected atmosphere, are proofs—1st, of its having originated in malaria, and possessed the characters distinguishing this class of fevers; and, 2d, of the effect of the contaminated air and diseased bodies on animals of prey. The destructive epidemic that ravaged Rome in the year A. D. 187, and many parts of Italy, was attended, rather than preceded, by a disease in cattle. HERODIAN (L. i.) ascribes it to the great concourse of people assembled from all parts of the earth, and to an unfruitful year, and consequent famine,—causes most likely to generate infection, particularly when aided by others which are seldom absent under such circumstances. Although this connection of epizooties and epidemics may be explained as was attempted by EUSTATHIUS and SPONDANUS, yet it is not improbable, that cattle confined together in a state of disease will generate an effluvium, remarkably injurious to man; that the use of the flesh of diseased animals, as may be inferred to have been the case in the epidemic last noticed, will have a similar effect; and that, when aided by other noxious agents, both these causes will occasion an infectious malady, which will spread with great rapidity and mortality under the circumstances

in which these epidemics were observed. The facts already adduced (§ 7.), support this inference; the following further tend to confirm it:—LIVY, DIONYSIUS of Halicarnassus, and OROSIUS mention a destructive pestilence which Rome and its territory experienced 464 years B. C. It seems to have occurred in autumn, and to have arisen from the crowds of countrymen and herds of cattle received within the walls of the city. "Ea colluvio," LIVY remarks, "mixtorum omnis generis animantium, et odore insolito urbanos, et agrestem, confertum in arcta tecta, æstu ac vigiliis angebat, ministeriaque in vicem ac contagio ipsa vulgabant morbos" (L. iii. 6.) The circumstance here so very explicitly stated, the vicinity of the Pontine marshes, and the state of the surrounding country admitting of inundations from any unusual rise of the Tyber, fully explain the occurrence of this epidemic. About ten years afterwards, another epidemic ravaged Rome, and was connected with famine and disease among cattle. In the year of this city 325, or twenty-five years subsequently, a remarkable drought and famine visited the Roman territory, the springs of water even having been dried up. LIVY states, that "multitudes of cattle thronged round the arid fountains, and perished with thirst. Diseases followed, first invading cattle, and infecting the rustics and the lower classes of people, and then extending to the city." (L. iv. 30.) DR. HODGES states, that the plague of London in 1665 was preceded by sickness among cattle, and that bad meat was consequently sold to the poor so cheap that they fed upon it to excess,—a circumstance that could not fail of predisposing them to be affected by its principal causes.—During the epidemic of New Orleans in 1819, cattle, sheep, and horses were affected, evidently owing to the concentrated malaria concerned in causing the disease.

13. 2d. It has been supposed that the death or absence of birds during an epidemic is evidence of the dependence of such epidemic upon terrestrial exhalations. But it should first be ascertained at what period this phenomenon occurs; for if it precede the disease in the human species, then it may be inferred that these exhalations are concerned more or less in causing that disease. But if it take place during the course of the epidemic, then it may arise from the infection of the atmosphere by the exhalations from the sick; the feathered creation, owing to the extent of their respiratory organs, and to their relatively large consumption of air, being very susceptible to changes in this fluid. I believe that the phenomenon in question has occurred only during *pestilential* epidemics, where the sickness and mortality have been very great; and that it has proceeded from this latter cause. This is proved by the circumstances in which it has been observed. THUCYDIDES states, that, during the plague of Athens, birds that prey on human flesh entirely disappeared. Analogous facts were noticed by DIEMERBROECK during the plague of Nimeguen; by Sir J. FELLOWES, during the epidemic of Cadiz; and at Dantzic in 1709, according to SHORT. It has likewise been remarked that domestic animals have died, during these epidemics, similarly affected to man. In these cases, the infection has manifestly extended from the latter

to the former; the air having been contaminated by the effluvia exhaled from the sick.*

14. F. The *putrefaction of animal substances* has been supposed by many to occasion disease in those who come within the sphere of the exhalations thus produced, and even to generate a malady which has become infectious, and has, partly thereby, and partly from other concurring causes, prevailed to an epidemic, or even pestilential, extent. It is not, however, merely dead animal bodies, or considerable collections of putrid matter, but also heaps of filth exposed in the streets, or animal excretions and exuviae, subjected to a warm and stagnant air, and neglect of domestic and personal cleanliness, that are thus injurious. These latter may be less energetic agents than the foregoing; but they more frequently exist, and are more common concurrent causes. The injurious effects, however, of putrefying animal substances have been denied by Dr. BANCROFT and others, by a species of argumentation more specious than solid—by a kind of medical special pleading, of which we have had more, since the commencement of this century, than is consistent either with facts or with the advanced state of general science. Animal substances in a state of decay will produce effects, varying with the temperature and humidity of the air, with the concentration of the exhalations proceeding therefrom, and with the state of individuals, or of the community, exposed to them. A candid appreciation of the facts which have occurred to most experienced observers, in connection with those recorded by creditable writers, will, I believe, warrant the following inferences;—1st. That in low ranges of temperature, the emanations from putrid animal substances will seldom be productive of marked effects, unless they accumulate or become concentrated in a stagnant atmosphere—unless they be assisted by

* The above occurrences were common in the pestilential epidemics that have visited the south of Spain since the commencement of the present century. The following illustrative facts have been observed by myself:—Some years ago, malignant puerperal fever, proceeding from a contaminated state of the air in the wards of a then crowded and ill-ventilated lying-in-hospital, had attacked nearly all the patients. The cat kept in the house died at that time, soon after having had kittens, with all the characteristic symptoms of that malady. During the prevalence of cholera in London, in 1832, a parrot, in the apartment of a person who had this disease, died with all the symptoms of it. Due precautions having been used to prevent its extension to the rest of the family, no one else was affected by it. Some other birds, in different parts of the house, escaped. That a very sensible effluvia is given off from the sick, and long adheres to the clothes of the attendants, is proved by the following occurrence:—During the summer of 1833, I was called by Mr. FAXON, to a patient violently attacked by pestilential cholera, at a considerable distance from my house. I took occasion, directly after one of my visits to this patient, to call upon two relatives of my own, residing about a mile and a half from the house of the patient; and, although I walked that distance, they both, upon entering the room, enquired respecting the peculiarly unpleasant odour I had brought in my clothes. I professed perfect ignorance of its existence, and of any cause for it. They had no idea, nor do they even now know, that I had been visiting a person in cholera. They were both seized with this disease on the following day, but recovered. No one else in the house was affected by it; and no other cases occurred in the vicinity, or within a mile of them in every direction, for long afterwards. This fact will, of itself, explain several important circumstances connected with the spread of infectious epidemics, and show the difficulty of accounting for the source or manner of infection; although infection, either direct or mediate, has, as in these cases, undoubtedly taken place.

imperfect ventilation;—2d. That the combination of these exhalations with those emitted by decayed vegetable matter, and by deep absorbent soils, gives rise to effects of greater severity than those occasioned by either operating separately; and that the intensity of these effects will depend upon the temperature, humidity, and stillness of the air, and other concurrent circumstances;—3d. That emanations from dead animal matter, in the various states in which it is met with, are capable of causing, even of themselves, serious effects, as shown in the article *DYSENTERY* (§ 23.); and that, when aided by high ranges of temperature and humidity, they are often productive of extensive disease, which usually assumes, especially in a crowded population, and calm atmosphere, infectious properties;—4th. That even when they have not been the chief element or cause of the epidemic constitution, they have been, not unfrequently, concurring agents.

15. It is recorded in the *Magdeburgh History*, that, in the year 394 or 395, swarms of locusts covered Judea; and were driven by the wind into the sea, and washed on the shore of Palestine: they filled the air with fœtid effluvia, which occasioned pestilence among men and cattle. In this case, the high temperature of the country, very probably famine—the frequent consequence of swarms of these insects—and other causes, concurred in the production of this epidemic. It is likewise stated in the same history, that swarms of locusts covered a great part of France in 874, and were driven by the winds into the British Channel; and, having been washed on shore, caused such a stench and sickness, aided by a famine, as to destroy about a third of the inhabitants of the French coast. I have stated that the *dysenteries* (see that article), which have been very generally epidemic immediately after very destructive pestilences, have been occasioned chiefly by the exhalations proceeding from the immense number of dead bodies, and by the presence of animal matter in the water. It is more, even, than probable, that pestilences are perpetuated in large cities from this circumstance; and that the prolonged epidemics, of which Rome, in her rise, in her acmé, and in her decay, was so frequently the seat, were partly owing to this cause, which neither burning nor burying the dead bodies could prevent. During the very prolonged pestilence that ravaged Rome in 262 and 263, the air is described by EUSEBIUS to have been so corrupt, as to form on the surface of objects a mould or tabid dew, such as proceeds from putrid bodies:—"Ros quidam tabidus e cadaveribus putridis;"—or, as CEDRENIUS expresses it, "Ros saniei mortuorum similis apparbat."

16. *G. Infection and contagion* are amongst the most important agents in the spread of certain epidemics; but great misapprehension has existed, as to the extent of their influence, the exact parts they perform, and their mutual connection. Many writers have erred remarkably in viewing epidemic diseases as being necessarily infectious, and even contagious; and others, in considering them entirely devoid of infectious and contagious properties. The importance of determining in how far they possess either property, and are diffused in consequence; and the great interest of

the subject, in medical, commercial, and political points of view; have given occasion to much and to warm discussion—a great part of which has not been calculated to advance the cause of science, or to elevate the medical character in public estimation. The subject of contagion, in all its relations, is fully discussed in the article *INFECTION*. I can, therefore, only allude briefly to a few of its connections with epidemic maladies.

17. 1st. A foul air may be generated by the crowding of many into a small space, even in health, but more especially in a state of disease, as in hospitals, &c.; or by the presence of only a very few in the same apartment, if their ailments be attended by copious discharges, as in puerperal and dysenteric cases, &c.; and this air may infect those who breathe it in a state of predisposition, with fever, dysentery, &c.; persons thus infected, communicating the disease to others similarly predisposed, and under the circumstances about to be stated (§ 18. 2d.). Thus I have seen puerperal fever generated in the wards of a lying-in-hospital, from the air having become vitiated by the discharges; and nearly all the females, who have been exposed to the action of the contaminated air soon after delivery, affected by it; the disease being, moreover, conveyed from one patient to another by means of the accoucheur. Foul and phagedenic ulceration, hospital gangrene, erysipelas, dysentery, inflammation of veins, &c. may also be produced, and become even epidemic to a certain extent, in this way.

18. 2d. Disease may take place sporadically, or from local causes, and owing to various circumstances acting either in close succession or coëtaneously; the circulating and secreted fluids, and even the soft solids, may be so changed during its course, as to emit an effluvia, contaminating the surrounding air, and thereby infecting many of those who breathe this air in a sufficiently contaminated state; and thus it will be propagated to several, and from those to others—especially under favourable circumstances of temperature, humidity, electrical conditions, and stillness of the air, and of predisposition on the part of those who come within the focus of infection. Thus disease may become *infectious and epidemic*, aided by the constitution of the air and other circumstances; and, after a time, cease and entirely disappear, with the circumstances which combined to propagate it.

19. 3d. A person may be either infected in the manner now stated, or seized by a malady which always evinces infectious properties under circumstances favourable to their development, as typhoid or adynamic fevers; or by one obviously contagious, and propagated by a palpable virus, as small pox, &c.; and be removed to a district where the physical conditions, aerial and terrestrial, as well as the states and manners of the inhabitants, favour its spread to others; or the morbid miasm or matter may be conveyed, by means of some inanimate substance imbued with it, to a distant place thus circumstanced, and the disease be there propagated for a time, then subside, entirely disappear, or again break out, according to the concurrence or disappearance of one or more of the causes aiding in its diffusion. In these cases, the disease becomes *epidemic from in-*

fection, and generally disseminates itself gradually at first, but with rapidly increased celerity as its victims accumulate, until either it exhausts the numbers of those predisposed, or the circumstances favouring it disappear, and others occur counteracting its diffusion.

20. 4th. The same disease may appear simultaneously in a number of persons distant from each other, and between whom no communication has taken place; and affect a great part of a community—those who are secluded, as well as those who mix with the rest of their species; and it may disappear after a time, without sufficient evidence being furnished of its possessing either infectious or contagious properties. Disorders thus appearing may be termed *simply epidemic*.

21. 5th. Disease may first appear as now stated (§ 20.); but, in certain situations and circumstances, as in low, filthy places; in crowded and ill-ventilated streets and houses; in stagnant, moist, impure, or other states of the air; from the confinement of a number of sick in small space; want of cleanliness, or bad habit of body; in states of physical and mental depression, &c.; may assume a more malignant character, and emit an effluvia, which will become either a superadded cause concurrent with apparent or concealed antecedent causes, in diffusing the malady, or a principal agent of infection, or possibly even of contagion, to which the others are entirely subsidiary. In this case, the epidemic is consecutively infectious; and a person, who, being infected, removes into a district which the disease has not yet reached, may, under the circumstances, and in the way stated above (§ 18, 19.), propagate it there: but if these circumstances do not exist, this occurrence will not take place; and thus the epidemic will be limited to the place where the constitution of the air, and the conditions, physical, social, and moral, of the inhabitants, combine to favour the operation of such infectious effluvia as may be generated and accumulated around the sick.

22. 6th. Certain diseases may appear, either in a sporadic or endemic form, or in a simply epidemic state (§ 20.); and, owing to the manners and circumstances of the community, be propagated only to members of the same family, or to those in very intimate communication with the affected; for, although commonly observed in the above forms, and, in ordinary circumstances, without evincing any infectious property, they have sometimes been transmitted to those who either sleep with, or inhale the breath of, the person affected, as in croup, and in some other diseases of the respiratory organs; or live in the same apartment with him, as occasionally remarked in respect of erysipelas, dysentery, &c.

23. Epidemics present themselves in one or other of these modes, according to the combination of the elements or agents co-operating in their production; and to the influence of these elements, either in predisposing the system to, or in directly exciting, certain trains of morbid action. Thus it will be seen that epidemics are either—(a), not manifestly infectious (§ 20.); (b), or conditionally infectious, owing to the co-operation of certain circumstances (§ 18.); (c), or primarily infectious and contagious,—the epidemic constitution, or state of the atmosphere,

&c. favouring their general diffusion. This last class, or that primarily and generally infectious, is characterised—*a.* by the specific forms which the diseases comprised in it assume; *β.* by their nearly determinate duration; *γ.* by their propagation under very different circumstances, although favoured by various atmospheric conditions; *δ.* by their little disposition to relapse, or return; *ε.* and by their affecting, with few exceptions, the system only once. From the foregoing, also, the fact may be explained, that the same disease, when occurring sporadically, often presents no infectious properties; but, when prevailing epidemically, generally evinces them more or less remarkably; the states of the air, the circumstances of the community, physical, social, and moral, and various other agents contributing either to the development of new properties, or to the manifestation of those which would have been otherwise latent or concealed.

24. *H.* The last element in the causation of epidemics, to which I shall briefly allude, is *mental depression*, in every form it can present itself. This, although a source of predisposition, rather than an element of the epidemic constitution, is one of the most influential causes in the spread of disease, particularly those that are pestilential. An army, during the success of a campaign, seldom presents more than sporadic cases of disease, unless they are subject to great privations, and even then, little illness may occur. But, during reverses, panic, disappointment, &c., particularly if such reverses be attended by their usual concomitants—by crowding, privations of all kinds, inattention to cleanliness, exposure to night air and malaria, &c.—epidemic sickness is a common result. The fear of the disease, amounting often to panic, which is very generally experienced upon the approach or breaking out of an epidemic, is not only one of the causes of its rapid diffusion, but also of the suddenness and fatality of the attack, usually remarked at its accession. The mental distress so generally diffused in the seats of war, is a very powerful concurrent cause of the diseases which are commonly attendant upon it; and this, as well as other contingencies, will, at least partly, explain the prevalence of sickness after earthquakes, in places where they have been most severely felt.

25. *Conclusions.*—*a.* It may be inferred from the foregoing, that, although any individual element of epidemic causation will of itself be insufficient for the production of the effects observed, more especially of wide-spreading or pestilential diseases, a concurrence of several, in various grades and forms, aided by a number of incidental circumstances, must, in the present state of our knowledge, be viewed as their true sources;—that neither infection, although the most influential agent, perhaps; nor terrestrial malaria, nor mineral vapours—the favourite agent of SYDENHAM, and of many recent writers; nor exhalations from dead animal matter; nor intemperance of season or weather; nor famine, scarcity, or unwholesome food; nor crowding of the living—the healthy, or the sick; nor filth; nor stillness, humidity, warmth, or other conditions of the air; nor depressing motions and passions; nor any physical, social, or moral vicissitude; will, singly, account for epidemics: but that the association of several, or of two or more, of these

causes, in various grades of predominance, is necessary to their occurrence, diffusion, and continuance.

26. *b.* That miasms generated by the sick in one or other of the modes stated above (§ 17, 18, 21.), and accumulated in a close air, or transmitted by means of fomes, or contagion by a palpable virus, are either primarily or consecutively (§ 19.) concerned in the production, or in the propagation, of all fatal, malignant, wide-spreading, or pestilential epidemics.

27. *c.* That the appearance of epidemics is owing to the rare concurrence of the elements just enumerated, and probably of others of less importance, whether acting as specific, exciting, or predisposing causes; and that infection, in any of its forms, will seldom or never give rise to the epidemic prevalence of a malady, unless it be aided by one or more of the above elements of an epidemic constitution, more especially such as occasion a stagnant and impure state of air, and depress the spirits of, or otherwise predispose, the community.

28. *d.* That the specific form which an epidemic assumes, depends upon the association of the causes in which it originates, and which favours its diffusion, but more especially upon the infectious miasm concerned either primarily or consecutively in producing it; and that its character may change, and become either more virulent upon the addition of a new cause or element, or less so on the abstraction of one or more. Thus, small-pox, scarlet fever, true yellow fever, pestilential cholera, plague, typhoid fevers, the adynamic forms of dysentery, and measles, require a concurrence of causes to their epidemic appearance, that will act chiefly in predisposing the community to be impressed or affected by their respective infectious miasms; these miasms being their specific exciting causes, without which they could not continue to present the same forms, or each one could no longer generate its like. When the predisposition to be affected by the specific miasm — whether such predisposition be inherent in the frame or intrinsic, or temporarily induced by external agents, as the state of the air, or other extrinsic influences — is limited to a very few of those coming within the sphere of its operation, then sporadic cases only of the malady will present themselves: but when, in consequence of the combined action of several causes, or of a peculiar but unknown state of air, the predisposition is more or less general, the disease will become epidemic; the nature, severity, and number of these causes, whether extrinsic or intrinsic — whether physical, social, or moral — determining the intensity of its character, as well as promoting its diffusion and continuance, until it exhausts itself, by affecting all those predisposed, or some change takes place which abstracts, or otherwise changes, the principal concurrent and predisposing agents. The salutary results sometimes observed during epidemics, from a violent storm, are obviously occasioned chiefly by the dissipation of an infected atmosphere; and those, as yellow fever, which require a high temperature as a principal concurrent cause, subside upon the setting in of cold weather.

29. *e.* The history of epidemic diseases, more especially small-pox, plague, yellow fever, pestilential cholera, hooping cough, and exanthema-

tous fevers, show that, although the concurrence of the causes enumerated above, are commonly concerned in their production as epidemics, they, nevertheless, sometimes rage violently without such concurrence having been observed. This can be explained only by inferring either the presence of these causes in a slight grade, or the existence of some quality in the atmosphere, independently of them, favouring the propagation of disease, or predisposing the community to infection: for, although measles become epidemic usually in winter and spring; and scarlet fever in summer and autumn, as observed by SYDENHAM; yet the same association of circumstances, at these respective seasons, does not always give rise to them; and they sometimes appear at other times, and even prevail very extensively. It is notorious, also, that small-pox, before either inoculation or vaccination was introduced, was often propagated with difficulty at one time, and with remarkable readiness at another, and yet the concurrent circumstances were sometimes apparently the same; and, although the usual epidemic agencies generally favoured its spread, yet it occasionally became extremely prevalent without their apparent aid. It must, therefore, be inferred, that there is a state of air either arising out of some of those changes insisted upon above, in peculiar but not manifest states of association, or consisting of an entirely unknown quality, that is sometimes instrumental in spreading infectious or epidemic maladies. The history of the progress of pestilential cholera fully illustrates this inference.

30. *f.* As the association of causes and circumstances, already specified, and a peculiar or unknown state of the air, are mainly concerned in the rapid diffusion of disease; and, as it is evident that these are but occasionally, although often suddenly, formed, the epidemic spreading with a rapidity in proportion to the suddenness and the degree of the change; so it may be inferred, that the return to the natural or healthy state of things may be equally sudden with the departure from it, and the epidemic abate with proportionate celerity. Much, however, should be attributed to the circumstance that, when an infectious epidemic occurs, it speedily seizes the most susceptible, and spreads rapidly until they are exhausted: it then subsides, and entirely disappears, either from this circumstance, as in the yellow fever at Gibraltar in 1813; or from a change in the concurrent circumstances and state of the air, as on several occasions in the south of Spain; or from the infectious miasm becoming less malignant in its passage through numerous persons, or from the circumstances influencing the disease in its progress.

31. *g.* That the germs of infection may lie dormant for a time, whilst either the concurrence of manifest causes, or the concealed constitution of the atmosphere, is unfavourable to their development. But as soon as the one or the other, or both become favourable, and predispose the frame, the infection assumes activity, and the distemper spreads accordingly.

32. II. *a.* OF THE PRECURSORS OF EPIDEMICS. — It is obvious that the true and only precursors of epidemics are their *Causes*. The phenomena preceding the more pestilential diseases have been too often magnified or misinterpreted, either from ignorance, or for the purposes of argument. One

of the precursors most insisted on by writers, is intemperance of the seasons; but it has been shown above, that although this may be a principal cause of the prevalence and aggravation of the endemic diseases of a country, it has only a concurrent influence in producing malignant or wide-spreading epidemics—some of the most pestilential not having been thus preceded; and, even where it has been remarked in its most intense forms, it has operated chiefly in favouring the generation of infection, and in predisposing the community to be impressed by the infectious miasm. The circumstance of nearly all epidemics commencing among the poor, and being most destructive to them, is a manifest consequence of their earlier and much greater exposure to, and predisposition to be affected by, the exciting causes—more especially such as are specific and energetic—than persons in good circumstances; and of the concurrence of causes occasioning epidemics, taking place chiefly in the former class, and very rarely in the higher grades of society.

33. *b.* Another precursor, on which much stress has been laid, viz. disease and mortality in the lower animals, is one which has likewise been shown, even when it precedes an epidemic, which is only occasionally the case, to be the necessary consequence of their earlier or greater exposure to its chief causes. In some unhealthy climates I have visited within the tropics, where malignant remittent fever, agues, and dysentery, in various forms, according to the habit, constitution, &c. of those who arrive, or are resident in it, are constantly prevalent, the more perfect animals, as horses, cattle, sheep, dogs, &c., soon die, evidently from the concentrated exhalations almost constantly evolved from a humid soil, and other endemic sources. This circumstance proves that the epidemic which is thus preceded is merely an aggravated form of the endemic of the place, more generally diffused through the community, owing to the concurrence of additional causes, than is commonly observed; and not a new or different distemper, unless either infectious miasms have been evolved by those first affected, and, having become a superadded cause of great activity, have thereby changed the character of the epidemic, or infection has been introduced originally, and favoured in its operation by the terrestrial exhalations, state of the air, &c., which occasioned at first the mortality in the lower animals, and the aggravation of the endemic disease. But in this latter case, the mortality in animals, as insisted upon above, will have been posterior to the commencement of the epidemic; as fully shown in the accounts furnished by the aggravated plague, or "*black death*," which extended over Europe during 1348, 1349, and 1350; and in the progress of pestilential cholera. Both BARNES and WOOD expressly state that the fatal murrain among cattle, that accompanied the black plague in England, in 1349, was several months subsequent to the appearance of this plague; and HECKER remarks,—“Of what nature this murrain may have been, can no more be determined, than whether it originated from communication with the plague patients, or from other causes; but this much is certain, that it did not break out until after the commencement of the black death.” (p. 70.)

34. *c.* Some authors have viewed the aggravation of the sporadic and endemic diseases of a country as forerunners of pestilential epidemics, and have considered an occasional occurrence, or a mere coincidence, as an intimately connected phenomenon. Much misapprehension, also, of a different kind, as will appear hereafter, has arisen on the subject. Dr. MEAD and Dr. HEBERDEN have too easily admitted that malignant or putrid fevers often precede plague; and various writers have contended that yellow fever commences as the bilious remittent of the country,—the latter passing into the former by such insensible grades, that a difference between them cannot be assigned. This last assertion, although made by some of the ablest of the non-infectionists, and insisted upon by all of them, is very properly denied by those who consider yellow fever to be distinct from even the worst forms of endemic fever. The diagnosis between them, the establishing of which is of so much importance in the controversy, is given in another place. But that there is a wide difference in the causes, the symptoms, the duration, the mortality, the morbid changes, the contaminating effects, &c. of both, I am morally convinced. One of the most recent ablest, and most moderate writers on this subject, Dr. HANCOCK, believes in the gradual and imperceptible change of malignant fever into plague, and of remittent into yellow fever. But I cannot agree with this opinion. There is, doubtless, much difficulty sometimes in distinguishing a very violent case of bilious remittent, from yellow fever; or a severe one of adynamic continued fever, from a certain form of plague; and the difficulty is greatly increased by the fact, that the infections of yellow fever, and of plague, are propagated chiefly by the concurring aid of those causes and circumstances which respectively give rise to, and favour the prevalence of, bilious remittents and adynamic fevers; and that, without such aid, these infections cannot occasion their respective distempers in a pestilential or epidemic form. Great stress has been laid upon the prevalence of fevers in London, at the time of the appearance of the great plague. But fevers were necessarily more or less prevalent in the then circumstances of the city; and it does not actually appear that they were more so at the time, when the first cases of plague occurred, than on other occasions. The imputed prevalence of a malignant fever, which SYDENHAM mentions (see *Works*, p. 105—107. and 123. of *Leyden edit.* of 1726.), occurred during the spring of 1665,—some months after the first cases of plague—and was considered by him, for reasons which he assigns, especially its difference from all other fevers that he had ever seen, as a variety of that pestilence. How could it, then, be the forerunner? Did the writers who lived subsequently know more of the matter than SYDENHAM and others, who saw the commencement of that plague, as well as its decline; at which latter time, this milder form of the plague—this malignant, spotted, or putrid fever, as it was called for the purposes of deception, as shown hereafter—began to predominate, owing either to the change in the temperature of the air, or some other alteration in the epidemic constitution. But, even admitting that fevers were actually prevalent before, and during the commencement of that pestilence, the association of

causes giving rise to their prevalence was, at that epoch, exactly such as would favour the action and propagation of the infection of plague, provided it had been introduced either by an infected person, or by fomites. That such introduction took place, and that the pestilence spread in consequence of the concurrence of causes productive of fever, is more probable, independently of the strong evidence of the fact, than that the circumstances usually occasioning fevers should have generated a progressively malignant distemper, until plague was at last produced. Our knowledge of pathological phenomena does not warrant this latter inference; for if such progression without any specific difference existed in respect of these maladies, we should surely see, on some occasions, the infection of plague give rise to fever, just as the confluent, often produces the distinct, small-pox; or the malignant, the mild, scarlatina;—or, without reference to cause, we should sometimes observe plague subside into common fever; as we often see malignant remittents lapse into ague.* The same reasoning equally applies to the supposed passage of remittents into true yellow fever—an error which is fully exposed at other places (see § 43., and FEVER, YELLOW).

35. *d.* Several writers have insisted upon the appearance of malignant fevers, during and after the decline of plague, as a proof of the convertibility of the one disease into the other; and have referred to SYDENHAM's account of the plague of 1665, in support of their argument. But he distinctly infers that the malignant, or spotted fever, as it was named in the bills of mortality, was a variety of that pestilence, which continued during 1666, chiefly in that form, when it ceased to be epidemic. It is not improbable, however, that though many of the cases of the malignant

fever seen after the decline of the plague, were milder cases of this distemper; yet some may have been—especially at a later period—actually cases of adynamic fever, occasioned by the contamination of the air, by the exhalations arising from so many thousand bodies scarcely covered by earth in the crowded churchyards of the city, and pits in which they were thrown, within the short period of a few weeks, and during a warm season; fever and dysentery affecting, owing to this very obvious cause, many of those whom the infection of plague had spared, or who returned to London after the epidemic had ceased. The circumstance, also, so much relied upon by SCHENK, HORST, SHORT, HANCOCK, and others, of continued fevers, dysenteries, small-pox, and measles, when raging epidemically, being frequently forerunners of plague, and sometimes reappearing upon, or following, its decline, is certainly no proof of the convertibility of either of these maladies into pestilence; but merely shows that, during epidemic constitutions, in which other diseases usually propagated by infection had become very prevalent, plague likewise spread rapidly owing to its infectious property—its contingent appearance after these maladies commenced, having depended upon the introduction of the pestilential infection, which was but little guarded against at the time when SCHENK and HORST wrote, and not at all in the Mahomedan countries where this occurrence has been noticed by JACKSON and others.*

* The non-infectionists insist upon four things; the truth of which they take for granted, and make the bases of their arguments in proof of their doctrine. The first is, the passage of fever into plague, and of remittents into yellow fever. I have shown particularly, in other articles, that no such transition takes place: and that it did not take place in the great plague, to which especial reference has incorrectly been made in proof of it. That pestilential infection spreads most readily in circumstances productive of continued and remittent fevers, is fully admitted; but the difficulty of distinguishing between these fevers and the pestilential epidemics is not so great as the non-infectionists are desirous of showing as an argument in favour of the opinion that the latter are only higher grades of the former, and devoid of specific differences.

The second is, that prevailing diseases are banished while epidemic pestilence rages. This only occasionally and partially obtains; and, when observed, is owing chiefly to the circumstance of a great part of those persons, who, from exposure and predisposition, would probably have been affected by the usual endemic diseases of the place, being actually such as are most obnoxious to the attack of pestilence. Pestilential cholera did not banish other diseases during its prevalence; or, at most, did so very partially; and similar facts have been remarked in respect of other pestilences—both plague and yellow fever. The great plague furnishes no grounds for the statement, that I can find in the writers on it the most deserving of confidence, more particularly as there actually appeared to be no prevailing disease at the time when the first cases of plague occurred. Facts should be duly investigated, before they are made the bases of important inferences. How many "false facts," furnished by the ignorant, the prejudiced, and the emissaries of interested traders and chartered companies, have been adduced in support of this and other parts of the doctrine, are best known to those who have devoted long and patient study to the subject.

The third statement is, the reappearance, upon the decline of pestilence, of the prevailing diseases which preceded it,—a circumstance of only occasional or even rare occurrence: 1st. because pestilences are only occasionally so preceded: and, 2dly. when they are so preceded, these diseases do not always disappear; nor, when they disappear, do they always return. I appeal to facts. Let them be scrutinised: and, when disease which prevailed at the breaking out of pestilence, return after it has ceased the occurrence is to be explained either as hinted at above, or by referring to the influence of existing endemic sources, and the causes usually concurring with them or increasing

* Upon a careful examination of SYDENHAM, BAYNARD, HODGES, DE FOE, &c., it is manifest that the malignant spotted fever, said to have been prevalent at the commencement and decline of the plague, was actually this distemper, reported as fever for the purposes of concealing its existence; and that, where this fever actually existed, it was one of the forms that plague very commonly assumes, especially during low ranges of temperature, as at that season. DE FOE (whom I consider especially deserving notice as to this point, as he had no medical doctrine to support) states, after describing the introduction and commencement of plague in St. Giles's, in December, 1664, that, early in May, 1665, "it had gotten into several streets, and several families lay all sick together; and, accordingly, in the next weekly bill, the thing began to show itself: there was, indeed, but fourteen set down of the plague, but this was all knavery and collusion; for St. Giles's parish buried forty in all—most of whom, it was certain, died of the plague." In the next week's bill, but nine were set down to the plague; "but, on examination more strictly by the justices of the peace, it was found there were twenty more, who were really dead of the plague in that parish; but had been set down of the spotted fever, or other distempers, besides others concealed."—"Now the weather set in hot; and, from the first week in June, the infection spread in a dreadful manner; and the bills rose high, and the articles fever, spotted fever, &c. began to swell: for all that could conceal their distempers did it, to prevent authority shutting up their houses." &c. (*Hist. of Great Plague*, p. 6. and 7.) A reference to the bills of mortality will show, that, at the time the plague first appeared in London, there was no particular prevalence of disease. The attempts thus made to conceal the existence of plague have been equalled in the present day, during the prevalence of a different malady; and in more places than London. The reputed predominance of putrid and spotted fevers, therefore, believed in by MEAD and HEBERDEN, who wrote long afterwards, was altogether a mistake; which originated as I have now shown, and was actually subsequent to the appearance of the first cases of undoubted plague.

36. *e.* The appearance of swarms of insects has been likewise considered as a forerunner of epidemics. After mild and open winters, when the cold has not been sufficient to destroy the eggs and larvæ of insects; and during moist and warm springs and summers, when warmth, moisture, and animal decay have contributed to their extraordinary generation; various species of both insects and reptiles have sometimes become so numerous, especially in low and humid districts, as to destroy the vegetable productions, to occa-

their activity. Those "prevailing or minor epidemic diseases," which these writers (see Dr. HANCOCK, in *Cycl. of Pract. Med.* vol. ii. p. 82.) have viewed, not merely as the forerunners of pestilence, but as convertible into it, must be either epidemic or endemic, otherwise they cannot be said to prevail. If the former, which the writer just referred to admits, where are the facts?—Can they bear scrutiny? None have been adduced that can stand the test. If the latter, the circumstance might be expected, *a priori*, occasionally to occur, and is no proof either of the convertibility of the endemic into an epidemic pestilence, or of the absence of infection. The distemper to which this statement is most applicable, and regarding which it has been especially made, is yellow fever, as it requires a certain concurrence of causes for its development, especially in temperate climates which are chiefly and commonly productive of endemic fevers. Those causes are also the principal predisposing and concurrent agents in the diffusion of the infection of yellow fever, which thereby attacks a large proportion of those who might otherwise have been seized by the endemic maladies—the predisposition to infection, occasioned by those causes, favouring an attack of the pestilential epidemic, which thereby takes the place of the endemic disease. Can it be a matter of surprise, or should it not rather be expected—(a) upon the breaking out of epidemic yellow fever, which requires a high range of atmospheric warmth for its existence, and which, therefore, can occur beyond the tropics only at particular seasons, which are also those of remittents, that these latter or other endemic diseases should prevail?—(b) or, after great numbers have left the place where it has appeared, and the population is thereby greatly reduced; and when three fourths, or even more, of those who remained are attacked by it, as in the epidemics in the south of Spain; that the endemic diseases that prevailed, and which generally do prevail, at these seasons, should then not be heard of, or entirely disappear?—(c) or that, when the inhabitants who had departed have returned, and seeing that an attack of one disease does not necessarily preclude an attack of a different disease, remittents and other endemic disorders should reappear to a greater or less extent, according to the intensity and combination of causes producing them, after the pestilential epidemic has ceased? A careful investigation shows that the phenomena connected with this and other pestilences are actually such as may be inferred *a priori*, conformably with the doctrine which imputes them, viz. plague, yellow fever, and pestilential cholera—the chief pestilential epidemics with which we are acquainted—to infection.

The fourth and last statement of the non-infectionists, to which I shall here allude, is, that "no pestilential epidemic is one form of disease" (*Op. cit.* p. 82.), or of unvarying type; and they adduce this as an argument of such epidemic being an aggravated form of the diseases endemic to the place in which it breaks out. But what is the foundation for this statement? Actually none: for, however much the pestilences just enumerated may vary in grade and severity, they present, individually, such speciality of features, wherever they are observed, as readily enables the well-educated, the careful, or the candid observer, to distinguish them from diseases which approach them the nearest in character; and are as unvarying as small pox, measles, or scarlet fever—if, indeed, they be not much more so. We see these latter maladies vary in severity, but they still preserve the same specific features; so do the pestilences in question. We, moreover, see the infections of those familiar and domestic diseases very limited, or scarcely at all diffusing themselves, at certain times and seasons; and, at others, spreading rapidly, generally, and in severe forms;—the same is also observed in respect of plague, yellow fever, and pestilential cholera. The principal difference between the epidemic manifestations of these two classes of distempers is in the frequency and the seasons of their appearance; and this is owing to the nature of the causes concurring to aid the diffusion of their respective infection; and without which aid they could not prevail generally, or become epidemic.

sion scarcity, and, by the decay of their exuviae and dead bodies, to increase the local sources of diseases. They have thus contributed to the causation of an epidemic constitution, and, perhaps, in some instances, have directly produced disease. In such cases, they have either preceded or attended the commencement of the epidemic. The common insects of a country have been said to have disappeared during the prevalence of pestilence. If this have occurred, it may be referred to the operation of the same cause to which the disappearance of, or death of, birds was imputed (§ 13.). But the non-infectionists, who have endeavoured to torture an argument in favour of their views out of the latter circumstance, have not ventured to affirm, as they did in respect of the disappearance of birds, that an unusual absence of insects or reptiles has been ever remarked as a forerunner of pestilence.

37. *f.* As to the influence of comets, meteors, earthquakes, the breaking out of volcanoes, &c. in causing epidemics, or even in indicating their approach, there is not the least evidence, notwithstanding NOAH WEBSTER'S labours to demonstrate it. Coincidence may have been sometimes remarked: but it would require a tolerably uniform antecedence of the former in respect of the latter, to show any relation between them, either as cause and effect, or as concurrent results of one general or pervading cause.

38. III. NOTICES OF SOME EPIDEMIC CONSTITUTIONS OF AUTHORS.—In illustration of what has been already advanced, I will take a brief view of some epidemics, and the causes to which they have been chiefly imputed by those who have recorded them. Epidemics and pestilences of recent occurrence, as well as some of very early date, are referred to in other and more appropriate places. RAMAZZINI records, that the years from 1689 to 1694 were wet, the winters mild, and inundations frequent; and that periodic fevers of an unfavourable kind, and diseases of the bowels, were epidemic; which he attributes chiefly to the irregularity of the seasons, and to the failure of the crops. But these were manifestly only a part of the elements which contributed to the causation of these maladies; the warmth of the climate, the great quantity of rain, and the frequent inundations, with their more direct results, being equally, if not much more, powerful agents. BAGLIVI describes the epidemic constitution of 1703 to 1705, and imputes it chiefly to the seasons, which were mild and rainy in winter and spring, and dry in summer and autumn. Earthquakes were frequently felt during these three years, in the States of the Church; and caused great alarm in the minds of the inhabitants, contributing thereby to the prevalence of disease. He states, that apoplexies and sudden deaths were very frequent; and that they had been also prevalent during 1694 and 1695, throughout Italy. Although he attributes them chiefly to irregularity of the seasons, it is more than probable that the wars, and the attendant evils, which devastated that country during these years, were equally concerned in their production. COTUGNO and SARCONI have described an epidemic, which was very fatal in Naples in 1764, which followed irregularity of seasons, and a scarcity of grain; and which appeared

first among the poor, presenting the various malignant forms of continued and remittent fever. Bleeding, emetics, purgatives, bark, opium, &c. were principally resorted to, but the mortality amounted to nearly one half of those affected. The intermittent, and subsequently the remittent, character which the epidemic assumed during its early progress, proved that the state of the seasons, and the abundant sources of malaria, which existed at the time, were concerned in its production: but the great malignity, with tendency to dissolution, in the fluids and soft solids, which characterised its advanced progress, evinced the operation of additional agents; and these were sufficiently apparent in the wretchedness of the lower classes, the bad quality of the grain, in the want of cleanliness and the general inattention to infection, excepting in the religious houses, which escaped.

39. M. FODÉRÉ refers to the transactions of the physicians of Berlin, Augsbourg, Breslau, Presbourg, and Laybach, to show that the seasons were not the chief causes of the epidemic constitutions they describe. Indeed, at numerous periods, as well as at these, the seasons have been remarkably irregular, without disease becoming epidemic, unless where *endemic* sources have been very much increased by such irregularity, or where the evils of war, or scarcity, or some other element of an epidemic constitution, have been superadded. When diseases have prevailed, they have not always been influenced by the state of the weather and seasons alone, more especially when they have possessed infectious properties. SYDENHAM, although he once conceived that the epidemics of this climate could be accounted for by means of the sensible states of the air, subsequently confessed that they depended less upon these states than upon something in this fluid that could not be ascertained; a more extensive observation having proved the inaccuracy of his former opinion, and confirmed the inference at which HIPPOCRATES had arrived. GEOFFROY and others attribute the adynamic and infectious fevers, dysentery, and scurvy, which became epidemic in Paris and the surrounding districts in 1709, to the very severe winter and spring of that year. But a stricter examination has shown that much more was owing to the scarcity of provisions, to their increased price, from the imposts of a disastrous war, to the oppression and poverty of the lower classes, to the want of cleanliness, and more particularly to infection favoured by these circumstances, by the state of society and manners, and by inattention to ventilation, &c., than to the severity of the seasons, to which they had been imputed; this co-operation of the elements of an epidemic constitution protracting as well as extending the prevalence of these maladies, as might have been expected, *a priori*, during three years, and for some time after certain of these elements had begun to disappear. In proof of the accuracy of this view of the matter, I may add, that the early months of 1716 were equally severe in Paris, and yet no epidemic occurred; for the principal causes which came into operation in 1709 did not then exist. In 1726, the winter and spring, in the same part of France, were very cold and wet, and grain somewhat scarce; but there was little increase of disease,—scurvy being, as it always was during the

preceding century and the early part of the last, one of the most common maladies of that country. But in 1740, a similar severity of these seasons existed, and was aided by the evils of war, by a much greater scarcity, amounting to famine in many places, and by infection, with the rest of the causes just enumerated; and the results were such as the well-informed pathologist might have inferred from this combination of agents, more especially when acting upon a population physically and morally constituted and circumstanced as the French of that period were: these results being infectious, adynamic, and malignant fevers; dysentery, diarrhoea, and scurvy. Cold and wet seasons, thick fogs, and winds that have passed over marshy and woody countries, are often productive of epidemic catarrh, hooping cough, sore throat, bronchitis, rheumatism, &c., especially among children, aged persons, and females; and, as additional agents come into operation—as scarcity, emanations from animal bodies, infection, or whatever depresses the powers of life—so the character of the epidemic changes, and the maladies above enumerated, or the exanthemata, supervene, and spread widely.

40. The malignant remittent fevers that raged in the summer and autumn of 1652, in Copenhagen (BARTHOLIN); of 1657, in London (WILLIS); of 1669, in Leyden (SYLVIVS DE LA BOË); of 1691, in various parts of Holland (DEKKERS); of 1684, in Helmstadt (SCHKELHAMMER); of 1695, in Rome (LANCISI); and of 1737, in Breslau (HANN); and which presented somewhat modified characters, with the variation in the circumstances producing them, were very generally imputed to the epidemic constitution of these seasons, by the authors just named. But the evidence they have themselves furnished of the state of the antecedent seasons, and of the great heat and protracted drought following inundations, and exposing places generally covered by water, together with various concurrent and subordinate circumstances, satisfactorily accounts for these epidemics. These cities were, for a time, owing to these causes, similarly circumstanced to places within the tropics surrounded by the sources of endemic diseases; and consequently the prevailing maladies were, in their most prominent features, the same as those which are common to such places, or which attack unseasoned Europeans visiting them. This was manifestly the case, on these occasions, as regards Copenhagen, Leyden and other parts of Holland, and Rome. London, in the middle of the seventeenth century, was still surrounded by marshes and low grounds on nearly three of its sides. These endemic sources, during very hot summers and autumns, particularly when these followed immediately upon wet seasons or inundations, always occasioned periodical and continued fevers, dysentery, &c.; and, aided by a crowded population, want of cleanliness and ventilation, the manners of the lower classes, by moist and calm states of the air, and possibly by certain electrical conditions, favoured not only the generation of the more common infectious fevers, but also the development and propagation of foreign infection, as that of plague, when introduced.

41. The fever characterised by disorganisation of the digestive mucous surface,—the *Mucous Fever*, of FODÉRÉ and others; the *Febris Stoma-*

chali-epidemia, of ARNOLD; the *Adeno-meningeal Fever*, of PINEL; and the *Gastric*, the *Catarrhal*, the *Mesenteric*, &c., of various authors,—had been observed in an epidemic form, on various occasions, somewhat similar to that in which it occurred in Gottingen in 1760 and 1761, when it was accurately observed and described by ROEDERER and WAGLER. It then assumed a very severe form, modified into the remittent, dysenteric, nervous, adynamic, and infectious states by the circumstances which concurred in producing it. These years, as well as those immediately preceding them, were very wet, and, moreover, the epoch of scarcity and war, during which the city was besieged. Hence it cannot be a matter of surprise that agues, remittents, dysentery, scurvy, gastric, adynamic, and typhoid fevers, &c., should have successively appeared; or that either should have successively predominated; or that a fever of a mixed or complicated character, and very severe form, should have prevailed during the co-operation of these energetic elements or agents of an epidemic constitution. My limits will not permit me to take a further view of the epidemic constitutions of authors. Those described more recently by HUXHAM, HEBERDEN, SIMS, &c. are of easy access to most physicians, and furnish merely illustrations of what has been already advanced. The epidemics which have occurred during the last half century in America and the south of Spain are particularly reviewed in the article on YELLOW FEVER. I shall, therefore, only advert to certain topics connected with them, and state such inferences as observation and study suggest.

42. Many of the writers who have either seen or given an account of the epidemic occurrences of yellow fever, as DEVÈZE, JACKSON, FERGUSON, &c. have insisted particularly upon the agency of miasms extricated, by a powerful sun, from the soil, and of the electrical states of the atmosphere, in their causation. It is very probable that such miasms emanate from rich deep soils abounding with the elements of vegetable and animal organisation and life, during very hot seasons, and when they are fully exposed to the sun's rays; it is also probable that vicissitudes in the electrical conditions both of the air and of the bodies placed on the earth's surface occasionally take place; and it is possible that both these agencies may be occasionally coincident, or co-operate in certain localities. But we possess no evidence, even granting their existence, that they are capable of producing the effects ascribed to them. Their existence, however, is only a matter of inference from certain phenomena which cannot sometimes be otherwise satisfactorily explained, and not of demonstration; and although the proofs of the injurious operation of the former of these are more convincing than those yet furnished in respect of the latter, yet facts are still wanting to render the evidence in support of it complete. After a personal examination of many of the localities, both within and without the tropics, to which certain pestilential epidemics have been altogether ascribed by many writers, I cannot come to the conclusion that, under circumstances of the kind just stated, these localities could ever, of themselves, produce the very general and fatal effects characterising these pestilences; that even the warmest sun, the

stillest atmosphere, and the longest absence of thunderstorms, which observation has ever shown to have occurred,—the conditions so strongly insisted upon by these writers,—could generate from them miasms of so noxious a nature as to occasion, by their unaided action, such pestilential epidemics as have occurred in various parts of America, and the south of Spain. That endemic sources of disease, especially the situations alluded to, give out miasms when long acted on by a hot sun; that these often become concentrated in a humid and calm atmosphere, or after autumnal showers; and occasionally are aided in their operation upon the human frame by the electrical states of the air; may be admitted; for an increased prevalence, and a more severe form, of fever is often observed in these situations, on such occasions. But after the most careful consideration long bestowed on the subject, and after a patient enquiry into the facts recorded, I cannot believe that these exhalations are the only, or always the chief, cause of these epidemics. That infection is a primary agent in the propagation of the disease, and that an infectious miasm is generated by the sick, cannot, I think, be denied by the candid enquirer into all the facts connected with the subject. But I believe that, without the physical changes and the consequent emanations alluded to, or some other concurring causes, the infection would not extend through the community, as these emanations, floating in the air, dispose the system to be impressed by the infectious principle, or otherwise aid its operation; or, in circumstances where the terrestrial exhalations have already produced much disease, the miasms from the sick become a superadded cause, increasing the severity of the epidemic, as well as the rapidity and universality of its spread. That an infectious principle is concerned thus primarily or consecutively in the production and propagation of pestilential epidemics, according as it may be introduced from some other quarter, or generated by those first affected, appears fully established by numerous circumstances, independently of various considerations derived from the nature of the particular epidemic, and of the antecedent and consecutive disorders, especially those endemic to the place in which it breaks out. Of these considerations, the following seem not the least important.

43. *a.* The localities to which certain epidemics, as yellow fever, are chiefly confined, have been, for many successive years, circumstanced, in respect of season and weather, similarly to the periods in which that disease has been most destructive; and yet the common endemic of the country only has been observed, in the form it usually puts on in that particular season.—*b.* True, or epidemic yellow fever differs not merely in degree, but also most essentially and in kind, from the endemic fever of these localities; consequently the former is not merely an aggravated state of the latter,—the one disease is as different from the other, as small-pox is from measles.—*c.* On all occasions on which the non-infectious properties of yellow fever have been argued for, the bilious remittent or severer forms of endemic fever of low situations in warm countries, and the ardent or seasoning fever of Europeans who have lately arrived within the tropics, have been assumed as identical with that malady. This error

has arisen from the occasionally yellow appearance of the skin in the bilious remittent, and the dark or coffee-ground vomiting sometimes seen before death in it and in the ardent fever. But these changes are not the same, even in the cases where they are most prominent, as those in the true yellow fever; and, as shown in another place, are owing to very different pathological states. — *d.* That the very essential difference between these diseases indicates their different origins; and a speciality of form in the various quarters where the epidemic malady has been observed, equally denotes its source in a specific cause. — *e.* That diseases which arise from terrestrial exhalations present numerous modifications, forms, and types; have all a tendency to relapse, or to return in some form or other, upon exposure to the exciting cause; and always occasion marked derangement, and ultimately organic change, of the liver, spleen, or pancreas, or one, or all; whereas the true or epidemic yellow fever, independently of the most irrefragable proofs of infection, possesses all the attributes of infectious diseases; attacks the frame only once, as shown by the most unquestionable evidence, British and foreign, derived from the epidemics of Spain and America; and leaves no organic changes of these viscera as sequelæ, even of its most malignant state. — The manner in which the very different diseases now referred to have been confounded the one with the other, by those espousing the non-infectious nature of yellow fever, whether from ignorance or unfairness, has led to the most serious consequences to the community; has misled the inexperienced, mystified the subjects in dispute, furnished grounds for a special pleading sort of argumentation, and, as will be seen in the articles FEVER and INFECTION, endangered the safety of fleets and armies, and even of kingdoms.

44. IV. GENERAL INFERENCES. — *a.* Civilization exerts a most decided influence in diminishing the frequency and mortality of epidemics, especially those that are fatal or pestilential, as shown by their history at different epochs, and in different countries holding various grades in the scale of civilisation, — an amelioration evidently due — *a.* to a better cultivation of the soil; to more extensive commerce, and, consequently, to the less frequent occurrence of great scarcity, and to the improved diet and circumstances of the lower classes, in most European countries, in modern times; — *b.* to a favourable change in the manners and habits of the middle and lower classes, particularly in regard to cleanliness, social intercourse, and domestic arrangements; and to better ventilated and improved dwellings; — *c.* to superior care in the separation and treatment of the affected; and to stricter measures for the prevention and counteraction of infection. Owing chiefly to neglect of these circumstances, the lowest classes, and the most wretched amongst these classes, are most frequently attacked — the mortality being also the greatest among them in proportion to the number affected.

45. *b.* Different ages are not equally affected by epidemics. The exanthematous fevers and hooping cough are most prevalent among, and fatal to, infants and children; influenza, to the aged and debilitated. Continued fevers, in adynamic and malignant forms, attack chiefly per-

sons from fifteen to sixty; but are less fatal to them, than to those of earlier or later ages. Plague most frequently seizes adult persons of early or middle life, and generally males in somewhat greater numbers than females, — probably owing, in part, to more exposure, at this age and of the male sex, to the predisposing causes and to infection. Yellow fever attacks chiefly the young and middle aged; but spares only those who have passed through it in former epidemics. Pestilential cholera, on the other hand, does not so often attack persons about puberty and the meridian of life, as those that are aged and exhausted; and it is usually more fatal in the latter than the former. When increased activity of endemic causes produces epidemic fevers, young children often suffer very remarkably; and the malady assumes, in them, gastric, choleric, or dysenteric forms.

46. *c.* The mortality from diseases, when they first appear in an epidemic form, is usually very great; but diminishes with the frequency of their recurrence, especially those which have sprung up since the early history of our science, and which are of a contagious or infectious nature. This has been the case with hooping cough, measles, syphilis, small-pox, and may probably be so with pestilential cholera. It is not so manifest with regard to pestilences appearing after long intervals: but these are usually much more fatal at their commencement, or during their early course, and less so at their decline. The first introduction of small-pox, syphilis, &c. among savage tribes, has been as destructive as the pestilences that occurred in the middle ages. This can be explained only as briefly stated above (§ 30.).

47. *d.* As to the influence of epidemics on population, it may be inferred, that the diminished prevalence of certain maladies, which formerly raged epidemically, is in some respects compensated by the greater frequency of other diseases, formerly of rarer occurrence; or the appearance of some previously but little or not at all known. — *a.* Since the introduction of vaccination, small-pox has rarely prevailed to a great or fatal extent; but scarlatina, measles, croup, inflammations of the bronchi and lungs, and cerebral affections, have evidently increased. The benefits, therefore, of vaccination may be said to be somewhat over-rated. It is remarked by M. SAY (*Cours complet d'Economie Politique*, t. iv. p. 385.), "When we hear it said, that, by saving a hundred thousand lives, vaccination has added a hundred thousand souls to the population, we may smile at the error, whilst we applaud the discovery." M. VILLERMÉ has deduced from his researches, that, in populous countries, and particularly in large towns and cities, and in the lower classes, small-pox is fully replaced by an increase of other dangerous diseases; but in districts furnishing sufficient subsistence and scope for increased population, and in the higher classes, this compensation is hardly or but slightly observed. Indeed, all preservative measures against the diseases of infancy act similarly, — in suppressing one cause of death, we more or less increase the activity of the rest.

48. *e.* In civilized countries, epidemics, although attended by a very great mortality, only

temporarily diminish the population; for it is uniformly observed, that the void is filled up, during the next few years, by a much greater annual average of marriages and births, and by an influx of strangers from other parts, the mortality leaving more abundant means of subsistence for those who have escaped. Destructive epidemics are most frequent in low situations and crowded cities; and epidemics of a slighter kind and commoner form often occur in these and other districts abounding with malaria; and, whether they be aggravated forms of the usual endemics, or infectious fevers, &c., they all indirectly tend to augment the number of marriages and births, whilst they increase the deaths and diminish the mean duration of life. These results are evidently owing to the more abundant means of sustenance and employment furnished by these places, than by mountainous and barren districts; and to the influx from more healthy parts; the excess of deaths over births being supplied from the latter source. The following statistic return, furnished by M. Bossi, prefect of the department of the Ain, in France, and which he has divided into four zones, according to the nature of the locality, illustrates this statement, and shows—

	1 Death annually to Inhab.	1 Marr. annually to Inhab.	1 Birth annually to Inhab.
In the hilly districts - -	38.3	179	34.8
Along banks of rivers, &c. -	26.6	145	28.8
In cultivated grounds - -	24.6	133	27.5
In marshy places, &c. - -	20.8	107	26.1

(For the Prevention of Epidemics, see art. ENDEMIC INFLUENCE (§ 20.) and INFECTION.)

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EPIGASTRIUM. SYN.—'Επιγάστριον (from ἐπί, upon, and γαστήρ, the stomach). *Regio Epigastrica.* L'Epigastre. Fr. *Der Oberbauch, Ober-Schmerbauch.* Germ. *Epigastrio, Ital.* *Pit of the Stomach.*

CLASSIF.—GENERAL PATHOLOGY, &c.
Semeiology, &c. SPECIAL PATHOLOGY.

1. I. EXAMINATION OF ITS STATES.—A careful investigation of this region, and accurate interpretation of the phenomena it may present, are of the utmost importance in practice. The symptoms of disorder referrible to this part, must not, however, be estimated by themselves, but in conjunction with others furnished by the adjoining regions, by the general surface, by the pulse, by the state of the tongue, by the excretions, &c.—Attention was directed to this part in the diagnosis and prognosis of disease, from the earliest history of medicine. HIPPOCRATES remarks, that it is a favourable symptom in fevers, when the epigastrium is supple, soft, equal, and free from pain.

2. i. *Altered or augmented sensibility* of this region, in any degree or kind, is an important indication of the seat, the nature, and the result of disease. In order to ascertain these points more accurately than can possibly be otherwise done, not only should the patient's account of his sensations be attended to, but the bared region should be carefully examined, when it can be done with propriety (§ 3, 4.). The *sensibility* of this region is greater than that of any other, more especially in thin delicate persons, and females—in the hysterical and hypochondriacal. It is increased in many acute diseases—frequently in fevers, of every type and form, very remarkably in gastritis, generally in hepatitis and diaphragmitis, particularly on pressure, and in inflammatory dyspepsia. Morbid sensibility amounts to acute pain, characterised by anxiety and a sense of vital depression or sinking in inflammations of the stomach, of the tendinous part and peritoneal surface of the diaphragm of the upper portions of the peritoneum and omentum, and of the gall-bladder and ducts; and in spasm of, or impaction of gall-stones in, the latter. In all these, tenderness is often extreme, and pressure is followed by sickness and desire to vomit. Pain is commonly dull, heavy, gnawing, or but little felt except on pressure, and deep-seated, in chronic inflammation of the liver, particularly of its substance; in hepatic abscess; in chronic disease of the gall-bladder and ducts, of the pancreas, and of the orifices of the stomach. It is burning and attended by nidorous, acrid, and acid eructations, in cardialgia and other dyspeptic affections, particularly in the gouty diathesis, or before a paroxysm of this complaint; or upon its retrocession, on which occasion this

sensation is aggravated, and is attended by great anxiety and vital depression. A sense of heat or burning at this part often precedes an attack of hæmatemesis; and the same feeling, with acute, lacerating pain, anxiety, depression, remarkable tenderness, tension, and continued or repeated vomiting, characterise acute sthenic gastritis. When a fixed, deep-seated, occasionally lancinating, pain is felt at the upper part of this region, sometimes extending under the sternum, or between the left shoulders, or under the shoulder-blade, and is increased during or directly after eating, or is accompanied by difficult deglutition, or rumination, or by palpitations and irregular action of the heart, then organic lesions of the cardiac orifice of the stomach may be inferred. Similarly characterised pain at the lower part of this region and to the right, increased an hour or two after a meal, and sometimes attended by sickness, indicates the commencement of chronic disease of the pylorus; but in its advanced stages, these symptoms are felt much lower down in the abdomen, or to the right of this part.—Pain of this region is a symptom also of acute and chronic pericarditis, particularly at the upper and left portion of it; and is frequently complained of, especially after a meal, by females who wear tightly laced corsets, and during the latter periods of pregnancy. A sensation of gnawing, erosion, &c. frequently accompanies worms in the prima via, and in some cases, the first months of utero-gestation.

3. ii. *Distension, tumefaction, or distinct tumour* of the epigastrium is seen in various diseases. Unusual *fulness, or elastic distension*, is generally occasioned by flatulence of the stomach, or by collections of air in the colon. In these cases, external pressure, if it be not prevented by increased sensibility, which is usually also present, often partially expels the flatus; and a tympanitic sound is emitted on percussion. Borborygmi are also troublesome, particularly when this symptom is observed in hysterical and hypochondriacal cases, or in flatulent colic. It also attends upon accumulations of bile in the biliary ducts and gall-bladder, and upon congestion of the liver; but in such cases, the fulness is partly owing to the disease of these parts, and partly to a contingent distension of the stomach by air.—*Tumefaction* of this region is frequently seen in hydrothorax, and in chronic pericarditis, with effusion into the pericardium; but most remarkably when the patient sits up. In the recumbent posture it is less evident.—Either swelling, or *distinct tumour*, is sometimes observed in enlargement of the liver, particularly of its left lobe, and in abscess of this organ. When the abscess points upon the diaphragm, and rises into the right thorax, swelling is occasionally not observed, but the patient generally complains of a dull or heavy pain, or soreness, with tenderness on pressure, in this part. In two cases of hepatic abscesses, in which I was very recently consulted by the practitioners attending them, there was very great, but diffused, swelling in the epigastrium, with pain and tenderness, in one; and no swelling, but deep-seated pain and soreness, in the other. The nature of the disease was recognised in both instances, and confirmed shortly afterwards by the sudden and profuse expectoration of the contents of the abscesses, which in both cases had opened into the lungs. The patients are still under treatment;

and, in one at least, there are hopes of recovery. Tumour in this region may be occasioned by great distension of the gall-bladder with bile, from obstruction of the common duct; but, in this case, it is more circumscribed and distinct than in abscess of the liver, is unattended by any appearance of inflammation of the external parietes, is often pyriform, and situated at the lower part of the region, and to the right, fluctuates obscurely, and often disappears after appropriate purgatives. Swelling of this part, in lean persons, may also be occasioned by enlarged or scirrhus pancreas, more rarely by distension of the duodenum, and not so often as is supposed by tumours about the pylorus, because, when they are sufficiently large to distend this region, they generally draw this extremity of the stomach below, and to the right of it. Fulness of the epigastrium is seldom occasioned by distension of the colon with flatus, or accumulated feces, or by enlarged spleen, or by the effusion of fluid, until after the swelling has appeared to a very considerable extent in the adjoining regions; and then it is greatest at the lower part.

4. iii. *Pulsation in the Epigastrium* arises from the following causes:—*a.* Nervous susceptibility and irritation;—*b.* Inflammation of the aorta;—*c.* Aneurism of the aorta, celiac, or superior mesenteric artery;—*d.* Adhesion of the pericardium to the heart;—*e.* Tumours at the root of the mesentery;—*f.* Tumours of the stomach, and scirrhus of the pylorus;—*g.* Enlargement of the pancreas;—*h.* Hypertrophy of the heart, particularly of its right side;—*i.* Enlargement of the vena cava inferior;—*k.* Hepatisation of the lower portion of the lungs;—*l.* Enlargement of, or abscess in, the liver. On the chief of these I shall offer a few remarks.

5. *a. Nervous pulsation of the aorta and celiac arteries* is not infrequent. It comes on suddenly; and often continues long, chiefly in hysterical females, and hypochondriacal men, whose nervous system and digestive organs have been long debilitated or otherwise disordered. It is generally stronger in the morning than in the evening. Dr. BAILLIE met with a case that remained for many years. Dr. VALENTINE MOTT states that of a lady, in whom it occurred as a certain sign of pregnancy; but usually left her after the third month. I have seen it so violent that the pulsation could be observed through the dress, and the patient insisted it could be heard at some distance. (See AORTA, § 2. *et seq.*)

6. *b. Aneurisms of the aorta and large arteries* may occasion pulsation in this region; but they frequently have proved fatal without this symptom being noticed; and, where it has been remarked, the pulsation has not been strong. Mr. A. BURNS states, that aneurism of the celiac artery is rarely a cause of this pulsation; and that, in about twenty cases of pulsating tumours in the region of this artery, not one of them turned out, upon dissection, to be disease of this or any other artery. (See AORTA, § 44.)

7. *c. Adhesion of the pericardium to the heart*, is sometimes a cause of pulsation; and that it should be, is obvious. Dr. MOTT thinks it one of the most frequent causes. Dr. HOPE describes the pulsation as peculiar, and distinguishes it by the epithets jogging or trembling; it is synchronous with the sounds of the heart. (See PERICARDIUM.)

8. *d. Tumours*, from enlargement of the glands at the root, or in the duplicatures, of the mesentery, are productive of pulsation when they become considerable and press upon the aorta, or celiac or superior mesenteric artery. A case of this description is described by Dr. ALBERS. In a person whom I attended some time ago, and who had become very emaciated, a distinct pulsation in the umbilical region arose from this cause. Indeed, the pulsation, when thus produced, is rarely so high up as the epigastrium, and is sometimes felt in both regions.

9. *e. Tumours developed in the stomach*, or attached to its villous coat, and scirrhus of the pylorus, have been noticed, by BAILLIE, BURNS, MONRO, FRANCIS, and V. MOTT, as occasionally attended by pulsation. I cannot, however, agree with the last writer, in thinking that “the obstruction to the free passage of blood through the hardened” and enlarged parts occasions this symptom; but believe that, when they press upon, or come in contact with, the large arteries, especially the aorta, the pulsation is necessarily propagated to the external situation in which it is felt.

10. *f. Enlargement of the pancreas*, or of the liver, is probably more frequently a cause of epigastric pulsation, than tumours connected with the stomach; the enlarged and indurated viscus transmitting the pulsation of the aorta, as just stated. This cause has been noticed by BURNS, WARREN, V. MOTT, PORTAL, and myself. Dr. SEWELL considers that an enlarged pancreas is always accompanied with pulsation at the epigastrium. I think that such is not the case; and that, generally, the disease must be far advanced before this symptom attends it.

11. *g.* Of the other causes of pulsation at the epigastrium, I need only remark, that cases, in which it has been occasioned by enlargement of the vena cava, are mentioned by SENAC and A. BURNS. Dr. PEMBERTON thinks that the fluttering, sometimes felt at this region, is produced by congestion of the vena portarum, and the undulation communicated to it. Pulsation from *hepatization* of the lower margin of the lungs, has been observed by A. BURNS and others. BERTIN, BOUILLAUD, and myself have noticed this as a symptom of inflammation of the aorta. (See art, AORTA—*Inflam. of.*) Its connection with *hypertrophy* of the heart, particularly of its right side, requires no remark.

12. iv. *In examining the epigastric region*, pressure should at first be very gentle, gradually increased, and be made in various directions. When the heart is diseased, it should be directed under the anterior cartilages of the upper false ribs; and, according to the situation of other organs or parts suspected of disorder, the pressure ought to be directed. When the patient almost involuntarily throws the muscles underneath into action, upon commencing the examination, acute disease of some part or other may be suspected. The state of the surface, in respect of moisture, temperature, softness, colour, &c.; and the sensibility, the elasticity, the degree of depression, fulness, pulsation, &c. of this region; are equally deserving of notice. In difficult or doubtful cases, *percussion*, particularly if aided by Piorry's pleximeter, will be of service in giving information as to the presence of air, or of effused fluids, or of enlargement of the subjacent viscera.

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II. EPIGASTRIUM—CONTUSIONS AND CONCUSSIONS OF.

CLASSIF.—I. CLASS, I. ORDER (Author).

13. Blows on the epigastrium, or falls, and concussions of the trunk, may give rise to the most serious consequences, and even to immediate death. The manner in which these effects are produced has not always been correctly estimated, although they are amongst the most familiar phenomena which present themselves. A blow on the epigastrium may seriously affect the frame from its effect—1st, upon the stomach; 2d, upon the liver, gall-bladder, or spleen, either of which it may rupture, particularly when congested, or in a state of disease; 3d, upon the digestive canal, some part of which may be ruptured by it; 4th, upon the diaphragm and respiratory organs; 5th, upon the actions of the heart; 6th, and lastly, upon the great ganglia and ganglionic nerves. In a person in previous health, I believe, from an attentive examination of the phenomena consequent upon the injury, that the immediate effect is produced upon these ganglia, and is analogous to that occasioned by concussion of the brain. In some cases, the stomach or other parts enumerated, may suffer, according to the nature and the direction of the blow; as in a case recorded by DUPONCHAL, in which the jejunum was ruptured; and in one seen by myself, many years since, in which the spleen, which had been much enlarged, was ruptured. A distended gall-bladder is, however, most obnoxious to this contingency, if it be distended with bile on the receipt of the injury.

14. I. SYMPTOMS.—*a.* The patient generally falls to the ground, pale and motionless, with the most distressing death-like sensation. The skin is cool, damp, and pale; the breathing is feeble, often scarcely perceptible, and slow. The eyes are fixed, the countenance collapsed, the lips pale, and the pulse at the wrist scarcely perceptible, or irregular and intermitting, or not to be felt. The surface and extremities become quickly cold; the muscles are flaccid, the joints pliable; and, in some instances, the sphincters are relaxed. If the powers of life be not rallied at this time, all these phenomena increase, until the action of the heart and respiration entirely cease. If death follow, the blood generally continues fluid, the limbs flaccid, and cadaveric changes quickly supervene. The changes, in the most severe cases, somewhat resemble those produced by lightning. In some instances, one or more of the organs, above enumerated, are injured, either in conjunction with these changes, or independently of them.

15. *b.* These are the more direct effects, which may terminate rapidly in death when the injury has been severe. But when slighter, or when a judicious treatment has rallied vital power, a

different train of symptoms appear. The patient is enabled to speak; he complains of pain and anxiety at the epigastrium, with remarkable tenderness; the pulse returns, and the surface recovers its temperature. At last, symptoms of intense reaction supervene: the pulse becomes full, strong, and quick; the epigastrium and abdomen tumid or tense; the eyes sunk and red; the face sharpened, pale, and anxious; the tongue and mouth dry, with great thirst, but generally without either sickness or vomiting; and pains are felt in the limbs, and different parts of the body, with restlessness. Such are the usual phenomena characterising the reaction, when no particular organ is seriously injured, or inflamed. The stomach, or the liver, or even the peritoneum, or one or more of them, often becomes inflamed in the course of the reaction, owing to the injury it had received. In this case, the particular signs of such lesion will be superadded; as constant vomiting upon taking matters into the stomach, and pain in the region of this viscus, when it is inflamed; tenderness and pain in the right hypochondrium and epigastrium, when the liver is affected; and so on as respects the other organs.

16. II. TREATMENT.—The means of cure are very different at the different periods distinguished above.—*a.* In the first period, remedies should be promptly employed, but with caution. Internal stimuli are dangerous, from their liability to induce fatal inflammation, particularly of the stomach. External warmth, and hot stimulating baths, are generally beneficial, especially when aided by irritating frictions. In plethoric and robust subjects, cupping over the hypochondria, notwithstanding the depression, and abstracting a moderate quantity of blood, so as to give greater freedom of action to the heart and blood-vessels, will be of service. But experience has shown, not merely in one country, but in all, that animal warmth, derived from a recently killed animal, is the most effectual means of rallying the depressed powers of life in cases of this kind. AMBROSE PARÉ advises the skin stripped from a sheep as soon as it is killed, to be wrapt round a person whose life is menaced by the first shock of a contusion. M. LARREY has resorted to it, in several cases, with instant benefit, one of which is detailed by M. DUPONCHAL. M. LARREY states, that some sailors, shipwrecked on the coast of Labrador, were found by Esquimaux Indians almost dead with cold and fatigue; and that they were recovered by these kind savages, who enveloped their bodies in the warm hides of newly killed animals, and chafed their limbs with hot aromatic liquors,—a proof of the frequent superiority of even rude observation, to fine-drawn inferences from theory, the grounds of which have either been assumed without investigation, or received as the dictum of current but worthless authority. The inhabitants of Upper Egypt, according to M. PUGNET, resort to similar applications, to severe injuries; and analogous means, particularly warm eviscerated animals, applied over the trunk, and the almost living flesh of pithed quadrupeds, are in common use among the vulgar in northern countries, in cases of contusion, &c.

17. *b.* In the second period, or that of reaction, general and local depletions, the tepid bath and fomentations, camphorated and stimulating

embrocations or liniments, blisters over the epigastrium or abdomen, emollient and gently refrigerant drinks, and aperient enemata, are the principal remedies. Great caution should be exercised during convalescence, as to the patient's food and drink; the former of which ought to be chiefly farinaceous, and in small quantity at a time; the latter bland, and between the temperature of 70° and 90° of FAHRENHEIT'S scale. If symptoms of inflammation of the stomach, or of any other part, appear during reaction, the treatment should be directed accordingly.

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EPILEPSY, *Syn.*—*Ἐπιληψία, Ἐπιληψις* (from *ἐπιλαμβάνει*, I seize, I attack). *Morbus Sacer*, Hippocrates. *Morbus Major*, Celsus. *Morbus Herculeus*, Aristotle. *Morbus Comitialis*, Pliny et Seneca. *Morbus Convulsivus*, Plautus. *Morbus Lunaticus*, Aretæus. *Analepsia*, Riverius. *Apoplexia parva; Caduca Passio; Morbus Sonticus, Caducus, Astralis, Sideratus, Scelestus, Dæmoniæus, Deificus, Divinus, Sancti Johannis, fædus, puerilis, inopitatus; Peditio; Epileptica Passio; Cataptosis*, var. Auct. Lat. *Epilepsie, Mal-Caduc, Mal de St. Jean*, Fr. *Fallsucht, Die Fallende Sucht*, Germ. *Mal Caduco*, Ital. *Falling Sickness*, &c.

CLASSIF.—4. Class, 3. Order (Cullen).

4. Class, 4. Order (Good). II. CLASS,

III. ORDER (Author, in Preface). See CONVULSIONS.

1. DEFIN.—Sudden loss of sensation and consciousness, with spasmodic contraction of the voluntary muscles, quickly passing into violent convulsive distortions, attended and followed by sopor, recurring in paroxysms often more or less regular.

2. Epilepsy has been noticed by all the ancient writers; but by none so fully and accurately as by ARETÆUS. The sudden and frightful seizure of which it consists, induced them to refer it to supernatural causes; and hence originated several of the names which have been applied to it. Notwithstanding the very numerous results of observation accumulated by the ancients, and still more remarkably by the moderns, its nature and treatment are very imperfectly known. There is, perhaps, no other malady of which the treatment has been more empirical than of it; and this opprobrium must necessarily continue until our knowledge of its pathological relations is much further advanced than at present. In the description I am about to give of this disease, its more distinctly marked states will be first considered, and afterwards the varieties into which it has been divided, according to the modifications and complications it usually presents in practice. It will appear in the sequel how very nearly it is related to *apoplexy* on the one hand, and to *convulsions* on the other,—in its more *idiopathic* states, to the former, to *mania, maniacal delirium*, and *idiocy*; and in its *symptomatic* states, to the latter, to *hysteria, ecstasy*, and some other nervous affections. But the relations and complications of epilepsy, and the transitions of it into these maladies, as well as of those into it, will be noticed hereafter; and the disease will be treated of as it actually presents itself to the practitioner and not

as it is usually described by systematic writers, who have viewed it (and, indeed, all other diseases) as a distinct species, and not as it commonly occurs—as a concatenation or group of morbid phenomena, which varies infinitely in form, intensity, and combination, and consequently approximates more or less nearly to other morbid actions, particularly of the same system or organ, and which may either pass into them, or appear in their course.

3. I. DESCRIPTION, &c.—In order to entertain satisfactory ideas of the nature and morbid relations of epilepsy, it should be studied as to—1st, the phenomena which precede its evolution; 2dly, the signs indicating the approach of the paroxysm; 3dly, the paroxysm itself, and the phenomena immediately consequent upon it; and, 4thly, the intervals between the seizures. M. ANDRAL has adopted a nearly similar arrangement, which, however, is merely a modification of that of J. FRANK, the latter, upon the whole, being the preferable of the two. Having described the more regular states of the malady, I shall take a brief view of its varieties and complications.

4. A. The phenomena preceding the evolution of the disease.—J. FRANK remarks that, of three hundred cases, the early history of which he had the opportunity of investigating, very few occurred in persons who had been perfectly healthy previously to the accession of the disease. This, however, had not escaped RIVERIUS and TISSOT, the latter of whom has treated specifically "*On the Diseases which precede Epilepsy*." This malady attacks chiefly those persons who had been subject to convulsions during their first dentition; to *tinea capitis*, or other chronic eruptions in early life; to diseases of the head, violent affections of temper, or to disorders of mind; to an unbridled indulgence of the passions; to diseases of the ear; to affections of the glandular and lymphatic system; to worms, to chorea, or to hysteria, at any period previously to the epileptic seizure. Many of these antecedent disorders may be viewed either as predisposing or exciting causes; or as indications of those early disturbances of the nervous systems, and of the circulation of the cerebro-spinal centres, that lead on to further changes, when left to themselves, until the fully formed epileptic seizure is the result. Thus, it is not infrequently remarked that epileptic patients have, long before the accession of the disease, complained of tremors, cramps, vertigo, partial paralysis, disorders of sensation, chorea, stammering, palpitations, epistaxis, &c.; or have received injuries on the head. The relations of these with the seizure, as well as of those noticed above, must be obvious to all. There are also other disorders which precede the disease; but which, being more intimately related to its causes, will be noticed hereafter.

5. B. Phenomena premonitory of the seizure.—As this disease rarely attacks a sound constitution, or person previously in good health, so each paroxysm frequently is preceded by some indication or other of its approach. Instances, however, are common, of persons being seized without any intimation, and even in the daytime, as suddenly as if struck by lightning. WEDEL, HENKE, and J. FRANK refer to several such. The last writer thinks it a rare occur-

rence; but I agree with ESQUIROL, in considering it by no means uncommon, particularly in the *idiopathic* form; the *symptomatic* form being generally preceded by some indication. In two cases at present under my care, the seizures are instantaneous and unexpected: and I have met with several such, chiefly in those idiopathically affected, or who have inherited the disease.

6. The *premonitory signs* of the fit are, generally, increased sensibility, or a sense of formation of the surface, or of some particular part, as the arm, back, breast, &c.; cramps; turgidity of the vessels of the head; redness of the countenance; a peculiar, anxious, or fixed look; heaviness or obtuse pain of the head; vertigo, or particular sensibility, or a feeling of emptiness or coldness in the head; a great paleness of the face, and paleness or blueness of the lips and gums; a deeper sleep than usual; sleeplessness, or sleep attended by startings or peculiar succussions of various parts of the body, or disturbed by singular dreams and visions, or by the nightmare; a sensation of sinking, or *leipothymia*, when falling asleep; unusual states of temper; irritability, or marked disposition to anger; various hallucinations, or spectral illusions; great timidity, or unusual depression or serenity of mind; anxious deportment; great hilarity or mental excitation; an uncommon feeling of strength, or of robust health; sudden loss of recollection, confusion of ideas, or forgetfulness; unsteady gait; a desire of motion, or an irresistible impulse to run forwards; shivering of the limbs; dimness of sight; red or black objects, or coruscations or scintillations, before the eyes; trembling of the iris, or alternate contractions and dilatations of the pupils; temporary loss of sight, double or partial vision, or strabismus; a rush of tears; deafness, or a sense of humming, roaring, or other noises in the ears; a morbid perception of colours, of odours, or of flavours; a sense of sweetness in the mouth; a flow of saliva; violent sneezing, hiccup, frequent yawning, attended by a feeling of anxiety at the præcordia; pandiculation; difficulty of articulation, or stammering; distortion of the countenance; spasmodic affections of the larynx; fainting, or *leipothymia*; palpitations; borborygmi; a sense of constriction in the fauces, throat, thorax, or abdomen; cramps in the stomach; great voracity, or unusual craving of the appetite; a copious discharge of watery or offensive urine, or hæmaturia; a peculiar fœtor of the fæces; more frequently eructations, nausea, and vomiting, or other dyspeptic symptoms; and still more commonly the *aura epileptica*. J. FRANK saw the paroxysm preceded by an eruption, over the whole body, excepting the face, of the *vittiligo alba*. He states, that in twenty-one epileptics treated in the clinical wards of the hospital at Wilna, vomiting announced the paroxysm in seven.

7. More than two or three of the foregoing symptoms seldom exist at the same time; but they sometimes precede one another. Thus, in a case which I lately attended, the patient was unusually excited in the morning, was restless, could not sit in one place any time, and desired me not to call again, as he never felt better in health and spirits than he did at that time. As I had been seeing him from time to time, on account of an indifferent state of health, I requested his

friends to watch him. In the afternoon, he turned pale, felt very cold, complained of pain in one eye-ball, became sick, vomited, and instantly was severely seized. Another patient felt an unusual craving for food, with faintness, sunk and pallid features, most distressing sense of sinking, followed by violent palpitations; and directly afterwards, experienced a severe paroxysm; the pulse becoming irregular and intermitting during its continuance. The sensation of a *cold or warm aura* proceeding from some part, and ascending to the head, but very rarely descending from the head to another part, is one of the most common precursors of the fit. In some cases, the *aura* has been felt to terminate at the epigastrium. The places whence it most frequently proceeds are, various parts of the upper and lower extremities, the groins, hypochondria, abdomen, loins, uterine regions or vulva, along the vertebral column, and from the vertex to the occiput. FERNELIUS mentions its occurrence at the vertex; and SCHELLHAMMER, a case in which it commenced at this part, and proceeded to the arm. From whatever place the *aura* may arise, as soon as it reaches the head, or ceases, the patient loses all consciousness, and the fit is fully declared.

8. *C. Phenomena characterising and directly following the fit.*—It is only during the paroxysm that the characterised symptoms are observed. These may be so violent as to appear most frightful, or so slight or momentary as to be hardly observed, with every intermediate grade. This has led to the arbitrary distinction adopted by ESQUIROL, FOVILLE, CALMIEL, and ANDRAL, into the *Grand* and *Petit Mal*. The former, or fully developed paroxysm, may be divided into *three stages*.—(a) In the *first*, or that of *tetanic rigidity*, the patient, either without any premonition, or after having felt one or more of the precursory signs above enumerated, generally utters a scream or exclamation, of which he has no recollection afterwards, and instantly falls backwards, if standing. Sometimes he runs some steps forward, or turns so as to describe a semi-circle or circle, and then falls to the ground. Rarely he turns rapidly around more than once, as remarked by KRIEGAL, WEDEL, BANG, VALENTIN, LÖBENSTEIN-LÖBEL, ESQUIROL, and J. FRANK; or is thrown into a sort of dancing motion,—a circumstance which led FABRICIUS to describe a variety of the disease by the name of *Epilepsia Saltator*. Directly afterwards the whole body assumes an almost tetanic stiffness; the head is drawn backwards; the eyes are generally open, and directed from the usual axis of vision; the limbs are thrown out forcibly, and become rigid; and the muscles of the thorax and abdomen firmly contracted. The pulse is either irregular, or natural, or slower than usual. The face is very pale, unless cerebral congestion precede the attack; and the respiration is impeded by the spastic contraction of the thoracic muscles. Occasionally, one half of the body is more affected than the other; and erection generally occurs in the male, with retraction of the testes. This stage is usually of very short duration, passing in some seconds, or almost instantaneously, into the next.

9. (b) In the *second stage*, or that of *convulsion*, the phenomena differ in no respect from those characterising the tonic form of CONVULSION

(§ 12.), excepting in the more profound insensibility attending it, which is so great that the patient may be subjected to the most painful applications without sensation being excited. The whole body is generally thrown into the most violent convulsions, so that, as *ARETÆUS* has remarked, the spectators dread the immediate extinction of life. The head is violently rotated, or tossed in every direction; the vessels of the head and neck are enormously swollen; the eye-brows, forehead, and scalp are much agitated or contracted; the hair is erect; the eyelids are either open, half shut, or convulsed; the eyes fixed, prominent, vacant, rolled about, or turned upwards, or out of their axis; and the pupils are either dilated, contracted, or natural; but the motions of the iris are very slow, or entirely abolished. This varying state of the pupils accounts for the different descriptions given by *HENKE*, *SPRENGEL*, *METZGER*, *SCHMIDTMÜLLER*, *SCHMALZ*, *DRESSIG*, and others. The face, which was generally at first pale, now becomes injected, tumid, and livid; the forehead contracted and wrinkled; the lips are at one time contracted, elongated, and pushed forwards, and at another drawn forcibly backwards; the teeth are gnashed; and the jaws so forcibly moved as to produce a remarkable stridor, or even to break the teeth. *VAN SWIETEN* saw dislocation of the jaws owing to their violent action. The tongue is generally swollen, livid, forcibly protruded between the teeth, and more or less injured in consequence. The arms are tossed about violently or struck against the chest; and the hands and fingers rapidly perform the motions of flexion, extension, &c. The lower extremities are similarly convulsed. The thumbs are drawn inwards, and the toes incurvated. The convulsions are often more violent on one side than another. In some cases, much fulness of the abdomen and hypochondria is observed, often with borborygmi or singultus.

10. *Respiration*, which was at first interrupted by the spasm of the thoracic muscles, and performed as if the chest were placed under a load, or as in the act of strangulation or suffocation, until a state of partial asphyxy was produced, now becomes quick, short, irregular, and sonorous. The patient sometimes screams, or utters the most unnatural and prolonged sounds, or the most extravagant expressions, but more frequently moans piteously; and the forcible expirations throw out a white tenacious froth, sometimes coloured with blood, over the lips. *TISSOT* has observed the saliva sometimes to possess a cadaverous odour; and *MACBRIDE* and others have remarked, in rare instances, blood to escape from the ears: epistaxis is more common. The pulse is often quick and small, but it is felt with difficulty; and is usually irregular, becoming more distinct, slower, and more languid towards the close of this stage. The action of the heart is loud, vehement, or tumultuous; and that of the carotids much increased. Flatus is often expelled involuntarily, sometimes with the feces and urine; and the erection is occasionally followed by a discharge of semen, or of the prostatic secretion. At last the convulsions subside; fetid perspirations break out about the head, neck, and breast; the interrupted and convulsive respiration is followed by deep sighs; and the spasms of the

muscles, by subsultus; vomiting or eructations sometimes occur, and the patient passes into the next stage. The duration of the first and second stages varies from less than one, to fifteen or twenty minutes. If they be prolonged beyond this, death is generally the consequence; which, in the most violent cases, may also occur in the first stage, from the asphyxy occasioned by the spasm of the respiratory muscles; or in the second, from the degree of cerebral congestion and its more direct effects.

11. (c) The *third* stage, or that of *collapse*, is the most prolonged, and is characterised by a continuance of the loss of consciousness, by the disappearance of the convulsions, by the deep and often snoring sleep into which the patient falls, and by the gradual return of the sensibility, which may be now momentarily roused by powerful excitants. The perspiration which had broken out at the close of the last stage becomes more copious and general, and continues for about an hour; the pulse is now fuller, softer, and sometimes slower; the respiration freer and easier; and after awhile the patient awakes as from a deep sleep, and is restored to perfect consciousness; but is stunned, or wearied and exhausted, and complains of headache, or pain in the neck or occiput. Sometimes the eyes remain, for a considerable time, fixed, dull, or squinting, and the pupil enlarged. The patient has no recollection of what has passed. His speech often falters; and he occasionally feels greater weakness in some one limb or other. These symptoms gradually disappear, but disinclination to exertion remains.

12. *The duration of the whole paroxysm* is generally from five or ten minutes, in the slight and imperfect cases, to three or four hours. *M. ESQUIROL* has seen it continue five hours. I have seen it last more than four; and in one case seven hours, the seizure consisting of two fits, with an indistinct interval of soporose exhaustion. The long attacks generally consist of two or more short fits, a slight remission taking place between each. The *return* of the fits is extremely various in different cases. Several years may elapse between the seizures, as in a case in which I was recently consulted; or one, two, or three years may intervene. In a few cases, they have appeared every year at the same period, or even day. When they occur monthly, a stated day is more frequently observed, which often coincides with the new or full moon,—a coincidence much insisted on by *GALEN*, *ARETÆUS*, *ARNOLD* of Villanova, *GEHLER*, *HOFFMANN*, *MEAD*, and others. The interval of a lunar month is more commonly noticed among females, from the connection of the disease with the uterine functions. In some instances, the paroxysms occur every week, on the same day; and occasionally every day, or night, at the same hour; but they most frequently come on when first falling asleep, and are often, for a time, unsuspected or overlooked. Sometimes several slight seizures take place in one day; but their recurrence is often extremely irregular. When they are neglected, they usually either become more and more severe, or occur after shorter intervals. Consciousness and sensation being abolished, pain cannot be felt, during the fit.

13. *The slight or imperfect seizures*—the *Petit Mal* of French writers—are very varied in cha-

racter. They often precede, for months or years, the full evolution of the severe form of the disease. Generally they consist of loss of consciousness, and slight rigidity, spasm, or convulsions of a few muscles, or of one or more limbs, which continue only one or two minutes. In still slighter cases, the patient is seized with vertigo, loss of consciousness and sensation, and muscular collapse or slight spasm of a few muscles, and is, after some seconds, completely restored. In some instances, the eyes of the patient become fixed and vacant; he attempts to articulate, but is unable; loses consciousness for a very few seconds; and, upon recovering it, takes up the thread of discourse which the seizure may have interrupted, and endeavours to conceal the occurrence. Occasionally the slight seizures very nearly approximate those of hysteria, or are associated with several hysterical symptoms. In many instances, the patient does not fall to the ground, although he may have been standing at the time of attack; and in others, consciousness is not entirely abolished, the patient retaining a vague recollection of what passed in the seizure, upon recovery from it, as after temporary delirium or dreaming. These slighter fits may recur either frequently or very rarely, but they commonly return after short intervals, and sometimes as often as several times a day.

14. *D. Of the intervals between the paroxysms.* — After the fit, the patient complains of lassitude, of soreness of the limbs and of parts that have been injured, and is pale, sad, and fearful of its return. In some severe cases, the face is studded, particularly about the eyes and temples, with numerous small ecchymoses arising from minute extravasations from the extreme capillaries of the *rete mucosum* during the congestion to which they had been subjected in the paroxysm. In rare cases, vomiting or purging of blood is observed, owing most probably to sanguineous exhalation from the congested capillaries of the digestive mucous surface. Sometimes paralysis of a limb, more or less complete, or strabismus, or even irregular movements or convulsions, or various hallucinations, follow the severer attacks, and continue several hours, or even days. In a case to which I was very recently called, paralysis of the left arm, and severe pain in the right eye-ball and temple, continued after the fit—the former for some hours, the latter for several days. Deafness, watchfulness, terrifying dreams, slight or passing delirium, occasional convulsive movements (ARETÆUS, &c.), and fits of absence or forgetfulness, often afflict the patient, either for sometime after an attack, or during the whole interval. Between the complete paroxysms, as well as before their evolution, the slight seizures, described above (§ 13.), in one or other of their forms—sometimes so slight as to amount merely to vertigo with momentary loss of consciousness, or spasm of some part—the *Vertige Epileptique* of French writers, are very common. Various signs of mental alienation often appear, which generally become more and more remarkable after successive, more frequent, or severer attacks, until insanity is the result. Epileptics commonly experience, during the intervals, various dyspeptic disorders; but their appetites are usually very keen, and seldom duly restrained. J. FRANK states, that he has seen persons suffer

little disturbance after a fit, and others display increased activity of both mind and body, until its approaching return; but this is a rare exception; the great majority, even of those who suffer the least, being incapable of devoting themselves to any undertaking with attention and perseverance.

15. *II. CONSEQUENCES AND TERMINATIONS.* — Persons long afflicted by the disease, gradually acquire a peculiar physiognomy, owing to the repeated distension of the vessels of the head, and to the frequent spastic and convulsive actions of the muscles of the face during the paroxysms. This is particularly the case in such as are addicted to masturbation—a baneful practice which is common among epileptics, and, indeed, a principal cause of their malady. This alteration of the features has been noticed by ARETÆUS, who mentions their pale or leaden complexion, and their languid dejected look; but DUMAS and ESQUIROL have described it most accurately. The individual features become coarse; the lips thick; the lower eyelids swollen; the eyes unsteady, full, and prominent; the look vacant; the pupils dilated; the cheeks pale; the finest countenances plain; the muscles of the face subject to twitchings, or slight convulsive movements; the arms and limbs thinner than the rest of the body; and the gait peculiar. The functions of organic life likewise languish, obesity or emaciation being a common result. When the disease appears or continues after puberty, or the fits return frequently, the mental as well as the bodily powers become greatly impaired. These consequences are, however, in some respects connected with the states of nervous function, and the circulation within the head directly producing the seizures; the pathological conditions, which, at their commencement, and in slighter degrees, occasion the epileptic seizures, giving rise, in their advanced course and heightened grades, to various associated maladies. After the continuance of the disease, the patient is at first listless, incapable of energetic exertion, and sometimes hypochondriacal. He is liable to attacks of stupor, and complains of lassitude, flatulency; of various forms of indigestion, generally attended by a craving appetite; of great torpor of the bowels; of vertigo and tremors, &c. He is subject to deafness, amaurosis, and, in prolonged cases, to irregular muscular contractions, or paralytic tremors, to partial paralysis or complete hemiplegia, to imperfections or even loss of speech, to apoplexy, to melancholy, to partial or complete, or to intermittent or continued insanity, and to mania and idiotcy.

16. Notwithstanding that epilepsy seldom passes into the apoplectic state, until after repeated fits, yet both maladies may be associated in the very first seizure. (See § 40.) Insanity and mania, although not generally appearing until after several or many attacks, are by far the most frequent consequences of epilepsy; but I believe much more so on the Continent than in this country; whilst apoplexy and paralysis oftener supervene here than there. VAN SWIETEN states, that persons who have become insane at an early age, have been generally first epileptic. ESQUIROL has come to a similar conclusion; and my experience confirms it; the seizures, however, having been sometimes of an irregular convulsive kind, rather than those of true epilepsy. In

this frequent class of cases, the mental faculties are gradually impaired; sensation and memory are weakened, the former being often acute; perception and imagination perverted; various hallucinations generated; and the patient lapses into a state of incurable insanity or imbecility, or passes from the former into the latter. The more severe the fits, the more is this result to be dreaded. Sometimes violent attacks of mania follow the paroxysms. Of 289 epileptics in the *Salpêtrière*, in 1813, 80 were maniacal, and 56 in various states of mental alienation and imbecility. In 1822, out of 339 cases in the same hospital, there were 2 monomaniacs, 30 maniacs, 34 furious maniacs, 129 insane for some time after the paroxysms, 16 constantly insane, 8 idiotic; 50 upon the whole reasonable, but with impaired memories, and liable to occasional slight delirium, and tendency to insanity; and 60 without aberration of intellect, but susceptible, irascible, capricious, obstinate, and presenting something singular in their characters. As this institution receives chiefly old and severe cases of epilepsy, it furnishes sufficient illustrations of the consequences of this disease. Occasionally the epileptic mania alternates with melancholia and a desire to commit suicide; the mania often preceding the paroxysm. Dr. CHEYNE states that he has known epileptics preserve their intellects to a very old age; but this is only the exception to the general rule, for they seldom live to a great age, or retain their faculties when they reach it.

17. The duration of the disease is most uncertain and various, and depends upon numerous circumstances connected with the regimen, habits, and treatment of the patient. Epileptics are most injuriously addicted to the indulgence of the appetites for food, and for the sex,—practices which should as much as possible be guarded against, as tending not merely to counteract the good effects of treatment, but also to induce the unfavourable consequences of the seizures enumerated above. A favourable termination is indicated by the fits being slighter, shorter, and more distant. Sometimes a marked crisis occurs—as the return of a suppressed evacuation, particularly the menstrual and hæmorrhoidal fluxes, epistaxis, &c., the reappearance of a repelled eruption; &c. An attack of continued fever has removed the disease,—but very rarely when it has become confirmed. M. ESQUIROL states, that in 1814, when typhus fever raged in the *Salpêtrière*, although upwards of fifty epileptics were attacked by it, and but few died, little or no amelioration was observed in any.

18. A person subject to epileptic fits may die of other diseases, or of a malady proceeding from an increased grade of the same changes, which, in a less degree, occasioned the fits; or of the direct or indirect effects of the repeated seizures; death taking place sometimes in the intervals, but more frequently during the paroxysm or soon afterwards. When it takes place in the interval, it is occasioned by the remote effects of the fits, in connection with the pathological states inducing them—by some one of the diseases consequent upon them (§ 38. *et seq.*). If it occur during or soon after the paroxysms, it is generally owing to an augmented degree of the same changes usually producing them, or to some further alter-

ation directly proceeding from these changes; either *apoplexy* caused by excessive congestion within the head, or by extravasation of blood in some situation, or by effusion of serum in the ventricles or between the membranes of the brain; or *asphyxy* occasioned by similar lesions affecting the medulla oblongata and upper part of the spinal cord, being the immediate cause of dissolution. It has been supposed, that suffocation often occurs in the paroxysm, owing to the position of the patient, or of the clothes around him when in bed. But this, I believe, rarely takes place; and when suffocation, or rather asphyxy, is met with, it is caused chiefly, if not altogether, by some one of the changes just stated.

19. III. CAUSES.—i. *Predisponent*.—*Hereditary disposition* is a remarkable predisposing cause of epilepsy, notwithstanding this kind of influence has been disputed in respect of it. But although the father or mother of the patient may never have had an attack, either of the grand-parents, or uncles, or aunts, may have been subject to it. ZACUTUS LUSITANUS (*Prax. ad Mir.* l. i. obs. 36.) mentions the case of an epileptic man who had eight children and three grandchildren afflicted by the disease. STAHL (*De Hæred. Dispos. ad var. Affect.* Hake, 1706, p. 48.) and REININGER adduce instances of the whole of the members of a family being attacked by it at the period of puberty. BOERHAAVE (*Aphorisms*, 1075.) remarks that, like several other hereditary maladies, it often passes over alternate generations; and he adduces an instance (*Prax. Med.* t. v. p. 30.) in which all the children of an epileptic father died of it. I had, in 1820, a brother and sister some time under my care, who inherited the disease from their father, and they had two other brothers and one sister also subject to it—in all five. The fits appeared in all of them about the period of puberty; and one of the brothers died about the age of forty, from apoplexy, complicated with the seizure. MM. BOUCHER and CASAUVEILH state that, in 110 patients, respecting whom they had made the enquiry, 31 were hereditary cases; and M. ESQUIROL found, that in 321 cases of epileptic insanity, 105 were descended from either epileptic or insane parents. Predisposition is often connected with *congenital formation*. I have seen the disease in several children, whose heads were of an oblique or diamond shape, or otherwise ill-formed; one side being more elevated than the other, and either side advancing or receding. Peculiarity of constitution, or *idiosyncrasy*, seems to predispose to it, as well as the epochs of *childhood* and *puberty*, at which periods the nervous and muscular systems are endowed with their greatest sum of sensibility and irritability, and the whole frame with great susceptibility. Cases, however, often occur in which these properties are rather diminished than increased. After puberty is fully attained, the disposition to the disease is greatly lessened.

20. The influence of *sex* is not remarkable; and is not manifested until after the second dentition. According to ESQUIROL and FOVILLE, females are more subject to the disease after this epoch than males. At the end of 1813, 162 male epileptics were in the *Bicêtre*, and 289 female cases in the *Salpêtrière*. J. FRANK found, that of 75 patients, 40 were females; but he agrees

with CELSUS, HEBERDEN, and SOEEMMERRING, in believing, that if a strict diagnosis were established between this and other convulsive diseases to which females are very liable, particularly several of those seizures described in the article CONVULSIONS, the predominance would be found on the side of the males; and Drs. COOKE, ELLIOTSON, and CHEYNE are of the same opinion. MM. BOUCHET and CASAUVIEILH ascertained, that of 66 female epileptics, 38 were seized before their first menstruation, and 28 subsequently to that epoch. I agree with M. FOVILLE in thinking the disease more prevalent in the *lower* than the upper classes. M. ESQUIROL states, that the melancholic temperament is more disposed to it than any other. Dr. PRICHARD seems nearer the truth, in saying than it is common to all temperaments and habits, but it is not *equally* common to all. Dr. COOKE remarks, that almost every case he has seen has occurred in sanguine temperaments and plethoric habits. This does not agree with my experience, which leads me to infer that it is most frequent in persons who are either very plethoric or very much the reverse. Its greater prevalence in persons of a *scrofulous* and *rickety diathesis*, than in any other, has been shown by HUFELAND and PORTAL, and is undoubted. J. FRANK remarks, that more than half the cases in his practice were strumous. Dr. CHEYNE would make the proportion even larger. DE LA FONTAINE and FRANK found epilepsy extremely common amongst those born of parents affected by the *Plica Polonica*. An exhausted state of frame occasioned by whatever means, a cachectic habit of body, the syphilitic and mercurial poisons, and scorbutus, also dispose to the disease. Great activity of the mental faculties, and an exalted or excited state of mind, may predispose to it; and in proof of this, the circumstance of JULIUS CÆSAR, MAHOMET, PETRARCH, COLUMNA, FRANCIS RHEDI, ROUSSEAU, and NAPOLEON, having been subject to it, has been adduced by authors. But in men of strong minds, and powerful talents, the disease has seldom or ever occurred until the nervous energy has been exhausted by exertion, or by the excitements and anxieties of life. SÆTONIUS (l. i. cap. 45.) states, that it was only in the last part of his life that CÆSAR was seized with epilepsy; and that he had two attacks while he was engaged in business. It seems more prevalent in some countries than in others. This has been referred to peculiarity of climate, especially to cold and moisture. It is more evidently dependent upon moral causes, particularly to excessive and premature venereal indulgences, which are more common in some countries than in others; the disease being very prevalent in the South of Russia and Germany, in Poland, in Italy, and France — certainly much more so than in this country and the United States. HIPPOCRATES and TISSOT think it most frequent and severe in spring, but this is not remarkably the case, and has been denied by several writers.

21. It has been asked, Whether or no this disease is more common now than formerly? The dissolute habits of the ancient Greeks and Romans lead me to infer that it was at least as prevalent among them as with us. PANAROLI states, that it was very frequent among the rich and noble Romans, particularly during the acme and decline of their greatness, when the utmost luxury,

dissipation, and debauchery prevailed among the higher classes under the emperors.

22. ii. The *occasional Exciting Causes* are remarkably numerous and diversified. Various circumstances may concur in exciting the first seizure; and where no marked predisposition to it exists, a concurrence of several causes is requisite to its production; but, when once produced, a single, and even a slight, cause may occasion subsequent attacks. This class of causes acts variously: — 1st, Many directly change the physical condition and circulation of the encephalon; — 2dly, Others affect the organic nervous influence and circulation of the brain, through the medium of the sensations, perceptions, and other operations of the mind; — and, 3dly, Some act upon various remote organs or parts; the brain and nervous system being only consecutively and indirectly affected. — (a) Injuries of the head; fractures, depressions of a portion of one of the bones of the cranium, concussions of the brain or spinal cord; tumours, and the numerous pathological changes in the brain, its vessels, and its membranes, or in the cranium, described in the articles BRAIN, and CRANIUM; partial or general inflammation of the brain, or of its membranes; diseases of parts immediately adjoining, as of the cranial bones, the scalp, the medulla oblongata, and spinal cord, the ear, eye, &c., or of the vertebræ, &c.; excessive hæmorrhage and discharges; hypocaustharsis, or blood-letting carried too far; omitting accustomed and requisite evacuations; insolation; the suppression of otorrhœa, of porrigo, and other eruptions; prolonged sleep; and the metastasis of gout or rheumatism to the encephalon; are the principal causes which act in the *first* mode pointed out. — (b) All inordinate affections of the mind may induce a seizure in persons predisposed to it, either by exciting the nervous influence and cerebral circulation too far above the natural pitch, as joy, anger, fits of indignation, coition, &c.; or by depressing the one or retarding the other to a degree incompatible with the continuance of the vital functions — as terror, sudden alarm, grief, protracted anxiety, a sense of disgust, the impression of various odours, excessive mental application or exertion, &c., nostalgia, disappointments, unrequited or forbidden affections, longings after objects of desire, or love, &c. Prolonged want of sleep; very great or enduring pain; difficult dentition; great surprise; frightful dreams; appalling and distressing sights; seeing others in the paroxysm; nervous irritation, titillation, whirling rapidly round; excessive sexual intercourse and masturbation; ill-controlled states or flights of imagination, &c.; are also very common and powerful causes. M. ESQUIROL, whose experience in this disease has been unequalled, truly states that fits of passion, distress of mind, and venereal excesses hold the next rank to terror, &c. in exciting the disease. — (c) The causes which act in the *third* mode are extremely numerous; persons who have become subject to the disease often experiencing a seizure from very slight occurrences. The most common are, however, the indulgence in too much, or in improper food; a heavy meal taken shortly before retiring to rest; the use of spirituous and fermented liquors, or of coffee, in excess; very high temperature, impure air, and

crowded assemblies; exposure to great cold; irritation of worms or morbid matters in the *prima via*; various acid, narcotic, and acronarcotic poisons, &c. There are several causes, the operation of which is either not well known, or connected with the diathesis and peculiar predisposition of the patient; and others—as, indeed, many of those just enumerated—which manifestly act in more than one of the ways pointed out above. The most remarkable of these are disorders of other organs or parts, particularly functional or structural diseases of the heart, of the digestive canal, of the liver, and of the generative or urinary organs; the presence of a *calculus* in either the kidney, the ureter, or bladder (BARTHOLIN, DE LA MOTTE, BRENDAL, SAUVAGES, &c.), or of a *gall stone* in the ducts (JENS, BEAMES, &c.); the irritation or lesions of remote nerves; the syphilitic and mercurial poisons, &c. (LARREY).

23. Dr. HEBBEARD ascertained that, of 162 male epileptics in the *Bicêtre* at Paris, 119 were unmarried, 33 married, and 7 widowers. According to LOCHER (*Observ. Pract. in Vien.* 1736, p. 36.), out of 80 cases, 60 were occasioned by frights of various kinds and degrees: but, of 69 cases, MM. BOUCHET and CASAUVEILH found only 21 that could be referred to this cause. The excitation of the feelings or passions produced by dramatic performances has also brought on an attack. J. FRANK states that, before epileptics were separated from the other patients in the wards of the Civil Hospital in Vienna, it was not uncommon for some of the other patients to be seized with the disease from sympathy or imitation upon seeing the epileptic paroxysm. This has been observed by BAGLIVI (*Opera*, l. i. cap. 14.), LETTSOM (*Mem. of Med. Soc. of Lond.* vol. iii. p. 383.), DUNCAN (*Med. Cases*, Edin. 1778.), AASKOW (*Coll. Soc. Med. Haun.* vol. ii. p. 14. 22.), MEZA (*Comp. Med. Pract.* fasc. v. p. 15.), and HARDY (*Lond. Med. Gazette*, vol. xi. p. 247.). I have seen it occur in one instance; but I believe that the form of *convulsion* described in § 17, 18. of that article is more frequently produced by this circumstance than true epilepsy, unless in persons liable to this malady. Various writers, particularly GALEN (*De Diebus Criticis*, l. iii. c. 2.), ARETÆUS (*De Caus. et Sig. Morb.* l. i. c. 4.), ALEXANDER TRALLIANUS (l. i. c. 15. 21.), CAMERARIUS (*Memorab.* cent. ii. n. 38.), RIVERIUS, F. HOFFMANN (*Institut.* l. iii. c. 88.), STAHL, MEAD (*De Imp. Solis et Lune*, &c. Lond. 1704.), WEDEL (*Ephem. Germ.* An. ii. decur. 2. obs. 148.), RUMFELT, BURMESTER (*De Morbo Spastico*, &c. Goet. p. 21.), OTTO (*De Planet. in Corp. Hum. Influzu.* Franc. 1805.), have insisted upon the more frequent occurrence of the paroxysm at the periods of new and full moon than at any other. Indeed, lunar influence on this disease seems to have been generally believed in by the ancients; and hence one of the names given to it by them. The supervention of epilepsy during the early stages of the exanthemata, or upon the disappearance of the eruption, is much more rare than stated by many writers; for the seizures that sometimes take place in such circumstances are more strictly symptomatic convulsions, and seldom return afterwards, unless in those much predisposed to this disease. A similar remark also applies to the violent convulsive

attacks, which occur during, or about the period of, parturition; and which, although they possess most of the characters of epilepsy, particularly of the uterine variety, do not necessarily return at any other period, or even on a subsequent confinement, unless in females who are really epileptic, who are very liable to dangerous seizures at this particular time.

24. Various nervous diseases sometimes pass into epilepsy, either of a simple or complicated form,—most frequently the latter. *Hysteria*, *chorea*, *catalepsy*, *cataleptic ecstasy*, *somnambulism*, and symptomatic attacks of *convulsion*, when neglected or improperly treated, occasionally terminate in confirmed epilepsy, with various associated disorders, and not infrequently in some one of the complicated states hereafter to be noticed. Numerous affections of the digestive organs have been assigned by writers as exciting causes. But I consider them, with the exception of worms in the *prima via*, which are a frequent cause, particularly in children, as coexistent with, or contingent upon, the commencement of that state of organic nervous power and circulation in the brain producing the disease, and that the disorders of the digestive organs, as well as this early state of cerebral affection, equally depend upon deranged vital manifestation throughout the organic nervous system.

25. IV. VARIETIES OF EPILEPSY.—Various divisions have been proposed with the view of fixing with greater precision the treatment which is most appropriate to the different phases of the complaint. ARETÆUS and other ancient writers distinguished it by the terms *acute* and *chronic*. One of the most commonly adopted divisions is that into *idiopathic* or cerebral, and *sympathetic* or originating in disorder of some other organ. PISO long ago doubted the existence of the sympathetic disease, and MM. GEORGET and BOSQUILLON have adopted his opinion. These writers contend, that the sensations, or disordered feelings manifested in remote organs, may actually have their seat in the brain; and that the aura felt in a distant part may depend upon an original cerebral affection. Those who believe in the sympathetic forms admit that the seat of the paroxysm is always the encephalon; its cause, or the disorder which excites the cerebral affection, on which the seizure depends, being often in other organs. Hence they subdivide the sympathetic species into as many varieties as there is disorder manifested in other organs—into the *spinal*, the *cardiac*, the *gastric*, *hepatic*, *intestinal*, *nephritic*, *genital* or *uterine*, the *nervous*, &c. SAUVAGES and SAGAR (*Systema Morborum*, &c. p. 442.) make as many varieties as there are principal exciting causes. VOGEL (*De Cognosc. et Curand. Corp. Humani Affectibus*, p. 404.) notices the *cerebral*, that depending upon *disorder of the digestive organs*, and that arising from *irritation of other parts*. Dr. CULLEN admits two species, the *idiopathic* and *sympathetic*—and distinguishes the former into the *cerebral*, the *sympathetic*, or that attended by aura, and the *occasional*, or that arising from some irritation; the latter into as many varieties as there are organs occasionally originating the disease. Dr. GOOD mentions three species—the *cerebral*, the *catenating*, and *complicate*. Dr. J. FRANK views epilepsy in connection, both with the organs

from which it seems to derive its origin, and with the states of action it manifests: these states he divides as follows—the *atonic, traumatic, inflammatory, rheumatic, metastatic, arthritic, carcinomatous, gastric, scrophulous, syphilitic, and complicated*. These distinctions are too complicated and unavailable in practice—are, in truth, as respects several of them, distinctions without differences. The arrangement adopted by Dr. PRICHARD is deserving of attention, as it comprises several of the most important sympathetic associations and complications of the disease; that, followed by Dr. CHEYNE, presents nothing novel or requiring remark. The *division* which seems to me most accordant with the states it commonly presents in practice, is that into—1st, its *Simple forms*; 2dly, its *Sympathetic varieties*; and 3dly, its *Complications*.

26. i. *Simple Epilepsy, Epilepsia Simplex*—*Primary Epilepsy; E. Cerebralis, Idiopathica, Essentialis, Legitima, Primaria, Encephalica*, Auct. varior.—may present itself in various forms, as respects nervous susceptibility and vascular fulness and action.—It may occur in emaciated persons, whose nervous energy has been exhausted, and whose blood is deficient in quantity and quality, or in those who are plethoric and apparently robust. It may present symptoms of imperfect or sub-action, in connection either with deficiency, or with too great fulness of blood; or of increased action, especially as respects parts about the base of the encephalon. It is very important in practice to ascertain these states of the vascular system, as upon them must necessarily be founded the chief indications of cure.

27. A. *Simple Nervous or Asthenic Epilepsy*—*E. Simplex nervosa, or Epilepsy with defective power and action*—is not so common in this, as in other countries; yet it is not infrequent in London and large manufacturing towns.—It is observed in weak constitutions; in thin habits, presenting a deficiency rather than fulness of blood; in young persons employed in factories; and in those who are endowed with great susceptibility, and who have been addicted to venereal excesses, especially to onanism. In this form, the face is pale or sallow; the veins small; the pulse weak, small, and accelerated, or readily excited; the seizures are frequently ushered in by leipothymia or fainting; and the countenance is neither full nor livid, until the convulsive stage of the fit, and often not even then. It is probable that, at the accession of the attack, the due supply of blood to the brain is withheld, or the circulation of it interrupted; although it must be admitted that there may be evident want of nervous power, and general deficiency of blood, and yet vascular action may be increased within the head, relatively to the rest of the body. It is very important in practice, to ascertain which of these states exists on the accession of the fit; and this can be done only by examining the circulation in the carotids, the temperature of the head, and the action of the heart, at this and at other periods. This state of the disease may ultimately become complicated with insanity, imbecility, or paralysis.

28. B. *Simple Sanguineous Epilepsy*—*E. Simplex Sanguinea; Acute Epilepsy, LÖBENSTEIN-LÖBEL and RICHTER; Epilepsy with Plethora; E. Plethorica, PORTAL and others; E. with excited or sthenic action; E. with deter-*

mination of blood—appears to be the most common form of cerebral epilepsy, especially in this country.—It is usually observed in sanguine and plethoric habits, and is consequent upon too high living, great exertion, the suppression of accustomed evacuations and discharges, the disappearance of eruptions, or the translation of morbid action from other structures to the brain, exposure to the sun, and violent fits of passion. In these, as in other cases betraying increased vital action, the disease has been supposed by several writers to possess an inflammatory character—*E. Inflammatoria, J. FRANK, PORTAL, and others*.—There is every reason to suppose that this form is caused by an impeded return of blood from the head, as well as by increased determination to it; and that it is more frequently associated with disordered action of the heart and congestion of the liver, than is generally supposed. Although simple plethora, or determination of blood to the encephalon, may alone be sufficient to the production of the fits, yet these states will ultimately be followed, if the disease be not arrested, by partial or slow forms, of inflammatory action; and, consequently, in protracted cases, the malady will often pass into, or be complicated with, mania, phrenitis, apoplexy, or paralysis. In other cases, owing to the constitution of the patient and the nature of the exciting causes, the disease is obviously connected, from the commencement, with chronic inflammation of a partial or limited kind, inducing alterations chiefly in the medullary substance of the brain. The distinction, made by SAUVAGES, SAGAR, J. FRANK, and others, between the *inflammatory, the rheumatic, the metastatic, and arthritic* states of the disease, are not to be discovered in practice; as they all present signs of determination of blood to the encephalon, and of excited action: but it is of importance to keep these morbid relations in recollection, as they should very materially influence the treatment. The countenance in the fit is generally red, tumid, or livid, and is, with the head, covered by perspiration; respiration is at first interrupted, and afterwards sonorous and laboured; the convulsions are not very violent, nor of long duration; and the subsequent stupor is profound and prolonged. In the intervals, the patient is subject to vertigo, or temporary loss of consciousness. The *Syphilitic, Scorbutic, Cachectic, Humoral Febrile, &c.* of BONET, HOFFMANN, SAUVAGES, &c. are merely occasional symptomatic or complicated states of the disease, the paroxysms often closely resembling those of simple convulsions.

29. ii. *Sympathetic Epilepsy; E. Sympathica; Epilepsy with associated disorder of other organs*.—This form is much more varied than the foregoing, not only as particular organs may betray disorder antecedent to, or coexistent with, or consequent upon, the explosion of the epileptic attacks; but also as it may present more or less of the features of either of the two states just particularised; epilepsy associated with especial disorder of some important organ, being, in respect of nervous power and vascular fulness, also either *nervous or sanguineous*, as described above (§ 27, 28.)—being oftener further characterised by defective tone and energy, and deficient fulness of blood, or by plethora and excited action. This

very important connection of morbid states, although appearing complex to the superficial observer, will not seem so to those who are in the habit of pathological analysis. It is chiefly owing to the circumstance of this species of investigation having been neglected as respects epilepsy, and to our consequent ignorance of the actual state of the circulation within the head, and of the heart's action, about the accession of the paroxysm, that our knowledge of the nature and treatment of the disease has advanced so little since the days of ARETÆUS.

30. *A. Epilepsy from affection of the spinal cord*—*E. Spinalis* of J. FRANK—has been elaborately described by HARLES (*Opera Min. ac Med.* t. i. 1825.). It generally arises from injuries and concussions of the spine; from caries of the bodies of the vertebrae, or inflammation of the intervertebral substances; and from inflammation of the membranes of the cord, or effusion of fluid within the sheath, from the metastasis of rheumatism, or the disappearance of eruptions, &c.; and is sometimes preceded by great sensibility, formication, or irritation of the skin. The fits are generally characterised by severe convulsions, seminal emissions, and relaxation of the sphincters. The head is seldom so much affected as in cerebral epilepsy, and the seizures often approach nearly, or altogether, to simple convulsions. One or other of the limbs is frequently weak, and sensation in them occasionally diminished, or otherwise altered, during the intervals. Mr. AUSTIN and myself lately attended a young lady, in whom the catamenia returned every fortnight in large quantity; and who afterwards had slight epileptic seizures. We found the spinous processes of the three upper lumbar vertebrae projecting, and that part of the spine painful, and tender upon firm pressure and percussion. The case terminated favourably from the treatment advised in this state. I believe that disease of the spine, associated with disorder of the uterine functions, and epilepsy or convulsions, is not rare. This form of epilepsy may be attended by great nervous susceptibility and deficiency of blood, as in the case now referred to; or by sanguineous plethora or excited action; either of the two pathological states characterising the simple malady also subsisting in this.

31. Very intimately connected with this variety is the supervention of the seizures upon pressure, irritation, laceration, or other injury of nerves. As in the spinal variety, so in this, the paroxysm, generally, is rather one of convulsions than of complete epilepsy. I do not believe that this and the spinal variety are more frequently preceded by an *aura* than the other forms; as this sensation may not depend upon any change in the part in which it seems to originate, but upon the condition of that portion of the brain or cord with which its situation is especially related. I have even met with cases in which the *aura* shifted from one limb to another in the course of treatment.

32. *B. With especial disorder of the circulating and respiratory actions.*—(a) I believe that the paroxysm is more commonly connected with disordered function of the heart, than is generally stated by writers. In many of the cases where I have had an opportunity of examining the state of the circulation, just before, or at the com-

mencement of, the fit, the action of the heart has been either suspended for a few seconds, or remarkably slow or irregular. This connection has not been overlooked by some authors. QUERCETANUS (*Tetrad. de Affect. Capitis*, cap. 8.), indeed, assigns to this organ the seat of the disease; and instances have been adduced by MORGAGNI (*Epist.* lxi. art. 5, 6.), LANCISI (*De Mortib. Subitaneis*, p. 113.), GOULD (*Philosoph. Trans.* vol. xiv. p. 537.), SPRENGEL, and BRERA (*Krank. d. Herzens. &c.*), in which the seizures commenced with fainting, followed by palpitations; and, after death, the cavities of the heart were found dilated, and containing fibrinous concretions. The numerous dissections of GREDING also show the frequent connection of the disease with lesions of this viscus. (See § 47.) Dr. REID has drawn attention to the subject in a more especial manner than any other writer, but in too general terms. "It will be found," he states, "that the first symptom of an attack is the suspension of the action of the heart; and, consequently, an intermission of the pulse, which may continue from a few seconds to about three minutes; which was the longest period of intermission I have yet seen." I noticed the affection of the heart in a young man, whom I attended in 1820; and in several cases since that time. But opportunities are comparatively rare in which the physician can examine the patient at or shortly before the accession of a fit. That the heart's action is interrupted at this period, in many cases, appears evident, on observing the symptoms, and tracing the connection between the exciting causes and their more immediate effects. When we consider that the most common and energetic causes, as fright, surprise, grief, anxiety, &c., are those which, although primarily affecting the cerebral functions, most remarkably disorder the actions of the heart, the importance of more frequently directing our attention to this organ, in our researches respecting the nature and treatment of epilepsy, will be evident.—(b) The disease can hardly be said ever to depend upon disorders of the lungs; although the function of respiration is very often remarkably affected, or even altogether arrested, owing to the sudden spastic contraction of the respiratory muscles in the first period of the paroxysm; and cases sometimes occur in which the frequent congestions of the lungs, from this cause, are productive of inflammation, or hepatisation, or even of effusions into the pleuræ. But such associations are merely consecutive; and are chiefly met with in prolonged and complicated cases, as shown by the researches of GREDING. (§ 47.)

33. *C. With disorder of the digestive organs.*—(a) When the stomach is the organ chiefly disordered—the *Epilepsia Stomachica* of SAUVAGES, CHEYNE, &c.; the *E. Gastrica* of FRANK and others—there are generally a loaded tongue, heavy or disagreeable breath and perspiration, unpleasant taste, acrid or acid eructations, cardialgia, a sense of distension at the epigastrium and hypochondria, and morbidly increased or even ravenous appetite; digestion being at the same time very slow and imperfect, especially just before the paroxysm. In some instances, the appetite is capricious or defective; and, occasionally, nausea and even vomiting occur. Not infrequently, large quantities of undigested food, some of which was taken two or three days pre-

viously, are vomited shortly after the fit. The bowels are usually torpid. This form, particularly in the paroxysm, generally assumes the character of the sanguineous or plethoric variety (§ 28.).

34. (b) Where the *biliary organs* especially betray disorder—the *Epilepsia Hepatica* of BURSERIUS, PRICHARD, and several nosologists—pain, fulness, or tenderness in the right hypochondrium, or towards the epigastrium, with flatulence, occasional hiccup, or quickened respiration, and a sallow or icteric countenance, are complained of, generally some time before the explosion of the paroxysm. BURSERIUS has seen the disease follow the formation of biliary calculi. It seems, from my own experience, to be connected more frequently with jaundice than with any other form of biliary disorder; and to possess more of the plethoric, or sub-inflammatory form, than of the nervous (§ 27, 28.).

35. (c) Epilepsy arising from, or associated with, disorders of the bowels—the *E. Enterica* of PRICHARD—more especially with worms in the intestines—the *E. Verminosa* of nosologists—is very common, particularly in children. It may commence in the form of convulsions, and become fully developed after several seizures; or it may be complete from the first attack, especially in the scrofulous diathesis. Although it most frequently depends upon worms, it may be connected only with an accumulation of morbid secretions, or fecal and undigested substances, in the intestinal canal. The tape and lumbricoid worms are those which oftenest induce it; and, where this cause exists, the symptoms of worms are usually observed. When it occurs about the period of second dentition, or about that of puberty, it is often a most severe and obstinate disease. It is very frequent among the poor and ill-fed. AUTENRIETH states, that more boys than girls are affected by it. It is with difficulty distinguished from convulsions, into which it almost insensibly passes; but, according to my experience, which, especially as respects children, has been very extensive, it is not so common as the different forms of CONVULSIONS. (See that article, § 24.) MONSCHEIN (*De Epilepsia*. Franc. 1700, p. 9.) and J. FRANK consider true epilepsy from worms comparatively rare. The paroxysms, in thin and weak patients, generally commence as in the cardiac variety; or with vertigo and leipothymia, the action of the heart apparently being momentarily suspended, and the countenance pale and collapsed. In some instances, where the habit is more plethoric, the face becomes tumid, livid, or injected. The attack is often preceded by pain in the abdomen, or by nausea or vomiting; and occasionally by an aura ascending from the umbilicus. The bowels are generally constipated; but sometimes the constipation alternates with diarrhoea, the evacuations being unhealthy, crude, and offensive, and often containing little or no bile. The appetite is also craving, ravenous, and unnatural; and the skin is foul, or the seat of chronic eruptions.

36. (d) In these varieties, the disorders of the digestive organs may be more or less concerned in producing the disease; or both the one and the other may be coexistent, or the associated consequences of impaired vital energy, manifested in the organic nervous and vascular systems, particularly of those organs which evince

most disturbance (§ 47.). In some cases, as in those related by MORGAGNI (*Epist.* ix. art. 7., et *Ep.* lxiv. art. 5.), and by Sir W. BURNETT, it is difficult to determine whether the heart, the liver, the stomach, or the bowels, present greatest functional disturbance. But, besides these, other parts concerned in the functions of digestion and assimilation may also betray disorder, as the *spleen*, *pancreas*, and *mesenteric glands*. These affections, whether they be viewed as concurrent exciting causes, or as associated effects of impaired health, are deserving of attention in practice, as their increase or diminution will very materially affect the disease; treatment being of little service, unless directed with strict reference to them.

37. D. With disorder of the generative or urinary organs.—(a) Epilepsy is most frequently either excited by, or associated with, disorder of the *female organs*, especially the *uterus*—the *Epilepsia Uterina* of EICKMEYER, GRÜGER, SAUVAGES, PRICHARD, and CHEYNE—or with irritation of the adjoining parts, as of the *ovaria*, *vulva*, &c. It may be further associated with *hysterical symptoms*—the *E. Hysterica* of WEDEL, SCHULZE, &c.; and the *E. Nervosa* of Dr. CHEYNE. But these are merely phases of the same variety; and not different species, as described by some recent writers. Uterine epilepsy sometimes proceeds from delayed, or difficult, or obstructed catamenia, and generally returns about the menstrual period. Frequently, the same causes which disorder the uterine functions, also induce this disease; as sudden alarms, terror, anxiety of mind, masturbatio, disappointed love, nostalgia, great fatigue, cold applied to the lower parts of the body, &c. This variety is most common about, or soon after, the period of puberty; and in young females of a sanguine temperament, light eyes, ruddy complexion, and plethoric habit of body; and is associated not only with difficult or suppressed menstruation, but with various symptoms of irritation of the uterine organs, or with too frequent or excessive menstruation. I have remarked that the paroxysm oftener occurs after the subsidence of the menstrual evacuation than either before it or during its continuance; and that the fit commonly commences in the leipothymiac or cardiac form. Although hysterical symptoms are observed in other varieties of the disease affecting females, yet they are most common in this, especially in nervous and delicate constitutions. These symptoms are, vertigo, faintings, palpitations, the globus or clavis hysterica; pain about the sacrum, under the left breast, or in the left side, or in either mamma; large evacuations of pale urine; borborygmi; and occasional hysterical delirium.—(b) The irritation of calculi in the kidneys or urinary bladder may likewise be connected with epilepsy; but I agree with FRANK in thinking that this disorder induces convulsions more frequently than genuine epilepsy. This latter is more commonly associated with great irritability of the male organs, both affections having been brought on by masturbation; inordinate excitement, whether mental or physical, occasioning a paroxysm. There are few states of the disease which oftener present extreme fulness, or deficiency of blood than this.

38. iii. *Complicated Epilepsy—E. Complicata.*

—Besides the association of diseases of distant parts with epilepsy, various important *complications* of other maladies of the nervous system with it, very frequently present themselves in practice. In most cases, the complications are of the kind above noticed (§ 15, 16.)—are merely consequences of an advanced grade of the same changes upon which the epileptic paroxysms seem to depend, or these heightened by the effects of the repeated seizures. But in others, different affections of the nervous system long precede the occurrence of an attack; and in some instances the complication is manifested from the commencement; and occasionally, even the first or second seizure is of a mixed kind.

39. (a) The most frequent complication is that with *mania* and other forms of *mental alienation*. Much attention has been paid to this state of disease by Continental writers, particularly by ESQUIROL, GREDING, GUISLAIN, FRANK, CALMIEL, BOUCHET, CASAUVEILH, and BOUILLAUD, and by Dr. PRICHARD. The mental disorder generally appears in the course of prolonged cases, and at first immediately after the seizures, in an intermitting form, and as stated above (§ 15, 16.); but it is occasionally the original affection, the epileptic paroxysms supervening in the most protracted and hopeless cases of insanity, imbecility, or idiocy. When it occurs early in epilepsy, the fits usually pass into a maniacal state of delirium, remaining longer or shorter after each, until continued and confirmed insanity is the result. This complication is sometimes congenital, and is then often connected with malformation of the cranium. It very frequently seems to depend upon chronic or sub-inflammatory vascular excitement in the encephalon, affecting chiefly the cortical and medullary structures of a part, or parts only; and is often further associated with diseases of either the *heart*, the *digestive canal*, the *biliary organs*, or the *uterine functions*, as shown by the instructive researches of GREDING, PRICHARD, BRIGHT, BOUCHET, and CASAUVEILH.—This state of disease may even ultimately pass into apoplexy or paralysis, before it terminates fatally.

40. (b) The *apoplectic* complication may occur as stated above (§ 16, 18.), or the very first seizure may be a combination of apoplexy with epilepsy. Of this latter, I have seen two cases within six months of writing this;—one, that of a female of middle age, attended by Mr. BYAM; the other, that of a corpulent man of sixty three years. The former of these recovered, the latter died. When the apoplectic and epileptic seizures are thus associated, the distinctive features of either may precede those of the other. In the two cases now alluded to, the seizure was apoplectic at its commencement, the true epileptic convulsions not appearing until after some time; but more frequently the apoplectic phenomena supervene upon the epileptic fit. Partial or general convulsions are not infrequent in the course of an apoplectic attack. But these do not constitute the complication now being considered; for in it, the stages of the epileptic fit, as described above, with the characteristic phenomena—injury of the tongue, priapism, &c.—are clearly defined. In this kind of seizure, one or more limbs, or one half the body, may be paralysed; but as often, this additional affection is not observed. The severe

forms of convulsions which occur in the puerperal states sometimes very clearly approach, or are altogether identical with, this complication. But they are rarely connected with paralysis. Notwithstanding the obvious relation between epilepsy and apoplexy, and their frequent complication, the subject has been unaccountably overlooked, even by practical writers; it having been incidentally noticed only by a few, until Dr. BRIGHT directed attention to it (*Med. Reports*, vol. ii. pp. 198, 519.). HIPPOCRATES (*Περὶ Ἀδύων*, § ix. v. 103.) seems, however, to allude to it; and his commentator, MARTIANUS (*Annot. in Lib. Hip. de Gland.* v. 103.), MORGAGNI (*De Sed. et Caus. Morb.* ep. iv. sect. 4. 5. et ep. ix.), and Dr. PRICHARD (*On Nerv. Dis.* p. 59.) mention it somewhat more explicitly.

41. Nearly allied to this complication, especially to the slighter of those seizures which commence as apoplexy, is that form of attack mentioned by Dr. PRICHARD (p. 86.) as *intermediate between apoplexy and epilepsy*. In these fits, the patient falls to the ground, and lies for some time in a state of insensibility; but without any rigidity or convulsion of the muscular system. They are sometimes preceded by vertigo; and seem—at least, in the cases which I have seen—to be slight forms of those attacks which I have ascribed to sudden congestion of blood on the brain (see BRAIN, § 139.), probably with some degree of affection of the *medulla oblongata*. They evidently are connected with epilepsy, inasmuch as they are occasioned by the same kind of causes as produce it, and are often met with in persons at other times subject to epileptic or convulsive seizures; the one species of fit frequently passing into or superseding the other. They are often consequent upon disorder of the uterine functions, and upon hysterical affections; and they then sometimes become convulsive as the attacks subside.

42. (c) The complication of epilepsy with *paralysis* may appear in the same manner as the foregoing; the latter occurring either during the advanced progress of protracted cases of the former, or almost contemporaneously with it, or even long previously to it; but I believe that paralysis is most frequently consequent upon the epileptic seizures. Of this I have seen several instances; the paralytic affection consisting of loss either of sensation, or of motion, or of both, in one limb, or in half the body; and occasionally of loss of sensation in one limb, and of loss of motion in another on the opposite side. Although this association is most common after repeated seizures, yet have I met with it after the first; the paralysis either disappearing some days or weeks afterwards, and recurring after each fit, or being from the first permanent, or ultimately becoming so. In some cases the paroxysm follows the paralysis, and at last passes into coma or apoplexy. Dr. FERRIAR (*Med. Hist. and Reflect.* vol. ii. p. 11.); Dr. PERCIVAL (*Essays, Med. and Experim.* vol. i. p. 148.), and Dr. PRICHARD (*On Nerv. Dis.* p. 60.), have recorded cases of this kind. Occasionally the paralytic state entirely supersedes the epileptic seizures; this latter disappearing, but the former being permanent. But this complication may be further associated with insanity or imbecility, or with amaurosis; and the seizure may, moreover, present a mixture of

epilepsy and paralysis, or a state intermediate between both, as remarked by PISO, MEAD, FERRIAR, PRICHARD, and myself.

43. (d) Of the *other complications*, little beyond the mere mention is necessary.—*Hysteria, chorea, catalepsy*, and *somnambulism*, not infrequently pass into epilepsy; and the seizures are sometimes intermediate between either of these affections and this disease. In a very large proportion of these cases, the uterine functions, or the digestive organs, are more or less disordered at the same time—such disorder proving the determining cause of the aggravated or epileptic character of the attacks.—Epilepsy may be also associated with *hypochondriasis* and *melancholy*, the digestive and biliary organs being generally remarkably disordered in these cases. I have likewise seen it alternate with *delirium tremens*, or this latter affection follow a regular paroxysm of epilepsy; and the same case, which has been thus associated, may ultimately pass, after a recurrence of the fits, into permanent mania or paralysis.*

44. V. APPEARANCES AFTER DEATH.—It has already been stated (§ 22.), that epileptic seizures may be connected with any of the organic lesions described in the articles BRAIN, and CRANIUM; but they sometimes are independent of any change cognisable to the senses. Appearances, however, vary much according as death has taken place in the fit or in the interval, and as the disease has been simple or complicated.

45. A.—(a) In the *simple states* of the disease (§ 26.), when the patient has died of some other malady unconnected with epilepsy, and has evinced no disorder of the locomotive and intellectual powers, either immediately after the fits, or during the intervals, little or no alteration can be detected in the nervous system. Occasionally, small tubercles, increased vascularity in parts, or bony deposits, and various other very slight changes, which are frequently observed without having produced any disorder of the nervous functions, are detected; but these may be viewed as coincidences, rather than as lesions connected with this disease.—(b) When the patient dies *during the attack of simple epilepsy*, the substance and membranes of the brain and cerebellum are generally loaded and injected with dark blood, as observed in persons who have died from hanging or asphyxy. But this change is no further connected with epilepsy than being contingent on the form and mode of death in the paroxysm.

46. B.—(a) In the *complicated states* (§ 38.), especially in that with *mental disorder*, lesions of great diversity are generally found; consisting chiefly of induration of the medullary substance of the brain, frequently with more or less injection, and of considerable dilatation of the blood-vessels. In some cases accompanying the dilatation of the vessels, the medullary structure is soft, flabby, or flaccid. These alterations are

generally limited in extent; but are met with in all the white portions of the encephalon. In addition to these, the grey substance often presents inequalities of surface, alterations of colour and consistence, and vascular injections—the usual results of chronic inflammation; and, in some instances, adhesions of a portion of the cortical surface to the membranes, or accumulations of serum in the ventricles. GREDING states, that of sixteen maniacal epileptics, the lateral ventricles of thirteen were filled with serum; and the brain softer than natural in nearly the same proportion of cases. In rarer instances, partial or general atrophy or hypertrophy of the brain is met with.—(b) In epilepsy complicated with *apoplexy*, either extreme injection of the vessels with dark blood, or the appearances presented by the different states of that disease, or great effusion of serum into the ventricles (RICHTER, MILLS, &c.), are met with. In those accompanied by *paralysis*, tumours and various other adventitious formations, cysts, softening, extravasation of blood, abscesses, and the other lesions described in the articles APOPLEXY, BRAIN, and PARALYSIS, are usually observed.

47. C. In the *sympathetic states*, alterations of the *medulla oblongata* and *spinal cord*, similar to those found in the encephalon, have been remarked by MORGAGNI, HARRIS, FRANK, GREDING, and others. Water in the *pericardium*; enlargement and dilatation of the cavities; thinning and softening of the walls of the *heart*; and diminution of its entire bulk; have been noticed by LIEUTAUD, GREDING, and PEW.—Hepatisation and congestion of the *lungs*, and purulent collections in them, have been recorded by BONET, BAADER, and the writers just mentioned.—Enlargement and other lesions of the *liver* have been observed by PRICHARD, Dr. CHEYNE, and myself.—In a case of abscess of the liver, lately under my care, and seen also by Mr. COPLAND HUTCHISON, an epileptic fit occurred at a time when the diaphragm was much affected.—Calculi in the *kidneys* have been met with by BARTHOLIN, LA MOTTE, and BRENDEN; and disease of its secreting structure, by Dr. BRIGHT.

48. D. The WENZELS, in their numerous dissections, directed attention to the state of the *pituitary* and *pineal glands*; but the result of their researches, until the mistake was pointed out by Dr. SIMS (*Lond. Med. Gaz.* vol. vii. p. 374.), was referred to the cerebellum, by nearly all subsequent writers, excepting ESQUIROL. These able pathologists found the *pituitary gland* and *infundibulum* variously altered in colour, consistence, size, and structure, in nearly all the cases of epilepsy they examined; and the spinous processes of the *os frontis*, the *crista-galli* of the *ethmoid*, and the *clivoid* processes of the *sphenoid bone*, more or less prominent, or otherwise changed in position and shape, in most of them. The *pineal gland* was also more or less altered in colour, and softer than usual, in the larger proportion of cases.—Caries, thickening, internal exostoses, spiculi, malformations, and malpositions, of the bones at the base of the skull, with various changes of the membranes, were met with in several instances. In fifteen cases out of twenty, the cerebrum and cerebellum were quite sound. Alterations in the *sphenoid bone* and *pituitary gland* have been found likewise by GREDING, NEUMANN, SIMS, and

*I was, whilst writing this, called to a man reduced in circumstances, from habits of intoxication; and who had experienced two or more attacks of *delirium tremens*. He was seized with an epileptic fit, brought on by the fear of being run over by a carriage near his own house. He had a return of the *delirium tremens* upon recovery from the paroxysm. A gentleman, given to occasional intoxication, is at this moment under the care of Mr. CARTER and myself. He has had regular attacks of epilepsy, followed by *delirium tremens*. The last paroxysm has not been followed by this affection, but by threatened paralysis.

myself. GREYING has also observed changes of the pineal gland, and fibrinous concretions adhering to the inner surface of the *sinuses*,—appearances likewise noticed by WAGNER and myself. Nearly all the lesions described in § 29. *et seq.* of the article on the BRAIN and its Membranes have been occasionally detected, but not so frequently as the foregoing, nor so often in this as in some other diseases of the nervous system, as insanity, paralysis, &c. Indeed, the most important maladies seated in this system, as somnambulism, chorea, hysteria catalepsy, ecstasy, convulsions, epilepsy, mania, apoplexy, and paralysis, are merely modifications, with exaltations of grade, of nearly the same pathological conditions.

49. VI. NATURE OF EPILEPSY.—There are certain circumstances connected with the pathology of epilepsy, fully ascertained, and which should be kept in recollection in our speculations as to its nature and treatment:—1st. That it may remotely depend upon inanition, losses of blood, or a deficient quantity or quality of this fluid.—2d. That it may be owing to a totally opposite state as respects either the system generally, or the brain especially.—3d. That it seldom occurs in persons whose digestive, assimilating, and circulating organs perform their functions regularly.—4th. That, in the simple and early disease, it is not dependent upon any lesion cognisable by our unassisted senses, unless such lesion be seated in the *medulla oblongata* or *pituitary* and *pineal glands*,—parts not yet sufficiently examined in this malady, and which may be dangerously affected without manifesting any material change.—5th. That the appearances found in old or complicated cases are to be referred rather to the repeated derangements the circulation of the brain has suffered in the paroxysm, and to the nature of the associated disease, than to the lesions detected in fatal cases; such lesions, however, when induced in the course of other disorders, being occasionally exciting or concurrent causes of the epileptic attacks.—6th. That general congestion of the encephalic vessels evidently exists in the second or convulsive stage of the fit; but it is not so manifest that this state is present from the commencement of the seizure, as cases have presented, at this period, symptoms of a very opposite condition.—7th. This congestion is only a passing phenomenon, evidently caused by interruption to the respiratory actions, impeded circulation through the heart, and to the spasmodic action of the muscular system; and is not the cause of the seizure, the principal phenomena of the fit even ceasing at the very moment when the congestion is at its height.—8th. The paroxysms of epilepsy cannot, therefore, be imputed to the congestion, which is evidently an advanced or consecutive phenomenon produced as now stated; but must be referred to the parts on which sensibility depends, and which actuate the respiratory and muscular organs.

50. Although these positions seem not to admit of being controverted, yet there are other points necessary to a knowledge of the nature of the disease that still require to be ascertained:—(a) What are the states of the heart's action, and of the circulation, particularly in the head, just before and at the time of seizure?—(b) Is the suspension of the heart's action sometimes observed at this time, owing to a spasmodic contraction of

some continuance; or to sudden loss of power; or to an interruption of the return of blood to either side of the heart? It is obvious that, until these and other points are fully ascertained, no satisfactory conclusion can be come to respecting the nature of the disease. Numerous opinions have been offered, but very few of them require any notice. The ancients supposed that the disorder is caused by a pituitous humour in the ventricles of the brain, the symptoms arising from an effort of nature to relieve herself from it. BOERHAAVE and VAN SWIETEN imputed it to a morbid action of the brain exciting the nerves of motion, and obscuring those of sensation. Dr. CULLEN considered that it may proceed in some cases from too great excitement of the brain, and in others from collapse. Numerous modern writers have referred it to a change in the structure of parts within the cranium. But opposed to this opinion, are the facts, that in the simple disease lesions are seldom observed; and that, when observed in either the simple or complicated states, they are not uniform, or even of the same kind, and are as frequently seen in other diseases of the brain, unattended by convulsions, as in epilepsy. Dr. J. JOHNSON has remarked that the immediate cause of the attack seems to be a temporary local turgescence of the cerebral vessels, determined by a temporary super-excitement of the nervous structure of the parts thus affected. This opinion is very generally adopted in connection with the inferences, that local turgescence or plethora causes pressure; and that pressure, when general, produces apoplexy; when partial, paralysis; and when slight, epileptic convulsions,—phenomena which, doubtless, frequently arise from these conditions, but not from them alone, but likewise from others; symptoms of pressure being very often altogether wanting at the commencement of the fit.—Mr. MANSFORD, proceeding on the supposition that the nervous and electro-motive fluids are identical, has contended that the brain is constantly generating them, and that, in health, they are controlled by the will, in opposition to their natural tendencies; their formation, retention, and discharge thereby being duly regulated; but, when weakened by disease, this control is irregularly or imperfectly exercised, and their accumulation is favoured, until it reaches its maximum, when it explodes in an epileptic seizure. It is obvious that this opinion is entirely founded on a postulatium—the identity of nervous influence with the electricities—to which few will subscribe. SAUVAGES had long ago ascertained by experiment that the hemispheres of the denuded brain may be punctured without exciting sensibility; but that, as soon as the instrument reaches the origin of the nerves, or the *medulla oblongata*, epileptic convulsions are produced (*Nosol. Method.* vol. i. p. 782.), and hence concluded, that whatever especially affects those parts, may induce the disease. The opinion has been adopted by several pathologists, and probably approximates as nearly to the truth as can be expected in the present state of our knowledge.—The researches of the WENZELS have led them to imagine that the proximate cause is to be referred chiefly to the pituitary and pineal glands, especially the former; and it is not improbable that impairment or other disorder of the function I have attributed at another place to these parts (see APOPLEXY,

§ 103, 104.), may be concerned in some way or other in deranging the circulation of the encephalic organs, and in predisposing, or giving rise, to the disease. Dr. REID, insisting on the suspension of the heart's action at the commencement of the fit, and on the tetanic rigidity of the muscles in the first stage of it, has referred these changes to "Irritation or accumulation of blood in the spinal nervous mass," particularly the cervical portion. Dr. SHEARMAN has contended, with much justice, that simple epilepsy often owes its origin to deficiency of nervous energy, or irregular distribution of it, independently of vascular excitement or any primary disorder of the circulation.

51. It is unnecessary to offer any further opinion of the foregoing views. From a survey of the predisposing and exciting causes, and of their mode of operation, as well as of the connection frequently subsisting between other diseases and this, it seems probable, that changes in the organic nervous influence of the encephalon, or alterations of structure of any part within the cranium, may so affect those parts at the base of the brain, connected with the origin of the nerves, especially the *medulla oblongata*, as to suppress sensibility, derange the functions of respiration and circulation, and occasion inordinate action of the muscles, under the influence of the cerebro-spinal axis—in short, to disorder especially the functions depending upon these parts, in the manner constituting the disease. It may be urged that, if this affection arise from irritation or any other change in the parts now named, wherefore is it paroxysmal, or of occasional occurrence and short continuance? To this I can only answer, that nervous excitement, not depending upon or kept up by inflammatory action, is usually manifested in this form; that any other than functional affection of the parts about the origin of the nerves of respiration cannot produce the disease, as any remarkable change of structure of these parts is quickly followed by death; and that, presuming the change therefore to be functional, or at most very slightly structural, the successive phenomena constituting the different stages of the paroxysm most probably remove for a longer or shorter time, according to the duration of the interval, the particular condition which excited the attack. According to this view, irritations or other alterations of function or structure in remote but related organs or structures may affect the *medulla oblongata* or adjoining parts, so as to induce a paroxysm of the disease, especially in persons predisposed to disorder of these parts, the predisposition arising from the state of organic nervous influence and of circulation within the head. In such cases, the irritation is propagated by nervous connections to the situation referred to, the chief phenomena of the seizure being one of the numerous forms of morbid action depending upon *reflex sympathy*.*

* The *aura epileptica* is also, in many cases, nothing else than a manifestation of this kind of sympathy—the irritation of some internal part affecting some portion of the encephalic organs, the affection being reflected in the course of some nerve belonging to the cerebro-spinal system. In cases where this sensation may depend upon some change in the part where it originates, the paroxysm is still more evidently an expression of reflex sympathy. The reader may refer to my remarks on the *Sympathies*, in the first and second editions of my notes to M. RICHERANT'S *Physiology* (pub. 1824 and 1829), where he will find them divided into the direct and reflex—"direct sympathy," sympathy depending

52. VII. DIAGNOSIS. — The intimate relation subsisting between the diseases of the nervous system just alluded to, might lead to the inference that the diagnosis of epilepsy would be sometimes a matter of difficulty. But in the regular and uncomplicated form of the disease, no difficulty will be experienced. It is only when insensibility precedes the convulsions; or when there are no convulsions, or merely slight or partial convulsions; or when there is violent delirium in the paroxysm; or when there are convulsions with some degree of consciousness; or when one half the body is only affected—all which modifications may occasionally present themselves in both the simple and associated forms of the disease;—that the practitioner can doubt as to the exact nature of the attack. The intermediate seizures also between epilepsy and apoplexy (§ 41.), which frequently attack aged persons, and are, as respects the course of the affection, merely a variety of epilepsy, without the convulsions—the *Leipothymia* of SAUVAGES—may also be mistaken, especially for apoplexy, or for syncope; but, by attending to the history of the disease, in all its forms, and to the state of the pulse in the fit, its nature will become apparent. When the paroxysms exhibit the regular course described above, as they usually do, there can be no difficulty in the diagnosis.

53. (a) If the fit be complicated with apoplexy, it may be mistaken for the simple form of that malady; but convulsions will sufficiently show the mixed nature of the attack. In the intermediate states (§ 41.), or the paroxysms without convulsions, greater difficulty will be experienced. The nature of the seizure will, however, be evinced upon tickling the soles; for, if it be epileptic, no sensibility will be evinced, particularly in the first and second stages of the fit; whereas, in apoplexy, the patient draws away his feet, unless there be paralysis, but still one foot will retain its sensibility. Besides, this form of fit is seldom above half an hour, or an hour in duration, unless it be aggravated by improper treatment.—(b) *Hysteria* may be mistaken for epilepsy, particularly when the paroxysms of the former are severe; but the borborygmi and globus hystericus, the discharge of limpid urine, followed by laughing, crying, sobbing, &c. will indicate their nature. Moreover sensibility is only obscured, but never altogether lost, in hysteria, until it has assumed the epileptic character; and the convulsions come on first, even when the insensibility is greatest; the restoration of sensibility being often followed by a renewal of the convulsions, the patient at last recovering without any sopor, and with little or no fatigue.—(c) The convulsions of children are often confounded with epilepsy, although both affections are very distinct. The former are more

upon the organic nervous functions; "reflex sympathy," upon the cerebro-spinal. See, also, a paper, in the *Philosophical Transactions* for 1833, on the latter class of sympathies—the reflex, which the author has dignified by the name of "reflex function." The reader will then see in what this new "reflex function," of the nervous system differs from the old "reflex sympathy" of the nervous system; or whether it differs at all; also whether or not the phenomena usually designated by the term sympathetic are more correctly named by substituting for it the word function: function, in physiology, being the office any part especially performs, and not such phenomena as only accidentally or occasionally depend upon it.

continued or recurrent; are more irregular in their course; and are accompanied with more or less fever, loss of appetite, and often with thirst: whilst the latter is less frequent, more periodic, and attended by much less disorder of the digestive, circulating, and assimilating functions; the one being an *acute*, the other a *chronic*, malady.

—(d) In fine, epileptic seizures may be readily distinguished from all others by — 1st, their commencing with a scream, and sudden and complete loss of sensibility; 2d, the spastic rigidity of the affected muscles in the first stage; 3d, the convulsions being more tetanic than clonic, unless in severe cases complicated with apoplexy; 4th, the foaming at the mouth, distortion of the features, and lividity of the countenance; 5th, the priapism and unconscious discharges; 6th, the injury sustained by the tongue; and 7th, the consequent sopor, or mental aberration. The diagnosis of real from feigned epilepsy is considered in the article on FEIGNING DISEASE.

54. VIII. PROGNOSIS.—An opinion of the disease should have reference—1st, to the recurrence of the paroxysms; 2d, to their severity, duration, and the danger to be apprehended; and, 3d, to the nature of the disorder complicated with them. Of epilepsy generally it may be said, even when the simple form, and not very frequent recurrence, of the fits indicate no immediate danger, that few disorders are more intractable, or more liable to contingent complications of a very serious kind. The danger varies materially in the different varieties and states of the disease, and increases as the fits return more frequently, as they become more severe or of longer duration, and as additional disorder of the nervous system associates itself with them. — (a) In the simple forms, the cerebral symptoms, preceding and following the fits, are the chief guides in forming a prognosis; but what is known of the causes must also be taken into account. The presence of intense pain, vigilance, delirium, mania, amaurosis, paralytic symptoms, &c., either before or after the seizure, indicate organic lesions of the brain, and an unfavourable form of the disease, usually passing into some one of the complications described above. In cases of this kind, considerable danger is to be apprehended from the paroxysm, especially when there is evident plethora. Hereditary predisposition, severe injuries of the head, and the scrofulous diathesis, although not necessarily indicating immediate danger, are also very unfavourable circumstances.

55. (b) The *sympathetic states*, or those associated with or arising from disease in related organs, are generally less dangerous than the cerebral varieties. Of these forms, the most serious are the *spinal* and *cardiac*; and the least so, the *uterine*, *enteric*, and *stomachic* or *dyspeptic*, but much will depend upon the amount of disorder in the respective organs, and the habits of the patient, particularly as to indulgence of the appetites. When these are under due control, the latter three varieties often terminate favourably. The *uterine* variety sometimes disappears after marriage; but if an attack occurs in the puerperal states, it is attended by much danger.

56. (c) The *complicated varieties* present few chances of complete recovery, especially the *paralytic* and the *insane*. When, however, the paralytic symptoms are slight, or pass away soon

after the fit, recovery should not be despaired of; and the same may be said of the form attended by temporary delirium, or by *delirium tremens*, or by temporary *mania*, or intermitting insanity. M. ESQUIROL states, that epilepsy complicated with continued insanity is never cured. I have seen complete recovery from the *apoplectic* variety; but this is a complication also of great, and often immediate, danger. The *intermediate* form is much less dangerous.

57. (d) The fits usually recur most frequently in the cerebral and complicated forms; and next in the spinal and cardiac. They are most rare in the uterine, and the nephritic, and in the gastric and hepatic. Dr. CHEYNE thinks that the disease is most inveterate, when it is accompanied with chronic cutaneous affections. Addiction to masturbation aggravates and prolongs it, and often causes it to pass into the paralytic and maniacal or insane complications; but, when it has arisen from this most baneful and disgusting practice, and the patient has had resolution enough entirely to relinquish it, a complete cure will often be accomplished. Epileptic seizures from the metastasis of gout or rheumatism, or in persons of the gouty or rheumatic diathesis, may not return, if these diseases fix themselves in the extremities. When the fits arise from the syphilitic infection, a mercurial course will generally remove them permanently. M. CULLERIER has recorded several instances of this.

58. IX. TREATMENT.—I. *Of the Paroxysm.*—The *intention* is to shorten the fit, or render it less severe: but this is not easily accomplished; and the means usually recommended for the purpose, if inappropriately used, may have a very opposite effect; and either render the next seizure more severe, and the interval shorter; or convert what would have been a simple, and by no means serious, paroxysm into a recurring and prolonged seizure, followed by various unfavourable symptoms.—*Bleeding* has been advised in the paroxysm; but, unless in the epileptic convulsions of the puerperal states, or when the fits are attended by very marked plethora, or cerebral congestion, or in a first attack, especially when consequent upon the suppression of some sanguineous evacuation, it should be deferred. Besides, it cannot easily be performed in the convulsive stage of the paroxysm, at which time it is most appropriate. In the just mentioned excepted circumstances, however, I have directed it with great advantage. But in the soporose period of the fit, it should not be resorted to, unless apoplectic symptoms be present. I have seen it, at this stage, cause a return of the paroxysm as soon as sensibility had been partially restored.*

* A gentleman, residing near Portman Square, had been under my care, in the spring of 1833, for articular rheumatism. He soon recovered, and went out of town. Towards the close of the year, whilst in Scotland, he had an epileptic attack; and was bled in the arm, and cupped soon afterwards. This was the second seizure, the first having occurred two or three years before. He returned to town immediately after this second attack; and, when I saw him, there appeared no occasion for further vascular depletion: a course of alteratives and stomachic purgatives was therefore directed. Three or four days afterwards, he had a third seizure, and was brought home in the soporose stage of the fit. I did not see him until about two hours afterwards; and then a physician, who had been called in whilst I was sent for, had had him cupped largely! But, soon after the depletion, and as sensibility was returning, the paroxysm recurred. The obvious

—The *cold affusion* on the head and occiput is sometimes useful, particularly where there is much heat of the head, and when the disease has been consequent upon or connected with hysteria, or associated with uterine disorder; but in other circumstances I have not seen so much advantage from it as I had anticipated. BRERA (*Giorn. di Med. Prat.* t. iii. c. 3.) however, speaks of it very favourably. It requires, however, discrimination as to the time and manner of employing it; for it may be even injurious, if resorted to in the soporose stage, or continued too long, especially when the head is cool, and the pulsation of the carotids is weak: in these, the *tepid or warm affusion* is much more appropriate. — *Antispasmodic and purgative enemata* are, upon the whole, as safe and efficacious means as can be employed in the fit. When there is but little determination to the head, the assafœtida injection, with or without a small quantity of camphor, and some castor oil, may be preferred. But when this symptom is present, the terebinthinated enema (F. 150.) is more efficient. In some cases it will be advisable to combine these substances, or to add others.

59. Under every circumstance, all ligatures and cinctures should be instantly removed; and the patient placed in bed, in a large and very airy apartment, with the head and shoulders much elevated. A cork or wedge-shaped piece of soft wood ought to be introduced between the teeth, and the struggles gently but forcibly restrained, so as to prevent the patient from injuring himself by their violence. Certain popular remedies have been noticed by writers. Dr. F. HAWKINS thinks that filling the patient's mouth with common salt is not without use; and J. FRANK entertains a similar opinion of placing a piece of cold metal in the hands. I have seen apparent benefit from a similar application to the nape of the neck and occiput; and probably ice, or the cold affusion, in this situation, would be

equally useful. Upon the whole, excepting the precautions recommended above, it will be as well to adopt the advice of CÆLUS, and to do but little in the paroxysm, unless under the circumstances now stated. Where the fits are moderate and uncomplicated, and especially when the practitioner is either in doubt, or insufficiently informed as to the state or variety of the disease, this is certainly the safest plan; for in the simple forms of epilepsy, I have seen more harm than advantage from the "*nimia diligentia medici*" during the paroxysm.

60. ii. *Treatment in the Intervals.* — Upon visiting an epileptic patient, the physician should enquire into his general health, disposition, avocations, habits, modes of living, and former attacks of this or of other diseases; and ascertain the causes of the first seizure. The information thus obtained, viewed in connection with his present state, will generally enable the physician to ascertain the following things, which are of the utmost practical importance:—(a) The existence of plethora, of asthenia, or of inanition, and the probable extent of either, in the *simple*, the *sympathetic*, and *complicated forms* of the malady;—(b) The states of the digestive, assimilating, circulating, depurative, and generative functions, and of the organs chiefly concerned in them—or the *sympathetic forms* of the disease;—(c) The existence of other disorders of the nervous system, and especially with reference to chronic inflammation, or its effects in parts within the cranium—or the *complicated states*;—(d) The evidence of impending or of more remote danger. Having thus analysed the case, the particular *variety* to which it should be referred will be determined with greater ease. Proceeding thus, in order to the due appropriation of the means of cure, the physician should direct them calmly and decidedly, with reference to the disposition, the feelings, the weaknesses, and the irresolution of the patient; and in a manner calculated to gain his confidence, and to inspire hope. In this, as well as in all nervous diseases, the communications of the physician should be brief, clear, and forcible, without descending to any explanation whatever, either as to the cause or intimate nature of the disease, and the operation of the remedies he recommends, or as to his reasons for adopting them in preference to others; for these are matters respecting which no one but a well-educated medical man can think aright, or should even attempt to think. All endeavours to explain abstract matters connected with disease, and the means of removing it, to unprofessional persons, however well informed they may be, is to place ourselves at the mercy of the pragmatical objector or self-sufficient volunteer in the professed cause of humanity. That ignorant empirics are sometimes apparently more successful in the cure of nervous diseases, than scientific practitioners, chiefly arises from the circumstance of the former being incapable of stating their views, or assigning reasons for their procedures; whilst the latter, as justly remarked by Dr. CHEYNE, are generally very much too ready, as respects both their own reputation, and the confidence of their patients, to explain every thing. The empiric is fully convinced of the justice of the apothegm—"Omne ignotum pro magnifico,"—and acts conformably with it:

course in this case was, to have caused the patient to be removed to bed, and to have stated that nothing further was requisite in that stage of the fit until the patient had partly slept off the exhaustion; when the physician in attendance would pursue that course which his knowledge of the antecedent disorders and state of the patient would warrant.

Whilst this was passing through the press, a man of middle size apparently about forty, consulted me; and stated that he had been seized with the first paroxysm of the disease immediately post coitum quinquies repetitum duabus cum puellis inter horas perpaucas; that he had been bled to about a pint soon afterwards, and experienced a still more severe fit about a month after the first; that the third seizure occurred about a fortnight after the second, during which he fell down and cut his head, the cut part having bled a pint at least, that his usual medical attendant upon arriving soon after the termination of this fit, bled him largely from the arm; but that, as soon as the vein was closed, the fit recurred; and that, during the struggles, the vein broke out, and the blood was allowed to flow until two or three pints were taken in addition to the quantities lost just before. The person who accompanied him to my house, on account of his weak state, and who witnessed the paroxysms, stated that this last was most severe; and that the fit which recurred during the depletion, and which was attempted to be put a stop to by continuing the abstraction of blood until a very unusual quantity was lost (about five pints in all) was remarkably prolonged and violent. The patient is now pale and weak, with a waxy appearance of the surface; completely exhausted, physically and mentally; and constantly dreading a recurrence of the paroxysms. This case furnishes a very remarkable instance, not only of the failure of large blood-letting in arresting or shortening the fits, but also of its influence in rendering them more frequent and violent, when injudiciously prescribed.

the man of science is candid, and ready to impart to others the views he entertains. The silence of the one, although generally the cloak of ignorance, imposes more on the public than the open deductions of the other, however confirmed by science and enlightened experience.

61. iii. *Treatment of Simple Cerebral Epilepsy.*

— A. This form of the disease, depending upon *deficient power*, and *inanition* (§ 27.), being occasioned chiefly by exhausting discharges, vicious habits, or imperfect nutrition, obviously requires the removal of these causes, and means to invigorate the nervous system, and equalise the circulation, which, even when the blood is most deficient in quantity, is generally inordinately determined to particular organs, and especially to the brain, during the convulsive stage of the fit. In this and the other form (§ 63.) of the cerebral disease, the moral means just hinted at are especially required, with the regimen hereafter to be described; and, whilst the mind is confirmed thereby, these intentions may be simultaneously fulfilled. With this view, a light and nutritious diet, in very moderate quantity, and chiefly farinaceous, may be allowed; and the preparations of *iron* exhibited in conjunction with bitter tonics, or stomachic laxatives. The feet should be kept warm, and the head cool, whilst the circulation on the surface is promoted by daily shampooing, or by frictions with coarse flannels or the flesh-brush. If there be occasional flushes, or increased heat of the scalp, the hair should be cut close, and the head sponged night and morning, or even oftener, with a cold acetous lotion. Moxas or blisters may be applied behind the ears, and repeated from time to time, or a seton inserted in the nape of the neck. In some cases, the latter may be found too irritating or exhausting; but, even in these, it may be of service, if the rest of the treatment and regimen be sufficiently invigorating; and the digestive and assimilative functions be judiciously promoted. As amendment proceeds, the cold sponging of the scalp may be replaced by the daily use, in the morning, of the shower bath.

62. Where we have reason to suspect that the disease has been induced by venereal excesses, the subcarbonate of soda may be given with tonics, and soda water taken as a common beverage: but neither of these ought to be continued too long. In the scrofulous diathesis, and where we suspect organic change, BRANDISH'S alkaline solution may be prescribed, in any of the bitter infusions; or a solution of the ioduret of iron, or of the hydriodate of potash. In a case very recently under my care, three grains of blue pill, with seven of the aloes and myrrh pill, were given on alternate nights, and one of the above preparations of iodine during the day, with very remarkable advantage. When the functions of the liver are impaired, as occasionally happens, small but frequent doses of the preparations of mercury, with taraxacum, taking care not to affect the mouth, will be of service. I have found them, however, often fail of improving the excretions, until tonics were also exhibited. In a case of this kind, I prescribed very small doses of the oxymuriate with the compound tincture of bark, and the preparations of sarsaparilla, with great benefit. Equal proportions of the nitric and muriatic acids, thrice daily, or oftener, or the

addition of them to the warm foot-bath, may also be useful. — When the disease proceeds from excessive sexual indulgences, late hours, and addiction to intoxicating liquors — a combination of causes by no means infrequently inducing it — the alkaline carbonates, or the liquor potassæ with the infusion of valerian, or bitter tonics; or very small doses of camphor with the oxide of zinc, and cinchona, or the tincture of the muriate of iron in the infusion of quassia, may be employed. In this, as well as in the other varieties of the disease, when depletions and depressing agents have been carried too far, the preparations of iodine, or the extract of nux vomica, or strychnine, or other tonic and antispasmodic remedies hereafter to be noticed, may be prescribed, in forms of combinations which the peculiarities of the case will suggest.

63. B. *Simple cerebral epilepsy, connected with plethora or excited action* in the head, is the most common form of this variety, in this country; and requires, according to the apparent degree of either of these pathological states, *bloodletting*, general or local, or both; and, subsequently, the affusion of cold water on, or cold sponging, the head, or the shower bath; derivatives, particularly setons, moxas, or issues, or blisters behind both ears, kept open some time, or often repeated; and purgatives every second or third night, with low diet, and total abstinence from all spirituous and fermented liquors. Unless plethora or vascular action be very considerable, local bloodletting once a month, in moderate or small quantity, is preferable to large depletions; and, if the fits recur monthly, the patient may be cupped just before the new or full moon, according to the period at which the fits recur. Dry cupping over the nucha and between the shoulders may likewise be practised once or twice, or even oftener, between the bleedings, as judiciously advised by Dr. CHEYNE. An issue or seton near the nape of the neck, or an open blister, is more serviceable in this than in the preceding form of cerebral epilepsy. Where there is manifest determination to, or increased vascular action in, the brain, antimonials, and especially James's powders, are often beneficial. Dr. CHEYNE (*Dub. Hosp. Rep.* vol. i. p. 315.) recommends this powder to be taken at bedtime, commencing with two or three grains, and increasing the dose by half a grain each night, until a sensible effect is produced on the skin, stomach, or bowels. If it occasion sickness, the dose should be diminished one grain on the following night. He states that, by adding a few grains of rhubarb to it, a larger quantity of the James's powder will be borne by the stomach than could otherwise be taken. If it produce diaphoresis, the same dose may be continued for three weeks, and then it should be reduced half a grain each night; the course of this medicine thus usually extending to six weeks. In this manner the dose may be increased to fifteen or twenty grains, and continued for some weeks, without offending the stomach. When we suspect the existence of a state of chronic inflammatory action, the *antimonial liniment* (F. 301.) or *ointment* (F. 749.), may be rubbed along the spine, or over the nape of the neck and occiput; the latter application being continued until a copious eruption of pustules is procured, which should be kept out for some time.

64. Although *cerebral* or simple epilepsy frequently appears connected with one or other of the states of vascular fulness and action above specified, yet cases will also often occur in which the practitioner will be at a loss to determine the presence of either; the disease being dependent upon deficient nervous power, with irregular circulation or distribution of blood, rather than upon any deficiency or excess of this fluid. In these cases, the vital nervous system is primarily and chiefly in fault; congestion or irritation possibly also existing in the medulla oblongata or adjoining parts of the encephalon. But little advantage can be expected in such from depletions only, especially when pushed far, as they will increase these morbid states, and even favour determination of blood to the head. I believe that most advantage will accrue from such remedies as will promote an equable and free action of all the excreting organs, and impart tone to the nervous system. Light diet and very moderate use of animal food; total abstinence from fermented and spirituous liquors; careful avoidance of the predisposing and exciting causes, and particularly of those in which the case originated; regular exercise in the open air, taken often, and short of fatigue; travelling, or frequent change of air; a due regulation or moderation of all the passions and appetites; the daily use of the shower bath; external irritation or derivation; and anti-epileptic tonics and antispasmodics; or moderate local depletions, or dry cupping, or both, as circumstances may indicate; are the most rational resources. When the case evinces an inclination to one or other of the states above considered, the treatment pointed out with reference to it should be enforced to an extent co-ordinate with the amount of such disorder. If there be any tendency to plethora or excited action, animal food should be altogether relinquished, — a measure advised also by FOTHERGILL, HEBERDEN, FRANK, ABERCROMBIE, and CHEYNE.

65. iv. *Treatment of the Sympathetic Varieties.* — A. *From Disease of the Spinal Cord or Nerves* (§ 30, 31.). — This variety will necessarily require either vascular depletions, or tonics, or even both, according to the degree in which plethora, increased action, or deficient power, is inferred to be present. — (a) Where increased fulness or action exists, cupping, the application of leeches, and dry-cupping in the course of the spine, the insertion of setons or issues a little below the seat of pain, frictions with the mercurial and compound camphor liniments, or the repeated application of moxas, are the most efficient means, aided by purgatives, the usual antiphlogistic remedies, and by rest. — (b) Increased vascular action in the spinal cord, or its surrounding parts, is, however, often associated with deficient power, and sometimes even with inanition. In such cases, whilst moderate local depletion, dry cupping, external derivation, &c. are resorted to, the more antispasmodic tonics, as valerian, myrrh, castor, &c., and even the preparations of iron, cinchona, camphor, ammonia, &c., should be prescribed. — (c) This state of disease is not infrequently induced by masturbation. In this case, cold aspersion of the genitals, night and morning; sponging the spine with cold salt water, or with vinegar and water; or the effusion or aspersion of these along the back; and the internal use of

the muriated tincture of iron, or of the carbonate of iron with soda, or of BRANDISH's alkaline solution in tonic infusions; will prove of the greatest benefit. Due regulation of all the secretions and excretions; early rising; and, as the strength increases, a shower bath every morning; will also be powerful adjuvants. When cold sponging, &c. are not resorted to, tonic plasters (F. 111. 117, 118.) may be applied along the spine. — (d) If pressure from the effusion of lymph, or serum, or from the thickening of some portion of the sheath of the cord, be inferred after a careful examination, the preparations of iodine may be tried both internally and externally, particularly the hydriodate of potash, or the ioduret of mercury; or the linimentum hydrargyri and the linimentum terebinthinæ may be rubbed along the spine night and morning. — (e) If the fits be preceded by an *aura*, a ligature should be instantly applied above the place at which it commences, if this be practicable; or a seton or issue inserted in the part, and kept freely discharging; or a blister applied before the expected return of the paroxysm, and either preserved open, or often repeated. — (f) Sometimes this variety is connected with uterine irritation or disorder; it being almost impossible to determine whether the spinal or the uterine affection is primary, or which of them is most instrumental in causing the epileptic seizures. Cases of this kind are met with chiefly in large or manufacturing towns, and in females who have become addicted to sexual excitement; and appear to me to be most benefited by counter-irritation in the course of the spine; by the application of an antispasmodic liniment (F. 297. 311.) in this situation; and by the alkaline carbonates, or BRANDISH's solution with hyoscyamus, in tonic infusions or decoctions. Subsequently, the remedies enumerated above (c) may be prescribed.

66. B. *With especial Disorder of the Heart or Lungs* (§ 32.). — It is by no means easy to determine what is the most appropriate and successful treatment in these states of the disease. Local depletions, antispasmodic tonics, or chalybeates, according as the case may present excess or deficiency of blood, aided by purgatives or laxatives, and regulated diet, are generally required. External derivation, chiefly by means of one or two setons or issues, should not be omitted. It has been supposed that the circumstances especially indicating the propriety of resorting to setons or issues, contra-indicate the exhibition of tonics. But such is certainly not generally, nor even frequently, the case in this disease. I believe that, in many instances in which these external means fail of affording relief, the failure has been partly owing to their having been employed, either at a time when the system has been too far reduced by depletions; or in conjunction with those and other depressing agents, in cases wherein such treatment was inappropriate, or carried too far. Where the function, or even the organisation, of the heart is affected in epilepsy, it will be found that greater benefit will accrue from a judicious exhibition of tonics and antispasmodics, aided by external derivation, than from other remedies. In many cases, the disorder near the centre of the circulation depends either upon deficient or irregularly distributed nervous power, or upon some affection of the medulla oblongata,

and is merely a varied manifestation of the primary form of the disease. In these, the treatment already advised for that form, according to the states of vascular fulness and action, will be appropriate. Where signs of pulmonary congestion or inflammation appear after repeated seizures, vascular depletions, external derivation, and low diet, must be chiefly depended upon. When the fits are preceded by a feeling or any other symptom of cardiac disturbance, an antispasmodic medicine should be in readiness for the patient to resort to. The following have been recommended; and either of them, or F. 423. or 424. may be taken, in any of the forms of the disease, when premonition of the fit is felt.

No. 210. R. Aquæ Ammon. Sub-carbon. ℥j.; Tinct. Succini ℥ij.; Tinct. Castorei, Tinct. Assæfætidæ, aa ℥vss. Capiat æger cochleare unum minimum, vel duo, in aquæ cyatho. (DE HAEN.)

No. 211. R. Fol. Recent. Lauri-Cerasi ℥vij.; tere cum Sacchari Albi ℥xiv.; Pulv. Fol. Aurantii ℥j.; Syrup. Rosarum et Syrup. Violar. aa ℥ij. Fiat Electuarium, cujus capiat cochleare unum medium ante paroxysmi accessionem. (VAN MONS.)

No. 212. R. Spirit. Ammoniz Succinati ℥ij.; Tinct. Castorei, Tinct. Valerianæ, aa ℥ijss.; Mist. Camphoræ ℥vij. M. Capiat coch. ij. vel ij. magna, adveniente paroxysmo.

67. C. With Disorder of the Digestive Organs.

—(a) In the gastric association, it may often be requisite to commence with an emetic, consisting chiefly of the sulphate of zinc. But the frequent repetition of it is very rarely of the least advantage. Although the appetite is often ravenous, yet digestion is slow and imperfect, and needs the aid of tonics associated with laxatives. The compound galbanum pill may be given through the day, conjoined with equal quantities of inspissated ox-gall and Castile soap, or with the extract of gentian and quinine; and, when the bowels are sluggish, three or four grains of the gall may be taken on alternate nights with an equal quantity of aloes. If the biliary secretion be deficient, a full dose of calomel once a week, followed by a purgative draught (F. 181, 182.), will be requisite. If there be deficient action, or fulness, of the vascular system, or general asthenia, the *mistura ferri composita*, or the *mistura ferri aromatica* (*Dublin Pharmacop.*), may be exhibited; or the sulphate of iron, or of zinc, or of copper, or of quinine, may be prescribed with some tonic or antispasmodic extract, or with the compound galbanum pill. In cases evincing great depression of nervous power, with deficient tone of the vascular and muscular systems, these latter remedies, or the ammoniacet of copper, the extract of nuxvomica, or strychnine, or the nitrate of silver, may also be tried, and in similar forms of prescription. It is in this variety that travelling, and change of air, of domicile, or of habits, as advised by DE HAEN, is most likely to be of service, as Dr. CHEYNE remarks. In many cases, it will be necessary to assist the digestive organs, either shortly before, at the time of, or soon after, a full meal. With this view, the aloes and myrrh pill, or aloes with mastich, or with the addition of capsicum, has been generally recommended. — Either of the digestive pills in the Appendix (F. 558. *et seq.*) may be directed in this manner. The ox-gall with extract of gentian, or of hop, and a grain or two of aloes, is the most beneficial; a small portion of the aloes acting fully on the bowels, when combined with these bitter tonics,

or with the sulphate of quinine. These will seldom or never fail of preserving the bowels very freely open; but if irritation in the rectum be excited by them, they may be relinquished for a time, and injections substituted; or they may be prescribed, in a more purgative form, every second or third night.

68. (b) Cases manifesting hepatic disorder (§34.) should be treated with reference to the nature of that disorder. If symptoms of excited action be present, general or local depletions, antimonials and cooling diaphoretics, and a seton or issue near the region of the liver, will be necessary. If there be enlargement, chronic obstruction, torpor, or accumulation of bile in the ducts, deobstruent purgatives, especially the preparations of mercury, the taraxacum in large doses, and subsequently a course of alteratives (see especially F. 503—511.); the repeated application of blisters over the hypochondrium; and the dilute nitro-muriatic acid, internally or externally, or both; will be productive of more or less benefit. As, in these cases, the functions of both the stomach and intestines are also impaired, these means should be conjoined with so much of the treatment directed with reference to disorder of these organs (§ 67. 69.) as the peculiarities of the case may warrant.

69. (c) *Epilepsy from worms or other disorders of the intestines* (§ 35.) should at once be treated by the purgative anthelmintics; for, even where no worms may exist, these medicines frequently remove morbid matters which have accumulated in the *prima via* in this variety. Having expelled these sources of irritation, antispasmodic tonics—especially valerian, assafoetida, camphor, galbanum, the preparations of iron, &c. — will generally be of great service, in preventing both a recurrence of the paroxysms and the regeneration of worms. It is in this variety that an occasional full dose of the oil of turpentine, either with castor oil, or followed, in two or three hours, by this or some other purgative, is most beneficial. A full dose of calomel should also sometimes precede the exhibition of the turpentine; and their action may be further assisted by enemata with equal quantities of these oils. When the symptoms described towards the conclusion of paragraph 35. are present, purgatives and purgative enemata every second and third day; and tonics or chalybeates, with warm cardiacs and anti-spasmodics, should be prescribed for a considerable period. Frictions of the surface, particularly of the abdomen, loins, and thighs, ought also to be employed daily, occasionally aided by warm embrocations or liniments. Subsequently, the shower bath may be directed, and steadily persevered in, with such other of the remedies already recommended as the circumstances of the case may require. Where associated disorder of the *spleen*, *pancreas*, or *mesenteric glands* is present (§ 36.), purgatives, deobstruents, and tonics, variously combined, and the preparations of iodine, with external derivation, are chiefly to be relied upon. In this variety, the following stomachic purgatives, taken alternately, at bedtime, will frequently be very serviceable:—

No. 213. R. Pilul. Hydrarg. (vel Hydrarg. cum Cretâ), Pil. Galban. Comp., Extr. Colocynth. Comp., aa gr. iv.; Fellis Bovini inspissati gr. ij. M. Fiat Pilulæ ij. pro dosi.

No. 214. R. Sodæ Sub-carbon. ℥j.; Sodæ Sulph. ℥ss. — ℥j.; Infus. Senar., Infus. Calumbæ, Aquæ Pimentæ, aa ℥v.; Tinct. Cardamom. Comp. ℥j. M. Fiat Haustus.

70. *D. From Disorder of the Generative and Urinary Organs.*—The causes (§ 37.) of this variety should be ascertained and removed, otherwise medicine will be of little service. The treatment should depend chiefly upon the degree of vascular fulness and action, in connection with the state of nervous power. When it has arisen from suppressed catamenia, or from amenorrhœa, without any chlorotic appearance, bloodletting may be safely prescribed and repeated; and the usual means of restoring this evacuation resorted to. But when the fits appear before the catamenia are established, the period of puberty having arrived, blood-letting must be more cautiously employed, unless there be evident plethora, when it may be prescribed much more freely; and it should be aided by such emmenagogues and purgatives as the habit of body, diathesis, and strength of the patient will warrant. If the disease be attended by signs of irritation of the uterus or ovaria, or by hysterical symptoms (§ 37.), heating and stimulating emmenagogues and antispasmodics should be laid aside, and those of a cooling and sedative kind prescribed, such as nitre with the subcarbonate of soda or of potash, with hyoscyamus or the preparations of hop. When the fits follow the subsidence of regular and free uterine evacuations, vascular depletion is very seldom beneficial; the antispasmodic tonics, as valerian, the ammoniated tincture of valerian, assafoetida, the metallic sulphates, &c., occasional purgatives, and strict attention to the digestive functions, being much more appropriate. If the fits be connected with dysmenorrhœa, or scanty menstruation, vascular depletions, especially from the feet immersed in warm water, are generally of service, when the habit is full or the strength unimpaired. After the necessary evacuations, large doses of camphor combined with opium or hyoscyamus, also in large quantities, will generally relieve the more urgent symptoms. This practice has been pursued by me for several years, and has very recently been recommended by Dr. CHEYNE. Semicupium, or the hip-bath, the internal use of the sub-borate of soda, and frictions of the lumbar region, abdomen, hips, and thighs, night and morning and after coming out of the bath, by a hard flesh-brush, or by flannel, will also be useful adjuvants. If the attacks occur about the commencement of the menstrual period, the application of a number of leeches near the groins, or on the insides of the thighs, shortly before the expected time, will often render the attacks more and more slight, and increase the discharge. Setons or issues in the latter situation will sometimes have a similar effect. If the catamenia be too abundant, or too frequent, or if symptoms of inanition or asthenia be manifest, the invigorating measures already advised ought not to be neglected. The connection of this form of the disease with manustupratio, or with great irritability of the sexual organs, should be kept in recollection; and where either the one or the other is detected, or even suspected, a strict mental and moral discipline, with the means recommended above (§ 62.), ought to be instituted. An occasional full dose of turpentine, either conjoined with some other purgative, or preceded by a dose of calomel, or followed by a brisk cathartic, and turpentine enemata, are sometimes of great service, particularly when the fits proceed from

suppressed, obstructed, or difficult menstruation. Dr. PRICHARD advises the turpentine, in this state of the disease, to be given in an emulsion, in doses of from half a drachm to two drachms three times a day, or two drachms every night; but in this mode of exhibition it is generally nauseated, and is often productive of disagreeable effects, unless it be conjoined with some other purgative. If the fits be connected with disease of the urinary organs (§ 37. b.), the alkaline carbonates, with hyoscyamus; and oily purgatives, or other remedies suited to the disorder of these organs; will often prevent or relieve them.

71. *v. Treatment of Complicated Epilepsy.*—The complicated states, being evidently, in a large majority of cases, caused by advanced grades of the same pathological conditions as produced at first the simple epileptic paroxysms (§ 28. 51.), generally demand similar measures to those directed in the cerebral forms, but in a more energetic and persevering manner, especially when occurring early in the disease, and in young or robust persons.—*A. The complication with mania or insanity* will require, according to the history, the stage, and the existing circumstances, of the case, either copious depletions and evacuations, or an invigorating treatment, conformably with the principles already stated. Chronic inflammation of the brain or of its membranes should always be dreaded in this unfavourable form of the disease; and wherever the state of the circulation, and the symptoms referable to the head and organs of sense, especially the pulse in the carotid, and the temperature of the scalp, evince its existence, general or local bleeding; the cold affusion on, and sponging, the head; purgatives; mercurials with antimonials, particularly calomel and James's powder; external derivation; irritating liniments, setons, or issues, &c.; should be employed, according to the habit of body and degree of vascular action and vital power. When the complication is of a *maniacal* kind, and vital power is not much impaired, these means may generally be energetically prescribed; repeated local depletions, the spirits of turpentine in purgative doses, and calomel with antimony pushed so far as to affect the mouth, being often of great service, especially if it occur in young robust persons, or from the suppression or disappearance or some other disorder, or of accustomed evacuations. But when the mental disturbance has slowly supervened, or attended an asthenic state of the disease (§ 27.); or has arisen from causes productive of exhaustion or inanition, consisting more or less of the low forms of *insanity*, or of mental weakness; the treatment advised with reference to the nervous or asthenic form of cerebral epilepsy (§ 61, 62.) must be pursued; external derivatives, and free alvine evacuations, being also directed. In this complication, the functions of the heart, digestive canal, liver, and uterine organs, should be duly regulated, as already recommended in the sympathetic varieties, whenever they present any manifest disorder.

72. *B. The apoplectic complication* (§ 40.) must be treated conformably with the principles explained in the article APOPLEXY. But my experience enables me to state that bloodletting can seldom be safely carried so far in it as in true apoplexy; and that cupping on the nape of the

neck, leeches behind the ears and to the temples, purgatives frequently repeated, brisk cathartic enemata, and external derivatives, are chiefly to be confided in. After recovery from the seizure, the measures appropriate to the habit of body and other circumstances of the case, as described with reference to the sanguineous form of cerebral epilepsy (§ 63.), should be resorted to. The *intermediate states* between apoplexy and epilepsy (§ 41.) will require local depletion, alvine evacuations, and restorative medicines, according to the evidence furnished of vascular fulness, or of vital and nervous depression. In the intervals, stomachic purgatives, and antispasmodic tonics, with regulated diet, change of air, &c., will generally be necessary. When these states are connected with disorder of the uterine functions, the measures directed in the uterine form of epilepsy should be prescribed.

73. *C. The complication with paralysis* (§ 42.) will seldom be treated with any success, unless the palsy be partial, and pass off soon after the fit; when we may infer that it has been owing to the congestion attending the convulsion. When the patient is young, of a full habit, or of unimpaired powers, *bloodletting*, general or local, or repetitions of the latter, will be requisite; aided by purgatives, setons, and the other means advised in the apoplectic complication. But in persons presenting evidence of asthenia or inanition, the preparations of *iodine*, especially the hydriodate of potash, and ioduret of iron; the extract of *nuxvomica* with aloes, or the aloes and myrrh pill, or *strychnine*, in any of the forms given in the Appendix (F. 542. 565. 907.); and the metallic sulphates, with the antispasmodic tonics, especially valerian, serpentaria, assafoetida, camphor, ammonia, &c.; will be most beneficial. But, even in these cases, purgatives should not be neglected; such as are of a warm stomachic kind being selected, and exhibited regularly every second or third day, so as fully to evacuate the bowels. In the more sthenic states of this variety, complete recovery from the paralytic symptoms is sometimes witnessed after free evacuations; but the patient is not secure from a return of the paroxysm in some one of its most dangerous states of complication, although his health may appear quite re-established. In a case to which I was lately called, these symptoms disappeared after full bleeding from the arm, copious purging, &c.; and the patient was able to pursue his occupation, and expressed himself quite well: but in a few days he was seized with another fit, of which he died in a few minutes. The bloodletting which I directed in this case was large; but the habit of the patient, the state of the pulse and of the blood drawn, and the effect produced by it, indicated the propriety of having recourse to it in a decided manner.

74. *D. Of the other complications* (§ 43.) of this malady, little further need be adduced. They require more especially a persevering use of stomachic and deobstruent purgatives, with antispasmodics, external derivatives, and due attention to diet and regimen, varied and associated with other means according to the particular nature of the complication, or sympathetic disorder, and the habit of body and other circumstances of the case.

75. *vi. Remarks on the Remedies and Means of Cure recommended by Authors, with reference*

to the Varieties and Circumstances in which they are most appropriate.—*A. Bloodletting*, general and local, has been recommended by most writers; but the extent to which it may be carried has rarely been understood, and never attempted to be assigned. At the present day, it is more frequently carried too far than neglected when it ought to be directed. Of modern writers, Dr. CULLEN and Dr. BRIGHT have estimated it in a manner which approaches the nearest to the results of my own experience. If carried too far, or performed in such a manner as to induce full syncope, it is apt to bring on a paroxysm; and if it be not followed by purgatives, restricted diet, and regular exercise, it will only increase the tendency to plethora. The circumstances in which it should be prescribed, as well as those in which it ought not to be resorted to, have been explicitly stated; but the extent to which it should be carried, the particular situation and manner of performing it, and the repetitions of it, can be regulated only by the existing circumstances of the case,—by the habit of body, the state of the pulse, the modes of living, the strength of the patient, and the causes producing and tending to perpetuate the malady. Dr. HEBERDEN expresses himself strongly against bloodletting; but the class of persons amongst whom he practised, and the inhabitants of large towns, subject to this disease, certainly are not so much benefited by this evacuation as those otherwise circumstanced; and yet, even in them, very small and often-repeated local depletion is frequently of great service.

76. *B. Purgatives*, and purgative enemata, have nearly all writers in their favour; and I believe that there is no class of medicines which is less capable of abuse in this disease than they. But the success of the practitioner will depend chiefly upon the selection and combination of them appropriately to the peculiarities of the case; and upon his firmness in persisting in them, when they are clearly indicated, although little apparent benefit at first results from them. The more drastic purgatives, as *elaterium*, *croton oil*, and the *hellebores*, have been prescribed; and are most suitable in the plethoric states, and apoplectic, paralytic, and maniacal complications of the disease. The fetid, black, and even the white *hellebores* have been recommended from HIPPOCRATES to the present day; and are often very serviceable in the verminous and uterine varieties, and in the maniacal complication, in which they have been prescribed by CELSUS, ARETÆUS, ALEXANDER TRALLIANUS, SCHULZ, STARKE, SMYTH, GREDING, and PRICHARD. PLINY states that the tribune DRUSUS was cured of epilepsy by the black hellebore. The powder of the root, or the extract, may be given in doses of ten grains increased to thirty; or the decoction of the leaves or root may be employed. In the apoplectic and paralytic complications, the extract or decoction are advantageously given in enemata. The *oil of turpentine*, especially conjoined with *castor oil*, in order to insure its cathartic operation, is a very efficacious medicine, exhibited either by the mouth, or in clysters. It is, in the latter mode of administration, the safest and most active of antispasmodics that can be given during the paroxysm; and, when prescribed in energetic doses, and suitably combined, it produces a very remarkable

derivative action from the head, whilst it fully evacuates the intestinal canal, and stimulates the abdominal organs. Hence it is especially serviceable in the enteric, verminous, uterine, apoplectic, maniacal, and paralytic states of the disease. It has been employed successfully by LATHAM, YOUNG (*Trans. of Coll. of Phys.* vol. v. p. 52.), PERCIVAL (*Edin. Med. and Surg. Journ.* vol. ix. p. 271.), LITHGOW (*Ibid.* vol. xi. p. 301.), PRICHARD, and by myself (see *Med. and Phys. Journ.* for May and July, 1821.) The ancients, as well as the moderns, have depended also upon *scammony*, *colocynth*, and *aloës*; but of these, as well as of *calomel*, it is unnecessary to make further mention. Dr. HEBERDEN was averse from the use of purgatives, excepting in the enteric variety, owing probably to the reason assigned above (§ 75.); and certainly, in the more asthenic states of the disease, and when the circulating fluids are deficient in quantity and quality, if trusted to mainly, they will be productive of mischief rather than benefit. In such cases, they should be given only on alternate days, or every third day,—should be of a warm and stomachic kind, or combined with tonics, and associated with the means recommended above (§ 67.). THOM, J. FRANK, KINNEIR, MANGOLD, &c., prefer *rhubarb*, the *neutral salts*, and the *supertartrate of potash*. This last, given in large doses, is most serviceable, when persisted in, if the vascular system be plethoric, and the biliary secretion in a morbid state. GALEN and many recent writers have preferred *aloës*. In some one or other of its preparations and combinations, it is the most generally appropriate purgative that can be prescribed. With stomachic, chalybeate, and cardiac medicines, it is suitable in the asthenic cases; and combined with ox-gall, or with sulphate of quinine, or with bitter extracts, &c., it will act with very remarkable energy, and without depressing vital power,—a circumstance of peculiar importance in the treatment of epilepsy.

77. *C. Emetics* have been recommended by ARETÆUS, ALEXANDER of Tralles, ZACUTUS LUSITANUS, ETTMULLER, RONCALLI, WERLHOFF, LETTSON, J. CLARKE, and others. VAN SWIETEN and J. FRANK assign, with much propriety, the circumstances in which they should be given, in prescribing them only when the fits appear to proceed from disorder of, or the irritation of morbid or noxious matters in, the stomach. DE HAEN directs them when the paroxysm is preceded by nausea; TISSOT, when a sense of weight, or a ravenous appetite, is felt; and RICHTER, shortly before the expected return of the fit. MAYER is favourable to the use of them, particularly of *ipecacuanha*, exhibited in doses short of producing full vomiting; and MARRYAT prefers those containing the *sulphate of copper*. HEBERDEN considers them injurious; and FRANK remarks, that he has never known an instance of a cure having been effected by them, although he believes that they have cleared the way for the action of other medicines. I agree with MEIBOM, in restricting them to the stomachic form of the disease, and in considering that they may be injurious in most other states, especially when there is much vascular fulness, or cerebral congestion.

78. *D. Diaphoretics* are much praised by TISSOT and LENTIN, who consider it of much importance to promote a free and equable perspiration,

which is seldom observed in epileptics. James's powder, as prescribed above, or the other preparations of *antimony*, may be selected, particularly in plethoric persons; or the *vinum ipecacuanha* may be given with *liquor ammoniæ acetatis*, and the *spiritus ætheris nitrici*. These are, however, most serviceable after other evacuations have been employed; and when the skin is dry; and then their operation may be aided by the tepid bath, as advised by TISSOT and MARCARD. Dr. ABERCROMBIE, according to Dr. COOKE, has seen benefit from the *tartrate of antimony* given four times a day, in such doses as the stomach could bear. I had recently a patient under my care, who experienced a very severe attack whilst he was under the influence of this medicine.

79. *E. Emmenagogues* are required in those states of the uterine form of the disease that are connected with delayed, suppressed, or difficult menstruation. The *oil of turpentine* is one of the most efficient of this class of medicines that can be given in such cases, as fully shown by Dr. PRICHARD, more especially after *bloodletting* from the feet, or leeches to the groins and tops of the thighs, and the hip-bath, or semicupium, have been prescribed. The *sub-borate of soda* is also sometimes of service, either given alone, in doses of ten or fifteen grains; or in conjunction with other emmenagogues and antispasmodics,—more especially with camphor, or valerian, castor, ammonia, galbanum, assafoetida, aloës, &c. (F. 268. 368.) But, as M. MAISONNEUVE justly remarks, the restoration of the uterine functions to their healthy state is not always followed by a cure or even alleviation of the disease. When this is the case, the treatment must proceed according to the principles already explained. Marriage has occasionally removed the seizures, especially in the female, as remarked by STAHL (*De Dispos. Hered. ad Var. Morb.* p. 48.), HOFFMANN (*De Epilep. Opp.* vol. iii. obs. 9. p. 20.), KRÜNITZ (*De Matrimonio Multor. Morb. Remedio.* Franc. 1749.), MOREAU (*Mém. de la Soc. Méd. d'Emulation*, t. ii. p. 189.—*in the male.*), and PRICHARD (*Op. cit.*). A young lady, whom I long attended on account of slight epileptic seizures, connected with irregularity of the uterine functions, and of the bowels, experienced, after marriage, a gradual amendment for some time; but had a very severe attack of puerperal mania after her first child. She is now in good health.

80. *F. Tonics and Antispasmodics.*—In the asthenic states of the disease, and in the other varieties, after bloodletting and the foregoing evacuations have been actively prescribed, remedies possessing a tonic and antispasmodic action are chiefly to be depended upon. But these should be selected with reference to the results of experience as to their operation, to the form of the disease, and to the particular features of the case, especially the states of sensibility and irritability, and of vascular fulness and action, generally and locally. But even when such remedies are most necessary, purgatives should be so conjoined, or so alternated, with them as to preserve a regular action of the bowels, or to occasion a brisker operation once or twice a week, according to the strength of the patient. In many cases, also, it will be requisite to administer tonics, and, still more frequently, antispasmodics, even contemporaneously with

local depletions, more especially when general or local plethora is associated with defective power and increased susceptibility.

81. *a.* Of mineral tonics and antispasmodics, the most active are the metallic sulphates and nitrates. — *a.* The preparations of copper, particularly the *cuprum ammoniatum*, or the simple *sulphas cupri*, have been recommended by ARETÆUS, BOERHAAVE, VAN SWIETEN, WEIZENBREYER, DUNCAN, BAUMES, THILENIUS, THEUS-SINK, MICHAËLIS, CULLEN, STONE, GREDING, BLAND, VOGEL, WILLAN, BATTIE, and REIL; and employed by them successfully in many cases. Drs. HOME, HOOK, and MAGENNIS, however, state that they have found it to fail in most instances. Dr. F. HAWKINS expresses himself much in favour of the *sulphate*, in doses of a fourth of a grain, conjoined with sulphate of quinine, or cinchona. In the asthenic states, and in the more plethoric forms, after depletions and evacuations have been prescribed, this combination, and the ammoniated preparation, frequently produce very great benefit, and sometimes entirely cure the disease. Dr. URBAN (HUFELAND, *Journ. d. Pr. Heilk.* 1827.) prefers the ammoniacal sulphate in the simpler states of the affection; and prescribes eight grains of it in forty-eight pills, of which three are to be taken night and morning, increasing the dose by one pill each second day.

82. *β.* The *sulphate* and *oxide* of zinc have been prescribed by HART, MARTINI, HARTMANN, CRELL, AASHEIM, BELL, PERCIVAL, GUTHRIE, HAYGARTH, RUSH, ARNAUD, RICHTER, and RANOE. OSIANDER directs the zinc with valerian and orange leaves. The *oxide* has been preferred by most of these writers; and Dr. F. HAWKINS advises it to be given with extract of conium. I have combined it advantageously with the ammoniated copper (F. 459. 598.), with camphor (F. 615.), and with valerian (F. 582. 665.); but I believe that the *sulphate* is more efficacious, especially when conjoined with camphor, musk, or other antispasmodics. (F. 584—587.). Upon the whole, zinc appears to be less useful than copper in this disease, although I do not rank it so low as Dr. CULLEN and Dr. COOKE have done, who employed chiefly the *oxide*, which is frequently inert, unless it be exhibited in large doses.

83. *γ.* The *nitrate* of silver seems, from a passage in STAHL (*Theoria Med. Vera.* p. 1019.), to have been given in this disease as the principal ingredient of a secret medicine much employed in some parts of Austria at the time when he wrote; having been probably adopted from the preparation described by ANGELUS SALA, which consisted of a solution of the salt in wine; and which he directed in so large doses as to act as a cathartic. SCHROEDER, however, had already recommended it in epilepsy and other diseases of the head. Both SALA and GEOFFROY prescribed it as a purgative in dropsies; but, although SCHROEDER, and BOERHAAVE had mentioned it as a cure for epilepsy, it was scarcely used until Dr. WILSON noticed (DUNCAN'S *Annals of Med.* vol. ii. p. 405.) its good effects. It was afterwards adopted by Dr. SIMS, Dr. CAPPE, Dr. POWELL, and many others, who published proofs of its efficacy. Subsequently, Dr. BAILLIE, Dr. ROGET, Dr. R. HARRISON, Dr. J. JOHNSON, Dr. COOK, Dr. SEMENTINI, M. VALENTIN, Dr. HEIM, and others, have prescribed this medicine with advan-

tage; and the more numerous observations of M. LOMBARD have also proved its success in a very large proportion of cases. The discolouration of the skin by it, noticed by ALBERS, ROGET, J. JOHNSON, VETCH, and others, is so frequent, and so permanent when it does occur, as to be a serious objection to it. In some of the cases in which this effect was produced, the disease was not removed; but in others the recovery was complete. It does not seem to depend so much upon the largeness of the dose, as upon the long continuance of its use. SEMENTINI (*Giornale di Fisica*, t. xi. p. 355.) recommends this salt to be triturated with some vegetable extract, and given in the form of pill; in this state the dose may be gradually increased to six or eight grains, or even more, in the day. I have prescribed it thus in several cases of epilepsy, and other diseases; and frequently with great benefit. It should not be continued very long, without intermitting it for a while. An eruption of minute pustules over the surface of the body, sometimes is produced by it, as first remarked by SEMENTINI, and observed by myself; but this should be viewed as a favourable circumstance. The nitrate of silver appears to me most beneficial in the asthenic states of the disease; or after evacuations have been practised, in the other forms; also in the stomachic and enteric varieties, and in the complication with paralysis. I have generally combined it with hyoscyamus, or camphor (F. 473.), extract of belladonna (F. 472.), musk, opium (F. 475.), or gentian (F. 474.). The following is the mode of administering it adopted by HEIM, an eminent physician in Berlin:—

No. 215. R Argenti Nitratis in Pulv. gr. xij. : Opii Puri gr. vj. : Extr. Conii Maculati 3ij. : Extr. Glycyrrh. 5j. Tere bene, et divide in Pilulas ponderis granorum duorum. Mane et vespere iij.—v. pil. capiat.

84. *δ.* The preparations of iron, especially the *sulphate*, and the *muriated tincture*, are often beneficial in the asthenic forms of the disease; or when depletions have been carried too far, and morbid matters have been evacuated. They have been much praised by TISSOT, and by QUARIN, who combined them with hellebore. I have directed them with valerian (F. 40.); with extract of hop; or with ox-gall, aloes, and myrrh. — *ε.* Arsenic, particularly FOWLER'S solution, has been employed by PEARSON, BRUGNATELLI, PRICHARD, and A. T. THOMSON. It requires much caution; as too large doses, or a too protracted use of it, may produce injurious effects, especially on the heart and arterial system. — *ζ.* The subnitrate of bismuth has been tried by me in two or three cases, both alone, and with other tonics and antispasmodics, the bowels having been kept freely open; and has appeared quite as beneficial as the preparations of zinc. — *η.* The *muriate* of baryta has been recommended by HUFELAND and GEBEL (HUFELAND, *Journ. d. Pr. Heilk.* b. vii. st. 3. p. 177.), especially when the disease is connected with the scrofulous diathesis; the *aqua calcis*, by TISSOT; and the *sulphuric acid*, by RULAND (*Curat. Empir.* cent. vi. obs. 96.), ROSENBERG (*Rosa Jatrice*, cap. 30.), HIRSCHEL, FEUERSTEIN, and HILDEBRAND. The *nitro-muriatic acids*, in equal proportion, have been prescribed by me in tonic and astringent infusions, in only one instance, connected with torpid function of the liver, and with some benefit; but the ultimate result is unknown to me.

85. *b.* Numerous *vegetable tonics* have been employed, in circumstances similar to those in which the foregoing are prescribed. — *a.* *Cinchona* and its preparations have been preferred, especially when the paroxysms were periodic, by BANG (*Acta Reg. Soc. Med. Hann.* vol. i. p. 106.), BUCHHAVE (*Act. Med. Soc. Hafn.* vol. i. p. 224.), FRANK, CHAVALIER, COMPARETTI (*occursus Medici*, &c. p. 303.), DE HAEN, CULLEN, HOME (*Clinical Experiments*, &c. p. 194.), PINEL, &c.; and by TODE (*Med. Chirurg. Biblioth.* b. ii. p. 160.), with the ammoniacal salts. — *β.* *Orange leaves*, and the bark of the tree, have been praised by THILENIUS (*Med. Chir. Bemerk.* p. 129.), HANNES, FISCHER, GESNER (*Beobacht.* b. i. No. 19.), DE HAEN, HENNING, TISSOT, LOCHER (*Observ. Pract.* p. 44. 47.), OBERTEUFFER, HUFELAND, &c. QUARIN (*Animadvers.* &c. p. 23.), however, and HOME, consider them inert. — *γ.* The *mistletoe*, or *viscus quercinus*, was formerly much employed against this disease; and is evidently a medicine of great power. But the mistletoe of the oak is procured with difficulty. It has been prescribed in epilepsy, probably from the time of the Druids. GERARDE (*Herball.* p. 1351.) mentions it as a popular remedy. PARKINSON* (*The Theater of Plants*, p. 1394.) is much more copious respecting it; and COLBATCH, in his treatise on its virtues, thinks it almost specific. The evidence of BORELLI, COLE, BOERHAAVE, VAN SWIETEN, BUCHWALD, ANDREE, HALLER, DE HAEN, QUARIN, and others, is also very much in favour of it. Dr. FRAZER states, that out of eleven cases which he treated with it in the years 1802, 1803, and 1804, nine were completely cured. He prescribed it in powder, in the dose of from two scruples to two drachms, twice a day, in camphorated emulsion. Dr. FOTHERGILL, Dr. G. THOMPSON, Mr. HAYNES, and Dr. WILLAN, have also employed it successfully. On the other hand, TISSOT, CULLEN, HOME, GOOD, and COOKE place no confidence in it; and, at the present day, it is almost wholly, and, perhaps, undeservedly, neglected, unless by empirics, whose success in this, as in other diseases, often depends upon the adoption of a once popular and efficacious remedy which had fallen into undeserved disuse. — *δ.* *Valerian* is mentioned by DIOSCORIDES and ARETÆUS as a remedy in epilepsy. FABIVS CALUMNA cured himself and others by it (*Phytobasanos*. Nap. 1592. 4to. p. 97.). WILLIS (*De Morb. Convul.* c. 24.) PARNAROLLI (*Jatralogism. Pentecost.* i. obs. 33.), CANNENGISSER, MARCARD, BRISBANE, LINNÆUS, QUARIN, HALLER, FOTHERGILL, SPRENGEL, UNZER, and many others, have insisted on its efficacy when exhibited in sufficiently large doses. THILENIUS (*Med. Chir. Bemerk.*

* He states: — "The Mistletoe to selfe of the Oke is the best (or of the Chesnut tree, as MATTHIOLUS saith to be as good), made into pouther, and given in drinke unto those that have the falling sicknesse: but it is fit to use it forty days together: and with this caution, that the wood, after it is broken from the tree, doe not touch the ground; which is in my minde too superstitious." — "GENTILIS FULGINAS, and others, have so highly esteemed of the vertues hereof, that they have called it *Lignum sancta Crucis*; beleieving it to helpe the falling sicknesse, apoplexy, and palsie very speedily." — "Divers doe esteeme of the Mistletoe that groweth on Hassell nuts, or Peares, as effectual as that on the Oke, so it touch not the ground, for the falling sicknesse, to be taken in wine."

p. 113—131.) and other German authors prefer its *essential oil*; and M. GUIBERT (*Rév. Médicale*, Dec. 1827, p. 376.) gives the *extract* in large doses. A powder, consisting of valerian and puff-balls, the *Lycoperdon Bovista*, is a popular remedy for the disease in Germany; and several writers contend that this latter substance is almost a specific for those fits which proceed from terror (COOKE). — M. TISSOT placed great confidence in the efficacy of valerian, not only in epilepsy, but in all nervous affections requiring a gentle tonic and antispasmodic. CULLEN, HOME, FRAZER, WOODVILLE, HEBERDEN, TODE, and COOKE, however, consider it a medicine of very little power — an inference much at variance with my experience of its effects, when appropriately exhibited; and depletions and evacuations have been premised, in plethoric cases. The powder of the root soon loses its activity by keeping; and, even when recent, often requires to be given in large doses. The ammoniated or camphorated tinctures, the extract, and essential oil, are useful preparations of it. The formulae in the *Appendix*, particularly F. 81. 101. 269. 368. 582. 665. and 863., illustrate the mode of prescribing it; but in most cases of this disease, its quantity should be much increased. It may also be exhibited in enemata. — *ε.* The root of the *Artemisia vulgaris*, or mugwort, has been recommended by BURDACH, HUFELAND, and LOEWENHARD, in the dose of from 50 to 80 grains, on alternate days, or a few hours before the expected return of the fit, the patient being kept warm in bed. HUFELAND prescribed it in ten cases, of which three were completely cured, three much relieved, and four received no benefit (*Rév. Méd.* 1824. t. iv. p. 447). Its operation, in the above dose, is tonic, diaphoretic, and diuretic. In plethoric cases, it should be preceded by depletions and cathartics (see F. 224.).

86. *ζ.* *Assafetida* has been much employed, but seldom in sufficiently large doses, and not always in appropriate circumstances. It is advantageously combined with purgatives, and other tonics and antispasmodics (F. 367. 423. 480.). LANGE (*Miscel. Verit.* p. 59.), BERGER (*De Remed. Specif. in Epilep.* p. 13.), and TISSOT, give it with valerian. With either castor, camphor, galbanum, myrrh, aloes, ox-gall, &c. (F. 368. 481. 482.), or any two of these, it is serviceable in the asthenic, dyspeptic, and enteric forms, and in the uterine variety after evacuations have been prescribed. It is one of the best medicines that can be given in enemata during either the fit or interval (F. 135, 136.). — *ν.* *Galbanum* and *myrrh* are useful chiefly as adjuncts in these varieties; but they are less efficacious, singly, than assafetida and the other substances just named. — *ξ.* *Camphor* may be employed in every form of the disease, but in very different doses and combinations; in the plethoric states, in small quantity with diaphoretics and refrigerants (F. 24.); in the asthenic, enteric, and uterine varieties, in full doses with tonics and other antispasmodics (F. 35. 615.). LOCHER (*Observ. Pract.* No. 40.) prescribed it with bark; and TISSOT, PINEL, and most modern writers have employed it, either as the chief agent, or as an adjuvant of other substances. When an immediate effect is required, it should be given in the form of draught or mixture, with the preparations of ammonia or of the

athers (F. 186. 212. 423. 845.). It often shortens the fit, or prevents it altogether when exhibited in enemata shortly before the usual period of accession, as in Formulæ 130. 135—138. 151.

87. *c.* Of animal substances, castor, musk, and ox-gall are most deserving of notice. — *a.* Castor is recommended by ARETÆUS, CELSUS, PLINY, SERAPION (apud *Cal. Aurel.* p. 352.), K. DIGBY (*Experim. Med.* p. 332.), MOOR (*Pathol. Cerebri*, p. 211.), THOUVENEL (*Sur les Vertus des Subst. Anim. Medicam.* p. 357.), TISSOT, and FOTHERGILL. When unadulterated, and given in full or large doses, it is often of much service; especially in the asthenic, dyspeptic, and uterine varieties; and in the combinations advised in respect of assafœtida and camphor, with which (as well as valerian and musk) it may be conjoined (F. 480. 497. 905.). — *β.* Musk is also beneficial in these varieties, or in the other forms after evacuations have been prescribed, and in similar combinations to those mentioned with reference to the preceding substance. It is favourably mentioned by FEUERSTEIN, VAN SWIETEN, QUARIN, CULLEN, ACKERMANN, and others. HANNES made a full and successful trial of its efficacy on his own son (See *Nova Acta Nat. Curios.* vol. v. p. 244.). It should, unless intended merely as an adjuvant of other means, be given in much larger doses than usually directed. It may be conjoined with camphor, sulphate of zinc, &c. — *γ.* The bile of various animals, particularly of the ox, bear, and dog, has been noticed by BARTHOLIN, UNZER, QUARIN, and others. Of inspissated ox-gall I have had some experience in this complaint; but have usually directed it in combination chiefly with assafœtida, galbanum, myrrh, aloes, &c. (F. 558. *et seq.*). It is of much service in the states just particularised, and after depletions have been carried far, or to an injurious extent. In a case of this latter description, I am now employing it with very marked advantage.

88. *d.* Cold or salt water bathing has been advised by CELSUS, CÆLIUS AURELIANUS, FLOYER, LENTIN, TISSOT, and HUFELAND; but it requires caution, and attention to its effects. In young persons and delicate females, who have not been accustomed to a plunge bath, the fear, or shock of immersion, may bring on the seizure: indeed, WIEKARD (*Observ. Med. Franc.* 1775.) and TODE (*Med. Chir. Bibl.* b. i. p. 117.) adduce instances of such an occurrence. The shower bath, used daily, commencing with tepid water, and gradually reducing the temperature, in cases where the shock may be dreaded, is of much less equivocal benefit; and is, in all the varieties, but in the simple or cerebral forms especially, a very excellent remedy. When it cannot be employed, the patient should daily affuse water from a large sponge over the whole head and occiput.

89. *G.* Numerous substances evincing more of stimulating, than of tonic and antispasmodic, properties have been prescribed, with occasional success; but, in general, in combination with one another, or with medicines producing an astringent or tonic effect. — *a.* — *a.* The oil of hartshorn, or DIPPÉL'S animal oil, was very generally used, both internally and externally, especially during the last century, owing to the recommendations chiefly of DIPPÉL (*Disquisit. de Vita Animalis Morbo et Med.* &c. p. 89.), ALBERTI (*De Med. in Motibus Nat. Exacerbatis.* Hæke, 1718.),

VATER (*De Specificor. Epilep. Sigillatim Olei Animal. Virtutibus.* Vitel. 1725.), MAUCHART (*De Oleo Animal. Dippellii.* Frib. 1745.), JUCH, KORTUM, BANG, THOUVENEL, CULLEN, MORAND, and PORTAL. FEUERSTEIN believes that, when it is pure, and not altered by the action of the air, it is often beneficial. ACKERMANN considers it possessed of no small efficacy in the asthenic forms of the disease, particularly those connected with anæmia, and languor; but hurtful in the irritable and plethoric states. QUARIN advises it in the uterine variety. TISSOT, however, thinks it possesses but little power. — *β.* Cajeput oil was prescribed with benefit by GOETZ (in *Commerc. Lit. Noric.* 1731, p. 5.), in doses of from two to ten drops on sugar; and by WERLHOF (*Oper. Med.* p. 711.), with cinchona. — *γ.* The oil and other preparations of amber have been found sometimes useful by RIVIERUS (*Prax. Med.* p. 32.), BEATTIE (*De Cognoscend. et Cur. Morb. &c.* Hæke, 1780.), CULLEN (*Mat. Medica.* vol. ii. p. 361.), and others. The oils of hartshorn, cajeput, valerian, and amber, are serviceable chiefly in the simply nervous and asthenic states of the disease; and are useful adjuvants of other medicines, and are often beneficially conjoined with narcotics (§ 97.). Besides these, other oils, both simple and medicated, have been prescribed; but they hardly deserve enumeration.

90. *b.* Phosphorus was, I believe, used for epilepsy first by KRAMER (in *Commerc. Lit. Noric.* 1733, p. 137.); and more recently by FEUERSTEIN, QUARIN, and others. WIEKARD, AUTENRIETH, and HUFELAND justly view it as a doubtful and dangerous remedy. HAARTMANN (*De Noxiis Phosph. in Med. Usu, &c.* Aboæ, 1773.) gave it in four cases without benefit. — *β.* Cantharides has been tried internally, by MERCURIALIS (*De Morb. Pueror.* l. i. c. 3.), ZACUTUS LUSITANUS (*Prax. Admirab.* l. i. obs. 35.), STOCKAR (*De Usu Canth. Interno.* Goet. 1784. p. 34.), and Dr. J. JOHNSON (*On Derangements of the Liver, &c.* p. 105.), with occasional advantage. Its external use, is, however, more common, if not more beneficial, in this complaint.

91. *c.* Guaiacum, either in decoction or substance, has been employed by VESALIUS (HALLER'S *Bibl. Med. Pract.* vol. ii. p. 32.), WILLIS (*De Morb. Convuls.* p. 460.), SENNERT (*Prax. Med.* l. i. c. 31.), MERCURIALIS (*Respons. et Consult.* l. ii. c. 3.), FORESTUS (*Observ. Med.* l. x. obs. 58. 63.), F. HOFFMANN (*Med. Rat. Syst.* t. iv. p. iii. c. i. p. 21.), and others, who considered it possessed of much efficacy in this complaint, especially if connected with a syphilitic taint; but it has been neglected by more modern writers. — *γ.* The flowers of the *Cardamine pratensis* were found beneficial by BERGER and NAGEL (*De Usu Med. Card. Prat. &c.* Franc. 1793. p. 13.); but BAKER (*Trans. of Coll. of Phys.* vol. i. p. 443.), LYSONS (*Pract. Essays, &c.* p. 173.), and GREDING, state it to be inefficacious. The saturated infusion of the flowers and leaves produced a copious and fetid perspiration in the experiments made with it by BERGER (*De Remed. Spec. in Ep. &c.* Franc. 1795. p. 11.) — *δ.* The *Arnica montana* has likewise been noticed by STÖERCK; and the *Serpentaria*, by GRUELMANN, when the attack has been occasioned by fright.

92. *d.* The extract of *nux vomica* was praised

by SIDREN (in *Acta. Med. Suec.* t. i. Upsalæ, 1783. p. 367.), RESE (*De. Nuce Vomica.* Jenæ, 1788. p. 20.), HUFELAND (*Journ. d. Pr. Arzneyk.* b. i. p. 109.), and VIEWEG (in *Annal. der Heilkunst.* Mai, 1811. p. 426.); and its active principle, *strychnine*, was prescribed by Dr. BROFFERIO (*Révue Méd.* t. iv. 1825, p. 488.), in this disease. I have tried the former preparation in two or three cases, and conjoined it with aloes (F. 541, 542. 907.). It is a powerful remedy in the asthenic forms of the disease, and in the paralytic complication, connected with inanition, or consequent upon excessive evacuations. When the fits follow the disappearance of the menstrual discharge, it is of especial service. LÖBENSTEIN-LÖBEL recommends the *tincture of nux vomica*, beginning with sixteen drops every three hours, and gradually increasing the dose to thirty or even to forty. This medicine is most injurious in the plethoric, inflammatory, and irritable states; and, if carried too far, is liable to excite inflammation of the membranes of the brain and spinal cord. These remarks apply equally to *strychnine*, which should be given in very small doses, and with strict attention to its effects (F. 565.). The *Strychnos Sancti Ignatii*, or the *Ignatia amara*, has been prescribed by STEIN and VALENTIN. It operates similarly to the foregoing, and requires equal caution in its use. The secret remedy for epilepsy employed by WITZ, father and son, is said by Dr. HAASE to have consisted chiefly of the powder of this bean. It was found most useful against the fits following excessive fear; and was given in doses of two or three grains twice or thrice daily. (*Bullet. des Sc. Méd. de FÉRUSAC*, t. xi. p. 74.)

93. e. The *pæony* (*Pæonia officinalis*) entered, in conjunction with various vegetable antispasmodics and tonics, into many of the empirical remedies so much employed in epilepsy. The dried root, seeds, and flowers, and the recent expressed juice of the root, were chiefly used; and, with other writers, old PARKINSON (*Theater of Plants*, p. 1382.) directs the male plant to be selected. The root was formerly hung around the neck as a charm against a return of the fits. Although praised by BERGER, FORESTUS, WILLIS, RIVERIUS, APPEL (*De Epilepsia.* Alt. 1713. p. 39.), SCHACHT (*Instit. Med. Pract.* p. 64.), MURRAY (*Appar. Medicam.* t. iii. p. 40.), DE HAEN (*Rat. Med.* par. vi. p. 317.), and VOGEL (*Hist. Mat. Med.* p. 206.), no confidence is placed in it by SYLVIUS (*Op. Med.* p. 427.) HERRMANN (*Cynos. Mat. Med. Argem.* 1726. p. 176.), MOOR (*Path. Cereb. &c.*), HALLER, and TISSOT. The imperfect trials made of it by HOME (*Clin. Experim.* 2d ed. p. 209.) showed it was not without effect. This contradictory evidence is easily explained by the empirical mode of prescribing it; like the other medicines classed under the present head, it being appropriate only in the asthenic cases, and in the uterine variety after evacuations have been practised.—The *Sedum acre*, or wall-pepper, was used in Germany, as a popular anti-epileptic, before it was noticed as such by medical writers. LAUBENDER, of Saxony, first prescribed it, and gave from ten to fifteen grains of the dried plant for a dose. ISCHORN (HUFELAND, *Journ. d. Pr. Heilk.* b. xiii. p. 167.) afterwards resorted to it with success. PETERS (*Biblioth. Med.* t. vii. p. 116.) tried it

with five patients, one of whom was cured, and the others relieved. M. FAUVERGE (*Journ. Génér. de Méd.* t. xcvii. p. 152.) employed it in four cases, three of which were cured. In these, bleeding was premised and vegetable diet directed: and very recently, M. GODIER (*Ibid.* t. cviii. p. 141.) has given it in three cases, but with benefit in two only.

94. f. *Rue* (*Ruta graveolens*), and its distilled water, decoction, infusion, expressed juice and oil, were formerly much employed in epilepsy, especially by FORESTUS (*De Capitis et Ventris Morbis.* 1590. Svo.), MAYERNE (*Prax. Med.* p. 20.), MOOR, RIEDLIN (*Lin. Med. Ann.* iv. 1698. obs. 25.), and STENZEL (*De Ruta Medicam. et Venen.* Viteb. 1735.). PLINY (l. xx. cap. 13.) mentions the use of the decoction before the expected return of the paroxysm; and BOERHAAVE (*Consult. Med.* Goet. 1752. p. 28.) frequently confided in the distilled water and infusion. It, as well as the sedum acre, should be prescribed only in those cases, to which I have restricted the *pæony*.—The extract, infusion, and powder of the flowers of the *Narcissus pseudo-narcissus* have been recommended by LAUREMBERG (*Appar. Plant.* l. i. cap. 18.), and DU FRESNOY (*Des Propriet. du Narcisse de Près.* Paris, 1788.), in such doses as will not irritate the stomach. The *Viola odorata*, and *V. tri-color*, also, have been noticed by DIOSCORIDES, PLINY, MATTHIOLI, and HAASE, as anti-epileptic medicines.

95. g. The frequent dependence of epilepsy on the scrofulous taint, or upon morbid structure, induced me several years since to employ iodine in the treatment of it; but the utmost discrimination and caution are required in the use of this substance; for it may be injurious in the inflammatory and plethoric states of the complaint, or if given in too large doses, or even for too long a period. It is indicated chiefly in the asthenic conditions, and in the paralytic complication if independent of inflammatory action. The *hydriodate*, or the *ioduretted solution* of it, or the *ioduret of iron*, may be preferred. But the iodurets are often uncertain as to the relative proportion of the metal and iodine. The *ioduret of mercury*, although a promising combination in this disorder, was prescribed by Dr. ROOTS, until the gums were affected, but without permanent relief.—I have found the ioduretted solution of the hydriodate most serviceable, given in very small doses three or four times a day: blue pill, and the aloes and myrrh pill, or any other gentle stomachic aperient, having been taken at bedtime. A patient at present under my care is pursuing this treatment with great benefit.

96. h. *Petroleum*, mineral oils, and *naphtha*, especially the former, have been recommended by DIOSCORIDES (l. i. cap. 85.), WEDEL (*De Epilepsia.* Jenæ, 1676.), and GMELIN (*Appar. Medicam.* vol. i. p. 185.). RAMAZZINI (*Opera*, p. 320.) has published a curious tract, written about the middle of the fifteenth century by FRANCIS ARIOSTO, in which petroleum is said to have been employed successfully against this disease.—The aetherial preparation from *caouchouc* seems deserving of a trial in the simple or nervous states of the disease.—Of the preparations of *ammonia* and of *aether*, little further need be stated. They are useful adjuncts—(especially the

spir. ammon. fetid., the spir. ammon. succin., and the tinct. valerianæ ammoniata) — to tonic or other agents, in the nervous or asthenic conditions of the complaint; and are sometimes serviceable when the accession of the paroxysm is indicated by failure or irregularity of the heart's action, or by other symptoms depending upon deficient nervous power. In such cases, the patient should be provided with a medicine, into the composition of which these preparations very largely enter (F. 210. 423, 424.), and have immediate recourse to it upon the recurrence of these symptoms.

97. *H.* The propriety of giving *Narcotics* and *Anodynes* in epilepsy is sometimes questionable. Yet cases frequently occur in which they may be prescribed, not only with safety, but with advantage, in judicious combinations, and after plethora, general or local, has been removed, and morbid secretions evacuated. — *a.* *Opiates* were employed by *ÆTIUS* (*Tetrab.* iv. ser. i. c. 96.), *AVICENNA*, *MILLARS*, *MORGAGNI*, *DE HAEN*, *TRALLÉS* (*De Usu Opii*, sect. iii. p. 16.) *TISSOT*, *MURRAY* (*Appar. Med.* t. ii. p. 272.), *CULLEN* (*Mat. Med.* vol. ii. p. 247.), *FOTHERGILL* (*Med. Observ. and Inquir.* vol. vi. p. 80.), *REHFIELD* (*DOERING'S Tracts*, vol. i. p. 160.), and *COOKE*. They should not be exhibited in the plethoric or inflammatory states, until evacuations have been carried to the utmost extent; nor in any form of the disease, until the bowels have been fully and frequently purged, and the secretions have assumed a natural character. In these circumstances, and in the asthenic conditions of the complaint, they are often valuable remedies; more especially if the attacks have proceeded from fright, or other affections of the mind, or are connected with an irritable or susceptible state of the nervous system. *ÆTIUS* and *AVICENNA* gave *opium*, with various stimulating antispasmodics; *SENSERT* (*Medicinæ Pract.* vol. i. p. 370.), with camphor: *DUCHESNE*, with aromatics: *AÄSKOW*, with assafetida; *HUXBY*, with musk; and *FERRIAR* (*Med. Hist. and Reflect.* vol. i. p. 34.), with musk and camphor. *DE HAEN* and *DARWIN* prescribed it alone, at bedtime, successfully, in cases in which the fits came on during sleep. *WARD* and *PORTAL* applied it with benefit, externally to the part which appeared to be the seat of irritation. *PANZANI* (*Giornale di Med.* t. xiii. Ven. 1776.) exhibited as much as four grains with advantage in a case complicated with maniacal delirium. It is seldom of any use in the hereditary disease, or in that occasioned by the suppression of accustomed evacuations, — indeed, it may be injurious in the latter; and, as *QUARIN* (*Animad. Practica*, p. 20.) justly remarks, it may induce a state of apoplectic torpor, when given during the paroxysm. The preparations of *morphine*, especially the *acetate*, in the liquor ammoniæ acetatis and camphor julap, or with an aromatic spirit, are frequently preferable to the pure opium, and less likely to affect the head injuriously. I have found the following draught to agree even with those who could not take opium in any of the more usual forms:—

No. 216. R Morphine Acetatis gr. ½; solve in Liq. Ammonie Acetatis ʒjss., et adde Mist. Camphoræ (vel Aq. Destillatæ) ʒj.; Spirit. Caryoph. ʒj.; Olei Anisi ℥ij. M. Fiat Haustus.

98. *b.* *Stramonium*, principally its *extract*, has been much employed in epilepsy, by Continental writers. *STOERCK* (*Libellus, quo demonstratur*

Stramonium, &c. Vindob. 1762.), who first prescribed it in this complaint, gave from half a grain to a grain of the extract, three, four, or six times a day, for several weeks or months. It afterwards was approved of by *WÄHLIN*, *SPALOWSKY*, *DURANDE* (*GARDANE'S Gazette de Santé*, 1773 et 1774, p. 143.), *SIDREN* (*De Usu Stramonii in Convuls.* Ups. 1772.), *RAZOUZ* (*De Cicuta, Stramonio, &c.* Nem. 1780. 8vo.), and others. *ODHELFUS* (*Comm. Acad. Suec. Stock.* vol. xxvii. p. 277.) prescribed it in fourteen cases of epilepsy and convulsions, eight of which, he says, were cured, and five relieved. *GRENING* (*Sammll. Schrift.* th. i. p. 102.), however, states, that of twenty-eight epileptics, it cured only two, permanently relieved four, and temporarily relieved eleven. He remarks, that aperients, tonics, and antispasmodics should also be exhibited. *ARNEMANN* (*Pract. Arzneimittellehre*, th. i. p. 279.) advises it to be given in the form of pill with camphor and bitter extracts.

99. *c.* *Hyoscyamus*, as well as *stramonium*, is indicated only in the circumstances and states of the disease pointed out when remarking on the use of opium and morphine (§ 97.), and in similar combinations to them. *MAYERNE* (*Synt. Prax. Med.* Lond. 1690. p. 23.) prescribed the seeds, commencing with six or eight grains, gradually increasing, in the course of forty days, the dose to twenty-four grains; and directed them to be taken in the expressed juice of the *semper-vivum*. *STOERCK* employed the *extract*, the preparation adopted also by *SAUVAGES*, *LENTIN*, *BANG*, *GRENING*, and *ÖBERTEUFFER*, who derived from it only slight or temporary advantage. — *Conium* has likewise been employed by *STOERCK* and some other writers, chiefly with liquor potassæ, when the disease is connected with the scrofulous taint.

100. *d.* The powdered root and leaves of *belladonna*, and the *extract*, are recommended by *MÜNCH*, father and son, *STOLL*, and *BOTTCHER*. *RICHTER*, *LÖBENSTEIN-LÖBEL*, and *HUFELAND* (*Journ. d. Pr. Arzn.* b. ix. p. 100.) prescribe either of these, with tonics, antispasmodics and aperients, according to the nature of the case. *GRENING* (*LUDWIG'S Adversaria*, b. i. par. 4.) considers this plant to possess but little efficacy. *KAUFER* and *MÜNCH*, the son (*De Usu Belladonnæ in Melanchol. et Epileps.* Goet. 1783.), however, contend, that it is especially beneficial when the fits are followed by maniacal alienation or tremors. It is most suited to the atonic states, conjoined either with ammoniated copper, or with nitrate of silver (F. 472.), or with musk, castor, camphor, &c. — *Tobacco* is stated, by *SENSERT*, *ZACUTUS LUSITANUS*, and *DUPAU* (in *Journ. de Méd.* Sept. 1789.), to have been used successfully, in the form of clyster, in the stomachic and verminous associations of the complaint. *CURRIE* directed epithems of the infusion over the epigastrium before the accession of the fit, with benefit.

101. *I.* There are many other substances which have been employed internally in this disease. — *a.* *Digitalis* is one of the most important of these. *PARKINSON* (*Theater of Plants*, p. 654.) remarks, respecting it, that “divers have been cured of the falling sickness thereby; for after taking of the decoction of two handfulls thereof, with four ounces of the *Pollipody* of the oake

bruised, in ale, they that have been troubled with that disease twenty-six years, and have fallen once a week, or two or three times a month, have not fallen once in fourteen or fifteen months." SALMON and WITHERING also praise it; but CURRIE (*Mem. of the Med. Society of Lond.* vol. iv. p. 18.) gave it in three cases with only temporary benefit. Dr. PERCIVAL (*Edin. Med. and Surg. Journ.* vol. ix. p. 271.) also tried it unsuccessfully, but in an unsatisfactory manner; for it is not by the empirical exhibition of one or two large doses of this medicine, that good effects can be obtained from it in a chronic complaint. Its efficacy in small doses has been shown in two cases (*Amer. Med. Recorder*, No. 2.); and in one that came under my own observation. It has been favourably noticed also by Dr. BRIGGS and Mr. SCOTT (*Edin. Med. Journ.* Jan. 1827.); and by KNIGHT, who has found much benefit from it in epileptic insanity. Dr. SHARKEY recommends an infusion of it in porter to be given until vomiting supervenes. It is advantageously exhibited also in conjunction with tonics, antispasmodics, and anodynes (F. 456. 469. 514. 537.); and is most serviceable when the disease has been caused by fright, or is connected with disorder of the heart.

102. *b.* The preparations of mercury have been used in epilepsy for their alterative effect, and in combination with various antispasmodics, or with antimonials. Of the propriety of these in the venereal and hepatic associations of the complaint, no doubt can be entertained. But in other circumstances they require discrimination. In the inflammatory or congestive states, and either alone, or with James's powder, they are often beneficial, although they be carried so far as to affect the mouth. PISO and ROLFINCE, SCARDONA, WALTHER, M. HOFFMANN (*Eph. Ac. N. C.* cent. 1. et 2. p. 272., et *Ibid.* cent. 3. et 4. p. 231.), and RAHN, have adduced proofs of the good effects of salivation in some instances. When we reflect on the frequency of serous effusion in the cavities, and of alterations of the coverings of the brain, in fatal cases, a judiciously conducted course of mercury, independently of the evidence of WILLIS, RIEDLIN, ETTMULLER, LOCHER, TISSOT, BURSERI, LYSONS, FRANK, SPÖRRY (*Ueb. die Wirk. des Quicksilbers in der Epil.*, in *Mus. der Heilk.* b. i. No. 35.), and others, in its favour, promises some benefit. It is chiefly, however, in the more active conditions, or when the malady presents the apoplectic, inflammatory, maniacal, or paralytic complications; or follows some acute cerebral disease, and the pulse retains considerable firmness; that mercury, given so as to affect the mouth, is most likely to be serviceable. In these, calomel or blue pill with antimonials, or mercurial inunction, may be employed; but in the more asthenic and chronic cases, either these preparations should be conjoined with antispasmodics, as camphor, castor, or musk, as directed by BANG; or the sublimate should be given dissolved in sulphuric æther (J. FRANK), or in tincture of bark; or hydrarg. cum creta, or PLUMMER'S pill, with James's powder, Castile soap, or any other substance that the peculiarities of the case will suggest.

103. *c.* The elutriated oxide of tin has been recommended by Dr. SHEARMAN, in the dose of two scruples to a drachm to an adult, night and

morning, continued for four or five days, an active cathartic being exhibited on the fifth day, and the tin again resumed, according to its effect.—The superacetate of lead has been prescribed by MAYERNE, SAXTORTH (*Acta Reg. Soc. Med. Haun.* vol. iii. p. 90.), RUSH (*Philad. Med. Mus.* vol. i. p. 60.), and EBERLE (*Lond. Med. Repos.* vol. viii. p. 178.); and the hydrochloric acid, by LARREY, chiefly in the syphilitic and cachectic states.

104. *d.* The *Agaricus muscarius* has been found serviceable in doses of from ten to twenty grains, by WHISTLING (*De Virtut. Agar. Mus. &c.* Jenæ, 1773. p. 13.); the *Boletus suaveolens*, in doses of a scruple four times a day, by ENSLIN (*De Bol. Suav. &c.* Erling. 1784. p. 77.); the *Aconitum napellus*, by DURANDE; the root of the *Dictamnus albus*, by STÖERCK; the seeds and root of the *Heracleum spondylium*, in doses of two or three drachms of the latter, by PLINY (*Hist. Nat.* l. xxiv. cap. 6.) and ORNE; the root of the *Tussilago petasites*, by CRANZ (*Nat. Med.* par. ii. p. 162.); the *colchicum*, by ALDERSON (*Lond. Med. and Phys. Journ.* vol. xxxvii. p. 17.); the *Hyssopus officinalis*, by FORESTUS, RULAND, and SENNERT; the flowers of *pimpernel* (*Anagallis arvensis*), in doses of twenty grains three or four times a day, by DIOSCORIDES and GASSER; the expressed juice of the *Galium luteum*, in doses of two or three ounces in the morning, by CHOMEL (*Plant. Usuelles, &c.* t. ii. p. 24.), GARDANE (*Gaz. de Santé*, 1773, p. 19.), and WENDT (*Klin. Annal.* p. 146.); the seed of the *Lycopodium clavatum*, by SCHROEDER and KUHN; the *Lunaria rediviva*, by J. FRANK; the watery extract of the leaves of *yew* (*Taxus baccatus*), in from one to ten grains in the day, by LODER (*De Taxo Baccato.* Jenæ, 1794. p. 17.) and HUFELAND, in uterine epilepsy; the *Cocos nucifera*, by THUNBERG; the flowers of the *Anchusa officinalis*, by BRUTZ and BALDINGER; the *Bryonia alba*, by REUSNER; the essential oil of the *Buxus sempervirens*, by SCHROEDER and VOGEL; the flowers of the *Lilium convallium*, by SENKENBERG, BALDINGER, and LANGHAN, in doses of a scruple to a drachm, in the periodic type of the complaint; the powdered leaves, the decoction, and the essential oil of the *Origanum majorana*, by DIOSCORIDES, SCHROEDER, and FONSECA; the berries of the *Sambucus niger*, by DUFOUR; the decoction of the *Solanum dulcamara*, by BOERHAAVE, in epilepsy from metastasis; the flowers and root of the *Tilia Europea*, by HOFFMANN, RULAND, and TILMANN (*De Mat. Med.* p. 308.); the *Verbena officinalis*, by SEBITZ and ROSENSTEIN; and the distilled water of the *Prunus laurocerasus*, by J. FRANK. Neither of these require any remark, excepting this last, which, from the quantity of prussic acid it contains, is sometimes not without efficacy. Its active constituent, prussic acid, is occasionally beneficial in the simple states of the complaint, after plethora has been removed, and the bowels fully evacuated, or when the disease is connected with great susceptibility and irritability, or is dependent on pain, local irritation, or gastric disorder.—Of internal treatment, generally, it may be added, that every medicine will fail, or afford merely temporary advantage, as long as plethora exists, or active determination to the head is unrestrained, and the appetites are indulged. And I must subscribe to the justice

of HEBERDEN'S remark:—"Etenim nulla sunt remedia, quæ non toties spes nostras fefellerant, ut incertum sit quantum illis debeatur, ubi visa sunt profuisse." (*Comment. &c.* p. 143.) It is chiefly by a judicious sequence, and combination of remedies; and by a well-devised plan, having strict reference to the circumstances of the case; that we can hope to treat this malady with success.*

105. *K. Electricity* was formerly much employed, but is now seldom tried, in epilepsy. DESHAIS, MANGIN (*Hist. de l'Electr.* par. iii. Paris, 1752.), MORRIS (*Gent. Mag.* 1753. p. 379.), LINNÆUS (*Consect. Electrico-Medica.* Ups. 1754.), FRANKLIN, and LOYET (*Elect. rendered useful in Med. Intentions.* Lond. 1760.), furnished the earliest notices of its use; but these were unsatisfactory, and almost contradictory. The more extensive experience, however, of FELLER (*De Therapia per Electrum.* Leips. 1785.), FEUERSTEIN, DEIMANN, and KÜHN (*Geschichte der Med. u. Phys. Elect. &c.* Leips. 1785. 8vo.), demonstrated—that indeed might have been inferred *a priori*—that it is occasionally successful in cases characterised by debility, inanition, or torpor of the vital functions, and in those occasioned by frights; but that it is seldom beneficial, and may even be injurious, in the acute, plethoric, inflammatory, and hereditary states of the complaint. In cases caused by suppressed discharge, it is not always a safe remedy: for, although the experiments of SPENGLER and KÜHN have furnished instances of its success in such; yet those of LINNÆUS, FELLER, and QUARIN, show that it was either inefficacious or hurtful, unless evacuations had been premised. Of the effects of *galvanic electricity*, the evidence is but little different from the foregoing. Mr. WHITLAM (*Lond. Med. Phys. Journ.* vol. xiv. p. 527.), Dr. DUNCAN (*Ann. of Med.* vol. viii. p. 339.), and Mr. MANSFORD, have detailed cases where this agent proved of service; but the last-named writer admits, notwithstanding his views as to the nature of the disease (§ 50.), that galvanism can often rank only as an auxiliary means. His plan of employing this agent is peculiar; and, although it may be the most rational and efficacious, it is seldom possible to have recourse to it; for, granting that the physician may manage, in the way Mr. MANSFORD directs, constantly to inclose the body of his patient within the circle of a galvanic battery; yet it may not

prove successful, or the benefit derived may cease with the discontinuance of its use. Of electricity and galvanism, it may be said generally, that they have occasionally been found successful: that, when resorted to shortly before the seizure, they have sometimes suppressed it, or rendered it more mild; that, when applied during the paroxysm, they have often mitigated its violence and duration; and that the safest mode of employing electricity, is to place the patient on the insulating stool, and subject him to the *electric bath*; and to draw sparks from different parts, when thus insulated and placed in connection with the prime conductor.

106. *L. Of external means*, the most deserving notice are setons, issues, moxas, open blisters, and artificial pustulation.—*a.* The *actual cautery*, applied to the nape of the neck, the occiput, and even to the vertex, is recommended by ARETÆUS, CELSUS, CÆLIUS AURELIANUS, AVICENNA, and several writers of the sixteenth and seventeenth centuries. At the present time, *moxas* have nearly superseded the cautery, and have received the sanction of the most experienced writers, especially ESQUIROL and LARREY; the former of whom directs them along the cervix and spine, he having observed disease of the medulla oblongata and spinal cord in several instances.

107. *b. Setons and issues* have been directed by nearly every writer on the disease. In the cerebral variety with determination to the head, they are often serviceable; but in the asthenic forms, or when evacuations have been carried too far, and when susceptibility and irritability are augmented, they often either fail, or increase the disorder, unless tonics and antispasmodics be administered. The nucha is the place usually selected for their insertion, but the insides of the arm, or thigh, are often preferable situations. ZACUTUS LUSITANUS (*Prax. Admir.* l. i. obs. 22.), AB-HEERS, ROCHARD, and LOCHER, direct either them, or the *actual or potential cautery*, to the seat of the aura. M. ANDRAL prefers the latter means, and advises their application to a limb in preference to the nucha or occiput. An accidental burn of the limb, followed by ulceration, has not infrequently effected a cure, as in the case detailed by Dr. BONA (*HUFELAND'S Journ.* 1827.).

108. *c. Artificial pustulation* by tartarised antimonial ointment, applied to the nucha, occiput, or vertex, has been found serviceable by Dr. CARTER (*Lond. Med. Repos.* vol. xix. p. 382., and vol. xxi. p. 369.), Mr. CREIGHTON, and Dr. MILLS, but it has, like all other agents, also failed. HORN (*Archiv.* 1812, May, p. 573.) directs this ointment to be rubbed on the part where the aura commences.—*d.* The propriety of exciting irritation in the scalp itself is questionable in the inflammatory, plethoric, and acute cases; although ARETÆUS recommends it, and ALEXANDER TRALLIANUS advises *mezereon bark* to be applied to this part. Where the disease has followed the suppression of an eruption in this situation, the antimonial ointment, or the mezereon bark, or blisters, are very appropriate applications. In the more obstinate and chronic cases, and after free evacuations in the more acute, *blisters* kept freely open, on the occiput, behind the ears, or on other parts of the

* M. BORIE'S plan of treating epilepsy, which is in great repute in Paris, is as follows:—Having premised a small bloodletting from the feet, exhibited an emetic, and acted on the bowels by means of four grains of calomel and an ounce of castor oil, he directs, every morning fasting, twenty drops of the distilled laurel water, in a glassful of sugared water; increasing the dose one drop daily until it reaches sixty, when that quantity is continued; and, every night, two drachms of the leaves of the *artemisia*, in powder, in the infusion of the *tilia Europea*. He applies, every fortnight, moxas—not exceeding six—along the spine, from the occiput downwards; causes the lower extremities to be well rubbed, with some aetherial preparation, twice daily; and leaves a bracelet on the left arm, which is to be drawn very tight upon the approach of the fit. He allows the patient only water for his drink, and restricts him to vegetable diet. He further directs sea-bathing—the head being first immersed—or the shower bath, and exercise in the open air, avoiding exposure to the sun: and lastly, he enjoins him—“Eviter les émotions vives, les emportemens de colère, les occupations sérieuses, les tensions de l'esprit, les lectures obscènes, la fréquentation des spectacles, les contrariétés, les habitudes extenuantes, l'onanisme, les plaisirs vénériens,” &c. (*Journ. des Progrès des Scien. Méd.* t. ii. D. S. p. 225.)

scalp, are prescribed by RIVERIUS, PISO, HOFFMANN, MEAD, PERCIVAL, and others.—*e. Scarifications of the scalp*, particularly on the occiput, are directed by CELSUS and CÆLIUS AURELIANUS, and are deserving of adoption in modern practice.—*f. Dry cupping* on the neck and between the shoulders shortly before the expected return of the fit, has been prescribed by me, with slight benefit, in some cases in which depletion had been carried as far as was judged prudent.

109. *M.*—*a. Ointments* containing the active principles of various medicines, as *strychnine*, *veratrina*, *acetate of morphia*, &c., have very recently been tried in epilepsy, and are calculated to prove serviceable in some of its states; but, as yet, the results have not been such as to admit of further remarks.—*b. Various medicated epithems* have likewise been resorted to, applied chiefly on the epigastrium, or along the spine. I have directed them in a few instances with advantage, particularly in children, and have generally employed modifications of F. 311. 313. and 770. in this manner.—*c. The endermic method*, or the application of various active substances to the skin denuded of its cuticle, has recently been tried on the Continent, in this disease. It possesses this advantage,—that it combines the operation of medicinal agents on the nerves of the part, and on the circulation, with external irritation; and it therefore deserves a cautious adoption, and more extended trials than have hitherto been made of it.

110. *N.* Immediate *ligature* of a limb or part, above the situation in which the aura commences, has been favourably noticed by GALEN, ALEXANDER TRALLIANUS, RHAZES, AVICENNA, SCHENCK, GREYING, LYSONS, PEW, CULLEN, &c. and is generally recommended when the fit is preceded by an aura. It sometimes wards off the seizure; but it fails of doing so, as often as it succeeds, although it may have been sufficiently early employed.

111. *O.*—*a. ARETÆUS* is the earliest author who has noticed *trephining* the cranium in epilepsy, and the circumstances in which it may be performed. CÆLIUS AURELIANUS was opposed to the practice, although he states THEMISON to have been in favour of it. Instances have, however, been recorded by ABERNETHY (*Quæst. Medicæ Monspeli. &c.* Monps. 1617.), RHODIUS (*Observ. cent. i. obs. 66.*), VAN DER WIEL (*Observ. Med. cent. i. obs. 8.*), MARCHETTIS (*Observ. Chirurg. Patav. 1664.*), LA MOTTE (*Chirurgie*, t. ii. p. 409.), LYSONS (*Essays*, &c. p. 111.), KITE, TISSOT, and others, where external injury, and circumscribed disease of the bone or scalp, have furnished indications to warrant the performance of this operation; and where it was resorted to with success. It has also been practised recently with benefit. Dr. ELLIOTSON refers to a case in St. Thomas's Hospital, where the trephine removed a piece of bone with a spicula from its inner surface, and cured the disease. Other successful instances are recorded by Dr. GUILD (*Med. and Chirurg. Review*, vol. xii. p. 504.), and Dr. BLAKE (*Lond. Med. and Phys. Journ.* Jan. 1826.).—*b.* The much less feasible experiment of *tying the common carotid*, in order to cure the disease, has been suggested by Mr. EARLE, and actually practised by Mr. PRESTON (*Trans. of the Med. and Phys. Soc. of Calcutta*, vol. v.); but its ultimate success

is not apparent.—*c. Pressure on the carotids* has been advised by Mr. EARLE; but it is probable, that the obstruction it must occasion to the return of blood from the head, will be as injurious as the diminution of the supply may be beneficial.

112. *P. Travelling, and change of air and of residence*, are sometimes serviceable; and are recommended by HIPPOCRATES and HOFFMANN. In the cases of children, change to a dry situation, or to the sea-side, is especially beneficial. VAN SWIETEN (*Comment. vol. iii. p. 436.*) states, that several epileptics were cured by emigrating from Holland to the East Indies, and that, upon their returning to Europe, some experienced a relapse, but that others had recovered permanently. It is chiefly, however, in the asthenic and sympathetic forms of the disease, that change of air and travelling prove serviceable.

113. *Q. Regimen.*—In addition to what has been already advanced on this subject, the practitioner should bear in mind, that as much may be done by a regimen suited to the peculiarities of the case, as by medicinal agents.—*a. The meals* should be light, very moderate in quantity, at regular and not too long intervals between each. In the plethoric and more acute states, animal food should be altogether or nearly relinquished; but in the asthenic conditions, or when there appears to be a deficiency of blood, the more digestible kinds of animal food may be allowed once, and occasionally twice, a day. Even in these latter cases, a spare, but nutritious and digestible, diet ought to be adopted, as a liberal allowance will seldom be duly assimilated, and will only embarrass the digestive organs. The principal meal should be taken early, and a light supper, consisting of a biscuit and half a pint of milk, about an hour before retiring to rest. The only *drink*, in plethoric habits, should be water, or toast-water, or imperial; but in the opposite states, and in asthenic cases, Seltzer water, or even Pyrmont or Spa waters, with milk, may be allowed. Chocolate and cocoa are unsuited to the former class of cases; and coffee and green tea should be avoided, especially where active determination to the head is observed. Black tea once a day, and milk and water, are the best suited to the ordinary states of the disease. Not more than half a pint of any liquid should be taken at one time.

114. *b. Epileptics* should not *sleep* longer than seven hours. They ought to lie in an airy chamber, without curtains to the bed, and without night-caps; upon a hair mattress, with the head and shoulders somewhat raised. The hair ought to be worn closely cut, and in the severe asthenic cases should be shaved entirely off. The tepid or cold affusion on the head, or shower bath, should be used every morning, the scalp being afterwards well rubbed. In all cases, *early rising*, and *regular exercise* in the open air, should be enjoined. But the exercise should not be at one time, but twice or thrice daily, with intervals of repose. It should be taken on foot, and not sooner than two hours after a full meal. The patient should be as much as possible in the open air; but should not venture on horseback. Flannel ought to be worn next the skin, and the lower extremities constantly kept warm. During warm weather, a light-coloured hat should be worn; and ex-

posure to the sun's rays always avoided. When the attacks are at all frequent, the patient ought never to be without an attendant, and he should be guarded from the fire, from precipices and water. He ought not to frequent crowded assemblies, nor even the bustling and crowded streets of great cities, nor should he look down from precipitous places. — There is no disease that requires a more strict dominance of the passions and desires than this. The concluding injunctions of M. BORIE's judicious treatment (see note to § 104.) especially require observance, as the habits there referred to have a powerful influence both in inducing and perpetuating the malady, and in destroying the constitutional and intellectual powers.

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EPISTAXIS. See HEMORRHAGES.

ERECTILE TISSUE.—*SYN. Vasa Erigentia; Tela Erectilis. Tissue Erectile, Fr. Erectiles Gewebe, Ger.*

CLASSIF.—PATHOLOGY.—*Morbid Structures.*

1. This structure, which is eminently vascular, and copiously supplied with organic or ganglial nerves, possesses, beyond all others, that vital property which is obscurely evinced by several other textures, and which was denominated the *turgor vitalis*, or vital turgescence, by *HEBENSTRIET*, *SCHLOSSER*, *REIL*, and *ACKERMANN*. This property, whether denominated as above, or called vital expansion, or any other name, is more generally diffused, and presents more important relations, both in health and in disease, than has usually been acknowledged. The reader will find it more fully discussed under the article *TURGESCENCE*. I have merely to notice in this place, very briefly, the morbid states, which the parts allowedly erectile present. These parts are—the cavernous and spongy body of the penis, as well as its bulb and gland; the clitoris and nymphæ; and the nipple of the female. There are other parts more obscurely (owing to their situation), but undoubtedly, endowed with this property: these are—the uterus, especially its neck; the Fallopian tubes, particularly the fimbriated extremities; the spleen; and the lips of both sexes: but these are not comprised in the following observations. The morbid structure called *Nævus*

Maternus, Aneurism by Anastomosis (*BELL* and *FREER*), *Angiectasia*, or *vasorum dilatatio* (*MECKEL*), *Telangiectasis*, or *vasorum ultimorum distensio*, by some German authors, appears to be merely an accessory or morbid form of the erectile tissue; and I agree with *Dr. CRAIGIE*, in considering that such is the case, and that the throbbing vascular tumour first noticed by *PEARSON*, and subsequently minutely described by *SCARPA*, is an adventitious formation of the same kind.

2. The erectile tissue may evince its characteristic property in a very marked manner, and to an extent that is truly morbid, without any appreciable change in its organisation. This is shown in *priapism*, in which the vascular turgescence is the result merely of nervous excitement or irritation. *Chordee* is a modification of this state, caused chiefly by inflammation of an adjoining structure; the erectile tissue of the penis being excited, whilst the submucous tissue of the urethra is inflamed, and unyielding, owing to its morbid state, and to spasm of the *ischio-cavernosus* muscle.

3. *Hæmorrhage* rarely takes place spontaneously in erectile tissues. I have, however, met with it in the *corpus cavernosum* of the penis, occasioning a state nearly resembling that of priapism, but unattended by nervous or mental excitement. In this case, the morbid state was removed by a small incision made into the cavernous structure, when grumous dark blood escaped. An interesting instance of this kind is recorded by *Mr. CALLAWAY*. Similar changes are not so infrequent, from external violence, particularly in the erectile tissue of the female organs, owing to difficult or instrumental labours. This tissue may be the seat of excrescences, of scirrhus, and, like others, be involved in specific inflammation, malignant ulcerations, and adventitious formations; but such of these, which belong to the province of the physician, are noticed in the articles on the *SPLEEN* and *UTERUS*.

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ERETHISM, AND MERCURIAL ERETHISM.

Erethismus (*ἐρεθισμός* from *ἐρεθίζω*, I excite or irritate.).

1. I. ERETHISM, in Pathology, has been generally understood, since the time of *HIPPOCRATES*, as implying a state of irritation, or excitement of a part, different from, or short of, the inflammatory condition; although often passing into it. *HIPPOCRATES* and *ARETÆUS* viewed it as irritation, accompanied with some degree of debility. *GALEN* applied the term to irritation of the stomach and intestines by acrimonious fluids; and most of the ancients believed that, where it existed, it prevented the accession of salutary critical evacuations. Many modern pathologists employ it as synonymous with orgasm, or simply an exalted state of the vital actions of a part; and others attribute to it more of a morbid import, viewing it as an early stage, and lesser grade, of many acute diseases, especially those that are febrile or inflammatory. The most familiar illustration of this state, according to the

former class, is the act of blushing. According to the latter class, the ravenous appetite attendant sometimes upon debility and various affections of the digestive organs, proceeds from erethism of these parts, or, in other words, from an excited state of the nerves of the organ, with increased circulation and secretion or exhalation from the villous surface. It is very probable, that this state, either prolonged, or frequently excited, will give rise to acute or chronic inflammation, and even to changes of structure, and to effusion from mucous or serous surfaces. That it prevents the accession of critical changes, is also probable.

2. This condition should be viewed as morbid, and treated according to its seat and grade. It requires, generally, refrigerants, light or low diet, soothing and mucilaginous drinks, tepid or warm bathing, cooling diaphoretics and diuretics, and mild laxatives and enemata. When neglected, it is apt to extend the sphere of its morbid influence, more especially when seated in the digestive mucous surfaces; the functions of digestion, sanguification, and assimilation becoming disordered, and irritation supervening in the cutaneous surface, in the liver, and even in various remote parts. (See art. DISEASE, § 72. *et seq.* and 78. *et seq.*)

3. II. ERETHISM, MERCURIAL.—*Erethismus Mercurialis*—was the name given by Mr. PEARSON to that extreme state of irritability and exhaustion which sometimes is occasioned by mercury. Before this state was described by this surgeon, its nature and cause had been entirely overlooked, although it must have often occurred, and even proved fatal. It evidently arises from the poisonous action of the preparations of mercury upon the organic nervous system and heart. The preparations which most commonly produce it, are, the blue pill and the ointment, particularly the latter; and it is not improbable that some change may take place in these from the action of the air, when they have been long kept, that will give rise to this affection, if they be prescribed in the quantities safely administered in the more recent state. A mercurial atmosphere, as in confined syphilitic wards, has also, very probably, a considerable share in its causation. The erethismal symptoms usually come on early in a mercurial course, but they may occur at any period. When once produced, they very readily return upon resuming the mercury, in the same form that first occasioned them. Pre-existing debility, the action of malaria, the scrofulous diathesis, constitutional susceptibility and irritability, and previous mental excitement and anxiety, seem to be, as far as is yet known, the chief predisposing causes.

4. i. This affection usually commences with slight trembling of the limbs and tongue, sense of fluttering in the chest, irregularity of the heart's action, and palpitations on the least exertion. The pulse is feeble, small, quick, compressible, irregular, or intermitting. The strength is extremely depressed, the countenance is pale and contracted; and great anxiety at the præcordia, with frequent sighing and a feeling of sinking, is complained of. If the mercury be still continued, the tremblings, the frequency, irregularity, and intermissions of the pulse, increase rapidly, and are attended by a sense of coldness, and

sometimes by vomitings. At this period, sudden or great exertion may extinguish life.

5. ii. *The Treatment*, early in the affection, is generally easy and effectual. Upon the first indication of it, the patient should be removed to, and remain as much as possible in, the open air; and mercury, in every form, relinquished; even a mercurial atmosphere should be avoided. The preparations of ammonia and camphor ought to be given in full doses, and the surface of the body cleansed from all impurities, especially from the remains of mercurial ointment. Having thereby restored the state of the circulation, a course of nitric acid with sarsaparilla should be entered upon, and the bowels kept gently open by a sufficient dose of the precipitated sulphur taken at bedtime on alternate nights. If it should be still necessary to resume the use of mercury, as sometimes proves to be the case, the utmost circumspection is requisite. The oxymercurate, in the tincture of cinchona, or in the form of pill with the pulvis glycyrrhizæ and camphor, and taken with the meals, will often produce a sufficient salivation. After a most severe case of this affection which came under my care, where it was determined, in consultation, to have recourse to mercurial salivation as a last resource, for the cure of most dangerous secondary syphilis, the preparation prescribed in the manner now mentioned had the desired effect.

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ERGOTISM.—(CLASSIF. PATHOLOGY, *Ætiology*.) Diseased, unripe, or damaged grain of any kind, is injurious to the animal economy, according to the quantity consumed. The species of grain, the nature of its alteration from the wholesome state, and the proportion of it entering into the food of man and the lower animals, are the chief circumstances modifying the morbid results. Rye is most frequently productive of injurious effects in the northern countries of Europe, the disease in it giving rise to the *ergot*, or spur, being the chief cause. But wheat, rice, or any other grain, either similarly diseased, or prematurely cut down, or damaged by the mode of keeping, or by age, or mixed with the seeds of poisonous plants, as those of the *Raphanistrum* and the *Lolium temulentum*, will occasion dangerous diseases. The noxious effects of spurred rye (*Secale cornutum*) have been most frequently observed, and are especially noticed in connection with the affections of which it is one of the chief causes. (See arts. GANGRENE, and SPASM—*Cachectic*.) But the disorders produced by other kinds of diseased or unwholesome grain, are in many respects similar to those consequent upon the use of spurred rye. Sufficient allusion has been made, in the article EPIDEMICS, to the influence of unripe, blighted, deficient, or damaged crops, upon the health of the community; the epidemics thereby occasioned, varying in character with the particular state on which the unwholesomeness of the grain depended, and the concomitance of other causes. The particular unwholesome condition of grain has not, however, been hitherto viewed sufficiently in connection with its specific effects

upon the economy, in any one instance; and it is only in respect of spurred rye, that we have any kind of data that will admit of the special consideration of the subject. From some circumstances that have come before me, I should infer that unripe grain is productive chiefly of diarrhoea and dysentery; that diseased, impure, or blighted grain, most frequently occasions affections of the nervous and vascular systems, with disorder of the digestive organs, and contamination of the circulating fluids; and that damaged and old grain gives rise principally to fevers of a malignant or adynamic kind, with predominance of some one or more of the preceding affections, according to concurrent causes and circumstances. (See DISEASE — Causation of; GANGRENE, and SPASM.)

ERYSIPELAS. SYN. — Ἐπιφλογισμα, HIPPOCRATES; ἰνυσίπιλας, Gr. (from παρὰ τὸ ἐρῖσθαι ἐπὶ τὸ πῖλας, that it extends to adjoining parts; or, rather, from ἐρῖω, I draw, and πῖλας, adjoining; or from ἐρῖθρος, red, and πῖλος, brown, livid) Ignis Sacer, Lat. *Febris Erysipelatosa*, Sydenham, Schroeder, &c. *Febris Erysipelacea*, Hoffmann, Vogel, &c. *Rosa*, Sennert. *Ignis Sancti Antonii*, Auct. Var. *Emphlysis Erysipelas*, Good. *Erysipèle*, Fr. *Die Rose*, der *Rothlauf*, Germ. *Erisipela*, *Risipola*, Ital. *The Rose*, St. Anthony's Fire.

CLASSIF. — 1. Class, Febrile Diseases; 3. Order, Eruptive Diseases (Cullen). 3. Class, Sanguineous Diseases; 3. Order, Eruptive Fevers (Good). 4. Order, Vesicular Eruptions (Willan). III. CLASS, III. ORDER (Author, in Preface).

1. DEFIN. — *Asthenic inflammation of the integuments, affecting them more or less deeply and extensively, with diffused tumefaction, and a disposition to spread, depending upon constitutional disorder.*

2. I. GENERAL DESCRIPTION. — A. *Erysipelas** usually commences with either the local or the constitutional symptoms more prominently marked; but I believe that the local symptoms never manifest themselves before some disorder referrible to the vital sources and centres has been present, although frequently in too slight a degree to alarm the patient or come before the physician. Previous to, or accompanying, a sense of tension, itching, heat, weight, and uneasiness, with diffused redness and swelling of the skin, the patient experiences chills, rigors, disturbance of the functions of the stomach and bowels, and a quickened circulation. On the second and third days, the swelling, which was either slight, or scarcely noticed, increases rapidly, extends superficially, and is warm, shining, of a yellowish red colour, disappearing momentarily during pressure, with a tensile burning pain, exacerbation of fever towards evening, and remissions in the morning. In addition to these, the patient complains of frontal headach, drowsiness,

anxiety at the præcordia, general lassitude, and pain or aching of the limbs; anorexia, nausea, or vomiting; thirst, and heat or dryness of skin. The tongue is generally loaded, and subsequently dry; the bowels are constipated, and the motions offensive; the urine is turbid or saffron-coloured; and the pulse full, soft, frequent, sometimes broad and compressible, and often oppressed or irregular. The disease generally runs its course, in its more acute forms, between the seventh and fifteenth day. It is sometimes extended to the twenty-first, but seldom beyond, unless in cases of relapse or metastasis, or when it assumes certain anomalous forms, or occasions organic changes of subjacent or internal parts, which prolong the fever and increase the danger.

3. B. *Erysipelas* presents phenomena which are peculiar to it, and distinguish it from phlegmonous inflammation, on the one hand, and from the inflammatory action attendant on rheumatism and catarrh, on the other. — a. The characters of erysipelatous inflammation are as follow: — a. The pain is peculiar — is tensile, burning, or stinging; is not severe, but is diffused throughout the inflamed surface, and is occasionally remitting. — β. The redness is not intense, as in phlegmon; but is either pale, rose-coloured, or of a pale yellowish hue — arising, seemingly, from a more copious and diffuse deposition of serum, slightly tinged with a little blood. The redness always disappears on pressure, but quickly returns when pressure is removed: it is of a deeper red when the attendant febrile action is of a sthenic kind; and of a more livid hue when the vital powers are much reduced. — γ. *Tumefaction* is always present, and is sometimes very remarkable, owing to the effusion of serum into the subcutaneous cellular tissue. It is, however, diffused, never acuminate or convex; but sometimes hard or brawny, as in the sthenic or phlogistic variety; and occasionally soft and boggy, as in the œdematous or asthenic variety, or when the adjacent cellular tissue is affected or suppurating.

4. b. *Erysipelas* is seated chiefly in the integuments; but it presents various modifications, according as the more superficial or more internal tissues of the skin are especially diseased. Where the *cutis vera* is the principal seat, the cellular tissue underneath is also materially affected; it being usually infiltrated with serum, tumefied, and sometimes inflamed to a very considerable depth in some instances; whilst the more superficial capillaries likewise partake in the disturbance. — Where, on the other hand, the *rete mucosum* and papillary tissue are the chief seat, the disease is commonly accompanied with vesication. When this occurs, or when a discharge from the surface, or free exfoliation of the cuticle, takes place, the severe affection of the subjacent cellular tissue very rarely is observed.

5. c. *Erysipelatous* inflammation has always a tendency to spread to adjoining, and occasionally even to attack remote, parts. As long as the metastasis, or vicarious affection of distant parts, is confined to the integuments, the primitive form and nature of *erysipelas* is retained; but, as soon as it has apparently attacked internal organs, which is sometimes the case, owing to their pre-existing disposition and morbid conditions, and to the operation of superadded causes, then the affection of the skin disappears, and the super-

* Some confusion has arisen from the manner in which this disease and erythema have been viewed in relation to each other, and in which both have been classed. For, while I admit, with Dr. GOOD, that the term *erysipelas* has been loosely employed in medical writings, yet I conceive that it will not add to the precision of our knowledge to remove certain of the varieties of *erysipelas* to the genus *erythema*, where their local characters are chiefly considered, and their more important constitutional and vital relations are overlooked.

induced internal disease occasions the symptoms of an idiopathic malady, with more or less of the constitutional disturbance characterising the erysipelatous eruption, particularly those which relate to the vital energies and powers of resistance. Thus, inflammations of internal parts, as of the serous or mucous surfaces, may displace, or be vicarious of, the erysipelatous disease of the skin; but such inflammations will still retain peculiar features, and differ from idiopathic or true phlogosis of those parts; the depression of the powers of life, the morbid condition of the circulating fluids and of the excretions, characterising erysipelas, attending also upon them, often in increased grades.

6. *d.* Like other inflammations of membranous parts, erysipelas generally assumes an *acute form*; and, in this respect, resembles phlegmon: but differs from it very materially as regards the nature of the constitutional disorder, especially the morbid state of the circulating fluids and of the excretions, and the manner of termination—particularly the slow convalescence; the persistence of congestion—especially of the venous capillaries; the desquamation of the cuticle, and the tendency to relapse.

7. *e.* The characteristics of erysipelas arising from the *texture* in which it is seated, are—the dryness, the stinging heat, the peculiar shining appearance of the surface, the burning and itching, and the frequent elevation of the cuticle into vesicles, or its successive desquamation. All these indicate—1st, suppression of transpiration, with increased circulation; 2d, morbid sensibility of the cutaneous nerves; 3d, a preternatural secretion of serum beneath the cuticle; and, 4th, an altered state of the reproductive or plastic function of the *rete mucosum*.

8. *f.* When erysipelas has once attacked the frame, there remains a certain morbid *diathesis*, disposing to renewed attacks at distant intervals. The same property is also evinced by several non-contagious affections of the skin; and is most probably owing to acquired constitutional disposition, or rather, to a weakened state of the digestive and excreting or alimentary organs—to a latent state of disorder arising out of the remote causes of the disease, and heightened or rendered more persistent by its attack.

9. *g.* The *causes* of this malady are frequently the same as those of low forms of fever, catarrh, and rheumatism; for, like them, it generally proceeds from peculiar states and vicissitudes of weather and of the atmosphere; especially cold, moist, miasmatic, and foul conditions of the air, acting upon a system already disposed to their influence by depression of vital power, or by the accumulation of morbid or effete matters in the circulation, owing to defective action of the excreting organs, to unwholesome diet and regimen, or to prolonged disorder of the *prima via*.

10. *h.* Erysipelas is generally preceded and accompanied by more or less *fever*, according to the situation of the part affected, the sensibility and irritability of the system, and the character of the prevailing epidemic constitution. It should never be considered apart from the attendant state of constitutional disturbance,—from the manifestations of vital power, and the conditions of the circulating fluids, and secretions,—of all which the local affection is merely an extensive and im-

portant effect; but one which reacts upon these states and conditions, whence it chiefly derived its origin, or at least its peculiar characters. The modifications of the attendant fever depend chiefly upon the constitution and pre-existing state of the assimilating and excreting organs, upon the prevailing epidemic influence, and upon the weather and season. Thus, the fever more commonly approaches the inflammatory type during cold and dry seasons, or in winter and spring; whilst the more adynamic forms, with predominance either of the gastric, bilious, or nervous states, are most frequent in summer and autumn.

11. II. PARTICULAR DESCRIPTION.—Erysipelas presents various modifications, according—1st, to the part affected; 2d, to the nature and form of the local changes; 3d, to the states of constitutional disturbance with which these changes are associated, and on which they are dependent; and, 4th, to the causes which have produced it.

12. *A. Modifications as to the part affected.*—The sensibility of the part in health, and its vital relations, especially modify the consentaneous disturbances of the sensiferous and vital functions generally characterising this malady. If it attack the *face*, commencing in one cheek, it generally soon extends to the other; and in a short time to the forehead and scalp, producing more tumefaction than almost in any other situation, owing to the effusion of serum in the subcutaneous cellular tissue. The eyes are closed or prominent; the nose is distended; the ears are red, shining, and burning. On the second or third day, the whole head and face are often enormously distended, presenting a yellowish or sub-livid redness.—Also, when the disease commences in the *scalp*, owing to punctures, bruises, or contused wounds, the affection of the subcutaneous cellular tissue is very great, frequently followed by diffused suppuration, and disease of the fibrous tissues adjoining. But, whether originating in the face or in the scalp, the greater the extent and intensity of the affection of these parts, the more are the functions of the brain, of the circulation, and of secretion disturbed. Hence the violent headache, tinnitus aurium, delirium, sopor, convulsions, coma, &c.; the parched and dark tongue; the morbid state of the evacuations; and the disturbance of respiration.

13. When erysipelas attacks the face, it sometimes affects the *mouth and fauces*, extending in some instances to the *pharynx* and *larynx*, internally, and down the neck to the chest externally. An interesting case of this kind was attended lately by Mr. BYAM and myself, where the enormous tumefaction of the neck and throat, with the affection of the larynx and trachea, increased by the constriction produced by the integuments surrounding the neck and throat, caused suffocation in a few hours.—This extension of the disease to the fauces and throat, not infrequently occasions a species of consecutive *croup*, as stated in that article (§ 18. *d.*): it may also occur, when the scalp is affected; but, in this case, the disease generally extends down the neck and back, even to the loins. The disposition to spread thus extensively, and to affect subjacent parts, is most remarkable when the pulse is frequent, and vascular action greatly excited, at the same time that vital power is much depressed, the functions of excretion impeded, and the blood morbid.

14. In other parts of the body, the symptoms are generally not so severe. The pain, however, is very great when the disease attacks the *mamma* during lactation, or when it extends to the *organs of generation*. In these situations, it frequently implicates the subcutaneous cellular tissue and adjoining glands, and thus closely approximates in seat and nature to the primary form of spreading inflammation of the cellular tissue. When it occurs in the latter situation, in children between one and six years of age, it often proves fatal, either from this circumstance, or from sloughing ulceration. Where the extremities only are affected, there are generally less pain and constitutional disturbance than in other cases.

15. *B. Modifications of the local affection.*—The changes which take place in the external seat of disease, may be classed under four varieties: the glabrous, vesicular, crustaceous, and deep-seated.—*a.* The *glabrous* local affection consists in a diffused or plane and smooth tumefaction of the skin, of a rose or yellowish redness, sometimes verging to a sub-livid hue.—*b.* The *vesicular* form is attended with bullæ, or blisters, in parts of the inflamed surface, resembling the vesicles raised by cantharides. Sometimes they are numerous, small, and discrete *phlyctenæ*; at other times confluent, and forming very large bullæ, containing a yellowish, sometimes dark, sanguineous, acrid serum, effused between the rete mucosum and cuticle, which it elevates. These vesicles continue to appear during the course of the disease; are accompanied by an unpleasant tension, itching, burning, or pain; and, instead of diminishing, often increase, the inflammation and fever.—*c.* The *crustaceous* form arises from an early rupture of the cuticle, and escape of the lymphatic serum effused beneath it, which exposure to the air forms into crusts, and under which an acrid fluid collects, and irritates, or even ulcerates, the skin.—*d.* In the *deep-seated* and *tumefied*, the cellular and other subcutaneous tissues are affected, either by œdema, or by phlegmonous or diffusive inflammation, tending to disorganisation. Whilst the superficial parts of the integuments are the chief seat of the affection, in the preceding varieties, the tissues underneath are principally diseased in this, particularly the cellular and adipose; and they present every shade of morbid action, from simple passive œdema, to inordinate vascular excitement—from the lowest state of asthenia, to the highest degree of vital action—either passing rapidly into suppuration, or into disorganisation, or spreading extensively in the course of the cellular tissue, and involving other adjoining parts, as shown in the article on *Diffusive Inflammation of this Tissue*. It is generally observed in this associated or deep-seated malady, that the skin is but slightly altered, or that the morbid action in it diminishes, as that in the subjacent parts increase, especially if the latter be of a diffusive or septic kind.

16. *C. Modifications connected with the constitutional disturbance.*—The forms which the disease assumes, chiefly result from the states of the nervous system, of the assimilating and excreting organs, and of the circulating fluids, and from the temperament and habit of body. These modify the febrile action as well as the local affection, aided by the existing grades of constitutional power and vital resistance. Erysipelas

consequently presents every intermediate shade between high vascular action with simply diminished vital power, and low vascular action with great depression of the vital energies, as respects both the part chiefly diseased, and the system in general.—*a.* As soon as the morbid action in the skin passes a certain height, it generally extends to the subjacent cellular tissue; and if it occur in young, robust, or plethoric subjects, or if the constitutional powers be not much reduced, or the nervous system not materially exhausted or oppressed; or if the functions of the digestive and excreting organs be not altogether overpowered; then the disease assumes more or less of the *sthenic* or *phlegmonous* character, both as to its local appearance and the attendant fever, and has a marked tendency to pass into suppuration, occasionally with destruction of the subcutaneous cellular and adipose tissues.—*b.* When the disease is attended by signs of accumulated sordes in the *prima via*, with nausea and vomiting, and a morbid state of the secretions, particularly of the biliary secretion,—characters which it often presents,—it has received, from Continental pathologists, the appellation of *gastric* or *bilious erysipelas*.—*c.* If it present great depression or disturbance, especially of the cerebro-spinal nervous functions, with a pale, evanescent, and changeable state of the part affected, and imperfect secretion and excretion; and if delirium coma, subsultus, &c. supervene; or if the local affection spreads rapidly, or if it entirely disappears, and is followed by internal disease; it has been called *nervous erysipelas*, or it may be said to be complicated with febrile disturbance of the nervous kind.—*d.* If, owing either to excessive morbid action over vital power, or to a faulty state of the system at the time of attack, or when it supervenes upon remittent or continued fevers, or upon any cachectic malady, or in aged or broken-down constitutions, it extends to the subcutaneous structures, and gives rise to œdema, or terminate in softening or disorganisation of these parts, it has received the name of *œdematous*, *septic*, or *gangrenous erysipelas*. This state of the malady is generally connected with defective assimilation and excretion, with an impure state of the circulating fluid, and with deficient vital power.

17. *D. The causes which dispose to, or excite, the disease*, have also great influence in modifying its characters, both local and general. When propagated by infection, it is prone to assume a complicated state, or to be associated with inflammation of the throat and pharynx of a most dangerous character, owing to its disposition to spread to the larynx and trachea; and with diffuse and gangrenous inflammation of the subcutaneous cellular tissue. A similar complication is also observed during certain epidemic constitutions, or when the disease has been occasioned by the contact of animal matters in a state of decomposition, or by other septic agents. In these cases, the tumefaction is often great; and, although vascular excitement may be very remarkable, vital power is much depressed, and speedily overwhelmed; owing chiefly to the morbid state of the circulating fluids, or to the contaminating and septic operation of these causes.

18. *III. DIVISION OF ERYSIPELAS.*—This disease has been divided by authors, according to its various states, into *febrile* and *non-febrile*;

the stationary and the erratic; the benign and malignant; the acute and chronic; the periodic or habitual, and the accidental; the sporadic and epidemic; the idiopathic and symptomatic; and the primary and secondary: to which may be added, the internal and external. As to all these general divisions, it is only necessary to remark that, by *Idiopathic* erysipelas is understood that condition of the disease which arises from the direct impression of the causes on the skin, as from vicissitudes and epidemic states of the air, chemical stimuli, morbid effluvia, poisonous matters, &c.; and by *Symptomatic*, is meant the external manifestation of internal disorder, as of impeded secretion and excretion, the accumulation of morbid excretions in the *prima via*, and an impure state of the circulating fluid, either from interrupted elimination of effete matters, or from the absorption of morbid matters. As to the existence of *Internal erysipelas*, I may observe, that it cannot be allowed otherwise, than that inflammatory metastasis to internal organs, particularly the mucous and serous membranes, occasionally occur; the internal disease taking place either in consequence of the suppression or disappearance of the external affection; or the latter ceasing to exist, owing to the commencement or progress of the former. But, although the internal disease may retain the constitutional peculiarities attendant on the primary affection, yet its distinctive characters can no longer exist when it attacks a differently organised structure, from that to which they are chiefly owing. It is in such circumstances, and when internal inflammations supervene in broken-down constitutions, or from interrupted excretion and a morbid condition of the circulating fluids, as in the course of fevers, and in the puerperal state, that J. P. FRANK and many other writers contend for internal erysipelas; similarity of morbid action, local and constitutional, although affecting different structures, being considered by them as sufficient to warrant the appellation.

19. The Division adopted by WILLAN and BATEMAN — viz. 1. *Phlegmonous*; 2. *Oedematous*; 3. *Gangrenous*; and 4. *Erratic* — is faulty, inasmuch as the termination in gangrene is peculiar to no one state, but may occur in either the first or second variety. — Dr. GOOD associates certain varieties of erysipelas, with *chilblain* and *intertrigo*, under the generic term of *erythema*. — BIETT, CAZENAVE, and SCHEDEL treat only of the *True* and *Phlegmonoid*. — One of the best and simplest divisions is by MM. ALBERT and RAYER, into (a) the *Simple*, (b) the *Phlegmonous*, and (c) the *Oedematous*; but it is defective, as it excludes certain states or complications which should not be overlooked, when treating of this disease. — Mr. JAMES adopts a nearly similar arrangement, substituting merely the term *superficial*, for that of simple, employed by RAYER.*

* Synopsis of the Arrangement of different States of Erysipelas adopted by the Author.

SPECIES I. — SIMPLE ERYSIPELAS; *E. Simplex*.
Var. A. — Benign or Superficial Erysipelas; *E. Simplex Benignum*.

Var. B. — Acute Erysipelas; *E. Simplex Acutum*.

SPECIES II. — COMPLICATED ERYSIPELAS; *E. Complicatum*.

Var. A. — With Oedema or the Subcutaneous Cellular Tissue.

Var. B. — With Inflammation of the subjacent Parts.

i. SIMPLE ERYSIPELAS — *E. Simplex* — *E. Exanthematicum* (RUST). — *Febris Erysipelatosa* (SYDENHAM, HILDENBRAND). — *E. Superficiale* (JAMES). — *E. Verum seu Legitimum* (NAUMANN.)

20. CHARACT. — Spreading inflammation of the skin, with soft and slight tumefaction, redness, stinging heat, fever, and frequently with vesication.

21. A. The mild, benign, or superficial form, is attended by little constitutional disturbance, or only by slight inflammatory fever, or disorder of the digestive organs; the surface of the skin is of a pale or rose red; vesication very seldom, or sparingly, occurs; and occasionally, after spreading to, or affecting, adjoining parts of the surface, and disappearing from those in which it first commenced, it terminates in resolution in the course of a few days, especially after the disorder of the digestive and excreting organs, on which it is usually dependent, has been removed.

22. B. The acute states are attended by more severe local and constitutional symptoms (§2.). They are preceded by marked disorder of the secreting and excreting functions, and are accompanied by smart febrile action. The skin is generally red, hot, diffusely tumefied, and covered with small vesicles, and, in various parts, with large bullæ. These generally break soon after their appearance, or about the fifth or sixth day of the disease, the fluid drying into crusts of varying colour and thickness; the surface underneath either healing rapidly, or becoming excoriated by the acrid serum effused beneath them. In this latter case, the duration of the disease is longer, and the subsidence of the symptoms more gradual, than in the former.

23. C. The termination, which is usually by resolution, is preceded by a mitigation of the symptoms, after having continued in full force for three, four, or five days; and is attended by exfoliation of the cuticle and of the crusts; resolution generally taking place more rapidly in this, than in any other, disease of the integuments. But sometimes the sudden disappearance of the inflammation is followed by its supervention in some other part of the external surface — *Erratic Erysipelas*; and more rarely by asthenic inflammation of some internal part — *Metastatic Erysipelas*. These occurrences are most frequent when the local affection suddenly subsides, although the constitutional disturbance continues, and effete or morbid matters are still retained. The evacuation of copious offensive stools, or of urine depositing a large sediment, antecedently to, or about the time of, the disappearance of the local affection, is a sure indication of a salutary crisis.

ii. COMPLICATED ERYSIPELAS — *E. Complicatum*.

24. CHARACT. — The inflammation of the integuments of the kind above defined (§ 1. 15.), associated with disease of the adjoining structures, or with prominent disorder of internal organs.

25. This species is very varied, owing to circumstances already enumerated, but chiefly to the severity of the attack, to its situation, to the states of the internal functions and of the constitutional powers, and to the exciting causes. Indeed, these latter circumstances mainly deter-

Var. C. — With Inflammatory Disease of the Throat, &c.

Var. D. — With Nervous or Cephalic Affection.

Var. E. — With Gastric or Biliary Disorder.

mine the character of the former. The morbid associations, or more complicated states and severe degrees, of erysipelas, are those in which adjoining tissues suffer, or internal organs are disordered, at the same time that the pathognomonic phenomena—the inflammation of the integuments—continue manifest. For, although metastasis to internal viscera, or the inflammation of other parts than of the skin, occurring in cachectic habits, or in those who are subject to this disease, may, with great propriety, be viewed as erysipelatous, as respects the nature of the attendant constitutional affection, yet neither of them can strictly be considered as such, as regards the part affected. The erysipelatous character, however, of the affection, under both circumstances, should not be overlooked; as thereupon ought to depend, in a great measure, the choice of remedies.

26. *A. With Œdema, or Effusion into the Subcutaneous Tissues*—*E. Œdematodes* of authors.—*a.* This state of the disease may be consecutive of the simple varieties, or it may accompany them from the commencement, when they attack the face, or the vicinity of the organs of generation; effusion, in these cases, always taking place in the loose cellular tissue. It often, also, supervenes in the progress of anasarca swellings. Its primary form occurs chiefly in old persons, and broken-down constitutions, consecutively of chronic visceral disease, and in the leucophlegmatic and dropsical diatheses; the affection of the skin and subjacent cellular tissue being nearly coetaneous. The external surface is of a pale or yellowish red, inclining to brown; generally smooth and glossy; and it is seldom tense. It is but slightly hot or painful; and sometimes neither the one nor the other. The swelling increases gradually, extends slowly, and pits slightly on pressure. Vesications are not common; and the vesicles, which are small, numerous, and flattened, usually appear from the third to the fifth day; they break in a day or two, and are replaced by thin crusts. In the more active states, a sero-puriform, or puriform, fluid infiltrates the cellular tissue, or is discharged from the vesicated surface. The genitals, the face and scalp, the thighs and legs, are chiefly the seat of this variety. Dropsical limbs, especially when the cuticle is cracked or abraded, or after scarifications have been made in them, are often affected by it; and, in these circumstances, there is a marked disposition to gangrene.

27. *b. Œdematous erysipelas terminates*—1st, in resolution, with absorption of the effused fluid; 2d, in suppuration; and, 3d, in softening, sloughing, and gangrenous destruction of the part.—*Suppuration* occasionally takes place; but is generally of an irregular or diffusive kind, extending in the course of the vessels, and between tendons and muscles; is preceded by a boggy state of the swelling; and is often attended by disorganisation of portions of the cellular membrane.—*Gangrene* is indicated by severe pain; and a red and glossy state of the surface, passing into a livid or leaden hue.

28. *B. With Inflammation of the Subcutaneous Structures*—*Er. Phlegmonosum vel Phlegmonodes*, Auct. var.; *Diffuse Phlegmon*, DUPUYTREN; *Er. Spurium, Pseudo-Erysipelas*, RUST.—This is a most important and often dangerous disease; especially when epidemic, or propa-

gated by infection. It is very varied in form and seat; and presents every grade of activity, from the passive or œdematous state, just described, to the most acute grades that rapidly pass into gangrene (§ 31.).—When it occurs *sporadically*, its local character is that of “diffused phlegmon;” the attendant fever being of an inflammatory kind, and preceded by rigors. In this case, vascular action is more acute; the swelling is greater and more circumscribed; the pain and burning more remarkable, and more pulsating; the redness deeper; the temperature higher; and the disposition to pass into suppuration greater, but to change its situation less, than in other circumstances. Where the symptoms are very acute, the subjacent cellular and adipose tissue frequently are profoundly affected; the fasciæ, the intermuscular substance, and even the fibrous structures, becoming inflamed. In such cases, disorganisation of the cellular and adipose tissues often rapidly supervenes; the part passes from a *brawny* and tumefied, to a flaccid and *boggy*, state; and the attendant fever changes to a low or adynamic form. When occurring *epidemically*, or from infection, the local and constitutional symptoms are more severe; vital power and resistance are diminished; and the disease is often complicated with a very dangerous affection of the throat and adjoining parts. This variety may be divided, as suggested by M. RAYER, into *three grades*.

29. *a.* In the *first*, after rigors, and in connection with the constitutional symptoms described above (§ 2.), tingling, heat, and redness, followed by hard tumefaction of the part, begin to appear. A stinging pain, tension, and burning heat are complained of in the seat of swelling; which is diffused, hard, and deep-seated. After pressing the surface with the finger, the redness returns more slowly than in the superficial and simple disease. The lymphatic glands often become inflamed or enlarged; and febrile action is fully developed. If, about the fifth or sixth day, the skin be less red and tense, or covered by furfureous scales, and the swelling subsides, *resolution* has commenced. *Œdema* of the cellular tissue, however, sometimes remains for two or three days. But if the pain, about this period, become pulsating, *suppuration* in one or more parts is inevitable. The abscesses thus formed generally give issue to well-digested pus, and heal in a few days.

30. *b.* In the *second grade* of this variety, inflammation is more extensive; and the redness, heat, pain, and fever are greater. If the disease be not arrested, abscesses form, very insidiously, from the sixth to the ninth day, or even earlier; or a sero-puriform fluid infiltrates the cellular tissue, extending between the muscles and under the integuments; and, upon free openings being made, disorganised portions of this tissue are discharged with the puriform or ichorous matter. Fistulous cavities frequently are formed, giving issue to a fetid and ichorous pus.—Sometimes the skin is thinned or detached, and falls within the margin of the ulceration (RAYER). In these cases, the stomach and bowels frequently become irritable; and the patient dies, either from the exhaustion occasioned by diarrhœa, or by the extensive suppuration and disorganisation of the cellular tissue; or from the absorption of the morbid

secretion of the part, and the consequent contamination of the circulating fluids; or from those causes combined: severe nervous symptoms (§ 35.) being either superadded, or taking the place of this disorder of the *prima via*.

31. *c.* The *third grade* presents a still more acute series of symptoms. In two or three days, the inflammation of both skin and subjacent parts reaches its acmé. The skin is tense, smooth, and shining; and of a deep or dusky red, which is hardly a moment dissipated by the pressure of the finger. The swelling is profound, very painful, intolerant of pressure, and diffused. In this grade, and sometimes also in the preceding, the inflammation extends to, and beneath, aponeurotic expansions; and, occasionally, even to the periosteum, especially when the head is affected. The pulse is sharp and frequent; the tongue is loaded and furred; and the excretions are offensive. There are, also, great thirst, restlessness, sleeplessness, increased fever towards night, and delirium. About the fifth or sixth day, the inflamed integuments assume a violet hue, lose their sensibility, are softened, and covered by phlyctenæ filled with a reddish serum. Soon afterwards, ecchymoses and sloughs form; and, at the same time, an ichorous suppuration, with destruction of the cellular tissue, is established in the subjacent parts—*Gangrenous Erysipelas*. In favourable circumstances, the sloughs are detached, and the parts beneath assume a healthy character; but more frequently the patient sinks, from the absorption of morbid matter causing contamination of the fluids, or inflammation of veins; with affections of the brain, of the stomach, and of the bowels, as in the more severe forms of adynamic fever.

32. *d.* The *first and second grades* of this variety often occur in the scalp, face, and neck; and are frequently further complicated with cerebral affection, especially delirium, coma, &c.; or with gastric and bilious disorder; and with inflammation of the fauces and throat. The *third grade*, as well as the first and second, is met with chiefly in the extremities, particularly after contusions, fractures, and punctured wounds, and is seldom preceded or attended by rigors. When occurring epidemically, as from infection, the constitutional disturbance is greater and more dangerous; the pulse weaker and more frequent; the inflammation of the skin generally less, and that of the cellular tissue more remarkable, and more nearly approaching, if not altogether identical with, *diffusive inflammation* of that tissue (see this article), than in other circumstances.

33. *C. With severe inflammatory Affection of the Throat and Larynx.*—This affection may accompany any of the forms of erysipelas attacking the face; but it is most frequent in the phlegmonous variety, particularly when it appears epidemically, or from infection. Of this, the papers of Dr. STEVENSON, Mr. ARNOTT, Dr. GIBSON, and Dr. McDOWEL, furnish interesting illustrations. In some cases, the extension of the disease over the nostrils and lips, to the fauces and pharynx, may be traced. In others, the affections of the throat and face are almost coëtaneous; and, in the more severe cases, the face, throat, and integuments, down to the chest, with the cellular substance underneath, and surrounding the pharynx, trachea, and glands, are more or less inflamed,

infiltrated, and tumefied. Most commonly, the inflammation commences, with or after rigors, in the fauces or pharynx; is of a dusky hue; extends along the nasal surfaces, and affects the face, scalp, &c. A sero-albuminous exudation is either partially or rarely seen; the croupy symptoms, which sometimes supervene upon this complication, being owing rather to the extension of the inflammation to the mucous surface of the larynx and trachea, and the infiltration of the subjacent and surrounding cellular substance, than to the exudation of lymph. In a few cases of the complication—one of them in the practice of my friend Mr. BYAM, at the time of writing this—the cellular tissue of the throat, and of the whole neck, was so distended, that the integuments appeared girt around them with the utmost tension; and, in this instance especially, the respiration and cough were as distinctly croupal as in idiopathic croup. I have seen, in some cases of this kind, the constriction of the integuments so great, that incisions of them—as first recommended by Mr. COPLAND HUTCHISON—were required, to arrest fatal cerebral congestion or immediate strangulation. The constitutional disturbance in this state of disease is most acute; and, at the commencement, attended by high action, with deficient power. As the disease proceeds, the pulse becomes more and more frequent, unequal, irregular, soft, or small; deglutition difficult or impossible; respiration sometimes suffocative, wheezing, or sonorous and croupal, with strangulating cough; and the excretions are always foul, morbid, and offensive. Delirium, coma, or sinking, preceded by restlessness and anxiety, or disorder of the alimentary canal, are also generally observed.

34. This complication may *terminate*, in the most acute cases, in the course of three or four days—1st, in suffocation, from the extension of the disease to the larynx and trachea, or from the inflammation, infiltration, and tumefaction of the cellular tissue surrounding these parts;—2d, in sphacelation;—3d, from the severity of the superinduced cerebral affection, in connection, sometimes, with congestion of the lungs;—and, 4th, the symptoms may abate under very decided treatment; and, as in the less severe cases, may pass on to resolution, or to the formation of purulent collections, either near the eyes, or about the angle of the lower jaw, or side of the neck. The formation of matter is generally insidious; this fluid being diffused throughout the cellular tissue, and frequently deep-seated. When this is the case, the result is usually fatal; owing to the partial absorption of the matter, and to the effects caused by it on important parts in the vicinity.

35. *D. With Nervous or Cephalic Affection—Erysipelas Nervosum*, of authors.—This is a common complication, where the disease affects the face or scalp, particularly the cellular substance surrounding the eyes (PIORRY); occurring generally between the third and sixth days; and in the course of other varieties, attacking persons of weak constitutions and susceptible nervous systems, especially when about to pass into dangerous exhaustion, or gangrene, or prevailing epidemically. In the former circumstance, there is evidently superinduced inflammatory irritation, or excited vascular action, in the mem-

branes of the brain, analogous to the vascular excitement of the skin, often occasioning an increased exhalation of serum: hence the delirium, passing frequently into coma. In the latter circumstance, the cerebral disturbance is the result rather of depressed vital power, manifested especially in the cerebral functions, and of the morbid changes in the blood, than of inflammatory action. The pulse is frequent, but variable as to fulness and power. The tongue is at first loaded, red at the point and edges, and afterwards dry in the middle, and of a brown or dusky hue. The excretions are suppressed or impeded; and, in the worst cases, particularly towards the close, are passed unconsciously. Tremors, subsultus of the tendons, floccitation, &c. are then also observed. A fatal termination occurs generally from the seventh to the fourteenth day, or later. A bilious diarrhoea, or copious feculent and offensive stools; a free discharge of urine depositing a copious sediment; and a general, warm, and copious perspiration; are favourable occurrences.

36. *E. With Gastric and Bilious Disorder.*—The bilious nature of erysipelas was strenuously insisted on by STOLL, DESSAULT, and others. Antecedent disorder of the digestive and assimilating organs is more or less evident in all the varieties, but especially in this; which is of common occurrence during summer and autumn, when the digestive mucous surface and biliary apparatus are most liable to be diseased. It is generally attended by manifest signs of accumulated sordes and morbid secretions in the *prima via*, and of an increased secretion of acrid bile, especially when the disease is epidemic at the seasons just mentioned.

37. *F.* Erysipelas may, moreover, be complicated with inflammatory action of the mucous surfaces, analogous to that of the skin, giving rise to a form of *bronchitis* or *gastritis*. Where it is connected with inflammatory sore throat, it sometimes extends along either the trachea, or the *œsophagus*, or even both, until the lungs, or the stomach and bowels, are affected; and, occasionally, along the Eustachian tube, to the ear: it thus becoming complicated with one, or even more, of these affections. This connection, first distinctly pointed out by J. P. FRANK, has more recently been insisted upon by BROUSSAIS, ELIOTSON, and others. FRANK alludes to instances in which erysipelatous inflammation extended from the pudenda, along the vagina, to the uterus, and even to the bladder. Erysipelas may be further complicated with inflammation of the *lymphatics*, particularly when caused by breach of surface; or with *phlebitis*, when consequent upon injury, or when it has proceeded to suppuration.

38. *G.* Erysipelas may occur in the course of continued and remittent fevers; and it may appear during convalescence from any of the exanthemata. In the first of these associations, it generally presents an adynamic character, with nervous or with malignant symptoms; frequently attacks the face, throat, and scalp; or the parts pressed upon in bed, or irritated by the evacuations; and is especially disposed to gangrene. When it supervenes upon remittents, it often assumes a bilious or gastric form; and in these, as well as in exanthematous fevers, it may prove a salutary crisis, if the pulse do not rise in fre-

quency; and if the cerebral functions remain undisturbed. In crowded sick wards, and in lying-in hospitals, it often occurs in the progress of other diseases, with which it consequently becomes complicated. But it is a most dangerous circumstance; as it is, in those cases, caused by an infected or impure air, which, favoured by the depressed state of vital power, or by imperfect excretion, has contaminated the circulating and secreted fluids.

39. IV. LESIONS IN FATAL CASES.—When the cellular tissue has not been severely affected, the injection of the integuments subsides considerably after death; and hence the redness of the external surface, as well as that of the throat, has often nearly or altogether disappeared. In addition to infiltration of the subcutaneous tissues with serum, or a sero-puriform matter, and occasional disorganisation or gangrene of these and of the integuments, various internal lesions are commonly observed. The *blood* in the large vessels and cavities of the heart is frequently semifluid; and the *veins* proceeding from the part chiefly affected, are often inflamed, or contain pus; as first observed by M. RIBES, and confirmed by MM. DANCE, ARNOTT, and by my own observations, especially when the disease has been complicated with diffuse suppuration of adjoining cellular parts. In cases that have been attended by cephalic affection, the membranes of the *brain* are sometimes injected, or inflamed, and the *arachnoid* opaque, with serum effused between them, and in the ventricles; but, as M. PIORRY has shown, these lesions are often not observed in this complication. Where the throat has been affected, the *fauces*, *pharynx*, and *œsophagus* are of a dark or dusky red, or of a livid or brown tint; much softened, sometimes with small patches of dark lymph on their surfaces; and the subjacent tissues infiltrated with a bloody serum, or with a sero-puriform matter. These appearances occasionally extend to the *larynx* and *trachea*, the submucous tissues being *œdematous*, or infiltrated with similar fluids.—In cases that have been associated with bronchial or pulmonary disorder, the *lungs* are congested with a dark semifluid blood; the *bronchi* are of a dark red or brown colour, are injected, and often contain a frothy and bloody fluid; portions of the lungs being *œdematous*, and others partially *hepatised*.—The mucous surface of the *stomach* and *intestines* is generally injected, of a deep or dark colour, often softened, and, where the bowels had been much affected, abraded, or inflamed, especially in the *cæcum* and *rectum*. The *liver* and *spleen* are seldom found in a healthy state, particularly in persons advanced in age; but they present no lesions peculiar to this complaint, excepting that those usually resulting from intemperance are most frequently observed.

39. V. DIAGNOSIS.—The antecedent constitutional disturbance, with excited vascular action and drowsiness;—the dull or yellowish red, or rose-colour, of the integuments, terminating in an irregular but well-defined margin, and disappearing, momentarily, on pressure;—the pricking, stinging, and burning heat and pain of the part, sometimes with irregular vesications;—the slight, plane, and diffused tumefaction, or the greater swelling and diffused affection of the cellular tissue in connection with the inflammation of the

skin;—its rapid extension, or delitescence, or change of situation;—its almost uniformly acute or subacute character, as respects both the local and constitutional symptoms;—its manifest association with disorder of internal organs, particularly of the digestive, assimilative, and excreting viscera, and of the brain and membranes; and its dependence upon a change in the circulating fluids;—its indisposition, owing to the states of vascular action and of the fluids, to confine or limit itself; and the inability of forming coagulable lymph, owing to these causes;—its infectious character under circumstances favourable to the manifestation of this property, more especially when the constitutional affection is of an adynamic kind, or when attended by sore throat;—the readiness with which it is repelled, and thrown in upon vital or important viscera;—its rapid termination in, or transition to, resolution and desquamation, or suppuration, or gangrene;—and, finally, the insidious and diffused manner in which purulent matter forms in the cellular tissue, when suppuration takes place;—are sufficient to distinguish the disease from *erythema* on the one hand, and from *phlegmon* on the other.

40. VI. PROGNOSIS.—There are various circumstances which should influence our opinion as to results, in this disease; and determine us to give a guarded prognosis on all occasions:—1st, Its tendency to *relapse* or to recur, from slight or unappreciable causes, or from errors in diet, &c.;—2d, Its disposition to become *associated* with severe or dangerous internal affections; to disappear suddenly, and to be succeeded by them, especially diseases of the brain and its membranes, of the air-passages and lungs, of the digestive canal and peritoneum, and of the veins;—3d, The age, habits, and previous health of the patient;—4th, The causes which produce it, and the character of the prevailing epidemic;—5th, The parts which it attacks, its particular form and complication, and the state of constitutional disorder accompanying it.

41. a. Recollecting that erysipelas is the external expression of an internal or constitutional disease, we should consider the free manifestation of it on the external surface, with little or no affection of the subjacent or internal parts, and without any remarkable depression of vital power, as a *favourable* circumstance, and not to be impeded by external means. As long as it remains thus *simple* and superficial, and of neither a deep, fiery, nor purple colour, although it may be extensive, and attended by vesication, it is not dangerous; unless it affect the face and head, and be accompanied with cerebral disorder. If it follow the stings of insects, the application of acrid substances to the skin, or external injuries, it is seldom attended by danger, unless in cachectic or aged persons, or those addicted to the use of spirituous liquors. Stationary superficial erysipelas is less to be dreaded than the erratic; for, in the latter, there is greater risk of internal metastasis; and the erratic character is often connected with serious changes in the nervous and vascular functions, or with latent internal disorder.

42. b. The risk of an *unfavourable issue* is generally great in proportion to the severity of the constitutional affection,—to the adynamic or nervous character of the attendant fever,—to the depravation of the circulating and excreted

fluids,—to the deepness and darkness of the colour of the affected part,—to the severity of the cephalic disturbance,—to the extent and diffusive form of the inflammation and suppuration in the subcutaneous tissues,—and to the vital importance of the parts prominently associated in the malady. Great tumefaction of the throat, scalp, or face, with prominence of the eye-balls; attendant disease of the fauces and pharynx, or of the respiratory passages and lungs, or of the stomach, intestines, &c.; tenderness at the epigastrium, or over the abdomen; the disappearance of the external inflammation, and supervention of either of these, or of some other malady; and coma, jactitation, unconscious evacuations, &c.; are dangerous occurrences. The frequent or habitual recurrence of erysipelas, particularly in persons advanced in life, indicates organic change in the liver; and its appearance about the organs of generation, in them, and in children, and around the umbilicus of infants, or in œdematous and dropsical limbs, especially after scarifications, is very unfavourable. A similar inference may be drawn when it attacks the face and scalp, particularly of delicate, aged, or broken down subjects; or follows severe injuries or surgical operations; or appears during convalescence from dangerous maladies, and when it is not preceded nor attended by shivering. Epidemic erysipelas, particularly in the crowded wards of hospitals, and during cold and humid states of the air, is attended by greater risk than sporadic cases.

43. VII. CAUSES.—A. There frequently exists a peculiar *predisposition*, or an erysipelatous diathesis, the nature of which has not been fully ascertained. It seems, however, to be connected with great irritability or tenderness of the cutaneous surface, and defective power of the capillary vessels and secreting surfaces and viscera. Females are much more *predisposed* than males, particularly at the period of menstruation, and after the epoch of its termination. The irritable, bilious, and phlogistic temperaments; feeble, leucophlegmatic, and plethoric habits; the gouty diathesis; the autumnal, winter, and spring seasons; torpor or interruption of the biliary functions; an habitually acrid and fetid perspiration; unwholesome and low diet; addiction to spirituous liquors; pre-existing visceral disease, general cachexia, and exhaustion of vital or constitutional power; are the chief predisposing causes. J. FRANK supposes that young persons and females are most subject to erysipelas of the face and head; and the aged, to that of the extremities. Certain parts are more predisposed than others; as the face, sexual organs, and lower limbs; owing to the greater sensibility and vascularity of the former, and the liability of the latter to injury and external irritation.

44. B. The *exciting causes* are—*a. Those which act locally*, as injuries of the head and face; contusions, wounds, and fractures; surgical operations, particularly when performed on cachectic habits; the scarification or puncture of anasarctous limbs; venesection, and the bites of leeches; punctures of the skin, and the inoculation of morbid, putrid, acrid, or septic matters; the stings and bites of insects; abrasions of the cuticle; irritation caused by coarse articles of clothing, or by morbid secretions or excretions; the appli-

cation of stimulating or acrid substances to the surface, particularly rancid oils and unguents; and the want of personal cleanliness.—*b.* The more general and internal causes are—exposure to cold and moisture; atmospheric vicissitudes; suppression of the cutaneous excretion; a fish diet, and especially the use of shell-fish, or of dried, stale, or rancid fish; or of rich, oily, fat, or smoked meats; the suppression of accustomed secretions, excretions, and discharges—as the menses, hæmorrhoids, &c.; violent mental perturbation; an impure state of the air, particularly a stagnant and moist air, loaded with animal effluvia; the miasm from persons affected by the disease, when confined in a close atmosphere; and certain constitutions of the air, which are recognised only by their effects.

45. In persons strongly predisposed, and particularly in those who have experienced an attack, very slight errors in diet, and indigestible meats, especially such as are apt to induce a rancid, acrid, or acid change in the chyme; or spirituous or malt liquors in excess; very frequently induce a relapse or return of the disease. Indeed, whatever has the effect of altering the chyme and chyle from their healthy states, or of interrupting the functions of depurating organs, and thereby of changing the circulating fluids, either by the introduction of morbid and contaminating matters, or by the diminished elimination of hurtful or irritating elements, will excite this malady.

46. The influence of infection in causing erysipelas was first pointed out, and, indeed, proved, by Dr. WELLS, the most original observer of disease in this country at the termination of the last and the commencement of the present century, when the state of medical science was by no means flourishing; and is fully confirmed by the observations of PITCAIRN, PARR, BAILLIE, DICKSON, WEATHERHEAD, STEVENSON, ARNOTT, GIBSON, BURY, and LAWRENCE, referred to in the *Bibliography*; and by evidence that has occurred to myself on more than one occasion.—When thus caused, erysipelas is very prone to attack the face and throat, and assume dangerous or even malignant characters; more especially if it also be epidemic.

47. *C. Epidemic Erysipelas.*—Most writers on the disease, from HIPPOCRATES to the present time, have mentioned its occasional appearance in an epidemic form, and the circumstance of its characters partaking of the prevailing epidemic constitution. On most of the occasions of my seeing it, from 1814 to 1824 or 1825, it possessed more or less of a sthenic or phlogistic type; and depletions early in the attack, were then better borne than more recently; it having, for the last few years (till 1834), presented chiefly adynamic forms. Its appearance in hospitals as a circumscribed epidemic is very common; and is generally owing to impure air, particularly during the cold, raw, and foggy east winds that prevail about the months of November and March; when the external air is in some measure excluded, and the air of the wards becomes loaded with miasms, or with the effluvia of one or more persons affected by it. In these circumstances, the constitutional disturbance presents, or passes speedily into, the adynamic or nervous states; the secretions, excretions, and circulating fluids being more or less morbid. Thus, accord-

ing to the particular epidemic constitution, the habit of body, the age and strength, and the modes of living, of those affected; the season in which it prevails; the contingent generation of an infectious effluvia, or of an impure and confined air; and the pre-existing state of the assimilating and excreting functions; epidemic erysipelas will appear with a predominance either of inflammatory, or bilious, or adynamic, or nervous symptoms—on some occasions, with an inflammatory appearance of the blood; on others, with a loose, dissolved, and otherwise morbid state of this fluid; and always with the excreting functions more or less disordered. In some instances, the integuments are chiefly affected; in others, and those the most dangerous, the subjacent parts are principally, and often insidiously, diseased. It occasionally does not confine itself to the situation it first attacked; and frequently it seizes on the face, neck, and scalp; and is sometimes complicated with a similar form of inflammation of the fauces, pharynx, and surrounding parts, or of the digestive or respiratory mucous surface. An abrasion, or some palpable irritation, of the cuticle, or external injury, is sometimes required to originate an attack; but much more frequently it is the external expression of a morbid state of the frame, especially of the assimilating and excreting functions, and of the circulating fluids. On all occasions of its epidemic prevalence, the constitutional disturbance, ushered in either by rigors, or by irregular chills, precedes the local affection: sometimes in a very evident manner; at others, more slightly or obscurely; and, generally, the formation of matter, and effusion of fluid into the cellular tissue, are not attended by the well-marked symptoms usually indicating them in more healthy states of the body.*

* HIPPOCRATES (*Epid.* l. iii.) states, that erysipelas, epidemic in the spring, sometimes continues through the summer and autumn.—BARTHOLIN and SYLVIVS describe an epidemic which was frequently complicated with inflammation of the stomach and bowels.—TOZZI (*Comment. in HIPPOCR. Aphorism.* l. vii. § 20.) remarks, that a fatal form of the disease was prevalent, during the autumn and winter of 1700, in Naples; and affected chiefly the face; delirium, epistaxis, and malignant symptoms rapidly supervening. When erysipelas is epidemic about the autumnal equinox, it sometimes abates during the winter, as remarked by SYDENHAM, and becomes again more prevalent in the spring. RICHTER states, that such was the case in respect of the epidemic of 1720-21, in Turin. It attacked any part of the body; but most frequently the face, neck, and limbs. Epistaxis and a lax state of the bowels were favourable occurrences. Bloodletting, in the more phlogistic cases, and medicines to aid the depurative processes, were found most beneficial.—In the epidemic of 1750, described by DARLUC, the disease commenced with circumscribed redness in some part of the face, which spread over the head and face, and was attended by great tumefaction, a hard and frequent pulse, great thirst, anxiety, &c. In many cases, the affection extended over the throat, was accompanied with difficulty of deglutition, hoarseness, a feeling of suffocation, and swelling of the external parts of the throat and neck; with delirium, thick and turbid urine, subsultus tendinum, &c.; and occasionally terminate in sphacelation. Offensive sweats, and free, copious, and foetid alvine evacuations, were salutary. Bleeding at the commencement, followed by emetics, purgatives, and diaphoretic tisanes, was generally employed. If these were neglected, the affection of the throat often proved fatal.—BRONFIELD mentions the epidemic prevalence of the disease for two years; the head being affected. In it, the antiphlogistic treatment was generally fatal: bark and cordials were most serviceable.—Dr. FERRO, of Vienna, and Dr. RAGGI, of Pavia, described an epidemic in these cities, during the years 1780 and 1783, which was frequently either associated with, or passed into, per pneumonia, colic, and diarrhoea. And, in all these complications, blood-letting, antimonials, diluents, and laxatives were the most successful remedies.

48. *D. Nature of Erysipelas.*—Dr. CULLEN considered erysipelas to arise from the irritation of a morbid matter generated within the body, and thrown out, by the fever, upon the cutaneous surface. This is substantially the opinion of the ancients; and, with a very few slight modifications, of the best writers among the moderns also, especially the FRANKS, SELLE, RICHTER, &c. —Sir A. CARLISLE says, that “it is a humoral and constitutional inflammation occasioned by alimentary crudities,” and attended by an excess of acid in the fluids. That it is a humoral and constitutional inflammation, is very generally admitted; and that alimentary crudities often precede and attend it, is also evident: I conceive, however, that not only a vitiated state of the chyme and chyle, proceeding from weak digestive power, or unwholesome and indigestible food, and vitiating the circulating fluids, but also the absorption of morbid effluvia, and the retention of effete matters in the blood, owing to impeded excretion, either by the skin, the liver, the kidneys, the mucous surfaces, or the uterus,—in short, that a morbid condition of the fluids, arising either from the passage into them of contaminating materials, or the retention in them of effete elements, that are constantly being excreted by the various emunctories,—are the principal changes productive of this disease.

49. These changes most probably depend upon deficient power of the digestive, assimilative, and excreting viscera—upon depression of the organic nervous influence. But, as soon as the change in the circulating fluid reaches a certain pitch, febrile action is the consequence; and the morbid matters in the blood are determined to excreting surfaces and organs, which are thereby exerted either to eliminate them, or to assume a morbid state of vascular action. The skin, being one of the most important of these organs, thus becomes irritated and inflamed, owing to its peculiar functions and susceptibility, and to the nature of the irritating matters contained in the blood, or of the change this fluid may have experienced. If the febrile commotion be characterised, owing to the state of vital power, by much sthenic action, the local change will be thereby fully developed, and thrown chiefly upon the excreting surface; but if, from deficient power, the fever partake more of an adynamic or asthenic form, the local expression of the disease will be made less fully on the external surface, and will fall more fully upon subjacent and internal parts. Hence the frequency of internal complications, and of affection of sub-cutaneous tissues, in adynamic cases; and of the simple and superficial forms in the more inflammatory and sthenic, unless when the disease is attended by a great excess of vascular action above vital power; when the local affection extends to adjoining parts from this circumstance, in connection with the morbid state of the blood. The diffusive character of the inflammation, whatever tissue it may attack, is referrible entirely to defective vital power, to the changes in the circulating fluids, and to the imperfect tone of the extreme vessels,—these conditions being inadequate to the formation of coagulable lymph; the products of inflammatory action in this state of vital power, and of vascular action and impurity, being a turbid, puriform, ichorous, or sanguineous serum,

which produces a septic effect, or poisons the adjoining parts, especially the cellular tissue.

50. VIII. ERYSIPELAS OF INFANTS—*Erysipelas Neonatorum*, HILDENBRAND and RICHTER—may be either simple or complicated; and it may attack either the head, trunk, or extremities. When it appears on the trunk, it generally commences at the umbilicus; the abdomen, trunk, and lower extremities being its most frequent seat in infants. It is generally accompanied with phlyctenæ or large bullæ; and it is sometimes complicated with œdema or inflammation of the subjacent tissues, and with inflammation or congestion of internal organs. It is most common from birth to a year old; and is sometimes remarkably prevalent in lying-in and foundling hospitals. The occurrence of BULLÆ, in nearly all the children born for many months in Queen Charlotte's Lying-in Hospital, alluded to in that article (§ 4.), was evidently referrible to a more than usually superficial, slight, and uniform kind of erysipelas, which affected the whole surface in many instances, and not any one part in preference to another.

51. When attacking infants, erysipelas presents the following conditions and morbid relations:—1st, It is sometimes referrible to imperfect ablation and removal, soon after birth, of the secretion which covered the cuticle, and which becomes acrid and irritating if left in contact with it;—2d, It frequently proceeds, especially in hospitals, from a foul air or other contaminating agents, or irritants, acting either internally, or on the uncatrised umbilicus;—3d, The retention of excrementitious matters, as the meconium, and morbid secretions, evidently dispose to it;—4th, Want of care and of due cleanliness, especially as to the immediate removal of the excretions from the parts with which they come in contact, is also a common cause;—5th, It is probably favoured, as M. BILLARD suggests, by the great vascularity of the external tissue of the integuments at this epoch;—6th, It is not so frequently complicated, or attended by great disorder of the circulating fluids, as in aged persons, although it is generally accompanied with disorder of the excretions, and often with an inflammatory state of the digestive mucous surface, and occasionally with disease of the throat and respiratory organs;—7th, The attendant fever is more commonly of an inflammatory kind, than in adults and aged persons;—8th, It terminates in resolution, suppuration, and gangrene; this last occurring frequently when the disease commences about the umbilicus and genitals; and occasionally in Induration of the CELLULAR TISSUE (see that article);—9th, The affection of the pudendum, and the complication with disease of the throat, are rarer in infants than in children from a year to five or six years of age;—10th, It is generally attended by great danger, especially when it prevails in lying-in and foundling hospitals, owing to the frequency of its complication with, or metastasis into, internal disease;—11th, Fatal cases usually present inflammatory appearances in the digestive mucous surface, and less frequently in the respiratory surfaces and membranes of the brain, in connection with destruction of the subcutaneous, cellular, and adipose tissues; a turbid, puriform, or sanguineous serum being sometimes effused from the serous sur-

faces, but never coagulable or albuminous lymph.

52. IX. TREATMENT.—So numerous are the shades of difference, as to both nature and degree, between the mildest and severest forms of erysipelas, that no general plan of treatment can be proposed, without modifications according to the circumstances of particular cases. In some instances, large depletions are required; in others, moderate or local depletion only is admissible; and, in many, depletion is most injurious, the most energetic tonics being often indispensably necessary. Whilst the disease thus requires, from the very commencement, most varied and even opposite modes of cure, it frequently also demands an almost equal diversity at different stages of its progress. The following, as remarked by Mr. JAMES, is, perhaps, the most extensively applicable precept, as to treatment, that can be inculcated:—Where the skin is tense, deep-coloured, and hot, with a high pulse, full and flushed face, active delirium, and great heat of the general surface, and the constitution not materially impaired, depletion is well borne, and is required; but where there is no tension, nor much heat, nor great redness of the part; the pulse being soft, the countenance pale or sunk, the general temperature but little elevated, and the delirium quiet or comatose; depletions are injurious, and a restorative treatment is most appropriate. In the former class of cases, the reduction of the external inflammation, by local as well as by general means, is most serviceable; but, in the latter, the external affection is a small part of the disease, relief to the system often arising from encouraging it, and great injury from repelling it.—Even in the most acute and inflammatory cases, large depletions should be employed with much circumspection; for, however high, bounding, or hard the pulse, or great the heat, may be, there is always, owing to the circumstances explained above (§ 16. 49.), a disposition to asthenic vascular action, and a deficiency of vital power. Blood-letting, especially venesection, should, therefore, be resorted to early in the attack, and should not be solely or even chiefly relied upon; the reduction of the excited action forming only one of the intentions of cure; and bloodletting being only one of the modes of fulfilling it.

53. i. *Treatment of Simple or Superficial Erysipelas.*—A. The mild or benign form requires only simple measures. Purgatives with the alkaline subcarbonates, warm diaphoretics, and diuretics, are most beneficial, if exhibited so as to promote the depurating or secreting functions. After the bowels have been fully evacuated, the decoction of quince seed may be given frequently, with mucilage, nitrate of potash, subcarbonate of soda, and spirit of nitric æther. If this form become erratic, a combination of tonics, especially bark, with these, will generally remove all disorder. I have found the following remarkably useful:—

No. 217. R Sedæ Subcarbon. ʒj.; Vini Ipecacuanhæ ʒij.; Spirit. Ammon. Arom. ʒj.; Infus. Sennæ Comp. ʒij.; Decocti Cinchonæ ʒiij. Tinct. Cardamom. Comp. ʒiij. Misce. Capiat partem tertiam, ter in die.

54. B. The slighter cases of the acute form of superficial erysipelas are generally removed by the above means. If, however, vascular action

be much excited, local depletions, or a small or moderate bloodletting, followed by diaphoretics, depurating purgatives, and abstinence, are always serviceable. When the head is unaffected, particularly if the disease occur in autumn; and after depletions, if requisite, have been practised; an emetic, early in the attack, generally restores the impeded functions of the liver and skin. A dose of calomel and James's powder, with two or three grains of camphor, should be exhibited at bedtime, and a purgative early the following morning; this last being repeated every morning, and diaphoretics, with diuretics, every three or four hours during the day. If the disease be caused by suppression of the perspiration, diaphoretics, as RICHTER very justly remarks, are especially indicated; the affected part being constantly covered by oiled silk, to prevent evaporation from it. The acetate of ammonia, antimonials, and camphor, are the most appropriate of this class of medicines. If the head or face be affected, a general bleeding—preferably from the feet, whilst immersed in warm water—is requisite; and the means just mentioned, with the exception of the emetic, ought to be freely prescribed, the action on the bowels being promoted by purgative enemata (particularly F. 150. or 151.). Colchicum may be tried in this and the phlegmonoid varieties. It was much recommended by Mr. HADEN, and recently by Mr. BULLOCK. It is most serviceable when given with the alkaline subcarbonates, or magnesia.

55. The choice of purgatives, and of the medicines that should be combined with them, is a matter of much greater consequence in this complaint, than is usually supposed. I have most frequently given the calomel in the above combination at first; and afterwards, the compound infusions of gentian and of senna, with a neutral salt. This last may also be prescribed in camphor mixture, with an alkaline carbonate, and taken whilst effervescing with lemon juice, the alkali being in excess.—RICHTER advises equal quantities of the supertartrate of potash and magnesia. Sir A. CARLISLE recommends the fixed alkaline carbonates to be given with the purgative; and barley water, with the subcarbonate of soda, to be used as common drink; on the supposition of the disease arising from an acid in the blood. It is possible that the change in this fluid may partake of an acid character, but we have no proof of it; nor can it be the only, or even the chief, change. The practice, however, has been long known to be serviceable. I believe that the carbonates of potash and soda pass rapidly into the circulation, and act beneficially on the blood. Yet acids may be given not only without risk, but apparently with advantage. They have even been recommended by MARCARD, PANZANI, and others. In a case which I recently saw in consultation with Dr. RIDING, and which was complicated with menorrhagia of a most atonic kind, and with nervous symptoms, large doses of mineral acid were added to tonics, and yet the recovery was rapid. The neutral salts, which are most to be depended upon, are—the sulphates of potash, soda, and magnesia; the tartrate of potash, or of potash and soda; and the phosphate of soda. Either of these may be given in the infusion of senna, or in equal parts of it and of the infusion of gentian, or of bark. The association of purg-

atives with tonic and bitter infusions is of the greatest benefit at all periods, and particularly at an advanced stage of the complaint. F. 215. or the following may be employed:—

No. 215. R Potassæ Sulphatis ʒj.; Sodæ Subcarbon. ʒjss.; Infus. Sennæ Comp., Infus. Gentianæ Comp., aa ʒijss.; Tinct. Jalap. ʒjss.; Tinct. Cardamom. Comp. ʒij. M. Fiat Mist., cujus capiat Coch. i j. larga, secundâ vel tertiâ quâque Horâ, donec plenè dejecerit alvus.

56. After morbid secretions have been evacuated by these means, and the functions of the skin and kidneys promoted, the infusion or decoction of cinchona, or the infusion of cascarilla, may be taken with the alkaline subcarbonates, or with liquor potassæ; and if the urine be scanty, the spirit of nitric æther, or of juniper, may be added. If the skin still continue harsh or dry, the lighter infusions, or camphor mixture, may be given with the solution of acetate of ammonia, and the spirit of nitric æther, or ipecacuanha wine. When excoriating secretions from the vesications on the surface extend or increase the irritation, defective function of the excreting organs should be suspected, and deobstruent and stomachic purgatives perseveringly prescribed. The morbid action, also, of the part ought to be corrected by washes containing a solution of the chlorates of lime or of soda, or by those consisting of lime water, or of Kræosote water; or by applying the linimentum terebinthinæ. If dry incrustations form on the surface, oiled silk should be constantly applied over it. But in ordinary circumstances, especially of the constitutional disease, it is advisable to abstain from local applications, or to resort merely to bathing or sponging the part with some tepid fluid, as the decoction of quince seed, or of the flowers of the lime (*Tilia Europea*), if the heat, pricking, &c. be troublesome. Where the vesications are numerous, the practice of dusting the part with flour, or any other absorbent powder, is warranted by the results of experience. Of incisions and other local means, especial notice will be taken hereafter.

57. Where a disposition to terminate in œdema of the subjacent tissues becomes apparent, the measures to be adopted must depend upon the state of the constitution, and on the previous treatment. If the former be not much impaired, and if the latter have not been energetic, purgatives, as directed above, and warm diaphoretics, should be frequently exhibited, and a blister applied to the part. But if the vital powers be much impaired, the more restorative remedies, and the local means, recommended in the next section (§ 58.), should be resorted to. Where the inflammation of the integuments extends to the parts beneath, and the skin becomes tense, local depletion by leeches, scarification, or incisions, and the other measures directed in this association of the disease (§ 60.), should be adopted.

58. ii. *Treatment of Associated and Complicated Erysipelas.*—A. In the association with œdema of the subjacent cellular tissue, the utmost attention to the state of health, the age, and habits of the patient, is necessary. When it occurs in broken-down constitutions, and persons addicted to spirituous liquors, not only should tonics, &c., particularly cinchona, quinine, cascarilla, with soda or potash, camphor, the preparations of ammonia, &c., be exhibited, but also wine, light

nourishing diet, and occasionally small quantities of the beverage to which the patient has become habituated. But these remedies should be preceded by, or alternated, or even conjoined, with, such purgatives as are most active in promoting the secretions and excretions, which are generally deficient in this state of disease. If the bile be scanty or morbid, *calomel*, blue pill, PLUMMER'S pill, or the hydrargyrum cum creta, should be given with camphor; and the mixture last prescribed ought to be taken a few hours subsequently, and continued from time to time. Those who have been addicted to spirituous liquors, are most benefited by half an ounce each of the spirit of turpentine and of castor oil, taken on the surface of weak Hollands or common gin. This dose may be repeated on alternate days: it will be found remarkably beneficial when the urinary secretion is deficient; or when the affection of the skin is consequent upon anasarca. In this latter circumstance, the infusion or decoction of cinchona may be given with the *chlorate of potash*, and the tincture of cinchona, more especially if there be any tendency to gangrene, or if the temperature of the surface be low, and the colour deep or dark.* Either of the purgatives prescribed above (§ 55.), should likewise be taken occasionally. Fomentations with decoction of chamomile flowers and camphorated spirit may also be employed, early in the disease. It is in this variety, as Mr. S. COOPER remarks, that pressure by bandages, as recommended by MM. RAYER, BRÉTONEAU, and VELPEAU, is most appropriate. After morbid secretions have been evacuated, and the use of tonics, with camphor in full doses, or with the chlorate of potash, or with both, has been commenced—the part being greatly distended, and the surface irritable or disposed to gangrene—I have seen immediate and remarkable advantage accrue from the application of a warm cloth, moistened either with the spirits of turpentine, or with F. 311., the bowels being kept regularly open by the oily draught, or by the stomachic purgatives directed above; or by enemata, particularly F. 135. 150. and 151., either of which should be repeated according to its effect.—When sphacelation has commenced, a poultice of the powdered bark, or of carrots, and this spirit; or a solution of the chlorate of lime, or applications containing the Kræosote; are the means which promise the most advantage.

59. B. *Treatment of Erysipelas associated with inflammation of the subcutaneous tissues.*—This most serious form requires, according to the grade and kind of vascular action, local and constitutional; the age, strength, and habit of the patient, and the stage of the disease, the most varied, but still the most active, treatment—in some cases general or local depletion, or both; and in others, as invigorating remedies as were prescribed for the preceding variety;—in an early stage the former means, and in a later period the latter. The treatment of this variety may be divided—1st, into that which should be adopted before suppuration has taken place; and, 2dly,

* I have lately had an opportunity of trying the *Kræosote*, in doses of from one to three drops four times a day in a case of this variety. It increased the urinary secretion; but it was not so beneficial as the chlorate of potash, which I have been long in the habit of prescribing. I have, however, found it useful in atonic dropsy, and general cachexia.

into that which is required when suppuration or disorganisation has occurred.

60. *a. Before suppuration or disorganisation takes place*, the most varied, and even opposite, measures are often necessary, according to the age, strength, and habits of the patient, the prevailing epidemic constitution, and the local and constitutional symptoms. When the surface of the inflamed part is of a deep or florid red, tense, and very hot; the pulse hard, full, or strong; the head much affected; and the papillæ of the tongue erect and excited; both general and local blood-lettings are requisite, especially in unbroken constitutions, in persons not addicted to intoxication, and very early in the disease. When erysipelas attacks the head, or face, and insufficient epistaxis occurs, *venæsection* should be resorted to; but when it appears in other parts, a large number of *leeches* should be applied, or *incisions* made, as recommended and practised by Mr. COPLAND HUTCHISON. This local mode of depletion will often be sufficient, excepting in the most phlogistic cases, when *venæsection* may also be necessary. But in large towns, and in hospitals, this latter will seldom be required, if the former have been employed with decision. Besides, in these circumstances especially, there is considerable risk of inflammation attacking the vein. When sufficient blood is not procured by leeches or incisions, *cupping* around, or even over the part if it can be borne, will frequently be preferable to *venæsection*. In proportion as the local and constitutional symptoms approach to those described under the head of *Diffusive Inflammation of the CELLULAR TISSUE*, is the necessity for bleeding diminished — that which necessarily attends the incisions of the part being often sufficient, — and for the restorative and tonic treatment there recommended (§ 34. *et seq.*) increased, especially after morbid secretions and fecal matters have been evacuated. Where the skin is but little affected; the powers of life depressed, from antecedent visceral disease or intemperance; and the affection of the subjacent parts extending rapidly; the remedies advised in that article should be prescribed energetically. When the pulse is broad, open, and expansive, or tumultuous, or easily compressed, although it be quick, sharp, or even bounding, general bloodletting is injurious; the local affection either extending, or changing its place, and vital resistance sinking from the evacuation. In the form of this complication first described by Mr. COPLAND HUTCHISON, wherein the inflammation extends to the fasciæ, to the intermuscular cellular substance, and to adjoining parts, incisions sufficiently deep to divide the fasciæ, as he directs (see *Surgical Observations*, &c. p. 110. 2d edit.), are most indispensable, whatever may be the state of general vascular action and constitutional power: for if these be of a *sthenic* kind, the incisions come in aid of the necessary depletions; and if they be *asthenic*, local congestion and effusion are thereby removed, and the operation of restorative remedies in no way impeded.

61. The observations made respecting other evacuations in simple erysipelas, very nearly apply in this complication. — *Emetics* are recommended by REIL, RETZ, and ROUX, and are most beneficial in the more *sthenic* diathesis, where those of antimony may be employed; and

least so where the disease approaches the character of diffusive inflammation of the cellular-tissue. If at all prescribed in the latter state, *ipeacuanha*, conjoined with ammonia or camphor in full doses, is preferable. The early and repeated exhibition of *purgatives* is as requisite in this as in the simple forms; and the choice and combinations of them, there directed (§ 55.), may be adopted. But, in proportion as the characters of diffusive inflammation of the subcutaneous tissues are assumed, the more warm and stomachic should the purgatives be. Where this kind of complication predominates, the treatment described in that article (§ 34. *et seq.*) should be followed. — *Diaphoretics* also, as already recommended, are usually of service; but the selection of them should depend much upon the state of the stomach, and the constitutional powers. Where the former is not disturbed, and the latter are not much depressed, small doses of antimony with other diaphoretics are beneficial; particularly if the febrile action be great, and at an early stage of the disease: but if the stomach be irritable, diaphoretics ought to be given in effervescence, generally with an excess of the alkali; and, if vital power be much depressed, those with the carbonate of ammonia and camphor are preferable. If the edges and point of the tongue be red, and the epigastrium tender, a blister, or sinapism, or the warm turpentine epithem, should be placed over this region, and small doses of the nitrate of potash, with subcarbonate of soda, prescribed in the decoction of quince seed, or of linseed, or of the flowers or bark of the lime or linden. — *Mercurials*, at the commencement, and occasionally afterwards, are generally of service. Calomel is most to be depended upon; and, when conjoined with camphor or ammonia, it may be taken in any state of the disease, if the biliary and other secretions require its exhibition. In low states of vital power, it should be followed, in three or four hours, by a stomachic purgative, the action of which may be promoted by a cathartic enema (§ 55. 58.).

62. *Opiates* or other anodynes are often necessary, particularly when there are watchfulness, general irritability, and much pain, which are often the precursors of, or even tend to induce, delirium. But they should be given with great caution. They are hazardous means, if prescribed before morbid matters are evacuated, or where there is any tendency to coma. The *acetate of morphine*, in a full dose in aromatic spirits, at bedtime, is most to be depended upon. — *Bark* and other *tonics* are necessary from the commencement, when the disease presents more of the *diffusive*, than of the *phlegmonoid*, characters. At first, the bark may be given in decoction or infusion, particularly when the propriety of exhibiting it is doubtful; and with the alkaline subcarbonates, or with the solution of the acetate of ammonia. In cases of manifest asthenia, or cachexia, and diffusive appearance, either the sulphate of quinine, or the bark in substance, with camphor and aromatics, may be prescribed; but I have generally found the decoction, with the chlorate of potash, and with either the compound tincture of bark, or the tincture of serpentaria, to act beneficially, when alvine evacuations were sufficiently promoted by suitable means.

63. In the three grades of the *phlegmonoid*

(§ 29. *et seq.*) complication, the same principles as have been now stated are applicable. Depletions and other evacuants should be prescribed with a promptitude, and to an extent, co-ordinate with each, and with a due regard to the peculiar circumstances of the case; always recollecting that, in diseases like this, which are connected more or less with imperfect excretion and a morbid state of the circulating fluids, vascular action may be excessive, whilst nervous power and vital resistance are reduced to the lowest states; and, therefore, that vascular depletion, in order to be salutary, or even not to be injurious, should be early employed, and with strict attention to its effects both at the time and immediately afterwards. Nor should it be overlooked, that, in circumstances where the propriety of general or even local depletion appears doubtful, either one or the other, or even both, may be practised, if judicious restorative means are also resorted to, especially in conjunction with such remedies as promote the excreting functions, and purify the blood, or correct its morbid state.

64. *b. When suppuration, or disorganisation, has taken place*, or when either is inevitable, general bloodletting is no longer admissible, although the vascular excitement may be great; and the only local depletion that can be ventured upon, is that which will follow incisions, which should now be made, if they have not already been resorted to. In some cases, however, the application of leeches, or cupping around the part, may still be ventured on, if the local action be high, and the changes now in question be only commencing. But where matter has already formed, or parts have sloughed, venesection, or emetics, or even lowering purgatives, will only promote the absorption of morbid matters from the diseased part, and the consequent contamination of the circulating fluids, instead of throwing them out upon the surface, and facilitating their expulsion through the outlets which ought to be made for them, by incisions down to their seats. In proportion as disorganisation is manifest, or advances, so should restoratives and tonics be freely administered; and either those already mentioned, or those prescribed in the article on *Diffusive Inflammation of the CELLULAR TISSUE* (§ 34.), ought to be liberally used; with the aid of wine, and such nourishment as the state of the digestive organs will admit of. The stomachic purgatives and evacuants, directed above (§ 55. 58.), should be given occasionally, in order to remove morbid collections, and promote the depurating actions of the abdominal viscera on the blood. In constitutions broken down by intemperance, the beverage to which they have become habituated is the most serviceable, as Sir A. COOPER has justly remarked; but, in other circumstances, wine may be taken in soda water, or in spruce beer, to which a little of the subcarbonate of soda or of potash has been added. When a free outlet has been given to matter or sloughs, advantage will often accrue from the injection of a weak solution of any of the chlorurets, or of Kreosote water; and the use of compresses and bandages around or above the seat of disorganisation, in order to prevent its extension.

65. *C. Erysipelas with Nervous and Cephalic Symptoms.*—*a.* When the nervous symptoms appear early, and the head or face is not the seat of

the disease, the attendant fever assuming this form, gentle tonics and diaphoretics are serviceable, especially the infusion of valerian, with the solution of the acetate, and the aromatic spirit, of ammonia; or the infusion of bark or of cascarilla, with the alkaline subcarbonates, and the preparations of camphor; or either of these infusions, with the tincture of serpentaria and the chlorate of potash. RICHTER remarks, that, when the attendant fever is of the nervous kind, the local affection is most prone to change its place, or to recede from the surface, and attack internal organs. I believe that there is much truth in this; and that these changes are less likely to occur when the above remedies are resorted to, and a blister is applied over the affected part; the excreting functions being moderately promoted by stomachic purgatives and enemata.

66. *b. Where delirium supervenes*, its treatment must depend upon its form, the seat of the local affection, and state of the system. When the fever is of the nervous kind, delirium is an early symptom, and the result chiefly of the febrile action, and depression of nervous power; the means now mentioned, especially if morbid excretions have been evacuated, being then beneficial. If the tongue be, at the time, moist, camphor and anodynes may also be prescribed. But when delirium is connected with general vascular excitement, depressed power, and manifest disorder of the circulating and secreted fluids, the alterative and stomachic purgatives, and enemata prescribed above (§ 55. 58.), are most to be depended on. Where the disease attacks the face and head, the delirium frequently proceeds from inflammatory action in the membranes of the brain, and rapidly passes into coma, from effusion and exhaustion of vital power. In this case, early bleeding from the feet, or cupping on the nape of the neck, or a number of leeches to the occiput and behind the ears; mustard pediluvia; cold applications to the head, if the heat be excessive and the patient young or robust; and active cathartics, both by the mouth and in enemata, are to be prescribed. If great and deep-seated tumefaction take place in the scalp, particularly about the occiput, incisions should not be overlooked.

67. *c. When profound coma comes on*, the excretions being voided involuntarily and unconsciously, when the pulse is rapid, and the tongue and gums covered by a thick fuliginous coating, what measures should be resorted to? This occurrence is frequent; is attended by the utmost danger; and is seldom satisfactorily treated. In several cases, I have resorted to the following means with success:—1st, Unless calomel has been already taken largely, a full dose of it, with camphor, ought to be prescribed, in some thick substance, and placed upon the back part of the tongue, when it will gradually be swallowed;—2d, Two or three hours afterwards, turpentine, with an equal quantity, or with one half or two thirds the quantity, of castor oil, with a little liquor potassæ, should be exhibited in the form of an electuary, and as just directed, if the coma be profound, or in any other form, if the patient can be roused sufficiently to take it; and repeated frequently until the bowels begin to act; when its operation may be promoted by enemata (F. 150, 151.);—3d, If matter form in any part, incisions

should be made early, and through the aponeurotic expansions, where there is the least risk of matter forming beneath them*; and 4th, Elisters to the insides of the thigh, or to the nape of the neck, and between the shoulders, should also be directed, if the symptoms be not soon ameliorated by the preceding means; and the calomel and camphor repeated every five or six hours, until the tongue and gums evince the specific operation of the former; when warm or stomachic purgatives, aided by the enemata already advised, and gentle tonics, ought to be given from time to time, to evacuate morbid secretions and support the vital powers.

* The following case occurred, eleven years since, to a very able practitioner Mr. H. COX, formerly House-Surgeon to the Infirmary for Children; and was soon afterwards published by him. I quote it in an abridged form, as it illustrates this complication, and the treatment recommended. It moreover, is evidence of facts connected with the treatment not only of this, but of other maladies:—"Jane Guest, aged 21, was seized, Jan. 22, 1824, with rigors, and fits of hysteria to which she was subject. On the fourth day, her scalp had become red and swollen, and the tongue tumid and red. Delirium and great restlessness afterwards supervened, and the erysipelas extended over the face and neck to the sternum. The eyes were now completely shut, and the features so swollen that she could not be recognised. In two or three days she passed into a state of coma and insensibility."—"The pulse, which was formerly full, but easily compressed, was now excessively quick; the tongue was black and crusted; and she rolled towards the foot of the bed. The treatment usually resorted to in similar cases had failed to ameliorate any of the symptoms. The condition of the patient was, on the 31st of January, the worst possible. The pulse could not be counted; she was profoundly comatose; the integuments of the head were distended to the utmost; and the tongue, teeth, and gums were covered by a fuliginous coating. At this date, I stated the case to Dr. COPLAND, as one for which there was no room for hope. He strongly advised me to exhibit the oil of turpentine in large doses, as he had experienced success from the use of it in several cases characterised by similar symptoms to this."—"I had had many opportunities of witnessing the beneficial effects of this substance at the Royal Dispensary for Children, where Dr. COPLAND had introduced its frequent use. I, therefore, according to his advice, prescribed as follows:—

"R Olei Terebinthinæ ʒ ss.; Olei Ricini ʒ ij., Mellis ʒ ij. Misce. Fiat Electuarium statim capiendum.

"R Olei Terebinthinæ ʒ vj.; Olei Olivæ ʒ j.; Aquæ ʒ x. Misce. Fiat Enema statim administrandum.

"Feb. 1st.—Several offensive evacuations. Pulse somewhat stronger, and not quite so quick. The coma is less profound.

"R Olei Terebinth., Ol. Ricini, aa ʒ jss.; Mellis q. s. ut fiat Elect. Sumat, tertiis horis, partem quartam.

"2d.—The patient could be roused. The mouth, teeth, and gums were cleaner; the pulse 130, and fuller. The local symptoms were ameliorated. The oils have procured several bilious evacuations.

"R Olei Terebinth. ʒ jss.; Ol. Ricini ʒ ss.; Liq. Potassæ ʒ j.; Aq. Cinnamom. ʒ iv. M. Capiat partem quartam quartis horis.

"3d.—Much better. Pulse 120, and more natural as to strength. The tongue is beginning to become clean. The bowels have acted copiously, and much yellow bile has been voided. The patient now answers the questions put to her, &c. From this time her recovery was uninterrupted. (*Lond. Med. Repos.* for April, 1825, p. 239.)

There is much misapprehension as to the operation of full doses of turpentine, given either by the mouth or in enemata; many supposing that they increase vascular action in the brain. The reader will perceive, upon perusing the account (published in the *Lond. Med. and Phys. Journ.* for May and July 1821.) of the experiments I performed—1st upon myself; 2dly, upon the lower animals; and, 3dly, in numerous cases of disease—that this substance, given so as to act upon the bowels, either from the largeness of the dose, or by the aid of a purgative conjoined with it, is a powerful derivative from the brain, diminishes vascular action in serous membranes, and restores lost tone to the extreme capillaries, especially in exhalant surfaces. The extensive experience I have since had of this medicine, has confirmed these inferences, but has shown that it may be injurious in the hands of those who are not well acquainted with the exact circumstances in which it may be given with advantage.

68. *D. Treatment of Gastric and Bilious Erysipelas.*—a. Where the yellowish coating of the tongue, the appearance of the surface, or of the excretions, and nausea or vomiting unattended by much tenderness at the epigastrium, indicate *biliary disorder*, an *emetic*, given early in the disease, if the head be not seriously affected, is usually of service. After its operation, a full dose of calomel, purgatives, laxative enemata, diaphoretics, and the other measures already recommended, according to the external character of the disease, and the states of general and local vascular action and of vital power, should be prescribed, and repeated as circumstances may require. Wherever tenderness of the epigastrium or hypochondria exists in connection with the nausea or vomiting, local depletions in the vicinity, blisters, sinapisms, or warm terebinthinated pithems, placed over these regions, will be of essential service. The last of these should be applied until it produce redness, and be repeated according to its effects upon the disease. Whenever any part within the abdominal or thoracic cavity is affected, either coëtaneously with, or consecutively upon, or even after the disappearance of, erysipelas, these are the most effectual remedies, especially when aided by mercurials, prescribed either alone, or with camphor and opium.

69. *b.* Where this specific form of inflammation seems to affect the *digestive mucous surface*, small and repeated doses of nitre, with the subcarbonate of soda, in the decoction of quince seed, or of the lime bark; camphorated emulsions; diaphoretics in mucilaginous vehicles; local depletion, and the external means just specified, are most to be depended upon. In both this and the hepatic complication, calomel, blue pill, or hydrargyrum cum creta, may also be given with opium and small doses of camphor, until the gums are affected; but it also will often be necessary to evacuate morbid matters by stomachic and mild purgatives, and to support the strength by light tonics, especially at an advanced stage. In most cases of internal erysipelas, particularly if parts within the abdominal cavity be affected, calomel with camphor and opium, terebinthinated purgatives and the epithems above mentioned (§ 68.), are of the greatest benefit.

70. *E. The association with Inflammation of the Throat and Pharynx*, being often attended by much danger, especially if the fever be of an adynamic kind, or if the head and face be affected, requires early and active treatment. Venæsection, or local depletion, or both, are frequently necessary; but the propriety of having recourse to them, and the extent to which either of them may be carried, must depend upon the state of general, as well as of local, vascular action, and vital power. Where there are great swelling of the external throat, and tension of the integuments (§ 33.), incisions should be made in the manner about to be directed (§ 80.), and the internal treatment conducted appropriately to the states of the different functions, conformably with the principles developed above. If the swelling and tension be less, and the symptoms not so urgent as to require incisions, a large blister may be applied to the lower half of the neck, extending over a part of the sternal region. Active cathartics, aided by the frequent exhibition of

enemata (F. 135. 151.); *gargles* with a solution of the chlorate of soda or of lime; or of the nitrate of silver; and diaphoretics; are also very generally appropriate and beneficial. Although *depletions* are very often necessary in this complication, yet venesection is sometimes injurious, and always in the adynamic forms, or at an advanced stage. In two cases in which I was lately consulted, an aggravation of both the local and constitutional symptoms followed bloodletting, though resorted to early, and in moderation. In this, as in every other form of the disease, the treatment should mainly depend upon the states just mentioned; and upon the various circumstances peculiar to the case.

71. *F. Where the Erysipelatous Inflammation extends to the Larynx or Bronchi, or affects the Lungs*, venesection is frequently required, but not always to a great amount: in some instances, it has even appeared injurious. Local depletions, however, are generally necessary. The chief dependence should be placed upon the external applications mentioned above (§ 68.), which ought to be repeated, sometimes oftener than once; and on purgatives, demulcents, and antimonials, or other diaphoretics; these being the chief means of exciting the excreting functions, and thereby of removing the constitutional derangement upon which the local affection depends.

72. *G. When erysipelas supervenes in the course of fevers*, venesection is inadmissible; but the early application of leeches to the part is often of service. Internal inflammations appearing in connection with external erysipelas, admit not of vascular depletions nearly to the extent required by true or idiopathic inflammation; local depletions, calomel, camphor and opium, terebinthinated purgatives and enemata, and the external and other means just particularised, being the most efficient remedies in such cases. Whenever erysipelas attacks internal parts, it may be referred either to insufficient power to determine the morbid action to the surface, or to pre-existing disorder of the part affected, or rather to both. But as all such complications present similar states of vital action to the more simple forms of the disease — varying from the more phlogistic to the most diffusive or adynamic, according to the age, constitution, and habits of the patient, the causes and stage of the disease, and the characters of the prevailing epidemic — so do they require a treatment varying from the strictly antiphlogistic, to the most energetically restorative and tonic.

73. *H. If Inflammation of the Lymphatics or of the Veins appear in the course of the complaint, or be associated with it* — circumstances by no means uncommon when the upper or lower limbs, especially the former, are affected — general blood-letting is always injurious, and even local depletion is seldom beneficial. The liberal exhibition of tonics and stimulants; of stomachic and mild aperients; and of warm diaphoretics; with anodynes (§ 62.) if the pain and irritability be great; and emollient and anodyne applications to the part, particularly if the absorbents be inflamed; are chiefly to be trusted to; the intention being, in all such cases, to arrest the extension of disease, and prevent the contamination of the circulating fluids.

74. *The spurious forms of Erysipelas, which*

are often connected with *inflammation of deep-seated parts*, and which most frequently occur in the extremities, should be treated according to the principles developed above, and in the article on the CELLULAR TISSUE; free incisions being particularly requisite for them (§ 80.).

75. *I. Depletions and other antiphlogistic remedies* are serviceable chiefly in a very early stage, whether of the simple or of the complicated disease, however high vascular action may seem; and, although they have been most requisite at that period, and energetically employed, a very active recourse to *stimulants* and *tonics* will often subsequently be necessary. Frequently, also, where the propriety of resorting to moderate or local depletions is unquestionable, the good effects of *restoratives* and *tonics*, exhibited even at the same time, are equally manifest; this complaint, oftener perhaps than any other, requiring vital power to be restored by the latter means, whilst vascular action and congestion are being subdued by the former, and by medicines which promote the secreting and excreting functions. The *stimulants* most to be depended upon, are — *camphor* and *ammonia*, or their preparations, given in large doses when the head is unaffected, or nervous power is exhausted; and the *tonics* already mentioned. Various substances, which are both stimulant and tonic, as *serpentaria*, *arnica*, &c. are useful adjuncts to the barks; and others, which possess more of an antiseptic property, as the *chlorates of potash* or of *soda*, or the *kræosote*, are often of essential service, especially in advanced stages of the disease. The frequent and manifest dependence of the complaint upon a morbid state of the circulating fluids, has induced some writers to recommend the carbonates of the fixed alkalies, and such other substances as affect more immediately the state of the blood; but although these are often beneficial, they ought not to be depended upon alone. The morbid condition of the blood is the result of imperfect action of the excreting organs, consequent upon defective vital power. The chief intention, therefore, should be to excite the functions of these organs, by agents which operate specifically and beneficially upon them, and by those which rouse the vital energies generally, and resist the extension of morbid changes.

76. *iii. Of the local Treatment.* — *A. a. Cold applications* have been recommended by several writers, but they are not always safe, and ought not to be prescribed when there is very evident adynamia, or for aged persons, or broken-down constitutions. In the more phlogistic states, at an early stage, and especially when these states occur in the face or head, they frequently afford much relief. — *b. Warm poultices* and *fomentations* are objectionable in the phlegmonoid, and, indeed, in the other varieties, unless under some circumstances of the disease connected with local injury. — *c. In the strictly constitutional complaint*, neither of these are of much service; dusting the part with flour or any other absorbent powder, when the vesicles break, or sponging it with some tepid and soothing fluid, if the heat and pricking pain be troublesome, being the safest practice.

77. *B. a. The application of the nitrate of silver*, in substance or in strong solution, as recommended by Mr. HIGGINBOTTOM, is often of great benefit.

It should be applied either to the inflamed surface and the adjoining integuments, or only to the healthy skin surrounding the affected part; and it should raise the cuticle, otherwise it will be of little benefit, and fail of isolating the disease. — *b.* M. LARREY has advised the *actual cautery* to be applied lightly to different points on the inflamed surface, to the number of forty or fifty, with the view of concentrating the morbid action to the parts, and arresting its extension. — *c.* *Blisters* were employed first by M. DUPUYTREN with this intention. They are of great service in stopping the progress of superficial spreading and erratic erysipelas. But, even in such, when the complaint is very acute, bloodletting should precede, as Dr. M'DOWEL justly states, their application. They are seldom of use in the phlegmonoid form, and never when purulent depôts are likely to be formed. This writer concludes that blistering succeeds best when the inflammation is pale, or in patches, with but little tumefaction or pain; and when proper constitutional treatment precedes and accompanies it. The blister should completely encircle the disease, covering about two inches, from the margin, of the inflamed, and as much of the healthy, surface, or it will extend at the unguarded point.

78. *e.* Mr. REID and Dr. M'DOWEL have given extensive trial to *mercurial inunction* in this complaint, in two of the Dublin hospitals. They concur in viewing it as a valuable remedy, especially in conjunction with such internal treatment as the case may require, in both the constitutional and the traumatic forms, whether affecting the head or the extremities. Two, three, or four applications have generally sufficed, and salivation has frequently come on. Where the ointment cannot be rubbed, it should be daubed, upon the part. The recommendation of M. RICORD, who originated the practice, to use only the recently prepared ointment, is very deserving of attention.

79. *D.* Mr. JAMES mentions in favourable terms the application of *spirits*, and other stimulating substances, to the part. Dr. PEART prescribed a lotion, consisting of a drachm each of the subcarbonate of ammonia and the superacetate of lead, in a pint of rose-water. I have directed epithems of spirits of turpentine with benefit; but morbid secretions should be evacuated, the excreting functions restored, and stimulating diaphoretics and tonics administered internally, before these should be ventured on in the constitutional forms of the malady. They are inadmissible where suppuration appears inevitable, or when vital power is much depressed, and where a tendency to affection of, or metastasis to, internal parts is manifest. In such, the diffusive stimuli are most serviceable given internally.

80. *E.* The introduction of *incisions* into the treatment of erysipelas and its allied affections is considered by all candid practitioners in this country, and by the more recent Continental writers, as one of the greatest improvements in medical and surgical practice, and as *solely* due to Mr. COPLAND HUTCHISON. It has been alleged, that the same means were previously recommended by some of the older of modern writers. I have looked into them, in order to ascertain the fact; and have found that, by

two or three, superficial scarifications merely have been directed for certain morbid states, but not for erysipelas; these scarifications being quite different from the incisions practised by this author, and such as have been adopted from the earliest ages as a mode of local bloodletting, among the inhabitants of both northern and intertropical countries. Since the publication of Mr. HUTCHISON's plan, modifications of it have been devised by Dr. DOBSON and Mr. LAWRENCE—a number of minute punctures by the former, and one or two incisions many inches in length by the latter. There is now, I believe, but little difference of opinion among practical men, as to which of the three modes should be adopted. The extensive experience of Drs. CRAMPTON, YOUNG, MACFARLANE, and M'DOWEL, and others, have decided the question. The last of these remarks that, in phlegmonoid erysipelas, early and free incisions, as advised by Mr. HUTCHISON, are of the greatest importance in immediately relieving, and speedily arresting, the disease; and in preventing sloughing of the fibrous and other tissues, and purulent infiltration of the cellular substance: their depth and number being proportioned to the extent of the inflammation. The fasciæ should be divided if the disease extend beneath them. The bleeding from the incisions ought to be watched, as it is sometimes profuse; and it may, if uncontrolled, or unaccompanied by a sufficiently restorative treatment, especially in old drunkards and broken-down constitutions, be attended by dangerous results. In these circumstances, and if the disease has been neglected till diffusion of pus in the cellular tissue, or sloughing, has occurred, before incisions have been made, lint dipped in spirits of turpentine, or in equal parts of it and Peruvian balsam, should be applied, and covered by warm poultices. This practice has been prescribed by me for several years; and was resorted to in a most dangerous case attended by Mr. HUTCHISON, myself, and another practitioner, in the summer of 1834. Applications with the solution of the chlorate of lime, or of soda, or of kreosote, will also be serviceable in cases where sloughing has preceded the incisions or where spreading ulceration attacks their edges, as sometimes occurs in irritable and broken-down constitutions. When phlegmonoid erysipelas attacks the loose cellular substance about the eyes, the rectum, and scrotum, early incisions are requisite. — Where the scalp is deeply affected, they should pass through the aponeurotic expansions and pericranium, the bleeding attending them often rendering further depletion unnecessary.

81. In erysipelas supervening in the advanced stages of low or malignant fevers, incisions should be made with great caution, and not unless imperatively required, as the bleeding attending them, although moderate, may induce sudden or even fatal collapse, notwithstanding the contemporaneous administration of restoratives. I lately met with such an occurrence. When suppuration has advanced or extended far, *compression* by bandages, as recommended by GALEN, AETIUS, HEISTER, and more circumstantially by Dr. DEWAR, should follow the evacuation of the matter by incision, in order to procure the adhesion of the opposite surfaces of sinuous cavities. But the compression ought to be so

applied, as to give a free discharge to the secretion by the outlet made for it.

82. iv. *Treatment of Erysipelas in Infants and Children.* — *A. a.* In the early stage of the complaint, the bowels ought to be kept freely open; *calomel*, or *hydrargyrum cum creta*, either with *magnesia* or the subcarbonate of soda, being given at first: and, if the fever be high, *James's powder* should be added, cooling diaphoretics exhibited, and leeches applied behind the ears, or over the sternum, especially if there be associated affection of the bronchi or lungs. The infant should be restricted to the mother's milk, and even that ought to be given in diminished quantity. It will often be necessary to administer a stomachic or mild purgative to the nurse, and to attend to her digestive organs, and her diet. — *b.* In the second stage of the disease, when suppuration has commenced, the various tonics and stimulants already mentioned — especially bark, quinine, ammonia, and the chlorates — should be freely administered. I have for many years prescribed the chlorate of potash with much benefit in this, and the allied affections. The chloric acid, with decoction of bark, and camphor, is also of great benefit.

83. *c.* *Blisters* have been favourably noticed by DEWEES, PHYSICK, and others; but they require much more caution in this class of patients than in adults. They ought to be applied only for a few hours, or with very fine tissue paper interposed between them and the skin, and be removed as soon as their action commences; when warm bread and water poultices will complete their effect. — *d.* *Mercurial ointment* is, however, a much more generally appropriate application, particularly in very young children. If vesications cover the part, they should be broken previously to the application (DEWEES); and if incrustations have formed, or if suppuration have commenced, the ointment may be applied to the inflamed margin, and a portion of the sound skin. Dr. DEWEES states, that Dr. SCHOTT has found a solution of *corrosive sublimate*, in the proportion of a grain to the ounce of water, equally beneficial with the ointment. In other respects, the constitutional and local treatment of erysipelas in infants should be conducted according to the principles developed above.

84. *B.* The affection of the *pudendum* occurring in children two or three years of age, and which Mr. K. WOOD considers distinct from erysipelas, is certainly a severe form of this complaint, in very delicate, ill-fed, or cachectic children, or in those labouring under mesenteric or hepatic disease. It is not a rare affection in large or manufacturing towns. Mr. DENDY (*On the Cutaneous Diseases incidental to Childhood*, 8vo. p. 199.), my respected colleague for many years, and myself, have met with several cases, in both sexes, at the Infirmary for Children. In these, the weak and rapid pulse, the pale cachectic countenance, and the appearance of the affected parts, determined me to evacuate morbid matters by stomachic and mild aperients; to support vital power, and thereby to prevent the extension of the disease, by the decoction of bark, with the chlorate of potash, or the medicines already mentioned; and to prescribe applications with the solution of the chlorate of lime or of soda, or with Peruvian balsam.

85. v. *Regimen and Diet.* — *a.* The removal of patients to a *pure atmosphere* is of very great advantage in the treatment; and fresh air should be freely admitted into the apartment, all sources of impurity, admitting of removal, being taken away. — The diet should be antiphlogistic in the early stage; and in the more adynamic states of the complaint, it should be light and nourishing, and some agreeable and appropriate stimulant given along with it, as old sherry, or spirits for those who have been addicted to them. Chicken broth, beef tea, arrow-root, with old wine or brandy, become necessary, where suppuration, or destruction of the subjacent tissues, has supervened; but, in the early stages of the phlegmonoid, or where there is plethora, abstinence from food, and from drink, excepting as much of the latter as is indispensable, should be enforced. Whatever is prone to become acid or acrid on the stomach, as rich broths and soups, and all oily and fat matters, ought to be avoided.

86. *b.* *During convalescence*, change of air; light tonics, with alteratives and mild aperients; warm bathing followed by frictions of the surface, or slightly alkaline baths; due attention to all the secretions and excretions, especially to the biliary secretion; a course of alkalies with small doses of blue pill and taraxacum, when chronic disease of the liver is suspected; regulated diet, with a small proportion of lean animal food once in the day; the utmost temperance, and daily exercise in the open air; are the measures which will most probably secure the patient from a return of the disease, to which he is rendered very liable by an attack. M. TISSOT justly advises those who have had the complaint, to avoid the use of cream, milk, rich and viscid food, baked and strong meats, aromatics, warm spices, and strong wines; to shun a sedentary life, and mental irritation; to live on light cooling vegetable diet, and to drink water with a little wine.

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ERYTHEMA.—SYN. *Ἐρύθημα* (from *ῥέω* *ῥοε*, red), Gr. *Erysipelas*, Celsus and Galen. *Erysipelas idiopathicum*, Sauvages. *Dartre érythémoidé*, Alibert. *Die Rötthe, Hautrötthe*, Germ. *Erythème*, Fr.

CLASSIF.—1. Class, Febrile Diseases; 2. Order, Inflammations (Cullen). 3. Class, Diseases of the Sanguineous Function; 2. Order, Inflammations (Good).

III. CLASS, I. ORDER (Author).

1. DEFIN.—Superficial redness, with burning pain, of a part of the integuments, varying in extent and form, disappearing momentarily on pressure, usually of an acute character, and uninfected.

2. I. DESCRIPTION.—The varieties of erythema and of erysipelas have been confounded together by many writers, — a circumstance almost unavoidable, when it is considered, that several states of the one are merely modifications of certain forms of the other; distinctions between them being rather conventional and artificial, than essential, distinct, and unvarying. HIPPOCRATES used the term erythema merely to signify simple redness of a part. CALLISEN, SAUVAGES, and ROSTAN employed it to designate the slightest grade of erysipelas. J. P. FRANK and J. FRANK applied it to several affections of a chronic kind, entirely distinct from those to which it has been given by recent British and French pathologists. CULLEN viewed it as a superficial inflammation of the integuments, but little, or only symptomatically, affecting the constitution; and erysipelas as an affection primarily, and chiefly of the whole system. WILLAN, BATEMAN, and RAYER considered erythema as generally connected with more or less constitutional disorder, — a circumstance that cannot be disputed, although such disorder is frequently latent, or but little evident. Dr. M. GOOD has detached two of the most common forms of complex erysipelas, viz. the phlegmonoid and œdematous, from that head, and comprised them under this, — an arrangement in so far improper, as intimately allied and serious affections, depending upon very manifest febrile disturbance of the system, are thereby separated, and certain of them placed in connection with others unattended by any marked disorder, and of comparatively little importance. Erythema is either primary, and proceeding from local causes; or symptomatic of some other disease, or of constitutional disorder.

3. I. PRIMARY OR IDIOPATHIC ERYTHEMA presents various modifications, according to its causes and seat.—A. *Er. Intertrigo*, SAUVAGES, WILLAN — E. *ab Acri inquilino*, CULLEN — *Ecorchure*, Fr.—*Fret*, or *Excoriation of the Skin*—generally proceeds—(a) from the friction of two contiguous surfaces, particularly in fat persons, as in the upper parts of the thighs, arm-pits, &c.;—(b) or from the irritation of morbid secretions coming or remaining in contact with parts, as of the perspiration in the groins, and below the mammaræ; or of the leucorrhœal discharge, or catamenia, and of the alvine and urinary excretions, particularly in the course of other diseases;—(c) or from chemical

or mechanical irritants, and artificially from sinapisms, or ammoniacal and terebinthinated liniments, &c.;—(d) or from excessive heat, or vicissitudes of heat and cold, or the rapid abstraction of heat—*E. pernio*, or chilblain;—(e) or from pressure, especially lying long in one position—*E. paratrima*, SAUVAGES;—(f) or from the stings and bites of insects, &c.—*E. punctura* of SAUVAGES.

4. When the epidermis is partially removed in this species of erythema, either by friction of the surfaces, or by the excoriation produced by acrid secretions, as in the intertrigo occurring in females and infants of a full habit from neglect of due cleanliness, a serous or sero-puriform fluid exudes from the inflamed surface during some days; but vesicles are not formed, nor is there any manifest swelling of the part as in erysipelas.

5. ii. SYMPTOMATIC ERYTHEMA—*E. Erythème Symptomatique*, BIETT, RAYER, CAZENAVE, &c.—often accompanies other eruptions, especially at their commencement and termination, as remarked by BILLARD; and is occasionally complicated with them. It most frequently is dependent upon disorder of the digestive organs; and is often observed in children about the periods of dentition, in plethoric or fat persons, and at the critical periods of female life. It is most commonly caused by the ingestion of irritating substances, and by certain kinds of food, especially in irritable temperaments, feeble or delicate constitutions, and individuals of a peculiar diathesis.

6. *A. Fugacious Erythema*—*E. fugax*, WILLAN, BATEMAN—the *macula volatica* of various writers—consists of irregular and evanescent red patches, with increased heat of the part, which appear successively on the arms, neck, breast, and face, in various febrile diseases, and in bilious fevers and diarrhoea (BATEMAN); often denoting, as HIPPOCRATES has remarked, a tedious and dangerous malady. This variety sometimes attends derangements of the digestive organs, and, more rarely, hysteria and hemicrania. It is not usually followed by sensible desquamation of the cuticle; but exceptions to this occasionally are observed.

7. *B. Shining Erythema*—*E. lave*, BATEMAN—is sometimes symptomatic of disorder of the *primæ viæ*, and occasionally attends the catamenia in delicate and irritable females; but it most frequently accompanies anasarca, or œdematous swellings. The inflamed surface is smooth and shining. When it affects young and sedentary persons, it is often attended by slight fever, and it generally terminates in extensive desquamation as the anasarca subsides; but where it occurs in aged persons, or in those addicted to intemperance, it is liable to pass into spreading or sloughing ulcers. It is merely a modification of œdematous erysipelas.

8. *C. Marginated Erythema*—*E. marginatum*—occurs in patches, bounded on one side by a slightly elevated, tortuous, red border; but the redness has no boundary on the open side. It appears on the extremities and loins of old persons, produces little or no irritation, and remains for an uncertain time. It is generally connected with internal disorder of a serious or dangerous tendency.

9. *D. Papulated Erythema*—*E. papulatum*,

BATEMAN—appears chiefly on the arms, neck, and breast, in irregular extensive patches, and most frequently in females and young persons. The patches are of a bright red hue, often slightly elevated; and, for a day or two, before the colour becomes vivid, they are rough or imperfectly papulated. The redness afterwards continues for several days; and, as it declines, assumes, in the central parts, a bluish or pale purple tinge. This variety is generally attended by a tingling sensation, passing to soreness as the colour changes; and sometimes with much constitutional disturbance,—with a frequent small pulse, anorexia, depression of strength and spirits, watchfulness, and pains or tenderness of the limbs; but the general disorder is often trifling.

10. *E. Tuberculated Erythema*—*E. tuberculatum*—is merely a slight modification or an advanced stage of the *papulated*. The patches resemble those of this variety; but there are small, slightly elevated tumours interspersed through them, subsiding in about a week; the erythema becoming livid and disappearing in about a week more. It commences with fever, is attended by languor, irritability, and restlessness; and is succeeded by hectic. It is so rare, that BATEMAN never met with it, and WILLAN saw only three cases; and, in these, treatment did not “alleviate the symptoms nor prevent the subsequent hectic” (BATEMAN).

11. *F. Nodose Erythema*—*E. nodosum*—affects chiefly females, children, and young persons of a lax and lymphatic constitution; and rarely occurs in boys. It is preceded by slight febrile symptoms, for a week or more, which generally abate upon its appearance. It shows itself on the fore part of the leg, and rarely on the arm, and, in large oval patches, the long diameter of which is usually parallel with the tibia, and slowly rises into hard and painful protuberances. In the course of nine or ten days these soften and subside, the red colour turning bluish or dusky a day or two earlier. It is sometimes connected with the approach of the catamenia; and its premature disappearance is sometimes followed by dangerous internal disease. Mr. DENDY saw pneumonia suddenly supervene on its retrocession.

12. iii. J. FRANK and RAYER have described, as a *chronic form of erythema*, the redness affecting parts of the face, and often associated with *Acne*, particularly *A. rosacea*, which it sometimes so nearly resembles, as to appear rather as a modification than as a complication of that eruption.* It generally commences in the nose, extending to the cheeks, and more rarely to the forehead and chin; is characterised by vascular arborisations in the *alæ nasi* and summits of the cheeks, with shining redness disappearing momentarily from pressure; and is attended by a sensation of heat, tension, and itching, which, with the redness, are increased by external and internal stimulants, or whatever determines the blood to the head; and,

* NICOLAUS NICOLUS FLORENTINUS took a tolerably accurate view of these complaints, in making them varieties or degrees of the same eruption. The one here described he names, “*Rubedo simplex seu facies rubra*”; the *Acne rosacea*, he calls “*Rubedo pustulosa*” (*Serm. vii. tr. vi. cap. 15.*); and T. MAYERNE was, upon the whole, right in connecting the former with disorder of the liver (*Opera Medica*, p. 213.), and in prescribing for it, local depletions from the nape of the neck, and behind the ears, setons, mercurial purgatives, antimonials, &c.

at first, by slight exfoliations of the cuticle. The reddened skin, at much later periods, becomes irregularly granulated, rough, thickened, and occasionally tuberculated. It is dependent upon protracted disorder of the digestive organs, usually resulting from a long course of indulgence or intemperance, and seldom appears till after middle age.

13. iv. M. ALIBERT describes two other species of erythema, — the *Epidemic* and *Endemic*. The former is characterised by burning itching, with pricking in the hands and feet. In some cases, the skin is red; in others, it is black, as if covered with a layer of soot. The epidermis exfoliates, or forms vesications; and the constitutional symptoms are very severe. This disease was epidemic in Paris in 1828. The *endemic* is the chronic affection of the skin, which attacks the peasants of the north of Italy, and is better known by the name of PELLAGRA (which see).

14. II. The CAUSES, particularly of primary erythema, have been already noticed (§ 3.); but, even when appearing in this manner, it is favoured, if not in a great measure caused, by disorder of the digestive and excreting organs. It often accompanies dentition and diarrhoea in children; and, in them especially, is frequently caused by particular kinds of food, or by errors in diet. It sometimes appears in the course of dysentery or fevers; and is indicative of inflammation or suppuration below fasciæ, or in deep-seated parts; it then generally assuming the shining or smooth form. Vascular plethora; the critical epochs in females; various irritating ingesta; very warm spices; disorder of the stomach, liver, and bowels, or of the excreting or eliminating functions; are chiefly concerned in its production.

15. III. DIAGNOSIS.—A. The superficial redness; the absence of tumefaction and vesication; the more or less circumscribed patches; the much less constant, severe, and burning pain; the generally slight form, and favourable termination, of both the local affection and the constitutional disorder; sufficiently distinguish erythema from *erysipelas*.—B. The redness is deeper in shade and in situation, and the patches are larger, but less numerous, in erythema than in *Roseola*: the latter eruption often appearing simultaneously in different parts of the body, which is never observed in the former. These two affections are, however, often distinguished from one another with difficulty; and there can be as little doubt, that they often insensibly pass into each other, as that they are both symptomatic of internal disorder; as, indeed, Mr. PLUMBE has properly observed.

16. IV. TREATMENT.—A. The *primary* or *idiopathic* forms generally disappear readily upon the removal of the causes which occasion them; aided by frequent tepid ablution, and by some mild absorbent powder, as that of calamine or of cerussa. When erythema occurs in *infants*, from inattention to the removal of the urinary and intestinal excretions, the tepid semicupium, mild aperients, and saline diaphoretics, may also be employed; and if it be attended by a serous or foetid discharge, a lotion with a weak solution of the chlorate of lime or of soda, or of kreosote, will readily restore the parts to a healthy state. If the part be very irritable, Dr. BATEMAN directs a lotion consisting of ten grains of oxymuriate of

mercury and six ounces of lime-water. A weak solution of the nitrate of silver is also of great service.—When it is produced by cold—*E. pernio*—turpentine and the balsams, or the former and tincture of camphor, soon remove it.—If it be caused by bites or stings of insects, ammonia and the essential oils are generally beneficial.—*Erythema from pressure* may be removed by the use of air-pillows; by spirituous, camphorated, or terebinthinated applications; and by suitable means of protecting the surface.

17. B. The *symptomatic states of erythema* should be treated according to the indications of internal disorder furnished by individual cases; and almost entirely by internal or constitutional means. The principles advocated in *erysipelas*, viz. that the excretions should be promoted, and the digestive and assimilating functions assisted, ought also to be followed in these affections. Therefore, deobstruent and alterative purgatives; mild tonics, with the alkaline subcarbonates, and diuretics; diaphoretics with sedatives, particularly at bedtime, as James's powder with small doses of calomel and opium, or hyoscyamus, are the most generally appropriate. In the *papulated variety* (§ 9.), gentle laxatives, mild tonics, and light diet, are sufficient; but, when local irritation, or restlessness, is much complained of, antimonials and anodynes may also be given at night.—The *nodose variety* (§ 11.) is soon removed by rest; small doses of mercurials, with James's powder, at bedtime; alterative mild purgatives given in the morning; and light tonics in the course of the day. Change of air and light diet are also of very great benefit. External applications are seldom useful, and may be hurtful. If this or any of the other varieties be connected with suppression of the catamenia, or of other discharges, bloodletting should precede the means recommended above; and measures ought to be used to restore the evacuation.

18. C. The *chronic form of erythema* (§ 12.) should be treated in the manner advised in the article ACNE (see § 23. *et seq.*), particularly for the *indurated* and *rosaceous varieties*, with which this form is often associated. Temperance; light mild diet; regular exercise; avoidance of stimulating and heating ingesta, especially hot spices, spirituous liquors, acescent vegetables, and fat meats; mild tonics and laxatives, with the alkaline subcarbonates; and frequent and very small doses of blue pill, or hydrargyrum cum cretâ, with taraxacum, &c.; constitute the most appropriate remedies. Astringent or other repellent washes are of use only at the commencement of the eruption. When it has become more diffused or chronic, it is not much affected by these applications; and if it were, the propriety of suppressing it by such means would be very questionable. When first appearing, the washes mentioned in the article ACNE, and a solution of borax in weak pyroligneous acid, are most useful. The severer forms of erythema, especially the shining, or œdematous, and the tuberculated, should be treated in the manner recommended for similar states of *erysipelas*; and the *regimen and diet* directed in that article ought to be adopted in this disorder.

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EXANTHEMATOUS DISEASES.—**SYN.** *Exanthemata*. **Ἐξανθήματα* (from *ἐξανθίζω*, I break forth, or effloresce). *Eruptive Fevers*, *Exanthems*.

CLASSIF.—1. *Class*, Febrile Diseases; 3. *Order* (Cullen). 3. *Class*, Dis. of Sanguineous Functions; 3. *Order* (Good). The 3d *Order*, of *Willan* and *Bateman*. III. *CLASS*, III. *ORDER* (*Author*, in *Preface*).

1. **DEFIN.**—*Diseases usually arising from specific causes, and capable of perpetuating their kind; evincing, at their commencement, diminished vital power and function, followed by reaction throughout the vascular system; but expressed chiefly in the mucous surfaces and skin, especially in their earlier stages.*

2. The term *Ἐξανθήματα* was employed by the ancients to signify any cutaneous eruption, whether acute or chronic, febrile or non-febrile; and a similar extension of its signification is very generally observable among medical writers until the commencement of the last century. The nosologists who wrote about the middle, or towards the close, of that century, either differed very remarkably as to the diseases which should be ranged under this order, or did not separate them from other febrile or inflammatory complaints. *SAUVAGES*, one of the earliest to make the distinction as to classification, placed the exanthemata as the first order of his third class, *Inflammations*; and comprised *plague*, *small-pox*, *pemphigus*, *measles*, *miliary fever*, *purpura*, *erysipelas*, *scarlatina*, *essera*, and *aphthæ*.—*SAGAR* arranged the same diseases into one class, which he divided into two orders, viz. *contagious* and *non-contagious* exanthemata; *miliary fever*, *erysipelas*, *essera*, and *aphthæ* constituting the latter order.—*MACBRIDE* made the exanthemata the fourth order of the class, *Fevers*; and omitted *purpura* and *essera*, on account of their non-febrile characters.—*CULLEN* added to the eruptive fevers of *MACBRIDE*'s classification, *chicken-pox* and *nettle-rash*.—*SELLE* retained the more extended signification of the term, and distinguished two orders—the *acute* and *chronic*: the former embracing the diseases enumerated above; the latter, various chronic eruptions.—*J. P. FRANK* formed his third class of the exanthemata, and distinguished them into two orders: those with little elevation of the cuticle, as *erysipelas*, *scarlatina*, *petechiæ*, &c.; and those in which the skin is rendered scabrous, as *variola*, *rubeola*, &c.—*PARR* arranged them as the first genus under his third order, *Eruptions*; added *strophulus* and *achor* to those already mentioned; and made a distinction between those appearing epidemically, and those which never assume this

form.—*K. SPRENGEL* comprised them in his third book or class; but, whilst he omitted *plague*, *erysipelas*, *miliary fever*, and *aphthæ*, he introduced *scabies* and *herpes*.

3. *WILLAN* and *BATEMAN*, in their artificial classification, restricted the term to *measles*, *scarlatina*, *urticaria*, *roseola*, *purpura*, and *erythema*; and *Dr. GOOD* extended it to the diseases admitted by *SAUVAGES*, with the addition of *urticaria*, *vaccinia*, and *yaws*.—*RAYER*, *CAZENAVE*, and *SCHÉDEL* have merely substituted *erysipelas* for *purpura*, in modifying the arrangement of *WILLAN*. *ALIBERT* has enumerated in this, his second group or order, *variola*, *vaccinia*, *clavus*, *varicella*, *nirlus*, *roseola*, *rubeola*, *scarlatina*, and *miliaria*. Two of these he has introduced into this group for the first time—viz. *clavus* and *nirlus*. The former is a febrile exanthema peculiar to sheep, very contagious, and characterised by flat circular pustules, resembling nail-heads, which appear on the parts least covered with wool, and which, like *variola* and *vaccinia*, attacks only once during life. The *nirlus*—the nirlus of Scotland, consists of distinct prominent papulæ, of a dull red colour, appearing after ephemeral fever, never suppurating, but terminating by absorption, or by desquamation. The febrile exanthemata formed the third order of the third class, in the outline published by me in 1822.—Lastly, *Dr. WEATHERHEAD* admits only *rubeola*, *scarlatina*, *variola*, *vaccinia*, *varicella*, and *Frambæsia* in his order of *Exanthematici*.—Other systematists, as *VOGEL*, *POUCQUET*, *PINEL*, and *YOUNG*, have not arranged the exanthems into a distinct group; but have classed them either with fevers or with inflammations. I have divided them into two sub-orders, viz. (a) those which attack the same person only once; and (b) those which may occur oftener than once; and have referred to a different order, such rashes, as *erythema*, *roseola*, and *urticaria*, as are chiefly sympathetic of disorder of the digestive organs.

4. There are various circumstances connected with all the diseases which I have classed as exanthematic, requiring to be constantly kept in mind by the practitioner:—1st. They frequently prevail epidemically;—2d. Different epidemics of the same malady often present very different or even opposite characters, chiefly as respects the state of vascular action, and of vital power and resistance;—3d. The sporadic occurrences of the exanthemata are generally less severe or dangerous than their epidemic prevalence, although, occasionally, the latter is very mild;—4th. Like all other febrile diseases, the severity of attack, the complications sometimes appearing in their course, and their terminations, depend in great measure upon the constitution and habit of body, upon pre-existing disorder; upon the occupation of, and other circumstances peculiar to, the individual; and upon the season of the year, and the treatment adopted at the invasion and in the early stages of the disease;—5th. As these maladies, when once formed, run a determined course, a too perturbative treatment, or the *nimia medici diligentia*, particularly if misdirected or otherwise injudicious, may be more injurious than inactivity, or the unaided efforts of nature;—6th. That we should protect vital organs from suffering injury, either from the reaction attending certain of their stages, or from the congestion

accompanying others of their periods; and, by endeavouring to interpret the procession of morbid phenomena aright, to follow where Nature points the way, and in the manner she indicates, in particular cases; in other words, that we should not treat the disease as a substantive, or entity, to which certain ideas are attached, but according to the actions, changes, and states presented at the commencement, and during the progress, of each case;—7th. The advanced stages of, and convalescence from, the exanthemata require careful supervision; as, during the latter period, various affections are liable to supervene, that are sometimes more dangerous than the antecedent malady;—8th. Opinions as to the result should generally be given with reservation, as sudden and unexpected changes may occur during their course, and during recovery, owing to moral and physical causes, over which the physician can often exercise no control.

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EXCRETION AND EXCRETIONS.—(CLASSIFICATION. PATHOLOGY—Ætiology—Symptomatology.)

1. **DEFIN.**—*Excretion is the separation of substances from the living body; and the secretions or substances separated are the fecal parts of the ingesta, and the matters which have fulfilled their destined purposes in the frame; and which, being no longer suited to, or susceptible of, vital alliances, are eliminated from the blood in gaseous, vaporous, or liquid states; their discharge being necessary to the continuance of health, and being performed under the influence of life.*

2. A knowledge of the various functions excreting or eliminating effete matters from the blood, of the manner in which they are influenced by foreign agents, and of their mutual actions and reactions, is necessary to a philosophical and successful exercise of the healing art. The continued introduction of matters into the frame, and their temporary circulation and assimilation, is counterbalanced by a corresponding discharge; the substances received being, after indefinite periods, excreted in very different states of elementary combination. Matters are introduced into the frame almost entirely by the digestive and respiratory surfaces; they are discharged also by these surfaces, and by other channels almost exclusively appropriated to this function. I shall take a view, first, of the several excreting functions; and, next, of the manner in which their interruption or suppression affects each other, and disorders the vital actions.

3. The **EXCRETIONS** are either—(a) The **NATURAL**, or those which are ejected altogether from the body, as the feces, urine, &c.; and which may be divided into—*a. exhaled*, as the transpirations from the skin and lungs; *β. secreted*, as the urine, &c.; and, *γ. fecal*, consisting

not only of exhaled and secreted fluids, but also of those parts of the ingesta which remain after the process of digestion is completed;—(b) The **MORBID**, or those—*a. which are imperfectly ejected* from the circulation, as the fatty matters which accumulate in situations where they do not materially interfere with the vital actions; and, *β. the most remarkable alterations from the healthy state* presented by, or attending, the excretions discharged by natural channels.

4. I. THE **NATURAL EXCRETIONS**, the *excretions proper*, or those matters which are ejected altogether from the body.—A. *Exhaled Excretions*.—*a. The cutaneous transpiration*, whether in its more insensible states of aqueous vapour and carbonic acid, or in the form of sweat, is a most important evacuation. It consists chiefly of water, with oily matter, mucus, osmazome, lactic or acetic acid, and the salts usually found in the blood (THENARD, BERZELIUS, ANSELMINO, TIEDEMANN). When the large quantity of fluid discharged from the blood by this channel is considered, interruption or suppression of the function will manifestly appear most injurious; and calculated either to disorder other excreting functions, or, if these do not perform a compensating action, to induce febrile or inflammatory affections. The *causes* which chiefly affect this excretion are stated in the article **DISEASE** (§ 41. 101.).

5. The *quantity* of this evacuation may vary remarkably; and its *quality* may also change.—It is suppressed or much diminished in the early stages of febrile and inflammatory diseases, especially during the period of excitement; and is either restored or greatly increased as the excitement passes into exhaustion. When it becomes abundant, it is often a salutary crisis; unless in hectic fever, in hæmorrhage, or in acute diseases attended by sinking, and coldness of the surface. Copious perspiration accompanies healthy action and excitement, and then it is warm and general. It is most profuse in the advanced stage of consumption; and in some malignant diseases, as pestilential cholera, &c. It is sometimes fetid, or contains more animal matters in solution than usual; and is at the same time more abundant, particularly in persons who are habitually costive, or who eat and drink largely or grossly; and still more so in the negro: in all whom, the suppression of the excretion is often followed by dangerous maladies. Profuse as well as offensive perspiration, particularly of the feet, also attends imperfect action of the liver or kidneys; whilst unusual heat and dryness of the feet, and of the palms of the hands, accompany chronic inflammation of these and other internal viscera. In *negroes* and the dark-skinned races, the integuments are a much more important organ of excretion than in the white variety—the perspiration, both sensible and insensible, of the former being very much more abundant, and containing more carbonic acid and animal matter, than that of the latter. I fully ascertained this fact by experiments made in Africa, in 1817; the cutaneous transpirations of the negro being from one fourth to nearly one half more abundant than that of the European.—Besides the matters usually found in it, the perspiration sometimes contains the colouring matter of the bile, or bile itself, especially in hepatic diseases and bilious fevers;

and, occasionally, minute quantities of urea and uric acid. It is very sensibly affected, particularly in costive habits, by the ingesta, especially some kinds of fish, and shellfish; the odour of these, and of numerous other articles, being very sensibly felt in this excretion.

6. *b. The Pulmonary Exhalation.*—*a.* The carbonic acid gas given out during respiration, is one of the most important excretions that takes place in the economy, whether this acid be formed within the blood-vessels, or in the air-cells, of the lungs; the quantity of it produced being an index of the extent to which the change from venous to arterial blood is carried in this organ. The evidence as to whether the carbonic acid is formed *within* the blood-vessels, or *without* them, is very contradictory. The experiments of Dr. EDWARDS show that the former process takes place to some extent; and they are supported by the fact observed by BERZELIUS, that blood, especially its colouring part, absorbs oxygen very quickly, and retains some part of the carbonic acid thereby produced. The passage of carbon from the vessels, and its combination with oxygen externally to them, is an inference from the experiments of Mr. ELLIS; which, however, were performed out of the body, and under circumstances which entirely excluded the operation of the vital influence. The evidence, however, for the absorption of oxygen through the capillary parietes is nearly the same with that for the excretion of carbon; for, if the tissue intervening between the blood and the air will permit the transmission of the one, it may also allow the passage of the other. I am inclined to think that both operations go on simultaneously: that, whilst a portion of the carbonic acid gas is given out from the blood, it is accompanied with a portion of free carbon, or oxide or hydrate of carbon, which combines with an additional quantity of oxygen in the lungs, and thus forms the whole of the carbonic acid in question; and that, at the same time, a portion of oxygen is absorbed, which combines with a portion of carbon in the blood; and there forms the carbonic acid, or the oxide of carbon, which is a part of the matters discharged from the blood in the lungs. These processes may vary, and either may predominate, according to the state of vital influence at the time, under whose control they are placed. This view is supported by the experiments of Dr. EDWARDS, which show that the carbonic acid is not formed instantaneously in the lungs; but is, to a considerable extent, secreted from the blood in the respiratory surfaces. Nor is it contradicted by the experiments of MM. MAGENDIE and ORFILA; who found that phosphorus, dissolved in oil, and injected into the blood, was secreted by the lungs in the form of phosphorous acid vapour.

7. However formed, it is obvious that the carbonic acid should be viewed as an excretion from the blood, the combination of the carbon with the oxygen being the principal source of animal heat. The quantity of the gas thus excreted, necessarily varies with the size of the thorax, the activity of the circulation, the state of nervous energy, and the condition of the excreting organ. Dr. CRAWFORD first found the quantity of the carbonic acid discharged, much diminished in a high temperature; and LAVOISIER, SEGUIN, PROUT, FYFE, and myself confirmed the observa-

tion. In the experiments I made in an artificial high temperature in this country, and in nearly the same temperature in a hot climate, the diminution was very remarkable, more especially in the latter circumstances; the humid and miasmatic air of an unhealthy intertropical country depressing vital and nervous power, and thereby diminishing still further this important function.

8. *β.* Other gases are exhaled from the lungs, as shown by the experiments of NYSTEN and EDWARDS. The former found that, when these are injected into veins, they pass out with the expired air; and the latter concludes that azote, absorbed into the blood, is discharged from it by the lungs. It is probable, however, that a considerable portion of the azote which passes into the circulation during respiration, combines with the chyle, and contributes to its complete animalisation; the ultimate product being urea, which is excreted by the kidneys. From experiments I performed many years since (*Lond. Med. and Physical Journ.* vol. xlv. p. 107. 185.), I inferred that numerous substances, as camphor, spirits of turpentine, several essential oils, spirits, æthers, &c., when absorbed or otherwise introduced into the circulation, are discharged from it chiefly by the lungs. Spirituous liquors, taken largely, pass off in great part through this channel—at least, their more volatile portions.

9. *γ.* The aqueous vapour constantly transpiring from the lungs is often a most important evacuation. It is slightly charged with animal matter; and proceeds chiefly from the blood in the pulmonary artery. Its quantity varies very much. LAVOISIER, SEGUIN, and THOMSON estimate it at about twenty ounces in the twenty-four hours: but it is increased much above this, by the free use of diluents, and malt or spirituous liquors, particularly the last; or by whatever increases vascular plethora. Diminished excretion by either the skin, kidneys, or intestines, also augments it; and, in these circumstances, it contains more animal or effete matters, to which, chiefly, is owing the faecal of the breath so often remarked; the lungs, in these cases, compensating in some measure for the interruption of the other excreting actions. The circumstance of various substances, that are absorbed into the circulation, being eliminated from it, along with the pulmonary transpiration, explains their influence in diseases of the air-passages, and their action in promoting expectoration. The morbid conditions of these passages, especially such as impede the functions of transpiration—whether gaseous or vaporous—must necessarily influence the other excreting actions, particularly those of the skin, of the liver, and the intestinal canal. Hence the advantages, in such cases, resulting from the remedies which promote those evacuations, and restore the pulmonary functions.

10. *e.* The Catamenial or Menstrual Discharge may be considered as an excretion, most salutary in its effects in most instances. It diminishes both local and general plethora; and it sometimes seems to be the channel by which morbid states of the circulating fluid are removed. In such cases, the discharge is offensive, or altered in colour; and, occasionally, it induces irritation or excoriation of the parts over which it passes, or with which it remains a short time in contact; the cutaneous surface and countenance being

clearer, and the health improved, after such evacuations, particularly when copious, and when the indications they furnish are properly followed. The *lochia* is also a salutary excretion, inasmuch as vascular fulness and local determinations are obviated by it, and the circulating fluid rendered more pure. (See PUEPERAL STATES.)

11. *B. The Secreted Excretions.*—*a.* The *biliary secretion* is *excrementitial* as well as *recrementitial*; the liver manifestly compensating for the deficient excreting action of the lungs—as was first shown by me in 1815—and combining a portion of the carbon, and other matters usually discharged from the lungs, into bile, preliminary to their excretion, as well as for the purposes of digestion; that portion of carbon, which does not combine with oxygen to form carbonic acid, being associated with the other constituents of bile in the formation of this fluid. Hence the abundant secretion of bile in circumstances which diminish the activity of the respiratory functions, as in warm moist states of the air, &c.

12. *b. The Urinary Excretion.*—MM. DUMAS, PREVOST, and SEGALAS, found, on examining the blood of living animals whose kidneys has been extirpated, that it contained *urea*, the quantity of which was increased according to the duration of life after the operation; and that this substance could not be detected in the blood of those animals in which the urinary secretion was interrupted. M. SEGALAS, having injected an aqueous solution of urea into the veins, observed the secretion of urine rapidly increased by it, and this substance so quickly eliminated in the process, that, after twenty-four hours, it could not be detected in the blood. It seems, therefore, not improbable that the effete and more highly animalised matters absorbed and carried into the circulation, are converted, by the influence of the vessels and organs through which they circulate, into the substance called urea; and that one of the functions of the kidneys is to eliminate it from the circulation. These experiments favour the conclusion that urea is not formed, or at least altogether formed, in the kidneys, by their appropriate actions; but that it, and probably other substances which are removed by these organs, exist in the blood, either already formed, or in certain stages of formation.

13. According to BERZELIUS's analysis, the urine contains, in its healthy state, somewhat more than 30 parts in 1000 of urea; and Dr. PROUT has shown that nearly one half of urea consists of azote. It consequently follows that the injurious accumulation of azote in the system, contingent either on assimilation or respiration, and the resulting putrefactive tendency of the fluids, are prevented by the action of the kidneys. Hence we observe the great proportion of urea in the urine of those who eat much animal food, in which nitrogen abounds; and we may therefore conclude, that the kidneys are the great outlet for azote, as the lungs and liver are for carbon.

14. *C. The Faecal Excretions.*—*a.* In their course through the small intestines, the alimentary matters are deprived of their chyle; the residue being poured into the cæcum, where its course is more slow, and where it assumes new characters. The contents of the colon and rectum evidently consist—1st, of the residue of the

aliments; and, 2d, of the excrementitial parts of the secretions poured into the digestive canal. These constitute the *feces*. It is, in some measure, owing to the quantity and properties of these latter, especially the biliary and follicular secretions, that the *feces* present distinctive characters; their *consistence* depending upon their retention in the large bowel, and upon the quantity of exhaled and secreted fluids poured out in this, and the superior portions of the canal. Their *colour* is owing—1st, to the abundance and properties of the bile, or to its suppression; 2d, to the fluids poured into the digestive tube; 3d, to acidity in some portion of the *prima via*; 4th, to the food and drink; and, 5th, to the properties of medicinal substances. A careful consideration of each of these is necessary, in estimating aright the indications furnished by the faecal discharges. The *odour* of the *feces* depends chiefly upon the secretion of the mucous follicles, particularly those of the cæcum, colon, and rectum; upon the states of constitutional and vital power, in connection with vascular action, and the conditions of the digestive canal; and upon their retention in the large bowels: an offensive or unnatural odour of the *feces* generally proceeding from depressed vital energy, or long retention, and the extrication or secretion of gases in the intestinal canal.

15. *H. MORRID EXCRETIONS.*—*A. The Fatty Excretions* consist of the secretion of fat—1st, in cellular parts; 2d, in the alimentary canal; 3d, by the kidneys; and, 4th, by the stomach.—*a.* I have stated in the article ADIPOSE TISSUE (§ 3.), in how far the excessive secretion of fat may be considered as a salutary excretion; in the circumstances which usually give rise to it; the excess of oily or fatty matter in the blood, consequent upon imperfect sanguification and assimilation, being deposited principally in the areolæ of the cellular tissue, whence it may be taken up by the absorbents for the purposes of nutrition, when the supply of food becomes deficient.

16. *b.* In some states, chiefly of disease, fatty substances are excreted *from the intestinal canal*, in a solid, semifluid, or liquid form.—1st. In some cases, the fat seems to be absorbed from the adipose tissue, carried into the circulation, and secreted or exhaled from the intestinal mucous surface; whence it is excreted of various consistence, according to the preponderance of certain of its elements, or to its combination with mucus or with an acid in the bowels.—2d. It may also proceed from an undue accumulation, owing to imperfect assimilation, of oily matter in the blood; which is excreted in this situation, instead of being secreted in the adipose cellular tissue: and, 3d. In those instances, where the fatty substance consists of small solid pieces, and resembles or approaches adipocire or cholesterine, it may be secreted in the liver. Cases of this morbid excretion are comparatively rare; but I am convinced that they would be much more frequently observed, if the alvine evacuations were more attentively examined than they generally are. I have met with only two cases; but several have been lately observed by Dr. ELLIOTSON, Dr. BRIGHT, and Mr. LLOYD. It should, however, be borne in mind, that olive and castor oils, in passing through the digestive canal, are some-

times so altered by combining with mucus, or with morbid secretions, as to assume a solid and fatty appearance; and that persons who eat largely of fat meats, occasionally pass portions of undigested fat, in either a fluid or consistent state.—In the cases recorded by MOEBIUS, MOELLENBROCK (*Ephem. Med. Phys. Germ. Curios.* dec. i. cen. 2. obs. 20.), and FABRICIUS HILDANUS (*Obs. et Curat. Med. Chirurg.* cent. iv. obs. 47.), emaciation appears to have been a prominent symptom; indicating the probable origin of the discharge in the rapid absorption of fat from the adipose tissue. Instances of fat voided from the bowels in large quantities are adduced also by TULPIUS (*Observ. Med.* Amst. 1685.), ARNOT (*Edin. Med. Essays*, vol. v. part ii. p. 652.), SCOTT (*Edin. Med. Comment.* vol. iv. p. 334.), BABINGTON (*Philos. Trans.* for 1813. part ii. p. 150.), Mr. HOWSHIP (*Pract. Observat. in Surgery and Morb. Anat.* p. 283.), CULLENIER, EASTCOTT (*Med. Gaz.* vol. xii. p. 49.), and Dr. TURNER (*Trans. of Med. and Chir. Soc.* vol. xviii. p. 73.).

17. In the first case detailed by Dr. ELLIOTSON (*Trans. of Med. and Chir. Soc.* vol. xviii. p. 76.), the fatty matter discharged was fluid, of a yellow colour, concretioned when cold, and burnt with a large flame, like oil. It was generally evacuated with the feces, in large quantity; and occasionally it ran from the patient involuntarily. The discharge was preceded by bloody stools, was continued for several months, was attended by great pain, and was associated with phthisis and mellitic diabetes; pus being thus evacuated from the lungs, saccharine urine from the kidneys, and fat from the bowels, at the same time. On dissection, all the intestines appeared greasy, as if soaked in oil, with numerous black points in their mucous membrane; but there was no other lesion in them. The liver was healthy, and the gall-bladder full of thick dark bile. The pancreatic duct, and large lateral branches, were filled with white calculi. The kidneys were sound, the lungs tuberculated and ulcerated. In the second case adduced by Dr. ELLIOTSON, the fat was discharged in both a solid and fluid state. The patient died of this complaint and phthisis. No disease was discernible after death, in the alimentary canal or urinary organs. The liver was large and pale, but healthy in structure; and, with the gall-bladder, destitute of bile. D. PROUT (*Ibid.* p. 79.) saw a young lady, who voided, "for many months before death, fatty matter in large quantities, mixed with blood and other things." The cæcum was found thickened; and the mucous coat of it and of the colon was ulcerated. The other abdominal viscera were healthy.

18. In the first of the cases detailed by Dr. BRIGHT (*Trans. of Med. and Chirurg. Soc.* vol. xviii. p. 3.), the fatty matter was observed in the stools, in the course of diabetes, on which jaundice had supervened from obliteration of the common bile-duct, caused by disease of the pancreas, with malignant ulceration of the duodenum. The second instance of this kind of excretion recorded by this physician was remarked during jaundice caused also by obliteration of the common bile-duct, owing to disease of the pancreas and malignant ulceration of the duodenum. In the third case, a nearly similar association of morbid phe-

nomena, and of organic lesions, to those characterising the second, was observed. In the case detailed by Mr. LLOYD (*Ibid.* p. 57.), the excretion of fat in the stools was remarked in the course of jaundice caused by enlarged pancreas; the gall-bladder and hepatic ducts being greatly distended with bile, and the common and pancreatic ducts obliterated.

19. I was recently called to a married female of about forty, who had never been pregnant, and who complained of symptoms which I attributed at first to the passage of gall-stones along the ducts, and afterwards to a concretion in the bowels. Upon examining the evacuations, with the expectation of detecting something of this kind, two lumps were found, the largest of which was above the size of a walnut. They were of a whitish colour, with a slight greyish green tinge, were greasy to the touch, imparted a permanent greasy stain to paper, resembled adipocire in consistence, and burned with a whitish blue flame and much smoke. After their evacuation, much relief was procured, and the opportunities of examining the evacuations ceased; but the patient, who occasionally calls at my house for advice, still complains of disorder of the digestive organs, particularly of the liver and bowels. In the autumn of 1833, I saw, through the kindness of Dr. O'DONNELL, a most able physician in Liverpool, a lady who had long suffered chronic disease of the bowels, particularly of the large bowels. The evacuations, which were fluid, contained a number of small lumps, varying from the size of a split pea to that of a bean; but presenting all the characters just described.

20. *b.* The excretion of fatty matter by the urinary organs is more rare.—Dr. PROUT, in a communication to Dr. ELLIOTSON, states, that he has seen, several times, a fatty or adipocirous matter voided with the urine; and that, in every instance, malignant disease of the kidney or bladder has supervened, and ultimately proved fatal. TULPIUS mentions a case of an old woman who voided fat from both the bowels and bladder, and died remarkably emaciated. Mr. PEARSON, in Dr. ELLIOTSON's interesting paper, details the case of a lady of seventy-nine, who, after suffering from gall-stones, observed in her stools, which were without bile, a fatty substance, that passed in the form of oil, but quickly concretioned; and in her urine a similar oil, which floated on its surface, and concretioned like that passed from the intestines. The quantity excreted by the bowels averaged an ounce and a half daily; and by the urinary organs, about the third of an ounce. The patient died emaciated, but no inspection was allowed.

21. *c.* A case is given, in the *Medico-Chirurgical Review* for July, 1826, from the *Annali Universali*, of a man who, after irregularities of diet, was seized with vomiting every week or fortnight, for two years. During an unusually severe attack, occasioned by great imprudence in diet, a quantity of pure blood, and a thick oil, or melted fat, were thrown up; amounting in all to thirty pounds in twenty-four hours. He nearly sunk; and his skin hung in folds, as though all the fat had been absorbed. After some time he was restored to health. It is reasonably supposed that his fat had been rapidly absorbed during the attack of vomiting, and

poured into the stomach. DIEMERBROECK (*Observ. et Curat. Med. Cent.* obs. 93.) minutely details the case of a female of twenty-seven years of age, who was long afflicted by violent gastrodynia, and obstinate vomiting of a black fluid containing lumps of fat of the colour and consistence of butter. The bowels were costive; but the uterine, biliary, and urinary functions were not deranged. She was ultimately cured by cathartics, enemata, and cordial anodynes. Instances of the ejection of fatty matters from the stomach, after prolonged or repeated vomiting, and without the possibility of a foreign origin, are recorded also in the *Philosophical Transactions* (for 1673, No. 96.), and by GESNER (*Beobachtungen*, b. i. No. 10.), GOURRAND (*Journ. de Méd.* t. lxxxv. p. 366.), and J. P. FRANK (*De Cur. Hom. Morb.* l. v. pars. ii. p. 370.)

22. From a consideration of the circumstances attending the excretion of fatty matter from the digestive and urinary organs, in the cases now referred to, the inference that it takes place in one or other of the three modes already stated (§ 16.), according to the nature of the disease in the course of which it supervenes, seems to be well founded. The fact, that the milk-like state of the serum of the blood, so often observed, depends upon the admixture of animal oil or fat in it, remarkably favours the inference as to the first and second of these sources of the fat found in the excretions. The opinion entertained by Sir E. HOME (*Philos. Trans.* 1813, part ii. p. 150.), and attempted to be proved by experiments, that the fat is formed in the lower intestines by means of bile, is disproved by the cases recorded by Dr. BRIGHT and Mr. LLOYD. The passage of bile into the digestive canal was completely prevented in all these. But the inference, that imperfect digestion and assimilation, and the consequent formation of oil in the blood, or the absorption of it from the adipose tissue into the circulation, and its excretion from the blood by the bowels, are the true source of this phenomenon, is fully evinced by the history of these, as well as of the other cases. The presence of oil in the urine, remarked in rare instances, is a further proof of the origin now contended for. There is strong reason to believe that the excretion of superabundant oil in the blood takes place much more frequently than is supposed, by this latter channel. HIPPOCRATES, GALEN, PROSPER ALPINUS, and several other writers, noticed it as an unfavourable occurrence, and not incorrectly considered it as a symptom of colliquation.

23. *B. The most remarkable changes presented by the excretions through natural channels* are described in the articles BLOOD (§ 115. *et seq.*), and DISEASE (§ 99. *et seq.*), and in the numerous articles on diseases in which the excretions are early or principally affected. The more isolated and prominent of them only will therefore be noticed at this place. — *a. The fecal excretions* are either diminished or increased, or otherwise changed; alterations of these being generally connected with disorder of the hepatic organs. Obstructed or diminished discharge of bile, arising either from torpor of the liver, from congestion, or from obstruction of the ducts, &c., deranges not only the intestinal functions and excretions, rendering the latter pale and offensive, but also the digestive and assimilative actions,

the urinary and perspiratory functions, and the conditions of the nervous system, occasionally terminating in coma and death; especially when the bile has been taken into the circulation, and has coloured the tissues and exhaled fluids. The bile may be so altered in colour and consistence, owing either to the superabundance of certain of its elements in the blood, or to its remora in the ducts and gall-bladder, and to the consequent changes, as to impart to the fæces a very dark green or almost black colour, even independently of the exhalation of blood in the prima via. I have remarked this uncommon state of the fecal discharges chiefly in diseases impeding respiration, as asthma, bronchitis, hydrothorax, and chronic affections of the liver. A black appearance of the alvine excretions is, however, more frequently produced by the escape of blood into the upper portions of the alimentary tube; but upon diluting or mixing the evacuation with water, a greenish hue will be assumed in the former case, and a reddish or ochry tint in the latter. The remarkably copious, rice-coloured, watery evacuations in pestilential cholera, are attended with an albuminous coating of the intestinal mucous surface; the serum of the blood having exuded from this surface, owing to deficient vital power of this part, and of the frame generally, and to a morbid state (dyscrasy) of the blood itself; its albumen partially concreting on, and adhering to, this surface, as proved by the examination of bodies, in which treatment had not removed it previously to dissolution. The fecal excretions are more or less altered in most diseases; but it would lead to repetitions to pursue the subject further at this place. The excretion of gaseous matters from the alimentary canal is considered in the article FLATULENCE.

24. *b. The urinary excretion* varies in quantity, influenced by the interruption or abundance — 1st, of the respiratory exhalation; 2d, of the cutaneous transpiration; 3d, of the intestinal exhalations: copious discharges from one or more of these surfaces diminishing this excretion, and opposite states increasing it. The urine may also contain various foreign matters, or certain of its usual constituents in excess; but generally as a consequence of disease. It contains much gelatine and urea, in *typhoid* or *adynamic fevers*; much albumen and phosphate of lime, in rickets; much urea or lithic acid, in *dyspeptic affections* and gout; and much saccharine matter, in diabetes. In *inflammatory fevers*, the urine is red, deep-coloured, or even a deep brown, and transparent, until a crisis occurs; when it becomes more copious, and deposits the lateritious sediment, which is of a reddish colour, and consists of phosphate of lime, lithic acid, sometimes lithate of ammonia, and animal matter, with lithate of soda, and purpurates of ammonia and soda, according to Dr. PROUT. In *intermittents*, it varies with the stage of the paroxysm; but, after the seizure, it deposits a red powder, consisting of rosacic acid. In *gout* and *rheumatism*, it contains much lithic acid. In *hysteria*, it is copious, of a pale colour, is deficient in urea and animal matter, and abounds with the usual salts. In *jaundice*, and other diseases interrupting the functions of the liver, the urine presents a brown or muddy appearance, or contains bile; the kidneys having to a certain extent assumed an office vicarious of that of the liver. In

bilious remittent fevers, it often possesses a similar character. In *dropsies*, it is sometimes yellowish green and extremely viscid. It generally deposits a copious sediment of rosacic acid, lithic acid, phosphate of lime, and animal matter; and in acute dropsy is frequently so loaded with albumen as to coagulate when heated, or when sulphuric or nitric acid is added to it.

25. In all *inflammatory diseases*, the urine is small in quantity and high-coloured, and contains acids in excess; but in *disorders of irritation or debility*, it is generally pale, in large quantity, and abounds in neutral saline, or alkaline substances. *Blood* is sometimes found in the urine; and the inky or black colour it presents on rare occasions, most probably is caused by the passage of the colouring matter of the blood along with it from the kidneys, and by the action of the salts contained in it. Dr. MARCET ascribed this colour to a particular acid, which he called the melanic. In a few cases, the urine assumes an almost gelatinous state shortly after it is voided. I met with an instance of this kind in an advanced stage of pregnancy; severe pains in the loins and sickness being complained of. Antiphlogistic treatment removed it. *Mucus* and *puriform matters* are also seen in the urine, during and after irritation, or inflammatory diseases, of the kidneys, bladder, or prostate gland. (See KIDNEYS, and URINE.)

26. *c. Vicarious excretion* is of frequent occurrence in several diseases; and takes place to a certain extent even in health; causes which merely diminish excretion in one part, increasing it in others, without manifest disorder ensuing. But no excretion can ever be long, or much interrupted, without disease supervening; the increased function, which supplies its place for a while, itself sooner or later passing into disorder of a more or less acute kind and dangerous character. The perspiratory and respiratory exhalations are seldom altogether suppressed; but when they are interrupted, one or two things generally ensue:—1st. When the vital powers are not materially depressed, nor any organ disposed to disease, the actions of the kidneys, of the liver, and bowels, are individually or conjointly increased, so as to compensate for the interruption of either of these exhalations;—2d. If such compensation does not take place, or if some organ is disposed to disorder, the vascular system is overloaded by the consequent augmentation of the serous parts of the blood, or irritated by the retention of matters requiring to be excreted; and the predisposed organ becomes congested or inflamed; fevers, inflammations, &c. supervening, according to individual predisposition and concurrent causes.

27. *d. Interruption or suppression of the urinary function* is one of the most serious occurrences to which the frame is liable, and the least admits of being replaced even for a time by other excretions. Yet a compensation sometimes takes place to an extent preservative of life, for several days, or until suppression is removed. In such cases, the exhalations from the lungs, the cutaneous transpiration, and the actions of the alimentary canal, are individually or conjointly increased, so as to supply the deficiency; and the urinous or ammoniacal fætor of the breath and perspiration often indicates that the excretion of urea and other injurious matters is effected chiefly by the

cutaneous and pulmonary surfaces. In some instances, a urinous fluid, or rather fluid containing urea and the salts usually found in the urine, is exhaled in considerable quantity during the repeated or prolonged vomiting that often attends disease of the kidneys with suppression of urine; and, in other instances, the intestinal discharges become watery, urinous, and abundant. When the suppression is complete, much more serious results follow: a *urinous species of fever* supervenes, owing to the retention in the blood of an excess of serum holding alkaline and highly azotised salts in solution, and to the actions of other excreting organs being insufficient to compensate for the suppression. In such instances, the pulse is accelerated, large, full, and oppressed; the perspiration copious and offensive; the soft solids and muscles flaccid; the bowels irregular or relaxed, and the stools morbid and fætid; the countenance and cutaneous surface foul or lurid; and the fætor of the patient's apartment often remarkable. These cases generally terminate in coma, or sudden death, with or without convulsions, owing to the influence of the impure blood on the brain; and in effusion into serous cavities: but similar terminations of interrupted urinary excretion sometimes take place without antecedent urinous fever. In a very hopeless case of this form of fever, in the cook of a friend's family, the secretion of urine, which had been suppressed entirely for several days, was restored by cupping repeatedly on the loins, and by diuretics, purgatives, and deobstruents. The abundance and fætor of the exhalations from the lungs and skin were very great in this case.

28. *e. Interruption of the biliary excretion* may continue for a long time without a fatal result; but whether the secretion be suppressed, or the discharge of it into the intestines prevented, serious consequences usually ensue, although the bile may not pass or be absorbed into the circulation. If the secretion does not proceed, the other excretions become morbid, particularly the fæcal and urinary; the breath and perspiration are offensive; the skin sallow or lurid; digestion and assimilation are interrupted; and, in the process of eliminating those matters from the blood, by which the organs are irritated, additional disease is excited, and complications induced. Thus the alimentary canal, lungs, kidneys, as well as the liver, often become affected. Even when bile is secreted, its discharge being prevented by obstruction of the ducts, the part of it which passes into the circulation is frequently so far removed by the kidneys and skin as to prevent, for a considerable time, any change in the blood sufficient to destroy life. (See DISEASE, § 162. 168.)

29. *f. Protracted or frequent interruption of the fæcal excretions* are generally in some degree compensated by an increase of the cutaneous and pulmonary exhalations and of the urine, and serious effects are thereby prevented for a time. These vicarious excretions are generally very offensive, owing to the quantity of effete animal matter carried off in the exhaled vapour; and they not infrequently excite dangerous disease of the organs by which they are principally effected. In a case of stricture of the transverse colon, at present under my care, with nearly complete obstruction of fæcal excretion, pulmonary disease has been superinduced; the kidneys having become

the chief excreting organs, and their actions greatly increased. Of the other vicarious excretions, it is unnecessary to add any thing to what is stated in the articles DISEASE (§ 162. *et seq.*), HÆMORRHAGE, MENSTRUATION, and SYMPTOMATOLOGY; topics which have not been alluded to at this place, being considered in those articles to which they more especially belong, and where their practical importance is fully estimated.

30. *g.* The practical indications furnished by the excretions in their increase, diminution, and alteration, as well as in their reciprocative relations, are most important in the management of disease. It is shown in various places, that one of the earliest effects of the exciting causes of disorder is the interruption or suppression of one or more of the excreting actions; it therefore follows, that the restoration of the interrupted function should be a principal indication of cure. The diversified and ever-varying states of the several excretions ought, in addition to the estimation of quantity, to be made subjects of attentive and daily examination; as furnishing, when interpreted aright, the surest proofs of existing disorder, and of the operation of medicines, as well as the firmest basis of rational or philosophical practice. The effects of impeded excretion on the blood and on the nervous system should be carefully watched and considered; and such as most obviously result, although often unaccountably overlooked both by writers and by practitioners—especially vascular fulness, local or general, with more or less of deterioration of the circulating fluids—ought to be prevented or removed by means appropriate to the peculiarities of the disease, and of the circumstances in which it is observed. (See PHYSIC — Practical Principles *of.*)

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EXPECTORATION (from *Ex* and *pectus*).

—CLASSIF. PATHOLOGY — *Symptomatology*.

1. This word, which signifies the act of discharging any substance from the chest, is now usually applied to the matters so discharged. The secretion which moistens the surface of the bronchi is a colourless and somewhat viscid fluid, consisting chiefly of the serum of the blood, and a modified, peculiar, or slightly glutinous form of

albumen. It is so scanty in health, as to be seldom or very rarely excreted: but in disease, its quantity varies very much; it being commonly—occasionally, remarkably—increased, excepting at the onset of some inflammatory or exanthematous complaints, when it is diminished, and then only for a short time. Its quality or appearance is also extremely different, in different maladies, and even in different stages of the same malady, seated in or implicating the respiratory or circulating organs; particularly as regards the quantity and condition of the animal matter or albumen which it contains. The saline substances found in the serum of the blood also exist in it, but in various proportions; they being usually more abundant in hæmorrhagic and inflammatory diseases of these organs.

2. *A.* The appearance and quantity of the expectorated matter are amongst the surest rational signs of the progress and state of several diseases of the chest, especially bronchitis and pneumonia; and in many instances they alone furnish sufficient grounds of both diagnosis and prognosis. They should, therefore, whenever the functions of respiration are disturbed, or when the bronchial secretion is any way altered, be carefully inspected. For this purpose the sputum ought to be collected in two glass vessels; one of which should be previously nearly filled with clear water, in order that it may be examined both alone and on the surface of water. The periods of expectoration should also be noted, with the frequency and nature of the cough, and the degree of difficulty attending the excretion.

3. *a.* The colour of the sputum varies, in pulmonary diseases, from the colourless and transparent or diaphanous, and viscid or glairy fluid of the early stages of bronchitis, through every possible shade, to the blackest hue exhibited in melanosis or in gangrene of the lungs. The expectoration is partly yellowish and opaque, and partly mucous, pituitous, and serous, variously mixed, in chronic bronchitis; and it is yellowish, greenish, greenish yellow, slightly mixed with blood, red or rusty, in pneumonia. Its colour is ash-grey in phthisis, and blackish in the rare states of disease just mentioned. But healthy persons often expectorate mucus so intimately mixed with the carbonaceous particles usually floating in the air of large towns and factories, as to resemble the sputum in melanosis of the lungs.

4. *b.* The savour of the expectoration is by no means constant in the same disease. It is sometimes sweetish or saltish, or intermediate, in phthisis and hæmoptysis. The odour of the sputum is sometimes disagreeable in chronic bronchitis, and in the ulcerated stages of phthisis; in which latter it is often foetid; but it is much more so in gangrene of the lungs and pleura, and in the last stage of abscess of the lungs. Increased warmth of the sputum is not readily perceived, although it may exist in inflammatory affections of the lungs. Diminished warmth indicates dangerous or fatal sinking of the vital powers.

5. *c.* The form of the sputum is important; and is chiefly owing to the manner in which the morbid secretion is excreted; and to the quantity and modification of the albumen existing in it. When it is frothy, it may be inferred to have been expectorated with difficulty, and with severe cough: it then is generally fluid, glairy, transparent, con-

tains albumen, and runs into one mass in the containing vessel, to the sides of which it adheres slightly; as in catarrh, the early stages of bronchitis, &c. When it is viscid, opaque, somewhat frothy, and thick, it is usually brought up with much cough, contains much more albumen, adheres closely to that previously expectorated and to the sides of the vessel, and results from acute inflammation of the smaller bronchi and substance of the lungs. When it is rounded and isolated, it is expectorated more easily, as in advanced stages of pneumonia; and when it is thick, opaque, rounded, distinct, and muco-puriform, or purulent, it is also brought up with more ease, and proceeds from organic change of the substance of the lungs, as in certain states of phthisis, &c.

6. *d.* The consistence of the sputum is of much importance. When it is watery and serous, it generally proceeds from simple increase of the exhalation from the air-passages, without inflammation of, or merely with simple determination to, the bronchial surface; but this kind of expectoration may accompany phthisis, chronic pleurisy, and other thoracic diseases not seated in the bronchi. A mucous and transparent fluid is expectorated in catarrh, and in slight affections of the throat, but it also frequently attends the diseases of the chest just mentioned. Viscid, thick, and adhesive sputa, containing much albumen, characterise acute inflammation of the lungs. A membranous or tubular substance, with thin, viscid, or puriform mucus, is often discharged in croup, and consists chiefly of albumen, sometimes approaching the fibrinous state. In rare instances of sub-acute bronchitis, albuminous concretions, solid or tubular, and of an arborescent form, moulded in the ramifications of the bronchi (*Bronchial polypi*), are expectorated during the decline of the disease. Cases of this description are recorded by TULPIUS, DALBIS, CONSBURCH, BUSSURES, SAMBER, DE HAEN, WARREN, CALLISEN, STRACK, DIXON, ACHARIUS, CHEYNE, and ILIFF.

7. The quantity of expectorated matters varies extremely. At the commencement of inflammations it is but little increased; but is augmented with the progress of disease, and diminished as disorder subsides. Suppression of the expectoration, especially when sudden, the pulse continuing frequent and the other symptoms unameliorated or exasperated, is a very dangerous circumstance. The more watery or thin the consistence, the more copious is the expectoration, as in bronchitis and bronchorrhœa; and the more thick, opaque, or dense it is, and the smaller the quantity compared with the severity of the other symptoms, the more seriously is the substance of the lungs diseased, as in pneumonia and phthisis. In many cases of the worst states of these diseases, the sputum is very scanty to the close.

8. *Bloody expectoration* is a serious appearance; but it is of importance to ascertain its origin, and to consider it in connection with all the phenomena. An exudation of blood from the nasal fossæ, from the posterior fauces or pharynx, or even from the gums, may take place, either so as merely to tinge the surface of the sputa, or to the extent of constituting a dangerous hæmorrhage. In these cases, the blood is not frothy, and is not mixed with the matters brought up from the air-

passages. If the expectoration be thin, frothy, ropy, and only streaked with blood, the fits of coughing are generally the cause of the bloody appearance. If the blood be mixed in a ropy, opaque, or puriform mucus, very acute bronchial inflammation is usually present; and if it be seen in spots in thick, opaque sputa, acute inflammation of the smaller ramifications of the bronchi, often extending to the substance of the lungs, may be inferred. When the blood expectorated is very abundant, or nearly pure (*hæmoptysis*), it may proceed from simple exudation from the bronchial surface, or from organic changes of the lungs, heart, or large vessels. (See HÆMORRHAGE and LUNGS.)

9. When the blood is simply exhaled from the air-cells of the lungs, it is florid and frothy, and more or less abundant. If the sputa be only tinged with blood, or reddish, and thick, viscid, adhesive, or slightly frothy, pneumonia is certainly present. If the expectoration become ochry, rusty, reddish brown, livid, and rounded, purulent infiltration, hepatisation in an advanced stage, or some other most dangerous organic change of the lungs, exists. Bloody sputa, but of no constant form, also attend the effusion of blood in the parenchyma of the lungs, and phthisis. The appearance of blood in the sputa, late in pulmonary diseases, or in very minute quantity, is of much more serious import, than in an early stage, or in large quantity.

10. *C. Purulent expectoration*, of a pure and unmixed kind, is much less frequent than is commonly supposed; what is usually considered purulent, being a mixture of puriform matter with mucus, and a product of inflammatory irritation in the bronchi. As a symptom of phthisis it deserves little attention, as this disease may be present, and even run its entire course, without its appearance: and it may be most remarkable, particularly in very young subjects, in the slightest pulmonary affections, as in chronic bronchitis, in the decline of severe catarrh, and in hooping-cough; in which latter, the morbid secretion in great part proceeds from the posterior fauces, pharynx, and their vicinity. When observed in phthisis, it is owing commonly to associated chronic bronchitis, or to the communication of a tubercular excavation with the bronchi, the puriform matter being secreted by the irritated surface of these tubes. But pus is seldom or never seen in a pure state, and unmixed with mucus, unless when a large vomica, or abscess, either formed in the parenchyma of the lungs, or extending thither from the liver, bursts into the bronchi. In this case, the matter, variously tinged, is friable, often foetid, does not retain air-bubbles, and sinks or diffuses itself in water. When mixed with mucus, as in other pulmonary diseases, it does not present these characters, excepting in a very partial and variously modified form, as shown in the articles BRONCHI, and LUNGS. When an abscess forms in the lungs, which is a comparatively rare occurrence, and bursts into the bronchi, the pus expectorated is generally in very large quantity; the expectoration continuing until the abscess is partially emptied; when it frequently altogether ceases, and again returns in great abundance when the cavity is refilled; the intervals often extending to several days. In these cases, the

matter is yellow, whitish yellow, yellowish green, or reddish yellow; presents all the characters of pure pus, excepting in the intervals when the more scanty sputa is generally mixed with mucus; and ultimately becomes more offensive, and assumes deeper shades of colour. I lately attended a case where abscess formed in the substance of the right lung presented these well-defined characters: yet the patient never coughed during its formation—although it was so large as to bulge out the right side of the thorax—nor until the time of its bursting into the bronchi.

11. *D.* The appearance of fine, white streaks; or the presence of *whitish*, or *whitish yellow*, *small masses*, like boiled rice, in a mucous or mucopuriform sputa, generally indicates the softening of tubercles: but the earlier and more advanced stages of phthisis are attended by the very varying state of the expectoration described in the article on that malady. *Sabulous*, *calculous*, or *earthy matters* are sometimes expectorated in certain states of pulmonary or phthisical disease; but these matters do not indicate the most dangerous forms; for I have known several cases where recovery took place after their discharge. The presence of *hydatids* in the expectoration is very rare.—Substances that are swallowed, are sometimes coughed up from the trachea, through an ulcerated communication formed between it and the œsophagus. ZEVIANI records a case of this kind; and one was, a few years since, attended by Mr. BYAM and myself. The various modifications of the expectoration, during the progress of pulmonary diseases, are minutely described in the articles BRONCHI, HÆMORRHAGE, LUNGS, and TUBERCULAR CONSUMPTION; and the indications derived from this source are there duly pointed out.

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EYE, DISEASES OF THE.—SYN. *Ophthalmos*
Oculus. *Das Auge*, Germ. *Œil*, Fr. *Occhio*,
Ital.

CLASSIF. SPECIAL PATHOLOGY—MOR-
BID STRUCTURES.

1. The progress of knowledge, in respect of diseases of the eye, has been very remarkable since the end of the last century; owing chiefly to the researches and writings of BEER, SCHMIDT, HIM-
LY, SCARPA, BENEDICT, DEMOURS, EDMOND-
STON, VETCH, WARDROP, WELLER, TRAV-
ERS, GUTHRIE, MACKENZIE, and LAWRENCE.
In the account that will be here given of these
diseases, those only which are inflammatory, and

consequent upon inflammation, will be considered.
Functional disorders are treated of in separate
articles. (See AMAUROSIS, SIGHT, &c.) The
order in which these maladies will be discussed,
will differ but little from that adopted in the truly
valuable works of Mr. LAWRENCE and Mr. MAC-
KENZIE; to which I have much pleasure in stat-
ing my obligations.—The latter of these writers,
and J. FRANK, treat first of the diseases of the
eyelids and lachrymal apparatus, and next of the
eye itself. Mr. LAWRENCE enters at once upon
the consideration of the inflammatory diseases of
the tissues of the eye-ball, and concludes his clas-
sical production with those of the appendages.
Either arrangement is unexceptionable; but I shall
follow the latter, merely as being more congruous
with the medical view of the subject, to which I
shall chiefly confine myself. The surgical treat-
ment of such of those diseases as require it, must
be studied in the works now referred to, or in Mr.
COOPER's *Surgical Dictionary*. I shall, there-
fore, first treat of inflammations affecting the ex-
ternal coats of the eye, and afterwards of those
attacking the internal tissues of the organ.

I. INFLAMMATIONS OF THE EYE.—SYN. *Oph-
thalmia*; *Lippitudo*, Celsus; *Augenentzündung*,
Germ.; *Ophthalmie*, Fr.; *Ottalmia*, Ital.

CLASSIF.—1. Class, 2. Order (Cullen).
3. Class, 2. Order (Good). III. CLASS.
I. ORDER (Author).

2. DEFIN.—*Pain in one or both eyes, with
vascular injection of one or more of their con-
stituent tissues, and constitutional disorder.*

3. Inflammations of the eye are of various
grades and kinds: they commence in any one of
the different tissues forming the organ; and they
are thus limited more or less, and for a longer or
shorter period of their course, according to the
temperament, habit of body, and diathesis of the
patient; to the state of predisposition, and the
nature of the exciting causes; and to the treat-
ment adopted. Before considering separately the
different varieties of ophthalmia, I shall first take
a general view of their causes; and next of the
numerous forms they present, owing to the varied
concurrence of predisposing and exciting causes.

4. i. CAUSES.—A. The predisposing causes of
inflammation of the eye are nearly the same as
those of inflammatory diseases of other organs.—
(a) *Temperament, idiosyncrasy*, and consequently
hereditary disposition, evidently favour its occur-
rence. The colour of the eye has apparently
but little influence, for Dr. SMITH found the re-
lative proportion of cases in light eyes nearly the
same as in dark eyes.—(b) *Morbid diathesis*,
especially the *scrofulous*, has the most remark-
able effect, and next the *gouty* and *rheumatic*.
These not only dispose to, but also modify, the
disease and its consequences, and require for it
appropriate modes of treatment.—(c) It is diffi-
cult to determine how far *age* and *sex* have any
influence; but advanced age certainly favours
the supervention of chronic inflammation of this
organ.—(d) *Climate* has a much more manifest
effect. The excessive cold, and reflected light,
in hyperborean regions; and the great warmth,
dryness, and reflected heat of some countries,
especially Egypt, Arabia, &c., heightened by the
quantity of fine dust floating in the atmosphere;
not only predispose to, but excite, ophthalmia.—
(e) *Great exertion of the eyes* occasions disease of

them; but chiefly when aided by too full living, by the use of stimulating liquors, and by an improper management of light, in respect both of the object on which the sight is exerted, and of the eye itself.—(f) Various occupations, consequently, are very liable to ophthalmia; as engraving, watchmaking, wool-sorting, and the manufacture of minute objects.—(g) The suppression of accustomed discharges, as of the catamenia and hæmorrhoids, and an impeded return of blood from the head, favour the supervention of inflammation of this organ, by occasioning cerebral congestion.—(h) A plethoric habit, and particularly fulness of blood in the head, are very common predisposing causes; and often exist in connection with the preceding.—(i) Impaired constitutional power is most influential, especially during convalescence from exanthematous diseases.—(k) An unhealthy or cachectic state, owing to impaired digestive, assimilative, and excreting functions, has also a most marked effect, and is often further associated with local or general plethora; particularly in those addicted to spirituous or fermented liquors, or who lead a sedentary and indolent life, or live in close, smoky, crowded, and unhealthy situations, or are subjected to anxiety of mind and other depressing passions.—(l) Too full or rich living, errors in diet, and the inordinate indulgence of the appetites, frequently predispose to ophthalmia by inducing plethora, and consecutively hepatic and cerebral congestions, imperfect secretion and excretion, torpor of the biliary and intestinal functions, and ultimately a morbid state of the circulating fluids and disordered vascular action.—(m) Inordinate indulgence of the sexual propensities has often a powerful influence, especially in connection with any of the preceding causes; the eyes sympathising remarkably with the generative organs.

5. B. The exciting causes of ophthalmia are numerous and diversified. Injuries inflicted on the eye, its appendages, or parts adjoining; wounds of a filament of the ophthalmic branches of the fifth pair of nerves; carious teeth; the presence of dust, or minute foreign bodies, between the surface of the globe and the eyelids; the irritation produced by acrid, stimulating, or chemical bodies, whether in the form of powder, fumes, or vapours; stimulating, acrid, or caustic applications to the organ; operations on the eye, or on adjoining parts; the introduction of contagious secretions, as the gonorrhœal discharge, or the matter of purulent ophthalmia; excessive exertion of the eyes, especially with artificial light, at late hours, or with the head held low, and on bright or minute objects; an impure, smoky, or fuliginous atmosphere, particularly in manufacturing towns, crowded and close streets, confined dwellings, poor-houses, hospitals, and the low cabins of the peasantry; the fogs of large cities, which prevent the smoke and vapours from rising in the atmosphere, and from being otherwise dissipated; exposure of the eyes to cold, or to currents of air; riding in an open carriage, or in a close carriage with the face to the horses and the carriage windows open; and too full living, or the abuse of intoxicating liquors; are the most common causes of ophthalmic inflammations. The eyes, moreover, participate with other parts, frequently in a very remarkable degree, in the inflammatory state characterising the exanthema;

and hence certain specific forms of ophthalmia hereafter to be noticed.

6. The modes in which these causes act are sufficiently obvious: but there are one or two that require a more particular notice. *Exposure to light* is injurious—1st, by its sudden or powerful impression; 2dly, by its combination with heat, as in glass-houses, founderies, forges, &c.; and, 3dly, by being reflected or refracted. Owing to this last circumstance, certain colours, especially red and orange, or the simultaneous impression of a variety of colours, or their rapid succession, irritate the eyes in a very remarkable manner. The reflected light from snow has also a very great effect; and from which the Tartars protect themselves by wearing spectacles of closely netted black horsehair; and the Esquimaux by an excavated piece of light wood, with a narrow slit corresponding with the fissure between the eyelids, and blackened on the inner or concave surface. Reflected light attended by high temperature is equally injurious. The glare from the white chalky roads in some parts during summer, and from the white houses and sandy surfaces of some warm countries, is a very frequent cause of ophthalmia. Another and a hitherto unrecognised cause, particularly of inflammation of the internal tunics, is reading, writing, or otherwise exerting the eyes, by the light refracted by ground glass shades placed around the flame of lamps used for illuminating rooms. About fifteen years ago, I was affected with slight inflammation of the internal tunics of the eye; but having fully ascertained its cause to have been the use of a table-lamp of this description, it soon subsided upon adopting suitable treatment and a different kind of light. I have since had no return of the disease, although I have continued for many years to read or write from eight o'clock in the evening till two or three in the morning.* The intimate vascular and nervous connection of the eye with the brain causes it to participate in several of the inflammatory states of the latter. Hence those causes which excite increased vascular action, or congestions, in the brain or its membranes, both predispose to and excite similar affections of the eye, especially of its internal tunics. In a perfectly healthy state of the system, a single exciting cause seldom occasions the disease, unless its operation be long continued, or very intense. It is the co-operation of two or more causes, or the action of several in quick succession, that is most injurious. But when the system is rendered susceptible of their impression, by the prolonged or continued influence of the predisposing agents, either of the more immediate causes, although acting singly, will frequently take effect.

7. II. THE VARIETIES AND FORMS which inflammation of the eye presents, are very diversified. The severity or acuteness of the symptoms,

* I write, and generally read, at a desk placed sufficiently high to prevent the head from being held low; and use two lamps with single wicks, the flames of which are equal to two large wax candles, and which are raised so high that the eyebrows and eyelids completely shade the eyeballs from the light. These are fed with the finest sperm oil; and, the flame being duly adjusted, they burn eight hours, without any diminution of their light, and without requiring to be once touched. The chief advantages of this light are its softness and clearness, the permanent height at which it remains, and the entire absence of the smallest trouble.

and the *rapidity* of the progress, of ophthalmia, vary from the slightest increase of vascular injection and action, and the most prolonged continuance, up to the most violent and rapid states in which inflammatory action is ever manifested. Hence the conventional terms of *acute*, *chronic*, and *sub-acute* or intermediate, are to be viewed with due latitude as to their import. But ophthalmia, like other inflammations, may be modified in *kind or form*, as well as in *grade and duration*, owing to peculiarity of constitution, morbid diathesis, the manifestations of vital power, and the state of the circulating fluids. Thus, ophthalmia in the scrofulous, gouty, or rheumatic diathesis, is different from that affecting sound constitutions; and that occurring in the course of, or subsequent to, the exanthemata, or during typhus fever, or after the passage of purulent matter into the circulation, is individually different from either of the foregoing, although the grade of action and of vascular injection may be apparently the same in all. I cannot, therefore, agree with Mr. LAWRENCE, when he infers that no such distinctions as *sthenic* and *asthenic* actually exist (*Treatise*, &c. p. 66.). This conclusion is the result of considering inflammation merely as increased vascular action, and without reference to the state of local and general vital power. But the phenomena, the progress, and the results of inflammation, in the various forms and circumstances in which it occurs, as well as the effects of treatment, show, that excited vascular action does not imply increased power; and that the former often exists, not only without the latter, but even with a diminution of it, as fully shown in the articles DISEASE, ERYSIPELAS, FEVER, and INFLAMMATION.

8. Ophthalmia differs in degree, at different periods of its course. Thus, it may be slight and prolonged, and suddenly become most violent, acute, and rapid; or, from the latter, it may lapse into an indolent, slow, or chronic form; owing to various contingent causes, to constitution, and to the treatment adopted. It is also remarkably modified by the tissue in which it is seated; by the nature of the predisposing and exciting causes; by its supervention upon, or complication with, other morbid states, or specific forms of disease; and by the age, habit of body, and regimen of the patient. Out of these circumstances arise the numerous varieties distinctly established by modern writers, and recognised by every observing practitioner, and the arrangements of them adopted in recent systematic works. The importance of divisions of this subject is shown by the different consequences or terminations usually observed to belong to each of the varieties, and by the modified treatment they individually require. Without carrying the subdivision as far as J. FRANK, or too far for practical purposes, I shall *first* consider inflammation of the *external tissues* of the eyeball, *next* those seated in the *internal tissues*, and *lastly* the much more rare occurrence of inflammation of the *whole eye*. In treating of inflammation of each of the tissues, its *common form* will be first described and afterwards those *specific* or modified kinds, it occasionally assumes from peculiarity of cause or of diathesis.

II. INFLAMMATION OF THE EXTERNAL TISSUES OF THE EYE. — I. OF THE CONJUNCTIVA.

VA. — SYN. *Conjunctivitis*, MACKENZIE; *Ophthalmia*, of numerous writers.

9. CHARACT.—Redness, from increased vascularity of the external coat of the eye, with pain, tumefaction, and febrile disturbance of the system; the enlarged vessels shifting their place with the motions of the eyeball or eyelids.

10. The muco-cutaneous membrane that covers the insides of the eyelids, and anterior third of the eyeball, may be inflamed in particular parts, or throughout its extent, in every grade of severity, and for various periods of duration. When this membrane is inflamed, the vessels are comparatively large, tortuous, and of a scarlet colour. They anastomose very freely, or form a network over the white of the eye, and are drawn aside by dragging the eyelids, or moved by rolling the eyeball; whereas, when the sclerotic is inflamed, the vessels are small, straight, of a pink hue, and unsuspensible of motion, either by dragging the eyelids or rolling the globe. When, however, the inflammation is so severe that chemosis exists, or the conjunctiva becomes tumid, and the discharge copious and muco-purulent, this distinction cannot be made, nor, indeed, does it altogether exist, as the inflammatory action from contiguity extends more or less to the sclerotic, and even to the iris and the cornea.

A. MILD INFLAMMATION OF THE CONJUNCTIVA. — SYN. *Catarrhal Ophthalmia*, LAWRENCE; *Conjunctivitis puro-mucosa atmospherica*, MACKENZIE; *Conjunctivitis catarrhalis*.

11. a. I have adopted the appellation employed by Dr. JACOB as the most appropriate; for, although the disease is generally caused by exposure to cold, yet it sometimes also arises otherwise. It is most common in spring and autumn; is sometimes epidemic; affects young persons oftener than adults; and frequently attacks most of the members of a family, or, when it appears in a school, a large number of children. Exposure to currents of cold air, or to the night air; north-east or easterly winds, and other atmospheric influences; damp feet; intoxication; fogs, smoky apartments, irritating vapours; and disorders of the digestive organs; most commonly occasion it. A person who has once experienced an attack, is very liable to a return of it; and I believe, with Mr. MACKENZIE, that, in the most severe cases, when the discharge is puriform, it may be propagated by contagion; the disease then passing into the purulent and severe form.

12. b. *Symptoms*. — This form of ophthalmia seldom extends deeper than the conjunctiva. It may be confined chiefly to the lids (*Blepharoconjunctivitis catarrhalis*); and may affect also the globe (*Ophthalmconjunctivitis catarrhalis*). It commonly commences in the eyelids, or circumference of the globe, and extends gradually to the cornea, with a sense of stiffness, smarting, dryness, and as if dust had got into the eye. The intolerance of light and pain are slight; and the secretion at first is diminished, but it is soon succeeded by watering and increased redness. When more fully developed, the redness is superficial, somewhat irregular, of a bright scarlet; and the enlarged vessels are superficial, and are readily pushed aside by pulling the eyelids. In the most severe and acute cases, the membranes become generally and uniformly red; sometimes with spots of ecchymosis, or with minute vesicles or

pastules near the margin of the cornea. There is very little swelling, and rarely any chemosis. An increased mucous discharge, which is at first thin and colourless, but afterwards yellowish or whitish, proceeds from the inflamed surface; but it is seldom in considerable quantity, unless in the most severe cases, when it is copious and muco-puriform. Inflammatory irritation frequently also affects the lining membrane of the frontal sinuses and antrum, occasioning pain and sense of weight in these parts. The patient complains of chills, of headache, exacerbations of fever, especially towards night, of impaired appetite, and of sickness or disorder of the stomach. The tongue is generally loaded, and the bowels constipated.

13. *c. Terminations and Prognosis.*—The symptoms continue for three or four days; or, under unfavourable circumstances, for a longer time; but they generally yield to treatment, and gradually subside; the secretion becoming more puriform and thick, but less copious, until the affection disappears. If the inflammation be very violent, or improperly treated, or if it occur in the scrofulous constitution, or in persons imperfectly nourished, or of dirty habits, considerable chemosis may ensue, and the sclerotica and cornea may also become inflamed; causing opacity, or even ulceration, of the latter; and giving rise to a copious puriform discharge, capable of propagating the disease, if introduced into the eye of a sound person. When catarrhal ophthalmia has been severe or of long duration, or has frequently recurred, the palpebral conjunctiva experiences change of structure, and becomes thickened, with elevations or granulations on its surface. The lower lid generally suffers most; the granulations being, according to Dr. EBLE, more numerous in the folds of the membrane between the globe and lid, than on the lid itself. Catarrhal ophthalmia, also, particularly in children of scrofulous constitutions, is liable to degenerate into the pustular or phlyctenular form of strumous ophthalmia.

14. *d. Diagnosis.*—The very slight pain and intolerance of light, although the vascularity be great; the superficial and scarlet redness of the membrane; the diurnal remissions, and evening exacerbations; the motion of the superficial and enlarged vessels; and the natural state of the sclerotica; distinguish this variety from common inflammation of the external proper coats, or catarrhal-rheumatic ophthalmia. But the one affection may nearly approximate, or even run into, the other, in the most severe cases. The catarrhal origin, and usually mild character of this affection, and the mucous secretion, are the only circumstances which really distinguish it from purulent ophthalmia; the severer states of the former and the mildest of the latter being so nearly allied that they be justly viewed as merely grades of the same disease.

15. *e. Treatment.*—In the mildest states of the affection, smart purgatives, diaphoretics, and low diet are sufficient to produce a cure. If the tongue be loaded, an emetic is of service. In more severe cases, local depletion, followed by an emetic, purgatives, and diaphoretics, is necessary. Venæsection is required only in the most acute states, occurring in young or plethoric persons, and when both eyes are attacked.

When the affection is connected with disorder of the digestive organs, it is readily removed by an emetic, by calomel and James's powder at night, by an active cathartic the following morning, and by sudorifics, aided by diluents, and warm poppy fomentations to the eye. When the inflammation is considerable, and not readily removed by these means, local depletions should be repeated, a blister applied to the nape of the neck, and purgatives, diaphoretics, and low diet persevered in. I agree with the German writers in considering warm applications to the eye preferable to cold, where the affection is produced by exposure to cold: but, when it is otherwise caused, and when the heat and smarting are considerable, cold washes are agreeable and generally beneficial. When the eyelids are gummed together in the night, a little spermaceti, or any other mild and fresh ointment, should be inserted between their edges in the evening.

16. Mr. LAWRENCE considers that this affection is one of those to which the application of strong astringents is most appropriate, especially if the inflammation do not extend beyond the mucous membrane; and those who more particularly recommend this treatment, believe that it may advantageously supersede general remedies, especially vascular depletion. Mr. MACKENZIE states, that it was most advantageously employed by BEER in 1817. Mr. MELIN directs a strong astringent, consisting of a solution of four grains of lunar caustic in an ounce of distilled water, to be dropped into the eyes twice a day, in the very commencement of the affection, with the view of arresting its progress. Mr. BACOT (*Treatise on Syphilis*, &c. p. 136.) states, that Dr. RIDGWAY originated this treatment, and that he prescribed ten grains of the lunar caustic to the ounce of water; he using this solution in gonorrhoeal, as well as in catarrhal ophthalmia. Mr. MACKENZIE, who appears to have had extensive experience of this practice, employs a solution of from two to four grains of this caustic in the ounce, and applies a large drop of it to the eye once a day; fomenting the organ thrice daily with a lukewarm collyrium consisting of one grain of corrosive sublimate and eight ounces of water. He introduces, at night, between the edges of the lids, a minute portion of an ointment containing a grain and a half of red precipitate to the drachm. Mr. GUTHRIE advises an ointment with ten grains of the nitrate of silver (§ 49.); and Dr. JACOB a few drops of a saturated solution of acetate of lead or of alum, to be introduced between the lids every night and morning.

17. A green shade may be worn before the eyes; but it is not necessary to confine the patient to the house, unless the weather be cold, windy, or rainy. Exposure to a mild atmosphere is advantageous (LAWRENCE).

18. *B. SEVERE INFLAMMATION OF THE CONJUNCTIVA, OR Purulent Ophthalmia.*—Under this appellation I shall comprise those forms of conjunctivitis, whose symptoms are very violent, and whose progress is very acute; the discharge possessing the purulent character. Hence they have received the appellation of *blennorrhœa*, and *suppurative ophthalmia*; the latter term, as Mr. LAWRENCE remarks, being objectionable. *Purulent ophthalmia* generally begins in the linings of

the lids. It soon extends to the conjunctiva of the globe; and, if not checked, to the cornea, which it either injures or altogether destroys. The conjunctiva is swollen and intensely red; the blood-vessels injected and enlarged; and the surface villous, pulpy, or granular. The discharge from the inflamed membrane is purulent and copious. When the disease extends to the cornea, interstitial deposition, causing opacity, and subsequently bursting, sloughing, and ulceration, if the malady proceeds, is a frequent result; prolapsus of the iris, escape of the humours, and collapse of the tunics, being ultimately produced. It is properly seated in the conjunctiva, and often goes through its course without extending deeper, unless the cornea become affected, or ulceration or sloughing takes place, as now stated.

19. *a. SEVERE INFLAMMATION OF THE CONJUNCTIVA OF INFANTS.*—*SYN. Purulent Ophthalmia of Infants; Purulent Eye of Children, WARE; Ophthalmia Neonatorum, Auct. var.; Ophthalmia of new-born Children, MACKENZIE; Blephar-Ophthalmitis glandulosa, BEER.*—The term used by WARE is inappropriate: and that employed by BEER implies that the disease originates in the Meibomian glands, and is incorrect; these glands being merely involved in the severe inflammation attacking the whole of the membrane.

20. *a. Causes.*—Purulent ophthalmia of new-born infants has been very generally imputed chiefly to leucorrhœal discharge in the mother. SCHMIDT, MACKENZIE, and LAWRENCE maintain this opinion; and the last writer refers to cases in which the infant was affected with the disease, owing to the mother having had gonorrhœa at the time of parturition. But these are instances of gonorrhœal ophthalmia in new-born infants, which is a still more severe affection than that now being considered. I have strong reasons for concluding that the disease does not so frequently arise from leucorrhœa in the mother as is supposed; for, in many instances in which I have enquired into the causes, and in two or three where the intelligence of the mothers seemed decisive of the matter, no such disorder had ever been complained of. It should not be overlooked, as Dr. JACOB has, indeed, mentioned, that a mild form of conjunctivitis sometimes attacks very young infants from exposure to cold,—*mild catarrhal ophthalmia in new-born children.* Of this I have seen numerous instances. But the present violent state of disease depends, perhaps, as much upon the predisposition as upon the exciting causes; and there can be no doubt that infants are frequently born of mothers affected by leucorrhœa, or even by gonorrhœa, at the time of parturition, without being infected by purulent ophthalmia.

21. The *predisposing causes* are, delicacy and susceptibility of constitution, premature birth, and whatever depresses the system. The disease is most common in twins and weakly infants; in those newly born; in those subjected to bad or foul air, to cold, and to insufficient or inappropriate nourishment; in those deprived of the mother's care, and of the mother's breast; and in the children of the poor, and the dissolute. It is particularly prevalent and severe in Continental foundling hospitals, where the infant is without maternal care; but it is not very frequent in

lying-in hospitals. LANGENBECK (*Neue Chirurg. Biblioth. b. iii. p. 208.*) states, that in the Lying-in-Hospital of Vienna, where the mothers are generally affected with leucorrhœa and gonorrhœa, but where the infants remain with them, the disease is not common; while in the foundling hospital, where the infants are half dead from cold and starvation when they are received, and deprived of their mothers, it is very prevalent. The *chief causes*, according to my enquiries, are those now stated, exposure to damp and cold air, improper nutriment, and especially the neglect of due ablution immediately after birth. In many of the cases that I have seen, the secretion covering the cutaneous surface in utero, which had not been removed from the eyelids and angles of the eyes, had evidently been the chief cause; and I am convinced that the presence of this matter, owing to the changes it undergoes when allowed to remain in contact with the external surfaces, especially near natural openings, after birth, is much more frequently a cause of purulent ophthalmia, than infection by leucorrhœa, although I do not deny the influence of this latter circumstance.

22. *β. Symptoms and Progress.*—This affection is of the utmost importance, as the majority of instances of blindness is caused by it. In a great proportion of cases it is far advanced before medical aid is required; it being frequently considered, at its commencement, as a common cold in the eye. It generally begins three or four days after birth; but it may occur at any subsequent period; the liability to it, owing to the nature of the exciting causes, being remarkably diminished when the child is some days, or a few weeks, old. In its *first stage*—the *Blepharo-blennorrhœa* of German writers—the inflammation is chiefly confined to the lids; a circumstance further proving its origin in the cause now, for the first time, pointed out. The lids at first stick somewhat together when the child awakes; and their edges are red, particularly at the corners. External redness of them is sometimes, also, observed. The eye is usually closed, from pain occasioned by light. The globe is in a natural state; but the linings of the lids are red and villous, especially the lower, the insides of which are covered with a little white mucus. In the *second stage*—*Ophthalmo-blennorrhœa* of some writers—the inflammation is more severe, and extends to the conjunctiva of the globe. Redness and tumefaction are increased; the lids are swollen and red even externally; and the discharge becomes copious and purulent, agglutinates the edges of the palpebræ, accumulates beneath them, and bursts out between them, and pours over the face. The whole of the conjunctiva is now minutely injected, of a uniform bright scarlet colour, and tumefied; its surface is villous; and its loose folds between the lid and the globe become enlarged, form tumid rolls, and are finely granulated. These folds often evert the tarsi, causing ectropium, which generally subsides with the disappearance of the disease. When the swelling of the lids is great, the upper usually overhangs the lower, and is externally of a bright red. These appearances are aggravated by crying, when the globe is pushed forwards. The discharge is yellowish in various tints; and, in unhealthy or jaundiced children, it is often yellowish green. It is sometimes whitish; and it is

then less abundant and thicker. It is more rarely ichorous or sanious; but it is then thin and ex-coriating. An admixture of blood in the discharge is also rare.

23. Both eyes are usually affected; but the complaint commences generally a few days earlier in one than in the other. The attendant constitutional disturbance is very considerable; the tongue being white and loaded, and the bowels disordered. The infant is restless, feeble, and ultimately, especially if an unfavourable issue has taken place, pale, emaciated, and cachectic. When the disease extends to the conjunctiva of the globe, its *duration*, until either of its bad effects supervene, is various, but commonly from seven to fourteen days. It, however, is sometimes confined, for a considerable time, to the conjunctiva of the lids in a slight or chronic form, before the globe is affected.

24. *γ. Terminations.*—In the course of the disease, it is important that the practitioner should examine the eye so as not to increase the disorder. If the infant be asleep, the tarsus of the upper lid should be pushed very gently and lightly, upwards and backwards; but no further than to obtain a clear view of the cornea. If it be awake, the lids should be separated quickly, whilst it is quiet, and before the muscles can resist. An attempt to see the eye when it is crying is either ineffectual or injurious.—1st. In the less severe cases, and in the more violent attacks, if early and judiciously treated, the tumefaction of the conjunctiva *subsides* gradually; the discharge is lessened, and becomes whitish; and the membrane gradually resumes its healthy state.—2nd. *Opacity* of the cornea may supervene, partially, or generally; and, from interstitial infiltration of lymph, either into the tissue of the corneal conjunctiva, cause a superficial bluish film, or into the laminae of the cornea, produce dense and total opacity.—3d. *Adhesion* of the iris to the opaque cornea may occur, especially when the inflammation has extended throughout the latter, and passed to the iris.—4th. Infiltration of pus between the lamellae of the cornea, or *onyx*, causing *ulceration* of the external lamellae, may take place. The ulceration may be of various extent and depth,—may affect nearly the whole surface of the cornea, or penetrate it, causing prolapse of the iris. This latter may adhere to the ulcerated part, and the ulceration either cease, or extend to the interior of the eye.—5th. *Sloughing* of the cornea, which has been described by SAUNDERS and LAWRENCE, but doubted by MACKENZIE, may supervene, partially or generally. The part becomes dusky, loses its polish and vital cohesion, and assumes a dirty greyish or brownish appearance. A line of separation afterwards forms at the margin, and the dead part is thrown off. The whole cornea may perish thus, and the iris protrude through the aperture, presenting an irregular brownish or dirty prominence; and being either covered by the membrane of the aqueous humour, or nakedly exposed, the humours having escaped. Partial sloughing generally leaves a ragged ulcer, which often extends into the anterior chamber, causing prolapse of the iris. These terminations often quickly supervene and rapidly proceed, in young, feeble, and ill-nourished children, until the humours escape and the eye is destroyed.

25. When the *entire* cornea has either sloughed or ulcerated, and the humours have not escaped, the projecting iris recedes, and becomes covered by an opaque pellicle, the front of the eye being flattened. After *partial* ulceration or sloughing, the iris either adheres to the internal surface of the cornea, or prolapses through the opening; the projecting part gradually subsiding and disappearing, leaving a cicatrix in the cornea. In this case, the iris also adheres to the cornea, and there is change of figure, with contraction of the pupil; vision being either impaired or lost, according to the extent of the change. When *ulcers* of the cornea are spreading, they are of a dusky or yellowish white, irregular in their surface, and often with a ragged edge; but when they begin to heal, they have a greyish or bluish aspect; become smooth, soft, and gelatinous, from deposition of the matter which is to repair the breach; and red vessels pass from the conjunctiva, through the intervening transparent portion of the cornea. They thus heal, leaving a permanent opaque cicatrix (LAWRENCE).

26. *δ. Prognosis.*—Although remarkably violent, this affection readily yields, if treated early, and before the cornea has sustained any injury. The appearance of the discharge often indicates the state of the disease. The whiter and smaller in quantity, the lower is the grade of inflammation. The yellower and more copious the discharge, the more acute the disorder. An admixture of blood in it, indicates a violent state of action; but is not, in itself, dangerous. A thin, ichorous, or sanious discharge, marks the existence of sloughing or destructive ulceration. If there be superficial ulceration without onyx, probably only a slight speck may remain. If the ulceration be deep, permanent opacity will be the result. If the iris protrude, the pupil will be disfigured, and vision more or less impaired. If there be considerable onyx, the matter may be absorbed, or the purulent infiltration may increase, the cornea burst, and the eye become partially or totally staphylo-matous.

27. *ε. Treatment.*—In the most acute cases, when the conjunctiva oculi is bright red and swollen, especially if the cornea looks hazy, or the palpebrae bright red and tumefied, depletion by leeches is requisite. A leech may be placed upon the temple, or, as Mr. LAWRENCE advises, upon the middle of the swollen upper lid; and it will generally procure a sufficient evacuation. If both eyes are affected, one may be applied to each temple or superior palpebra; but in weak infants, the two leeches should be small. If the state of the cornea be doubtful, and vascular action in the conjunctiva still acute, although the lids be not much swollen, nor very red, it will be better to apply the leech. Dr. MONTEATH (*Trans. of WELLER, &c.* vol. i. p. 61.) advises scarification of the inner fleshy and granular surface of the lids, in preference to the application of leeches, the lids being kept everted until a sufficient quantity of blood has flowed, the replacement of them being always followed by arrest of the bleeding. Mr. MACKENZIE directs the immediate application of astringents; but in the more violent cases, before the cornea has been materially injured, the depletion is beneficial. In the less severe attacks, and in feeble

or ill-nourished infants, the astringents about to be noticed may be at once employed. In every instance, purgatives ought to be prescribed. One grain of hydrargyrum cum creta, or of calomel, may be given, with three or four of magnesia or of rhubarb, at bedtime, and a dose of castor oil in the morning. A small blister may be applied on the posterior and middle part of the scalp, as advised by Dr. MONTEATH; but it should be removed in five or six hours, and the part carefully attended to. The eye should be bathed frequently with tepid milk and water, and a little fresh butter, or a mild form of the red precipitate ointment, applied between the edges of the lids at night, to prevent their agglutination, and favour the escape of the discharge.

28. Astringent collyria are more efficacious, and safer in this affection, than in any other, especially when resorted to at its commencement. But in severe cases, when the inflammation has proceeded so far as to endanger the cornea, it will be much safer to premise depletion, than to enter at once upon the use of astringents. Mr. WARE recommends a preparation formed by pouring eight ounces of boiling water on eight grains each of sulphate of copper and Armenian bole, and two of camphor. SCHMIDT prescribes a lotion of two grains of sulphate of zinc, three drops of liquor plumbi super-acetatis, twelve drops of spiritus vini camphoratus, and an ounce of distilled water. Mr. GUTHRIE directs the nitrate of silver ointment (§ 49.) to be applied with a brush over the inside of the lids. Mr. MACKENZIE employs a collyrium of one grain of corrosive sublimate and eight ounces of water, three or four times in the day; and, having washed off the discharge by this lotion, he applies, once, or at most twice, a day, to the conjunctiva, a solution of four grains of lunar caustic, or of six grains of sulphate of copper, in an ounce of water, by means of a camel-hair pencil; preventing the agglutination of the lids by smearing their edges at night with the mild red precipitate ointment (consisting of from twelve to twenty grains of the precipitate to the ounce). Dr. MONTEATH uses a nearly similar collyrium to that prescribed by this writer. Mr. LAWRENCE advises a solution of from two to ten grains of alum in an ounce of water, to be carefully injected between the lids three or four times in the twenty-four hours, so as to wash out the purulent secretion; and afterwards a soft rag, moistened in the solution, to be laid over the eye for a short time; the bowels being regulated by a mild aperient. If there be occasion to change the astringent, he prefers the lunar caustic solution, gradually increasing its strength from two grains to the ounce, to four or six, to be dropped between the lids twice or thrice a day.

29. When the cornea has ulcerated or sloughed, the infant is generally pale, weak, irritable, and restless; and tonics are required. The sulphate of quinine in the form of syrup, and the resinous extract of bark blended in milk, and given every three, four, or six hours, are the best preparations. The solution of the nitrate of silver, or of alum, may be applied to the eye. Opacity of the cornea is generally permanent; but instances of recovery have occurred. M. BILLARD mentions a case in which the recovery was spontaneous.

30. *Purulent Ophthalmia in Children.*—The

treatment just recommended is most appropriate to newly-born infants, or to children of one, two, or three years old. In these latter, and in those somewhat older, the local depletion should be more active, according to their habit of body and strength; and blisters behind the ears are of much service. Blisters, unless employed with caution, and only so far as to produce slight redness, and followed by the application of warm poultices to the part, often are productive of much trouble in young infants; in older subjects, they are more beneficial. In the latter class of patients, vascular depletion, according to the circumstances of the case and of the patient, purgatives, blisters, and astringent applications, constitute the chief means of cure. Purulent ophthalmia introduced in large or crowded schools or foundling hospitals, may spread extensively and prevail long. Mr. MACGREGOR has described its prevalence for some years among the children of the Military Asylum at Chelsea. It was most severe in those having red hair, or of the scrofulous diathesis. It commenced in the eyelids with itching, sticking together of the lids on waking in the morning, followed, in twenty-four or thirty-six hours, by a viscid mucous secretion, extension of the inflammation of the conjunctiva oculi, redness of the skin around the eye, and a purulent discharge. General bleeding, leeching, purgatives, blisters behind the ears and on the nape of the neck, cold lotions, low diet, and, subsequently, astringent collyria, and the unguentum hydrarg. nitratis, at first mixed with twice its quantity of lard, but afterwards of its full strength, applied to the lids by means of a camel-hair pencil, were the remedies found most beneficial.

31. *PURULENT OPHTHALMIA IN ADULTS.*—SYN.

Oph. purulenta or *puriformis*, *Suppurative Oph.*, *Egyptian Oph.*, *ophthalmo* and *Blepharoblennorrhœa*, Auct. var.; *Oph. contagiosa*; *Oph. catarrhalis bellica*; *Blepharitis glandularis contagiosa*, BEER; *Adenitis palpebrarum contagiosa*; *Epidemic contagious Oph.*, ROSAS; *Conjunctivitis puro-mucosa contagiosa vel Egyptiaca*, MACKENZIE; *Purulent Oph. in the Adult*, LAWRENCE.

31. This affection is essentially the same as that just described, as to both nature and seat; it commences and extends in a similar manner, and produces the same ill effects, especially as respects the cornea and iris. Its severity, its serious consequences, its contagious properties, and its extensive prevalence at the commencement of this century, impart to it the highest interest. ASSALINI states, that two thirds of the French army in Egypt were affected with the complaint. Dr. VETCH treated 636 cases, including relapses, belonging to the second battalion of the 52d regiment, from August 1805, to August 1806; fifty having lost both eyes, and forty, one eye: and the ophthalmia depôt, under his able care, contained, in the summer of 1808, upwards of 900 cases. Mr. MACGREGOR mentions that, the returns of Chelsea and Kilmaham hospitals furnished 2317 cases; soldiers who had lost the sight of one eye not being included in the number: and that, from April to December, 1804, nearly 400 cases of this disease occurred in the Royal Military Asylum; and from that time to the end of 1820, upwards

of 900 cases additional, exclusive of relapses, had taken place in the same establishment. About this time it appeared in a large boy's school in Yorkshire; blindness, or serious injury to sight, having resulted in nearly twenty instances.—MUELLER treated 1604 cases, including 200 relapses, in the Prussian garrison of Mentz, during three years and a half: 1344 were restored to the service; fifteen became blind in both eyes; eighteen had vision impaired in both; and twenty-six were blind of one eye,—furnishing the most successful results upon record; but the complaint was more mild than in the British troops.

32. *a. Causes.*—The much discussed question as to the propagation of the disease by contagion* has been fully and ably considered by EDMONDSTON, VETCH, MACGREGOR, GRAEFFE, MUELLER, OMODEI, RUST, LAWRENCE, and MACKENZIE; and completely set at rest by the evidence they have adduced. My limits will permit only a brief view of the matter. It has been contended—1st. That the complaint is produced by atmospheric and other causes, and that it is not contagious;—2d. That, although it arises from these causes, it is contagious;—and, 3d. That it is a *specific* disease, communicable by contact of the purulent discharge, and not arising sporadically from other causes.—One of these opinions must be true; and, if true in all respects, the others must be false. In order to arrive at a correct conclusion, I shall first briefly review the facts adduced in support of the non-contagious nature of the complaint; next, notice those proving its contagious properties; and, lastly, show in what manner and under what circumstances it manifests these properties.

33. 1st. Those who contend that this disease is not contagious, argue that, in Egypt, the

* It may be supposed from the lines in OVID,

"Dum spectant læsos oculi, læduntur et ipsi,
Mutique corporibus transitione nocent."

and the remark in PLUTARCH (L. v. Symp. 7.) as to "the readiness and certainty with which the contagion of ophthalmia spreads amongst persons living together," that the contagious nature of the disease was well known to the ancients. GALEN (*De Differ. Febr. i. c. 2.*) enumerates it amongst infectious maladies; and Rabbi MOYSES (*Aphor. 24.*) avers, that whoever attentively regards inflamed eyes, will contract the complaint. BENEDICTUS FAVENTINUS (*Prax. v. i. sect. ii. c. 2.*) gives it as his opinion, that a morbid effluvia proceeds from the eyes in ophthalmia, which, through the medium of the atmosphere, will affect those that are near. The same opinion is stated by MERCURIALIS (*Prax. lib. i. cap. 38.*). DIEMERBROECK (*Observat. 55.*) mentions the case of a lady who was attacked by the complaint, and two or three days afterwards three of her servants were also seized. He arrested the disorder by the following collyrium:—

R Zinci Sulphatis ʒj.; Sacchari Candi ʒj.; Aquæ Plantaginis ʒij.; Aq. Rosarum ʒj. M.

Similar facts and opinions are to be found in the writings of RIEDLIN (*Curat. Med. Millen. Observ. 187.*), WEDEL (*De Ophthalm. Jenæ, 1684.*), and BOERHAAVE (*De Morbis Nervorum, ii. p. 512.*). Dr. EDMONDSTON has adduced a very striking fact, about to be referred to, from the thesis of a Dr. ARMSTRONG. From this it will appear, that although the contagious nature of the disease was not fully shown, nor generally believed in, until it was demonstrated by Dr. EDMONDSTON, yet it did not altogether escape the notice of writers; some of whom, as DIEMERBROECK, were at a loss to account for the facts they observed; or to explain how a virus could be conveyed, through the medium of the air, from the eyes of the diseased to those of mere spectators. The vulgar belief, however, in its contagious nature, has long subsisted in various countries; but the vulgar judge by results and assemblages of facts, without caring for the explanation, or disbelieving them because they are unable to account for them; and they often judge aright.

country in which it is endemic, and whence it was brought by the European armies invading it at the termination of the last and the commencement of the present century, it was not considered contagious; that this property was not noticed by any of the ancient visitors of that country, or by any who travelled thither before the period now mentioned; and that the army physicians and surgeons, who treated the malady there, did not suppose it to be contagious. ASSALINI, a physician who accompanied the French army into Egypt, denies this property, and refers it to the causes of ophthalmic diseases existing in that country; especially the powerful light and glare from the sandy surface, the dust floating in the air, the night chills and dews following the burning heat of day, and other atmospheric vicissitudes, to which the troops in very active service were necessarily subjected. Hence he, and other army physicians, viewed it as a very acute catarrhal inflammation, affecting those chiefly who were most exposed to these causes. Those who espouse this opinion, further appeal to the alleged fact, that there was no dissemination of it in the families, or districts, to which soldiers or other persons affected by it returned. But this argument is, in my opinion, more specious than correct; for instances were not numerous of soldiers having been dispersed in civil communities with the disease in its early and active stages; and where such occurrences did actually take place, many of the circumstances favouring contagion thereby ceased to exist. But, besides, the results were not altogether such as the non-contagionists have asserted, as exceptions now and then occurred to this broad and incautious statement. The fact noticed by WALTHER, that the complaint seemed to lose its contagious properties when single patients lived in their families, under the ordinary domestic relations, is admitted by him to be weakened by one exception; and is open to the objection just offered. The experiments of MUELLER, who attempted to transmit the disease by applying the matter to the eyes of dogs, cats, and birds, without infecting them, are contradicted by others which succeeded. The experiment of Mr. MACKESEY (*Edin. Med. and Surg. Journ. vol. xii. p. 411.*), who applied the discharge to his own eyes without communicating the malady, only shows that what is known and allowed of other contagious affections also obtains in this, viz. that the state of health, and of the organ of the exposed person, as well as the state of weather, frequently both dispose to, and prevent, the communication of a contagious disease; and that even inoculation will sometimes fail to convey it, owing to these and other circumstances.

34. 2d. Numerous facts have been adduced in proof of the contagious nature of the disease, to which only the most cavilling scepticism can object. Mr. MACGREGOR met with three instances of nurses, in the Military Asylum, having been infected by the accidental introduction of the matter into their eyes whilst injecting the eyes of patients; the affection manifesting itself within twelve hours afterwards in all the cases. Dr. VETCH applied the morbid secretion to the eye of a dog, in which it soon produced great irritation; but the animal was lost before the result could be ascertained fully. RIMA, VA-

SANI, GRAEFFE, and others, produced the disease repeatedly in dogs and cats by the application of matter to their eyes; and M. GUILLIÉ introduced under the eyelids of four blind children the purulent discharge, and the disease was communicated in each instance.

35. But independently of these incontrovertible facts, others equally satisfactory may be adduced. It is not denied that the disease extended from the detachments of the French and English armies which returned from Egypt, to the troops in Italy, Sicily, Malta, Gibraltar, France, and England, which had direct communication with them; the progress of the complaint having been clearly traced from the infected detachments to the fresh troops. The excellent accounts furnished by Dr. EDMONDSTON, VETCH, MACGREGOR, RUST, WALTHER, MUELLER, GRAEFFE, and others, completely demonstrate its spread by contagion, and show that it extends rapidly among soldiers crowded in barracks, using the same utensils and linen, whilst the officers, who live separately, are seldom attacked. RUST states that, in Mentz, which was garrisoned by Prussians and Austrians, it spread extensively among the former; while the latter, who inhabited separate barracks, in a different quarter of the town, entirely escaped. Dr. EDMONDSTON adduces a most conclusive fact. In 1782, the Albemarle ship of war took on board, in the West Indies, three sailors, with inflamed eyes, from a slave-ship, in which the disease prevailed. On the fourth day after their reception, the disorder appeared in the Albemarle; and, by the seventh morning, twenty-two men were unfit for duty. Those affected were now separated from the healthy, and the progress of the malady was arrested, and, in the course of a few weeks, entirely ceased. Similar facts to the above may be adduced; and most of those about to be noticed in illustration of points connected with this subject, fully prove contagion. Numerous instances have occurred in civil life, of the disease extending from one, to all the members of a family; and, in the public service, where the circumstances favouring its spread are more numerous and influential than elsewhere, it has been arrested by separating the diseased from the healthy, and confining each person to his own utensils, cloths, and sponges. Mr. MACGREGOR states that, when the complaint was spreading rapidly in the spring of 1810, among the children of the Military Asylum, those affected were removed into a detached building, so as to cut off the communication between the healthy and diseased; and that it afterwards declined. That it did not arise from the state of the air, or any other general cause, is shown by the circumstance of its prevalence among the boys for nearly a month, before the girls were attacked; and by the fact, that all the adults who did not mix with the sick escaped, while those who were connected with them all suffered, the assistant surgeon excepted. Similar proofs are adduced by RUST, WALTHER, and OMODEI, in the works referred to in the *Bibliography*. Mr. MACGREGOR has given a most convincing account of its extension, by contagion, from two boys, brothers, in the Military Asylum, in his Memoir referred to hereafter.

36. 3d. *The origin of the contagious property, and the manner of, and the circumstances favour-*

ing, its propagation, are matters of great practical importance, as respects both prophylactic and curative measures.—(a) As to the *origin* of the contagion, Dr. VETCH has made an important observation, and one which appears to approach very nearly to the truth. He remarks that, from whatever cause inflammation of the conjunctiva may originate, when the action is of such a nature or degree as to produce a purulent discharge (*Ophthalmia-Blennorrhœa*), the discharge so produced operates as an animal virus when applied to the conjunctiva of a healthy eye. To this I would merely add, of a predisposed or susceptible person.—The opinion of Mr. MACKENZIE agrees with that now stated. He observes, that it scarcely admits of a doubt, that the discharge in *catarrhal* ophthalmia, especially when distinctly puriform, if conveyed by a towel, or by the fingers, to the eyes of other persons, will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects, than was the original affection. He has arrived at this conclusion, from having observed many instances, in which the disease had arisen in one of a family from atmospheric exposure, and several others had become affected, it having been, in the first attacked, comparatively moderate, but, in the rest, much more violent and puriform. Similar facts have been remarked by myself. That the disease may arise spontaneously, and afterwards extend by contagion, is evinced by the following occurrence adduced by M. GUILLIÉ. A French slave-ship left the coast of Africa in 1819, with 160 slaves crowded in the hold. No case of ophthalmia existed among them, nor among the crew, when they put to sea. But fifteen days afterwards it broke out in the negroes, and spread rapidly among them, and subsequently among the crew, twenty-two in number, one only of whom escaped. On their passage across the Atlantic to the West Indies, they met another slave-ship, the crew of which was similarly circumstanced to themselves. Nearly one half of the crew and slaves lost their sight in one or both eyes.

37. (b) As to the *manner* of the propagation of the disease, some difference of opinion is entertained. Dr. VETCH believes that it is not communicable by a contagious miasm conveyed through the medium of the atmosphere; and thinks that direct application of matter is necessary to infection. Mr. MACGREGOR expresses a similar opinion, although many of his facts favour the conclusion at which I shall arrive in the sequel. MUELLER, on the other hand, considers that the contagion is generally conveyed by the air, although it necessarily also admits of being propagated by direct contact; and, in proof of this position, adduces the fact of the medical attendants and nurses, notwithstanding their care to avoid the contact of the discharge, having been frequently affected. WALTHER entertains the same opinion, and appeals to similar facts in support of it. Dr. EDMONDSTON, the first writer who demonstrated the contagious nature of the complaint, and attempted to assign the range and laws of this property in respect of it, considers that it is contagious, not only by the contact of the discharge, but also by fomites, and through the medium of the atmosphere within a limited range, when a number of cases are brought

together, in close apartments or crowded hospitals. Such appears to be the opinion of this able physician, promulgated as early as 1802; and, although not always candidly objected to at the time, and for some years afterwards, it is now confirmed in every respect by the more recent experience of the best writers on the disease in this country and on the Continent.

38. (c) The *circumstances favouring* the diffusion of this contagion are in no respects different from those which promote the spread of other contagions:—1st. Novelty of morbid impression, or the unblunted sensibility and unimpaired susceptibility of those who are exposed to the infectious miasm for the first time; as a person coming out of a pure air into a foul atmosphere or close apartment, or breathing an effluvia to which he has heretofore been a stranger, is much more sensible of its operation, and much more affected by it, than one who has gradually become accustomed to it by frequent or continued exposure.—2d. Whatever increases the discharge, or accumulates or concentrates the emanations from it, and from the diseased organ; as want of ventilation, crowding together of the sick, want of cleanliness, &c.; will greatly increase the contamination of the air more immediately surrounding the patient, and favour the infection of the healthy who are most susceptible, when they approach within a certain limited range.—3d. Whatever multiplies the chances of conveying the morbid secretion directly to the eyes of the sound; as sleeping in the same bed or apartment, using the same towels, sponges, and utensils, and the want of domestic cleanliness; will augment the number of cases.—4th. Whatever depresses the vital powers; as unwholesome diet, insufficient clothing, intoxication, exposure to cold, &c., fatigue, malaria, a confined or foul air, the depressing passions, and venereal excesses; will render persons more susceptible of infection.—And, 5th. Exposure to the more common causes of ophthalmia about the same time as to contagion, or shortly before or after it, will likewise assist or determine its influence.—It is hardly requisite to appeal to facts in support of these positions. The numerous works referred to furnish them in abundance, especially those of EDMONDSTON, MACGREGOR, and VETCH. Mr. MACGREGOR found that the complaint was much more severe and of longer duration in hot and moist, than in cold, weather; and Dr. VETCH ascertained that a humid atmosphere and marshy soil increased both its violence and spread.

39. From the above, it may be *inferred*—1st, that the disease may be produced by common causes, and without the operation of contagion;—2dly, that, when so excited, and existing to such a degree as to give rise to a puriform discharge, it is capable of propagating itself, under favourable or particular circumstances;—3dly, that it spreads, not only by contact, but also through the medium of the atmosphere, within narrow limits; more especially when numbers affected by it are crowded together, and the air is humid or impure, and those exposed to the contagion are predisposed by the operation of the causes mentioned above (§ 4.). Hence its remarkable virulency in ships, particularly transports, slave-ships, barracks, prisons, workhouses, and schools; and it therefore should be referred to the *second*

category, stated at the commencement of the enquiry (§ 32.).

40. *3. Symptoms and Progress.*—The symptoms succeed each other with different degrees of rapidity and severity, even in persons suffering from the same infection, and in the same place, owing to the previous health, the habits, and constitution of the patients. The disease is more mild in females than in males; and it is more violent about the period of puberty than at an earlier or later age. It has also been more severe in one place, or regiment, than in another; and it was evidently more violent among the British troops, than among the French, Germans, or Italians, owing most probably to the more phlogistic diathesis and robust constitutions of the former than of the latter, and to their fuller living and greater intemperance.

41. (a) *The more acute and violent states.*—In its *first stage*, the complaint is confined to the palpebral conjunctiva; and is attended by stiffness of the lids, itching or watering of the eye, a sense of sand or some foreign body below the lids, succeeded by sticking of them together, on waking from sleep, and greater fulness of them externally than usual.—It is seldom seen by the physician at this period; or until it has advanced to the conjunctiva oculi, or its *second stage*. This membrane then rapidly becomes bright red, remarkably vascular, and greatly swollen; the chemosis being sometimes such as to conceal the cornea. Patches of ecchymosis are also seen, and the whole palpebræ are much tumefied, and occasionally also red externally. The discharge is profuse and purulent, often in a few hours from the commencement, but always soon after the inflammation has extended to the globe; and sometimes it is so copious as to pour over the face and clothes; but there is no secretion of pus in the chambers. In this stage, the pain becomes severe, seated deep in the eye, and attended by a sense of a foreign body in the eye, of fulness or great distension, with throbbing in the temples, and headache. These symptoms, especially the pain, often remit, or occur in paroxysms, or return after having been removed for a time. The *constitutional disturbance* is not severe; the pulse, tongue, and appetite, not being materially affected. The cornea is liable to the same effects as have been described above (§ 24, 25.); but the swelling of the lids, and the tumefaction and overlapping of the conjunctiva, and the accumulation of pus over the cornea, or in the depression of which it forms the bottom, frequently prevent its state from being ascertained.—In the *third stage*, the symptoms gradually subside; the swelling, pain, and discharge are diminished; the external tumefaction is lessened; and the lids, which before were somewhat inverted, from the cartilages not yielding, are now slightly everted, especially the lower. As the discharge diminishes, it gradually loses its purulent characters, and becomes thinner, more mucous, or gleet. The internal surface of the eyelids, the semilunar membrane, and caruncula lachrymalis, which were the first parts affected, are the last from which the disease disappears. The right eye is more frequently, and generally more severely, attacked than the left; and its sight oftener lost. In some cases, only one eye is affected; but commonly both are seized, although an interval

of several days occur before the second becomes inflamed. Such are the features of this disease as it prevailed in the British army, and as it sometimes occurs in civil life under certain circumstances.

42. (b) *The milder or chronic states.*—These were most common on the Continent, both in the army and in civil society. Mr. MACGREGOR, Dr. VETCH, Professor WALTHER, and Dr. MUELLER, particularly the last, have pointed out, not only the origin of the complaint, in the conjunctiva of the lids, but also its long persistence in this part, in some cases, and its entire limitation to it, in others. In all the grades, the inflammation both begins and terminates in it. — In the *slightest grades*, the patient complains of pressure or uneasiness, with a sense of dust or sand, in the eye; but without redness of the globe, or of the external surface of the palpebræ. The conjunctiva tarsi is villous and dark red; but towards the globe it is smooth, and its vessels distended. The eyeball has an irritated appearance: there are an increased flow of tears, and a mucous secretion, but little or no pain. The disease may continue long in this mild form, or may yield to treatment in two or three weeks; or it may pass into a higher or severer grade. — The *second or intermediate degree* may be an aggravation of the first or slightest grade, or may commence with all its characteristic features. The conjunctiva of the lids has a granular appearance, which becomes more conspicuous when the inflammatory tension is abated, and is swollen, dark red, and covered by a puriform secretion. The lids are tumefied; the pain is considerable, and as if caused by a foreign body. This form may continue for weeks or even months, and pass into the severe or acute state already described (§ 41.), owing to atmospheric changes or other causes; unfavourable consequences to the organ supervening sometimes in twenty-four or thirty-six hours.

43. (c) *The alterations* which the conjunctiva undergoes are of much importance. In the mildest grade, the membrane appears as if covered with dust, or velvety; in the severest degrees, it seems strewed with rough bodies, or with granulations, resembling those of a healing wound. These bodies exist in great number, arise by a broad basis, and have a round prominence at first, which becomes flattened or angular, by pressure against the globe. The largest of them are in the middle of the lid, the smallest at the edge and near the angles. They are sometimes crowded very close, and are most remarkable in the upper lid. Their colour varies from the darkest blood red to the palest brick hue. MUELLER considers this change of structure not as a mere effect of inflammation, but as proper to the disease, and as connected with the production of the contagious secretion disseminating the complaint.

44. *γ. Consequences.*—1. *Suppuration of the Cornea*, and destruction by ulceration, sometimes supervene; the progress of the disease usually leading to the escape of the humours, and collapse of the globe.—2. *Ulceration* frequently takes place, to the extent, and in the manner, described above (§ 24, 25.).—3. *Sloughing of the cornea* rarely or never occurs in this variety. Mr. LAWRENCE has not met with it, and other writers do not mention it.—4. *Bursting of the cornea* is less rare, particularly during suppuration or

ulceration. Dr. VETCH met with cases, in which the rupture occurred without previous change; the aqueous humour having escaped by a clear division or rent in the cornea, which afterwards became opaque, and projected around the opening; but this occurrence is very seldom observed.—5. *Interstitial deposition* in the conjunctival covering, or the corneal laminae, occasioning opacity of every degree; the slighter grades often disappearing after recovery.—6. *Loosening or thickening of the mucous membrane* covering the cornea, with enlargement of its vessels, and diminution of its transparency.—7. *Opacity* from cicatrization of ulcers.—8. *Prolapse of the iris*, partial or total (*Staphyloma racemosum*).—9. *Adhesion of the iris to the cornea* (*Synechia anterior*), either with or without prolapse.—10. *Staphyloma*, general or partial, or other changes, from extension of the inflammation to internal parts of the organ.—11. *Weakness or irritability of the eyes*, which usually disappears sooner or later.—12. *Impaired vision* (*Amblyopia*), arising from numerous causes; as turgidity of vessels in the orbit, and surrounding the optic nerves; slight alterations of the choroid, retina, or lens; and lesions within the cranium.—13. *Thickening, induration, and granulation of the conjunctiva of the lids*.—14. *Temporary and permanent ectropium and entropium*.—And, 15. *A great tendency to relapse*, upon exposure to very slight causes. This last especially occurs, when the palpebral conjunctiva has not been restored to its natural state,—a result not readily attained after severe or prolonged attacks, and which WALTHER doubts ever to be entirely accomplished. Hence a person may be considered as cured, but experience a return of the complaint, from exposure to cold or intoxication, and may spread the disease in the family in which he resides.

45. *δ. Diagnosis.*—Purulent ophthalmia in the adult may be mistaken for the *catarrhal* and *gonorrhæal* varieties. The peculiar change in the palpebral conjunctiva, the great chemosis and swelling of the lids, the extreme redness and vascular congestion, the profuse purulent discharge, the long continuance of the complaint, its tendency to affect the cornea, and the disposition to relapses, sufficiently distinguish it from *catarrhal* or mild ophthalmia. Nevertheless, the mildest cases of the former, and the severest of the latter, hardly differ in any respect. The specific cause and nature of *gonorrhæal* ophthalmia, and its uniformly acute and violent form, distinguish it from the purulent variety. There are, besides, other differences, which will be noticed hereafter (§ 59.).

46. *ε. Treatment.*—(a) *Of the most acute, or highest grade of the disease.*—The intention should be to arrest the violence of the inflammation, and prevent the extension of it to the cornea. If the patient be seen sufficiently early, or before the conjunctiva oculi be much inflamed, or chemosis have appeared, the treatment advised in *catarrhal* ophthalmia will generally succeed. But, if the disease be thus far advanced, and has assumed a severe form, the most active antiphlogistic means ought to be resorted to. VETCH, MUELLER, RUST, WALTHER, LAWRENCE, and other experienced writers, recommend *venesection* carried at once sufficiently far to produce a decided effect upon the circulation, without regard

to the quantity abstracted. Drs. EDMONDSTON, MACKENZIE, and JACOB place much less reliance upon large general bloodlettings, which have but little effect upon the local inflammation. This opinion coincides with the result of my own limited experience. Dr. JACOB has seen the abstraction of blood carried to the utmost extent; "he has seen repeated bleedings of forty, fifty, and even sixty ounces, and streams flowing from the arm and temporal artery at the same time, without generally beneficial results." After one full bloodletting, these writers coincide in trusting chiefly to *local depletions*, by cupping in the temples, by the application of from twenty to thirty leeches over the cheek-bone and temple, and by *scarifications* of the inflamed conjunctiva. This last is advised chiefly by Dr. EDMONDSTON and Mr. MACKENZIE; but it is objected to by Mr. LAWRENCE, on the grounds that the wounds thus inflicted increase the local irritation; in the most severe cases, however, the advantage accruing from the practice far outweighs any inconvenience contingent on it. Mr. MACKENZIE places scarification of the conjunctiva among the most effectual means of combating the contagious ophthalmia; but makes no mention of Dr. EDMONDSTON, who, many years before, strongly insisted on this practice. When the chemosis is great, SCARPA and WALTHER recommend a portion of the conjunctiva to be cut out, either from the eyelid or the globe; several drachms of blood usually flowing from the incision, with great relief to the symptoms. When the tumefaction is such as to project the membrane between the lids, or to overlap the cornea, Dr. JACOB directs an extracting knife to be run from one end of the tumour to the other, the effused serum and much blood generally escaping by this means.

47. Having practised bloodletting so as to make an impression on the circulation, conformably with the principles espoused in other places (see BLOOD, § 64, 65.), and immediately afterwards applied leeches, or scarified the conjunctiva, according to circumstances, full doses of *calomel*, *antimony*, or James's powder, and *opium*, conjoined, should be immediately taken, and followed, in a few hours, by a brisk *purgative*, and this latter, by a *cathartic* enema. If the *calomel*, *antimony*, and *opium* have been exhibited for the first time in the morning, they may be given again at bedtime, if the case be very acute; the cathartic being repeated at an early hour in the morning. If the tongue be loaded, or the stomach disordered, an antimonial *emetic* should follow the bloodletting, and precede the medicines now directed, which should be given soon after the full operation of the emetic, and repeated according to their effects. Having thus acted upon the circulation and the *prima via*, without materially diminishing the local action and pain, *diaphoretics* and *nauseants* may be resorted to. Full doses of DOVER's powder, or *antimony* conjoined with *opium*, promoting their operation by *diluents* and *pediluvia*, will generally be of much service. Nausea kept up by these medicines is sometimes of use, in the more severe or obstinate cases, before the cornea is affected; but under other circumstances, it is seldom beneficial. The same remark is applicable to mercury exhibited with the intention of

affecting the system. The most efficient and certain derivative cathartics, in this disease, are equal quantities of castor oil and spirits of turpentine, the same being exhibited in enemata (F. 151.); but they should not supersede the other means. The antiphlogistic treatment ought to be strictly enforced in an early stage of the disease, particularly in robust, phlogistic, and well-fed persons. In the *dark-skinned races*, as well as in persons of relaxed or cachectic habits, bloodletting is injurious; and even local depletions should be cautiously prescribed.

48. The *local Treatment* is even more important than the constitutional. After local bleedings, the frequent application of cloths moistened with *cold water*, or vinegar and water, and, when the headache is urgent, or the chemosis great, the *cold effusion* on the head, repeated twice or thrice daily, are favourably mentioned by WALTHER, VETCH, GERICKÉ, and LAWRENCE. If the cold applications cannot be borne, or if there be spasm of the lids, *warm fomentations* may be used for a short time; but they should not be long persisted in, or too frequently repeated, unless they be alternated with astringents. *Tepid ablution* is, however, both serviceable and requisite. Cold or warm applications should, therefore, be employed according to circumstances. Mr. TRAVERS prefers those that are tepid, in the painfully acute stage. Whichever be adopted, ought to be carefully attended to by the practitioner himself. As soon as the conjunctiva becomes somewhat paler, or appears flabby, *astringent applications* ought no longer to be withheld. In relaxed habits they should be very early applied, or immediately follow the local depletion. Mr. MEELIN and Dr. O'HALLORAN, from having been dissatisfied with the antiphlogistic treatment, were led to the use of powerful astringents, not only in the first stage, but also when the purulent discharge and chemosis were fully established. Dr. O'HALLORAN used, once a day, either the sulphate of copper in substance, rubbing it on the inner surface of the eyelids after everting them; or the nitrate of silver, dropping a ten grain solution of it on the eye. He also applied fomentations, and gave purgatives. If the symptoms indicated the extension of the inflammation to internal parts of the eye, then only he directed leeches.

49. Mr. GUTHRIE, considering the nitrate of silver in solution to be ineffective, in the most severe cases, recommends an ointment, made with ten grains of this salt, reduced to an insipid powder, and thoroughly incorporated with a drachm of lard, to be inserted between the lids. The eyes ought previously to be well cleansed with a tepid solution of alum; and when the ointment is inserted, the lids are to be moved freely, so that the whole conjunctiva receives it. If the membrane become white, it is satisfactorily applied; if not, the ointment should be rubbed on the inside of the lids. He also directs the patient to be bled fully, and until an impression is made upon the pulse; he employs warm narcotic fomentations to the eye; exhibits an opiate internally; injects, from time to time, a weak solution of alum under the lids, to wash away the discharge; and applies a mild ointment to them at night, to prevent their adhering together. The next morning, the discharge is again

to be removed, and the strong ointment re-applied, so that the new action that should be set up may not cease; the other remedies are likewise to be continued. In addition to these, he gives calomel and opium, so as to affect the mouth; and the other more common remedies.

50. As different writers prescribe different astringents, and of various grades of strength, it were desirable that some more precise knowledge were attained as to which is the safest and most efficient. Dr. JACOB, after passing acetate of lead, alum, sulphate of copper, sulphate of zinc, corrosive sublimate, and lunar caustic, in review, decides in favour of the undiluted liquor plumbi acetatis, and strong solutions of alum, or of the nitrate of silver; which, however, he recommends after the painfully acute stage has passed, and in the chronic or atonic state of the complaint. Mr. MACKENZIE directs a tepid solution of one grain of corrosive sublimate in eight ounces of water, to be injected under the lids, for the purpose of cleaning the eyes; and, as an astringent, four grains of the nitrate of silver, or six of the sulphate of copper, dissolved in an ounce of distilled water. The solution of alum, or of the oxy muriate of mercury (j.—ij. gr. to 3 j.) may likewise be tried. MUELLER prescribes one, two, or three drops of sulphuric acid, or two or three grains of acetate of copper, in an ounce of water. Mr. BRIGGS states, that a minute quantity of the oleum terebinthinæ introduced between the lids every morning, on the point of a camel-hair pencil, the eye being afterwards bathed with cold water, is most efficacious in checking the profuse discharge.

51. It will be observed, from the foregoing, that some difference of opinion exists as to when the use of active astringents should be commenced. The majority of authorities, as EDMONDSTON, VETCH, MACKENZIE, LAWRENCE, JACOB, &c., resorting to local depletions, and soothing or anodyne applications, in the early, acutely painful, or active inflammatory stage, and to strong astringents, when this stage is removed, and the chronic or atonic condition has commenced; whilst some military authorities, as MELIN, O'HALLORAN, and GUTHRIE, advise the adoption of powerful astringents from the beginning. I agree, however, with the former; and with them consider, that the effects of astringents should be carefully watched, when early, or even at first employed; and, if the redness be increased by them, that they should be laid aside for a time, and antiphlogistic remedies adopted. The citrine or red precipitate ointment should be applied to the edges of the lids at night.

52. In the dark races, astringents ought to be early and energetically employed. Among the negro tribes, vegetable astringents and stimulants, especially lime-juice, are entirely confided in. The astringents above noticed are, however, equally appropriate in them; and the addition of anodynes, particularly opium and camphor, is also of service, with pure air, and suitable diet.

53. Blisters to the nape of the neck or behind the ears, are sometimes serviceable, especially when kept open for some time. When the pain is very distressing in the acute stage, relief is afforded by the steam of hot water, to which laudanum and camphor have been added; and the vinum opii is often a useful application, when the conjunctiva

is relaxed and painful upon the disappearance of the discharge. Evacuation of the aqueous humour by incision has been recommended by Mr. WARDROP, in order to remove the bursting pain in the eyes and forehead, and practised in twenty-three cases by Mr. MACGREGOR, from a dread of rupture of the cornea. In the advanced stage of the disease, exercise in the open air, exposure of the eye to as much light as it will bear, and the use of gentle tonics, with a free state of all the excretions, are serviceable. If, after depletions, the eye becomes irritable, or the pain intermittent or periodical, the preparations of bark, with the mineral acids, as MUELLER advises, will be of benefit. If ulceration of the cornea have commenced, a tonic and stimulating treatment is required, especially if it spread and be attended by debility. When ectropium of the lower lid remains after the inflammation is gone, and presents a red fleshy mass, Mr. LAWRENCE directs the application of the nitrate of silver in substance to it.

54. (b) Treatment of the milder grades.—If the inflammation have extended to the conjunctiva oculi, however slight, local depletion, low diet, and purgatives should be directed. When active disorder is removed by these, the application of astringents to the diseased surface of the eyelids should be entered upon, and continued until the morbid state of this part described above (§ 43.) is entirely removed. The solution of alum, or of nitrate of silver, or of sulphate of copper, the strength of which should be gradually increased, or the undiluted liquor plumbi, ought to be dropped into the eye, once or twice a day, the citrine ointment being applied to the margins of the lids at night. Exercise in the open air, free exposure of the eyes, and due regulation of all the natural functions, are beneficial. MUELLER recommends mercurial ointments to be rubbed over the diseased surface of the lids once or twice daily.

55. When the palpebral conjunctiva becomes altered, or granulated, in the chronic state, as above described (§ 43.), very active local means are necessary, as the irritation occasioned by the morbid surface produces vascularity and opacity of the cornea, or loosening and thickening of its conjunctival layer—or pannus. With the change in the surface of the eye-lids, may be associated some one of the unfavourable results of the more violent attacks, as leucoma, synechia anterior, staphyloma, &c.—Mr. LAWRENCE remarks that, if the globe be free from irritation, the astringents already specified, particularly a solution of twenty or thirty grains of nitrate of silver in an ounce of water, should be applied to the granulated surface, with a camel-hair pencil; the lids being everted. If this be not sufficient, escharotics, beginning with the weaker, and proceeding to the strongest, must be used. In order to prevent their injurious action on the conjunctiva oculi, the lids should be everted, the diseased part only touched, and they ought to be kept everted until the effect is produced. The acetate of copper, the sulphate of copper, or the nitrate of silver—the strongest—should be lightly applied to the granulated surface, previously freed from moisture; and, after waiting a minute or two, the lid should be carefully washed and restored. These applications cause severe pain

redness, and swelling, with increased discharge, and should not be repeated until these effects have disappeared, which may not take place for five, seven, or eight days. In the intervals of the escharotics, some astringent solution may be applied. Mr. LAWRENCE and Professor WALTHER do not speak very favourably of this plan; and are more disposed to depend upon antiphlogistic means in the first instance, and the subsequent use of astringents, as above directed, with regulation of diet and of the digestive organs, residence in a pure air, exercise, and a moderate use of the organ. Rapid improvement, Mr. LAWRENCE states, sometimes has followed the substitution of soothing applications for strong astringents.

C. GONORRHOEAL OPHTHALMIA.—SYN. *Gonorrhœal Inflammation of the Conjunctiva; Specific Ophthalmia; Conjunctivitis specifica; Ophthalmia Gonorrhœica vera*, BEER.

56. This is a violent inflammation of the mucous membrane of the eyelids and globe, attended with a profuse discharge of a fluid closely resembling that which issues from the urethra in gonorrhœa, and occurring in some kind of connection with that complaint. — It is the most violent and rapidly destructive inflammation to which the eye is subject; fortunately it is one of the most rare. It sometimes destroys the eye within a very short time; or irreparably injures it before medical aid is resorted to, especially in the lower classes. Mr. MACKENZIE divides it into — 1st, that from inoculation; 2d, from metastasis; and, 3d, without inoculation or metastasis. Mr. LAWRENCE distinguishes three forms:—*a*. Acute gonorrhœal inflammation of the conjunctiva; — *b*. Mild inflammation of this membrane; — and, *c*. Gonorrhœal inflammation of the sclerotic coat. I shall here consider chiefly the former; the third form being merely rheumatic ophthalmia, occurring, like other rheumatic affections, in connection with gonorrhœa.

57. *a*. Symptoms and Progress.—Acute gonorrhœal ophthalmia presents all the fully developed characters of purulent ophthalmia. Mr. LAWRENCE distinguishes three stages; which, however, are not very clearly evinced, although the division is judicious. In the *first stage*, which is short, the inflammation is confined to the conjunctiva, and is attended with a sensation of sand in the eye, and soreness, stiffness, uneasiness on exposure to light, and a thin whitish mucous secretion. Extreme vascular congestion, intense and general redness, excessive tumefaction of the conjunctiva, great chemosis, and swelling of the lids, supervene; especially as the disease approaches the *second stage*, which is characterised by a profuse discharge of thick yellow matter, closely resembling in its appearance, and in the stain it communicates to linen, the gonorrhœal secretion. When the discharge is established, the inflammation causes effusion into the cellular tissue connecting the conjunctiva to the surrounding parts. Hence the very remarkable chemosis, which is sometimes so extreme, as to overlap or hide the cornea; and the palpebral swelling and enlargement, which is occasionally very great. The affection soon extends to the cornea, constituting the *third stage*, with agonising pain in the globe, orbit, and head, augmented on exposure to light, and attended by

symptomatic inflammatory fever. The danger to the organ is now most imminent. The swelling of the lids and chemosis render it difficult, or even impossible, to obtain a view of the cornea. When this is the case, attempts to attain this end should not be made so as to increase the symptoms. Although pain is most acute in both the eye and head, as in other instances when the unyielding cornea is the seat of inflammation; and although patients often complain of burning pain, of tension as if the eye would burst, with deep-seated suffering extending to the brow, forehead, and head, there are some instances in which little or no pain is felt. The symptoms are, however, not equally violent through the whole course of the complaint; and the *duration* of the *stages* varies with the constitution and health of the patient, and the treatment adopted. The *first* and *second*, particularly the first, usually passes away rapidly.

58. *b*. Consequences.—The immediate effects of the inflammation on the cornea are sloughing, suppuration, ulceration, and interstitial deposition; these changes leading to escape of the humours and collapse of the globe, obliteration of the anterior chamber, and flattening of the front of the eye, staphyloma, prolapse of the iris, obliteration of the pupil, opacity of the cornea, and anterior adhesion of the iris. Sufficient notice has already been taken of each of these lesions; as they do not differ from those supervening upon the other varieties of purulent ophthalmia, although they more rapidly appear, and in severer forms, than in them.

59. *c*. Diagnosis.—The severest grade of purulent ophthalmia closely resembles the acute gonorrhœal. In the latter, however, the swelling of the conjunctiva oculi is greater, and that of the eyelids somewhat less, than in the former. The discharge, however, is thicker, and perhaps more abundant, and the constitutional disturbance greater, in the gonorrhœal, in which the peculiar granulated change of the conjunctiva of the lids does not occur. In purulent ophthalmia, the disease begins in the lids, and advances gradually; but in the gonorrhœal, it seems to commence in the conjunctiva oculi: in one case, Mr. LAWRENCE saw it distinctly begin there; and it attacks most violently and proceeds most rapidly. The former generally continues long, affects both eyes, remits, or returns, rarely destroys the eye by sloughing, and is much less destructive: whilst the latter more frequently affects only one eye, and the cornea is much oftener destroyed by sloughing. This disease is uncommon, occurs in single instances, and in persons who have had, or who still have, gonorrhœa; whilst purulent ophthalmia usually affects numbers, particularly when many live together.

60. *d*. Prognosis.—Nine cases out of fourteen related by Mr. LAWRENCE in his treatise on this disease, were seated in one eye; out of the fourteen, loss of vision took place in nine cases from sloughing, suppuration, or opacity of the cornea. In two cases, one eye was lost and the other recovered. Sight was restored in the other five, with partial opacity of the cornea and anterior adhesion of the iris in three of the number. This writer adds, that so short a period intervenes between the commencement and full development of the complaint, that irreparable mischief

is generally done to the eye before aid is resorted to. In the *first* or *second* stage, its progress may be arrested; but success even thus early must not be reckoned upon. If the cornea still possess its natural clearness, the eye may be saved; but if it have become hazy or dull, and particularly if it be white or nebulous, serious consequences will ensue. Sight may, however, be restored after partial sloughing of the cornea; and ulceration may occur in its circumference without injury to vision. When both eyes are successively attacked, the disease is often less severe in the second, which, therefore, is saved; but exceptions to this occasionally occur, the sight of both being lost.

61. *e. Causes.*—Dr. VETCH found that the matter of acute purulent ophthalmia, applied to the urethra of the same individual, excited no disease; but that, when it was applied to the urethra of another person, it produced a virulent gonorrhœa: he therefore infers that the matter from the urethra, coming in contact with the eye of the same individual, would not occasion gonorrhœal ophthalmia. But Mr. MACKENZIE, Mr. LAWRENCE, and Dr. JACOB, adduce cases from their own practice, which were produced in this way, and refer to others from WARDROP, ASTRUC, ALLAN, and FOOT. It has been incidentally mentioned by SCARPA and BEER, that gonorrhœal matter applied to the eye excites only slight inflammation; but they do not refer to the source whence it was derived—whether from the same person or from another. The cases observed by LAWRENCE and the other writers just mentioned, show that this statement does not hold in respect of the same person, and that he may infect himself, although such infection is not so frequent, as the inattention of gonorrhœal patients, particularly in the lower classes, would lead us to expect; and the experience of WARDROP, DELPECH, BACOT, ALLAN, and MACKENZIE fully proves that the disease may be caused by the application of gonorrhœal matter from a different person, although, for obvious reasons, this cannot be a frequent occurrence. It is, therefore, placed beyond doubt, by the cases observed by the above writers, that the complaint may be caused by the contact of gonorrhœal matter—1st, from the same individual, and, 2dly, from another. But as, in the greater proportion of cases of gonorrhœal ophthalmia, no application of matter, either from the same or another individual, can be traced, in what other way does the disease arise? It has been very generally imputed to metastasis in all such; and the discharge from the urethra has been said to be suppressed by ST. YVES, RICHTER, SCARPA, and BEER, but erroneously, as contended by DELPECH and LAWRENCE. In the cases which this last writer has recorded, the discharge was not stopped in any one, although it was generally lessened, but in some not at all. He therefore concludes that, since the complaint may occur while the discharge from the urethra continues, and since it does not take place when that discharge is stopped, we cannot admit that it owes its origin to the cessation of the urethral discharge. This supposed metastatic form he refers to the state of the constitution, considering it as analogous to those successive attacks of different parts which are observed in gout and rheumatism; and he

remarks that, although direct infection operates equally on the eyes of both sexes, this particular form seems confined to the male. BEER says that he has observed it only in young, robust, and plethoric men.

62. *f. Treatment.*—The antiphlogistic plan, and particularly vascular depletion, has been carried to the utmost extent, sometimes with complete, but as often with only partial, success. Of six cases which Mr. LAWRENCE saw at an early period, and treated by *extensive depletion*, general and local, loss of the eye occurred in one only,—a most satisfactory evidence of the propriety of the practice. But whenever the disease comes late under treatment, no plan can succeed, so violent and rapid is the disease. The application of strong *astringents* and *escharotics* to the eye, in order to arrest its progress, has been advised, as its consequences have been so destructive to the organ; and the nitrate of silver ointment, already described (§ 49.), has been recommended by Mr. GUTHRIE. The success of this practice in the severe purulent ophthalmia, warrants its adoption in this; and active depletions, found so successful by Mr. LAWRENCE, in an early stage, may precede it. One circumstance, however, may militate against our inferences in favour of it, namely, the original and principal seat of disease being in the palpebral conjunctiva, in purulent, and in the conjunctiva oculi, in gonorrhœal, ophthalmia, the pathological states are not therefore the same in both. Notwithstanding, both modes of practice may be conjoined with advantage, as Dr. JACOB suggests. The oleum terebinthinæ, dropped into the eye, is deserving of trial.

63. Large and repeated *bloodlettings* from the arm or jugular vein, followed by local depletion and the remedies above advised (§ 62.), are, in the present state of our knowledge, most to be depended upon. But if sloughing or suppuration of the cornea have occurred, this treatment will be of no service. Mr. LAWRENCE has seen mercury employed without any advantage, and he places no reliance on the reproduction of the urethral discharge, as advised by RICHTER, SCARPA, and BEER. He also thinks *blisters* to be of little use. The eyes should be very frequently cleansed by the usual means. When the inflammatory symptoms have been completely and quickly subdued, the effects will pass off in a little time without astringents and tonics; but when the conjunctiva becomes pale and flabby, and the patient pallid and weak, the purulent discharge being still abundant, *astringents* locally, and *tonics* internally, are usually recommended. When sloughing or ulceration of the cornea is attended by signs of great depression, *quinine* and *generous diet* are necessary, and *astringent lotions* are sometimes of service. Mr. LAWRENCE prefers a solution of from two to ten grains of alum in an ounce of water, the solution of the nitrate of silver, and undiluted liquor plumbi acetatis.

64. *g. Mild gonorrhœal Inflammation of the Conjunctiva.*—Mr. LAWRENCE has described a very slight variety of gonorrhœal ophthalmia, consisting of external redness of a bright scarlet tint, with distension of the superficial vessels of the globe, and increased mucous secretion. In still slighter attacks, the redness is not deep nor gene-

ral, the membrane is not swollen, the secretion is but little increased, and the pain is trifling. The severer grades of this form approach to those of acute purulent ophthalmia, the conjunctiva being red throughout, tumefied, and secreting a copious yellow mucous matter. These milder states of the disease usually occur in patients with gonorrhœa of a rheumatic or gouty diathesis, and most frequently in conjunction with rheumatic affections consequent upon the gonorrhœal disease of the urethra.

65. *h. The Treatment* consists of antiphlogistic remedies, co-ordinate with the severity of the attack, and the strength of the patient; followed by astringent applications—the best of which, in the opinion of Mr. LAWRENCE, is the solution of lunar caustic.

66. *D. PUSTULAR OPHTHALMIA—Pustular Inflammation of the Conjunctiva.*—*a.* Inflammation of the conjunctiva, with small *pustules*, or *phlyctenulae*, sometimes occurs from cold or other causes, and resembles, in its appearance, and occurrence chiefly in persons before puberty, the strumous form of the disease. But it is met with in those who are not strumous; and it does not exhibit the other symptoms of scrofulous or catarrhal ophthalmia: it therefore constitutes a distinct variety. It is characterised by distended fasciculi of vessels upon the conjunctiva, which run towards the cornea, either terminating at its margin, or extending a short way over this boundary, and there form a small reddish or whitish elevation. This elevation contains, at first, a little watery fluid (*Phlyctenæ*), but it afterwards assumes a pustular appearance. Sometimes only one is observed, at others there are a greater number extending around the margin of the cornea. They are usually small; but, when single, they are occasionally as large as a split pea. They are not attended by much pain or intolerance of light. If the complaint is neglected, the pustules may ulcerate, and the ulceration spread.

67. *b. The Treatment* consists in the application of leeches and blisters in the more acute cases. The disorder generally disappears, under ordinary circumstances, without ulcerating, when due attention is paid to the secretions and excretions; mild aperients and a saturnine lotion are usually all that are required.

68. *E. SCROFULOUS OPHTHALMIA.—SYN. Scrofulous Inflammation of the Conjunctiva; Strumous Ophth.; Inflam. of the Conjunctiva in Scrofulous Constitutions.*—Scrofulous children are very liable to this disease. It is sometimes the first manifestation of the strumous diathesis; and, if neglected, it often becomes the source of impaired, or entirely lost, vision. It seldom attacks infants before weaning; but, from that period to nine or ten years of age, it is very prevalent; as many as three fourths of the cases of ophthalmia at this period being scrofulous. Sometimes only one eye is affected, at other times both are inflamed from the first; and very often the disease passes from the one to the other. When both are simultaneously attacked, one is usually much worse than the other.

69. *a. Causes.*—*a.* The *predisposing causes* are those of SCROFULA (see that article) which may be very generally referred to climate, air, exercise, food; and to the habits, health, and con-

stitution of the parents.—*β.* The *exciting causes* are exposure to cold and moisture, injuries to the eye, irritating matters in the air, excessive use of the organ; the common causes of catarrhal ophthalmia, or an attack of this complaint; teething, whooping-cough, and more especially cow-pox, exanthematous diseases, and porriginous eruptions on the scalp and face. Measles and small-pox very frequently excite it; and JUENCKEN represents vaccination as one of its most common causes. He disapproves of the practice of vaccinating children in the first year; as he considers that a certain degree of constitutional vigor is required to remove from the system the poison introduced by inoculation; and that, when the child is weak or too young, the morbid matter is not thrown off, and calls into action the scrofulous diathesis. BEER states that, in Breslau, where ninety-five cases out of one hundred of ophthalmia in children are scrofulous, the streets are narrow and filthy, and the food of the poorer families unwholesome. Mr. LAWRENCE and Mr. MACKENZIE think that the complaints described by Mr. WARDROP under the denomination of "*Exanthematous Ophthalmia*," and by Mr. CHRISTIAN under the name of "*Porriginous Ophthalmia*," belong in every essential respect to the disorder now being considered.

70. *b. Symptoms and Course.*—*External redness* is often inconsiderable, and most apparent at first in the linings of the lids. It is generally only partial in the conjunctiva oculi, particular enlarged vessels, or fasciculi of vessels, running in this situation towards the cornea, and extending over its margin, or stopping short of it. Where the fasciculi terminate, small *phlyctenæ* or *pustules* form, and contain either a little clear or a yellowish fluid. These pustules may be seated on the sclerotica or cornea, but more frequently on the boundary between them; and may be single, or several. Their presence has induced Mr. MACKENZIE to view strumous ophthalmia as an eruptive disease.—The *intolerance of light* is extreme, and characteristic of the complaint. The lids are spasmodically closed, and resist any attempt to open them; and, when opened, the cornea is turned up under the edge of the orbit, and away from the light. The child puts all the muscles into action to protect the organ; and hence a peculiar and characteristic physiognomy is assumed. It seeks the darkest part of the room, or presses its face against the pillow in bed, to escape from the light. This excessive sensibility of the retina (*Photophobia scrofulosa*) is not caused by inflammation, nor is redness even essential to it; for it is often very remarkable where the eye appears almost natural; and the child opens its eyes and sees as well as usual in the dusk. This disordered sensibility is altogether sympathetic and functional; and is dependent, as Mr. LAWRENCE thinks, on the condition of the alimentary canal. I would impute it rather to the state of the organic nervous system.

71. There is a copious flow of tears at the commencement. The external surface of the organ suffers great irritation, extending to the lachrymal gland, so that when we attempt to examine the eye, or to expose it to the light, there is a copious discharge of scalding tears, causing redness of the lids, and excoriating them and the face. Owing to the itching and soreness

thereby occasioned, the child rubs or scratches the parts, which become sore and pustular, and produce a discharge which encrusts; the affection ultimately extending over the face and forehead, and in its worst form resembling *crusta lactea* and *porrigo larvalis*. The edges of the lids are often red, swollen, and painful. There are sometimes an acrid secretion from, and excoriation of, the nostrils; with redness and swelling of the *alæ nasi* and upper lip. The ears are frequently red and sore, or excoriated behind, and the absorbent glands of the neck are swollen. The bowels are costive, the tongue white or furred, the abdomen distended, the breath foetid, the appetite is morbid, the head and sometimes the skin are hot, and the child is restless and grinds its teeth when asleep. The symptoms are worse during the day, but remit somewhat in the dusk of evening. The inflammation of the eye may suddenly subside, and return as suddenly; and very slight exciting causes will bring back the complaint; which may thus continue with slight intermission for months, or even for years. The affection of the eyes may also alternate with some other disorder, or symptoms, in remote parts. In the more chronic cases, the health suffers greatly from seclusion from light, air, and exercise; and the patient becomes pale, etiolated, and sickly, with a dry and harsh skin.

72. *c.* The *Consequences* of the disease on the cornea are often serious, although the external redness may not be great. The phlyctenular or pustular elevations in the cornea may subside, leaving *slight opacity*, or considerable thickening of the corneal conjunctiva with greater and more permanent opacity; but they more commonly *ulcerate*, in an irregular form, and with a ragged edge, the ulcers sometimes extending superficially, or making their way through the cornea to the anterior chamber, occasioning prolapse of the iris. The vessels passing over the cornea may, without forming pustules, occasion thickening and opacity, which may proceed so far as to render the whole corneal covering thick and vascular (*Pannus*). *Opacity* from interstitial deposition may also occur, either with or without enlargement of the proper corneal vessels; and, according to Dr. FROBIEP, a brownish red discolouration, from interstitial effusion of blood, may supervene. In addition to the opacity, the external layers of the cornea may yield from the pressure from behind, and form an external protuberance (*Staphyloma*); or adhesion of the iris to the internal surface of the cornea may take place. In some instances, the inflammation extends to the sclerotic coat and iris, and even to the parts seated behind them. This occurs most frequently in prolonged or after repeated attacks; and occasionally is followed by structural change of these parts, or by dropsical enlargement of the globe.

73. *d.* *Diagnosis.*—The extreme intolerance of light, and copious flow of tears in connection with the trifling external redness, the pustular elevations of the conjunctiva, sufficiently distinguish this affection, which frequently, also, co-exists with enlargement of the glands and scrofulous irritation of the nostrils, lips, behind the ears, and in other parts of the body. In many instances, however, of conjunctivitis in children,

it is difficult to draw a distinction between the common and scrofulous forms of the disease; the characters of the one gradually merging into those of the other. This is more especially the case when the affection of the eyes is associated with, or consequent upon, either acute or chronic cutaneous eruptions, particularly such as affect the scalp and face.

74. *e.* The *Prognosis* is *favourable*, if the cornea be not affected, or if superficial or slight opacity, owing to deposition between its laminae, only be present. Mere vascularity of the cornea will disappear; but if it be attended by thickening and opacity, the change will be more or less permanent. If ulceration have taken place to considerable depth or extent in the cornea, and especially if it be accompanied with affection of the iris, or lesion of the sclerotic coat, vision will be more or less impaired.

75. *f.* *Treatment.*—*a.* Constitutional or internal means are most important in this complaint. After the bowels have been freely evacuated, a course of *tonics* should be prescribed, with *alteratives*, to promote and improve the various secretions. A full dose of *calomel* and *rhubarb*, and afterwards equal quantities of the compound infusions of gentian and senna, or the compound decoction of aloes, repeated according to circumstances, will be most serviceable. In some cases, an *emetic* will advantageously precede the purgatives. Having thereby evacuated morbid matters, and excited the secreting and excreting viscera, tonics, especially the *sulphate of quinine*, will be productive of the greatest benefit. During the course of tonics, the *hydrargyrum cum creta* should be given, on alternate nights, with the sub-carbonate of potash and *rhubarb* or *jalap*. If the skin be pale, or the child languid and etiolated, the *preparations of iron*—especially the *tinctura ferri ammoniata*, the *vinum ferri*, the *ferrum tartarizatum*—may be preferred. An electuary of carbonate of iron, confection of senna, and treacle, may occasionally be substituted—particularly on the day following that on which the powder was taken. In some instances, the decoction of *bark*, with *sulphuric acid*, may be alternated with these tonics, especially after mercurials have been laid aside. *Cascarilla* with soda, or any of the tonic infusions, with small doses of the *chlorate of potash*, may likewise be tried.

76. *β.* *Regimen and diet* are most important items in the treatment. The patient should be warmly clothed, and take regular exercise in the open air, particularly when it is dry and bracing. Change of air, occasionally to the sea-side; and *warm, tepid, or cold bathing*, are also beneficial. In weak or irritable children, warm or tepid bathing, salt having been added to the water, or in sea water, should be first adopted; and cold bathing tried, as the health improves. The *diet* should be duly regulated; animal food in moderate quantity, suitable vegetables, and ripe baked fruits, being allowed; but all fermented liquors, indigestible substances, and rich crusts or pastry ought to be withheld. The usual farinaceous food should always constitute a chief part of the diet. The child ought to wear through the day a dark shade before the eyes; and sleep in a dark but well-aired room, with the head considerably raised.

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