

Of the causes, nature, and treatment of palsy and apoplexy : of the forms, seats, complications, and morbid relations of paralytic and apoplectic diseases / by James Copland.

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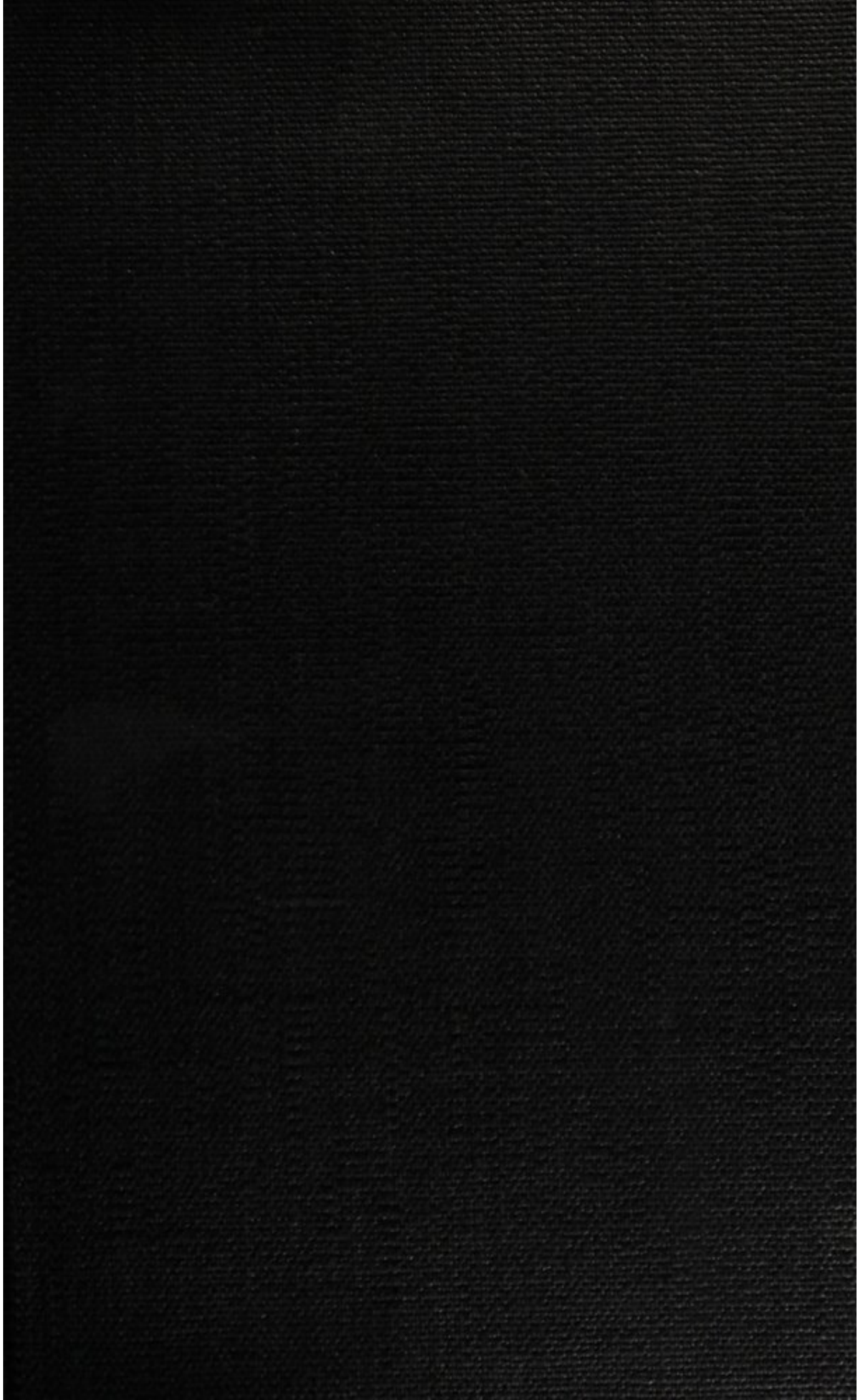
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OF THE
CAUSES, NATURE, AND TREATMENT
OF
PALSY AND APOPLEXY:

OF THE
FORMS, SEATS, COMPLICATIONS, AND MORBID RELATIONS
OF PARALYTIC AND APOPLECTIC DISEASES.

BY JAMES COPLAND, M.D., F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
HONORARY MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY; AND OF THE
ROYAL ACADEMY OF MEDICINE OF BELGIUM;
FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETIES OF LONDON AND BERLIN;
LATELY CONSULTING PHYSICIAN TO QUEEN CHARLOTTE'S LYING-IN HOSPITAL;
CONSULTING, AND LATELY SENIOR, PHYSICIAN TO THE ROYAL INFIRMARY
FOR DISEASES OF CHILDREN;
FORMERLY SENIOR PHYSICIAN TO THE SOUTH LONDON DISPENSARY;
ETC., ETC.



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TO

THOMAS GODFREY SAMBROOKE, ESQ.

EATON PLACE.

MY DEAR FRIEND,

I DEDICATE this Treatise to you with the most sincere esteem for your high-minded and generous disposition, and with grateful feelings for the kind interest you have always taken in my professional reputation and success, for the many kindnesses I have received from you, and for the confidence you have reposed in me during a long and intimate acquaintance. With ardent wishes for your health, happiness, and prolonged life,

I am, my dear Sambrooke,

Ever yours most sincerely,

JAMES COPLAND.

Old Burlington Street, 2
March, 1850. 3

THE UNIVERSITY OF CHICAGO

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P R E F A C E .

A CONSIDERABLE part of the following *Treatise* was published many years ago in the first and third volumes of the Author's Dictionary of Practical Medicine, and several of the Chapters on the connection of Paralytic and Apoplectic seizures, with other disorders, formed the Croonian Lectures, for 1846 and 1847, at the Royal College of Physicians. The Author now publishes the whole in a connected form, believing that palsy and apoplexy should be studied in intimate connexion not only with each other, but also with other diseases, of which they are often the consequences and terminations, and with other affections which are frequently associated or complicated with them.

From a very early period of the Author's practice he was strongly impressed by a conviction of the importance of describing not merely the primary and uncomplicated forms of disease, but also the several associated or complicated states in which each malady most frequently comes under the observation of the physician, and he was not the less convinced of the propriety of recognizing alliances and connections between diseases, too often described as distinct species, extreme features of difference being chiefly or only insisted upon, and intimate relations generally disregarded. The Author, in his Lectures on Pathology and Practical Medicine, and afterwards in his Dictionary, endeavoured to supply what he considered a defect in medical works; and was the first to attempt to point out and to describe the relations, associations, or complications of each specific disease, as well as the different states or forms which such disease may assume according to the various causes, circum-

stances, and combinations of causes, which either occasion it, or influence its course.

The chapters of this Treatise, in which *Apoplexy* is more especially considered, were first published in 1832; and the Author believes that the practical opinions he then promulgated have received the sanction of physicians in this and other countries, as well as of recent medical writers. A more extensive and prolonged experience has confirmed his views, thus long submitted to the profession, as to the pathology and treatment of apoplectic and paralytic affections; and in the present republication, although these views are exhibited in somewhat fuller detail, and in more intimate connection with one another, and with allied topics and related affections, they are not different from what he had previously furnished.

When treating many years ago of HEMORRHAGE, the Author referred the extravasation in some cases to disease of the smaller arterial vessels—"to disease of the coats of an artery or vein, or to atheromatous or other deposits in the coats favouring their perforation or rupture"¹; and he then mentioned instances of hemorrhage having been traced in his own practice to this change in the small arterial branches. Since the publication of this, Mr. GULLIVER has shown the fatty nature of those changes in the blood-vessels which were formerly described as atheromatous; and soon afterwards some apoplectic cases came before the Author, in which he had reason to believe that this change in the vessels existed not only in arterial branches but also in the smaller ramifications, and that it weakens these vessels and favours their rupture, thereby producing either apoplexy or palsy according to the amount of hemorrhage. Since that part of the present work went to the press in which this statement is made, Mr. PAGET has published microscopic observations which fully illustrate and prove this statement. The observations of Mr. PAGET and of the Author have been made independently of, and unknown to, each other; but those of Mr. PAGET have extended further than those of the Author, as respects the state of the cerebral capillaries.

¹ See Art. HEMORRHAGE in Author's Dictionary of Practical Medicine, &c., vol. ii., p. 92.

After the appearance of Mr. GULLIVER'S memoir on this change in the arteries, the Author has examined, after fatal hemorrhage, the changes in the bloodvessels more minutely than before, and he is induced, from what he has observed, to conclude that the changes formerly termed atheromatous, although more or less resembling fat, are not actually this substance, though closely allied to it, or containing it in various proportions, in connection with more or less of other animal matters.

When treating of the diseases of the *arteries* in his Dictionary, the Author imputed these changes to altered nutrition, owing to failure of the organic nervous influence endowing the cerebral vessels, and this idea he has supported in the present treatise, believing the change in the vessels to be consecutive of impairment of the functional energy of these nerves, and the effusion, softening, disorganization, &c., to be the ultimate results of this procession of changes—first in these nerves, next in the vessels, and ultimately in the cerebral structure and membranes. He has stated these changes, in general terms, to be atheromatous or fatty: but they are really of a composite nature, and consist of various proportions of olein, margarin, cholesterin and albuminous matter deposited in or between the coats of the arteries; the more strictly fatty deposit assuming the form sometimes of oil-globules, or fat-globules, or of fat granules. It is not improbable that these changes are owing not merely to impaired organic nervous power, either generally or locally, but also to the state of the blood—to a superabundance, consequent upon imperfect assimilation of these substances in the blood, and to a perverted nutrition; and that they are independent of inflammatory action in the coats of the arteries.

Of the imperfections of this as well as of his other works no one can be more convinced than the Author is himself; for he has neither had the time, nor has he enjoyed the opportunities or the occasions requisite to the full attainment of what he desired, or of perfecting satisfactorily to himself that which he attempted. In certain other circumstances he might have accomplished more; he could not have done much less than he has done; for that which still appears to himself but little, imperfect, and hence unsatisfactory, has been produced under no cheering influences—during the

anxieties and interruptions incidental to the practice of his profession — chiefly during hours which are generally devoted to the restoration of powers exhausted by the mental and physical labours of the day.

*Old Burlington Street, }
March, 1850. }*

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THE
CAUSES, NATURE,
AND
TREATMENT
OF
PALSY AND APOPLEXY, ETC.

1. PALSY and APOPLEXY are so intimately connected the one with the other in their causes, seats, pathological conditions and treatment, as to render it most difficult, if not altogether impossible, to treat fully and satisfactorily of the one apart from the other. The same remote causes and contingent occasions, and the same structural changes, varying only in grade, affecting often the same parts or seats, produce both these diseases. In these circumstances, therefore, and in the great majority of cases, they may be viewed as modifications of one malady, even when unassociated. Seeing, however, that they are very frequently found associated—that, in most cases, palsy either commences or terminates in apoplexy,—when it is observed that the majority of instances of apoplexy are either complicated with, or followed by palsy, the propriety of treating of them in connection with each other, and as they usually come under the observation of the physician, will be admitted. Both forms of malady thus depending upon sameness or similarity of pathological conditions, necessarily require also similar modes of treatment; or, at most, the means which

are often the appropriate to the one are suitable also to the other, with more or less modification.

2. In treating, therefore, of these two forms of disease—of apoplexy and palsy—it is immaterial which of the two should receive precedency. The fatality of the one is nearly equal to that of the other, although after different periods of duration; and the consideration of the changes producing both, and of the means most appropriate to the removal of these changes, is beset with difficulties equally great in respect of each. As, however, several forms of partial palsy are often forerunners of either complete and extensive paralysis, or of attacks of simple or of complicated apoplexy, I shall direct my attention, first, to the more *simple and primary varieties of palsy*; next, to the *uncomplicated forms of apoplexy*; afterwards, to the *complicated states of palsy and apoplexy*, and to their *causes*, to the *disorders which often precede them*, and to the more *important points of their pathology*; and, lastly, to the *treatment of their several forms and complications*.

SECTION I.

OF THE LESS COMPLICATED FORMS OF PALSY, OR PRIMARY AND SIMPLE PALSY.

3. PALSY, or *Paralysis*, is characterized by a *diminution or loss of the power of motion, or of the sensibility, or of both motion and sensation, in one or more parts of the body.* Pathologically, or as respects its nature, palsy may be defined to be, *a disease depending generally upon structural change, either of some portion of the cerebro-spinal axis and ramifications, or of adjoining parts implicating these, so as to impair or altogether to abolish motion or sensation, or both, in a part, or more or less extensively throughout the frame.*

4. PARALYSIS presents itself in several *forms and states*, according as the *sensibility* or the *power of motion, or both*, are affected; and according to the *degree* and the *extent* of the affection. It varies thus in grade, character, and extent, from the numbness or weakness of a single joint or finger, or the failure of the action of a single part or organ, to a complete apoplexy, in which the sensation and motion of the whole body is abolished. These circumstances have led to the use of various terms, as respects the *form* and *extent* of the disease, that may briefly be noticed.

5. As regards the *form* or *character* of the malady, it has generally been allowed that when either motion or sensation is entirely lost, the paralysis is *complete* as respects the lost function; if either be impaired only, or not altogether lost, the disease is *incomplete*. If only one function is affected, the paralysis is *imperfect*; if both sensation and motion are lost, the disease is *perfect*, as suggested by Dr. BENNETT. Thus, palsy may be not only incomplete or complete, or imperfect or perfect; or incomplete and imperfect, or both complete and perfect; but it may even be complete

as respects either function, and yet imperfect, inasmuch as one only is lost; or it may be incomplete and yet perfect as regards the affection of both functions.

6. Palsy has been divided, as respects its *extent*, into *partial* and *general*; the former has been further divided into *hemiplegia*, when one side or lateral half of the body is affected; *paraplegia*, when the inferior half is attacked; and *local* when a smaller portion of the frame affected. It has, moreover, been called *idiopathic* and *symptomatic*; but those who have thus divided it have not pointed out in what its idiopathic nature consists. Palsy is generally, if not universally, a symptomatic malady, inasmuch as it depends upon lesion of the central nervous masses, or of the principal nervous trunks or cords, or of parts implicating them; as it is rarely owing to an affection of the parts themselves which betray the disorder, unless in a few instances of palsy from cold or from some agents directly influencing these parts.

7. *Palsy*, in all the forms of loss of sensation, or of motion, or of both, and in their several grades and combinations, is remarkably diversified, and often variously complicated with other ailments or diseases. As I shall have to show in the sequel, several disorders which have been differently named are merely modifications of paralysis, whilst many others are so intimately allied to this important affection as to either approach it in grade, or to be symptomatic manifestations of organic lesions, which sooner or later produce it in one or other of its forms.

8. Paralysis has been termed *continued* or *intermittent*, *fixed* or *moveable*, according as it presents these characters. It has likewise been called *plethoric*, *serous*, *bilious*, *febrile*, &c., according to its presumed cause, or to these states of concomitant disorder. Its origin in certain metallic and vegetable *poisons* has also been used, and with true practical advantage, to distinguish those instances which are thus produced. To these forms and characters of the malady attention will be directed in the sequel, as well as to the *complications* presented by them in practice. In describing the several states and forms of paralysis, *loss of sensation* will be first considered, and afterwards the several forms of *loss of motion*, with or without impairment or loss of sensation.

CHAPTER I.

OF PARALYSIS OF SENSATION.—*Loss of the Sensibility of an Organ or Part.—Partial Paralysis of Sensation.*

9. A PARTICULAR sense, or the feeling of a limited or even of the greater part of the body may be impaired or altogether lost—the *palsy of sensation* may be *incomplete* or *complete* in the part affected; the affection being either *limited*, or so extended as to be almost *general*; but this latter is very rarely or never observed.—Under the head of *local, limited or partial loss of sensation*, may be comprised incomplete and complete palsy of the several senses.

10. i. PARALYSIS OF THE SENSE OF SMELL.—*Loss of Smell—Anosmia*, is commonly a symptom of some disease, as a catarrh, &c. It is rarely observed as a simple affection unless it be caused by the abuse of stimulants or of irritants, as of snuff, &c. Dr. TODD and Dr. GOOD mention instances of this having been a congenital affection. It often attends *coryza*, or common cold, *ozæna*, nasal *polypi*, diseases of the spongy bones, &c.; and it is sometimes caused by external injuries; by prolonged irritation or ulceration of the Schneiderian membrane; and by diseases of, or tumours pressing upon, the olfactory nerves. M. SERRES states that disease of the roots of these nerves, and more particularly of the external root, is not an unfrequent cause of defect or loss of this sense. But in its more evanescent states it is most commonly caused by a common cold, or by discharges from the nasal surface.

11. ii. PARALYSIS OF THE SENSE OF TASTE.—*Loss of Taste—Ageusia*, sometimes also attends other diseases. It occasionally accompanies palsy of the tongue, or of the muscles of the face. It is frequently observed in continued and exanthematous fevers; and is in them, as well as in some other acute diseases, partially caused by the fur and viscid mucus covering the tongue and adjoining parts, that prevents the sapid body from coming into close contact with

the nerves of taste. It may be produced also by the use of tobacco, especially by chewing it, or by other acrid substances. It has even arisen from want of exercise of the nerve of taste, as in a case detailed by Dr. ROBBINS (*Lond. Med. Gazette*, vol. x., p. 175), in which, owing to an unsound tooth, substances were usually taken and masticated in one side of the mouth without being brought in contact with the side on which the diseased tooth was situated. After the tooth was removed it was found that taste in that side of the mouth was impaired. A slight degree of ageusia often is associated with loss of smell in severe catarrhs and coryza; and it is then owing chiefly to the state of the nerves of smell and taste. Marked impairment, however, of the former sense often also slightly impairs the latter.

12. iii. PARALYSIS OF THE ORGANS OF SIGHT.—PALSY OF VISION.—LOSS OF SIGHT.—*Amaurosis* (from *αμαυρος*, obscure)—the *drop serena* of MILTON—*Gotta serena*, of the Italians,—or *nervous blindness*,—may be defined to be, “a partial or total blindness” owing to the state of the retina, or of the nerves, or of that part of the brain related to the organ of sight, caused by functional disorder, or by congestion, or by inflammation, or by any other change of these parts; or by sympathy with other organs: or, in other words, partial or total loss of sight from other causes than those which obstruct the passage of the rays of light to the bottom of the eye—or to the retina.

13. *Palsy of vision* is met with at all ages; but most frequently in the advanced epochs of life. It is sometimes congenital: and it is then often difficult to ascertain the seat and nature of the affection. At advanced periods of life, the history of the case, of the previous habits and ailments of the patient, and of the various resulting and related morbid phenomena, will generally throw light upon the pathology of the disease.

14. A. *Seats of Amaurosis*.—Privation of sight may be owing to affections of either of the following parts;—1st. To functional or structural lesion of the retina; 2d. To the state of the optic nerves;—3d. To the functional or structural conditions of the organic or ganglial nerves communicating with the lenticular ganglion and nerves of the eye;—4th. To the state of the nerves which send branches to the eye, as the fifth and third pairs of nerves;—5th. To the

parts of the encephalon connected with the optic nerves, either at their origins or in their course;—and 6th. To states of the pineal and pituitary glands.

15. That *impaired* or *abolished function* of one or more of these parts will occasion amaurosis is by no means improbable; and that such impairment or even abolition may take place independently of organic change of an obvious kind may be admitted, although not readily demonstrated. For there are causes which will *directly depress* the sensibility or vital functions of these parts, whilst there are others which will indirectly depress or *exhaust* the functions which these parts severally perform. Admitting the existence, then, of functional amaurosis, it may be inferred that the impairment of function of one or more of the parts just enumerated cannot long exist unless it depend upon some degree of vascular or structural change, or without superinducing such change; and accordingly numerous lesions have been detected by observers, in connection with loss of sight in the situations now particularized. The *organic changes* upon which the disease most frequently depends are very numerous, and many of them are identical with those which occasion several other forms of palsy. They will therefore be noticed in the sequel. The most important of them have been described, and the symptoms most frequently connected with each have been noticed under the head *Amaurosis*, in the Author's "Dictionary of Practical Medicine."

16. *B.* The *symptoms* of Amaurosis are, 1st. Those which the patient *himself experiences*; and 2d. Those which the *physician detects* in the eyes, or in the several organic and animal functions. Each of these classes of symptoms are to be inquired into separately. Each eye should be carefully and separately examined, the light being extended from the one whilst the other is observed; the effects of gradations of light being remarked.

17. *a.* The loss of vision may be gradual in its accession, or remarkably sudden, and may amount to an almost total deprivation of sight. It may be more gradual in one eye, and more sudden and complete in the other. Hence, the disease has been distinguished by the epithets, *slow* and *sudden*, *incomplete* and *complete*, or *imperfect* and *perfect*.

18. At the commencement the failure of vision is sometimes only occasional for a short time, and after shorter or

longer intervals. In some cases it assumes the form of *day-blindness*, in others of *night-blindness*; and it not unfrequently recurs for a time after great exertion of the eyes with either minute or bright objects. Sudden and transient attacks are often the consequence of disorder of the digestive organs, or rather of a state of the vital manifestations which occasions equally loss or impairment of sight as well as of the digestive functions.

19. Palsy of sight is often at first only partial—extending only to a part of the field of vision. In some cases intervening portions of the field are obscured: in others one-half of it is hid from view. Occasionally objects are seen only in a particular direction; some patients discern objects in a distorted form—in a crooked, mutilated, shortened, lengthened, or inverted form. Double vision is not unfrequent; and in rarer instances the objects are doubled as well as otherwise distorted. These conditions are generally the results of disease within the head.

20. In some cases the failure of vision assumes the form of *shortness* or *great nearness of sight*, or an indistinctness of sight as respects near objects, and a clearer view of distant objects. But these are not so frequent as the occurrence of false impressions, in the form either of flashes of light, shining stars, globes of light, and various other lucid spectra; or of dark spots or motes, or other dark objects in the field of vision. False impressions of colour are also frequent in the early course of amaurosis. Luminous spectra are most common in plethoric persons and when amaurosis depends upon increased vascularity or inflammation of the retina; motes, black specks, *muscæ volitantes*, and thick mists or clouds, when the affection arises from exhaustion of the sensibility and vital energy of the organ; and when it occurs in dyspeptic subjects, or from exhausting causes.

21. As the disease advances the field of vision is obscured as if by a cloud or net-work; the latter appearing gray or black in a good light; but occasionally becoming light, white, silvery, yellowish, red and luminous in the dark. The patient sometimes also complains, especially early in the disease, of some intolerance of light, or of pain in the eyes when exposed to light. But, in other cases, from the very beginning, diminished sensibility of light, and a constant desire for a stronger light—a thirst of light—are present.

Pain in the eyes and commonly also in the head is an important symptom, and it should be carefully investigated. The precise seat, extent, and character of the pain, and the circumstances which relieve or aggravate it should be noted. We should also ascertain whether or not it be attended by giddiness, noises in the ears, wakefulness, forgetfulness, torpor, inability of exertion, or failure of any of the mental manifestations; as from the grouping of these symptoms the nature of the efficient cause of the affection may be inferred.

22. *b.* The general health and previous ailments of the patient require a particular investigation in this as well as in the other forms of palsy. The temperament, diathesis, and habits of the patient should be considered; and preceding attacks of gout, rheumatism, inflammation of the brain, fever, apoplexy, epilepsy, inquired after and duly considered. We should ascertain whether the patient is of the scrofulous constitution, or whether he has had syphilis, or sustained internal injuries, or undergone long or severe courses of mercury; and, in the case of a female, whether she has been subject to any hysterical affection, or disorder of the uterine organs. Amaurosis, occurring either in an uncomplicated or in a complicated form, presents numerous phenomena, many of which vary with the particular pathological condition upon which the affection depends; but these are generally either identical with, or very closely allied to, those observed in other states of paralysis.

23. *c.* *The duration* of palsy of vision is extremely various. It may, in slighter cases, be only of a very few days' continuance: it may altogether disappear, either spontaneously or from treatment, and never after recur. This is, however, a rare occurrence. Even when slight it more frequently returns after an indefinite period, from errors in diet, disorders of the digestive and organic functions, or from various causes. In such cases the affection is either functional or the result of vascular congestion of the brain of a transient or recurring kind. Most commonly, however, it is a protracted affection, especially when associated with other states of palsy, and continues all the life of the patient.

24. *iv.* PALSY OF THE SENSE OF HEARING.—*Impaired or lost Hearing—Deafness.* This affection may be the consequence of inflammation of the membrane, or of the follicular

glands, of the auditory passage, or of inflammation and its consequences, in any of the structures constituting the organ of hearing. But in all the varieties of disease of this organ, especially of inflammation and of the organic changes consequent upon inflammation, the loss or impairment of hearing is only symptomatic of these changes. It is chiefly when the deafness is more or less nervous—or dependent upon the state of the auditory nerves, that the affection can be justly viewed as paralysis of the function of hearing. We can, however, seldom arrive at just conclusions from direct phenomena respecting the existence of deafness from this cause. We can infer the existence of this cause of paralyzed hearing only from the absence of those deviations from the healthy state affecting the auditory passages and internal ear. When, in connection with the absence of these lesions, ascertained by a minute examination, there are indications of disease within the cranium, or of some other malady with which the organ of hearing may be presumed to sympathise, then the existence of deafness from an affection of the auditory nerves may be considered as probable. In such cases there is impaired or lost hearing without any organic deviation in the ear; the lesion being either in the nerves, in their expansions in the labyrinth, or in their course thither, or in the brain at or near their origins. It is always difficult, frequently impossible, to determine the situation of the lesion; and still more so to ascertain whether the lesion consist of simply impaired or lost function of the nerves, or of interrupted action, owing to extraneous influences or morbid productions in their vicinity. In all cases, however, the absence of organic change in the ear itself should be previously made out.

25. DR. KRAMER divides nervous deafness into two forms, the one attended by excitement or erethism—the other by torpor. Noise in the ears is always present in the former, but never in the latter. This symptom is often, however, attendant on very different diseases of the ear, but in a very indeterminate and inconstant manner. To determine, therefore, whether deafness with noises in the ear proceeds from disease in the organ, or from nervous affection merely, minute investigation and the means of diagnosis already mentioned must be had recourse to. But these are also requisite in the torpid form of nervous deafness. Mr. SWAN

believes, that many cases usually imputed to palsy of the auditory nerve are occasioned by chronic thickening of the membrane lining the cavity of the tympanum, involving the small branches of nerves in this situation. This is not improbable, and admitting it to obtain, DR. KRAMER'S mode of diagnosis will not always succeed, nor determine the existence or absence of true nervous deafness.

26. *A. Deafness may proceed from compression of the auditory nerve.* In most instances, however, this source of the affection cannot be accurately determined. A tumour may be developed, or purulent formations or extravasated blood may exist in the course, or in the vicinity or near the origin of the seventh pair of nerves, interrupting the passage of impressions made on the organ to the sensorium; but this condition often can be only surmised. DUVERNEY and SANDIFORT found these nerves pressed upon by tumours; and SEVERINUS observed them surrounded by serum and effused blood. If the tumour or morbid collection be considerable, the extension of paralysis to the nerves of vision and of smell may favour the conjecture. BONET mentions a case in which hearing and sight were lost, and on dissection a tumour was found pressing on the nerves of these senses. THOMANN records a similar instance to this. ITARD found in a man who had lost his hearing in the left ear, small tumours lying on the corresponding side of the cerebellum, and nearly two ounces of a thick fluid in the ventricle of the same side. In cases adduced by LIEUTAUD, in several detailed by LALLEMAND, and in some seen by myself, an abscess had formed in the part of the brain adjoining the ear, and, by pressure or consequent disorganization, had destroyed the functions of the auditory nerve.¹

27. *a. The symptoms* of deafness from compression of the nerve of hearing are, severe and nearly constant headache, vertigo, noise in the ears, impaired sight, and weakness of the mental faculties, especially of the memory. The progress of this affection is generally very slow, although the internal disease producing it is ultimately fatal. In several instances mentioned by ITARD, it continued some years without materially affecting the general health. In two instances the above symptoms continued upwards of

¹ See Author's "Dict. of Practical Medicine," art. EAR, s. 21, *et seq.*

fifteen years. I also have known cases as long protracted as these. The case is most protracted when it proceeds from a tumour or morbid growth within the cranium.

28. *B. Deafness from Palsy of the acoustic Nerve.*—M. ITARD supposes that this nerve may be paralysed—(a) by a severe shock or commotion, (b) by convulsions, (c) by apoplexy, (d) by fever, and (e) from sympathy with some other organ. Without denying the possibility of these causes giving rise to palsy of the nerves of hearing, and even admitting that apoplexy or convulsions and fever will sometimes occasion it, yet the others may seem problematical.—*a.* It is probable that very loud noises, as a clap of thunder, or the explosions of artillery, may paralyse these nerves, especially as deafness from these and similar causes can be explained only after this manner, when symptoms of inflammation or of congestion of the ear or of the brain cannot be detected. M. ITARD believes that the shocks occasioned by falls in the lower part of the body, or the counter-stroke occasioned in this and other ways, also may paralyse the auditory nerves: but this cause seems more doubtful than the preceding. When deafness has been occasioned by loud noises, hearing often returns spontaneously in a few days or weeks; but if the deafness persists for some months, it is rarely removed by treatment.

29. *b. Deafness sometimes follows convulsions.* This is most frequently observed in children under four or five years of age. Many of the cases of deaf-dumbness originate in the convulsion occurring during the first dentition. But the deafness may not be the result of convulsions; both the one and the other being produced by some lesion at the origin of the acoustic nerves, or by effusion into the fourth ventricle or by some change at the base of the brain or about the medulla oblongata. When the loss of hearing is complicated with palsy of one side or of one limb, the nature of the affection may be inferred; but when this is not the case, and when hearing in both ears is lost, the exact nature or seat of lesion can seldom be determined or even surmised. M. ITARD considers deafness occurring in this manner as quite incurable.

30. *c. Deafness from apoplexy* is a frequent occurrence, and may exist in one or both ears. When hemiplegia has followed an apoplectic attack, the deafness is generally on

the same side, and is then incurable; but when the patient is not far advanced in years, and when there has been no consecutive palsy, the affection of hearing may be somewhat ameliorated by the sole efforts of nature, or by the means about to be mentioned; but more frequently, especially in old persons, no advantage accrues to the hearing from treatment. When deafness occurs early in *typhoid* and *infectious fevers*, it frequently continues after recovery from them. If a judicious application of remedies do not succeed in a reasonable time, and if the affection have been of long continuance, hearing is very rarely recovered.

31. *d. Deafness is sometimes symptomatic of, or associated with, disorders of the digestive organs.*—In these cases the affection is generally slight; but it is sometimes very considerable and difficult of removal. Impaired and disordered digestion, deranged biliary secretion and excretion, a foul or loaded tongue, tumid abdomen, a morbid state of the evacuations, and an unhealthy aspect of the countenance and of the general surface, commonly characterize this form of deafness.

32. *e. Idiopathic paralysis of the acoustic nerves.* This affection has been defined by ITARD to be a want of excitability in these nerves,—a loss of their sensibility, independently of the circumstances or causes already passed in review. Its existence has been unjustly doubted by Dr. KRAMER. M. ITARD believes, however, that it may be congenital, or supervene at any period of life; but that it most frequently occurs after forty. It is often accompanied by headache, noise in the ears, and mental inaction. Numbness, or want of sensation in the external ear, is sometimes present. M. ITARD has seen the organic sensibility of this part entirely lost in two instances. In old persons this symptom is often observed in slighter degrees, and is attended by dryness of the meatus. This variety of deafness is generally ameliorated by warm or mild weather, and by loud noises; but as soon as these cease the affection returns to its former state. It is *caused*, as well as aggravated, by mental exertion and fatigue; by masturbation, venereal excesses, and other depressants; by exposure to cold, currents of air, and humidity; and by the depressing passions. Its accession is imperceptible, and its progress very slow. Sometimes it

continues long stationary; but it is little influenced by treatment.

33. *f.* Deafness, in its more complete states, may also proceed from *organic changes in the acoustic nerves*. SYLVIVS found them, on dissection, remarkably atrophied; a state probably consequent upon prolonged inaction. ACKERMANN observed them indurated; and MORGAGNI states, that in one case they were entirely wanting.

34. *v.* PALSY OF THE SENSE OF TOUCH.—DEFECT OR LOSS OF FEELING.—*Insensibility of a part or of the general surface of the body.—Anæsthesia.* Incomplete or complete loss of the sensibility of a part sometimes occurs *alone* or independently of any other form or palsy; but it more frequently *precedes* or *attends* loss of motion, generally of the same part—in rare cases of another or opposite part. It very rarely *follows* paralysis of motion. It more commonly *precedes* loss of motion of the lower than of the upper extremities; but paralysis of motion is often unattended by loss of sensibility.

35. *A.* The *access* of anæsthesia is often sudden and without any premonition. Sometimes it is characterized by a perversion rather than by an absence of feeling; the sensation of fine sand, or of some intermediate substance between the skin and the object touching it, being for some time present before feeling is lost. In other cases formications, slight tinglings, and incorrect reports furnished by the sense of touch, precede for a short time more or less complete numbness.

36. *a.* The loss of sensibility may be very *partial* in any part of the surface. It may exist in one or more fingers only; and in this partial state may have been *congenital*, or have occurred soon after birth. Partial anæsthesia is observed most frequently in one limb, or in one half of the body, or in one side of the face. In this latter situation, when any substance is put between the lips, the sensation of its being broken is occasioned. Anæsthesia of the surface has been observed by M. ANDRAL in a number of round spots, the surrounding skin being quite sensitive. When loss of sensibility of any of the extremities is considerable, muscular motion of the same extremity is generally more or less impaired. In many cases, however, the defect of the

muscular power of the part is caused by the want of report between sensation and voluntary action; for in holding an object in a hand which is deprived of sensibility it is readily dropped if the eyes are not fixed on it:—the sensation of its presence not being conveyed by the nerves of feeling in the part, the act of volition is either imperfectly excited or is not excited at all. In some such cases, also, it is probable that volition is not transmitted in sufficient force to the muscles to produce prolonged or energetic action. In the familiar instance of numbness from pressure on one of the lower extremities, it will be found that the limb will not support the weight of the body unless volition be strongly exerted.

37. *b.* It is rare to find the sensibility of a part *completely* lost, so that it is insensible to the severest kinds of injury, as to fractures, burns, &c. Cases, however, of this kind have been adduced by YELLOWLY, GOOD, EARLE, BROUGHTON, and others. Sensibility is lost chiefly in the integuments, or in the more superficial terminations and distribution of the nervous tissue in the mucous and vascular texture of the skin. In parts more deeply seated the sensibility is more entirely dependent upon the ganglial or the organic nerves supplying the bloodvessels and nourishing the structures.

38. *B.* The more extended forms of *partial* anæsthesia generally appear in one half of the body—*hemiplegic anæsthesia*—and is limited with precision by the median line, or in the lower or upper extremities. In these forms it is most frequently followed by, or associated with, loss of motion of the same part. Cases, however, sometimes occur of complete anæsthesia of one side existing without palsy of motion, or with very slight local palsy. In some cases of this kind recorded by Mr. BROUGHTON there was slight impediment only of speech. In the cases of hemiplegic anæsthesia which I have seen, the temperature of the surface was below that of the sound side, whilst in hemiplegia with loss of motion only, the temperature was somewhat higher in the hemiplegic than in the opposite side. In a case of hemiplegic anæsthesia lately attended by me, which occurred in a gentleman aged about 34, and in which the faculty of motion was but little affected, not only was the temperature much less and the desire of keeping up the

temperature of the affected side very urgent, but the nutrition of that side, especially of the limbs of that side, was remarkably reduced below that of the other, although the movements and exercise of both sides were nearly equal.

39. *C. Paraplegic anæsthesia*—*Paraplegic loss of Sensibility*. This form of palsy may be incomplete or complete—most frequently the former, although often approaching the latter. It is often attended by more or less loss of motion; but in many cases motion is but little impaired. When the loss of sensibility predominates, the affection may be correctly denominated *paraplegic anæsthesia*. This very interesting form of palsy has only recently received attention; and has been generally attributed to the spinal cord, and more especially to lesions of the posterior columns of the cord. When treating of palsy in my work on *Practical Medicine* (vol. iii., p. 37), I contended that the persistence as well as the loss of sensation of cases of this disease, and more especially in paraplegia, is attributable chiefly to the organic or ganglial nerves supplying, or connected with, the paralysed limb; and that the state of the spinal cord, as observed on dissection, of fatal cases of paraplegia, or of general palsy, does not explain either the persistence or the loss of sensibility of the paralysed parts. These cases have been very recently noticed by Dr. GULL, who has termed them "*encephalic paraplegia*," viewing them as depending upon the state of the brain, and as caused chiefly by mental emotions. This form of palsy was first described by Mr. EARLE, and subsequently by Dr. GRAVES.

40. Mr. EARLE (*Trans. of Med. Chirurg. Soc.*, vol. xiii., p. 516) remarks, that "such paralytic persons are incapable of walking in a direct line; the limbs are loose, and thrown forward with an exertion of the whole body; there is a great consciousness of feebleness in walking, and the greatest difficulty of turning round. The appearance of the eyes often resembles those of a drunkard, particularly when the patient is at all excited or anxious. Sensation is more impaired than in spinal affections, where it will often remain perfect after a total loss of the locomotive powers. This impaired sensation is often peculiar, imparting an idea of some foreign body, as a leather glove or stocking, being interposed. The patient seems to feel through a false medium. The limbs are wasted and flabby, without

any spasmodic rigidity of the muscles, which so often occurs in affections of the spine." A brief notice of the following cases will show that this form of paraplegia is as little owing to alterations in the brain as to changes in the spinal cord:

41. T. B., aged 39, admitted into St. George's Hospital with paralysis of the lower extremities. Motion is not entirely lost, but greatly impaired. Sensation is entirely lost at the soles of the feet, and becomes less so up the legs. Urine and fæces passed involuntarily. Death after six weeks: sloughs on the back and disease of the lungs having preceded this event. On *inspection of the body*, which was much emaciated, the spinal cord and brain were found healthy. The sinuses of the brain contained much dark blood.

42. A female, aged 21, was admitted into the same Hospital with palsy of the lower extremities: sensation was impaired but not altogether lost; double vision occasionally; incontinence of urine but not of fæces. Sloughing of the back came on; the vision was soon affected, and pain in the head severe. On examination after death, the spinal cord and brain, and the membranes of both, were apparently healthy.

43. I was lately consulted in the case of a female upwards of 35 who was imperfectly paraplegic. Sensibility was remarkably impaired below the hips, and almost altogether lost in the legs and feet. Motion was also impaired in the lower extremities; but the loss of sensibility predominated. Retention of urine not unfrequently occurred; the bowels were confined. There were no symptoms referable to the head; and the spine, on a careful examination, betrayed no tenderness, deviation, or affection. The patient was considered to have been long addicted to manustupratió. She was not benefited by treatment; and after some time passed from under my care. The case was considered, at the time, as being independent of any organic lesion of the brain or cord, the symptoms having been viewed as resulting chiefly from exhaustion of the energies of the organic nervous ganglia and plexuses supplying the pelvic viscera, this exhaustion implicating the function of sensation in the spinal nerves, with which ramifications from these ganglia and plexuses communicate.

44. Although I have had several opportunities of examining the bodies of persons in whom more or less anæsthesia accompanied the loss of motion, I have not had occasion to inspect any who had complained only or chiefly of the former; and yet these cases are not very rare. I have met with several in both sexes; but chiefly in those who have exhausted their vital or organic nervous powers by the unnatural vice of self-pollution. EARLE, GULL, and others, have attributed these cases to the depressing mental emotions. These may concur in developing the morbid effect; but I am convinced that the cause I have now assigned is one of the most influential. The anæsthetic affection is not confined to the lower extremities but is experienced in some instances in the upper extremities also, especially in the fingers; and it is, in rare cases, felt only in these latter situations. In some, especially in hysterical females, paraplegic anæsthesia is accompanied with more or less disorder of the catamenia, and with pains in the loins, which I have attributed to congestion of the veins and sinuses of the lumbar region of the spine, and to some degree of pressure on the spinal nerves near their passage from the spinal canal.

45. That this form of palsy may be produced by the prolonged or severe operation of cold is not improbable. Dr. GRAVES has recorded a case which appears to have been produced by cold. This case was characterized by loss of sensation, which commenced in the great toe and extended upwards along the leg and thigh. There were also coldness of the limb and impairment of the power of motion. A similar affection afterwards commenced in the little finger, and extended to the other fingers of the hand of the same side; but no other symptom of disorder could be traced to the head or spine. The termination of this case is not given. But Dr. GRAVES states his conviction that the disorder had its origin in the extremities.

46. Of this form of palsy, which may be viewed as seated chiefly in the nerves of sensation, and partly in those of motion, the brain and spinal cord not being organically diseased, although probably more or less disordered in function, it is remarked by Dr. GULL, in his able lectures at the College of Physicians, that the paraplegic affection is in part owing to the affection of sensation, so that the patient can-

not direct the muscles, rather than to an actual weakness in their contraction. One patient told me that he could not walk without looking at his feet, because he felt as if the legs were cut off below the knees; and another because he had no apparent weight. With the numbness there is yet the perception of pricking or pinching of the integuments, and the numbness generally terminates in an undefined manner about the elbows, or just above or at the knees. Power over the bladder and rectum is not lost except in extreme cases.

47. "There is often pain over the head, some affection of vision, as dimness, or *muscæ volitantes*, noises in the ears; and one peculiarity is, that the most moderate pressure on the nerves will very speedily render the nerve completely anæsthetic. In walking the patients complain of difficulty of keeping on the ground, which seems due to the want of sensation, which is necessary for directing the movement, as well as to the sudden contraction of the muscles." Dr. GULL considers the morbid changes to be general, rather local; and, as far as he can find, to afford no explanation of the loss of sensation, although it seems probable that such may depend upon disorder in or about the mesencephalon. But it may be remarked, that examinations after death, as far as I am acquainted with them, in this form of palsy, have not evinced lesion in this quarter; and that the complaint may, with equal probability, depend upon the state of the ganglial nerves distributed to the periphery of the body.

48. *D. Functional or universal Anæsthesia.*—Anæsthesia is very rarely *universal*, although it sometimes commences partially, and extends gradually and more and more until it becomes almost general or universal. But an *universal anæsthesia* may be produced by various medicinal and poisonous substances, and, as it is believed by many, by the manipulations of the mesmerist. It is, however, most rapidly, certainly, and universally induced by the *inhalation* of the ethers, of chloroform, and of the fumes of alcohol or of strong spirits. The anæsthesia thus produced in a complete and universal form cannot be protracted beyond some minutes without risk to life. The several anæsthetic agents which have been resorted to with the intention of allaying the acute pains caused by surgical operations, by childbirth, and by several nervous affections, seldom produce an effect

beyond a few minutes, unless their inhalation is repeated upon indication of the cessation of the effect; and in this way their operation may be prolonged, but not always without risk; the paralysis of sensation extending to or implicating the functions of the lungs.

49. When universal anæsthesia is produced by inhalation of the fumes of the substances just mentioned, or by other gases or effluvia, the injurious operation is not confined to the production of insensibility, but generally commences in, or extends to, the respiratory functions, impairing the vital actions of the lungs, and arresting the changes which take place during respiration on the blood. In these cases the quantity of air received into the lungs is reduced, the lost quantity having been replaced by the anæsthetic fumes, whilst the paralysing influence of these fumes on the lungs prevents the portion of air taken into the lungs from producing its usual effects upon the blood. The consequences, as respects this fluid, are such as to render it unfit for the support of the several vital functions. It is no longer oxygenated; it becomes dark, the elements usually coalescing to form fibrine, lose their power of attraction, and it is in its appearances and properties altogether altered. Sensibility is annihilated, motion is arrested, consciousness is altogether lost, the respiratory movements are interrupted and ultimately cease, and, lastly, the heart ceases to beat.

50. *E.* The *duration* of anæsthesia is very indeterminate, and depends much upon the remote causes, upon the pathological conditions producing the affection, and upon the treatment. The affection may continue but a short time, as in cases of concussion or of temporary pressure on a nerve. It may be very protracted and terminate only with life. The sensibility may be restored unexpectedly, and sometimes even suddenly. When the anæsthesia is associated with loss of motion, it is generally protracted, although it is often removed, whilst the palsy of motion continues or is but little relieved.

51. *F.* The *pathological changes* producing anæsthesia are not always obvious: they have even been incorrectly assigned; and it is doubtful whether certain of the localities which are at the present day supposed to be especially and solely concerned in the propagation of sensation, are really thus exclusively employed. The alteration producing

anæsthesia may exist in the brain, in the spinal cord, or in the nerves themselves; but although the posterior roots of the spinal nerves appear to be more especially concerned in the function of sensation, it has not been fully shown that the posterior columns of the spinal cord are the appropriated channels for the transmission of sensation. Numerous cases are recorded in which the posterior columns have been disorganized, or even the whole cord pressed upon, softened, or otherwise disorganized, and yet the sensibility has either been unimpaired or even increased. Some of these cases have been referred to by M. OLLIVIER, and others have been lately published in recent transactions of societies and periodical works. To these a more particular reference will be made in the sequel. I may here, however, briefly remark, that anæsthesia has followed causes affecting chiefly the surface of the body, as the prolonged influence or excessive degree of cold. It has been likewise produced by torpid or interrupted circulation of blood in the part. It is sometimes a symptom in hysteria and hypochondriasis, in all which cases it is usually partial or limited as to extent; and it has occurred in the puerperal states. It has also appeared in connection with certain epidemics affecting the system generally, and the cutaneous surface and extremities more particularly, as that which prevailed during the summer and autumn of 1828 in Paris,—a circumstance calculated to support the view of the pathology of anæsthesia which I shall have to state hereafter.

52. *G.* The singular occurrence of *epidemic anæsthesia* which took place in Paris in 1828, was described by several contemporary writers, and in the Medical Journals of that year. (See *Journ. Hebdom. de Med.*, vols. i. and ii.) This affection began with pricking and severe pain in the integuments of the hands and feet, followed in some cases by inflammatory redness, and accompanied more generally by so acute sensibility that the patients could not bear those parts to be touched by the bed-clothes. After some time, a few days, or even a few hours, a *diminution, or even abolition, of sensation took place* in the affected members; they became incapable of distinguishing the shape, texture, or temperature of bodies, the power of motion declined, and, finally, they were observed to become altogether paralytic. The injury was not confined to the hands and feet alone, but

advancing with progressive pace extended over the whole of both extremities. Persons lay in bed powerless and helpless, and continued in this state for weeks and even months. Every remedy which the ingenuity of the French practitioners could suggest was tried, and proved ineffectual. In some the stomach and bowels were deranged, and this affection terminated in a bad state of health, and even in death. In another, the vital organs, cerebral, respiratory, and digestive, were in the same state as before their illness, and their appetites were good, but still they remained paralytic. At last, at some period of the disease, *motion* and *sensation* gradually returned, and a recovery generally took place, although in some instances the paralysis was very capricious, vanishing and again re-appearing. In a few instances the palsy became general and complete, and terminated fatally. The nervous centres were examined for the immediate cause of this strange disease; but there was no lesion found in the brain, cerebellum, or spinal marrow. That the disease was chiefly owing to an alteration of the more peripheral distributions of the organic or ganglial nerves appears not improbable, seeing that, in many cases, the altered sensibility was attended by inflammatory appearances in the extremities; and it is well known that these nerves not only evince sensitive functions, but also actuate the bloodvessels.

CHAPTER II.

OF PARALYSIS CHIEFLY OF THE FUNCTION OF MOTION.

53. As already observed, either of the functions of sensation and motion may be more or less impaired or entirely lost, whilst the other is unimpaired; or both may be impaired in different degrees, or both may be lost. The function of motion is, however, more frequently affected than that of sensation; but when either is completely abolished in a limb, or more generally, the other is more or less impaired.

54. Under this head are comprised those varieties of the

disease which affect a part only of the body. They are divided, as already noticed, into—1st Local paralysis;—2d. Hemiplegia;—3d. Paraplegia;—and 4th. General palsy.

i. OF LOCAL OR PARTIAL PALSY CHIEFLY OF MOTION.

55. *Local paralysis* implies loss of motion, or of sensation also, in some part only of the body, and to a small extent. Although sometimes a limited form of the disease, it is more frequently the commencement of a more extended malady. It is occasionally an evanescent or slight affection: but it is as frequently ingravescent or permanent, or followed at some indefinite period by a much more severe shock or attack, as coma, apoplexy, &c.

56. *a. Paralysis of motion of particular muscles and parts* is not infrequent, occasioning affections, to which certain names have been applied according to their seats. *Strabismus*, or *Squinting*, is often caused by palsy of one or more muscles of the eyeball, although not by this in all cases; for it may be produced, but much more rarely, by spasm of one or other of the muscles attached to the side of the eye to which the pupil is drawn. In either case, it is often symptomatic of a lesion of the substance or membranes of the brain of a serious or dangerous nature. It may, however, be congenital, or be the result of injury during birth; or it may be caused by disease in infancy or childhood—the symptomatic affection remaining after the lesion which produced it has been removed. It may, moreover, result from habit contracted in childhood.—*Squinting* may be *associated* with other forms of palsy—with palsy of the muscles of the face, or with hemiplegic anæsthesia, or with hemiplegic loss of motion, or with a combination of both in various grades. It is a common symptom of scrofulous softening of the more central parts of the brain.

57. *b. Ptosis*, or falling of the upper eyelid, often arises from an atonic or paralytic state of the *levator palpebræ superioris* muscle, owing to some alteration implicating the nerve which supplies it; although it may arise also from a spasmodic action of the *orbicularis palpebrarum* muscle. A slight examination, or the degree of resistance opposed to raising the eyelid, will immediately show the nature of

the affection, Ptosis from local palsy is often associated with squinting, showing that the third pair of nerves is palsied. It is always a serious affection, particularly when thus associated; and is often indicative of cerebral disease, being frequently a precursor of hemiplegia or even of apoplexy; and it often attends complete hemiplegia (§§ 75, *et seq.*). It is a common and most unfavourable symptom of the advanced stages of diseases of the brain in children. It is, however, sometimes caused by a tumour pressing upon the nerves in some part of their course.

58. *c. Lagophthalmia*, or gaping of the eyelid, the eye being generally open or imperfectly closed, sometimes proceeds from paralysis of the *orbicularis palpebrarum* muscle, owing to disease of, or implicating the *portio dura* nerve. When this is the case, the affection is associated with a state of partial palsy about to be noticed.

59. *d. Palsy of the muscles of the face* is not infrequent, and is generally caused by pressure, injury, or disease of the *portio dura* and fifth pair of nerves. If loss of motion is complete, the *portio dura* and motor branches of the fifth pair are affected; if sensibility also be abolished, then the sensitive part of this nerve is implicated. Where the *portio dura* only is paralysed there is little evidence of palsy until the muscles supplied by this nerve are called into action. As long as the patient neither speaks nor smiles the countenance presents nothing remarkable; and the sensibility of the face is unimpaired. But when laughing, coughing, sneezing, crying, or any of the actions of excited respiration are produced, the deformity of the countenance is apparent. The mouth is drawn to the sound side; the derangement of the features being remarkable in proportion to the intensity of the respiratory act. The affected cheek remains motionless, while the other is thrown into unusual action, is flaccid or swells out at the moment of expiration, or when the patient attempts to pronounce a word with emphasis, and appears broader and more prominent than the sound one, which is more contracted or wrinkled. The muscles moving the jaws and used in mastication, which are supplied by the motor portion of the fifth, still perform their functions. Owing to the palsy of the lips on the affected side, the labial consonants are imperfectly articulated; and saliva, or even aliments some-

times escape from the palsied side of the mouth. The patient is unable to spit out his saliva, or to blow fully, or to snuff up with the nostril of the affected side. Lagophthalmia generally accompanies this state of the disease, the eye appearing more prominent, and, being exposed to constant irritation, generally becomes inflamed. In protracted cases the muscles are wasted; and hence the face acquires a peculiar expression.

60. Palsy of the portio dura may be occasioned by severe or protracted cold, or currents of air, giving rise to what was usually termed a blight: but it is probably more frequently caused by an inflamed or enlarged state of the parotid gland, or a tumour in the vicinity of the stylo-mastoid foramen, or inflammation or abscess of the internal ear, or by disease of the petrous portion of the temporal bone, or by a tumour or abscess compressing the nerve at its entrance into the internal auditory foramen; by disease of the brain at the origin of the nerve; or by one or more tubercles, or ulceration implicating the nerve in some part of its course; or, lastly, by a wound or injury of the nerve. It is thus a not infrequent consequence, at some more or less remote period, of chronic inflammation of the ear occurring either primarily or in the course of scarlet fever; the disease having extended to the bones of the ear, to the temporal bone, and ultimately to the membranes and substance of the brain. Several instances of this occurrence have been mentioned in my work on Practical Medicine, when treating of *diseases of the brain* and of *scarlet fever*. It often accompanies concussion of the brain or fissures of the base of the cranium, especially when attended by hemorrhage from the ear.

61. When the *motor portion of the fifth pair of nerves* only is palsied, there is generally slight loss of sensibility of the parts supplied by this nerve; but the motions of the jaw on the affected side are impaired. Mastication is impeded, and is not performed on that side owing to the palsy of the muscles which convey the morsel to the operation of the teeth, and to the lost action of the masseter and temporal muscles. There are still, however, command over the countenance, little or no distortion of the features, and no loss of expression. The jaw is in some cases a little depressed; but this disappears when the patient smiles or

laughs, a circumstance distinguishing this variety of palsy from that caused by disease implicating the portio dura nerve. This state of disease may exist alone; but it is commonly associated with loss of sensibility (§ 36, *et seq.*), and is usually further complicated with hemiplegia. The disease of the motor portion of the fifth pair may be seated in the course of the nerve, or in or near the origin of it in the brain.

62. As Dr. BENNETT has very justly remarked, it is rare that the lesions are confined to the fifth or to the seventh pair of nerves. In general, the symptoms of disease of the one and the other are conjoined; although they seldom indicate an equal affection of both nerves. Commonly the disease appears first in the one, and then in the other; and when the muscles on which the nerves first affected ramify are completely paralysed, the muscles supplied by the second are partially affected. In some of these cases, also, the paralysis is accompanied with neuralgia of a very acute description. Palsy of either of these nerves is very rarely met with in both sides in the same case. Dr. ABERCROMBIE met with an instance of palsy of the fifth pair on one side of the face, and of the portio dura on the other, occasioned by a tubercle in the brain.

63. *e. Palsy of particular muscles or of a single limb* is not uncommon. Temporary palsy is not infrequently produced in these by casual pressure of the nerves supplying them. It may arise, also, from overstraining the nerves or the muscles themselves by over-exertion, as by lifting very heavy weights. Dr. HEALY has described instances of palsy of the hand and forearm owing to pressure caused by the head resting on the arm when asleep, which could be removed only by electricity; and Dr. DARWALL has ascribed the palsy consequent upon over-exertion to the injury done to, or overstraining of, the nerves supplying the affected muscles.

64. Palsy of a single limb is not infrequent in children. It is often congenital; and the upper are more liable to it than the lower limbs. It is sometimes owing to congenital disease or deficiency of the brain; but when it takes place subsequently to birth, it has been imputed to a loaded state of the bowels or to disorder of the stomach; but disease of the brain or spinal cord is probably more immediately than

those connected with its occurrence, Some of these cases grow up, and present the limb of a child joined to the body of an adult. I have met with several instances of this occurrence,—one in a physician, another in a medical student; both being characterized by remarkable irritability of temper. An upper extremity, which contrasted remarkably in size with the sound limb, was affected in both these cases.

65. Palsy of a part or of the whole of one limb is very generally the commencement of a more extended malady; and instances are sometimes met with where only a few of the muscles of an extremity are affected; these being, according to Sir C. BELL, muscles naturally combined in action, although supplied with different nerves and different bloodvessels. Occasionally, even when the lesion is seated in the brain, one limb, especially one arm, is chiefly or solely paralysed—generally as respects its movements, but sometimes also as regards its sensibility, which, however, is less completely lost. Sometimes all the extensor muscles lose their power, while the flexors preserve it. In rare instances, also, as in the case of a lady lately under my care, the motions necessary for writing, or for any fine work, were completely lost, whilst the arm could be moved as strongly as ever. I was lately consulted by a gentleman, who, after complaining of headaches, experienced a partial loss of power of his fingers, preventing him from writing and the more delicate movements of these parts. His arm was strong, and he could grasp with the fingers with considerable power: there was nothing wrong locally that could be detected. It has been supposed that the nerve in these cases is incapable of performing its functions owing to pressure or disease; and this is probably the case in some instances, as in those recorded by Drs. ABERCROMBIE and STORER, and more especially when partial paralysis follows acute or chronic inflammation of a nerve. It is even possible that, in other cases, the palsy is caused by imperfect or interrupted circulation through the bloodvessels of the limb, owing to disease of them, as supposed by GRAVES, STOKES, and others. But, in some instances, as in the two just adduced, there are no indications of disease of the nerve itself, and the circulation is perfect in the affected extremity. In the case of the lady just alluded to, who is about sixty years of

age, and of a full habit of body, there was no sign of disease in either the nerves or the bloodvessels of the limb itself. I prescribed for her bloodletting, which was performed under my own eye, twenty-four ounces being quickly taken away without any faintness being caused. After the depletion and purging, the partial state of palsy gradually disappeared.

66. *f. Paralysis of the tongue and muscles of articulation*, although occurring frequently in connection with hemiplegia and apoplexy, is rarely met with alone, or without more or less impairment of motion in some other part. Instances, however, occur of thickness of speech, want of distinct articulation, and even of almost complete inarticulation, without any other attendant paralysis; but either of these states is usually followed, at some indefinite period, by more general palsy, or by apoplexy. In some cases the paralysis of the faculty of speech has at its commencement been accompanied by apoplexy, or by palsy of other parts, which have been removed by treatment, the impairment or loss of articulation alone remaining. I have been consulted in several cases in which loss of the power of articulation was either the chief apparent disease, or was associated only with difficult or impossible deglutition. Sometimes palsy of distant parts attends the loss of speech, or of deglutition also. In a case from the country which I recently attended, complete loss of the power of articulation was associated with partial palsy of the extremities, the patient being deficient chiefly in the power of contracting the muscles of the hands and forearms. Both lower extremities were also weak. He returned without benefit from treatment, and died soon after. I have not learned the particulars connected with his death. In this case, loss of articulation was the first and chief symptom, yet the tongue could be protruded without being drawn to either side.

67. Some years ago, Mr. WINSTONE consulted me in the case of a professional gentleman, aged about fifty, who had for many months lost all power of uttering the most simple articulate sound, and who swallowed substances with the utmost difficulty, or not at all, unless they were conveyed over the base of the tongue. The tongue could not be protruded, and indeed was incapable of motion. The mouth

also could be opened only imperfectly, but the sense of taste was not affected. He had neither headache nor any other ailment; and no other part was paralysed. He attended regularly to his profession during the usual hours of business; but was obliged to write down all he wished to say. The disease was ascribed to pressure or structural change at the origin, or in the course of the lingual and glosso-pharyngeal nerves; and the prognosis of suddenly fatal apoplexy or general paralysis was hazarded, which occurred some months after my attendance ceased. Various means were prescribed without any effect on the disease.

68. Most frequently, however, paralysis of the muscles engaged in articulation, or in deglutition, or in both functions, follows upon severe or renewed attacks of apoplexy, or of hemiplegia complicated with apoplexy. I have seen it occur after inflammation of the brain and after cerebral convulsions in children, as in the case of a fine boy, respecting whom I was consulted by my friend Mr. WORTHINGTON of Lowestoft. The disease may continue for many months unmitigated by treatment; it is generally ultimately fatal; death taking place after or during a convulsive attack.

69. *g. Loss of voice, or aphonia*, in the true sense of the word, can occur only when the *larynx* is affected—either its muscles being paralysed, or its structure changed by serous or other effusion between its ligaments, tendons, or cartilages. Loss of the power of articulation depends upon paralysis of the tongue, cheeks, and lips: and this loss may be so complete as to prevent all *articulate* sounds from being produced; still the power of uttering sound remains, but in its simplest form only. When articulation is entirely gone, the motions of the muscles of the pharynx and base of the tongue are also lost. Simple aphonia is often caused by temporary inaction or torpor of the nerves of the larynx in hysterical or nervous persons, and is thus a complaint of comparatively little importance. Loss of the power of articulation is a much more serious and permanent malady than aphonia, and is either attendant upon, or followed by, the most complete or fatal states of palsy or apoplexy, unless in hysterical cases; and in these the motions of the tongue are also sometimes temporarily lost. In catalepsy, voice and articulation are quite lost, with all voluntary motion, but they return as soon as the cataleptic attack ceases. In

incomplete palsy of the tongue, protrusion of it may generally be affected; but it is usually drawn to one side, particularly if hemiplegia also exist. But if this form of palsy be not also present it is protruded in a straight direction, or it is protruded imperfectly. The tongue, even in cases of hemiplegia, is not always drawn towards the sound side. Sometimes it is drawn to the paralysed side. LALLEMAND imputes its direction to this side to the action of the genio-glossus muscle of the unaffected side drawing the base of the tongue forward and turning the apex to the opposite side. CRUVEILLIER attributes the direction of this organ, when protruded, to feebler resistance on one side than on the other.

70. *h. Paralysis of the respiratory movements* when complete causes death in a few seconds; but these movements may be incompletely paralysed, especially those of the intercostals, and life continue for a time varying with the degree of loss of power. Several diseases attended by organic lesion, extending to the base of the brain and medulla oblongata, or upwards from the spinal cord to these parts, terminate life by the asphyxia consequent upon palsy of the respiratory muscles, the nerves of respiration being implicated at, or in the vicinity of, their origins, or as they pass through these envelopes and the foramina of the bones which protect them at their sources. Thus, injuries extending to the base of the brain or the medulla oblongata, or the changes and products of inflammation of the sheath, or membranes, or substance of the medulla, or of parts in the immediate vicinity, produce paralysis of the respiratory muscles in either an incomplete or complete form, according to the extent and seat of lesion, and to the slowness or rapidity of the organic change. *Paraplegia*, especially when passing or having passed into *general palsy* (§§ 124), most frequently terminates fatally, owing to the extension of the paralysis to the muscles of respiration. Dr. SCHOENLEIN of Berlin has recorded a case in which a large fibrous tumour involved the first cervical ganglion of the sympathetic nerve on the right side, destroying the natural structure of the ganglion, and altering that of the communicating cerebral, spinal, and ganglial nerves. The patient, a female, complained of palsy of the upper extremities, with numbness and tingling, palpitations of the heart, oppression and suffocating sensations in the chest, and threatened asphyxia,

of which she died. (M. LEBERT, *Physiol. Patholog.*, &c., vol. ii., p. 179.)

71. *i. Paralysis of any of the muscles of organic life* rarely takes place to a considerable extent, and is, indeed, incompatible with the continuance of life, unless in those viscera which are more or less influenced by volition, as the urinary bladder, the rectum, the sphincters, &c. A temporary state of relaxation or loss of the contractile power of portions of the alimentary canal not infrequently occurs in the course of various diseases, and constitutes a part of the pathological conditions obtaining in inflammations of this canal, in colic and ileus, in lead colic, in hysteria, &c.: but it rarely continues for any considerable period, at least in a complete form, and in the same portion of the tube, without being followed by a fatal result. An incomplete state of palsy of the muscular coats of the digestive tube, attended by remarkable torpor of these coats and great flatulent distension of this tube, often accompanies the more severe cases of hemiplegia and of paraplegia, especially as they advance to a fatal issue.

72. *k. Palsy of the urinary bladder*, owing to over-distension, is a frequent occurrence: it is likewise connected with paraplegia; and in both circumstances of the complaint retention of the urine is the prominent phenomenon. Hysterical paralysis of the bladder is often met with. Sir B. BRODIE remarks that, in these cases of hysterical paralysis, "it is not that the muscles are incapable of obeying the act of volition, but that the function of volition is suspended." Of course, the muscles possess their capability of motion; but a careful inquiry into the phenomena of hysterical paralysis in some cases which have come before me, has shown that, owing to a weakened or exhausted state of the spinal cord and motor nerves, volition is not transmitted in sufficient force to produce muscular action; that volition is not suspended, although it may be weakened; and that it must be made with more than usual energy to act upon, or even to be transmitted to the muscles.

73. *l. Palsy*, more or less complete, *of the rectum* is not infrequent in aged persons and in hysterical females. In these cases, fæcal accumulations often form in the rectum and colon, owing to the inaction or want of power of these parts of the alimentary canal to overcome the resistance of

the sphincter. But in many of these cases, the paralysis extends also to the sphincters, especially to that of the rectum, the accumulation taking place more or less throughout the colon and rectum, the fæces being indurated in consequence of absorption of the more watery parts, and the sphincter ani being equally paralysed with the rectum.

74. *m. Palsy of the sphincters* of the rectum and bladder attends most maladies in which either the brain or the spinal cord is oppressed or has lost its power. The inability to retain the fæces, or the incontinence of urine which results, becomes one of the most troublesome and unfavourable phenomena of the disease. As, however, this form of local paralysis very rarely occurs unconnected with a more extensive malady, it will be more fully noticed hereafter.

ii. PALSY OF ONE SIDE OF THE BODY.

75. *Hemiplegic palsy*;—*Hemiplegia* (from *ἡμισυ*, the half, and *πλησσω*, I strike)—*semisideratio*—is used to denote paralysis of the movements of one side, extending to both the upper and the lower extremities. When the upper limb of one side and the lower of the opposite side is affected, the palsy is usually called *transverse* or *crossed palsy*; but this form is comparatively rare. I lately attended a case of this crossed form of palsy with my friend Mr. ROWDON, which soon terminated fatally; but we were not allowed to examine the body after death. Hemiplegia is the most common form of the malady; and it occurs more frequently on the left than on the right side—the proportion being as three to two, according to the observations of Sir G. BLANE. Generally, the paralysis extends to the side of the face, the angle of the mouth being drawn to the sound side, and a little upwards. The tongue, also, is often more or less affected, and on the same side, as shown either by its imperfect protrusion or by its being drawn to one side—usually to the same side as the mouth. The pharyngeal muscles are sometimes also affected. Hemiplegia is limited exactly to one half of the body, the median line being the boundary, owing to the distribution of the spinal nerves.

76. *A. SYMPTOMS ATTENDING THE ACCESSION OF HEMIPLEGIA.* The attack of hemiplegia occurs variously. 1st. It may appear gradually; local palsy, affecting first the

fingers or toes, leg or hand, taking place, and extending slowly and gradually until the lateral half of the body is implicated. In some cases of this form of the disease, convulsive movements of a limb, or even of both limbs, are remarked, and continue until the loss of motion is complete.

77. 2d. It may occur in an incomplete or slight form in the whole of one side, the upper or the lower extremity being most affected. It may thus appear without headache, but with pains in the affected limbs resembling those of rheumatism, motion being only or chiefly affected. The sensibility of the surface is much more rarely lost or chiefly impaired. The paralysis may continue in this state, or be more or less remedied, or it may proceed either slowly or rapidly to complete hemiplegia, or ultimately terminate in coma or apoplexy. In these cases, softening of a portion of brain, or cancerous or other tumours or tubercles, have often been found in the brain after death.

78. 3d. After various chronic cerebral symptoms and affection of one or more of the senses, the speech becomes affected, the tongue more or less palsied or protruded with difficulty, and the face distorted. Upon these, complete hemiplegia supervenes in a short period. This form is not infrequent in aged persons. In this and the preceding variety several organic lesions, as tumours, tubercles of the brain or membranes, are often present.

79. 4th. After cerebral symptoms of a more acute and painful character,—after severe headache, febrile commotion, sometimes delirium or intellectual disorder, spasm or twitchings of the muscles, pain in the limbs, occasionally spastic rigidity of some of the flexor muscles, or even convulsions, complete hemiplegia takes place. In this variety inflammatory softening of a portion of the brain is often present; and pain is complained of in the paralysed limbs.

80. 5th. After injury of the head at a more or less remote period, or after chronic cerebral symptoms, and various affections of some one or more of the senses, convulsions or epileptic seizures occur, which, after a more or less frequent recurrence are followed by palsy of a limb, most frequently the arm, extending to the whole side; or at once by complete hemiplegia. In three cases of this variety, I found one or more abscesses in the brain. In these several states of hemiplegia the sensibility is generally unimpaired or but par-

tially affected. Hemiplegia may follow in a few days from a blow or injury on the head, with or without division of the scalp, and with or without fissure of the cranium; or it may not appear until many weeks or months after such injury. In the former case, the abscess is the result of acute or sub-acute partial inflammation of the structure of the brain, and is attended by much softening of the surrounding cerebral substance, and the formation of the abscess may or may not be indicated by rigors or perspirations.

81. 6th. Hemiplegia may occur suddenly without any previous indication. In some of these cases I have ascertained the existence of inflammatory attacks of the brain at a remote period, recovery having taken place long previously to the hemiplegic seizure. This variety is often followed by *apoplexy*, but at no precise period.

82. 7th. Hemiplegia frequently immediately follows an *apoplectic seizure*; or attends it, or appears in its course. In this variety more especially, and very often in that immediately preceding, hemorrhage within the cranium has occurred. Generally, the hemiplegia is observed only when the stupor subsides; but in many instances it may be detected at first by a careful examination of the state of the extremities and features. According to my experience, the sensibility is most frequently implicated in the sixth and seventh of these varieties of the seizure. (See the *Sections on Apoplexy and Complications of Palsy*.)

83. Although some reference has just now been made to the cerebral lesions upon which those varieties of hemiplegia individually appear most frequently to depend, still no precise or constant connection between the one and the other has been ascertained, and most probably it does not exist. Nevertheless, the relation is too frequent and too obvious to be entirely overlooked. Of hemiplegia it may be remarked, in general terms, that it may proceed from any one or more of the numerous *organic lesions* which are described in the sequel as being seated chiefly in the brain and its membranes, and much more rarely in the bones of the cranium. Most frequently, however, it is occasioned by extravasation of blood, with or without softening, more or less limited in extent.

84. A *slight or temporary form* of hemiplegia is sometimes met with, which must necessarily depend upon a temporary

cause, as I have seen them removed in a few days, and much benefited in the course of a day or two. These cases are often sudden in their accession, and are occasionally so speedily and entirely remedied as to lead to the inference that they must have depended either upon interrupted circulation through, or upon congestion of, a portion of the brain only, and not upon softening of the cerebral structure, nor upon effusion of blood or other lesion of the substance or membranes of the organ.

85. In the more severe, as well as the more slight cases of hemiplegia, the lesion, whatever it may be, exists with very few exceptions, and these not very precisely determined, in the side of the brain or cerebellum opposite to the seat of palsy; and that the paralysis affects only one side of the body when the effusion of blood or other lesion is confined to one hemisphere of the brain, or one of the lateral lobes of the cerebellum. This crossed effect of the cerebral lesion is explained with difficulty in all its phenomena, especially when we find the face paralysed on the same side as the body; although this is not universally the case; nor is the crossing effect of the lesion universal, according to M. ANDRAL and some others. We require to gain much more minute and extended knowledge of the functions of the cerebrum, cerebellum, and medulla oblongata, and of the connections of these organs with each other, and with the spinal marrow and the origins of the nerves, before we can arrive at anything like sound inferences as to this matter, or as to the correspondence of loss of function with the seat of lesion of parts within the cranium. Dr. R. B. TODD remarks that, according to the views of FOVILLE and others, we should expect to find the optic thalami and corpora striata, or some of the fibrous radiations which pass through these bodies, the seat of disease in hemiplegia; and in fact, in the generality of cases, those bodies, or some portion of the cerebral hemisphere, present alteration of structure variable in extent as well as in degree. It must be admitted, however, that cases occur in which one only of these bodies is the seat of disease, or in which no appreciable lesion can be detected in the hemisphere. Such occurrences, however, as Dr. TODD justly observes, can hardly be deemed to militate against the theory of FOVILLE, inasmuch as our ignorance of the mechanism of cerebral action, whether healthy

or morbid, is alone sufficient to make them appear anomalous to us. This topic will be more fully noticed hereafter.

86. Hemiplegia is very rarely produced by disease of the upper part of the spinal marrow. In several cases of lesion of this part in which I have been consulted, the paralysis has been at first local or partial, generally affecting one arm, but it has soon become more general. In some instances, however, one side has been affected more than the other, or one or two limbs more than the rest. Instances, however, have been observed of loss of motion of one side, and anæsthesia of the other, but these are remarkably rare. One has been adduced by PORTAL and another by Mr. DUNDAS. This latter case was consequent upon concussion of the spine produced by a fall. The temperature of the side and limbs deprived of sensation, but possessing muscular power, was $1\frac{1}{2}^{\circ}$ Reaumur below the side which retained sensation without motion; the heat on this side being rather beyond natural, and the sense of feeling morbidly increased.

87. Palsy of one side of the body is a frequent occurrence at a *far advanced period of life*, especially in those who have lived fully, or who have employed much, or greatly exerted, their mental faculties. At this age it may or may not be attended by loss of sensation; most frequently by impairment of sensation merely; and in the more severe cases there is often insufficient control over the excretions both fæcal and urinary. Flatulent distension, owing to a palsied state of the digestive tube, especially in the very aged, is also present. Emaciation and loss of temperature are the more remarkable the more complete the loss of sensibility. The most perfectly paralysed limb often becomes œdematous, especially at its extremity.

88. Hemiplegia may be *congenital*, or may occur soon after birth. M. CAZAUVIEILH has shown that congenital hemiplegia usually depends upon an arrest or defect of development or growth in a portion of the brain. The limbs on the affected side, particularly the arm, were stunted in growth, and flexed and contracted. The opposite hemisphere of the brain was generally smaller, the convolutions imperfectly developed, the capacity of the ventricle less, and the corpus striatum and optic thalamus of smaller size. Cases of this kind may attain an advanced age. Most of the instances I have had an opportunity of observing were

idiotic, as well as incompletely paralysed on the deformed side. Cases of hemiplegia have occurred in which the opposite side has become similarly affected, either soon after the first attack or during convalescence from it. In these, the sensibility has sometimes either been only partially or not at all affected.

89. The paralysed side may be the subject of *pain*, the result of morbid action in the brain, or of *spasm*; hence designated spasmodic hemiplegia by SAUVAGES and others. In these, inflammatory irritation in the brain or its membranes, in the vicinity of the primary seat of lesion, often exists. Deep-seated pain or spasm may occur in a limb, the superficial sensibility of which is either impaired or altogether lost; and either, or both phenomena, may affect the opposite or sound limb, although less frequently than the paralysed side. I have never seen an instance of hemiplegia with spasm of the paralysed side, to which the term of *hysterical* imposed by some nosologists, was strictly applicable. Hysteria very rarely occasions true or complete hemiplegia, but I have met with several cases of paraplegia caused by hysteria.

90. *Intermittent hemiplegia* has been noticed by SAUVAGES, MORGAGNI, CULLEN, ELLIOTSON, and TODD; but examples of it have been rarely and imperfectly observed. It would seem that the congestion of, or vascular determination to, the brain, during the febrile paroxysm, occasioned a condition of one of the hemispheres, or of a portion of it, so as to interrupt the action of volition; but that the change was only temporary, and depended upon the state of circulation attending the febrile paroxysm—that it consisted neither of softening nor of hemorrhage. A very slight or incomplete form of hemiplegia in rare cases follows epileptic seizures, and disappears in a few days, and recurs with the next seizure of epilepsy, being thus intermittent; but the paralytic affection consequent upon epilepsy is frequently either more partial or slight, or more severe and permanent than this. (See *the Complications of Palsy*.)

91. Much variety in the symptoms are observed in the course of hemiplegia, depending upon circumstances that will be alluded to hereafter, and upon a partial or more complete return of sensibility when this has been also lost, and upon a slight recovery of some of the motions of the limbs,

particularly of the lower limbs; but generally when the patient is able to walk a little, or with the aid of a stick, the lower extremity is usually thrown forward by the inclination of the trunk to the sound side. The foot is pointed outwards when the limb is raised, and falls from its own gravity. The affected arm is applied to the trunk, and the forearm is slightly flexed on the arm; the wrist and fingers being also slightly bent inwards, and occasionally somewhat œdematous.

iii. PALSY OF THE LOWER HALF OF THE BODY.

92. *Paraplegia*, &c., *Paraplegia* (from *παρὰ*, *vitiose*, and *πλησσω*, *percutio*) has in modern times been applied to that form of palsy in which the lower half of the body is deprived of motion or sensation, or of both. HIPPOCRATES denominated all paralytic affections *paraplegia* which were consequent upon apoplexy: and ARETÆUS employed the word to designate any form of palsy. BOERHAAVE and VAN SWIETEN defined *paraplegia* to be a palsy of all parts below the neck—or viewed it as a *general palsy* (§ 124, *et seq.*)—and in this sense it has been used by OLLIVIER and several modern pathologists. I shall, however, apply the term *paraplegia* to that form of palsy which affects the lower half of the body on both sides. When palsy extends to the upper and lower extremities of both sides it may be denominated, although it is not strictly, *general palsy*.

93. *A.* The SYMPTOMS most characteristic of *paraplegia* are, *loss of the power of motion in the lower limbs, with inaction of the urinary bladder and rectum, or loss of power over the sphincters, and often with impairment or entire loss of sensation.*

94. *a.* The *accession* of the symptoms of *paraplegia*, as well as the character, range, and grouping of the symptoms themselves, varies with the pathological changes or physical causes of the malady—according as it proceeds from injury, from inflammation and its consequences in the spinal cord or its membranes, or from organic lesions of these parts, or of the bones and cartilages of the spine. When the disease is consequent upon injury, the symptoms are generally sudden in their accession and fully developed, although this is

not always the case, especially if the accident be slight, and serious only as regards its consequences. When it proceeds from disease of the cord or of its envelopes, some disorder of sensation or of motion, or even of both, is first experienced, which becomes more or less rapidly increased to numbness, or diminished power of motion, of the lower extremities. The patient trips when walking, is unable to stand for any time, and complains of a sense of weight in the limbs, and of pains extending to the legs and feet. He cannot walk without the aid of one or two sticks, or of another person. The urinary bladder, rectum, and sphincters, soon afterwards become more or less affected, and various other phenomena supervene, according to the seat and extent of the organic change occasioning the affection. In some cases *sensibility* in the lower extremities is but slightly, or even not at all impaired, particularly when the lesion is seated high in the spine; and when this is the case, even the patient's power over the excretions and the sphincters may not be materially diminished. It is comparatively rare that sensibility is impaired or altogether lost in the lower limbs without the power of motion being also diminished or abolished.

95. *b.* The *Symptoms, progress, and consequences* or *terminations* of paraplegia vary with the lesion producing it; and it is difficult, if not impossible, to connect the symptoms in their full extent and course with the particular lesion upon which they depend. The exact seat of lesion, in respect not only to the portion of the cord which it affects, but also to the roots of the nerves connected with the part implicated; the nature of the lesion, particularly as regards the degree of pressure or of irritation it produces; and the suddenness or slow progress of the change—all influence very remarkably the phenomena and course of the malady.

96. There are few diseases which have been more lucidly illustrated than paraplegia consequent upon injury has been in the paper upon this subject published by Sir B. C. BRODIE; and as injury often causes inflammation, and its usual consequences, of the spinal cord and its membranes, the subject has both a medical and surgical bearing. Many, however, of the changes consequent upon injury—even hemorrhage upon or into, and softening of the spinal cord,—and

various organic lesions of these parts, or in their vicinity, may occur independently of external injury, and cause paraplegia. It will, therefore, be proper to enumerate these.

97. *B.* THE CHIEF STRUCTURAL CHANGES PRODUCING PARAPLEGIA.—¹*a.* *Concussion* of the spinal cord affecting the intimate structure of some part of the cord, although not evidently to the unassisted eye;—²*b.* *Manifest laceration* or *division* of its substance;—³*c.* The *pressure* or *irritation* caused by *extravasated blood*;—⁴*d.* The pressure or irritation produced by *displaced bone*;—⁵*e.* *Sanguineous congestion*, particularly of the spinal veins or sinuses;—⁶*f.* The usual *consequences of inflammation* of the cord or of its membranes, especially effusion of coagulable lymph, induration of the substance of the cord, &c.;—⁷*g.* *Softening* of the cord, whether it be consequent upon inflammation or upon impaired nutrition or lost vitality;—⁸*h.* *Inflammation*, and its *consequences*, of the *vertebræ*, or of the *intervertebral substance*, as *caries*, *exostosis*, *anchylosis*, &c., of the *vertebræ*;—⁹*i.* *Scrofulous disease* and *tubercles* in these parts, and scrofulous *caries* of the *vertebræ*, causing angular curvature of the spine and pressure on the cord, &c.;—¹⁰*k.* *Tubercles* or *tumours* in the cord or its membranes;—¹¹*l.* *Hydatids* or *cysts* in either of these situations;—¹²*m.* *Fungoid* or *malignant tumours* implicating the cord or the roots of the spinal nerves;—¹³*n.* And the *projection of the intervertebral substance into the canal of the spine*, with *thickening of the ligaments* covering this substance, narrowing of the canal and pressure on the cord,—are, severally, pathological causes of paraplegia; but the symptoms of individual cases, as well as the issue, depend upon the part of the cord affected; upon the extent of the particular lesion; upon the slowness or rapidity of its development; and upon the manner in which the cord or roots of the spinal nerves is implicated—whether by pressure, loss of substance, softening, irritation, interrupted circulation, &c., or by two or more of these conjoined.

98. *a.* It would be inconsistent with a proper consideration of this subject were I to overlook the physical condition of the spinal cord, especially in relation to the fluid surrounding it, to the membranes enveloping it, and the bony case protecting it. The physiological view here sug-

gested materially aids the pathological consideration of the subject. This interesting physical condition also obviously concerns the roots of the spinal nerves, and serves to explain several circumstances connected with them, as well as with the spinal cord itself. These parts, being thus surrounded by a limpid fluid, and being protected by membranous coverings, and by a bony case and muscles, are thereby rendered much less liable to disease and injury than if they were otherwise circumstanced, as first insisted upon by COTUGNO, more recently by MAGENDIE, and most satisfactorily by Dr. TODD. Before pursuing further this part of the pathological bearing of the subject, I will notice more fully the chief phenomena of paraplegia.

99. *b. Paralysis of motion* is the chief characteristic symptom of paraplegia, and it affects more or less all the muscles supplied with nerves from the seat of and below the injury or disease in the cord. If the disease be slight, only one limb or a set of muscles may be affected, as above adverted to, especially if the roots of a nerve or nerves on one side only be implicated; or one limb may be more severely affected than the other; or a slight affection may soon become severe, or the converse. Complete paraplegia may thus be gradual and slow; or it may be sudden. It rarely happens that the palsy extends to parts supplied with nerves proceeding from a portion of the cord above the seat of injury. Instances, however, of this occurrence are recorded by Mr. STAFFORD and Sir B. BRODIE. In these cases, it may be presumed that the consequences of the injury, as softening of the cord, effusion of blood or of lymph, had extended upwards from the part primarily injured.

100. Although voluntary motion is completely abolished in the lower limbs, involuntary motions and spasms of their muscles are not infrequent. When the lesion is seated high in the cord, spasmodic contractions, either of more or less permanency, or of a momentary or short continuance, may affect the abdominal muscles as well as the muscles of the lower limbs, and these may be attended by much or by little pain, either in some portion of the spine, or in the limbs. Occasionally the involuntary motions are of a tremulous kind, and often the flexor muscles are those more permanently contracted. The pains, involuntary motions and spasms, are often manifestly caused by inflammation or

irritation of the cord or of its membranes or of the roots of the nerves at the seat of lesion, especially by extravasated blood; by pressure or irritation of tumours, displaced bone, effused pus; by caries of the vertebræ, by malignant or other formations.

101. The introduction of the catheter, tickling the soles of the feet, or pinching the surface, will often excite *involuntary or excito-motary movements*, although the irritation producing them may not be perceived or felt by the patient. When these movements appear spontaneously and independently of being excited in either of these ways, then they may be referred to some one of the above lesions, or to irritants acting upon the ganglionic nerves, the irritation being propagated to the roots of the spinal nerves by communicating branches; but if they occur only when thus artificially induced, or in the ways now mentioned, then they can arise solely from the effect produced upon the sensory nerves, whether these be ganglial or spinal, although perception does not take place.

102. *c.* The *affection of the urinary organs* consequent upon paraplegia from injury or disease of the spinal cord varies in different cases. It may be considered with reference to the functions of the kidneys, and the states of the bladder. Paraplegia from severe external injury is very frequently followed by diminished secretion of urine, or even by complete cessation of the function; but this is often only temporary, and the urine is secreted in variable quantity and altered quality. In some cases, it is at first acid, very offensive, of a yellowish colour, and deposits a yellow amorphous sediment. More commonly, however, especially after two or three days, the urine is ammoniacal and turbid when voided, and deposits on cooling a quantity of adhesive mucus. At a later period, a white substance—phosphate of lime—may be detected in the mucus, which is often tinged with blood; and subsequently blood and bloody coagula are blended in the urine and mucus. These changes generally take place between the third and ninth days from the paraplegic attack, when it is sudden and complete, especially if caused by injury; and when the bladder becomes distended from loss of its contractile power. At the same time that this distention exists, a dribbling of urine often takes place if the fluid is not drawn off. In

other cases, especially in those caused by disease seated in or implicating the cord, the voluntary power over the sphincter of the bladder only is paralysed, there being incontinence but no retention of urine. In the most severe cases, the urinary affection continues and hastens a fatal issue; but in others, the power of evacuating the bladder or of retaining the urine is restored; and the urine assumes a more acid and healthier character. This amelioration of the urinary disturbance is one of the chief indications of restoration of the functions of the cord; but the state of the urine often varies from time to time, before it becomes permanently healthy, or before the muscles of the extremities obey the will.

103. In these cases, where the urinary bladder is paralysed and the urine retained, a state of septic or asthenic inflammation is rapidly produced in the mucous membrane of the bladder, ureters, and pelves of the kidneys, occasioning the chief changes observed in the urine, particularly the ammoniacal state, the presence of mucus and coagula of blood, &c. Sir B. BRODIE has put the question, whether the injury of the cord operates directly on the mucous membrane, or whether its first effect is to alter the quality of the urine, the mucous membrane becoming affected afterwards owing to the unhealthy and irritating secretion? Instead, however, of imputing the effect on the urinary organs to one of these causes only, I believe that it may be justly imputed to both of them—that the unhealthy and irritating secretion rapidly induces inflammation of the surfaces with which it remains for a time in contact, owing to the marked disposition of these surfaces to become inflamed when deprived of that portion of nervous influence which they derive from the spinal cord; and that they partake in this disposition to be inflamed and ulcerated with other parts below the seat of spinal lesion. In some instances, particularly when the lesion is seated high in the cord, or when the paraplegia is incomplete, or the power of motion principally affected, the urinary disturbance is not considerable, and the powers of expulsion and retention but little impaired.

104. *d.* The *bowels* are generally not only torpid in paraplegia, but the evacuations are very dark and morbid. This latter state is the more remarkable the higher in the cord is the seat of lesion. In a case lately under my care, the

evacuations, which were procured without difficulty, were nearly black, or of a deep greenish black, and of a treacle or tar-like appearance and consistence. This colour is probably owing to impaired decarbonisation of the blood by respiration, the liver and digestive mucous surface performing a vicariously increased function in respect of sanguineous depuration, or of removing the superabundant carbon from the blood. This explanation of the phenomenon was published by me as early as 1815, and subsequent observations induce me to re-assert it now.

105. One of the earliest phenomena associated with paraplegia is palsy or *inaction of the rectum and colon*; the latter viscus especially being unable to propel its contents. At the same time the sphincter ani is not relaxed, but subsequently, or as soon as the fæcal matters accumulate in the lower bowels, they pass involuntarily, owing to reaction of these bowels on their contents, and the loss of voluntary power over the sphincter. Incontinence of the fæces generally accompanies retention or incontinence of the urine; whilst, on the other hand, it is not remarked in the same states of the disease that are unattended by the urinary disturbance (§ 102). Still, although the patient has power over the fæcal evacuations, particularly when the upper portion of the cord is affected, or when paraplegia is consequent upon disease slowly developed and implicating the cord, the stools are not the less black and offensive. They are often also very abundant, and the intestines are usually distended by gases, and are tympanitic.

106. *e.* The *sensibility* in paraplegia varies remarkably. When the palsy is caused by concussion or other severe injury of the cord, both sensation and motion are abolished. In sliher cases, and in diseases or spontaneous lesions implicating the cord, and occurring gradually and slowly, the sensibility may be unaffected, whilst motion is altogether lost. In other cases sensation may be only blunted, or it may be impaired in one part and perfect in another, or entirely lost. Very frequently sensibility of the surface only is impaired or abolished, whilst deep-seated parts retain their sensibility; and often pains, more or less acute, or feelings of heat, burning, or constriction, are felt in the back, abdomen, or loins; or even in limbs or parts which are altogether insensible to touch and even to external punc-

tures or injuries. Sensation is sometimes gradually, occasionally suddenly, lost; but as in hemiplegia, so in paraplegia, it is restored before the power of motion.

107. *f. Priapism* attends paraplegia from concussion or injury of the upper portions of the cord: but it sometimes occurs in those cases which are caused by disease as well as by hemorrhage in or upon these parts of the cord. Sir B. BRODIE has not met with this symptom where the seat of lesion was below the sixth dorsal vertebra. It is observed even where the sensibility is altogether abolished. It seems to be occasioned, in some cases, by the irritation consequent upon the introduction of the catheter.

108. *g.* The *temperature* of the paralysed parts is generally above the healthy standard. This is most manifest in complete paraplegia from external injury; but I have observed it also increased in cases produced by disease, although not so generally and remarkably; and where the sensibility of the surface was unimpaired. This increase of temperature appears to be chiefly owing to the dry and unperspiring state of the surface of the paralysed parts, in connection with the state of the circulation and blood. When sensibility of the paralysed parts has been either lost or much impaired, both the temperature and nutrition of these parts have been reduced: this circumstance showing that sensibility, animal heat, and nutrition chiefly depend upon the organic system of nerves.

109. *h.* The occurrence of *gangrenous sores*, upon the least injury or pressure of any of the paralysed parts, is generally observed and is often remarkable. It seems to be attributable to an impaired vital cohesion of the tissues, caused by a loss of that portion of nervous energy bestowed on them by the spinal cord. It is most manifest in cases of severe injury of the cord, and when sensibility is altogether lost. When the lesion is seated high in the cord, and is more or less chronic, a scurfy, dry, or furfuraceous state of the surface is often observed.

110. Numerous *cases* of paraplegia illustrative of the pathological causes enumerated above (§§ 97, *et seq.*), and of the description now given, might be adduced from my own experience and from other sources; but I will briefly advert to only a few.

111. *Palsy consequent upon inflammation of the mem-*

branes of the spinal cord, &c.—A medical friend was driven in an open carriage, after having been over-heated, to some distance in a cold night, and was soon after seized with pain in the dorsal and in the lumbar spine, and with severe pains and cramps in the lower extremities. I did not see him until some weeks after his attack. He then complained of extremely severe rheumatic pains in the lower limbs, with increased sensibility of the surface, a nearly total loss of motion of the lower extremities, tenderness on pressing the the spinous processes of the upper lumbar vertebræ; with a girding sensation proceeding thence around the abdomen, with occasional cramps and paroxysms of pain in the legs and thighs. His bowels were confined; his urine was voided regularly; but it contained much of the phosphates. He was treated for inflammation of a rheumatic character of the membranes of the spinal cord; and as the disease continued in a more mitigated and chronic form, it was inferred that lymph which had become coagulated was effused between the membranes, or between them and the medulla. The patient still continues paraplegic.

112. In a nearly similar case which I soon afterwards attended, also in a medical friend, with Sir B. BRODIE and Dr. WATSON, the urine was freely voided, but abounded in the phosphates; and in the course of our attendance inflammation of the femoral vein supervened. This complication was however overcome, but the paraplegic disease became chronic. This case was also caused by exposure to cold, and was viewed as rheumatic.

113. *Paraplegia; lymph between the membranes of the cord, partially converted into adipose substance, &c.*—A female, aged about fifty, very corpulent, and of intemperate habits, complained of pain in the lower extremities, and an almost total loss of motion, with tenderness on firmly pressing on the spinous processes of the lower dorsal vertebræ. The loss of motion was more complete at first in one limb than in the other; but it gradually became complete in both. Sensibility was not impaired; and the urine was not retained. A distressing feeling of constriction around the abdomen was complained of. After several weeks this sensation was referred to the base of the thorax. Subsequently one arm was also partially paralysed, and she soon after died of asphyxia. She had imputed the attack to ex-

posure of her back to a current of cold air when insufficiently clothed. On examination after death, the venous sinuses of the vertebral canal were remarkably congested with black semi-fluid blood. Coagulated lymph, partially organized, was found effused between the membranes; and the more organized parts presented somewhat of an adipose appearance from the quantity of oil-globules they contained. The upper portion of the cord and medulla oblongata were very vascular and surrounded by a turbid serum and recently effused lymph.

114. The inflammation in this case after being limited for a considerable time, and in a chronic form, to the membranes of a portion of the dorsal medulla, had ultimately extended upwards to the medulla oblongata. The effusion of lymph from the inflamed and congested membranes of this latter part and of the cervical cord having been the more immediate cause of death. The oleaginous, or the approach to an adipose appearance of the more organized portions of the coagulable lymph observed in this case, was still more remarkable in the following case.

115. *Paraplegia supervening upon prolonged jaundice; lymph found effused between the membranes, and converted into a soft adipose tissue in the dorsal and lumbar regions.*—A lady, aged about fifty at her death, was attended by Dr. KING of Eltham, and the author, for jaundice, which had continued during several years without having been materially affected by treatment. She, however, had retained her strength, flesh, and spirits, and was able to go abroad daily until nearly a twelvemonth before her death, when she gradually lost the motive power of her lower extremities, sensibility being unimpaired. She had, about the accession of the palsy, complained of pain in the back and loins. Her bowels became confined, but the excretion of urine was not affected. The menses were regular, and continued so during the paraplegia up to two or three months from her death. The palsy had continued for many months, with a slight improvement during the latter months, when a very few days before her death, and owing to mental and physical perturbation, signs of the extension of the disease to the upper extremities, with symptoms referable to the brain appeared, and she died asphyxed. On examination after death by Dr. KING and two other medical men in my

presence, the dorsal and lumbar cord and membranes were found agglutinated by a substance which presented an organization almost identical with adipose substance, but which, as it approached the upper portion of the dorsal spine, presented more and more of the characters of firmly coagulated or partially organized lymph; and in the cervical region as far as the medulla oblongata the lymph had the usual appearance of recent effusion, and were attended by a considerable accumulation of turbid serum. In this case, as well as in some other instances where I have observed coagulated lymph many months after its effusion between serous surfaces, the conversion of it into an adipose, or rather into a cellulo-adipose tissue, had been affected, this conversion being in some respects a process of reparation admitting of a partial return of the functions of the diseased parts.

116. *Paraplegia caused by a cancerous tumour involving the cord.*—A man, aged forty-six, had hemiplegia of the right side, followed by two attacks of epilepsy. Some months afterwards he complained of weakness and numbness of his legs, which increased to total loss of motion below the pelvis, and complete insensibility of the right leg. There was tenderness over all the lower dorsal vertebræ. The palsy ultimately invaded the abdominal muscles and the bladder and rectum. Loss of sensation and voluntary motion was complete below the chest. Convulsive movements of the upper extremities and face, with temporary loss of consciousness, preceded death.

117. On dissection, the brain and membranes were seen to be healthy. Within the spinal canal, closely adherent to the theca externally, there existed an irregular cancerous mass, mottled with dark spots, extending from the third to the sixth dorsal vertebræ, the bodies of which were carious and infiltrated with cancerous matter. The tumour extended outwards between the spines of the vertebræ and muscles to near the integuments. The portion of the cord beneath it was flattened, soft, and wasted. (Dr. WILLIAMS, in *Report of Proceedings of the Pathological Society of London*, vol. i., p. 43.) The complete loss of sensibility in this case, especially at an advanced period, was manifestly owing to the circumstance of the roots of the nerves, and especially the ganglionated roots, having been pressed upon or otherwise implicated by the cancerous tumour.

118. *Paraplegia from a tumour pressing upon the spinal cord, &c.*—A female, aged thirty-five, felt pain in her back and side, after which she complained of weakness, weight, and coldness, with impaired power of motion, and numbness of the lower extremities. No tenderness was indicated in any part of the spine. During the following four years palsy of motion and sensation became more and more complete in all the parts below the loins, but the bladder performed its functions. She had severe pain in the back and lower part of the body. Both lower extremities were cold, and the right was much swollen. Tickling the soles of the feet, notwithstanding the loss of sensation, occasioned muscular contractions; and the slightest excitement or irritation of parts above the loins caused involuntary movements of the paralysed limbs.

119. On inspection, the body was seen extremely emaciated, with extensive sloughing over the lower part of the back. At the lower dorsal part of the spinal cord there was a tumour involving the substance of the spinal marrow, about the size of a filbert. "Its consistence was firm, and osseous where it sprung from within the dura mater, opposite the eleventh dorsal vertebra, to the depth of a quarter of an inch, and fibrous, with rough granular matter intermixed in the rest of its texture. It compressed, and was firmly attached to, the arachnoid and spinal cord itself, so as to cut into and flatten the nervous substance of the cord. For about two inches below the tumour the cord was much softened, and a little behind its centre was a canal half an inch long within its neurine." (*Rep. of Proceed. of Patholog. of Soc. of Lond.*, vol. i., p. 180.)

120. *Paraplegia caused by tubercles in the spinal marrow.*—A laundress complained of pains in her back and lower extremities, with deficient power in the latter, followed successively by tingling and pricking pains in the legs and by complete paraplegia, both motion and sensation being lost simultaneously. But she suffered severe spasmodic contractions of the muscles, the knees being rigidly bent and drawn to the abdomen when the legs were touched, or when the catheter was introduced. Voluntary power over the bladder and rectum was lost. She pointed to the spinous processes of the lumbar vertebræ as the seat of pain in her back. A large slough formed on the sacrum.

121. At the *post-mortem* examination the membranes of the spinal marrow were seen to be quite healthy; but at two points—the upper one opposite the eighth, and the lower to the twelfth dorsal vertebra—the spinal marrow was slightly swollen into a globular form, and felt hard; the surface in colour, texture, and vascularity, remaining unchanged. On making a longitudinal section of the upper swelling, an oval mass of tubercular matter, three quarters of an inch in length, and about the same diameter as the spinal marrow, of the firmness of a lymphatic gland, of uniform structure, and of a pale green hue, was seen to occupy the whole interior of the organ, and was invested all round by a thin layer of medullary matter. The structure of the spinal marrow immediately adjoining the morbid growth appeared sound. The swelling a few inches lower down was found to be caused by a similar circumscribed mass of tubercular matter contained in the interior of the cord; but it was somewhat smaller in size. In the left crus cerebelli, close to the pons Varolii, and about its middle, another tubercular tumour, in colour and size not unlike the kernel of a hazel-nut, was found imbedded in the substance of the crus, at the depth of about a quarter of an inch from the surface, the adjacent medullary matter being quite healthy. There was also a tumour of the same structure, and of the size of a pea, in the left hippocampus minor. Tubercles were scattered through both lungs; and in the upper lobes some seemed to be breaking down.” (Mr. SHAW, in *Ibid.*, vol. i., p. 25.)

122. *Tumour pressing on the spinal cord, with softening of the cord.*—A young lady, eighteen years of age, complained of weakness and numbness of the legs, and on the following day was completely paraplegic. The motions were soon afterwards passed involuntarily, and there was retention of urine. Three days after the accession of paraplegia, shortness of breathing came on, followed by a slight convulsive fit, and soon afterwards by death. The arches of the dorsal vertebræ and the spines were raised, and, upon the visceral surface of the fourth and fifth, a growth of such a size as to contract considerably the caliber of the vertebral canal was discovered. “This growth resembled carcinoma, although, perhaps, somewhat lobulated. Opposite to this, the theca was congested, although its normal contour was preserved. The medulla spinalis and its theca were

removed. Upon opening the theca posteriorly, in the centre, the veins upon the posterior surface of the cord were turgid, and the cord itself was a little flattened. When the anterior portion of the theca was divided in the centre, and reflected laterally, the anterior columns seemed to fall spontaneously upon either side, and to expose the gray matter of the medulla, which was of a darker tint than usual, and very soft. This softening extended about one inch. The softening corresponded to the fourth and fifth dorsal vertebræ, the texture of the bodies and arches of which appeared to be normal. The new growth was not adherent to the posterior surface of the theca." (Mr. A. KEY in *Ibid.*, vol. i., p. 27.)

123. *Hemorrhage into the spinal marrow.*—A gentleman, forty-four years of age, was suddenly seized with spasms in the stomach, and loss of sensation and power in the lower half of the body. An hour after the attack there was complete palsy of the whole body below the third ribs, and strong priapism. He had perfect use of his arms, but complained of pains of the wrists. No excito-motory actions were producible. His mind was quite clear. The priapism subsided in twenty-four hours. Numbness of the hands, an imperfect power of using them, followed by embarrassed and afterwards difficult breathing, and death on the fourth day. On examination of the body, the vessels on the surface of the spinal cord were much congested. There were two small clots of blood, amounting to about a drachm, in the interior of the medulla spinalis, occupying about an inch and a half in extent, and situated between the origins of the second and third pairs of dorsal nerves. The substance of the cord around the clots was somewhat soft. The medulla was more or less infiltrated and stained with blood from the site of the clots, upwards as high as the third cervical vertebræ, and downwards as low as the last dorsal. (Mr. T. B. CURLING, in *Ibid.*, vol. i., p. 29.)

iv. OF GENERAL PALSY.

124. WHEN palsy extends to both sides of the body, although one side may be more completely paralysed than the other—when all the limbs and trunk of the body are more or less completely deprived of motion—the disease has usu-

ally been viewed as *general palsy*. In this very extended form of the malady, voluntary motion may alone be lost, sensibility still remaining. But the general sensibility is sometimes also more or less impaired, as in cases of paraplegia, much more rarely altogether abolished. Indeed, general palsy may be viewed as a more extended state of paraplegia, as it has been by some of the older as well as of more modern writers. In some rare instances the senses, or one or more of them, have been impaired, or even lost, as well as the power of motion and sensation. Instances of this kind have been published by M. DEFERMON and Mr. DAVIES GILBERT. In the more common states of general palsy the affection extends no higher than the upper extremities; and depends upon some lesion implicating the spinal cord or its membranes below the origin of the pneumogastric nerves. In the rare instances where the senses are also implicated, the lesion is generally seated within the cranium, or in one or more of the parts composing the base of the brain. In the case described by Mr. D. GILBERT, it was found upon dissection that "the dura mater lining the basis cranii was deficient, and its place occupied by a thin and transparent membrane, loosely and singularly arranged; the tentorium cerebelli was likewise deficient, so that the posterior lobe of the brain rested immediately upon the upper surface of the cerebellum. All the nerves were regular."

125. A. THE CHIEF LESIONS CAUSING GENERAL PARALYSIS.—*a. Concussion of the brain* and the *more severe states of apoplexy* are attended by general palsy; concussion of the brain especially implicating also the senses. These, however, occur differently, and are attended by phenomena which remove them from the category of paralytic diseases. The relation between them, however, is intimate. Motion, sensation, and consciousness are all lost in these maladies; respiration and circulation alone continuing. As soon as the respiratory nerves are affected by direct or counter-pressure in apoplexy, or by the change produced in the intimate structure of the brain or medulla oblongata in concussion, life is soon terminated. When, on the other hand, the mischief is less extensive, and the patient regains consciousness, a more or less general state of palsy may remain, at least for a time, and either re-

covery take place, or hemiplegia or more partial palsy only remain.

126. The *apoplectic* or *cerebral form* of general palsy may be viewed as an indication merely of the nature and extent of the cerebral lesion. A person may be seized with hemiplegia consequent upon softening of a portion of one of the hemispheres, or upon hemorrhage in the brain, or upon any other organic lesion. A greater amount of the same lesion, or others concurring with it, may so completely subvert the powers of motion, and even of sensation, as to give rise to a general palsy, circulation and respiration alone remaining. These occurrences are not rare. Thus, inflammation limited to a portion of the brain may first occur, and be manifested by symptoms, which the close observer will detect. At an indefinite period subsequent to this attack the patient may be suddenly seized with hemiplegia, and may continue in this state for weeks, months, or even years, when a profound apoplectic seizure occurs, occasioning general palsy, extending ultimately to the muscles of respiration, and causing death by asphyxia. But, in rare instances, instead of an apoplectic seizure, the other side may become palsied, as respects the power either of motion or sensation, or of both, and either before or after the side first affected has recovered any or much of its powers. In this case there is general palsy, incomplete probably as regards one or other function, in either side, with certain of the senses and many of the faculties of the brain but little affected, until apoplectic coma or paralysis of the muscles of respiration terminates life. An instance of this kind recently occurred in the practice of my friend Dr. BABINGTON; and, upon dissection, lesions were found in both hemispheres of the brain.

127. When circumscribed hemorrhage takes place in the *pons Varolii* or the *crura cerebri*, or when scrofulous tubercles are developed in these parts of the brain, or when tumours press upon or otherwise implicate them, paralysis will attack both sides of the body, although one side may be more affected than the other. Sir A. MORISON found in the brain of a lunatic, who was suddenly seized with paralysis of both sides of the body, a clot of blood about the size of a pea in the centre of the *pons Varolii*. No other disease of the brain was detected. But it is very rare to

observe either of the above lesions in this situation without coma or apoplexy being also present. In a case recorded by Dr. PEACOCK (In *Rep. of Pathol. Soc.*, vol. i., p. 36), the symptoms were those of apoplexy associated with general complete palsy; and, on dissection, the pons Varolii was extensively broken up by extravasation of blood into its substance. In a man who died from coma and other cerebral symptoms, Dr. BENICE JONES (In *Ibid.*, vol. i., p. 41) found scrofulous tubercles in the cerebellum, and two as large as beans in the pons Varolii; and yet he complained only of weakness in his legs up to a few days before his death; the very slow development of these substances preventing the accession of symptoms attending the sudden effusion of blood, or other more rapid changes. General palsy consequent upon lesions of the pons Varolii and adjoining parts have not been observed with such precision, or in such circumstances as will admit of determining the degree in which the sensibility is affected.

128. It may be generally inferred, when the paralysis exists on both sides of the body, is sudden or very rapid in its accession, or when one side is affected, the other being afterwards attacked, and the upper as well as the inferior extremities are affected, that hemorrhage has taken place in both hemispheres of the brain, or in both lateral lobes of the cerebellum, or into the ventricles, or in the pons Varolii or medulla oblongata, or on the surface of the brain; and that paralysis of both sides of the body may also take place when the hemorrhage, although confined to one hemisphere of the brain or lateral lobe of the cerebellum, is so extensive as to produce compression of the opposite hemisphere or lobe; but in this latter case the degree of paralysis is generally greater in one side than in another, yet affecting equally the superior and lower extremities of each side.

129. *b.* The forms of general palsy to which I am desirous of directing attention at this place are altogether *spinal*. They may occur *suddenly*, as in cerebral general palsy, or *gradually*, and even slowly. Severe injuries, as dislocation of the cervical vertebræ, laceration of the cord, violent concussion of the spine, hemorrhage upon the cervical portion of the cord, &c., usually occasion general palsy instantly. M. BOUILLAUD has recorded a case of general palsy which was suddenly produced by hemorrhage from the posterior

columns of the medulla oblongata, laceration of these columns with effusion of blood along the cord and into the fourth ventricle having been observed. Sensation is stated to have existed, but epileptic convulsions had occurred at the commencement of the seizure. The patient died in a short time. (*Journ. Hebdom de Méd.*, vol. ii., p. 56.) But disease seated in the spinal cord or its membranes, or implicating these consecutively, produces the paralytic phenomena much more slowly than the causes just mentioned. Even severe injuries may not be followed by palsy for a considerable period; still, it may be stated, that the accession of general palsy from injury, as well as the phenomena characterizing it, will vary with the immediate or more remote effects of the injury upon the cord or its membranes; it being either instantaneous or remote according to the extent and nature of the lesion produced. A muscular man, aged about sixty years, the father of a late medical friend, when turning in bed, his head being forcibly pressed on the pillow so as to partially raise the trunk, felt something snap in his neck. He was afterwards unable to bend or to rotate the head without causing much pain in the neck. I inferred that rupture or laceration of some of the small muscles or ligaments had occurred, and advised quietude and various means, which palliated the more painful symptoms. Still, the least movement of the head caused distress. Notwithstanding this, he travelled outside a coach during the summer to Cornwall, and returned to town; and not till sixteen months after the accident he complained of numbness and want of power in the left arm. In a day or two the palsy extended to both the upper extremities, but it was incomplete in the right; it soon became more general, and in a short time difficulty of breathing, rapidly terminating in asphyxia, supervened. The body was examined by Prof. R. QUAIN and myself, and the second cervical vertebra was found fractured completely across on both sides, the fracture on one side passing close to the base of the odontoid process. Chronic inflammation had extended from the fracture to the theca and membranes of the medulla oblongata; lymph was thrown out upon the arachnoid surfaces; the membranes, particularly the dura mater, were much thickened, and ultimately the cord at this part was pressed upon.

130. Next to injury or concussion of the spinal cord, *caries* of one or more of the cervical vertebræ may be considered as a cause of general palsy; but the palsy rarely occurs until the disease of the vertebræ has induced chronic inflammation of the membranes of the cord, with thickening and effusion of lymph, or such a degree of angular curvature as to affect the physical condition of the cord itself. I was lately consulted in the case of a child, twelve years of age, who presented unequivocal indications of *caries* of one or two of the cervical vertebræ consequent upon malignant scarlatina. To these supervened incomplete palsy of motion in one arm and hand, which gradually increased and extended to the other arm and lower extremities, until general and complete palsy of motion existed; sensibility was unimpaired. The bowels were obstinately constipated, and the evacuations black and tar-like. The sphincters were not paralysed. Respiration was performed by the diaphragm; and all parts below the face were deprived of motion. The head could neither be rotated nor bent without great pain. The body and limbs were much emaciated. The skin was cool and dry, and covered with a furfuraceous scurf, particularly the scalp. The pulse was very frequent, weak, and soft; the tongue furred and loaded. After persisting for many months in a treatment hereafter to be described, this young lady recovered the use of her limbs, the neck, however, remaining stiff, shortened, and turned a little to one side. In this case, the change produced in the membranes enveloping the cord, or in the theca, was most probably limited to the diseased vertebræ and their immediate vicinity. It is not unlikely that it was owing to this limitation of the disease, and to the gradual accession and increase of it, that the sphincters continued unaffected.

131. *c.* General palsy may be only an *extension of paraplegia*; or, in other words, the disease may commence and continue for a time, as paraplegia, either complete or incomplete, and gradually extend higher and higher until the trunk and upper extremities are deprived of motion, sensibility being generally either not at all or but little impaired. In some of these cases, the palsy of the lower extremities, as well as that consecutively affecting the upper parts of the body, continues incomplete for a long time; the motions consequent upon volition being imperfect, weak, and vacil-

lating, and executed slowly, tremulously, and with difficulty. In these, the patient often complains of spasmodic or severe pains in the limbs, with a sense of constriction; of spasm and flatulent distention, with occasional attacks of painful constriction in the abdomen; of want of power over the sphincters, and involuntary discharges. This last symptom often varies much in different cases and different times in the same case, according to the treatment, &c.

132. In other cases the paralytic symptoms either appear nearly contemporaneously in several parts or limbs, soon becoming general or more complete, or extend much more rapidly from the lower to the upper extremities than in the immediately preceding class of cases. Still the same symptoms are generally present, only varying in some subordinate phenomena, sometimes continuing nearly stationary for months or even for years, and ultimately terminating in a similar manner. I occasionally attended, during nine or ten years, a gentleman somewhat above the middle age, who was affected with this particular form of general palsy. It was long incomplete, sensibility being but little impaired, even when the power of motion was altogether lost. Power over the sphincters was only partially retained for some years; but was very considerably increased by opiates conjoined with stimulants and aromatics; at last it was altogether lost. The intellectual powers were unimpaired. Ultimately cerebral symptoms, followed by coma and death, supervened. Permission to examine the body was allowed by his accomplished and highly intelligent relatives. The membranes at the base of the brain were more vascular than usual, and a considerable quantity of serum was effused. All the spinal arachnoid presented appearances of previous chronic inflammation. It was thickened, covered in parts with false membrane or adherent to the opposite surfaces by means of cellular bands. The whole dura mater or sheath of the cord was more or less thickened throughout, and the arachnoid of the cord, where it was not adherent, was opaque and thickened. The venous sinuses, placed between the bodies of the vertebræ and the sheath of the cord, were remarkably dilated and congested, so as manifestly to encroach upon the spinal canal and diminish its caliber, especially at the lowest part of the cord. The cord itself was firmer than usual, particularly in this situation, was somewhat atro-

phied, and its gray substance was wasted and less apparent. Its vascularity also was diminished, although the spinal veins and sinuses external to the sheath were remarkably dilated and congested with coagulated blood.

133. Whilst I was treating the above case, a respectable tradesman, aged about fifty, came under my care, and was seen by me occasionally until his death, which took place three or four years afterwards. The symptoms, protracted course, and termination of the disease, were altogether the same as those just described. On examination after death, the lesions found in the spinal cord were also similar to those observed in the preceding case. The chief difference was the less remarkable congestion of the spinal veins or sinuses; although this was considerable. The consequences of the chronic inflammation of the membranes, and the state of the cord itself, was nearly the same as those already described. There was, however, a more abundant effusion of serum between the membranes of the cord than in the former case; and much fluid was found in the ventricles of the brain. The upper portion of the medulla oblongata, and the membranes at the base of the brain, presented appearances of recent acute inflammatory action, especially increased vascularity and congestion, with a turbid serous effusion: these corresponded with the cerebral symptoms preceding death.

134. I have occasionally seen, during the last few years, with Mr. PETTIGREW, a gentleman, between thirty and forty years of age, whose complaints are nearly the same as those characterizing the above cases, and are most probably owing to similar changes existing in the spinal cord and its membranes. In this case the loss of power over the sphincters is more remarkable than in the preceding cases, or rather appeared earlier in the course of the disease.

135. The above cases of general palsy, from *chronic inflammation of the membranes of the cord and its consequences*, came before me when the paralytic symptoms were more or less fully developed. I had an opportunity many years ago of observing the disease from its commencement. In 1820, a boy, aged thirteen, was brought to my house with chorea. He had rheumatism of the arms and wrists, associated with rheumatic pericarditis. After a few days the rheumatic affection subsided, and the chorea returned, with pain in

the course of the spine. Leeches, &c., were applied along the spine; but the disease passed into a state of general palsy which was complete in respect only of motion from the head downwards. All power over the sphincters was lost: sensibility of the surface was at first acute, and although it became somewhat impaired as the general palsy was developed, still it was not materially diminished. After death, coagulated lymph and turbid serum were found effused between the opposite surfaces of the arachnoid of the cord in a very remarkable quantity, and so as to press upon the cord itself. (See *Lond. Med. Repos.*, vol. xv.)

136. *d.* It has been stated above (§§ 96, 97), that *softening of the spinal cord*, whether it be the consequence of concussion of the spine, or of the pressure of a cancerous or other growth, or of inflammatory action, or of some other morbid condition of the vessels or constituent tissues of the cord, is not an infrequent cause of paraplegia when seated in any portion of the cord below the fourth or fifth cervical vertebra. When the disease is seated at or above this part the palsy is nearly general. In a very remarkable case recorded by Dr. WEBSTER, the spinal cord was soft and pulpy in this situation, particularly the posterior columns; the membranes were adherent to the cord; close to the softened part the medulla was of a dusky red tinge; but above and below this part it was healthy. The subject of this case "was for many months totally unable to move, even in the slightest degree, any muscle situated lower than the neck, but still retained the capability of feeling quite perfect throughout the surface of the body; whilst the other senses and intellectual faculties were unimpaired to the last moment of his existence. Indeed, the patient's cuticular sensibility even appeared, in the latter stages of the case, to be more acute than natural." The evacuations took place involuntarily; and violent spasmodic twitchings frequently affected the lower extremities.

137. *e.* Although general palsy as well as paraplegia is most generally caused by some manifest lesion seated in, or implicating, the spinal cord or its membranes when the functions of the brain are unimpaired, still it is not to be inferred that the lesion is always of a nature which may be detected. Cases sometimes occur that present no appreciable lesion, at least to the unaided eye, upon dissection; and

others recover after a treatment not obviously calculated to remove any serious lesion of the cord or its membranes. Sir B. BRODIE refers to a case (*Lancet*, No. 1060., p. 380) which commenced as paraplegia and terminated in general paralysis. The spinal cord and solar plexus were examined with the greatest care after death; but they presented no change from the natural state. Sir B. BRODIE justly remarks, that it is not, however, to be supposed that this is a mere functional disease because we see no lesion after death. The minute organization of the brain and spinal marrow is not visible to the naked eye, and even with the microscope we can trace it only a little way. Some defect in the minute organization, some change of structure not perceptible to our senses, may exist in the part and interrupt its functions.

138. Some years ago I attended, with Dr. ROSCOE, a gentleman who had resided many years in an intertropical country. On his voyage across the Atlantic to this country, in the winter season, he was seized with general palsy of the powers of voluntary motion immediately after prolonged exposure to cold and wet. The functions of the brain were unaffected; and neither pain nor uneasiness was felt in the neck or in any part of the spinal column, under any circumstances of position, flexure, rotation, or pressure. No evidence of inflammatory action or of congestion in the spine could be detected. Cutaneous transpiration was suppressed, and the bowels were costive and torpid; but he retained the sensibility of the surface and command over the spincters. He was treated, at first, upon the supposition of either serous effusion or vascular congestion having taken place in the spinal canal, but without receiving any benefit. He ultimately, however, quite recovered, by having a frequent recourse to warm baths containing stimulating substances.

139. That form or state of general palsy in which structural lesion may be inferred to be most decidedly absent, and which consists entirely of functional disorder, is the *cataleptic seizure*. In this affection, as shown elsewhere (see *Dict. of Pract. Med.*, vol. i., p. 290), voluntary motion is altogether suspended; but in two very remarkable cases which I had an opportunity of observing attentively, consciousness and sensibility remained, with the senses of seeing and hearing. Yet no part—neither the muscles of the

tongue or jaw, nor the eyelids—could be moved during the attacks, which often continued for many hours. Nor did the least muscular contraction take place on tickling the soles of the feet, or on pinching any part, although the sensibility was affected by these acts. Recovery from these seizures was generally sudden and complete; little disturbance, beyond slight hysterical disorder on some occasions, being observed.

140. *B.* SYMPTOMS OF GENERAL PARALYSIS.—*The symptoms of general palsy* vary much with the lesion occasioning it.—*a.* The *accession* of the attack also varies. In the *cerebral form* of the malady, particularly when it depends upon *apoplectic* or *epileptic seizures*, and when it assumes the cataleptic form, the accession is sudden or rapid. In the *spinal form*, the symptoms appear gradually, and generally slowly, when it is the result of disease, but often suddenly and completely when it proceeds from severe injury, and from hemorrhage in or upon the cervical portion of the cord—apoplexy of the cord. In the cerebral state, the *sensibility* and even consciousness are abolished or nearly lost; but in the *spinal states* (§§ 129, *et seq.*) of the malady, sensibility, the functions of sense, and the intellectual powers are either unimpaired or but little affected. In a few cases only is the sensibility of the general surface remarkably diminished, and in still fewer is it altogether lost.

141. *β.* The *loss of voluntary motion* is most sudden and complete in the cerebral states of the disease, especially when caused by hemorrhage in or upon the pons Varolii, and in cases of injury of the cervical portion of the cord, or of concussion of the spine. When the palsy proceeds from disease of the spinal medulla or of its membranes, the loss of motion is rarely complete at first, and often does not become complete until after several years, and until the organic lesions have advanced so far as evidently to interrupt the functions of the cord. Still there are exceptions to this, as the case noticed by Sir B. BRODIE, and when hemorrhage takes place in or upon the cord. During the protracted progress of the malady, the patient often experiences spasmodic actions, or more permanent contractions of the muscles, particularly of the flexors; frequently a sense of painful constriction, or a sensation of girding,

around the abdomen and the thighs; and sometimes, especially when the upper part of the cervical medulla is implicated, even convulsions or complete epileptic attacks. These are evidently the consequence of inflammatory action or irritation in or near the portion of the cord or its membranes which are the seat of lesion.

142. A compositor, who was engaged in printing a work which I was editing many years ago, came to me with caries of one or two of the upper dorsal vertebræ. Matter had evidently formed and was making its way externally. He became paraplegic, and subsequently generally paralytic; but at a very early period of the paraplegic state fully developed epileptic seizures occurred. These became more frequent, and ultimately terminated in coma and death. On examination, a sanious pus was found collected around the second and third dorsal vertebræ, extending between the muscles and between the theca vertebralis and bodies of the vertebræ. The membranes at, and to a considerable extent above, this part were inflamed, the arachnoid surfaces being partially covered with lymph, or adherent. Injection of the vessels and effused serum were traced thence along the membranes to the brain. The cord itself was not, however, materially changed.

143. *γ. Pain*, even of a most severe character, is often remarked, particularly in the inflammatory states of the spinal disease, and when the roots of the nerves, or when the nerves as they pass through the spinal foramina are implicated in the lesion. The pains are usually deep-seated in one or more limbs, and are often not the less acute where the cutaneous sensibility is much impaired. In some instances of spinal general palsy the sensibility of the surface, particularly at first, is painfully increased, and sometimes even perverted. Pain is often felt in the part of the spine affected, either primarily or consecutively. In some instances, particularly when the disease commences in the lower portion of the spine and extends upwards, it may be confounded with lumbago; or it may be viewed as originating in lumbago; the pain in the loins being caused either by inflammatory action or softening, or by congestion of the spinal veins and sinuses. When the disease is consequent upon masturbation or venereal excesses, it is often preceded and attended by pain in the loins, extending upwards with the local lesion and the paralytic symptoms.

144. *δ*. The *bowels* are remarkably torpid, and the evacuations in the more complete states of the disease dark, and like tar or treacle (§ 104). The *urinary organs* are affected, in the more complete and advanced forms, in the manner already noticed (§§ 102, 103); but in the less complete states, and when the spinal cord itself is not materially changed, the patient still retains more or less power over the evacuations and actions of the sphincters. In the more severe and sudden cases, particularly those consequent upon injury of any kind, and attended by marked disturbance of the urinary functions, priapism is a frequent symptom.

145. *ε*. The *external surface* is always dry, often scurvy, sometimes discoloured in the extremities, or presenting livid spots resembling vibices. It is generally emaciated, and colder than natural, even when the patient complains of a sensation of heat. The disposition of the surface to ulcerate or slough on pressure, so remarkable in paraplegia, is less so in general palsy, unless at the last stage or more severe and complete state of this latter form of the disease.

146. *ζ*. The *cerebral functions* are unaffected in the spinal form of general palsy as well as in paraplegia, and continue unimpaired until the malady implicates the medulla oblongata, or terminates either in fatal congestion of the lungs, or asphyxia, or in congestion of the brain with or without serous effusion.

CHAPTER III.

OF PARALYSIS IN NEW-BORN INFANTS AND YOUNG CHILDREN.

147. PARALYSIS is sometimes met with in new-born infants. It may be the effect of injury to the nerve either in the part paralysed or in its course after its transmission through the cranial or spinal aperture. Dr. E. KENNEDY remarks that we have examples of this fact in injury to the portio dura, as in face-presentations; or where the head has been long pressed in the pelvis against the projecting ischiatic spines; and he adds, that several cases of this kind had occurred to

him, in which the disease was quite local, the paralysis being removed on the subsidence of the swelling produced by the protracted pressure.—*a.* I have already mentioned (§ 88) that the paralysis may be the result, not merely of spontaneous lesion of some part of the nervous centres during foetal life, but also of arrested development, or insufficient growth, during the early periods of this epoch. In this latter case the palsy is often associated with idiocy. The cerebral or spinal lesion may, however, occur shortly before as well as during the period of parturition. In the following case, recorded by Dr. E. KENNEDY, the lesion must have existed some time before birth; and, probably, from the speedy recovery, consisted merely of congestion of one side of the brain.

148. Immediately after birth, a large soft tumour was observed on the right side of the head, principally on the vertex, with two or three small excoriations on the left side. The left eye was closed; the mouth drawn to the left side; and when the child cried, the *ala nasi* and angle of the mouth were drawn up; the right eye was open, and the right side of the face unaffected during crying. The left side of the body was completely paralysed. The extremities of this side were of less bulk than those of the right, and were rough to the touch; the muscles were flabby. Both pupils were insensible to light. The child was unable to suck; but deglutition did not seem to be affected. On the third day it had several slight convulsions confined to the upper half of the body. A leech was applied to the vertex, followed by the warm bath: stimulating liniments were rubbed over the spine, and the child recovered. In this interesting case the portio dura of the right side, and the levator palabræ of the left side, supplied by the third nerve, were paralysed, in connection with hemiplegia of the left side.

149. It is often difficult to ascertain the extent of paralysis in new-born infants and very young children, as the paralysed limbs are generally either so much convulsed, or so spasmodically contracted, as to be removed from under the influence of volition. When the spasms cease, the paralysed state of the limb sometimes becomes more evident in the more unfavourable cases. The lesions which most frequently occasion paralysis in this class of subjects are, con-

gestions of the brain and spinal column, serous effusion either between the membranes or in the ventricles, and extravasation of blood. This last is much less frequent in children and infants than in adults, and very rarely occurs in the cerebral structure. When hemorrhage takes place within the cranium or spinal canal of infants, it is generally found to proceed from the surface of the membranes, and seldom causes permanent paralysis, but usually apoplectic attacks, or eclampsia, trismus, or convulsions terminating generally in death. In these cases, the effused blood produces either coma, spasm, or convulsions, according to the quantity effused; and ultimately, if the child live a short time, inflammatory action in the parts into which it is extravasated, owing to the irritation it occasions.

150. *b.* Paralysis, sometimes partial, at other times more or less general, accompanies the advanced progress of the disease usually called acute hydrocephalus, and of true or chronic dropsy of the brain. When treating of the former of these maladies in another work, I have shown that the palsy is the consequence of the softening of the more central parts of the brain rather than of the effusion into the ventricles which either attends or supervenes on the softening.¹ The tubercles sometimes found in the brain, or its membranes, of children, either associated with or independent of softening and serous effusion, are rarely a cause of paralysis, unless at an advanced stage of these lesions, or as a termination of convulsions or spasms, with which, however, some degree of paralysis is occasionally associated.

151. *c.* But palsy is sometimes met with under different circumstances, especially during suckling and teething; and although not so frequently as immediately after birth, still sufficiently often to have procured for it, as occurring at this period, more attention than has been paid to it. From the first dentition to the period of puberty, paralysis is generally the consequence of scrofulous caries or disease of the vertebræ, or of softening of a portion of the brain, or of tubercles within the cranium or spine. In cases of softening or tubercles in the brain or its membranes, convulsions, more or less of an epileptic character, almost always precede the paralysis, which commences generally

¹ See Author's Dict. of Pract. Medicine, vol. i., p. 664-666.

in one arm, and sometimes passes into hemiplegia. When these lesions are seated within the spinal canal of young children, convulsions of a more limited character, often spasms or contraction of a limb, are more frequently remarked either before the development of palsy or in connection with it; although even in these cases the convulsions may assume an epileptic character, particularly when the upper part of the cord is implicated.

152. *d. Infantile paralysis* may, therefore, be divided as follows:—1st. The congenital, and then it is commonly a consequence of arrested development or congestion of a portion of the cerebro-spinal centres:—2d. That caused by the accidents attending parturition, as shown above (§ 147):—3d. That consequent upon lesions or spontaneous disease of a demonstrable nature implicating the brain or some portion of the cerebro-spinal axis:—and 4th. That which presents no obvious lesion in the brain and spinal cord beyond slight congestion; and from which recovery often takes place, without sufficient evidence of organic lesion having been afforded. This last class of infantile palsies generally occurs in infants at the breast or during the first dentition. It is often sudden in its accession, and is preceded by no very apparent state of disease beyond the usual irritation often attending dentition, or disorder of the alimentary canal or biliary functions. The arm is commonly the part affected; but the leg of the same side is sometimes either also paralysed, or contracted and drawn up, or both palsied and contracted. Sensibility has not been, as far as I have observed, impaired in the affected limb, but, on the contrary, sometimes morbidly increased. A large proportion of the cases which I have seen of this description has recovered after the means that will be noticed in the sequel have been employed.

153. My very learned friend, Dr. M'CORMAC, of Belfast, has noticed cases of paraplegia in infants, which he considered to proceed from concussion of the spinal cord—a cause by no means unlikely to produce the disease in both infants and children, and to be followed by either hemorrhage, inflammation, softening, serous effusion, or other change of the parts lodged in the spinal canal. He believes, also, that injury to the sciatic nerve may produce paralysis of the limb in infants; but this is manifestly a rare occurrence.

154. Paralysis of one limb, most frequently of a lower limb, sometimes occurs during the first dentition; but the palsy is generally incomplete, and is limited to the function of motion. If the sensibility be also paralysed, which is very rarely the case, the limb ceases to grow so fast as the other, and its temperature is diminished. Palsy of one limb, or even of one side, the sensibility being generally not much impaired, is also sometimes met with in children after the eruptive fevers, especially after scarlet-fever, and is then an obstinate if not a fatal disease. It is most frequently the result of scrofulous softening of a portion of the brain, or of tuberculous formations in the membranes; and even, in rare instances, in the substance of the organ, probably developed by the fever, or by the debility and other changes following the fever, aided by various concurrent causes.

CHAPTER IV.

SHAKING PALSY.

155. THIS disease is *characterized by a tremulous agitation—a continued shaking, and weakness of one or more parts or members of the body.* Although it was described by HARSCHER, DIEMERBROECK, SCHELHAMMER, HAMBERGER, and others, and more recently by PARKINSON and J. FRANK, it has not received the attention which the frequency of its occurrence and the obscurity of its nature should have obtained for it. Even its symptoms, its relations to other nervous affections, its course and terminations, have been imperfectly observed and described; and no accounts have been furnished of the appearances observed in fatal cases.

156. Shaking palsy may affect either a single part or limb, or several parts, or even the greater part of the body. It may continue *limited* to its original seat for many years, and even never extend beyond it; or it may not only increase gradually in the part first affected, but *extend* to two, or to all the limbs of the body. Generally the power of motion only is affected, and usually is only partially im-

paired; and it continues long in this state; so that the complaint may be viewed as *imperfect palsy of the power of motion, with shaking of the part*. In some cases I have observed the muscular power of the part not materially if at all impaired, although the involuntary motion was considerable. The shaking is not observed during sound sleep, when the affection is slight, or during the early period of its progress.

157. This affection usually commences imperceptibly, and proceeds slowly. It often begins in the head, or in one or both arms, and it frequently is confined to these parts for a long period, or even for years. It is generally attended by a feeling of weakness of the part. In two instances I have seen the complaint limited to the lower jaw, which was moved by a rotatory or lateral action in one case, and by a vertical action in the other. When the head is affected it is commonly moved upwards and downwards; but it is in some instances in a constant state of rotation. In these situations, as well as when it affects the hands and arms, the motion often does not exceed that of tremor, or a gentle but quick shaking; but in others the agitation is more remarkable and violent; and even the slighter cases may be more severe when the patient is influenced by any excitement or marked emotion of mind.

158. The affection appears usually with a slight sense of weakness and proneness to trembling, especially on any emotion or after physical exertion, and commonly in the hands or arms, but sometimes in the head, or in the tongue or lower jaw. These symptoms gradually and slowly increase; and after one, two, or three years, but in some cases not until after a longer period, they extend to the lower extremities; and the patient finds great difficulty in walking, or bends his body forwards. The tremulous agitation has now extended to his legs, and the limbs have become less and less capable of obeying volition. Suspension of the agitation is seldom experienced, unless in some cases when the limbs are held or supported; and when it ceases from this circumstance in one limb or side it continues in the other. Thus, it sometimes ceases in the arm or side on which the patient lies or reclines, but as soon as he changes to the opposite side it begins in the former. Occasionally, attempts to restrain the agitation only increase it; and it is

often exasperated at the sight of strangers. When the patient walks, he is often thrown on the fore part of the feet, and impelled to adopt a quick or running pace, from fear of falling at every step on his face. At an early stage, or in less severe cases, the affection ceases for a short time, or is ameliorated after a refreshing sleep; and it is often then controlled by the will or by earnest attention to the part, but it soon afterwards recommences.

159. At a far advanced stage, the tremulous motions of the limbs occur during sleep, and, particularly when the patient dreams, waken him, often in agitation. The power to convey food to the mouth ultimately becomes so impeded as to oblige him to be fed by others. Mastication and deglutition are impeded, or difficult, and the saliva dribbles from the mouth. The trunk is permanently bowed from the general want of power in the muscles. The bowels are costive; are acted upon with difficulty; and sometimes require mechanical means to remove them from the rectum. Ultimately the agitation becomes more vehement and constant; and when exhaustion passes into sleep it sometimes becomes so violent as to shake the room. The head falls down, so that the relaxed or shaking jaw meets the sternum. The power of articulation fails or is lost, and the urine and fæces are passed involuntarily. Slight low delirium, passing into coma, usually terminates life.

160. I have met with this affection both as the chief and primary malady, and in connection with disease in some distant organ, of which it appeared either as a consecutive change, or as a concomitant disorder. I have seen it more frequently in males than females, and chiefly in persons about fifty years of age and upwards. I observed it to a very remarkable extent in a man aged about sixty, who had valvular disease of the heart, upon which pulmonary congestion and dropsy supervened; but could not obtain permission to examine the body; and have seen it also in a lady in a similar form of complication, but I ceased to attend her before her death. I was recently consulted by a gentleman from Lancashire, affected by this complaint in the arms; and in every other respect he professed himself to have been in good health. I have observed it both in plethoric and in thin and spare habits; but more frequently in the fair and sanguine than in any other temperament.

I have never had an opportunity of ascertaining the changes that existed after its fatal termination. This disorder is frequent in very aged persons in its slighter forms; and although they have been the subjects of it for very many years, yet they have reached a great age. A lady with whom I am acquainted has had this affection for more than thirty years, and she is now living and nearly eighty years of age.

161. In rare instances, *hysteria* assumes a form very nearly allied to, or closely resembling, this affection. In 1842, I attended with Dr. N. GRANT a girl aged about sixteen, on account of various anomalous nervous affections consequent upon obstructed catamenia. After passing through various phases, in which the tongue, larynx, and diaphragm, seemed spasmodically affected, violent tremulous agitation of the head and arms supervened. The head was rotated from side to side without intermission for several days. She received benefit from treatment, and ultimately recovered.

162. In the absence of minute *post-mortem* examinations, opinions as to the origin and seat of this complaint must be viewed as suppositions merely. But it is not unreasonable to infer that the medulla oblongata and upper part of the spinal cord are the chief seat of the affection in some cases; although the brain or cerebellum, or both, may be affected in others, especially when the muscles of the face or the senses are implicated. J. FRANK adduces the case of a widow, aged forty, who had experienced an interruption of the catamenia, had complained of pain in the spine, and had recourse to a vapour bath; after coming out of the bath she was exposed to cold, and suddenly was attacked by this affection. Her head was in a constant state of rotation; and the arms, hands, legs, and feet were in continual motion. Blood was taken from the spine by cupping, and she recovered sooner than was expected. It is not improbably connected with congestion of the venous plexuses or sinuses placed between the sheath of the cord and bodies of the vertebræ, particularly in persons of a plethoric habit, when the lower extremities are affected, and when it is consequent upon suppressed evacuations. In other cases it appears to depend more upon the states of the spinal cord and nerves, or to be more strictly nervous.

163. I have not had an opportunity of examining the body

of a person who has been the subject of this variety of palsy. The following are adduced from MORGAGNI:—A man, nearly seventy, of a pale countenance, who had long complained of deafness, vertigo, languor, and constant tremor, but was in other respects healthy, ut venera cum uxore melioris ætatis perstrenuè operam daret, died suddenly.—*Dissection.* The thoracic viscera were all healthy. The mouth was drawn to the right side. The blood was found everywhere in a fluid state. After removing the calvarium, the brain was perceived to be very soft, flaccid, and discoloured, and surrounded by serum, of which more was effused upon the surface of the membranes than within the ventricles. The plexus choroides presented turgid vesicles, as they frequently do. The left vertebral artery was covered at its first flexure by very small lamellæ, some of a tendinous and others of a cartilaginous or osseous appearance.

164. In another case of this species of paralysis, in which the loss of power and the tremor were most evident in the right side of the body, MORGAGNI found serum between the dura and pia mater. “The left ventricle contained in the choroid plexus a body about the size of a bean, apparently consisting of hydatids. Under the same ventricle was a sinus, whose parietes was formed by the medullary substance, which was of a yellow colour, flaccid, and corrupted.” This sinus evidently arose from an old extravasation in that situation, on which the more severe affection of the right side supervened and afterwards depended.

CHAPTER V.

PALSY CAUSED BY POISONS.

165. PALSY, varying as to seat and character, is not infrequently occasioned by several poisonous substances of either a mineral or vegetable nature, especially the former. The poisons most liable to cause palsy are lead, mercury, arsenic, ergot of rye, monkshood, thorn-apple; and, in rare instances,

palsy occurs as a contingent remote effect of most of the stupefying and acro-narcotic poisons.¹

166. i. PALSYP FROM LEAD.—*Lead palsy* generally occurs after one or more attacks of colic produced by the introduction of lead into the system; but it occasionally appears without any severe disorder of the digestive organs. When the palsy is connected with colic it usually becomes manifest as the colic subsides; but both affections may be associated or contemporaneous. When the palsy occurs independently of colic, costiveness, and indigestion, with or without slight pains in the abdomen, are generally present both before and concomitantly with it. The palsy usually presents peculiar characters. It is seated chiefly in the upper extremities, and affects the extensor more than the flexor muscles. It is attended by great emaciation of the affected muscles; and the loss of power is most remarkable in the muscles which move the thumb and fingers. The palsy is seldom complete even in these except in the extensors. The hands and fingers are constantly bent, unless when they hang down by the sides. The patient, in the most severe cases, is unable to raise them; and when one arm is more affected than another, he raises the one by the aid of the other. Severe pains are also felt in the lower limbs and arms. Attacks of colic, severe fits of indigestion, and obstinate constipation are apt to occur, especially after irregularities of diet or exposure, and carry off the patient. A fatal issue may also ensue from the extension of the palsy to the respiratory muscles. Palsy of the arms is sometimes associated with *deafness* in some instances, and with *amaurosis* in others. It is more frequently attended by *anæsthesia*, either slight or complete, of the paralysed muscles or limbs.

167. M. TANQUEREL, an able and experienced writer on this form of palsy, states that paralysis of some part of the superior extremities, especially of the wrists and fingers, was observed in ninety-seven cases, of the lower extremities in fifteen, of the intercostal muscles in two, and of the thoracic muscles generally in one case. The vocal organs were

¹ See the Art. Poisons in the Author's Dict. of Pract. Medicine, vol. iii., p. 312, *et seq.*

affected in thirty-one instances, of which fifteen were stammering or hesitation, and sixteen ephoria. With the exception of some cases in which the paralysis was general, the extensor muscles only were affected, the reason of which, as M. TANQUEREL remarks, does not appear. In five cases anæsthesia was observed at the same time in the parts deprived of motion, and in eight cases arthralgia. Although the loss of power is almost universally complete in the affected muscle, it does not arrive at that state until after a few days, but commences with simple numbness and slight tremor. The tremor assumes in no case the extent of alternate, almost spasmodic, contraction and resolution observed in mercurial tremors, but considered as the first degree of paralysis. (vol. ii., p. 32.) When the paralysis has been of long duration, there is a flaccidity, a withering, and an extraordinary emaciation of the parts affected; the skin becomes blanched and sallow, sometimes livid, harsh, dry, loose, and flaccid; the cuticle scales off; the subcutaneous cellular tissue disappears, and the adipose tissue is entirely absorbed; the flesh feels flabby; the muscles become much decreased in size, and when the partial emaciation or atrophy has arrived at its ultimate stage the skin seems adherent to the bones, every prominence of which may be readily distinguished through the wasted muscles. The pulse, contrary to the opinion of M. MERAT and others, who describe it as vibrating, slow, and very strong, is, on the contrary, weak, soft, easily compressible, and very slow. Neither in the head nor in the spinal column is there pain or other symptom to indicate any anatomical lesion of the nervous centres as the cause of the paralysis.

168. Although there are cases which show that lead produces palsy by its action on the skin, yet the usual mode in which it exerts its deleterious agency is by gradual introduction through the digestive and respiratory passages. Generally it requires a considerable time before the symptoms of paralysis show themselves, those only becoming affected who have been long engaged in lead works, and who have already suffered from repeated attacks of colic; exceptional cases, however, are found, as the following table of the periods at which the 102 cases of paralysis seen by M. TANQUEREL occurred sufficiently shows (vol. ii., p. 19):—

Duration of work.				No. of sick.
8 days	-	-	-	3
From 15 days to	2 months	-	-	11
" 1 year to	5 years	-	-	36
" 5 years to	10 "	-	-	20
" 10 "	15 "	-	-	12
" 15 "	20 "	-	-	12
" 20 "	25 "	-	-	7
" 52	-	-	-	1

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169. *In fatal cases*, the paralyzed muscles have been found pale, bloodless, and flaccid; and in cases of long standing they have become still more pale and fibrous. The nerves have also appeared atrophied and firmer than natural. It is not improbable that the lead, in a state of oxide, has in some measure combined with these tissues. In this case, however, it ought to be detected by chemical analysis; but whilst some chemists avow that they have detected it, others assert that they were unable to do so. Dr. CHRISTISON'S able researches into this subject do not countenance the opinion that a combination takes place between the lead and the tissues affected in these cases. That the metal affects the states of these tissues cannot be doubted; but whether by its actual presence, or by its indirect operation on the nerves and nutrition of the muscles, independently of its presence, has not been demonstrated. Most probably its operation is direct in the state either of an oxide or of a salt, in either of which states it may pass into the circulation, and act immediately upon the nerves and muscles.

170. *B. PALSY FROM MERCURY.*—*Mercury*, when carried into the system in the form of an oxide or of a salt, sometimes causes an affection approaching the incomplete form of palsy, especially the form described as shaking palsy, or *incomplete palsy of motion with tremor*. It usually occurs in miners, in gilders, and in other workmen exposed to the operation of mercurial substances. It commences with unsteadiness of the arms, and afterwards with tremors, which

extend more or less with the continuance of the malady; and often becomes associated with convulsions.

171. Mercury occasions various affections of a more or less serious nature when its use is long continued, or when it is introduced into the system in excessive quantity. The paralytic tremor which this mineral causes rarely amounts to palsy, even of motion only. The sensibility is not affected. M. TANQUREL remarks that of upwards of fifty cases of mercurial tremor complete palsy was not observed in a single instance; and his researches among workmen show that of the several metallic substances lead is the only metal capable of producing paralysis properly so called. Although not constituting a form of complete palsy, it is so closely allied to this disease as to merit some notice in connection with it.

172. *Mercurial Palsy, the tremblement mercuriel* of the French pathologists, is produced in artisans by the fumes or oxides of mercury. It is almost, but certainly not altogether, peculiar to these persons. Its approach is generally gradual, but occasionally sudden; it usually commences with slight convulsive snatches, followed by agitations and tremors of the affected muscles, particularly those of the arms, which it first attacks, occurring as it commonly does amongst the workers in mercury. If the person continues his employment, the affection extends to the lower extremities and whole body. He becomes incapable of muscular exertion, and even of the avocations requiring the least precision of muscular action. Restlessness, falling out of the teeth, constipation or disorder of the bowels, a dry and brownish state of the skin, slight atonic convulsions, cephalalgia, delirium, great depression of the nervous powers and of the general health take place, in which state the patient may continue to live for many years. (MERAT and COLSON.) Although it is chiefly long-continued exposures to mercurial preparations which produce this affection, a single exposure to the fumes, even for a few *hours*, when they float in the air, may occasion it; the effects being both rapid and violent when their vapours are inhaled with the atmosphere, and act upon the extensive surface of the bronchial tubes and air cells.

173. *C. ARSENICAL PALSY.*—*a.* *Arsenic* sometimes occasions limited or partial palsy when it has failed of causing

fatal effects in a short time; or in the advanced stage of the more prolonged cases of poisoning by it. In some cases, an incomplete form of paralysis, resembling palsy from lead, and affecting one or more of the extremities, is caused by this poison. Occasionally the palsy is preceded by cramps, tenderness, and weakness of the extremities; the palsy being sometimes attended by contraction of the joints. The affection is not confined to the power of motion, but generally also extends to that of sensation. Dr. FALCONER observed a case in which the palsy was limited to the hands, and another in which it gradually extended to the shoulders.

174. *b.* Of the *secondary* effects of the chronic form of arsenical poisoning, *palsy* and spasm, or *contractions* of the extremities, are the most frequent. The palsy is generally partial, and often commences at the fingers or toes, and proceeds gradually upwards. Dr. MURRAY (*Edin. Med. and Surg. Journ.*, vol. xviii. p. 167) has given an instructive account of this effect of arsenic. Four persons were affected about an hour after breakfast with the primary symptoms of poisoning by arsenic. But in addition to these symptoms the muscular debility was extreme; and in two amounted to true partial palsy. One of them lost altogether the power of the left arm. The other had great general debility and long-continued numbness and pains of the leg. In a case of an over-dose of the arseniate of potass the paralytic affection consisted in the loss of sensation and of motion of the hands, and the loss of motion in the feet, with contraction of the knee-joints.

175. *D.* PALSY FROM STUPEFYING AGENTS.—*a.* *Paralysis from narcotic or acro-narcotic poisons* is sometimes observed contingently upon their more remote effects. I was consulted many years ago respecting a case of hemiplegia caused by eating the root of monkshood by mistake. The more immediate effects had been numbness and palsy of the tongue, followed by apoplexy, and a state of the cutaneous and mucous surfaces closely resembling that existing in fully developed purpura hemorrhagica. The apoplexy had been either associated with hemiplegia from the commencement, or the latter rapidly followed it. The patient, aged about twenty, ultimately recovered; and I lately saw him without any remains of the paralytic affection, which, however, had con-

tinued during two or three years. Paralysis from this class of poisons generally affects sensation more or less remarkably.

176. *b.* The *stupefying poisons* most frequently causing palsy are *carbonic acid gas; carburetted hydrogen gas; chloroform and the æthers; sulphuretted hydrogen gas, and monkshood.* The *narcotico-acrid poisons* occasionally also produce paralysis; as *poisonous mushrooms or fungi; diseased grain* of various kinds, especially the *ergot of rye; the *Lolium temulentum*, &c.*; but all these—both the more simply stupefying and the stupefying and irritant poisons—very rarely occasion palsy independently of producing profound coma or complete apoplexy, as in the case just adduced. The effects of those poisons thus become nearly indentedified, as respects the pathological conditions produced by them, with apoplexy and palsy in the associated forms about to be noticed.

SECTION II.

THE UNCOMPLICATED FORMS OF APOPLEXY;—OR PRIMARY AND SIMPLE APOPLEXY.

177. APOPLEXY is characterized by a loss of consciousness; feeling and voluntary motion being remarkably impaired, although not altogether lost; or, in other words, by a suspension of the functions of the brain, respiration and circulation being more or less disturbed.

178. As respects its nature, apoplexy consists of *oppressed, defective, or exhausted organic nervous or vital power, with hemorrhage in or upon, or with other lesion of the circulation of the organs within the cranium, or with the consequences of these lesions, or with other organic alterations.*

179. There are few diseases which present a greater variety of modes of attack, or which depend upon a greater diversity of lesion of the organ affected, than the one now about to be considered, with the exception of *palsy*, with which it is so intimately allied in its nature and character, as already stated (see pp. 13 and 14). The sources, modes of manifestation, and morbid relations of apoplexy are numerous, and many of them difficult of investigation. These circumstances have given rise to various attempts at arranging the phenomena of the disease in such a way as to indicate the relations which subsist between the changes within the the head, on which it depends, and the mode and progress of attack. Apoplexy has long been described as consisting of certain forms, which have been distinguished by some authors as the *sanguine* and *serous*, with reference to the nature of the effusion; by others, as the *nervous* and *bilious*, according to their idea of the more immediate causes. By several writers it has been, with more justice, divided into the *active* or *sthenic*, and *passive* or *asthenic*; or *entonic* and *atonic*, according to the state of the constitutional or

vital powers and respiration, and the degree of vascular action accompanying it. All these arrangements are, however, only partially founded in truth: in many respects they are entirely erroneous. Wherein they are either the one or other will appear in the sequel. M. CRUVEILHIER, one of the most recent and best writers on the disease, confines the term apoplexy to the occurrence of spontaneous hemorrhage in the brain, and divides it into two species:—1st. That consisting of a collection of blood in a torn part of the brain, or on its surface, from a ruptured vessel; and, 2d. That with sanguineous infiltration into the softened structure, or capillary exudation into, and combined with, its substance. The defects of this arrangement, as well as of this pathology, particularly in regard to practical purposes, must be apparent; for it will often be impossible to ascertain during life whether extravasation of blood has actually taken place, or merely great congestion of the vessels, with or without serous effusion; and many cases of true apoplexy occur occasioning death, as well as where complete recovery takes place, without either of the lesions to which he imputes the disease having existed.

180. In the account which I will endeavour to give of the disease its common form of approach and attack will be described; next, the different modes in which the attack is made, distinguishing the principal forms it assumes; and afterwards will be noticed several important states of the malady, arising from peculiar causes and antecedent affections. When detailing the different varieties and states of the disease, it will be made manifest that the distinctions heretofore offered, although occasionally obtaining, have no uniform or even general relation to the lesions existing within the head; that apoplexy, with the symptoms described as characteristic of *serous* effusion, has been frequently found to proceed from sanguineous extravasation; and that the *sanguineous* has sometimes only presented slight serous effusion: a similar objection being also applicable to all the other distinctions above enumerated.

CHAPTER I.

THE SYMPTOMS PRECEDING AND CONSTITUTING AN ATTACK OF APOPLEXY.

181. i. OF THE APPROACH, OR PREMONITORY SIGNS OF APOPLEXY.—THE importance of recognising the approach of this disease must be evident to the practical reader; for judicious measures employed at this period will often succeed in preventing an attack, or will render it less severe, even when they fail of averting it altogether. The most common precursory symptoms are, a tendency to sleep at unaccustomed periods; a heavier sleep than usual, particularly if accompanied with profound, laborious, or stertorous breathing; stridor of the teeth; nightmare; succussions of the frame, or cramps; a lethargic feeling and drowsiness even during the waking hours; more rarely, unusual wakefulness; pains in different parts of the head, or general headache or megrim; a sense of weight or fulness in the head, or of pulsation of the arteries; incoherent talking, resembling intoxication; a turgid appearance of the veins of the head, particularly of the forehead; lividity or redness of the countenance; slight or imperfect attacks of epistaxis; loss of recollection; irritability of temper, or unusual serenity or apathy of mind; a disposition to shed tears; suffusion of the conjunctiva; collapsed appearance of the *alæ nasi*: moats floating before the eyes, or dimness of vision (*amaurosis*); scintillations, or bright or shining coruscations before the eyes during darkness; inability to follow the line in reading; double vision, or a sharper sight than usual; difficulty in shutting or opening the eyes; noises in the ears; dulness of hearing; a sensation of an unusual *fœtor*; dryness of the nostrils; continued sneezing; frequent yawning; hiccup; stammering, or indistinct articulation; the substitution of one word for another, or forgetfulness of words and names; difficulty of swallowing, or fits of coughing upon deglutition; giddiness, *leipothymia* or faintness, or a sensation approaching to faintness; difficulty of writing, or an inability to spell the words, or to

follow a straight line; torpor, or numbness, or pricking of the extremities; itching, or formication of the surface; pains of the joints or limbs; a feeling of fatigue upon slight exercise; partial or slight paralytic affections, chiefly of the muscles of the face, or confined to a limb or part of a limb, occasioning drooping of the eyelids, imperfect utterance, slight distortion of the mouth, an unsteady or tremulous gait, tripping upon ascending or descending a stair, or in walking; difficulty in voiding the urine, &c.¹

182. ii. THE CHARACTERISTIC SYMPTOMS, OR THOSE CONSTITUTING THE ATTACK.—After one or more of the foregoing signs, or after the succession of two or more of them, and their continuance for a short or long period, the phenomena which constitute the disease supervene. Sometimes the premonitory signs are so slight and of so short duration as to escape notice, the attack being severe and sudden: at other times they are very remarkable, and several of them are grouped together, the attack advancing either gradually and severely, or suddenly, and disappearing rapidly; yet recurring after an indefinite time. The mode of approach and attack sometimes has a close relation to the state of internal lesion; but occasionally no such relation can be traced, as will be shown and explained hereafter. The premonitory signs, as well as the early part of the attack, generally present more or less either of *augmented* or *diminished* vascular action, particularly about the head, according to the state of the vital powers. The character of the symptoms, therefore, in respect of degree of vascular action and constitutional power, should receive the utmost attention, as being our best guide to a successful treatment.

183. A. In the most *severe and sudden* forms of attack,—the *apoplexia fulminans* of the older authors, and of some of the Continental writers of the present day; the *fortissima*

¹ NAPOLEON, who dreaded Apoplexy before his reverses, asked CORVISART, his first physician, for some information respecting this disease. Sire, replied CORVISART, Apoplexy is always dangerous; but it is always preceded by certain symptoms. Nature seldom strikes a blow without giving warning: A first attack, which is often slight, is *a summons without costs*; a second, *a summons with costs*; but a third is *an execution on the person*. CORVISART himself afforded a melancholy proof of this assertion.—(*Méd. Chirurg. Rev.*, 1841.)

of Dr. COOKE and others; the *apoplexie foudroyante* of the French,—the patient is struck down instantly, sometimes froths at the mouth, has a livid countenance, complete relaxation and immobility of the voluntary muscles and limbs, and unconscious evacuations of the urine and fæces; and dies very shortly afterwards, either with or without stertor, or rattle of the respiration, with cold, livid extremities; cold perspiration, and sometimes a cadaverous cast of countenance.

184. *B.* In the more *active* or *sthenic* forms of attack,—the *apoplexia fortis*; the *entonic* apoplexy of Dr. GOOD; *A. exquisita* of various authors,—the patient is more or less suddenly seized with profound stupor, the eyes being either open or closed; the breathing is deep, slow, sonorous, or stertorous; and the pulse slow, full, hard, or strong: sometimes irregular or unequal. In this state of disease the above are often the chief symptoms, no signs of paralysis being observed. But frequently the mouth is drawn to one side, the eyes are distorted, and one eyelid immovable, with relaxation, loss of sensation and of motion of a limb, or of one side of the body; the arm of the non-paralysed side being often closely applied either to the chest or to the genital organs. In this latter state of the disease there is sometimes also some degree of paralysis of the urinary bladder, or of its sphincter, giving rise to ischuria, or enuresis, or a combination of both. The patient generally lies on the paralysed side, which is relaxed, incapable motion, and insensible to the application of irritants; whilst the limbs of the opposite side are sometimes subject to spastic contractions.

185. *C.* In the more *gradual seizures*, or those of a less complete character,—the *atonic* apoplexy of Dr. GOOD; the *apoplexia imperfecta*, the *parapoplexia* of various authors,—the patient, after experiencing some of the premonitory symptoms, is seized with alarming vertigo, leipothymia, or a feeling of faintness; sickness at stomach and vomiting; disturbance of the senses, particularly of the sense of sight; loss of memory; partial loss of sense, consciousness, speech, and voluntary motion; weak, irregular, and sometimes quick pulse, with more or less of sopor.

186. Besides the foregoing forms of apoplexy,—which differ merely in respect of the state of the constitutional

powers, the severity of attack, and the grouping of the symptoms, and not as to the organic lesions which occasion them, —other distinctions offer themselves which are still more deserving of attention, as generally having a more intimate relation to the changes which are going on within the head than the degrees of severity of seizure merely. Viewing, therefore, the premonitory symptoms as common to all its varieties, I shall divide the disease according to the form, manner, and complication of the attack, and consider, briefly, —1st, the sudden form of apoplectic seizure in its simple state, and unassociated with paralysis; and 2d, the gradually increasing or ingravescent attack. These states of seizure complicated with paralysis; and that form which commences with paralysis, and after an indefinite period passes into complete apoplexy, will be described as *associations of apoplexy and palsy*.

CHAPTER II.

PRIMARY AND SIMPLE APOPLEXY.

187. *A. Description.*—IN this variety of the disease the patient falls down deprived of sense, consciousness, and voluntary motion, is like a person in a very deep sleep, with his face much flushed, tumid, and occasionally livid; his breathing slow, deep, and stertorous; his pulse full, natural in frequency, or slower than usual. Sometimes slight convulsions of the limbs or contractions of the muscles occur, or contractions of the muscles of one side and relaxation of those of the other. The attack, in rare instances, is either ushered in or accompanied with general convulsions, passing into complete apoplexy, or profound coma. The patient may continue in this state of profound stupor for several days; or he may recover after some hours, or even minutes, when judicious assistance has been instantly procured.

188. *B.* This form of the disease *terminates*, 1st, in perfect recovery,—often in the course of a few hours,—but rarely when the attack has continued longer than one or

two days. I have, however, seen cases of perfect recovery in comparatively young or robust subjects after the apoplectic state had been of several days' duration. 2d. In death, which may take place in the course of a very few hours, or after some days, but most commonly from the first to the fourth day,—and very rarely in less than an hour.

189. *C.* The *appearances* which this class of cases present on dissection may be arranged into—1st. Those which are insufficient to account for the symptoms, or their termination in death; 2d. Those which proceed from intense injection and congestion of the membranes of the brain and of the cerebral structures; 3d. Those which are accompanied with an effusion of serum, or engorgement of the vessels of the head, or both; and, 4th. Those which are attended by extensive extravasation of blood.

190. 1st. Cases of apoplexy, in which *no morbid appearance* could be detected after death, have been recorded by WILLIS, STARK, POWELL, and ABERCROMBIE; and similar cases have occurred to MORGAGNI, TISSOT, QUARIN, OZANAHAM, FODERE, and HILDENBRAND. It is to this variety of apoplexy that the term *nervous* has been applied by several eminent authors, particularly by KORTUM, ZULIANI, and HILDENBRAND. NICOLAI referred it to spasm of the meninges; LECAT and WEIKARD to spasm of the nerves and vessels of the brain. BORSIERI termed it *convulsive* apoplexy; and TISSOT, and some other authors, *hysteric* apoplexy. HILDENBRAND conceives that it is the cause of death in contagious typhus; patients dying after profound coma in this disease, without any effusion or appearance of congestion or compression, but apparently from a sudden collapse of the nervous energy of the brain. Apoplectic seizures, rapidly terminating in death, have been occasionally observed to occur in *epileptics* and maniacs, as recorded by FODERE, NACQUART, BELLOC, and GENDRIN, without any manifest lesion of the encephalon. This particular state of the brain seems, also, in some instances, to obtain in the course of a few other diseases, and to be occasioned by certain external causes, particularly injuries producing concussion of the brain, lightning, extreme cold, and poisonous substances.

191. A case occurred to me of this description in a man aged about forty, who had complained of vertigo, leipothy-

mia, and loss of recollection, suddenly followed by profound stupor. He had been blooded largely when I saw him. His breathing was not stertorous; his pulse was weak, small, and quick, and his countenance sunk. The brain on a careful examination presented no change in colour or consistence, and was even less vascular than usual. The pineal gland was, in my opinion, smaller and softer than natural, and contained scarcely any of the small gritty bodies which are generally found in it. The pituitary gland was not examined, the case having occurred to me a number of years ago, and before my attention had been directed to the nature and functions of this part.

192. 2d. In a small proportion, however, of this class of apoplectic cases, *excessive injection of the vessels of the pia mater and engorgement of the whole vascular system of the encephalon* are the only or chief lesions; the pressure to which the brain has been subjected from this cause, as well as the interrupted state of the circulation, whence the attack most probably proceeded, being sufficient to destroy life in a few minutes, or a very few hours at the furthest. This forms the simplest state of sanguineous apoplexy, and is of comparatively rare occurrence. It constitutes the *coup de sang* of the French, and is observed in those cases of *coup de soleil*, or sunstroke, which proves rapidly fatal. I have met with it in two cases of this description.

193. 3d. *Serous effusion* is one of the most frequent appearances found in this form of apoplexy, but it seldom occurs alone, being generally accompanied with engorgement of the veins and sinuses of the brain. It is often also observed in the symptomatic and complicated states of apoplexy which will come under consideration in the sequel. The very judicious observations which have been made by Dr. ABERCROMBIE and M. CRUVEILHIER, particularly the former, as to the relation which this lesion presents to the apoplectic state, is well deserving of the attention of the pathologist. I perfectly agree with them in considering the distinction proposed between sanguineous and serous apoplexy as not supported by observation; for many of the cases which terminate by serous effusion exhibit in their early stages all the symptoms usually assigned to sanguineous apoplexy, such as flushed countenance, strong pulse, vigor of constitution, &c.; whilst, on the other hand, many

of those accompanied by paleness of countenance and feebleness of the pulse are found to be purely sanguineous; even the pre-existence of dropsical effusion, or the leuco-phlegmatic diathesis, or great age, &c., furnish no certain data, although a strong presumption, of the attack being that depending upon the effusion of serum. The shock given to vitality by the sanguineous effusion is generally not sufficiently estimated or correctly interpreted by many.

194. The serous effusion in those cases in which it constitutes even the chief lesion cannot be viewed in any other light than in that of a result of pre-existing disturbance of the circulation, depending, as will be more fully alluded to in the sequel, either upon imperfect vital tonicity or action of the vessels, or upon obstructed circulation, especially in the veins and sinuses of the organ, or even upon both. Another circumstance well deserving of notice, and evincing that the serous effusion is of itself to be viewed as merely a part, and indeed no very important part, of the existing lesions, although the most demonstrable, is the fact also first insisted on by Dr. PHYSICK and Dr. ABERCROMBIE, that the quantity of fluid effused bears no proportion to the degree of the apoplectic symptoms: for we find it in large quantity when the symptoms have been slight; in small quantity when they have been both strongly marked and long-continued; and, finally, we find most extensive effusion in the head, where there have been no apoplectic symptoms at all. The inference, therefore, clearly deducible from the most faithfully observed facts, is, that the effusion is not the cause of the apoplectic seizure, but the consequence of that state of circulation on which the disease more immediately depends. Indeed, I am of opinion that a considerable portion of the effusion takes place either immediately before death or soon after life is extinct; and that several cases referred to serous effusion have not arisen from this cause, the quantity of serum having evidently not been greater than we have reason to believe naturally exists in the head as necessary to regularity of the functions of the brain under the varying states of circulation, and of atmospheric pressure on the surface of the body, from which the unyielding bones of the cranium protect the encephalon.

195. 4th. *Extensive extravasation of blood* is a rare occurrence in this form of apoplexy, being most commonly ob-

served in other varieties of the disease. When, however, extravasation is met with, it is either found diffused about the base of the brain, and pressing upon the medulla oblongata, in the fourth ventricle, or in both the lateral ventricles, from rupture of some diseased vessel, or attended by laceration of the cerebral structure at, or near to, the surface of the brain. When extravasation of blood is found, the attack has generally been characterized by symptoms closely approaching those of the next variety, viz., a gradually invading and slight attack, rapidly followed by a short interval of sensibility, which is as quickly followed by profound coma and death.

CHAPTER III.

THE GRADUALLY INCREASING OR INGRAVESCENT APOPLEXY.

196. *A. Description.*—IN this form of the disease the patient is not at first seized with loss of sense and voluntary motion; or if he be so seized, the attack is momentary, and passes off without the use of any remedy. It more usually commences with a violent and sudden attack of headache, very frequently accompanied with paleness, sickness, and vomiting. Sometimes the patient sinks down from its severity, pale, faint, and exhausted, and experiences a slight convulsion, but recovers from this state in a short time. This attack generally soon abates or some of the symptoms subside, and others continue in various degrees or differently modified. The pain is generally referred to one side of the head, and the vomiting sometimes returns. Coldness, paleness, and faintness are complained of, with all the other symptoms indicating a serious shock received by a vital organ. The pulse is weak and frequent, the countenance cadaverous and sunk, and the patient feels depressed, but sensible. After this state has endured from an hour, to two, three, or even more, the surface acquires some heat, and the pulse improves in strength. The face now becomes flushed and the features expanded. The op-

pression increases rapidly; the patient answers questions slowly and heavily, and at last sinks into a state of profound stupor or coma. The period which elapses from the commencement of the attack to the continued and perfect coma varies from less than an hour to three days. But Dr. ABERCROMBIE, who has illustrated this form of apoplexy in an able manner, has observed an interval of not more than twenty minutes, and has seen it prolonged to a fortnight.

197. *B.* This is the most fatal form of apoplexy, very few recovering from it. On *inspection after death*, extensive extravasation of blood is always to be met with. From the whole history of this class of cases, Dr. ABERCROMBIE thinks they depend upon the rupture of a considerable vessel, without any previous derangement of the circulation, the rupture probably arising from disease of the artery at the part which gives way. He conceives, that, at the moment when the rupture occurs, a temporary derangement of the functions of the brain takes place, but that this is soon recovered from; and the circulation then goes on without interruption until a quantity of blood has been extravasated sufficient to produce coma. This may possibly be the case, particularly in those instances where the coma soon follows the first attack. I am more inclined to think that a depressed or deranged state of the vital energy and circulation of the brain, similar to that which occurs in the foregoing variety of the disease, takes place at the commencement of the seizure, and that the extravasation frequently accompanies the reaction supervening on the oppression which precedes the perfect attack; or, if extravasation have taken place in the first instance, that it is only to a small amount, the state of energy of the circulation of the organ at the time preventing it from proceeding to any considerable extent, and that it is afterwards renewed in the same situation, or even in a different part, upon the reaction which takes place soon after the shock which the first seizure occasions. Dr. ABERCROMBIE is of opinion, that in some cases the extravasation commences with the early part of the attack, and that it goes on till such a quantity has been accumulated as is sufficient to produce fatal coma; and that in others, after the rupture has taken place, the hemorrhage is stopped by the formation of a

coagulum, and after a considerable interval bursts out afresh and is fatal. It is by no means improbable that some cases present the phenomena which this accomplished physician contends for, whilst others may proceed in the manner which I have suggested. A chief reason for my believing that this form of apoplexy frequently originates in the way I have stated, is, that I have met with cases in which the disease was gradual, or consisted of several attacks either of incomplete or complete loss of recollection and voluntary motion from which the patients had recovered, but had at last been carried off by a more severe seizure; and yet, upon dissection, appearances of recent extravasation merely, or of congestion and engorgement, with or without serous effusion, but without the least extravasation of blood, were the only lesions which existed.

198. The rapidity with which the disease advances will, of course, depend upon the nature of the lesion, and upon the size of the vessel or vessels from which the hemorrhage proceeds, and the extent of the extravasation. The situation, also, will have some influence; inasmuch as a small extravasation, if it press upon the medulla oblongata or the annular protuberance, will be more rapidly and certainly fatal than a much larger effusion into the ventricles or into the substance of the hemispheres.

199. *C.* The appearances on dissection chiefly consist (*a.*) of extensive *extravasation of blood*, most commonly in some part of the brain in the vicinity of the ventricles, as the corpora striata and thalami optici, or some other situation adjoining those cavities, and which frequently lacerates the cerebral structure and passes into and fills the ventricles. In some instances the hemorrhage takes place in a part of the brain nearer to its periphery than to its internal surfaces: in such cases the blood ruptures the cerebral substance, and is effused on its surface. In the more suddenly fatal cases this is observed to have occurred generally towards the base of the brain.

200. In cases of profound coma supervening after a considerable time from the first seizure, the parietes of the cavity, formed in the substance of the brain by the effused blood, are softened, discoloured, and broken down, evidently indicating that in these cases softening and disorganization had either preceded the seizure, or speedily followed the

first extravasation, and that a recurrence of the hemorrhage had produced a lacerated opening, communicating either with the ventricles or the exterior surface of the organ. In a considerable portion of cases of this form of apoplexy the arteries are either ossified or otherwise diseased. The veins and sinuses also sometimes present morbid appearances (§§ 205, 206).

201. *b.* In rarer instances the extravasation of blood takes place in the *cerebellum*. When the effusion is either in this situation or below it the symptoms are more severe and rapid in their progress than when it is in the substance of the brain. This remark is also applicable when the blood flows from or into the substance of the annular protuberance, or accumulates around the medulla oblongata and foramen magnum. In some of those latter cases, which are much rarer than the foregoing, the fatal result is rapidly produced. In nearly all the cases of extravasation taking place either within or near the surface of any part of the cerebral structures, it is extremely if not entirely impossible to trace its exact source, or the vessel or vessels whence it has proceeded. It is very probable that the laceration produced by the hemorrhage separates several vessels, and thus a greater number are laid open than are concerned primarily in producing the extravasation. Besides, the softening of the surrounding cerebral structure may destroy additional vessels, and give rise to secondary extravasations of blood, either into the original cavity, thus forming a more recent portion or layer of coagulum, or into the surrounding structure in the state of capillary infiltration.

202. *c.* Besides the foregoing sources and seats of extravasation others have been observed. M. SERRES describes a case in which the hemorrhage had occurred in the substance of the pons Varolii, whence the blood had burst into the occipital fossa. It may also take place from the superficial vessels, forming the *meningeal apoplexy* of this writer. In cases of this description the blood generally seems accumulated between the dura mater and arachnoid; but cases have been recorded in which the blood appeared to have been discharged from the *retiform plexus* of vessels at the base of the brain, and confined beneath the pia mater. The hemorrhage may also proceed from *ulceration or rupture of a considerable arterial vessel*. Dr. MILLS met with

a case in which it was traced to ulceration and rupture of the basilar artery; and MORGAGNI and SERRES have found it proceed from a similar lesion of the internal carotid. MORGAGNI, DE HAEN, and HUFELAND have traced the extravasation to the vessels of the *choroid plexus*. This is probably the source of the hemorrhage when it is confined to the ventricles, without laceration of the surrounding substance of the brain. Rupture of one of the *lateral sinuses* has also been observed: a case of this description occurred to Dr. DOUGLAS. (*Edinburgh Med. Essays and Observ.*, vol. vi.)

203. *d. Small aneurisms* in various parts of the cerebral vessels may have formed, and by their rupture occasion apoplexy. SERRES relates cases in which aneurism occurred in the basilar artery, and in a small artery in the circle of WILLIS. (*Archives Gen. de Med.*, t. x., p. 419.) Similar cases are also recorded by BLANE and HODGSON. Numerous other instances of extravasation from disease of the cerebral vessels have been noticed by MORGAGNI, LIEUTAUD, DE HAEN, BAILLIE, PORTAL, LALLEMAND; and especially by BOUILLAUD (*Mém. de la Soc. Méd. d'Emul.*, t. ix.) and Dr. BRIGHT (*Medical Reports*, vol. ii., p. 266, *et seq.*), who have adduced several proofs of this kind of lesion. In a case of apoplexy recorded by BANG, the extravasation had taken place between the occipital bone and dura mater. Dr. WATTS, of NEW YORK, met with a case in which the hemorrhage had proceeded from the erosion of a vessel in connection with caries of the inner surface of the parietal bone.

204. *e. Infiltration* of the blood into with softening of the cerebral structure, also, seems to form one of the lesions which are sometimes met with in this form of apoplexy, although not near so frequently as in the seizures which supervene on and are accompanied with paralysis, where this state of softening forms the principal lesion; whereas, when it occurs in this variety, it is one of several other changes, or at least a subordinate one.

205. *f.* Perhaps the most common causes of hemorrhage in this form of apoplexy, particularly when occurring in the substance of the brain, are ossification, earthy deposits in various places, and a peculiar friability of the *vessels* of the organ. This state of the vessels, as disposing to aneurism

and hemorrhage, has been well illustrated by SCARPA, and is justly insisted upon as being connected with apoplexy by ABERCROMBIE and CRUVEILHIER, and frequently met with in the brains of elderly persons. "There is much reason to believe," Dr. ABERCROMBIE remarks, "that this diseased condition of the arteries of the brain may give rise to a variety of complaints in the head; and that after going on for a considerable time in this manner it may at length be fatal by rupture." The remarkable frequency of osseous or cretaceous deposits, &c., in the arteries of the brain, in cases of apoplexy, had been noticed by CORTESIUS and MORGAGNI. There can be no doubt that changes of this description, or that fatty or atheromatous deposits in the coats of these arteries, in connection with alterations of caliber and of vital cohesion in vessels, the coats of which are remarkably thin and fragile even in the healthy state, will readily dispose them to rupture; particularly when influenced by the varying actions of the heart and the different emotions of the mind, or when congested by derangement of the vital energy bestowed on them by the ganglial system, or by disease of the veins or sinuses, and interruption to the return of blood through these channels. Indeed there is every reason to believe that the hemorrhage may even proceed from the smaller *veins*, in many of the cases where congestion has been concerned in originating it, and especially when the return of blood from the head has been interrupted so as to produce the disease. It may therefore be inferred that the laceration of the cerebral structure is occasioned by the rupture of either an arterial or venous capillary vessel or vessels, and extravasation of blood; and that, in cases of this description at least, the morbid change commences in the vessels and not in the cerebral tissue itself, the cerebral structure being only consecutively diseased.

206. *g.* Cases have also occurred in which this species of apoplexy has arisen from disease of the *sinuses*, chiefly thickening, induration, and obstruction or obliteration of their canals. When this is the case, the veins running into the sinuses are generally enlarged, tortuous, and engorged, and as if varicose. I have also met with cases in which all the symptoms of this disease proceeded from the development of tumours in the central parts of the brain, and similar instances have been recorded by several writers.

207: *h.* Besides disease of the *vessels* of the brain, lesions of the *membranes*, as ossific deposits, ossification of the falx (MORGAGNI), but particularly derangements of the circulation in them, especially in the pia mater,—as evinced by copious extravasation on the surface of the hemispheres, or at the base of the encephalon,—and inordinate injection and congestion, deserve to be enumerated among the sources of this variety of apoplexy, although they are, perhaps, more frequently productive of congestion and serous effusion, and consequently of the most common forms of the preceding species. But there can be no doubt that this form, as well as the foregoing, also sometimes proceeds, although much more rarely, from injection and engorgement of the vessels of the membranes and of the brain itself, without extravasation; and that in other instances the degree of congestion, and the accompanying serous effusion, when occurring without extravasation, are not of themselves sufficient to account for the fatal issue, without imputing something to the vital condition of the encephalon itself.

SECTION III.

OF THE ASSOCIATIONS OF PALSY AND OF APOPLEXY WITH EACH OTHER.

208. THE association of apoplexy and palsy with each other are remarkably frequent, and it is often difficult to determine which is the primary state of disease when apoplexy and palsy are associated in the first apoplectic seizure. In many instances, hemiplegia and palsy of some of the muscles of the face may be detected at the commencement of or very early in the attack, even when the apoplexy is most sudden and severe. In many others, also, the palsy becomes more and more manifest after the commencement of the seizure, although it certainly did not exist at first, until it reaches its acme, either as the attack subsides into a return of consciousness, or when the apoplexy has been removed. In an equally great, if not greater, number of cases, palsy, in either a partial and incomplete form, or in the form of hemiplegia, or this latter associated with one or more of the local or partial states of palsy described above, is the primary morbid manifestation; and after a very indefinite continuance is followed by a more or less fully developed attack of apoplexy, of which the patient either dies, or is left still more completely paralysed, and which returns subsequently in a more profound and fatal form. In considering those associations of palsy and apoplexy with each other, I shall describe, with the appearances observed after death, *firstly*, the occurrence of apoplexy complicated with or terminating in paralysis; and, *secondly*, palsy, which after an indefinite period terminates in a complete apoplectic attack.

CHAPTER I.

APOPLEXY ASSOCIATED WITH OR TERMINATING IN PALSY.

209. *A. Description.*—THIS form of complicated apoplexy may take place either suddenly or in the manner of the last-described variety of primary and simple apoplexy (§§ 196, *et seq.*); but more frequently the latter, with the additional phenomenon of paralysis which may be either coeval with the attack, or supervene as the apoplectic state passes off. In the majority of cases, the patient complains of symptoms referable to the head, particularly of acute pain in one part; and is suddenly or gradually seized with stupor or profound coma, loss of speech and voluntary motion—with perfect apoplexy. The mouth is often distorted, and the patient moves the limbs of one side; whilst one or both limbs of the opposite side are found to be deprived of all motion upon their being pinched or tickled. The patient generally lies on the paralysed side, and one or both the opposite limbs are sometimes contracted or slightly convulsed.

210. In other cases, the seizure is less perfectly apoplectic in its character, varying in the degree of coma and disturbance of the respiration; and as the seizure declines the paralytic symptoms become the prominent disease. In some instances of this description the comatose state is slight or of short duration; but the eyelid, or orbicularis of the eye, of one side is paralyzed; or the eyes are distorted, the mouth twisted, and the tongue drawn aside upon its being held out. In the majority of these cases the speech is either altogether lost or greatly impaired; but the patient appears sensible of his situation, and even attempts to express himself by words or signs: but he is frequently incoherent, unintelligible, and without recollection, even when the power of speech is partially retained. In many of this class of cases complete hemiplegia exists, or gradually manifests itself as the seizure declines. Sometimes one limb only is affected, which is commonly the arm; although the leg is sometimes the only paralysed part. In rare cases, the power of swallowing is lost, owing to paralysis of the muscles of the pharynx and the upper part of the œsophagus.

211. This form of apoplexy presents various modifications in its further progress, which may be arranged under the following heads:—

212. *a.* The apoplectic attack may, under judicious treatment, pass off entirely and quickly, and leave no trace of its existence after a short time; the paralytic symptoms, particularly when slight, either disappearing with it, or soon afterwards.

213. *b.* The recovery from the apoplectic seizure may be more gradual, taking place only in the course of some days; whilst the paralytic symptoms require several or many months for their removal.

214. *c.* The apoplectic seizure may be either quickly or slowly removed; but the paralysis may be permanent,—may continue for years, either until the patient is carried off by a subsequent seizure or by some other disease.

215. *d.* In other cases the patient experiences a very partial recovery merely, or is subject to several exacerbations, is confined to bed, or his room, speechless or paralytic, or the latter only, with his mental faculties either more or less impaired, or but little affected; and at last sinks gradually exhausted after many weeks or even months; sometimes having become comatose for a short time before death.

216. *e.* The apoplectic seizure may pass off in a shorter or longer time, leaving either hemiplegia, or paralysis of a single limb, or impaired speech and mental faculties; and may recur after a period of indefinite duration, and either carry off the patient or leave his symptoms greatly aggravated. In this latter case, either another seizure again takes place after a time, or he sinks into the state characterizing the immediately preceding modification.

217. *B.* *The morbid appearances* which this variety of apoplexy in its different states presents are very diversified:—1st. In some cases, *no lesion* is detected sufficient to account either for the symptoms or the termination: 2d. In other cases, *serous effusion*, merely to a slight extent, or little beyond what we have reason to suppose usually exists within the cranium, is found, sometimes conjoined with more or less congestion of the vessels: 3d. In some instances, *congestion* is the most remarkable and only morbid appearance; and, occasionally, this state is connected with disease of the arteries, generally of the kind already described.

218. 4th. *Extravasation of blood* into a defined cavity is amongst the most frequent lesions met with in this form of apoplexy. We have already seen that when the hemorrhage is very considerable, or bursts its way into the ventricles or to the surface of the brain, the apoplectic seizure is complete; and owing to the quantity of blood effused, and the pressure thereby occasioned on the whole encephalic mass, the patient is either suddenly carried off before any paralytic symptoms become evident, or rendered comatose, and incapable of sensation and voluntary motion in every limb. In the majority of cases in which extravasation takes place in this form of apoplexy, there is every reason to believe, from its small extent, that it is merely a consequence of the simple apoplectic state occasioned by congestion or interruption to the circulation,—these states of the circulation being followed by the extravasation, on which the paralytic symptoms chiefly depend.

219. 5th. The extravasated blood presents various *appearances*, according to the period which has elapsed from its effusion; and the surrounding portion of the brain, and parietes of the cavity formed by the coagulum, likewise undergo *changes*—in some cases extremely slight, in others very extensive—which generally have an intimate relation to the various states the patient has presented in the progress of the disease. When the cerebral substance surrounding the extravasated blood continues but little changed, coagula of considerable size are gradually and often completely absorbed. About fifteen or twenty days after the attack the more fluid part of the effused blood disappears, and the coagulum is firm and of a dark brownish colour. At a remoter period it assumes more of a firm and fibrous texture, and the dark red or brown tint is lost. At last the coagulum is nearly or altogether absorbed; and a small quantity of fibrous matter, of a slightly reddish colour, which after a time passes into a loose cellular-looking substance, only remains. These changes generally take place at the end of four or five months; but exceptions not unfrequently occur. RIOBE found blood in the apoplectic cavity after twenty months; MOULIN met with a small coagulum at the end of a year; and SERRES has observed firm coagula at the termination of two and three years.

220. 6th. The *parietes of the cavity* also experience an

important change. They frequently consist of a firm yellowish membrane; and when the coagulum is altogether absorbed this membrane forms a more or less complete cyst and well-defined cavity, which is either empty or contains a little very loose cellular substance connecting its opposite sides in all directions; sometimes with yellowish bands of a denser consistence running through it. Dr. ABERCROMBIE has never found the cavity entirely obliterated; while Dr. BRIGHT, M. CRUVEILHIER, and some other French pathologists, have seen it in some instances, after a remote period, reduced to a dense nucleus; and, in others, to a linear induration resembling a cicatrix. In some cases the cyst has been found distinctly organized, and with blood-vessels ramified in it.

221. The firm membrane, constituting the *apoplectic cyst*, or covering the sides of the cavity, seems to form soon after the extravasation has taken place, and apparently arises from the lymph thrown out upon the torn surface of brain. It may generally be detected as early as a fortnight or three weeks after the attack, or even earlier. At a remoter period, when the coagulum is removed, the cyst is either empty, or it contains a serous fluid, usually tinged with blood or the remains of the coagulum. RIOBE and other French writers suppose that the serous fluid is exhaled from the membrane covering the cavity, and absorbed after dissolving a portion of the coagulum. When blood is extravasated into the ventricles in cases of this description, although extravasation in this situation much more rarely occurs in this than in the preceding form of disease, there seems no doubt of the possibility of its absorption. In this case the membrane lining the ventricle containing the effused blood becomes thickened, and of a yellowish colour. M. RIOBE records a case of apoplexy with palsy of the left side which was completely removed. The patient died of diseased lungs after eighteen months; and the *right* lateral ventricle contained a small quantity of coagulated blood, and its membrane was changed as now described. Absorption of the coagulum, with the formation of a cyst similar to those formed in the cerebral structure, also takes place when the blood is effused on the surface of the brain, or in the cellular structure of the arachnoid pia mater.

222. As the coagulum disappears the paralytic symp-

toms in some cases subside ; but more frequently the improvement is only partial, and the patient continues paralytic, although the coagulum is either altogether or in a great measure absorbed, and all unusual pressure or interruption to the circulation is removed from the adjoining parts of the brain. It would seem that the fibres of cerebral structure being once ruptured, and not being susceptible of a direct reunion, remain ever afterwards incapable of conveying volition to the paralysed limbs, which are always on the side opposite to the seat of lesion in the encephalon.

223. In some cases of apoplexy complicated with paralysis the apoplectic symptoms pass away speedily ; and the paralysis also disappears, either with the apoplectic attack or very soon afterwards. In these, sufficient time for the absorption of extravasated blood has not elapsed : are we, therefore, to infer that it has been effused, and recovery taken place notwithstanding ? I am more inclined to think that no effusion has occurred in these cases ; but that either congestion of vessels in a part of the brain, sufficient to interrupt the functions depending on it, or retardation of the circulation through it, owing to deficient vital energy of the part, occasioning a temporary abolition of its functions, particularly the power of voluntary motion, or both these states, have merely existed. In many cases, one or more coagula in distinct parts of the brain, or cavities or cysts in older attacks, are found, and generally their number has a relation to the number of seizures. But it occasionally happens that extravasation takes place in two parts of the encephalon, either at the same time or during the same attack ; and thus the number of lesions will be greater than of the seizures : and in other cases, particularly in the next form of the disease, the second or even third extravasation takes place in the same situation as the first ; forming either an external layer with appearances distinct from the centre coagulum, or a separate portion with the characters of more recently effused blood.

224. 7th. The *substance of the brain* surrounding the extravasated blood often presents important lesions, chiefly consisting of change of consistence and colour. This portion of brain is sometimes very much softened, and is either colourless or of a yellowish or greenish yellow tint, or presents the usual appearances proceeding from capillary injec-

tion or sanguineous infiltration. This change of structure seems to commence from five to ten days after the sanguineous extravasation, and to arise from inflammatory action having taken place in the part surrounding the effused blood. We have already seen that the formation of a membrane around the coagulum, upon the lacerated surface of brain, is necessary to the reparation of the apoplectic effusion; and that the membrane seems formed from lymph thrown out upon the surface. If the local action necessary to the production of this membrane, and to the process of reparation pass the healthy standard, inflammation is the result; occasioning either a considerable effusion of serum or a second hemorrhage, as already stated, or softening of the surrounding cerebral structure. This consecutive inflammatory action may also give rise to exhalation of serum into the ventricles or into the sub-arachnoid cellular tissue, according to the situation of the primary extravasation; or even, though much more rarely, to a secretion of puriform matter.

225. 8th. It sometimes happens, when the consecutive inflammation has been slight and of long duration, that *induration* of the surrounding cerebral texture takes place, the intellectual faculties having been generally much impaired in these cases; this change, however, is much less frequently met with than consecutive softening.

226. There is no part of the brain exempt from the lesions described under this form of apoplexy, although they are most frequently observed in the corpora striata, the thalami, and the substance of the hemispheres. They likewise occur, though less frequently, in the cerebellum, annular protuberance, &c. In all these situations the paralytic symptoms affect the side opposite to that in which the lesions of the encephalon are seated. Some exceptions, however, to this have been recorded; but either the various circumstances connected with the cases in which they have been said to have occurred have been insufficiently investigated, or they admit of explanation without invalidating the accuracy of the general inference. Of *forty-one* cases in which extravasation of blood was found in the brain on dissection, by M. ROCHOUX, eighteen were in the left side, seventeen in the right, and six in both sides. Of these forty-one, there were twenty-four in the corpora striata, two in the thalami, one in both these situations, and one

under the corpus striatum; making altogether twenty-eight in the corpora striata and vicinity. Of the remaining cases, five were in the middle of the hemispheres, two in the posterior part of the ventricles, two in the anterior and interior part of the hemisphere, three in the posterior and interior part, and one in the middle lobe. ANDRAL has described the locality of extravasation in 386 cases. He found it seated in the part of the cerebral hemispheres, situate on a level with the corpora striata and the optic thalami, and at the same time in both these bodies, in 202 cases; in the corpora striata in sixty-one; in the optic thalami in thirty-five; in the portion of the hemispheres above the centrum oval of Vieussens in twenty-seven; in the lateral lobes of the cerebellum in sixteen; anterior to the corpora striata in ten; in the mesocephalon in ten; in the spinal marrow in eight; behind the optic thalami, posterior lobes in seven; in the median lobe of the cerebellum in five; in the peduncles of the brain in five; in one peduncle of the cerebellum in one; in the corpora olivaria in one; in the pituitary gland in one; in the central white parts in none.

CHAPTER II.

PALSY, EITHER PARTIAL, LOCAL, OR HEMIPLEGIC, OR VARIOUS COMBINATIONS OF THESE STATES, AFTER AN INDEFINITE DURATION PASSING SUDDENLY INTO THE APOPLECTIC ATTACK.

227. *A. Description.*—The commencement of this association of palsy with apoplexy is various. The palsy may exist long in one of the forms described in the first section, especially in a local, partial, or hemiplegic form, or in two or more of those conjoined; and then, after an obvious exacerbating cause, or after no obvious cause, an apoplectic attack may suddenly supervene. In other cases the patient complains, for a short time only before the apoplectic attack, of pain, vertigo, and other symptoms referable to the head; with want of recollection, loss of memory of words, cramps,

pains, or with numbness, pricking, tingling, or weakness of a limb or limbs on one side, generally beginning in the hand. The speech is sometimes at first affected, or the mouth and eyes distorted; the limbs being subsequently paralysed. In many instances the local symptoms continue short of paralysis for a considerable time previously to this state being fully developed. In this case inflammatory action seated in a part of the brain has often existed, although the symptoms have been so obscure as not to have been detected. After a period of indefinite duration the paralytic symptoms are followed by a complete apoplectic seizure, occasionally preceded or accompanied with spasms or convulsions of the unparalysed limbs; or the attack supervenes on repeated aggravations, or after a gradual increase and extension of these symptoms. In some cases the patient sinks gradually into a comatose state; from which he may at first be partially roused and give rational answers, the state of complete loss of sensation and voluntary motion having gradually advanced. From this state the patient seldom or never recovers. In certain cases the apoplectic seizure is more sudden but is not so profound, or it passes away more quickly than in others. The apoplectic attack having occurred, the patient is either carried off by it, or he recovers after a time the state in which he was previous to it, or he is left by it in a still worse condition: either gradually sinking, and dying in a state of exhaustion or coma; or experiencing a recurrence of the apoplexy, which terminates his existence. This forms a variety of M. CRUVEILHIER'S second species of apoplexy. It is often a result of previous acute disease, proceeding from a feeble capillary exudation.

228. As soon as the patient suffers the first complete apoplectic seizure, the *progress* and *termination* of the disease very closely agrees with the description given of the immediately preceding form; but the appearances observed on dissection are frequently somewhat different, and are altogether much more diversified.

229. B. *Appearances on Dissection*.—Many of the changes observed after this form of the disease are entirely similar to those described under the foregoing head (§§ 217, *et seq.*); whilst others fall under a different chapter, where they are described in connection with palsy. There are some lesions,

however, which seem more strictly related to the present variety of complicated apoplexy than either to the other varieties of the disease on the one hand, or to simple paralysis on the other. The most frequent morbid appearance which I have met with in this form of apoplexy, or seen described in the works of BAYLE, RECAMIER, CAYOL, ROSTAN, RIOBE, SERRES, CRUVEILHIER, LALLEMAND, BOUILLAUD, ABERCROMBIE, and GENDRIN, who have paid great attention to its pathology, consists of softening, with a reddish tint, of a portion of the brain. In cases which I have examined the softening was accompanied with *infiltration* of the blood into the cerebral structure. In some cases the softening and infiltration increased from the circumference to the centre, whilst in others the change from the healthy state to this took place abruptly; the diseased part presenting the appearance of a cavity containing a softened and reddish pultaceous mass, which could be removed without evincing any connection with the surrounding brain. In some instances the softened part is of a yellowish green tint, and the surrounding portion of brain more vascular than natural. The parts most commonly affected with this lesion are nearly those which are most frequently the seat of hemorrhage; the chief difference being, that the gray substance of the hemispheres is oftener the seat of the former than of the latter.

230. As to *the origin* of this particular form of softening of the cerebral structure I must refer the reader to what I shall more fully adduce respecting it in the sequel. As, however, the origin of this species of softening has a very intimate relation to this class of cases, it may be briefly noticed at this place. The French pathologists, with very few exceptions, ascribe it to inflammation of the cerebral structure. There can be no doubt that it sometimes proceeds from this source. But as soon as the inflammatory action has given rise to this change the vessels no longer enjoy their requisite tone,—their vitality has evidently become exhausted,—and they allow the red particles of blood to escape from them, and to be infiltrated into the cerebral structure; as we observe sanguineous infiltrations into the parenchymatous structures to occur in scurvy or in purpura hemorrhagica. When the softening arises from this cause the paralytic and apoplectic seizure more frequently is met with in patients not far beyond the middle

age, and whose constitutions are not much injured; and the attack is more commonly preceded by acute or febrile symptoms than where it proceeds from the cause about to be adduced.

231. Dr. ABERCROMBIE considers that it also depends upon disease of the arteries, chiefly ossification, thickening, contraction, or separation of their inner coat, occasioning a failure of the circulation, and gangrene of the part of the brain which is supplied by the diseased vessels, as is observed to take place in the toes of aged persons. This may possibly occur; but still we have no satisfactory proof that it does so. This far I may concede,—that the disease proceeds from a change of a state of the capillaries of the part, and of the cerebral structure in which they ramify; otherwise we should not observe infiltration of blood and great softening of structure; but which of the two is the primary lesion is very difficult to determine. Most probably both are dependent upon the state of that part of the ganglial system which supplies the encephalon, particularly its blood-vessels.

232. The other appearances with which this lesion is associated in this form of the disease consist of the morbid states of the arteries of the brain already noticed; of aneurisms [Sir G. BLANE records a case which arose from rupture of aneurism of the internal carotid]; congestion of the vessels, veins, and sinuses; more rarely extravasations of blood in some one of the situations and states already noticed, or the remains or marks of antecedent hemorrhage; empty cysts from which coagula have been absorbed; portions of the brain in various degrees of induration; purulent collections in different forms; encysted and other tumours of various descriptions; a large proportion of the lesions described in my work on "*Practical Medicine*," in the article on the *Alterations in the Substance of the BRAIN*; thickening, injection, or ossifications of the membranes; and, occasionally, accumulations of serum in the sub-arachnoid cellular tissue and in the ventricles. The further exposition of this form of the disease, especially in relation to the *paralytic* symptoms, falls more appropriately under a different head where they are more fully discussed.¹

¹ I may subjoin the following classification of apoplexies, according to a different principle to that adopted above. It is based upon the chief patho-

CHAPTER III.

OF CERTAIN PHENOMENA OBSERVED IN THE SIMPLE AND ASSOCIATED FORMS OF APOPLEXY AND PALSY.

233. A. THERE are *certain symptoms* occasionally met with both in simple apoplexy and in apoplexy associated with palsy to which I shall briefly refer. The *pulse* is often full, strong, and slow, or of natural frequency, in the first form of simple apoplexy, and in apoplexy associated with hemiplegia, and occasionally in palsy passing into apoplexy. In other cases, and especially in those which are intense, and particularly in the second form of simple apoplexy, and

logical states from which the attack proceeds, and approaches nearer the arrangements adopted by the German pathologists, particularly HARLESS (*Der Speciellen Nosologie, &c.*, p. 131, Cobl., 1824), than that usually followed by our own writers. In some respects it may be preferable to that which has been now fully described, especially as I have here placed those forms of the disease which depend upon the nervous or vital energy of the encephalon in a more prominent point of view than they can hold in a classification framed according to the symptoms and mode of seizure, in connection with the internal lesions:

I. SANGUINEOUS APOPLEXY,—with extravasation of blood in some part within the cranium.

II. CONGESTIVE AND SEROUS APOPLEXY,—from obstructed return of blood from the head, and frequently from the metastasis of gout, rheumatism, or eruptive diseases.

III. ASTHENIC APOPLEXY.—*Nervous Apoplexy of Authors*,—from depression, exhaustion, or abolition of the vital influence bestowed on the encephalic organs, and occasionally giving rise to extravasation of blood, or of serum, and to congestion of the cerebral vessels.

A. From *intoxication*. B. From *narcotic poisons*, and *mephitic gases*. C. From *a stroke of lightning*. D. From the *influence of great or continued cold*. E. From *exhaustion* of the mental and bodily powers, and from convulsive affections. F. From *violent mental emotions*.

IV. APOPLEXY FROM PRE-EXISTING CHRONIC LESIONS WITHIN THE CRANIUM,—from inflammations, softening of the cerebral structure, abscesses, tumours, &c.

V. TRAUMATIC APOPLEXY,—from external injuries. *Concussion*, or shock of the vital powers of the organs;—*pressure* from depression of bone or extravasation of blood.

VI. COMPLICATED APOPLEXY,—supervening at the invasion or advanced stages of fevers of an adynamic or asthenic type. *Profound Coma*.

VII. APOPLEXY ASSOCIATED WITH PALSY.—The complication of either of the foregoing with hemiplegic or general palsy, especially the *first*, the *fourth*, and *fifth*, with hemiplegia, and the others with general palsy.

in palsy which has passed into apoplexy, it is often small, feeble, and unequal or irregular. The *respiration*, both as to strength and frequency, generally presents similar characters with the pulse; when the latter is slow and strong the former is deep, slow, and stertorous; and when the pulse is weak and frequent, respiration is quick, less laboured, and much less sonorous. *Deep sighs* are occasionally observed in all the forms of the disease.

234. The *state of the pupils* is very various; sometimes they contract and dilate independently of the influence of light; but in the *first* form of simple apoplexy, and in the first variety of the associated diseases, they are generally dilated; and they are often contracted, or one is contracted and the other dilated, in the associations of apoplexy and palsy. Contraction of the pupils has been remarked as a not infrequent attendant on the worst forms of apoplexy, and particularly on those characterized by a tendency to spastic action, by ARETÆUS, and recently by CHEYNE, COOKE, and various other pathologists. The *features* are usually large, bloated, relaxed, and flushed; but they are sometimes pale, and even collapsed, particularly in the *ingravescent* and consecutive forms of apoplexy. The *fecal* and *urinary evacuations* sometimes take place involuntarily in all the varieties of simple apoplexy, and of apoplexy associated with palsy.

235. The *muscles* most frequently paralysed, either antecedently, consecutively, or at the same time with apoplexy, are those of the superior and inferior extremities, particularly those of the superior; next, those of the tongue and face; and lastly, the muscles of respiration. The muscles of the face which are paralysed are sometimes on the opposite side to that which is hemiplegic—an occurrence which will be noticed hereafter. In general, the power of feeling is more or less deficient, as well as of voluntary motion of the affected limb or side; but sometimes voluntary motion is lost, whilst sensation remains. There are also very rare cases recorded where the feeling only was lost, and sensation has been observed paralysed on one side and motion on the other. These phenomena will be more particularly considered in the sequel. As the patient convalesces, sensation returns in the paralysed limb before the power of voluntary motion; and generally the lower ex-

tremity recovers its functions before the upper, unless disease of the spinal cord, producing more or less of paraplegia, co-exist with, or is consequent upon, the apoplectic disease,—an occurrence which is sometimes met with.

236. *B. The duration of the apoplectic state* is extremely various. The attack may terminate fatally in a few minutes, particularly the *first variety* of simple apoplexy; or it may pass away in as short a time, and the patient recover, especially in *this* and more rarely in the first form of the associated disease. Dr. COOKE thinks that death seldom or never occurs in less time than one or two hours in genuine apoplexy; and I believe, as respects those apoplexies which consist of cerebral hemorrhage, this is generally the case; but when large hemorrhage takes place into the ventricles and about the base of the brain, or medulla oblongata, death is very quickly produced. In a case of this kind to which I was called, death took place in a few minutes. An attack often, however, continues for a much longer time, generally from several hours to as many days. If no remission of the symptoms be observed after twenty-four hours, the disease generally terminates unfavourably. The progressive or ingravescent variety sometimes continues for several days; the apoplectic state becoming more and more profound, and at last usually ending fatally.

237. *C. The terminations of apoplexy* have already been noticed when describing the different forms of the disease. I may, however, remark generally that the attack may end as now stated, or it may go off completely, leaving no further ill effects than a tendency to recur upon the action of the remote causes. This favourable termination, however, is entirely owing to the nature of the causes; a larger proportion of cases either terminates in, or is accompanied with paralysis. When the speech and mental faculties are affected in a marked manner from the first attack, they return but slowly; the memory, the strength of mind, and force of character, are more or less impaired; the patient becomes weak, puerile, easily excited, and timid; and a disposition to a subsequent attack is produced, which either carries him off, or weakens still further his mental and motive powers, until perfect imbecility of mind and body is occasioned. Sometimes, after repeated attacks, with marked injury of the mental faculties, a considerable diminution of the volume of

the cerebral convolutions is observed upon dissection,—they no longer fill the cranial vault; but the space is occupied by a greater or less quantity of serum infiltrated in the subarachnoid cellular tissue, and not only on the exterior surface of the convolutions but also between their anfractuosities. In some cases this change is more remarkably developed in certain convolutions than in others, or in those of one lobe or hemisphere than in the rest.

238. I have shown above (§§ 208, *et seq.*) that the procession and association of apoplexy and palsy are generally as follows:—1st. *The apoplexy occurs as the primary malady, and is either associated with or followed by paralysis;* 2d. *The paralysis, in some one or other of its partial states, often in that of hemiplegia, first appears, and is followed, after a very indefinite period, by an apoplectic attack more or less profound.*

239. *a.* In the *first* of these complications, the paralytic affection may disappear in a short time after the apoplectic seizure, or not until after several days or weeks. It may be permanent, or continue for years, or until after another apoplectic seizure carries off the patient; or it may be rendered more complete or general, or it may affect additional or different parts, those first affected being either partially restored or unchanged by renewed seizures of apoplexy, or by coma attended by sinking or exhaustion. In these cases death is usually produced by the apoplectic state, or by a comatose sinking, attended by a general palsy, in which, owing probably either to nervous exhaustion or to counter pressure on the base of the brain, or on the medulla oblongata, or to lesions extending to these parts, the respiratory organs participate. I have described fully, in the chapter just referred to (§§ 217, *et seq.*), the lesions usually observed in these circumstances; and I need not, therefore, allude to them further than to state that in the slighter and less prolonged instances they consist chiefly of congestion and serous effusion; and, in the more severe and permanent cases, of extravasation of blood, softening of portions of the brain, and of extravasation and softening conjoined. In rare cases, little or no lesion is seen, or at least lesions insufficient to account for the phenomena and for death; and in other cases, in connection with one or more of these lesions, effusion of serum in the ventricles or between the membranes; inflamma-

tion of a portion of the brain or of the membranes; and other concomitant or contingent lesions are observed.

240. *b.* In the *second* of these forms of complication (§ 227), the palsy in some one or other of its more partial forms, frequently in that of hemiplegia, is the primary seizure; and is generally then caused by alterations in some part of the substance of the brain, especially by softening, hemorrhage, cysts, tumours, tubercles, and by almost any of the diversified lesions described in my work on *Pathology and Practical Medicine*, when treating of structural changes in the *Brain and its Membranes*, particularly when they have arrived at an advanced state of development. Many of these lesions are followed by inflammation, softening, congestion, or effusion of serum or of blood in the brain or its membranes, causing either a more complete or a more extensive palsy, or spasms or contractions of one or more limbs, or superinducing apoplexy, which may either terminate life, or be removed, leaving the pre-existing palsy more complete or extended than before. When apoplexy thus follows upon either partial or hemiplegic palsy, it generally assumes an intensely comatose form, from which recovery seldom occurs, especially when the patient is far advanced in life, or has been long devoted to mental exertion.

241. *D. The Disorders of the Nervous System, and of the general health accompanying simple and consecutive Palsy, vary in different cases according to the seat of the malady.*—*a.* In *hemiplegia*, and in palsy of any of the organs of sense, the memory, and in severe or prolonged cases even the intellectual powers generally, are more or less impaired; the palsy thus extending to the manifestations of mind. This state is, however, most remarkable in the complication of general palsy with insanity, hereafter to be noticed. The temper and disposition are often changed from their usual characteristics; persons of a mild disposition becoming peevish and irritable, and those who have been irascible becoming placid; in some cases the memory, chiefly of words or of names, is impaired or perverted, so that the patient substitutes those which either are inappropriate or have an opposite meaning to that which he wished to convey. The powers of attention and application, and mental energy generally, are usually impaired.

242. *b.* The action of the *heart and lungs* is seldom much

excited in hemiplegia or cerebral palsy, unless when inflammation of a portion of the brain supervenes upon or attends the lesion causing the hemiplegic state. Nor is the action of these organs oppressed or impaired, unless effusion, so as to cause direct or counter pressure, takes place, or the medulla oblongata becomes in any way implicated. Hence the temperature of the surface of paralysed parts is seldom lower than natural; and frequently, owing to diminished transpiration from the surface of these parts, it is higher than in other situations.

243. *c.* *Digestion* and *assimilation* are often but little disturbed or impaired. In some cases, vomiting or nausea, with or without flatulence, attends the accession of hemiplegia; but subsequently acidity, heart-burn, or flatulence is often complained of. The appetite is but little impaired; it is even frequently keen or craving, and is generally too great for the amount of exercise taken and of air consumed by respiration, and consequently for complete digestion and assimilation. This keenness or craving appetite I have often remarked as an indication of latent irritation in the substance of the brain. The bowels and liver are usually torpid, and often require powerful chologogues and purgatives to act on them.

244. *d.* The *nutrition* of a paralysed part is often not materially affected when the disease occurs after the growth of the body has been matured. Occasionally, however, some degree of shrinking or atrophy exists, especially in prolonged cases, and when the sensibility has been much impaired. When the power of motion has been alone or chiefly affected, then this change has been owing to disuse of the muscles. The nerves are also somewhat atrophied. Very frequently an œdematous state of a paralysed limb is observed, increasing its bulk, although the muscular and other soft parts may be more or less wasted or atrophied. The urinary functions are seldom much affected in hemiplegia and other cerebral forms of palsy.

245. *E.* In *paraplegia* and *general palsy* the attendant phenomena have been already fully noticed (§§ 93, 124, *et seq.*), and consist chiefly of lesion of those functions which depend upon or are influenced by the part of the spinal cord which is the seat of disease. As the brain continues unaffected until the fatal termination of the disease draws near,

so the mental powers continue unimpaired till that period arrives.

246. *a.* When the medulla oblongata or upper part of the cord is affected, the *action of the heart and lungs* is often much disordered; and if these parts, especially the former, are pressed on, or much disorganized, death by asphyxia is more or less speedily produced. In slighter lesions of these parts, remarkable slowness of the pulse, in some cases, and great rapidity of it in others, are often observed.

247. Respiration is usually performed chiefly by the diaphragm, and the quantity of oxygen consumed during the process is very small: consequently the heat of the surface is low, and transpiration from it much diminished. The skin is dry, becomes covered with a branny or furfuraceous substance, owing to rapid exfoliation of the cuticle. When the lesion is seated lower in the cord, or so as not to impede the motion of the chest, and consequently not to diminish the action of the air on the blood, the parts below the seat of injury experience diminished or interrupted cutaneous transpiration; and, instead of any diminution of temperature, they present an actual rise of temperature, owing to the interrupted transpiration, the functions of respiration not being impaired.

248. *b.* The *heat of the surface* of paralysed parts depends upon the state of respiration and the consumption of oxygen, in connection with the amount of transpiration from that surface; for, whilst the oxygenization of the blood proceeds without diminution, suppression of the cutaneous transpiration raises the temperature of the surface on which transpiration is suppressed; but when the oxygenization of the blood is impaired, suppressed transpiration cannot have this effect, or only to a small amount. If the change produced by respiration on the blood be much impeded the temperature generally continues much below the natural standard. This appears to me to be the true cause of the different states of temperature of paralysed limbs in different cases; and it is preferable to account for the phenomenon conformably with established principles upon which a sound and safe practice may be based, than to mould it so as to suit a pre-conceived hypothesis, and to make it subserve a doubtful or hazardous treatment.

249. It may be objected, however, that the rise or fall of

temperature in a paralysed or in an inflamed part may be independent in some degree of states of respiration; and this is actually the case; for, although the passage of oxygen into the circulation takes place in the lungs, the oxygenization of the blood, or rather of certain elements of the blood, occurs chiefly into the systemic capillaries, under the influence of the organic nervous power; the oxygen combining partly with these elements for the nutrition of the tissues, and partly with the carbon of the blood. The change in the capacity for latent heat consequent upon the combination of oxygen with these elements in the several parts of the body, is great in proportion to the extent of combination; and as this combination is strictly a vital process, or at least brought about by vitality, although conformably with chemical laws, so it takes place independently of the cerebro-spinal nervous system. Notwithstanding that this combination and the change of capacity for caloric consequent upon it are independent of this system, and are effected chiefly by vital or ganglial nervous power, still they may be influenced by the cerebro-spinal system. The passions and emotions show this; but they also prove the predominant influence of the organic nervous system; their physical action—their operation on the circulation and the tissues—being through the medium of this latter system. Fear blanches the cheek and lowers the temperature of the surface; sexual passion produces turgescence of the erectile tissues and heightens the temperature; but these as well as other mental emotions change the state of the circulation and temperature by depressing or exciting, according to the nature of the emotion, the organic nervous or vital power in the first instance, the effect upon the circulation and temperature being consecutive. The independence of the organic or vital nervous system of the cerebro-spinal is shown, even in those vital organs which are most influenced by the mental emotions and the spinal cord, in the course of paralytic cases. Thus palsy, even when general, does not extend to the organs of generation. Erections take place in almost all the varieties of the disease, if no other concomitant complaint exist to prevent them; they are even morbidly frequent or constant when the upper part of the spinal cord is congested, inflamed, or otherwise implicated. Pregnancy proceeds in its usual course, and par-

turition takes place, in the natural way, in cases both of hemiplegia and of paraplegia. Of this latter occurrence several instances have come under my notice in public institutions.

250. *c.* When the upper part of the cord is the seat of lesion the *stomach* is sometimes so much disordered as to reject its contents. The bowels are obstinately confined, as above noticed (§ 104); the tongue is furred and loaded; the urinary organs are remarkably affected (§ 102); and the vital cohesion of the superficial and other tissues below the diseased portion of the cord is more or less impaired, disposing them readily to undergo asthenic inflammation, sloughing, &c., (§ 109.)

251. *d.* *The vitality of the tissues* is much affected by paralysis, more especially in paraplegia when it is complete, and in general palsy; but this is more particularly the case, especially as indicated by a tendency to mortification when sensibility is abolished, than when motion alone is lost.

SECTION IV.

OF SEVERAL DISEASES OFTEN PRECEDING, INDUCING, AND
COMPLICATING APOPLEXY AND PALSY.

252. It is obvious that a sufficient knowledge of the pathology of Palsy and Apoplexy cannot be acquired without reference to the several affections and changes which induce and complicate not merely either of these states of disease, but often both. We frequently find that active determination of blood to the head, and that more passive forms of congestion of blood within the cranium, have preceded other diseases which may ultimately terminate in apoplexy or palsy, or have even more directly ushered in one or other of the forms of malady under consideration. The diseases which may thus induce and complicate either palsy or apoplexy are not confined to the brain, or even to the brain and its membranes; they may even be seated in the blood-vessels and sinuses, or in the cranial bones, or even in remote organs; and they may have either a local or constitutional origin. They may, moreover, contaminate the blood, and thereby induce coma, apoplexy, asphyxia, or hemiplegic or general palsy. My limits will not admit of noticing all these morbid connections and associations, but it becomes necessary that the most important of them, as respects their practical relations, should receive some notice.

CHAPTER I.

DETERMINATIONS OF BLOOD TO, OR VASCULAR CONGESTIONS
OR INFLAMMATION OF, THE BRAIN OR ITS MEMBRANES
OFTEN INDUCE AND COMPLICATE APOPLEXY AND PALSY.

253. A. THAT frequent *determinations of blood to the head,*

or repeated *active or passive congestion* within the cranium, whether produced by excited organic nervous influence, as in the first pathological condition, or occasioned by exhaustion of this influence, as in the last of these conditions, or caused by retarded or obstructed return of blood from the head, as in congestion of the lungs or interrupted circulation through the heart, actually favour the development and sometimes complicate apoplexy and palsy, cannot be doubted. Proofs of this procession of morbid phenomena have been frequently furnished to every experienced physician; and have been observed to produce these results both when existing simply and primarily, and when occasioning various intermediate effects, or certain specific forms of disease, which contingently terminate in those more advanced morbid conditions now being considered, more especially inflammations, softenings of the structure of the brain, epilepsy, or convulsions, &c.

254. If the previous history of many of those persons who are attacked with either palsy or apoplexy, or both, be inquired into and duly estimated, it will be found that they have been frequently, if not habitually, subject to the state of the circulation of the brain and its membranes just mentioned, for a long period before the seizure to which medical aid has been called; and that although these states have existed long, yet as they did not interrupt the avocations of those subject to them, or as they even directly proceeded either from these very avocations, or from the indulgences and excitements which had long been pursued, they had not received the attention which their importance required, owing to ignorance of the results contingent on their neglect. But either of these states of the circulation within the cranium not merely precedes and *induces*, but also often *complicates* both apoplexy and palsy, although a portion only of the brain or of its membranes may be the seat of such lesion. A knowledge of this morbid association, and of its frequency, is of importance in directing our practice in safe and successful channels.

255. *B. Inflammation of the brain or of its membranes* often precedes, or induces, and complicates, or even follows, apoplexy and palsy, both in their simple and in their associated states. But in these the inflammation is most frequently limited to a portion of the brain. Either the in-

inflammation or the apoplectic or paralytic seizure may be primary, but the inflammation most frequently precedes and accompanies these seizures; and not unfrequently follows the hemorrhage or other lesions producing the attack. This complication thus presents itself in practice in two states, viz.—1. *The changes consequent upon the inflammation may induce those further changes upon which the palsy depends*; thus, inflammatory softening favours cerebral hemorrhage, and this latter usually causes the paralytic or apoplectic state. 2. *The lesion primarily causing the palsy or apoplexy may induce inflammation of the adjoining parts of the brain, and the phenomena usually consequent upon this state*; thus, blood extravasated, or a tumour formed in the brain, will occasion palsy or apoplexy, and inflammatory action will often follow in the surrounding cerebral structure, or in the adjoining membranes, or in both structures, and give rise to the association of the chief phenomena of inflammation of the brain or of its membranes with the paralytic or apoplectic state. Both these states of association may present themselves even in the same case; thus, a gentleman, attended by Dr. PARIS and the author, had inflammation of the brain; and, long after the more acute attack had been removed, hemiplegia supervened. The hemorrhage, consequent upon the inflammatory softening, and productive of the palsy, after a short time reproduced the inflammation, which was again subdued; but after some months an apoplectic seizure took place and carried off the patient. In cases of this complication, the membranes may or may not be implicated, according to the seat of primary lesion, or to the nature of that lesion.

256. When the congestion, inflammation, or structural change in the brain is limited in extent, *the symptoms preceding hemiplegic palsy or apoplexy* are often inconstant, and diversified according to contingent causes and complications. *Hemiplegic palsy* is often preceded by the same disorders as have been noticed in connection with the accession of apoplexy, particularly in that form which is associated with palsy: more especially by various affections or disorders of one or more of the senses, particularly of hearing, sight, and touch; by neuralgic pains about the face or head; by twitchings, spasms, cramps, or convulsions; by weakness of muscles of a limb; by headaches,

restlessness, sopor, lethargy, or watchfulness; vertigo, faintness, and unsteady gait; irritability of temper, loss of memory; imperfect or difficult utterance; flatulence, costiveness, and various dyspeptic symptoms; more or less manifest indications of irritation or inflammatory action in some part of the brain; by epileptic seizures, and most frequently by apoplectic attacks.

257. *C.* When *congestion or chronic inflammation is seated in the spinal marrow or its membranes*, and passes into paralytic or general states of palsy (§§ 111, 135, *et seq.*), then the patient complains, for an indefinite period, or for periods furnishing various exacerbations and remissions, of pain in parts or in the course of the spine, sometimes resembling and often mistaken for lumbago. There are often, also, pains resembling rheumatic pains in the limbs or in particular muscles; or pains in the neck, or wry-neck, or cramps or spasms of the extremities or of one or more muscles; or neuralgic pains or even well-defined neuralgia; increased sensibility of the surface of one or more limbs or of the body generally; sometimes numbness or prickings, or tingling of the toes or fingers; costiveness, colicky pains, spasms of the abdominal muscles, or obstinate constipation; retention of, or difficulty of voiding, the urine; slight attacks of suppression or urine, or nephritic symptoms, the urine being either alkaline or containing the phosphates in excess: in rarer cases chorea, or partial convulsions or jactitation, and various anomalous nervous symptoms, or partial states of palsy more or less incomplete. These disorders may exist only partially, or in several forms of association, for a shorter or longer time before the disorganization which they denote reaches that pitch which is productive of complete palsy; and they attend chiefly the congestive or chronic states of inflammation of the spinal cord or membranes, with or without softening or induration of the structure of the former, or with effusion of lymph upon or between the membranes.

258. When *Acute Inflammation* attacks these parts, and especially when it implicates the substance of the cord, then the symptoms are even more severe than the foregoing; and, upon examination after death, the structural changes, especially softening of the marrow, are more remarkable than in the more chronic cases. If the disease be limited,

as it is most frequently, to a portion only of the cord or its membranes, the pain is very severe in that situation, and is greatly aggravated by pressure over the part or parts affected. The sensibility of the surface of the parts below, or supplied with nerves proceeding from, the diseased portion of the cord is very remarkably increased. Shocks of pain, often with involuntary succussions or movements of the limbs, recur at shorter or longer intervals; and the pain is increased by touch, by motion or muscular action, either of which often induces spasms. There are also heat of skin, dryness of the mouth, thirst, a foul or loaded tongue, constipated bowels, and scanty urine. After the continuance of these symptoms for a period varying in duration, generally according to their severity, loss of power of the sphincters, or the unconscious passage of the fæces, or retention of urine, with more or less complete paraplegia, especially of motion, and the phenomena described above (§§ 102, *et seq.*) in connection with this form of palsy supervene, and ultimately terminate in death—at least with few exceptions, in this acute form of inflammation of the spinal cord—*acute Myelitis*; and, upon examination after death, disorganized softening of the substance of the marrow is generally found.

259. The most remarkable *symptoms* of this acute form of the disease, before it has passed into paraplegia or general palsy, are the shocks or succussions of pain and spasm through the limbs and trunks, resembling those produced by strychnine or electricity; the extreme sensibility of the surface, the tenderness of the spine on pressure over the seat of the disease, and the pains and cramps in the limbs. When the cervical portion of the cord is thus diseased, the upper as well as the lower extremities are affected, although in various degrees, according to the seat or extension of the inflammation; and priapisms is also usually present. In these cases the disease generally extends to the membranes or substance of the brain, either before or after the supervention of palsy; and delirium, followed by coma, attends the last hours of life.

260. *D. Acute and Chronic Inflammations* of portions of the brain, or spinal cord, or their membranes, may not merely precede and induce those changes upon which either palsy or apoplexy depends in a more or less obvious manner, although neglected by the patient until they produce these

latter maladies ; but they also often manifestly accompany, and are frequently developed by, the special lesion, which occasions the apoplectic or paralytic attack. Even when existing most obviously and exciting the fears of the patient, the symptoms by which they are indicated are often mistaken by the practitioner, not less when accompanying than when preceding either of these attacks,

261. *E.* As *palsy* is generally a consequence of some organic lesion of a part of the cerebro-spinal nervous system and nerves, it will readily be admitted that it will frequently present itself in practice as an accident or result of an immediately antecedent and intimately related disease, and often be associated with such disease. Of its association with apoplexy, and of its connection with congestion and inflammation of the brain, spinal cord and membranes, sufficient notice has been already taken ; but there are other affections and diseases which are also occasionally connected with palsy more especially, which may be here enumerated, and to some of these a more particular attention will be devoted in the sequel. Palsy may also be induced by, and connected with, softening of the brain ; with similar lesions of the spinal cord ; with structural changes of the membranes of the brain and of the spinal medulla ; with disease of the cranial and spinal bones ; with epilepsy, convulsions, hysteria, and catalepsy ; with insanity, imbecility, and idiocy ; with rheumatism, lumbago, and congestions of the spinal sinuses ; with neuralgic affections ; with disease of the kidneys or other parts of the urinary apparatus. In the progress of these maladies some form or other of palsy may appear, whenever lesions of structure, or even congestions, take place in, or extend to, any portion of the cerebro-spinal axis, or nerves proceeding from it ; or, in other words, when palsy is complicated with any of these maladies, it is a consequence of the vascular and organic lesions characterizing or supervening in the progress of such malady.

CHAPTER. II.

OF SOFTENING OF THE BRAIN IN CONNECTION WITH PALSY AND APOPLEXY.—*Softening of the Brain as inducing and complicating Palsy and Apoplexy.*

262. SOFTENING of the Brain—*pulpy destruction of the cerebral substance,—Ramolissement,—Encéphalitis sub-acuteus,—Cerebritis sub-acuteus et chronicus.*—Softening of the substance of the brain has generally been ascribed to a sub-acute inflammatory action, especially by MORGAGNI, ROSTAN, LALLEMAND, BOUILLAUD, PINEL, OLIVIER, and VELPEAU, to whom we are chiefly indebted for having directed attention to this particular lesion. There are others, however, as RECAMIER, who consider this change to be the effect of a morbid nutrition of the part rather than the result of inflammatory action. By softening of the brain must not be understood that soft state of the organ which is always present in early infancy, nor the less consistent state of the organ sometimes observed in some chronic diseases, and in certain forms of fever. It should also be recollected that all parts of the brain possess not the same degree of firmness; for if the mesocephalon be as soft as a lobe of the cerebellum, it is undoubtedly in a morbid state. Whilst I consider that softening of the brain is most frequently the result of inflammatory action, in an acute, sub-acute, or chronic form; that this action is often characterized by deficient or exhausted vital power, and that it is most frequently observed in scrofulous and cachectic constitutions; yet I believe with ROSTAN, RECAMIER, and others, that it is occasionally unconnected with inflammation, particularly in aged persons.

263. i. SYMPTOMS.—This change of structure takes place slowly, and presents two stages, the recognition of which is of much importance in the diagnosis, inasmuch as when the first period does not exist, or when the physician cannot obtain a satisfactory knowledge of it, it is difficult to determine the particular kind of disease present.

264. 1st. *The first period.*—A. *Direct symptoms, a. of non-inflammatory softening.*—A continued and more or less severe pain in the head is generally complained of. To some, the existence of pain may appear pathognomonic of inflammation; but, as M. ROSTAN has justly said, this is an inference not borne out by close observation; for pains frequently occur, of a most severe description, unconnected with any form of increased vascular action or capillary injection. Cephalalgia is, however, not always present. At this period vertigo is oftener complained of, and there is generally a more or less marked diminution of the intellectual and moral faculties. The perceptions, attention, judgment, memory, and imagination, are more or less enfeebled; and the patient sinks into a species of senile mental alienation. Sometimes the mental disturbance is partial or slight, owing to the seat and limited extent of the softening. There are observed, moreover, slowness in the answers; some degree of embarrassment in the motions of the tongue; dejection and sadness of spirits; hypochondriasis, or an extreme indifference as to events; great inclination to sleep, with pickings, twitchings, and numbness in the limbs; and much difficulty of laying hold of objects, particularly those of small size. The sensibility is generally diminished; vision is often affected, being less distinct than usual, or partially or altogether abolished. It very rarely happens that unequal dilatation of the pupils, or strabismus, occurs. The sense of hearing is generally impaired. These are the chief symptoms of *non-inflammatory softening* of the brain.

265. *b.* If the *softening* proceeds from *inflammatory action*, this period is more acute, of longer duration, and presents also certain important distinctions. The pain in the head is then more acute and sharp; the answers are abrupt and quick, and there is frequent delirium. The sensibility of the limbs is often increased, and the patient complains of pain in them, with stiffness, contractions, and cramps. This affection of the limbs may be mistaken for rheumatism, but is to be distinguished from it by the existence of cerebral symptoms, and the absence of increased heat, redness, or tumefaction. The senses evince excessive sensibility, and cannot tolerate their natural stimuli. Pain is sometimes felt in the eyeballs.

266. *B. Indirect symptoms.*—*a. Non-inflammatory soft-*

ening.—The functions of organic life do not present undeviating symptoms, and assist but little the diagnosis; the appetite may be diminished, the thirst somewhat increased, digestion more or less disturbed, and the mouth and tongue white and clammy. Sometimes there is nausea, or even vomiting, with epigastric tenderness; and there may be either constipation or slight diarrhœa; micturition is more or less difficult, or involuntary; or all these symptoms may be absent. The following are more constant in this non-inflammatory form of the disease: the pulse is slower and feebler than natural,—a symptom which is not observed in inflammatory softening of the brain; the skin is pale, its temperature is lower than natural, and the respiration slow and gentle.

267. *b.* In *inflammatory softening* the pulse is strong, full, or frequent; skin hot; and there is much thirst, and many of the local and constitutional symptoms of inflammation of the brain; but generally in a sub-acute or chronic and slight form. Thus far the symptoms do not seem very urgent; and they may be so slight, or so obscure, that the patient is not induced to have recourse to medical aid, or the physician overlooks the nature of his ailments, until an attack of palsy or apoplexy takes place.

268. 2d. *Second period.*—*A. Direct symptoms.*—*a. Of non-inflammatory softening.*—The patient now loses the use of some limb, or even one half of the body, either gradually or suddenly, but generally the latter. The greater part of the time his intelligence is but little disturbed; but he answers with extreme slowness, and is often incapable of making himself understood, except by the aid of painful gesticulation. In certain cases either complete coma supervenes on the paralysis, or both come on simultaneously. If the latter, the patient often regains his recollection in a day or two afterwards. This change seems attributable to temporary congestion of the brain. The symptoms, particularly the coma and paralysis, are increased, the mental faculties and the powers of sense become entirely abolished, and the patient sinks under the most complete coma.

269. *b.* In the *inflammatory softening*, often in the place of paralysis there exist pains, more or less violent, shootings in the limbs, with contractions, cramps, or convulsions, and severe headache. In either the inflammatory or non-inflammatory form of the disease, when the patient complains

of pain in the head, and is asked its situation, he carries the unaffected hand slowly to his head, and indicates generally the side opposite to that paralysed. In *encephalitis* there is generally the delirium; in the *non-inflammatory* form of *softening* the intellectual faculties are enfeebled or much weakened; the countenance is generally pale, colourless, or sometimes even sunk, whereas in *inflammatory softening* it is red, or more or less injected, or even tumid; the pupil is contracted and the conjunctiva injected.

270. *B. Indirect symptoms.—a. Of non-inflammatory softening.* In this *second stage* of the disease the organic functions are more or less affected; there is no appetite; the teeth and gums are dry, the tongue rough, brown, blackish, chopped, or traversed by small fissures; deglutition is difficult; sometimes there is vomiting, first of the ingesta and afterwards of bile: all the excretions are involuntary; frequently there is no constipation; respiration is laboured, and at last stertorous; the pulse feeble, frequently irregular or unequal, or even intermittent, and the skin is cold; and the patient becomes comatose or apoplectic.

271. *b. In inflammatory softening* there are great thirst, redness of the tongue, sensibility of the epigastrium, hot skin, increased heat of the scalp, or of portions of it, a frequent pulse, spastic contractions of one or more limbs, followed by paralysis. The patient's answers are abrupt, rapid, or incoherent; and he ultimately sinks into unconsciousness, coma, or apoplexy.

272. The second period may be of longer or shorter *duration*. The morbid phenomena often continue stationary for a considerable period, and then make rapid progress; at other times the progress is slight, but constant; in some cases it is constant and remarkable. This disease very rarely retrogrades or evinces much amelioration; its progress is essentially continued and increasing.

273. ii. APPEARANCES AFTER DEATH.—*Softening of the brain* presents various degrees. The least change of consistence of the part can be recognised only when it is touched. In a more advanced degree the softening is obvious to the sight. In a still farther advanced grade the cerebral substance is nearly liquid, and has almost entirely lost its organization; and in its place there is a mere loose cellular sub-

stance, soft and gelatinous, appearing as the original matrix of the structure; and in the last and most advanced state of all there is a perfect dissolution of the part, and breach of continuity. In the cases of this description, published by MM. RULLIER and VELPEAU, the disorganization was so complete that the filaments of the delicate cellular substance, forming, as it were, the matrix of the structure, were suspended in the middle of the diffuent matter into which the cerebral substance was charged. In the case observed by M. VELPEAU the solution of continuity was still more complete. From the inferior margin of the mesocephalon to the base of the pyramidal bodies, a substance entirely liquid, which no longer retained the appearance of nervous substance, occupied the place of the bulb of the cord; and through the whole of this space there existed neither arachnoid nor pia mater.

274. The softened portion of brain presents various shades of *colour*. 1st. It may be of the natural or healthy colour of the part,—even although the softening has advanced to such a degree as to form a diffuent pulp (ANDRAL, LALLEMAND). 2d. It may be perfectly colourless; of a dull white, resembling milk; and occasionally the whiteness of the part assumes a clear or brilliant hue. 3d. The shades of colour sometimes are the following:—a rose tint, an amaranthine red, reddish brown, the colour of wine lees, violet, yellowish, greenish yellow, light gray and dark gray. Besides the above appearances, the softened part of the brain may be,—1st. The seat of effusions of blood, which are sometimes small, relatively to the degree of softening, or to its extent; at other times very considerable compared with the softening itself. 2d. Pus may be infiltrated throughout the part which is softened, or the pus may exist in it in the form of one or more distinct collections. M. LALLEMAND considers that in all softenings of the brain of a white colour this appearance is owing to the infiltration of purulent matter through the softened structure. MM. ROSTAN and ANDRAL espouse an opposite opinion, on the grounds that in many softened portions of the brain of this shade no pus could be detected. The softened part of the brain is generally inodorous; but M. BILLARD has remarked the smell of sulphuretted hydrogen. Softening, attended with the odour ob-

served by this author, seems to have constituted what was called by the older writers gangrene of the brain.

275. There is no part of the brain or cerebellum in which softening has not at some time or other been detected. Generally those parts which are most obnoxious to hemorrhage are most liable to softening, such as the optic thalami and the corpora striata, and the parts in their vicinity. It also as frequently affects the cortical substance as the medullary texture. In the cerebral hemispheres the softening may be seated in the *cortical substance* of the convolutions, the white medullary structure remaining unchanged, where it may often escape detection, owing to such limitation; and it is usually an attendant upon active inflammation of the membranes of the brain. When the gray part is softened it generally separates along with the pia mater on attempting to raise this membrane. When softened, this portion is commonly also redder than natural; sometimes, on the contrary, it is paler than common.

276. The *medullary structure*, situated above the lateral ventricles, is very often the seat of this species of lesion. This mass may be altogether softened, or in a few small points merely, each point being quite isolated from the other. The symptoms, however, resulting from this smaller extent of morbid change may be as severe as those arising from the more extensive and more intense lesion. When one of the hemispheres is softened near to its external surface, the circumvolutions are flattened, and often evince a species of fluctuation. M. ANDRAL and the writer have remarked, in some cases, the existence of softening of the parietes of the ventricles, with the presence of a turbid fluid effused into them. (*Anat. Pathol.*, t. ii., p. 802.)

277. The optic thalami, the striated bodies, and parts in the vicinity of these; the cornu ammonis, and the eminences in the interior of the digitated cavities of the lateral ventricles, the commissures of the hemispheres (*corpus callosum*, *septum lucidum*, &c.), have all been observed the frequent seats of softening; sometimes limited to one or other of them only, at other times extending to two or more, and occasionally co-existing with signs of inflammatory action or with effusion of a serous fluid into the ventricles. Softening of the other parts of the encephalon is not so often met with as those now enumerated; yet has it been seen in

the mesocephalon, in the various parts of the cerebellum, in the medulla oblongata, and spinal cord.

278. Softening of the brain may be limited to one part, or it may exist in several parts, even in both hemispheres, in the same case; and it may affect these different parts at the same time, or successively, either as respects the brain merely, or as regards the whole cerebro-spinal axis. Instead of being partial, which is its usual form, the softening may be so general, and to so intense a degree, that the brain is almost reduced to a pulpy matter, evincing scarcely any appearance of organization. So general and great a change is very rarely met with in the adult; but it is occasionally observed in infants. M. BILLARD has met ten instances of it, and I have also found it in some cases of young children: the odour of sulphuretted hydrogen, first noticed by M. BILIARD, was sensible in these; and he found it present in all his cases, which were chiefly of infants only, of a few days old.

279. Softening of the cerebro-spinal axis is met with in patients of all ages. According to M. ROSTAN (*Récherches sur Ramollissement du Cerveau*, 2d edit., p. 155), whose attention has been directed, at the Salpêtrière, to this lesion in a special manner, it is very common in old subjects; even more so than sanguineous apoplexy. The researches of LALLEMAND, ANDRAL, and others, go to confirm this opinion, and to show that it is also common during early and middle age, although less so than in old age. And I perfectly agree with M. BILLARD in considering it common in children, especially infants. He believes, and I think with justice, that it commences in some cases even before birth. This alteration is, however, much heightened after death, the structure of the brain being one of the parts which are the first to undergo change.

280. There still remains an important question to be discussed, namely, what is the *origin and nature* of the softening which has now been described? M. LALLEMAND conceives that it is a constant and necessary result of an acute, sub-acute, or chronic inflammatory irritation of the part. M. ROSTAN, who has examined this subject with great care, and viewed it in various lights, as respects both the morbid appearances and the symptoms accompanying them, concludes at last by confessing its difficulty, and by consider-

ing this change as analogous to senile gangrene. Before this question can be entertained with precision, we should inquire with what other morbid states of the system generally, and of the brain in particular, has softening been found allied? 1st. It has been observed by JEMINA, BLACK, myself, and others, to supervene during fever, especially those of an epidemic and malignant character. 2d. It has been seen connected with puerperal diseases of a malignant nature; and with epidemic and infectious erysipelas. 3d. It has been found, in cases of scorbutus, to occur in persons of an unhealthy and cachetic habit; also in those whose powers of life have been exhausted by bad living and excesses. 4th. It is often associated with scrofula, and with tubercles of the brain and membranes, especially in infants and children.

281. As to its relations to other lesions of the brain, I may state that it is often found surrounding *extravasated blood* in the brain, and intimately connected with this effusion. The softened part is then generally of the colour of wine lees, of a brownish hue, sometimes tending to green, or of a gray or ash tint. But what is the nature of this connection? M. ROSTAN contends, that the softening precedes and is always the cause of the effusion, owing to the destruction of the minute capillaries at the point where the softening is greatest; whilst Dr. CRAIGIE and others consider the softening surrounding the effused blood as the consequences of such effusion; and chiefly because, "in cases in which death takes place early, the pulpy disorganization is less complete than in those in which it takes place at a later period. In short, the extent of the disorganization is proportionate to the interval which elapses between the effusion of the blood and the period of death." But is this the fact? It certainly is not in accordance with my experience; for I have observed no such relation; but have found recent effusions surrounded by as great, and even a greater extent of softening as effusions of an older date.

282. Pulpy softening may be the attendant upon a *coup de sang*, or sudden congestion of the venous capillaries of some part of the brain. This is considered to be the case in softenings with the reddish, amaranthine, crimson, or reddish brown shades of colour. But is the softening a consequence or a cause of the injection? May it not be a

state of the vessels preceding that of effusion? Dr. CRAIGIE thinks that softening is a consequence of the blood-stroke; but I cannot agree with him, merely because the reasons for a contrary opinion are quite as strong as those which may be urged in its favour. It has been often found accompanying hydrocephalic effusions by ROSTAN, LALLEMAND, BILLARD, OTTO, ANDRAL, and by the author.

283. It is then generally of the lighter shades of colour, and not great in degree. Is it here a consequence or a cause of the serous effusion? It may be either. I am more inclined to consider both lesions as being often coeval; and, whether consecutive or not, depending upon a similar state of the vessels and vital manifestations of the organ and system generally.

284. Softening, or pulpy destruction of a portion of the brain, has likewise been found surrounding tumours and abscesses by MORGAGNI, SANDIFORT, MECKEL, LALLEMAND, BLANE, YELLOWLEY, POWELL, the author, &c., and presenting almost every variety and depth of shade already noticed. In these cases, especially in those where purulent matter is lodged in the substance of the brain without any intervening cyst or membrane, the softening often amounts to disorganization, and is more clearly attributable to inflammatory irritation. When it is found subsequently to injury of the brain, external violence, and inflammation of the brain and its membranes, its nature and origin are most manifest. That it does supervene in this way is shown by FANTONI, MORGAGNI, LE DRAN, SCHMUCKER, O'HALLORAN, DEASE, ABERNETHY, THOMSON, HENNEN, ABERCROMBIE, and others. The apparently unequivocal origin of this lesion in inflammation, under these latter circumstances, induced MORGAGNI, LIEUTAND, JEMINA, and more recently BAILLIE and ABERCROMBIE, to consider it analogous to gangrene in other structures.

285. But it should be kept in recollection that this state of the cerebral structure, although often preceded by signs of inflammation, and exhibiting in the parts surrounding it inflammatory appearances, is often neither preceded by the one nor accompanied by the other; but, on the contrary, with a directly opposite train of phenomena and state of parts. In these opposing cases, what is the origin of the disease? Are we to infer, with RECAMIER, an entirely

opposite origin to that of inflammatory action; and that, as the softenings observed in the brain betray a variety of characters, therefore they ought not strictly to be referred to a single unvarying source?

286. From what I have seen of this lesion I should infer, in respect of either of its most manifest conditions, that it is an effect of different states of morbid action, but most frequently of a form of sub-acute inflammation, characterized by deficient power and loss of the vital tone and cohesion of both the vessels and the substance of the brain,—that it is the result of deficient vitality of the extreme capillaries and cerebral structure, occurring either primarily or in consequence of previously excited action. The circumstances in which it is observed; its occurrence after injuries and bruises, from the pressure of tumours, &c., and during the progress of malignant diseases, show that it is not produced by a sthenic or healthy form of inflammatory action; but by that unhealthy, disorganizing, and diffusive kind observed in cathetic habits, or in persons whose vital powers are much reduced, or in the scrofulous diathesis. At the same time I think it cannot be denied that it sometimes originates in a different way, being preceded by no signs of inflammatory irritation, nor attended with inflammatory appearances, and is a simple consequence of diminished, or altogether lost, vital power and cohesion of the part affected.

287. The *minute or intimate changes* observed in softening of the brain have been recently investigated by Professor BENNETT of Edinburgh (*Edin. Med. and Surg. Journ.*, Oct., 1843). He believes, with ROSTAN, myself, and others, that two kinds of softening exists—the one inflammatory, the other non-inflammatory, and that these states may be distinguished from each other by means of the *microscope*. In the inflammatory softening he found, in addition to the natural, tubular, and granular structure, 1st. Exudation granules coating the vessels, or floating loose, either isolated or in masses; 2. Exudation corpuscles, with distinct cell-walls, and sometimes nucleated. The more pultaceous and diffluent the softening the more numerous are the granules and corpuscles. The nervous tubes and natural structure also then are more and more broken down.

288. Dr. BENNETT considers that the chief *causes* of non-inflammatory softening of the brain are the following:—1st.

Mechanical violence in exposing the nervous centres: 2d. A breaking up of the nervous tissue by extravasations of blood, either in mass, or infiltrated in small isolated points, constituting capillary apoplexy or palsy: 3d. The mere imbibition of effused serum, which loosens the connection between the nervous tubes, and diminishes the consistence of the nervous tissue: 4th. The process of putrefaction. The first and last of these are actually unconnected with the production of the change before death. But, in such cases in which asthenic inflammation affects portions of the brain, there can be no doubt of the rapid disorganization or dissolution of the substance of the brain, upon the departure of vitality; and hence the softening may have been preceded by inflammation shortly before death. Dr. BENNETT, however, considers that the existence of exudation granules and corpuscles is distinctive of inflammatory action; and that, where these are not found, the softening is to be referred to one or other of the causes he has assigned.

289. In twenty-four cases in which cerebral softening was observed, exudation corpuscles existed in eighteen. In the other six no traces of these bodies could be found. In four, however, of the eighteen cases of inflammatory softening, non-inflammatory softening existed in another part of the brain. In the fourteen cases of simple inflammatory softening well-marked symptoms invariably existed, as dullness of intellect, contractions, spasms or rigidity of the extremities, paralysis, followed by loss of consciousness, &c.

290. In three of the six cases of non-inflammatory softening, there was extravasation into one side of the brain, followed by sudden coma and hemiplegia. In the fourth and fifth cases there was sudden loss of consciousness, with convulsions, but no contractions or paralysis; and on dissection, capillary apoplexy, with central softening, was found. In one of the cases, where both kinds of softening existed, there were paralysis of both arms, contractions of the right, and spasms of the mouth and neck. On dissection, inflammatory softening existed in the *pons Varolii*, extending more to the left side, with non-inflammatory softening of the right *corpus striatum*.

CHAPTER III.

ON THE CONNECTION OF APOPLEXY AND PALSY WITH EPILEPSY.

291. THE connections of *apoplexy* and *palsy* with *epilepsy* are more intimate than has usually been remarked, or even admitted by modern writers, who have generally been more prone to point out distinctions or to establish differences than to record intimate alliances, or even still more close connections, not only between the diseases just named but also between others similarly circumstanced. These maladies, although not similar in many respects, are nevertheless so intimately related, as respects frequency of succession, and the nature of the organic changes, of which they are the outward manifestations during life, as to require some notice of their connections at this place:—1st. An attack, more or less sudden, may present the mixed characters of apoplexy and epilepsy;—2d. The epileptic seizure may pass into the apoplectic;—3d. The epileptic attack may be followed by paralysis, either directly, or as a consequence of either of the two preceding forms of seizure;—and 4th. The paralytic affection may be followed, although in rarer instances, by an epileptic attack, or by coma attended by convulsions, most frequently terminating in death.—The lesions found in the brain in these several forms of disease may be the same, or may differ only in grade and in the degree of pressure or of interrupted circulation in the brain. But in cases which are attended by paralysis, especially by hemiplegia, extravasation of blood is more frequently found than any other lesion, of which, however, a great diversity exists, as I have shown when treating of the *morbid alterations of the Brain* and of *Epilepsy*, in my work on *Pathology and Practical Medicine*,—where, indeed, I have stated that any organic lesion of the brain or of its membranes may be followed by convulsive epileptic attacks, and that these lesions, in a more advanced state of development, may occasion either palsy or apoplexy,—often both in succession at very indefinite intervals.

292. *A.* When the *apoplectic* and *epileptic* seizures are associated, the distinctive features of either may precede those of the other. In several of the cases which I have seen 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, with the characteristic phenomena—injury of the tongue, frothing at the mouth, 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 convulsion which occur in the puerperal states sometimes very nearly 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 (Περί Ἀσθενειῶν, § 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.

293. 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 *Diet. of Pract. Med.*, vol. i., p. 227, § 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.

294. *B.* 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 one side of 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 epileptic seizures, yet have I met with it after the first; the paralysis either disappearing some days or weeks afterward, 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. 10), 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 farther associated with insanity or imbecility, or with amaurosis, or deafness, 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.

295. Although palsy connected with epilepsy is generally a consequence of repeated seizures of the latter, yet early fits of epilepsy may be followed, as just stated, by slight or incomplete palsy of one of the organs of sense, or partial palsy affecting the face, or imperfect palsy of a limb, or of certain muscles, especially of an arm, or of the muscles of articulation, &c. In these cases the palsy may soon disappear and follow the next or subsequent attacks; and may

continue without much variation, or become more and more complete, until either hemiplegia, or even more general palsy, supervenes. In some instances, the epileptic seizure may present the mixed character, or the state intermediate between apoplexy and epilepsy just mentioned (§ 292); or it may be viewed as apoplexy attended by convulsions—a form of seizure which had been generally overlooked, until it was described in the author's work on "*Practical Medicine.*" These mixed forms of seizure are not infrequently followed by palsy. The slighter states of palsy, consequent upon the epileptic fit, may be viewed as the result of congestion, more particularly affecting that portion of the brain that has most intimate relations to the paralysed part. Where, however, the palsy is more complete or extensive and permanent, it may be viewed as depending upon similar changes to those which have been alluded to as causing palsy in connection with apoplexy (§§ 208, *et seq.*); and if the palsy be attended by contractions or spasms either of the paralysed or of the sound limbs, inflammatory action or irritation may be inferred to exist either in the vicinity of the cerebral lesion or in another part of the brain, according to the seat and character of the spasms, &c. In some instances, the same lesion of the brain that causes the epileptic or convulsive seizure may induce at the same time a paralytic state. Indeed this appears to be especially the case where acute inflammation of a portion of the structure of the brain passes into softening with slight exudation of blood, or into abscess. These cases usually soon terminate fatally.

296. *C.* The occasional occurrence of either palsy or apoplexy, in connection with the *convulsions* or *eclampsia of the puerperal states*, is well known. Either affection may even take place, although very rarely during parturition, without previous convulsion, or in the latter months of pregnancy. The same lesion which occasions convulsions may, in a higher grade, be productive of apoplexy of a most profound and fatal character either with or without hemiplegia.

297. *D.* *Palsy* consequent upon *epilepsy* or *convulsions* is usually either *partial* or *hemiplegic*; but in some instances it is altogether *paraplegic*. Of this latter form of complication I have met with two instances; but in one of them there was manifest disease of the spinal column. A case of epilepsy, complicated with paraplegia (in *Lond. Med.*

Repository, vol. xxii., p. 449), presented the following particulars deserving notice:—D. R., aged twenty-one, was subject to epileptic fits hereditarily, the disease having been traced back four generations. He was completely paralytic, as respected the power of motion. The epileptic fits continued during the treatment, but were rendered less frequent and severe; the paraplegic attack was nearly altogether removed when he ceased to be under treatment, which consisted chiefly of purgatives, the shower bath, and external derivatives.

CHAPTER IV.

ON THE CONNECTION OF PALSY AND APOPLEXY WITH INSANITY.

298. i. PALSY generally does not supervene upon insanity until the mental disorder has continued for a considerable time, and assumed a chronic, confirmed, and general form. In some cases, however, it soon follows the mental disorder; less frequently it is almost coeval with this disorder; and in rarer instances it even precedes the mental derangement. This last occurrence I have recently met with in aged persons on two occasions. Palsy thus associated is commonly *general*, or soon becomes such. It is usually incomplete, especially in its early stages, and affects chiefly the muscular system. The sphincters, and consequently the evacuations, are uncontrolled by volition. This form or association of palsy is usually a result of chronic inflammation of the brain, and is distinct from palsy caused by cerebral hemorrhage, softening, tumours, &c., which, however, may also occasion the more partial or hemiplegic forms of palsy in the course of insanity; but these latter are not so frequent as the general palsy just alluded to. The paralysis of the insane may be further *associated* with or followed by epileptic, convulsive, apoplectic, or comatose attacks, either of which may terminate life, or the patient may sink from vital exhaustion.

299. Palsy is not infrequently also associated with *idiocy*,

and with *puerile imbecility*. In these complications the palsy may be either general or partial; but when it is general some parts are usually more affected than others, and imperfect development of portions of the cerebro-spinal axis is often seen on examinations of them after death; but this is chiefly confined to congenital or puerile idiotcy or imbecility. When this affection occurs in the aged it may be connected with atrophy of a lobe, or portion of the brain, consequent upon antecedent disease.

300. *A. Description.*—Paralysis associated with insanity is not mentioned by the older writers, and it is but slightly noticed by PINEL. M. ESQUIROL has studied it with much care, and especially with reference to the ulterior progress of the mental disease. More recently, MM. DELAYE, BAYLE, CONOLLY, and CALMEIL, have investigated it still further. This affection, usually designated the paralysis of the insane, and general or incomplete palsy, consists of a gradual loss of power in the voluntary muscles. It commences with an embarrassment of the motions of the tongue, or with indistinct articulation. Patients hesitate for a time at some syllables, which they overcome only by an effort. They are unable to pronounce some letters,—the R, for instance,—or they express them with difficulty. Afterwards a similar embarrassment is observed in the movements of the arms, legs, &c.; and lastly in all the muscular system. The disease possibly commences as early in the muscles of the limbs as in those employed in articulation; but as these latter require a greater precision of action for the due performance of their functions than the former, they more readily betray the incipient disorder, which is thereby early brought to the notice of the physician.

301. It requires, however, some experience to enable the physician to ascertain the commencement or earlier grades of this affection. When it has made some progress the diagnosis is easy. The embarrassment of pronunciation is then very sensible. The patient cannot speak without throwing all the muscles of the face into action. The walk is vacillating; the motions of the arms and hands are unsteady and awkward, and these last constantly tremble, and are incapable of retaining a determinate position. It is not, however, as yet, the force so much as the precision of the movements that is impaired.

302. A patient may squeeze any object with much power; but he cannot execute any delicate work, or even button his own vestments. In attempting to run his course is irregular, or attended by deviations to the right and left, like to an intoxicated person; he exhibits the appearance of suppleness; but a state of morbid tension exists in all the muscles of the trunk, extremities, head, and face; he comes awkwardly down on the soles of his feet, his arms are extended, the eyelids are widely open, the jaws firmly closed. Sensibility becomes blunted, so that irritation of the skin is not perceived until after some time. The paralysis of the insane is often more marked on one side of the body than on the other; but sometimes the progress of the affection varies, or even alters materially in either side.

303. If this complication be observed with attention, *two distinct stages* may be recognized. In the *first*, the movements, although uncertain, retain some vigour—a rigidity of action rather than power. This gives way, after a time, to the *second*,—to a relaxation, or a state of resolution, always increasing, of the muscular system. The patient becomes incapable of exertion, the features sink, the eyelids open sluggishly, the eye is dull, the jaws fall, the lips are pendant, and the excretions are involuntary. The patient is incapable of retaining a favourable position, and at last lies prostrate; the parts pressed upon by the weight of the body being excoriated, and ultimately gangrenous. In the course of this state of disease, attacks of cerebral congestion, followed by convulsion and coma which continue for many hours, and are frequently repeated for several successive days, are often observed. After these attacks, the intellectual debility and aberration, and the paralysis, which are generally co-ordinate, are much more prominent. In many, variable periods, during which the symptoms are stationary, are interrupted by seizures of this kind; after which the malady proceeds rapidly, without ever retrograding, until the last degree of intensity is reached.

304. It should, however, be kept in recollection, that a general paralysis, similar in all respects to that now described, occurs in rare instances, especially in aged persons, without being followed by insanity, or at least by fully-developed insanity. I have seen several cases of this kind; and the circumstance has likewise been noticed by MM.

DELAYE and FOVILLE. Dr. CONOLLY, in his admirable lectures at the College of Physicians, remarks "that M. CALMEIL, as also Dr. RODRIQUES of Montpellier, and Dr. WINN, state that the paralysis sometimes precedes the mental affection;" and adds, that he has not seen this in any instance. I was lately consulted in two cases of this description, one of them that of a medical man, at a very early period of his disease, and in this instance the general paralysis preceded the mental disorder. The patient was attended by Dr. KERR and Mr. GATES of Northampton; but these are the only instances of this mode of accession of the disease which has come under my own observation.

305. This form of paralysis is often indicative of chronic inflammation of the meninges, and is distinct from the paralytic affections consequent upon cerebral hemorrhage, or upon softening, tumours, &c., of the brain, which, however, may also be complicated with insanity, although much more rarely than the general form of the affection above described. Whatever form the mental disorder may have presented it soon passes into chronic dementia, when complicated with paralysis. It generally terminates the life of the patient within three years; death being preceded by cerebral congestion, convulsions, diarrhœa, and gangrene of those parts sustaining the weight of the body when muscular support has been lost. This form of paralysis is much more frequent in men than in women. Of 109 insane paralytics under the observation of M. ESQUIROL, during three years, at Charenton, 95 were males. Of 609 lunatics admitted at this institution in three years, 109 were paralytics; the proportion in males and females being,—in 356 male lunatics, 95 were paralytics; and of 258 females, 14 were thus affected. Of 334 lunatics in the asylum of St. Yon, near Rouen, 31 were paralytics, of whom 22 were men, and 9 women. At the Bicêtre, the proportion of paralytics to the number of lunatics is much smaller.

306. It is observed by M. ESQUIROL, that this complication occurs most commonly in those lunatics who have caused their insanity by venereal excesses, by intoxication, by the abuse of mercury, and by mental exertions,—circumstances which account for the greater prevalence of it in males than in females. The lunatics at Charenton, where it is most frequently observed, have been in easy circumstances, and

have possessed means of gratifying their passions, or have exercised professions which have excited or over-exerted the brain, without duly exercising the body. According to M. CALMEIL, this affection has generally, at Charenton, appeared soon after the commencement of insanity; but it sometimes has not occurred until insanity has continued for many years. A few individuals have displayed all the vigour of intellect for some time after they were attacked by it, and derangement has afterwards taken place. If the mental disorder has not already proceeded, it very rapidly proceeds, in this complication, to advanced or complete dementia; yet persons thus affected preserve their appetites, or have them greatly increased. They are in all other respects in health. The circulation is natural, and the sleep undisturbed. They continue plump, but the soft solids are flabby and soft; and as the disease proceeds they are liable to constipation, often followed by diarrhœa, by unconscious evacuations, and by want of power over them, owing to palsy of the sphincters. Retention and incontinence of urine generally also take place, and aggravate the evils to which the paralytic person is liable.

307. *a.* The *duration* of this complication is various, but is reckoned by MM. ESQUIROL and CALMEIL to average about thirteen months; very few surviving longer than three years with it. The ultimate *prognosis* is most unfavourable. M. ROGER COLLARD, after an experience of twenty years, had not met with one instance of recovery from it. M. CALMEIL has seen only two cases, thus complicated, that recovered; and M. ESQUIROL has mentioned only three.

308. General paralysis is apparently more frequent in Paris than elsewhere. There can be no doubt, however, that it has been more accurately observed amongst the insane in that city, and indeed through many parts of France, than elsewhere. Dr. BURROWS had stated it to be comparatively a rare disease in England. M. ESQUIROL doubted this, and inferred that it was considered rare because it had not been accurately observed in this country. There is much truth in this, as shown by the recent inquiries of Dr. PRICHARD and Dr. CONOLLY. Dr. PRICHARD states, that he had made many inquiries with a view of determining this question; but had met with considerable difficulties in obtaining satisfactory information. The facts, however, which he and

Dr. CONOLLY have adduced, prove that this is a frequent complication of insanity in this country, although not so frequent as in Paris; and in every respect confirm the accuracy of the observations furnished by MM. ESQUIROL, CALMEIL, and other French pathologists.

309. Dr. CONOLLY observes that, "at the Hanwell asylum about fifty per cent. of the deaths are occasioned by paralysis; although, among the singular characters of this malady, it is proved that the proportion is very small on the female side of the house, not exceeding eleven per cent. of the deaths. In Dr. STILLWELL'S private establishment at Hillingdon, of thirty deaths in nine years, twenty-one have been the result of this disease; of these all the subjects were males.

310. "It attacks patients of every age, from twenty to eighty. Out of 143 cases, in which, among male patients, the age was ascertained,—

	5	died	between	the	ages	of	20	and	30
47	"	"	"	"	30	"	40		
52	"	"	"	"	40	"	50		
26	"	"	"	"	50	"	60		
12	"	"	"	"	60	"	70		
1	"	"	"	"	70	"	80		

In about two-thirds of all these cases it is seen that the age of the patient was between thirty and fifty at the time of death. We have now between twenty and thirty patients affected with general paralysis in the asylum, but not one has been in the house longer than four years; all previously admitted, in whom the malady existed or supervened, have died."—(*Lancet*, No. 1365.)

311. *b.* There is a modification of paralysis, as Dr. PRICHARD truly remarks, of frequent occurrence, during protracted insanity and dementia, in English hospitals for lunatics, that differs in duration and in some of its features from the general paralysis so accurately described by the French writers. It resembles the debility or decrepitude of extreme old age. Patients affected by it sit crouched with their heads hanging down; and when they attempt to raise themselves into the erect posture, their limbs tremble, they stoop, and totter. Some stand leaning against a wall for whole days, with their bodies curved forward, their heads and necks hanging down, and their upper extremities

shaking and hanging useless. Such patients are always in the most advanced stage of dementia, and often continue in this state of paralytic decrepitude for many years. Some become bedridden, and remain incapable of any voluntary movement, until at length either the powers of life are gradually extinguished, or they are carried off as in the form of paralysis previously described.

312. *c.* Paralysis from cerebral hemorrhage, from softening, from tumours, or from other organic lesions of a portion of the brain, is also observed in insane patients; but not so frequently as the varieties of this affection already noticed. In these cases it generally assumes the form of hemiplegia; but it sometimes continues in a partial or limited state,—being confined to one arm, or to the muscles of one side of the face, or to the arm and face, for a considerable time. It may even proceed no further, although more commonly it passes into palsy of the whole side. In these the attack is gradual, slow, and *chronic*; and usually proceeds from softening, or from some other change of structure, in a portion of the brain or of its membranes. In other cases the paralytic affection is more sudden and *acute*, and is consequent upon an apoplectic or comatose state, or upon an epileptic or convulsive seizure. It may be at once hemiplegic, or it may be at first more partial, and become more complete, either gradually, or after relapses or repeated attacks of sopor or convulsion. This more acute form of palsy seems to proceed from congestion or sanguineous effusion in the brain; but it has occurred without any organic lesion having been found to account for it.

313. The more usual forms of paralysis may precede the insanity; but they most frequently take place in the more confirmed and chronic states of mania, and especially in dementia and fatuity. They are evidently more or less intimately connected with the pathological conditions upon which insanity depends, as well as with the consequences which these conditions produce. Whilst palsy in the insane is generally incurable, insanity is equally so when thus complicated.

314. *B.* *The morbid appearances found in cases of insanity complicated with general paralysis* have engaged the attention of M. CALMEIL. In this association of mental

and of physical disease it is very difficult to determine, as Dr. PRICHARD remarks, what alterations are connected with either morbid state; and certainly many of the changes met with by M. CALMEIL, in these paralytic cases, are similar to those regarded by various writers as connected with insanity, without reference to its association with paralysis. This pathologist concludes that general paralysis is not dependent upon compression of the brain by serous effusion, as supposed by M. BAYLE, but upon the disease of the encephalon which gives rise to the effusion, and chiefly on inflammation, of which the thickenings, and lesions, and vascular turgescence of the pia mater, and the peculiar condition of the gray structure, afford sufficient evidence. M. CALMEIL has succinctly enumerated the changes observed by him in the encephalon, in this class of complicated cases, nearly as follows:—Injection and absorption of the bony structure; injections of the dura mater, separation of its fibres; effusion of serum into the cavity of the arachnoid, or false membranes, organized or without organization, or cysts filled with blood in its two laminæ; simple hemorrhages in the arachnoid; œdema of the meninges; injections and thickenings of the membranes; vegetations of the pia mater and development of its vessels; adhesions between the pia mater and the convolutions; disappearance of the gray substance; softening, induration, and discolouration of this substance; hardening and injection of the white or fibrous structure; redness and tumefaction of the ventricular villousities; serous effusion into the ventricles; apoplectic cysts; erosions of the convolutions; softening of the brain or of the spinal marrow. These changes are so various, and so far from uniform in occurrence, that they cannot satisfactorily explain the results imputed to them. M. CALMEIL considers them all to be proofs of a chronic inflammation of the brain; and in this, as well as in his descriptions of many of the alterations, he agrees with M. FOVILLE. This latter writer states that, in lunatics affected with general paralysis, he found the induration of the fibrous structure of the hemispheres wanting only in two cases, and in these the cerebral nerves, the annular protuberance, and the medulla oblongata presented extreme hardness. He states further, that this induration of the fibrous structure of the brain has been found in old men, whose voluntary

movements have become uncertain or vacillating; but it has never been seen in lunatics whose muscular powers had remained unimpaired. I have observed induration of the spinal cord, with effusion of serum between the membranes and other changes, in two cases of general incomplete paralysis unattended by insanity; both patients, however, having become delirious shortly before death.

315. The brain has occasionally been so infiltrated with serum that the fluid has flowed from the surface of the incisions. This infiltration has been so remarkable in a few instances as to constitute a true œdema of the brain. Much more rarely, as observed both by ESQUIROL and by myself, a multitude of pores or small cavities, containing a limpid serum, have been found in the substance of the brain; a section of the part thus changed resembling that of a porous cheese. In these cases the brain may be also somewhat indurated and changed in colour. It is by no means determined, as some suppose, that these pores or cavities are the sequelæ of vascular extravasations. It is more probable that they are the consequences of softening, the pores being left by the removal of the molecules of the cerebral substance, which have lost their vital cohesion to the rest of the structure, and filled by a serous effusion. Dr. CONOLLY states that the brain is frequently either firm, or exceedingly firm, or soft. The septum lucidum is sometimes particularly firm. The pia mater is usually congested. There is injection of the cineritious substance, and the medullary structure is studded with bloody points. With the exceptions of the distensions of the ventricles with fluid, and the general alteration of the consistence of the brain, there is nothing in the appearances in these cases of general paralysis different from what we find, variously associated, in all the other forms of insanity where there has been no paralysis at all.

316. ii. APOPLEXY may be the *cause* of insanity, or it may be the *consequence* of those intimate lesions of structure which either occasion or are connected with the mental disorder. ESQUIROL considers that apoplexy constitutes a sixth of the physical causes of mental alienation, and an eighth of the deaths. Dr. BURROWS thinks that it is not so frequently a cause of insanity or of death in this country,

as M. ESQUIROL states with reference to France. When apoplexy is connected with the production of insanity it is generally congestive or hemorrhagic; and, in the latter case, is generally followed by paralysis,—the mental disorder being complicated with hemiplegia, or with a more partial form of palsy. Apoplexy with effusion of blood generally occurs early in the mental disorder, and commonly in the maniacal form. When apoplexy precedes mania there is often a great change perceived in the moral and intellectual character for some time before the attack. Dr. BURROWS justly remarks, that this change in the character may usher in an apoplectic as well as a maniacal paroxysm; and hence the affinity between sanguineous apoplexy and mania is very evident.

317. The sudden deaths, however, which take place in chronic mania, and in confirmed dementia, and in the complication of insanity already noticed, are seldom produced by cerebral hemorrhage. They were formerly ascribed to *serous* apoplexy; but as I have shown (§§ 193, *et seq.*) that the form of this disease, usually imputed to the effusion of serum, depends rather upon exhausted organic nervous power, in connection with congestion or interrupted circulation of the vessels of the brain, than upon effusion,—which, even when present, is seldom in such quantity as to account for the fatal event,—so it may be inferred that sudden deaths in these chronic forms of general insanity are chiefly owing either to congestion or exhaustion of nervous power. The fatal attack either commences with sudden or profound coma, which is soon followed by convulsions; or it begins with convulsions, which are soon succeeded by coma, rapidly terminating in death,—the apoplectic or the convulsive state being thus consecutive, or both, in a few instances, being simultaneous. Either of these forms of attack is often immediately consequent upon a paroxysm of furious mania, or of delirious excitement; and in some cases a state of acute or furious delirium, or of insane agitation, terminates at once in death, without convulsions or coma—at least of any appreciable duration—having preceded the fatal event. This termination, which may be viewed as a form of apoplexy, has been noticed by PINEL, ESQUIROL, BURROWS, and others, who have described it as occurring only in old and cathectic

cases, and as being preceded by a sudden accession of maniacal or delirious excitement, which soon ceases, and the patient dies, as if from exhaustion of the vital energy. On dissection, but little is found in the brain to account for the event; and the body soon passes into putrefaction. These forms of apoplectic attack are identical with those which I have ascribed (§ 194) to exhaustion, or loss of the nervous energy of the brain,—a state formerly noticed by BOERHAAVE, and designated by him *Apoplexia defectiva*.—It is probable, however, that in the cases of insanity in which the sudden death is consequent upon distinct evidence of general cachexia, the event is caused rather by sudden privation of power in the heart, or by sudden congestion of the lungs, or other affection of these organs, than by loss of the nervous energy of the brain.

318. A state of profound and continued *coma* occurs in the course of a few cases of insanity. It may follow mania; and I have seen it, in one instance, consequent upon moral insanity. I believe that it takes place chiefly in those states of mental disorder which have been produced by depressing causes. The two cases which I have had an opportunity of observing have been prolonged, and evidently owing to exhaustion of the vital manifestations of the brain. Restoration took place from this state; but the powers of the mind were never, even partially, recovered.

319. The *apoplectic* and *comatose* complications of insanity, especially of chronic mania, of dementia, and of fatuity,—particularly when terminating quickly in death, or characterized by sudden collapse or exhaustion of nervous power,—occur most frequently in winter and during cold weather, and are occasioned chiefly by causes which depress or exhaust the powers of life.

CHAPTER V.

OF THE CONNECTION OF APOPLEXY AND PALSY WITH DISEASE
OF THE HEART.

320. THE connection which sometimes subsists between *apoplexy* or *palsy* and *organic disease* of the *heart*, especially hypertrophy of the left ventricle and obstructive disease of the right side of the heart, has been remarked by VALSALVA, MORGAGNI, LIEUTAUD, TESTA, PORTAL, CHEYNE, RICHERAND, BERTIN, WATSON, and HOPE; and has been viewed by them in the light of cause and effect, the apoplectic seizure arising from the cardiac disease. CORVISART and ROCHOUX, physicians of large experience, have thrown doubts upon the nature of this connection; have likewise denied the frequency of its occurrence; and have viewed these diseases as sometimes consecutive in their origin, although co-existent in their advanced state, but without the relation of cause and effect: thus considering the occurrence of apoplexy or paralysis, in the advanced stages of disease of the heart, as entirely an accidental coincidence. But, as I contended many years ago (1822), when such a complication of morbid states is frequent, prominent, and observes the same succession, a more intimate connection than mere sequence or coincidence ought not to be entirely rejected, particularly when admitting of a rational explanation. The frequency of apoplexy or paralysis, and the general presence of the latter when the former occurs in the advanced progress of cardiac disease, especially lesions of the orifices and hypertrophy of the left side of the heart, have led me to believe that more than mere coincidence actually exists. It is, however, by no means improbable that the disposition to organic change throughout the whole vascular system, sometimes associated with disease of the heart, may so far exist in the delicate vessels of the brain as to favour the occurrence of hemorrhage from them when the action or impulse of the heart is increased by disease or by passion or emotion; or when the return of blood from the head is impeded by congestion, or interrupted circulation through the lungs and right side of the heart.

321. *Cerebral hemorrhage* producing either apoplexy or palsy is probably a more frequent consequence of cardiac disease than pulmonary hemorrhage; but facts are wanting to determine to what extent it is so. That it is more common is shown by BERTIN and BOUILLAUD; and it may partly be accounted for by the fact of disease of the pulmonary arteries being much less common than alterations of the cerebral vessels. That an intimate connection often exists between the occurrence of apoplexy and palsy and antecedent disease of the heart is now fully established, although doubts are still entertained by some as to the nature of the connection. As long ago as 1822 and 1823, I discussed this question (*Lond. Med. Repos.*, vols. xviii., p. 149, and xix., p. 17), and in the article APOPLEXY¹ (published Sept., 1832) the results of my inquiries were again stated. The occasional dependence of cerebral hemorrhage on disease of the heart was first remarked by BAGLIVI, who observed it in the case of MALPIGHI, who died of apoplexy after palpitations caused by structural change of the heart. It was only incidentally mentioned by MORGAGNI and LIEUTAUD; and not insisted on in the relation of cause and effect until M. RICHERAND treated of it in his account of the case of CABANIS, in whom this complication was found. PORTAL, TESTA, and SPRENGEL soon afterwards expressed the same opinion as RICHERAND; and ROSSI met with this association of disease in the case of the Crown Prince of Sweden. The frequent connection between cerebral hemorrhage and disease of the heart has been shown, in this country, by HUTCHINSON, ABERCROMBIE, CRAIGIE, JOHNSON, HOPE, WATSON, BURROWS, and myself; and in France, by BRICHETEAU, LALLEMAND, BERTIN, CRUVEILHIER, BROUSSAIS, ANDRAL, and BOUILLAUD; and the effect of cardiac disease upon the brain has been too generally imputed to hypertrophy of the left ventricle. There is, however, every reason to believe that softening of the brain, congestions of the veins and sinuses, and serous effusions into the ventricles or between the membranes, occasionally also proceed from cardiac disease, especially when causing obstructed circulation through the right side of the heart; and that cere-

¹ Dict. of Pract. Med., vol. i., p. 94.

bral hemorrhage may sometimes depend upon the lesions in this situation, as suggested in the places just referred to.

322. M. BRICHETEAU has very recently investigated this subject at full length; but he has insisted chiefly upon the influence of hypertrophy of the left ventricle in the production of hemorrhage in the brain. He has, however, remarked that other changes within the head besides this may result from this cause, especially determination of blood to the brain, mental disorder, serous effusion, brain fevers, &c. He observes, that when hypertrophy is accompanied with other lesions of the heart, particularly with such as impede the free egress of the blood from the left ventricle, as disease of the aortic orifice, the symptoms of cerebral disorder are then much less conspicuous; and that dyspnœa, tendency to syncope, and dropsical effusions, are more marked. M. BOUILLAUD found, out of fifty-four cases of hypertrophy, in some of which the right ventricle only was effected, and the left one not at all, or very little so, that there were eleven with cerebral disease, six with apoplexy, and five with softening of the brain. In five of these eleven, the cerebral arteries were ossified or cretaceous at one or more points. In six of these cases the hypertrophy of the left ventricle was *excentric*, in three it was *concentric*, and in two *simple*.

323. Dr. WATSON (*Lond. Med. Gaz.*, April 6, 1835) has made some very judicious remarks upon this subject, and in all the material points, particularly in the explanation of the connection between diseases of the heart and brain, has confirmed the observations I have offered both in the papers referred to above and in the Dictionary of Practical Medicine (vol. i., pp. 94, *et seq.*), where are succinctly given the results of my own investigations. The views there entertained, as Dr. J. JOHNSON has done me the justice of stating (*Med. Chirurg. Review*, April, 1836, p. 512), in an able inquiry into this subject, are fully confirmed by his own experience, and by the more recently published researches of MM. BOUILLAUD, BRICHETEAU, and others.

324. According to M. ANDRAL, simple hypertrophy of the heart is the lesion of this organ most apt to occasion cerebral hemorrhage by augmenting the force of the circulation in the brain; but unless, as I have long ago contended, the hypertrophy of the heart be co-existent with

disease of the vessels of the brain, as ossific, cretaceous, or atheromatous deposits in the coats of these vessels, cerebral hemorrhage would seldom occur from this form of cardiac disease. Palsy or apoplexy is probably as frequently the result of obstructed circulation through the right side of the heart, and through the lungs, and consequently of impeded return of blood from the brain, as of increased force of the circulation from simple hypertrophy of the left ventricle. It is, however, not improbable, although the statistics of the connection of palsy and apoplexy with cardiac disease have not established the fact that, whilst simple hypertrophy most frequently occasions apoplexy, with sanguineous effusion, obstructive disease of the valves and orifices of the heart is the most productive of those changes of the brain which is followed by palsy or coma, owing to the congestions, softening, indurations, serous or sanguineous effusions, resulting from the impeded return of blood from the brain and membranes. Dr. BURROWS (*Disord. of the Cerebral Circulation, &c.*, 8vo., Lond., 1846,) remarks that, in any given number of cases of apoplexy and sudden hemiplegia, three-fifths will present signs of cardiac disease.

325. That either apoplexy, or palsy, or both, may be induced by interrupted circulation through the *lungs*, or congestion of these organs, has been demonstrated by BONET, HUXHAM, BANG, J. FRANK and CHEYNE, and to my own observation. The occurrence of the maladies under consideration during the advanced stages of both acute and chronic diseases of the *air passages* and *lungs*, particularly those attended by violent attacks of cough, has likewise been noticed as contingent events by several writers as well as by myself, most frequently in whooping-cough, bronchitis, asthma, and emphysema of the lungs, although not so frequently as the more usual forms of coma or unconsciousness.

CHAPTER VI.

OF SEVERAL OTHER CONSECUTIVE AND COMPLICATED STATES
OF APOPLEXY AND PALSY.

326. *Apoplexy*, or *Palsy*, or both associated, may be *consecutive upon* and *complicated with* other diseases than those already mentioned, in various stages of their progress. An attack of either apoplexy or palsy has just been shown frequently to supervene upon cardiac disease, owing to such disease having favoured the production of lesions upon which these depend.

327. *Palsy* or *Apoplexy* may occur after the pre-existing disease has disappeared, and in consequence of its disappearance, as in the case of suppressed hemorrhages, particularly epistaxis and hemorrhoids; or suppressed evacuations and eruptions, as those from the uterus, bowels, &c., or either may supervene in such a way as will lead us to infer that its occurrence has been the cause of the disappearance of the pre-existing malady, as in cases of misplaced or metastatic gout, rheumatism, &c.; or apoplexy or palsy may likewise appear in the course of other diseases, which cannot be thereby displaced, and may assume the character of a most serious or fatal complication. The importance of these morbid relations of apoplexy and palsy requires for them a more particular notice than they have generally hitherto obtained.

328. i. CONSECUTIVE.—The supervention of apoplexy or palsy, after *suppressed hemorrhages*, *evacuations*, and *eruptions*, has been satisfactorily noticed by many writers; and it seems to proceed from unusual fulness of the vascular system, owing to the suppression, and the accidental cooperation of causes which determine the blood to the head, and favour its extravasation. A gentleman between fifty and sixty years of age had recently experienced attacks of epistaxis. These had ceased for some time, but he complained of heaviness and pain in the head. For these he consulted a medical man who prescribed some aperient medicine, which

failed of producing a beneficial effect; and the German spas were then recommended. Soon after he reached there he was seized with hemiplegia, which soon terminated (as I had predicted from the particulars of the case, which were communicated to me in consultation) in a fatal attack of apoplexy.

329. Another gentleman, about sixty years of age, had been subject to hemorrhoids, which were arrested by treatment, and he continued well for two or three years. But he then experienced an attack of apoplexy associated with palsy; and on this occasion I was called to him. He recovered from this attack, but remained paralytic for some years.

330. Besides the suppression of the evacuations just mentioned, the stoppage of other discharges may favour the occurrence of an attack of either apoplexy or palsy. The drying up of setons or issues (especially when used for either of the maladies under consideration), the sudden healing of chronic ulcers, the arrest of habitual perspiration from the feet, unusual continence, and sudden suppression of the lochia or of leucorrhœa, may have this effect. Palsy and even apoplexy are not infrequently observed after suppressed otorrhœa; and from inflammation of the ear having extended to the membranes and substance of the brain, and produced abscesses and other lesions within the cranium. I have met with several cases of this description in which the apoplectic state was complete and attended with hemiplegia. Numerous instances are also recorded by LALLEMAND, GENDRIN, ITARD, and other writers.

331. ii. METASTATIC.—*a.* The occurrence of apoplexy or palsy, from *misplaced* or *metastatic gout*, has been noticed by MORGAGNI, WEICKARD, MUSGRAVE, JUNCKEN, TODE, FLAGENDON, CONRADI, and CHEYNE. The last-named author thinks that the symptoms differ, when occurring from this cause, from those which constitute true apoplexy. I believe, however, that they differ, in no respect, in general from those which characterize congestive apoplexy; and that as hemorrhage within the head does not commonly constitute the attack of apoplexy from this cause, hemiplegia or paralytic symptoms seldom accompany it. Some years ago I was called to a medical friend in Westminster, who, after complaining of

symptoms of indigestion, was suddenly seized with complete apoplexy, with stertorous breathing, but with no signs of paralysis, for which the usual means were promptly and decidedly employed. On the following day a complete attack of gout in both feet took place, with complete disappearance of the cerebral disease. Warmth to the feet, and aperients, were prescribed; but from his eagerness to rid himself of the pain, and to visit his patients, he took, contrary to the advice given him, a large dose of colchicum. A few minutes afterwards the gout left his feet and seized his stomach; whence it was with difficulty recalled to the extremities. This was the first time he had ever been seized with gout, and the first part it attacked was the brain in as complete a form of apoplexy as can be conceived. Misplaced gout in, or metastasis of, gout to the head may also occasion inflammation of the brain, with coma or lethargy.

332. *b.* Nearly similar seizures to the foregoing will occur from attacks, or metastasis, of *rheumatism* to the membranes of the brain. The apoplectic symptoms are, however, seldom so fully developed in these as in other cases, a comatose state being the more usual result. On dissections of fatal cases of this description, MORGAGNI, HOFFMANN, PLENCIZ, RANOE, WEICKARD, and STOLL, found the membranes injected, thickened, and with serum interposed. Very nearly similar symptoms and appearances within the head result from *erysipelas* extending to the membranes of the encephalon. Here, as well as in the rheumatic disease of the same structures, the apoplectic state is not so strongly marked as in its more idiopathic forms; paralysis rarely occurs, excepting in the advanced progress of the cerebral disease.

333. *b.* *Palsy* is more frequently *consequent upon rheumatism* than has been acknowledged by writers on either of these diseases. It should not, however, be overlooked, that the pains, whether dull, gravative, gnawing, shooting, &c., sometimes complained of both before and during paralytic affection, are often mistaken for rheumatism, or for neuralgia, although they are not infrequent attendants of that change of structure at the origin of the nerves supplying the pained parts that ultimately produces palsy. The pains may even be felt in different parts from those which are paralysed; and they are then to be viewed as caused by the extension of inflammation, or of other organic lesions to parts adjoin-

ing or differently related. The pains in the loins or back, so often viewed as *lumbago*, and felt more or less by persons addicted to venereal excesses or to manustupration, are occasioned either by congestion of the spinous sinuses, or by inflammatory action of the membranes of the cord; and although they are most frequently the precursors of palsy, especially of paraplegia, still they not infrequently accompany it, and extend either to the sound or to the affected limb, or even to both.

334. *Disease of the membranes of the spinal cord*, probably commencing in, or at least implicating the theca of the cord, is occasionally observed either immediately consecutive of, or complicated with an attack of acute or sub-acute *rheumatism*. A case occurred to me in 1820, in which acute rheumatism of the joints, complicated with *pericarditis*, was followed by *chorea* and inflammation of the membranes of the spinal cord, soon passing into effusion of lymph, and terminating in complete general *palsy*. This case was not only demonstrative of this complication and succession of local affections, and of the appearances after death (see *London Med. Repos.*, vol. xv.), but it also evinced the connection subsisting between rheumatism and inflammation of internal fibro-serous surfaces on the one hand, and between atonic spasmodic affections, *chorea*, and paralysis on the other.

335. When treating above (§§ 92, *et seq.*) of the forms of paraplegia and general paralysis, I described certain states of that disease which depend upon inflammation of, followed by the effusion of lymph upon or between the membranes of the spine; and which often commences in a very slight form or degree of palsy, the movements of the limbs being at first uncertain, tremulous, irregular, or spasmodic, in many respects resembling *chorea*, and gradually becoming still more imperfect, until they are altogether lost, sensation still remaining unimpaired. This affection, in rare cases, is consequent upon acute or sub-acute rheumatism, appearing as a transference of the morbid action from the more external parts to the theca and membranes of the spinal cord. I have met with several cases of this description, two of them in children under twelve years of age; and in five of the cases I had an opportunity of examining the spine after death. It ought not, however, to be overlooked, that inflammation of the membranes of the cord, occasioning effusion

of lymph and palsy, is generally attended by severe pain in the limbs, and by a girding sensation around the abdomen, which may be mistaken for rheumatism, but which is owing to the irritation at the origins of the nerves supplying the pained muscles, and may be quite independent of pre-existent rheumatism, or of the rheumatic diathesis.

336. iii. COMPLICATED.—Either apoplexy, or palsy, or both, may supervene in the course of several diseases, even at the commencement of some of them; and become *associated* with them.—*a. Apoplexy* sometimes occurs during the cold stage, or period of invasion of *fevers*, especially of severe marsh fevers of warm or intertropical countries. The epidemic prevalence of apoplexy, noticed by BAGLIVI, LANCISI, MORGAGNI, FORMEY, and STOLL, may be explained by a reference to this connection; although the observations of the FRANKS and CHEYNE, which are conclusive of the great frequency of apoplexy in hot and moist seasons, seem to countenance the opinion of these authors. When apoplectic seizures usher in fevers, whether paludal or infectious, the attacks are seldom accompanied or followed by paralysis. In a case, however, of perfectly formed apoplexy ushering in a case of endemic fever of a warm climate, which occurred in my practice, paralysis supervened upon the seizure. An attack of true apoplexy may also occur in the stages of depression and collapse of adynamic, typhoid, or malignant fevers. In these, coma is generally present; but it rarely amounts to the true apoplectic state, and when it does, hemiplegia sometimes attends it.

337. *d.* The association of apoplexy and palsy with *hepatic disorder* has been noticed by STOLL, BALDINGER, MOLL, CHEYNE, and others. The circumstance of icteric patients frequently being cut off by apoplexy or by profound coma marks the connection. I have met with several cases in which both apoplexy and paralysis have supervened upon, and become complicated with hepatitis, both acute and chronic, particularly the latter. The liver is seldom diseased without disordering the functions of the brain; and I believe that accumulations of vitiated bile in the gall-bladder and hepatic ducts, independently of any actual disease of the liver, will predispose to the apoplectic or paralytic seizure. I am the more confirmed in those opinions by

having observed disease of the biliary apparatus in a very large proportion of those who had died of apoplexy or paralysis; and, in many of those who have recovered, the active use of purgatives had produced morbid evacuations containing a large quantity of blackish green, greenish, or yellowish brown bile, before much amendment had taken place. It may, however, be conceded that serious disturbance of the brain equally induces disorder of the liver; and that the latter may have been occasioned by the former. But this circumstance merely proves the frequency and intimacy of the association. It should be also kept in recollection, that the apoplectic seizure generally masks the hepatic affection; the practitioner should therefore examine the region of the liver, where, as well as at the epigastrium, fulness, and, in some cases, tenderness may be detected; and, as the consciousness of the patient returns, the hepatic disorder will occasionally become more manifest. This complication is so important and frequent that it ought always to be looked for in practice; for many of the causes which occasion hepatic disorder also give rise to cerebral disease; and the production of either the one or the other singly often favours the appearance of the other subsequently. I have no doubt that an inflamed or actively congested state of the substance of the liver, or an engorged state of the biliary ducts, has a very marked effect in developing that state of the circulation of the brain on which the apoplectic or paralytic seizure depends.

338. *e.* The influence of *gastric disorders* in producing apoplexy or palsy, not merely as evinced by intoxication, a surfeit, &c., but also by some one or more of the several ailments which characterize impeded or otherwise disordered function of the stomach and intestines, has been noticed by SCHENCK, SCHROEDER, WEICKARD, MEZLER, FOTHERGILL, SCHÆFFER, THILENIUS, HUFELAND, LOUYER VILLERMAY, and CHOMEL; and more strongly insisted on by BROUSSAIS and his followers. Although the general dependence of the latter on the former has been too absolutely contended for by BROUSSAIS, the occasional connection cannot be doubted. Indeed, in several of those cases wherein the association with hepatic disorder is observed, gastric and intestinal disturbance is also evinced. But however complicated, whether with either gastric or hepatic disorders only, or

with both conjoined, apoplexy and palsy are, perhaps, as often the concurrent results of the same causes that produced these disorders as diseases springing from and dependent upon them. The fact ought not to be overlooked, that the vital manifestations of the stomach, liver, and brain, although different, are yet actuated by the same system of nerves—the ganglial; and that, notwithstanding, the individual parts of the system seem to perform modified or special offices; yet the healthy condition of the one part is necessary to the perfect functions of the rest; and, consequently, a morbid state of one considerable portion of the series will necessarily, sooner or later, be followed by derangement throughout,—causes which operate upon one part of the circle, thus having their effects extended to other parts remote from the seat of primary morbid impression. It should not, however, be overlooked, that a large number of instances of gastric affection, retching, &c., accompanying the apoplectic seizure, proceed from the sympathetic effect produced upon the stomach by the severe injury or shock sustained by the brain.

339. *f.* The occurrence of apoplexy, either after or during attacks of *colica pictonum*, has been noticed by HAGENDORN and CHEYNE. Although *palsy* is the common consequence and state of complication, yet apoplexy, with or without paralysis, particularly the former, is sometimes met with. An instance occurred to me some time since of a patient having died of apoplexy during an attack of this disease. The *constipated* state of the bowels to which persons affected with cerebral disease are liable, when neglected, or not readily yielding to medicine, will sometimes favour the occurrence of the apoplectic attack.

340. *g.* The association of *apoplexy with disease of the kidneys* has been noticed by several writers, particularly BONET, LITRE, MORGAGNI, and BRIGHT. The occurrence of apoplexy, particularly serous apoplexy, after suppression of urine, is not uncommon. By some writers, however, the suppression has been imputed to pre-existing disease of the brain. But this is a supposition merely; for, in the great majority of cases, the kidneys and ureters offer evidence of having been the parts primarily affected. The experience of BONET and MORGAGNI, and of numerous later writers, fully supports this conclusion. Besides, the cerebral ner-

vous system can only indirectly influence the urinary secretion. That apoplexy, coma, or lethargy, should occur when the urinary secretion is suppressed, and the vascular system overloaded by excrementitious matters, will be readily admitted. The occurrence of apoplexy or coma, as a consequence of organic change in the secreting structure of the kidneys, whereby their functions are more or less obstructed, has been illustrated by the cases recorded by Dr. BRIGHT and others; and by the experience of every physician. Apoplexy thus supervening is rarely associated with palsy; for the congestion and effusion, chiefly of serum in the cavities of the brain and between the membranes, are generally so great as to produce unconsciousness, and are very rarely the cause of simple palsy.

341. *h.* *The association of palsy with disease of the kidneys and urinary organs generally* has been noticed, with reference to the supervention of the latter upon *paraplegia* and *general palsy* (§§ 102, 103, 144). But the complication now to be noticed is of a different kind. When the kidneys, either from intense inflammation or from a primary state of inaction or palsy, or from some organic lesion, cease to perform their functions, and retention of urine from this cause results, a state of excrementitious plethora is produced, not infrequently terminating, as just stated, in fatal coma or apoplexy. Although these cases may assume the form of general palsy, hemiplegia very rarely takes place. In these the procession of morbid phenomena is sufficiently manifest; but in others it is much less so; especially in those which present the occurrence of paraplegia consequent upon the nephritic disease. Mr. STANLEY, in an interesting memoir (*Trans. of Med. and Chirurg. Soc.*, vol. xviii., p. 260), has adduced several cases, in which inflammation of the kidneys existed in connection with paraplegia and appeared as the primary malady, and yet no change was observed in the spinal cord or its membranes. Some of the cases deserve a brief notice.

342. A man complained of retention of urine conjoined with paraplegia; motion and sensation being lost. Tenderness on pressure was felt at the third lumbar vertebra. After death, no lesion could be detected in the vertebræ, spinal cord, or its membranes. The kidneys presented

inflammatory changes with small abscesses dispersed through their substance.

343. A man had retention of urine consequent upon the suppression of gonorrhœa by injections. He complained of pain in the back, paralysis of the lower limbs, and of the sphincters. He distinctly traced the course of the pain from the bladder, upwards to the kidneys and across the loins. On dissection, the kidneys were inflamed, with minute purulent depositions throughout their substance. The bladder was inflamed, and its inner surface partly covered by coagulable lymph. The brain and spinal cord presented no disease.

344. A man, aged thirty, stated that he had been suffering for a day or two from pain in the loins, when he was seized with paraplegia extending to the umbilicus. The loss of motion was complete, and the loss of sensation nearly so. The functions of the brain were unaffected. The urine flowed involuntarily, and three pints were drawn off by the catheter. In sixteen hours from the attack of paraplegia the man suddenly died. The kidneys were found gorged with blood and nearly black. The mucous membrane of the urinary passages was congested. The substance and membranes of the spinal cord and brain were sound, vascular turgescence of these parts being but slightly greater than natural.

345. I believe that if cases of the kind now adduced were carefully observed at an early stage of their course, sufficient evidence would be found of congestion of the veins or sinuses placed between the sheath of the cord and the bodies of the vertebræ. This congestion would of itself be sufficient to cause disorder of the urinary functions and inflammation of the kidneys and urinary passages, which would re-act upon and aggravate the spinal lesion. In the examinations of these cases no mention is made of the state of the venous sinuses of the spine.

346. *i.* Although both *paraplegia* and *general palsy* are often produced as shown above (§§ 257, *et seq.*) by the more common consequences of *inflammation of the spinal cord* and *of its membranes*, still the inflammation, as well as those consequences, may continue after the paralytic state has been produced, and thus become *associated* or *complicated with it*. The history of cases of this description, and some of those above noticed, suggests this position; and the ap-

pearances I have observed during the examination after death sufficiently confirm it. The importance of attending to this circumstance cannot be over-estimated in a practical point of view, as being suggestive of a rational treatment of these cases. The persistence of inflammatory action in the spinal cord and its membranes, particularly the latter, during the paralytic states depending upon lesions of these parts, is often evinced by pain in the spine, by spasms or contractions of the muscles, by pains in the limbs, and by the various phenomena usually attending inflammations. In some instances the inflammation occasions not merely spasm, contraction, or pain of the muscles supplied with nerves from the part of the spinal cord which it affects, but also more general convulsions; or, when the upper parts of the cord is implicated, epileptic seizures or coma and asphyxia.

347. The lymph thrown out between the membranes of the cord, and most probably more or less concerned in producing the paralytic phenomena, may be partially absorbed, or be transformed in a loose adipose substance, admitting of a return of the functions of the cord to a certain extent—a transformation observed by the author as above stated. But even in these cases, and more especially in others, there is a remarkable tendency in the inflammatory action, which has already produced the paraplegia, to advance upwards along the membranes, with the usual changes consequent upon the inflammatory action, until the upper portions of the cord are implicated, and even the medulla oblongata and base of the brain are reached, the patient ultimately becoming generally paralysed, and dying either from asphyxia or from profound coma following delirium and various cerebral symptoms.

348. *k.* Disease of the *cranial and vertebral bones*, or of the *periosteum* sometimes *complicates* as well as *causes palsy*, particularly in the scrofulous diathesis. In these cases the disease of the bones extends to the membranes enveloping the brain or cord; and inflammation, with its usual consequences when affecting these membranes, supervenes and interrupts the functions of, or extends to, the inclosed portion of the cerebral or spinal structure. Thus, I have repeatedly met with instances of caries of the petrous portion of the temporal bone, consequent upon neglected otorrhœa, that were followed by inflammation and abscess of the adjoining

membranes and cerebral structure, and by palsy, or by palsy associated with coma or even by an apoplectic state, with various concomitant and consecutive phenomena, as with cramps, convulsions, &c. Cases of this description have not infrequently occurred to me in dispensary practice, and in children at the institution for their diseases.

349. Lesions of the *cranial bones* associated with, as well as causing palsy, may be the result of disease or of injury. Thus, a portion of the parietal bone was remarkably and permanently depressed in a boy by accident, and coma with hemiplegia was the result. The coma soon passed off, but the hemiplegia continued for a time. Ultimately, the palsy also was altogether removed; and, long before he reached the period of puberty, the paralysed side had become as strong as the other. The depression, however, continued as remarkable as before; yet, notwithstanding this, the subject of the accident became, and still is, a most powerful and talented man, with whom I have been acquainted for more than thirty years.

350. *l.* Disease, particularly *scrofulous caries of the vertebræ*, is a frequent cause and concomitant of paraplegia and even of general palsy, as in the case above noticed (§ 130); and not only may the palsy be associated with disease of the vertebræ, but also be further accompanied with epileptic seizures. A young man several years ago consulted me respecting epileptic attacks, each of which was preceded by the *aura epileptica*, which proceeded from the palm of the left hand to the lower cervical vertebræ. On examining the hand the palm of it was found swollen, and obscure fluctuation was detected in it. The part was opened and matter was discharged from beneath the palmar fascia. The fits disappeared for a considerable time; but pain and stiffness in the lower cervical and upper dorsal vertebræ were complained of, and were attended by a diffused swelling. The epileptic attacks returned and paraplegia, nearly amounting to general palsy, supervened. An abscess pointed between the scapula and spine which was opened; and the patient soon afterwards was carried off by an epileptic seizure. In this case, caries of the vertebræ, purulent infiltration of the adjoining muscles, and inflammation of the membranes of the cord, with effusions of coagulated lymph, adhesions, &c., were found after death: and the inflamma-

tion of the spinal arachnoid, with serous effusion above the seat of adhesions, had extended to the arachnoid of the medulla oblongata and the base of the brain.

351. The *scrofulous tubercle* found to exist in cases of *carios vertebrae* or vertebral disease of POTT, and to be often the origin of that disease, appears under various forms and in different situations:—1, as single or several deposits, varying in size from that of a pea to that of a nut; of a white, yellow, or gray colour; in cavities, either isolated or communicating with one another, either opening anteriorly or into the vertebral canal:—2, more rarely infiltrated into the spongy tissue of the bones, the texture of which has undergone no other change than a diminution of consistence:—3, amorphous masses of tuberculous matter, of various size, frequently deposited beneath, and elevating the anterior and posterior common ligaments.

352. The dorsal is more frequently the seat of these tubercular deposits than either the cervical or lumbar regions. Most commonly the tubercles are deposited in the bodies of the vertebrae. It is rare to find them confined to one bone. Any portion of the atlas and axis may be the nucleus of tubercles, the consequent phenomena being very different from those observed in the other situations of the same disease. Tubercles sometimes originate within the intervertebral cartilages, which may be affected alone or simultaneously with the vertebrae. In every situation their first effect is to form a cavity for their reception. The bony parietes of these cavities preserve their normal structure and consistence, their production being apparently the effect of simple absorption from pressure, without inflammation. When the tubercles are not in immediate contact with the bone their cavities are lined with a thin, vascular membrane; and this is generally accompanied by a smoothness of the adjoining portions of bone. Tubercles formed in the centre of the bodies of the vertebrae gradually destroy them, until a kind of shell is all which remains: being no longer able to sustain the weight to which it is subjected this breaks, and the column inclines, allowing the opposite bones to come in contact. If the tubercular matter be deposited within the bone, in cavities separated by thin septa, these for a time afford support, but they eventually give way; and the inclination occurs somewhat suddenly, and at the mo-

ment of the destruction of these partitions. When the tubercles are first formed on the anterior surfaces of the bodies of the vertebræ the destruction takes place slowly backwards; deformity occurs more gradually; and as several vertebræ are generally implicated in the disease, instead of the angular prominence caused by the obliteration of a single bone, the spine assumes the form of a curve. It is rare to find tubercles deposited only behind the bodies of the vertebræ; in this case but trifling protruberance results; the effect is nevertheless very serious, and consists of compression of the cord and consequent paralysis. Lateral destruction of the vertebræ produces a corresponding deformity.

353. The small extent of bony matter in the atlas and axis is rapidly destroyed by tubercles; the head inclines towards the part which is deficient, the ligaments are stretched or torn, and a fatal termination results from compression of the cord. The processus dentatus, when partially absorbed, may be separated from its connections by a sudden motion of the head, and produce death by pressure upon the cord. An ulceration of the articular cartilages of the first two vertebræ gives rise to elongation of their ligaments; the atlas slides downwards and forwards, its posterior arch compressing the cord; the movement of the dentata backwards contributes to the same result; paralysis gradually increases, and death supervenes by asphyxia.

354. In an advanced stage the intervertebral cartilages of these bones become softened and absorbed. It may happen that, by the loss of a body of a vertebræ, two cartilages come in contact, and are then rubbed away. More rarely, tubercles are deposited within the substance of cartilages, which are then destroyed by ulceration. Paralysis does not always accompany this vertebral disease: when it does occur it is limited to the organs inferior to the spinal lesion. Its forms are, simple loss of power, associated or not with loss of sensation; permanent contraction of the muscles, with or without sensibility, or accompanied by acute pains in the contracted limbs. The curvature of the spinal column does not necessarily produce paralysis. In the majority of cases where paralysis has existed, its cause, on examination after death, has appeared to be—1st, an effusion of tubercular matter between the meninges of the cord;

—2d, tubercular matter within the cord, which has been found completely divided;—3d, tubercles in the meninges, either infiltrated or deposited in small masses, and sometimes coalescing, accompanied by thickening of the membranes;—4th, slight or extensive softening of the cord;—5th, induration of the cord;—6th, thickening and injection of the dura mater and arachnoid;—and 7th, bony spiculæ penetrating, or ossific deposits pressing upon, the membranes.

CHAPTER VII.

THE RELATIONS OR ALLIANCES OF PALSY AND APOPLEXY TO SOME OTHER DISEASES.

355. *Palsy* especially is more or less intimately related to several affections, from which nosologists have endeavoured to distinguish it by adducing the most extreme points of difference to the neglect of those which serve, if not to connect, at least to approach each other. But the approximation does not consist alone of resemblances between the external characters or symptoms belonging to each complaint, but extends also to the pathological states producing them, as far as these are known to us; different grades, or modifications merely, of these states often producing these several diseases. Although some relation may be traced between the maladies now being considered and others besides those which are about to be noticed, I shall confine myself to those which are more especially related to palsy and apoplexy; and to certain of these a very slight notice merely will be directed.

356. i. NEURALGIA is so intimately related to *Palsy* and *Apoplexy* as to entitle it to have been viewed as the not infrequent antecedent and concomitant of these maladies, and to have been considered as one of their most important complications. But it is equally allied with other maladies as with *epilepsy*, *coma*, and *convulsions*; and it, in common with those and with the several states of palsy and apo-

plexus, depends upon a variety of organic lesions of the brain or of its envelopes, or of the spinal cord and its membranes, which lesions, according to their seat, grade, and nature, occasion either of these allied maladies—the same lesion, even according to its seat and development, producing either or even all of them in succession, and after indefinite periods, or even intervals or intermissions. A tubercle or tumour of any kind, for instance, may first occasion neuralgia or epilepsy, or neuralgia following epilepsy, or convulsions, and successively partial palsy, hemiplegia, and ultimately apoplexy, or profound coma, or asphyxia.

357. The lesions within the cranium or spine, or even in the cranial and spinal bones, which may, according to their nature, size, and seat, produce either of these allied maladies, are so numerous that I cannot notice them satisfactorily in this work. They are, however, fully described in my work on *Pathology and Practical Medicine* (see vol. i., pp. 439–441). Frequently superadded to one or more of these lesions, or even independently of them, *hyperæmia* in any form, general or local, congestive or inflammatory, may, either at the origin or in the course of a nerve, occasion this affection. Evidence of this is to be found in the appearances observed in some cases after death, in the termination of several other cases of neuralgia in apoplexy or palsy, and in the symptoms and the effects of treatment in other cases. I was consulted several years ago by a gentleman, about fifty years of age, suffering neuralgia of the head and face; the symptoms indicated active determination of blood to the brain, and he was treated accordingly, and the neuralgia disappeared. Two years afterwards he experienced a return of the affection; and he had just arrived in the vicinity of London from the country to consult me, when he was seized with apoplexy and soon afterwards died.

358. I was called to a lady, about fifty years of age, suffering neuralgia referred to inflammatory congestion or similar change within the cranium. Cupping in the nape of the neck, with other means appropriate to these views, were prescribed. She was relieved; but the complaint soon afterwards returned. Her friends then requested a consulting surgeon to see her; and he prescribed large doses of the carbonate of iron. She immediately became

maniacally delirious, afterwards hemiplegic, and she soon afterwards died. The family surgeon informed me that the appearances after death indicated intense vascular congestion, with signs of previous inflammation.

359. A gentleman from the country recently came under my care for chronic diarrhœa of seven years' continuance. He had experienced, too, attacks of phlebitis of the femoral veins, consequent upon having taken the extract of log-wood in large doses for the cure of the diarrhœa; this medicine having restrained, but not arrested the diarrhœa. A cautious alterative and derivative treatment was therefore prescribed, and the diarrhœa was slightly abated and the stools improved. But a violent attack of neuralgia supervened—the pain being seated chiefly in the *right side* of the occiput, and in the frontal branch of the fifth pair of nerves of the *left side*. The increased action of the carotids induced me to prescribe local bloodletting, a blister to the nape of the neck, &c., and the attack entirely ceased in a short time. But a few days afterwards the phlebitis returned for the third time, in a less severe form, recovery from it taking place after some days, but the diarrhœa was only moderated. This gentleman soon afterwards returned into the country, and was seized with hemiplegia which terminated in fatal apoplexy.

360. That *neuralgia* of the *spinal nerves* is sometimes owing to *venous congestion* or *inflammatory* action in a limited portion of the *spinal cord* or *its membranes*, or even of the *theca vertebralis* and the vicinity of the inter-vertebral foramina, although often associated with other lesions enumerated above (§ 97), cannot be doubted, inasmuch as it is sometimes observed in connection with, and manifestly depending upon these vascular states. In two cases, both of them males between fifty and sixty years of age, the neuralgic pains, sometimes associated with spasm of the abdominal and femoral muscles, of which they complained for several years, and which ultimately terminated in paraplegia, were ascertained by post-mortem examinations to have arisen from these changes. These cases were frequently seen by the author and other physicians, and the nature of the malady recognised from the first. It is not unusual to observe, associated either with these affections of the spinal cord and its membranes, to which the term spinal

irritation has been recently applied, or with inflammation of the constituent structures of the spine, or with caries of the vertebræ, intense neuralgia, or marked pain, generally of a remittent or intermittent kind, in one or more of the spinal nerves more immediately related to the seat of these lesions. When the vertebræ and their connecting structures are unaffected in these cases, the disease in the spinal cord and its membranes may not be evinced by tenderness on pressing the spinal processes, or by manual examination of the spine, especially in adult or aged males.

361. *Epilepsy* and *convulsive* or *spasmodic affections*, as well as *palsy* or *apoplexy*, are, as already noticed (§§ 356, 357), often the external manifestations of the same lesion which occasions neuralgia, the one alternating with or, to a certain extent, accompanying the other. Indeed, the same local lesion which produces intense pain may in a different grade, or as it extends to the nerves of motion, occasion spasm or convulsion; and, in a still more advanced grade, *loss of sensation*, or *of motion*, or of both functions. Of this I have met with several instances, when the primary lesion was seated within the cranium or spinal canal. In some cases, severe pain has been experienced in different parts of the lower extremities, afterwards the pain has been attended by cramps in the muscles of these extremities, or of the abdomen; these have recurred at intervals, and have been followed by weak, imperfect, and irregular action of these muscles, giving the patient an unsteady and partially paralysed gait, in some cases resembling paralysis agitans, in others chorea or an intermediate state, and characterized by weak, tremulous, and indeterminate movements.

362. That neuralgia and epilepsy may be associated effects of the same lesion, the latter appearing consecutively on the former as the primary lesion increased, was demonstrated to me many years ago in the case of a compositor in a printing-office who complained of most severe neuralgic pains in the left hand, which generally originated in the situation where the metal composing-stick pressed most during his work. As the intensity of the pain increased regular attacks of epilepsy supervened; but disappeared with the removal of the local affection and its cause. Neuralgia, associated with epilepsy or convulsions, is remarkably prone to pass into partial, local, or more general palsy, or

into apoplexy, or into both, either in succession, or in coeval connection. Of this procession and association of disease I have met with several instances in the course of practice.

363. *Painters' colic* may be considered as a form of visceral neuralgia; and this affection I have seen associated with epilepsy on two or three occasions, and terminate in apoplexy in another case. Its connection with paralysis from lead has already been fully noticed (§§ 166, *et seq.*)

364. When neuralgia cannot be imputed to exposure to malaria, or to vascular congestion or inflammatory action—when it is occasioned by the less manifest causes—when there is reason to suppose that some *organic lesion* exists within either the cranium or spine, then a protracted disease may be expected; and the *supervention of another malady*, generally resulting from the progressive increase of the primary lesion, and of a still more fatal tendency, may be anticipated, although at a more or less remote period. In even a larger majority of these cases than of the preceding, neuralgia terminates in some related malady—in a convulsive, epileptic, apoplectic, or paralytic seizure. From any of these the patient may recover partially, rarely completely, and be again attacked; but he seldom experiences the neuralgic affection, or at least in the same form or degree of severity. Of the several maladies into which neuralgia from organic lesions passes, *palsy*, generally in the form of hemiplegia, sometimes in that of paraplegia, when the lower extremities have been the seat of the neuralgic affection, has been that most frequently brought under my own observation. Next to this, apoplectic, or apoplectic conjoined with convulsive seizures, have been noticed.

365. It is chiefly, if not entirely, by passing into the apoplectic, epileptic, or convulsive, or the universally paralytic states, that *this affection terminates in death*, such termination sometimes taking place more or less suddenly, upon the occurrence of the first seizure, or not until two or more recurrences or exacerbations of the seizure. A gentleman from the country consulted me for facial neuralgia. He continued tolerably free from the affection during nearly two years, when a severe attack occurred, followed by convulsions, which rapidly passed into apoplexy and death. Another experienced an attack of apoplexy, attended by convulsions, that supervened upon neuralgia. I found him par-

tially recovered from this attack. He had been very largely blooded, and the pulse indicated an excessive loss of blood; but another attack took place, nevertheless, within forty-eight hours, and speedily terminated life. Whether or not he could have recovered from the first attack without the large depletion is difficult to determine. Still, I have rarely seen large bloodlettings beneficial, more frequently I have observed them prejudicial, in seizures attended by convulsions. In these cases it is better to wait, or to employ other measures less likely to be prejudicial, than to bleed largely with the view of recovering the patient from the seizure, which cannot always be arrested at once, or recovered from under some time, after having been developed. Time, I may here remark, is a necessary element in the process of recovery; and if due time be not allowed for the procession of phenomena terminating in a return to health, but disturbing, officious, or exhausting measures be adopted to hasten what admits not of being accelerated, serious mischief may accrue.

366. *Neuralgic affections* of the face, head, or limbs, not only *precede*, but also occasionally *accompany palsy*. The pain sometimes ceases when the palsy takes place, especially if the muscles supplied or connected with the pained nerves are those paralysed; but it is sometimes only alleviated. Neuralgic pain is occasionally complicated with palsy, particularly when the neuralgia and palsy occur on different sides of the body. Neuralgic pains may thus accompany hemiplegia, paraplegia, and any of the more partial states of palsy, the latter affection supervening after the former has been of long duration. It is only in rare instances that neuralgia appears in the course of palsy, or that the latter is the primary affection.

367. Severe *muscular pain*, or *neuralgia of the muscles*, is often mistaken for rheumatism; and is sometimes the chief indication of the progress of an organic lesion which ultimately terminates in palsy or apoplexy, or coma. But in true neuralgia of the muscles the pain is much more acute than in rheumatism, recurs in frequent exacerbations, and is rarely or never altogether absent in a dull or numb form. In all the cases I have seen, the remissions were attended by weakness or partial palsy of the muscles affected; and the complaint was symptomatic of organic lesion in either

the brain or spinal cord; apoplectic, epileptic, or paralytic attacks generally occurring after longer or shorter periods. A lady from the vicinity of Gravesend consulted me, a few years since, for neuralgic pain of the muscles of one side, and particularly of those of the shoulder and arm of that side. After many months of suffering, maniacal delirium and palsy supervened: several large tubercular formations were found in the brain after death. Indeed, as Dr. SEYMOUR has very justly insisted, those severe neuralgic pains in the muscles or limbs should always lead to suspicion of the existence of softening or other organic lesions or formations in the substance of the brain. In four cases, in which the muscular pains were most acute in the thighs, and were attended by occasional cramps, followed by weak and irregular action of these limbs on volition, amounting to incomplete palsy, but terminating in complete paraplegia, I found extensive organic changes in the spinal cord and its membranes after death.

368. ii. CHOREA is closely related to palsy, especially to shaking palsy. The connection between these two diseases was entirely overlooked until I had the opportunity, many years ago, of treating a case of chorea, which was followed by general paralysis, terminating by asphyxia. In this case the membranes of the spinal cord were found agglutinated by coagulated lymph. The patient had been subject to rheumatism, which had supervened upon the chorea, and which almost immediately afterwards seized upon the membranes of the cord, producing an exudation of lymph and complete and general palsy of motion. It must, however, be admitted that the changes found on dissection are to be imputed to the metastasis of rheumatism to the membranes of the cord, rather than to alterations upon which chorea should be considered to depend. It is very probable that this latter disorder is owing more to functional disturbance of the spinal marrow and roots of the spinal nerves than to alterations which are evident to the senses; and that the functions of these parts of the nervous system are disturbed by irritation of the organic or ganglial nerves supplying or communicating with the cord and roots of the spinal nerves; the irritation of the visceral and sympathetic nerves occasioning, by reflected sympathy through the medium of the

spinal nerves, the irregular or automatic movements of the muscles of voluntary motion. I may state that this view of the nature of chorea was published by the writer (see *Dict. of Pract. Med.*, vol. i., pp. 330, 331), at greater length, before the appearance of Dr. M. HALL'S paper on the "*Reflex Functions.*"

369. Subsequently to the occurrence of the case just alluded to, changes in the spinal membrane, similar to those described by the writer, were observed by Dr. PRICHARD in four interesting cases, and by Dr. ALIPRANDI in one case of chorea terminating in general palsy. But these cases only prove, as stated in that part of my work just now referred to, that irritation or other disorder of the ganglial and sympathetic nerves, when propagated to the roots of the spinal nerves, or even to the cord itself, may occasion inflammatory irritation either of the cord or of its membranes, with effusion or exudation of lymph, and the consequent palsy.

370. iii. HYSTERIA sometimes presents all the characters of palsy and even of apoplexy, although much more rarely than those of palsy. In cases of *hysterical palsy* there is seldom a fully-developed state of hysteria, but merely an occasional manifestation of certain of its symptoms, and a concomitance of uterine disturbance in some one of its forms. In most instances of these, as well as of other irregular hysterical affections, the variable character of the temper and mind, and the exalted sensibility and irritability of the body, are evinced.—*a.* The paralytic form of hysteria is sometimes connected with spasm, inability to move being attributable rather to this than to loss of power. Occasionally, also, it depends upon a deficient exertion of volition, the patient being capable of moving the limb when excited. This affection may occur in a single limb, or in both; it may even closely imitate *paraplegia*. Sir B. BRODIE mentions an instance of hysterical paraplegia, which had been improperly treated before he saw it by large depletions, &c., and which consequently terminated in sloughing of the nates and in death; the brain and spinal cord were not altered from the healthy state; the thoracic and abdominal viscera were also sound.

371. *b.* Several cases of hysterical palsy, generally in the form of paraplegia, have come under my care during

the more recent period of my practice. In these, the function of motion was chiefly palsied, sensation but little or not at all impaired. The bowels were more or less confined in all; but the excretion of urine was either irregular or interrupted, or altogether arrested. In one case, which was sent to me from Canada, there was but little severe disorder beyond the nearly complete loss of the movements of the lower extremities. In another, in which the paraplegia was more complete and extended higher, and which was seen also by Sir B. BRODIE, the uterine functions were slightly disordered; but there was no tenderness of any part of the spine: complete recovery took place in both cases. In the case of a young lady from Yorkshire, the paralytic symptoms sometimes passed nearly into the state of catalepsy. The catamenia and the alvine evacuations were much disordered; and pain in the lumbar region, with occasional attacks of vomiting and of retention of urine, was complained of. She was seen by me in consultation with Sir B. BRODIE and the late Dr. D. DAVIS; but derived little benefit from treatment, owing probably to persistence in the presumed cause of disorder.

372. A remarkable case of *hysterical paraplegia* was a few years ago attended by Mr. FLOCKTON and myself:—A young lady had experienced hysterical symptoms with irregularity of the catamenia, on which had supervened suppression of this discharge, attacks of vomiting sometimes alternating with diarrhœa, and complete paraplegia, as respected the power of motion. The sensibility was only slightly affected. The urine required to be regularly drawn off. There was no tenderness in the course of the spine; and all the cerebral functions, the organs of sense, the intellectual powers, and the moral feelings, seemed to be in unimpaired vigour and duly regulated. She had been long ill, and had been under the care of various eminent men both in London and in fashionable watering-places. The treatment, which will be noticed hereafter, restored her in the course of a few weeks, and after three or four months she was quite recovered. She is now married to the son of a physician and has a family.

373. *c.* It is very difficult to explain the connection between the hysteria, or disordered states of the female organs, and palsy. But it is not improbable that many of the

symptoms, and particularly those of a paralytic character, arise not merely from irritation propagated from the uterine system to the roots of the spinal nerves, or to the spinal cord itself, but rather from superinduced congestion of the spinal veins and sinuses, the congestion being attended either by interruption to the circulation in the cord, or by compression, or even by both. This change will account for the frequent connection also of palsy of the urinary bladder with hysteria, even when paraplegia is not present. Yet even in these cases, pains in the limbs, with weakness and partial loss of power, are often complained of. When the remote causes of hysteria are considered, particularly in connection with the effects they produce upon the spinal cord and roots of its nerves, the frequent supervention of congestion of the spinal veins and sinuses may be viewed as altogether conformable with the laws of the animal economy.

374. When the paralytic state affects internal parts, particularly the digestive canal, it is limited in extent, and conjoined to spasm in its immediate vicinity. It is doubtful whether or not the dyspnoea of hysterical subjects may not also depend upon one or other, or rather upon both of these conditions. A seemingly paralytic state of the bladder is also met with in young women, especially those who are subject to pains in the loins, pelvis, or hypogastrium; and, like other paralytic affections, is sometimes attended by pain or tenderness in a portion of the spine. *Hysterical retention of urine* arises either from temporary paralysis of the muscular coat of the bladder, or from spasm of the neck of this viscus, caused by irritation of adjoining parts. Hysterical females are liable to an excessive secretion of urine from mental emotion; and if imperfectly exerted volition, or other circumstances, allow its accumulation, the bladder soon loses its contractile power, owing to over-distension. There is every reason to suppose that many of the most constant and pathognomonic symptoms of hysteria proceed from irregular spasmodic and paralytic states of the muscular coats of the digestive canal, in connection with inflation, propagated from the large bowels to a greater or less extent, and frequently as far as the œsophagus.

375. *d. Coma* occurs in rare instances in connection with hysteria, and even assumes the form of *congestive apoplexy*: the patient is insensible, the pulse is regular and full, the

respiration is calm or profound, and the face is either natural or flushed. The seizure is usually preceded by indications of hysterical disorder or of uterine affection; its duration varies from a few to many hours; and unless the patient be injudiciously treated, owing to its being mistaken for apoplexy, it terminates in rapid or sudden recovery of consciousness or voluntary motion, without any paralytic affection. This attack may be merely a modification of catalepsy, or nearly approach the latter in certain of its states. I was lately requested by Mr. GRANT, of Thayer Street, to see a female, who suddenly became comatose after evincing hysterical symptoms. He judiciously directed cold applications to the head, and a continuance of these for a few hours restored the patient.

376. *e.* The *soporific* form of the hysteric attack, or that in which the patient lies as in a profound sleep, respiration being so low as hardly to be noticed, and the pulse weak and small, is more frequent than the foregoing, and has been noticed by WHYTT, VILLERMAY, CONOLLY, and others. This state, although approaching the apoplectic, is sufficiently distinct from it; yet so far, coma and congestive apoplexy are merely grades or modifications of the same pathological conditions.

377. *iv.* CATALEPSY may be viewed as a form of general palsy—as *general functional palsy*. In this complaint the palsy is the most complete: there is the most marked inability of moving any part or of contracting any voluntary muscle. The sphincters, however, retain their functions. No reflex actions can be produced on irritating any part of the body, or on tickling the soles of the feet; although consciousness is retained more or less obscurely. I have had several opportunities of examining the phenomena of this affection from the commencement to the cessation of the attack; and of satisfying myself as to the accuracy of the description of the symptoms, relations, and causes of it contained in the work already referred to. It is very remarkable how instantly a female subject to catalepsy is seized with it upon being startled or affected suddenly and unexpectedly by any cause. The effect is as immediate as that produced by lightning; and although the power of motion is entirely and universally lost, yet sensibility is often but

little impaired. Patients have informed me that they painfully felt the pinchings of the surface and tickling of the soles of the feet resorted to in order to ascertain the existence of reflex actions, but the absence of all motion, both voluntary and automatic or excito-motary, was complete. They have even seen and heard what was passing around them, although more or less obscurely or imperfectly. Hence, as respects the power of motion, this is the most complete and general form of palsy, and yet the least dangerous—the most purely *functional*. Several cases which I have seen were more or less hysterical and connected with uterine or ovarian disorder; yet the most complete case I have met with, and one which I had frequent opportunities of closely observing, presented no indications of hysteria, and the uterine functions were quite regular. This lady was subject to attacks of catalepsy upon being startled by any cause. The seizure continued sometimes for many hours; and she was more or less subject to an attack for several years. The seizures ultimately departed altogether, and she has now been free from them for some years.

378. There is a manifest connection between hysteria, catalepsy, epilepsy, palsy, and apoplexy. Hysteria, especially when it appears in some of its less irregular and anomalous forms, or when produced by masturbation, sometimes assumes more or less of a cataleptic form, or approaches the character of leipothymia, or the "*petit mal*,"—the occasionally incipient form of epilepsy; and this last is not unfrequently the intermediate state between hysteria and catalepsy, on the one hand, and palsy, coma, or apoplexy, on the other; neuralgic pains, or muscular pains resembling rheumatism (§ 367), appearing, in some cases, as contingent complications of either, or even as antecedents, especially of palsy, epilepsy, and apoplexy. Although the phenomena of these diseases are so different as to render them nosologically distinct; yet they all, with the addition of chorea, convulsions, and even insanity, comprising puerperal mania and convulsions, present a more or less intimate pathological relation, in respect both of their physiological pathology and of their organic changes.

379. v. RHEUMATISM has been noticed above in its rela-

tions to palsy and apoplexy, chiefly as producing the latter, by metastasis or extension to the membranes of the brain or of the spinal cord (§§ 332, *et seq.*) In the same way *gout* and *erysipelas* may occasion similar effects. But rheumatism frequently produces somewhat of a paralysing effect without attacking these membranes, by occasioning what has been called a *rheumatic palsy*—by remarkably weakening the motions or contractions of the rheumatic limbs or muscles, especially after an acute or sub-acute attack, and during, as well as after, a protracted form of the chronic disease. In many of these cases, the inability of motion is not owing so much to the pain excited by contracting the affected muscles and parts, as by the weak, imperfect, and difficult transmission of the act of volition by the voluntary nerves, or by the weak execution of that act by the muscles which they supply.

380. The several important changes often taking place in, at, or near the origins of the nerves, or parts of the brain most intimately related to the nerves supplying the voluntary muscles, may, in some cases, as noticed above (§ 367), occasion pains more or less severe, and either superficial or deep-seated, in the extremities or distant parts; and these changes, in their progress to a dangerous or fatal issue, may be indicated, not by these remote pains merely, but also by epilepsy, or cramps, or contractions, or convulsions; or by imperfect or irregular motions upon the exertion of volition, or by partial or more or less extended palsy, or by alterations of the sensibility of the surface or of the functions of sense, or even ultimately by coma or apoplexy. The pains thus originating are altogether distinct from rheumatism, and require a very different treatment. They are often the earliest, and even the only indication of organic lesion in the brain or spinal cord; and whilst they frequently precede the maladies now enumerated, especially palsy and apoplexy, they occasionally also accompany them, generally to a fatal issue.

SECTION V.

THE DIAGNOSIS AND PROGNOSIS OF APOPLEXY AND OF PALSY.

381. THE *diagnosis* of apoplexy and of palsy, when either appears primarily and simply, is generally easy. Cases, however, occur attended by more or less difficulty; and it is often difficult to determine the commencement of palsy when it is associated with a profound apoplectic attack, although the more developed state of palsy, particularly when the muscles of the face are affected, may be recognised even with ease when complicated with the apoplectic seizure. The descriptions which I have already given will tend to facilitate a diagnosis, even in the more difficult circumstances, and will render a lengthened discussion of this subject unnecessary.

382. The *prognosis* of these states of disease, whether occurring simply, primarily, or in connection with each other, or with some one of the other maladies with which I have pointed out an alliance, is much more difficult than their diagnosis. The nature of this subject will admit only of the consideration of the more manifest phenomena which may attract the notice and direct the prognosis of the physician; for numerous appearances and shades of diversity, as respects both the direct signs and the indirect symptoms, and not merely existing states, but also antecedent ailments and conditions, will be seized upon as the elements for the formation of an opinion of the issue of the disease by the experienced physician; and will furnish occasion for displaying a learned and practised acumen and a judicious tact.

CHAPTER I.

OF THE DIAGNOSIS OF APOPLEXY.

383. APOPLEXY is, in general, readily recognised; but it may occur in a way and under circumstances which will render its diagnosis a matter of difficulty. Thus, we may be called to a patient, of whom nothing is known, with the following symptoms:—Coma, laborious or stertorous breathing, relaxation or rigidity of the limbs, complete loss of consciousness: he may or may not have had convulsions, or a blow upon the head; there may be hemiplegia, or not. In this case, is the patient in a state of dead drunkenness, asphyxied, poisoned by narcotics, or affected with the profound coma consequent upon epileptic or hysteric convulsions? Is it concussion of the brain; the advanced effects of organic disease within the head—as of cysts, abscess, or of inflammation terminating in effusion; or fever, either at its commencement or close, with apoplectic symptoms? It is true that these states differ but little from apoplexy; the difference consisting chiefly in grade, unless hemorrhage has taken place, when paralysis generally manifests itself. But it should be at the same time recollected that there is sometimes hemorrhage without local palsy, and even palsy without sanguineous extravasation. The diagnosis of such cases is very important; but without information of the circumstances connected with the history of the case its difficulty is extremely great. I once treated a case, many years ago, of adynamic fever, caused by infection, and commencing with a sudden loss of sense and voluntary motion, as a case of apoplexy, and gave an opinion accordingly. The history of the case, and its subsequent course, showed the error. When paralysis is present the nature of the case is there manifest, although the particular cause of the palsy may be a matter of doubt. We should, therefore, inquire after this symptom by observing the attitude and motions of the patient, by pinching the extremities, tickling the soles of the feet, &c. The existence, also, of stertorous, laborious, or snoring respiration, will confirm the diagnosis.

384. *a.* It should be kept in mind that, whilst the coma-

tose state consequent on *epilepsy* or *hysteria* may closely resemble apoplexy, the convulsive stages of these diseases may give rise to the true apoplectic state. But in the usual consecutive coma of epilepsy there is no stertorous breathing, and the limbs are not so relaxed as in apoplexy.

385. *b.* The *coma* which supervenes on inflammation of the membranes of the brain is to be distinguished from apoplexy chiefly by the antecedent symptoms, and by the loss of sense and cerebral function being greater than the loss of motion. The existence of paralysis, so frequently characterizing the apoplectic seizure, will further assist the diagnosis of coma consequent upon meningitis.

386. *c.* The symptoms consequent upon *injuries of the head*, whether simple concussion or compression from depressed bone or extravasation of blood, are in all respects identical with certain of the varieties of apoplexy described above, and are not to be distinguished from them but in respect of the exciting cause. A similar remark is applicable to cysts, tubercles, and other tumours slowly developed in the encephalon, which sometimes produce no very marked external sign of disease until apoplexy, or still more frequently hemiplegia, suddenly takes place. In such cases there is no actual difference in the proximate cause of the abolition of function, but only in the compressing body whereby abolition of function is occasioned.

387. *d.* In cases of loss of sense and voluntary motion from the action of *narcotic poisons*, or breathing *deleterious gases*, there is also little actual difference from several of the apoplectic states described above, excepting that the functions of the lungs have, in the case of breathing deleterious gases, been primarily affected; for the chief lesion is to be referred to the state of *nervous energy* and *vascular action* in the brain; the circulation of the organ being retarded, and its vessels congested with dark blood. Indeed, in many such cases the true apoplectic state, either with or without hemiplegia, is produced; although in these cases the apoplectic condition is more especially owing to alteration of the blood, as will be noticed more fully in the sequel, a state of profound but simple coma being the most frequent result.

388. *e.* In *asphyxia* the lesion of function commences in the lungs, the pulse being either diminished in strength or

altogether abolished; whilst in apoplexy the lesion is in the head, and the pulse is generally fuller and stronger than natural; but the exceptions to this state of the pulse are numerous. In asphyxia, also, lividity of the face, lips, and hands, and duskiness of the skin, are often remarkable, and generally greater than is ever observed in apoplexy.

389. *f.* In *syncope* the marked diminution or almost entire absence of the pulse from the wrist, the pallor of the countenance, and the very gentle or scarcely apparent respiration, are sufficient to distinguish it from apoplexy, even in the weakest forms. The only difficulty will be found when the injury done to the brain by hemorrhage or laceration of the cerebral structure is followed early in the attack by severe vital shock; or, where the patient is sinking from vital exhaustion, at an advanced stage of the attack. In many of these severe incipient states of the disease the symptoms closely resemble those of concussion of the brain.

390. *g.* Complete *intoxication* may readily be mistaken for apoplexy; and, in some cases, may terminate in this disease. This state of intoxication is evidently attended by congestion of the vessels of the encephalon. The smell of the breath, however, and the appearance and smell of the matters thrown up by the retching that frequently accompanies intoxication, will readily distinguish this state. The greater frequency, also, of the pulse, and absence generally of stertorous breathing in drunkenness, will also assist the diagnosis. But these symptoms are occasionally observed in apoplexy; and, on the other hand, the pulse may be slow or natural, and the breathing stertorous in the former; but this is very rare, particularly slowness of the pulse.

391. *h.* In *concussion of the brain*, the state of circulation, and the influence of that portion of the ganglial system which supplies the brain, are as remarkably depressed as in the weakest form of apoplexy—in concussion from the shock received, in apoplexy from internal causes; in many cases no difference existing. In some instances, however, even of the weakest form of apoplexy, the respiration is much more laborious, the countenance somewhat more tumid or distorted, and the pulse fuller and more developed than in concussion of the brain. In the stronger states of apoplexy there can be no risk of mistake, the characteristic symptoms of each being very different.

CHAPTER II.

DIAGNOSIS OF PALSY.

392. It will be seen, from the description of the several varieties of *palsy*, that motion is much more frequently impaired than sensation; that either may be singly, or both jointly, affected in various grades; but that when motion is totally lost sensation is frequently more or less impaired; that sensibility is seldom entirely lost in a paralysed part, and very rarely over the surface of the body; and that palsy is both preceded and attended by considerable derangement of the general health, as well as of the nervous functions, to which especial attention should be directed.

393. *Palsy* in a simple and primary form cannot be mistaken for any other malady. It is only when it appears secondarily, or is associated with any one of the diseases above-mentioned, that the diagnosis requires attention; and, even then, the object is chiefly to ascertain which is the primary affection, to trace the nature of the connection between them, and to form some idea as to the structural changes upon which the paralytic symptoms—which are usually sufficiently manifest—depend. It is to this last that our chief attention should be directed: this is the great object of diagnosis, and one which is not only very difficult to determine on many occasions, but almost impossible on some.

394. *a.* When palsy presents any of its more *partial states*, the question of its origin will suggest itself; and the chief point to determine is, whether the affection depends upon lesion at the origin of the affected nerve in the cerebro-spinal centre, or whether it proceeds from disease in the course of, or in the nerve itself. If there be no symptoms of disorder referable to the brain or spine—if neither pain nor disordered function can be observed—and more especially if disease implicating the nerve can be detected, the source of the palsy becomes manifest. In palsy of the face, disease of the portio dura, and tumours or matter pressing upon the nerve, are readily detected. When the ganglionic portion of the fifth pair is implicated, the affection of the eye, and

the symptoms mentioned above (§§ 59, *et seq.*) in connection with the states of the other senses, and of the function of the brain generally, will readily indicate the seat of the disease. The various circumstances of the case will also aid the diagnosis. Previous injury or disease, the presence of tumours, or of periostitis, the scrofulous diathesis or manifest scrofulous disease, the occupation of the patient, and the operation of lead or arsenical poisons, &c., severally aid the diagnosis.

395. *b. Hemiplegia* is generally caused by disease in one side of the brain; but it may be produced by lesion in one side of the spinal cord, although very rarely. When it proceeds, as it usually does, from the former source, it is often preceded by cerebral symptoms, or attended by an apoplectic seizure. The chief difficulty is to determine the nature of the lesion producing it; for the several changes, upon either of which hemiplegia may depend, are not attended by determinate phenomena. When it proceeds from hemorrhage it is usually, as above noticed (§§ 81, *et seq.*), both sudden and complete in its accession, is often not preceded by pain, and is frequently associated with apoplexy. If it proceeds from softening, or from tumours or morbid growths of any kind, it is generally preceded by cerebral symptoms, by various nervous disorders, by pain, &c., and attended by spasms, convulsions, contractions, or pains; its accession is usually slower, and it is at first less complete than in other circumstances. Tubercles in the brain or in its membranes are not unfrequently causes of palsy in children from one or two years of age to twelve or fourteen.

396. I may here remark, that considerable lesions or morbid growths may exist in or near the periphery of the brain, or implicate chiefly the cineritious substance of the convolutions, without causing palsy, although coma, convulsions, or epilepsy generally result. I have remarked this circumstance in several cases; but I have never seen any marked lesion of the central parts of the brain without palsy being present.

397. In the majority of cases of *hemiplegia*, certain symptoms either precede or accompany, or both precede and attend the attack, whether sudden or gradual. These are chiefly turgidity of the veins of the temples, especially on one side; pain in the head, or in one temple; difficult motion

of the tongue, or indistinct articulation, the difficulty being referred to one side; a drivelling at one side of the mouth; impaired perception and memory; and when the attack is sudden, the falling down of the patient on the one side affected, if he have been standing, or over to that side, if sitting.

398. *c. Paraplegia* has been assigned above chiefly to disease of, or implicating the spinal cord or its membranes. But it was supposed by Dr. BAILLIE, Dr. GOOD, and others, to arise much more frequently from disease within the cranium. Many years ago I controverted this doctrine (see *Lond. Med. Repository*, vol. xviii., p. 522, 1822); and then took occasion to state "that, although I admit that paraplegia will sometimes result from lesions seated at the base, or in both sides of the central parts of the brain, still I contend that it most commonly arises from diseases of the spinal cord." "The chief reason of the prevalence of the cerebral pathology of paraplegia appears to be the old physiological opinions respecting the nervous system still entertained by many; and the circumstance of the brains of paraplegic subjects being, in conformity with pre-conceived notions, the only parts of the nervous masses which, until lately, had attention paid to them. It is by no means unlikely—and many pathologists have recorded the fact—that a patient who has been for some time paraplegic from lesion in the spinal cord or its membranes, shall die apoplectic, or shall expire from lesions subsequently developed in the brain. This latter morbid structure instead of being consecutive may be even co-existent; but, at the present day, I should not expect to hear a pathologist conclude, because he found lesions in the brain, that the paraplegia therefore arose from the cerebral disease only. I would be still more surprised were I to hear the same inference drawn without any examination of the spinal canal or medulla oblongata having been made. Now, I do contend that such conclusions have been actually drawn from such inconclusive data as the above, by those who suppose—for the inferences of those investigators are but suppositions at the best—that paraplegia is generally seated in the brain." Thus I wrote in 1822, in opposition to the then received doctrine; and now the justice of my views, which even then were based upon tolerably extensive observation, is almost universally acknowledged.

399. Admitting, as I have done, that paraplegia may occur, in rare instances, from disease in both sides of the more central parts of the brain, or near its base, it will be asked, How is paraplegia from this cause to be distinguished from spinal paraplegia? In many cases the evidence of the former is negative only. There are no circumstances nor symptoms indicating disease in the spinal cord, membranes, or containing parts, and then we are constrained to look to the brain for it. But where, in addition to this evidence, there are indications, antecedently or concomitantly of cerebral affection,—if any of the functions of sense or manifestations of mind be impaired, or otherwise affected, or if headache or vertigo be present,—if the disease proceeds rapidly to a fatal issue,—the source of disorder may thus be conceded to the brain.

400. Where it is manifest that the paraplegia proceeds from disease implicating the spinal cord or its membranes, the question as to the nature of that disease is often solved with great difficulty. When paraplegia is caused by accidents, injuries, wounds, &c., the nature and seat and direction of these often assist the diagnosis. The suddenness or slowness of the accession of the malady, viewed in connection with the presence or absence of pain and tenderness in the spine, will often suggest correct views. Thus, antecedent pain, tenderness on pressure, especially on pressure or percussion of the spinous processes, &c., and the continued presence of these burning or constrictive pains in the limbs or in the abdomen, spasms or contractions of the muscles or extremities, &c., or the development of pain in the spine upon the application of the warm douche or a hot sponge to the vertebræ, will indicate congestion or inflammation in some one or more of the constituent tissues of the part, particularly if the palsy supervene gradually, and if the remote or exciting causes are such as are likely to occasion these lesions. If pain in the back occur suddenly, and is attended almost immediately by paraplegia, extravasation of blood may be dreaded; or the displacement of a previously diseased vertebræ, or sudden effusion produced by disease of the spinal bones, may be inferred. (See §§ 130, 351, *et seq.*)

401. Debility of the muscles of the spine causing curvatures of the column is rarely attended by any considerable

degree of paraplegia. When this palsy is associated with disease of the spinal bones the curvature is *angular*, owing to caries and absorption or tubercular disease (§§ 130, 351) of one or more of the bodies of these bones. In the former case attempts to straighten the spine are not attended by pain or risk, and the patient can lie on the back or abdomen without pain. In the latter, such attempts are dangerous or even fatal; as in a case of caries of one or two of the cervical vertebræ, for which a surgeon was consulted; and an attempt which was made to straighten the part was soon afterwards followed by general paralysis. I was afterwards called to the patient, who recovered after a most protracted confinement. When palsy is associated with angular curvature, as in a case attended by Mr. CHILCOTE, which I occasionally saw, any attempt to lie on the back or to straighten the spine was followed by pain; and in another case just seen by me, such attempts produce convulsions. These attempts always interfere with those processes from which alone recovery is to be expected.

CHAPTER III.

OF THE PROGNOSIS OF APOPLEXY.

402. AN attack of *apoplexy* is always dangerous:—1st. It may be fatal immediately; 2d. It may also be fatal in one, two, or three days, and previously to reaction having commenced; and, 3d. It may occasion death during reaction.—*a*, by a recurrence of the attack; *b*, by inflammatory softening and infiltration of the cerebral tissue surrounding the extravasated blood; *c*, by the exhalation of serum; *d*, by inflammatory action of the membranes of the brain and subjacent cellular tissue, and of the membrane lining the ventricles. Even in more favourable circumstances it leaves behind it debility of feeling, motion, and of the mental faculties; and a first attack is generally followed by a second, or even a third, and, in rare cases, by a fourth.

403. *A*. The *unfavourable* symptoms are increased fre-

quency or intermittence of pulse: continuance of the symptoms for twenty-four hours, or for little more than half of this time in the *strong* apoplexy, after a judicious treatment; very profound coma, and obtuseness of the senses; involuntary discharges of the urine and fæces; contraction of the pupils, or contraction of one or both pupils, accompanied with spastic actions of muscles; very laborious or stertorous breathing, particularly if attended by foam about the mouth, and a weak pulse; cold and profuse sweats; the occurrence of convulsions; the association of hemiplegic symptoms with the apoplectic, and complete loss of vision. Frequent yawning or continued somnolency indicate effusion, or increasing effusion. QUARIN observes very justly, that when the patient frequently applies the hand to a determinate part of the head, or when delirium supervenes, or if perspirations occur early in the attack without benefit, the result is generally fatal. Complete hemiplegia, without coma, but with integrity of the mental faculties, and perfect motion and sensation of the non-affected side, is less dangerous than a more partial paralysis, with stupor or coma. When one pupil is contracted and the other dilated, the existence of unequal pressure may be inferred; and if recovery from the attack take place, which is very doubtful, hemiplegia or loss of speech is generally the result. It has been stated that complete loss of feeling and motion, accompanied with profound coma or stupor, is extremely dangerous. CRUVEILHIER remarks that he has seen recovery in such a case. I have seen it in three cases, one of which was seen also by Dr. HOOPER in consultation; and to another I was called in Hertfordshire by Mr. WATKINS. In the former of these recovery took place without hemiplegia; in the latter hemiplegia took place, but the patient lived twelve years afterwards.

404. The nature of the *complication* should always influence the prognosis. The existence of disease of the heart, or of the kidneys, or of an altered or contaminated state of the blood, should almost, if not altogether, preclude hope of recovery. The most singular exception to this rule lately occurred to me. A man of middle age, whom I had attended on several occasions for asthmatic attacks, complicated with cardiac disease, had subsequently several epileptic seizures. He afterwards was attacked with erysipelas

of the face and scalp; and I was requested to see him with Mr. GRIFFITH of Camden Town, who was then attending him. When the erysipelas was at its acme he experienced an attack of epilepsy, which passed into apoplexy; and the tumefaction of the scalp subsided considerably. He ultimately recovered, the treatment hereafter to be recommended having been adopted, and he is now living. A case of erysipelas of the face and scalp which I recently saw with Mr. ODLING, terminated fatally on the third day of the disease, with profound asthenic apoplectic symptoms.

405. Delirium is an unfavourable complication; and indicates either the escape of blood from the seat of extravasation upon the membranes which it irritates or inflames, or the occurrence of inflammation of the cerebral structure or meninges. Acceleration of the respiration, and vomiting, supervening spontaneously, unless from matters occasioning the attack, are very dangerous symptoms. Complete loss of speech, or of the power of articulation, particularly when attended by a quick pulse, also indicates great danger. When loss of speech is attended by loss of power of the pharyngeal muscles, and of the faculty of deglutition, recovery very rarely takes place. Loquacity is very rarely observed, and is a dangerous symptom.

406. When apoplexy occurs in the course of *insanity*, or in *epileptics*, or after previous attacks, or after palsy, an unfavourable result may be generally anticipated. Nearly the same conclusion may be drawn if it seize aged persons, and broken constitutions, upon the disappearance of gout from the extremities. In the majority of cases of apoplexy proceeding from efficient causes originating in the brain, a perfect recovery is not to be expected. On this M. PORTAL has insisted strongly; and, although it is just as a general rule, many exceptions present themselves. If the pulse sink, or intermit, or become remarkably quick; and coldness of the extremities, or cold clammy sweats come on; or the power of respiration be greatly diminished; inevitable or fast approaching dissolution may be predicated.

407. *B.* The *favourable* signs of the disease are, a moderate attack; a decline of the symptoms after treatment, and particularly if a warm, general, and gentle perspiration take place; the occurrence of discharges of blood from the nose, hemorrhoidal vessels, or uterus; and a free state

of the bowels, with consciousness of all the evacuations. The accession of the menses, of the piles, or of ptyalism, has been justly viewed as the most favourable signs by HIPPOCRATES, SCHADT, DOLÆUS, and many subsequent writers. GOAVARTS considers hemorrhage from any part, particularly epistaxis, ptyalism, a copious and general perspiration, with free alvine and urinary discharges, the most favourable signs. The accession of fever has been considered favourable by HIPPOCRATES and PORTAL; but many experienced authors do not agree with them. I believe that, although some may recover from this state, it indicates the accession of inflammatory action of the portion of brain or membranes adjoining the seat of hemorrhage; which will be dangerous in respect of the extent to which it may proceed, and the effects it may produce on the part, particularly in causing a renewal of the hemorrhage. In all cases the physician, even under favourable appearances, should give a cautious prognosis until the tenth or twelfth day; the eighth being that on which an unfavourable change is apt to occur, and the extravasation to be renewed.

408. Mr. COPEMAN (*A Collect. of Cases of Apoplexy*, in 8vo., Lond., 1845) remarks that the mortality of apoplexy is fearfully great, and proves either that the proximate causes of the disease are beyond the reach of art, or that the measures usually adopted as remedies are inapplicable, inefficient, or prejudicial. There can be no doubt that the treatment is often not only inefficient, but also inapplicable and prejudicial; a successful result, depending chiefly upon the appropriate employment of remedial means in all their details, to the states of individual cases. Of 250 cases collected by this writer, only 68 recovered, 7 partially recovered, and 175 died,—a proportion of deaths to recoveries of $2\frac{1}{3}$ to one. But in this enumeration the number of first and second or third attacks, or of simple or complicated cases, are not stated. There can be no doubt, when the nature of the lesions found in fatal cases is considered, that a very large proportion of cases must necessarily be fatal, whatever may be the treatment adopted.

CHAPTER IV.

CONSEQUENCES, TERMINATIONS, AND PROGNOSIS OF PALSY.

409. *A.* THE most important *consequences* of palsy have been noticed above (§§ 273, *et seq.*); but as palsy in all its forms is itself chiefly a consequence of pre-existing disease, it seldom induces further change unless what becomes speedily fatal; and that change is seated chiefly around, or in the immediate vicinity of, the lesion causing the palsy. Owing to such change the mental powers are often weakened, or partially, or even nearly altogether lost in *hemiplegia*, or attacks of apoplexy or coma supervene. A partial palsy may become more extended; and even imperfect *paraplegia* may gradually increase and be more complete or be general, ultimately terminating in coma or apoplexy, or in asphyxia from injury to, or counter-pressure on, the medulla oblongata. The principal consequences of palsy, especially when the spinal cord is implicated, are manifested in the urinary organs, the digestive canal and respiratory functions, and in the weakened state of vital cohesion of the tissues of the paralysed parts; and these have been severally noticed at length (§§ 102-109, *et seq.*)

410. *B.* The *terminations* of palsy are chiefly *apoplexy*, *coma*, *sinking* of the *vital powers*, *asphyxia*, *convulsions* or *epileptic seizures* terminating fatally, and more or less complete *recovery*.—*Apoplexy* frequently supervenes, as fully shown above (§§ 227, *et seq.*), on hemiplegia or partial palsy, and either aggravates it or terminates life. A state of gradually *ingravescent coma* may also terminate these states of palsy and even general palsy, although this last variety frequently causes *asphyxia*; death occurring sometimes gradually, at other times suddenly—*gradually*, from defective oxygenation of the blood and diminished production of carbonic acid, coma usually intervening; *suddenly*, owing to the arrest of the actions of the respiratory muscles and functions, and of the heart, consequent upon lesion at the origins, and complete paralysis of the respiratory nerves. In both these latter classes of cases the blood after death is fluid and of a dark venous colour.

411. Paraplegia either passes into general palsy and terminates as stated above (§ 146), or becomes fatal owing to consecutive changes produced in the urinary organs, or to sloughing of the parts upon which the body rests, sinking of the powers of life, and contamination of the circulating fluids arising from these alterations. When the upper portions of the cord or the medulla oblongata become affected, epileptic attacks or convulsions occasionally occur and even terminate existence, rather by the attending or superinduced asphyxia than by the amount of injury sustained by the brain.

412. *C.* The *prognosis* of palsy depends much upon the grade of severity, or the complete or general character of the malady, and upon its duration. In forming a prognosis, the circumstances alluded to when noticing the consequences and terminations of the disease should be taken into account.—*a.* When the palsy is *local* and independent of lesions in or near any part of the nervous centres, or where it is caused by any of the metallic poisons, hopes of recovery may be reasonably entertained. But when the disease depends upon organic change of these centres or of their envelopes; when it is complete and extensive; when a whole side of the body is affected; and when it has been of considerable duration, perfect recovery rarely takes place. I have met with this favourable result only in a few cases; and these were chiefly in young and middle aged persons. Yet, although perfect recovery so rarely occurs, the state of the patient may be ameliorated, and he may live many years without the occurrence of any of the unfavourable consequences or terminations of the malady, especially if a suitable diet and regimen be pursued. In all cases, the causes of the attack, and the nature of the antecedent disorders and attendant symptoms should be considered. When the palsy is attended by great disorder of the digestive organs, when the urinary organs are remarkably affected (§§ 102, 103), when loss of motion is attended by loss of feeling, and when the sphincters are relaxed, when spasms or contractions of the muscles are present, or convulsions supervene, and when the nature of the organic lesion implicating the brain, spinal cord, or their envelopes, is manifestly such as cannot be entirely removed, the most unfavourable opinion may be formed of the result, although

the ultimate issue may be deferred for a considerable time. When palsy follows wounds or other injuries the extent and nature of these will suggest the prognosis.

413. *b.* The *complications* also of palsy should influence the prognosis. The most unfavourable of these are the associations of hemiplegia with apoplexy or coma; with inflammation of the substance of the brain, as indicated by spasms, contractions, and pains of the limbs; with neuralgia of the nerves of the face or head; with epilepsy or convulsions; with insanity, imbecility, or idiocy; with disease of the heart or of the liver; with lesions of the cervical spine, or caries of the vertebræ; and with inflammation of the kidneys. If the palsy supervene in the course of these, it may be generally assumed as the result of severe, if not irremediable, organic change in the brain or spinal cord.

414. Palsy of the muscles of articulation, of the tongue, or of deglutition, whether appearing singly, or alone, or in connection with hemiplegia, is a most dangerous state of the malady, and often precedes more complicated and severe forms of the disease, that will soon pass into fatal convulsions or apoplexy, or asphyxia.

415. *c.* Fully-developed *shaking palsy* is rarely materially ameliorated by treatment; although patients afflicted with it may live many years without much increase of the symptoms; and when it is not severe it may not shorten the duration of life. I have seen several instances of the duration of the disease for very many years, and yet the extreme ages of from seventy to eighty years have been reached.

416. *d.* Recovery often takes place from the *hysterical* or *uterine complications* of palsy, although even in these the absence of all organic lesion of the nervous centres or of their envelopes ought not to be generally inferred; for irritation of the uterine organs or suppression of the catamenia may be followed by inflammation and its usual consequences in these parts, particularly in the spinal cord, or by congestion, especially of the venous sinuses of the spine, sufficient to produce interrupted transmission of the act of volition from the brain to the nerves of the extremities, owing to the pressure which such congestion may occasion.

417. *e.* Recovery from the less complete and least complicated states of palsy from the *metallic* or from the *narcotic poisons*, is sometimes brought about by careful treat-

ment and suitable precautions and regimen. A case of complete hemiplegia consequent upon apoplexy caused by monkshood, respecting which I was consulted many years ago, quite recovered after a protracted treatment.

SECTION VI.

THE REMOTE CAUSES, OR CONTINGENT OCCASIONS, AND THE PATHOLOGICAL STATES PRODUCING PALSY AND APOPLEXY.

418. HAVING recognised the forms, relations, and pathological conditions of *palsy* and *apoplectic coma*,—having ascertained the previous disorders, the existing complications, and the present states of vital power of vascular action, of the circulating fluids, and of the secretions and excretions,—it remains next to consider those remote or contingent occasions of the particular attack for which medical aid is required, and the pathological condition upon which that attack most probably depends. These causes, circumstances, occasions, or conditions, as they have been frequently termed; or those *predisposing*, *exciting*, and *proximate* or *immediate causes*, as they have been more commonly denominated, furnish the basis, not merely of a rational treatment, but also of judicious means of prevention, as respects diet and regimen, and medical management.

CHAPTER I.

THE REMOTE CAUSES OR CONTINGENT OCCASIONS OF APOPLEXY.

419. THE *causes of apoplexy*, both predisposing and existing, have generally a direct or indirect influence upon the state of the vital energy and circulation of the brain. The manner, however, in which causes may individually influence either the vital condition or circulation varies extremely; and the action of several of them is even peculiar. Those

causes, which in some cases are merely predisposing, may in others be exciting; and changes previously induced in the organization of the brain, or in the state of its vessels, even from causes which lead to other maladies, may either directly or indirectly occasion apoplexy. In many instances, several causes co-operate in producing the morbid result.

420. *i.* THE PREDISPOSING CAUSES OF APOPLEXY.—This disease occurs most frequently in persons of the *male* sex, owing to their habits, and greater exposure to the exciting causes; and in the *far advanced stages of life*. The majority of authors state the period intervening between forty and seventy as that in which it is most common; but it is not unfrequent at both earlier and later epochs, particularly the latter. M. ROCHOUX found, in 63 cases attended with extravasation of blood, that 2 were between 20 and 30 years of age, 8 from 30 to 40, 7 from 40 to 50, 10 from 50 to 60, 23 from 60 to 70, 12 from 70 to 80, and 1 from 80 to 90 years. I have met with the true hemorrhagic apoplexy at the early age of eighteen. The *hereditary* tendency of the disease, as shown in several instances by FORESTUS, WEPFER, PORTAL, BLANE, FRANK, myself, and others, cannot be doubted.

421. It has been justly observed by Dr. WATSON, respecting the calculations of M. ROCHOUX, that if the exact truth could be ascertained, of a given number of persons there are more attacked with apoplexy between seventy and eighty than between sixty and seventy years. Dr. BURROWS has shown, in his interesting work (*On Disorders of the Cerebral Circulation, &c.*, 8vo., London, 1846), the correctness of this observation; and he states that, "it will be found there are only half so many persons living between the ages of seventy and eighty as there are between sixty and seventy; and yet the number of apoplexies occurring between the ages of seventy and eighty is more than half those observed between sixty and seventy years.

"Pursuing this interesting and useful inquiry, I shall exhibit the relative frequency of apoplexy and hemiplegia at different ages, in a table formed of data collected from approved authors, and from my own experience. The truth is more likely to be obtained from the comparison of cases occurring under the observation of several, than of any one physician."

“*Analysis of 215 cases of apoplexy and hemiplegia, showing the proportions of cases occurring in the successive decennial periods of life from 20 to 80 years.*”

422. “These 215 cases are chiefly selected from the works of well-known authors; the remainder are from my own case-books. Only those cases are included in this table which offered unequivocal symptoms of apoplexy or sudden hemiplegia.

	20 to 30 years.	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	Above 80	Totals.
Abercrombie	3	4	6	7	7	1	0	28
Andral . . .	3	3	4	6	5	4	0	25
Bright . . .	4	4	8	4	5	1	0	26
Rochoux . . .	2	8	7	10	23	12	1	63
Hope	2	2	9	6	7	11	2	39
Burrows . . .	2	9	6	8	7	1	1	34
Totals in pe- riods of 10 years.	16	30	40	41	54	30	4	215

423. “In the succeeding table there is given a further analysis of the 215 cases of apoplexy and hemiplegia, arranged in periods of ten years, and compared with the respective numbers of the population at similar ages; it also shows the proportion occurring in 1,000 persons in the successive decades. Population supposed to be 20,000.

Age.	Number of Cases.	Population of this Age.	Proportion of Cases in 1000 Persons.
20 to 30 . . .	16	3,000	5.3
30 to 40 . . .	30	2,500	12.0
40 to 50 . . .	40	1,800	22.2
50 to 60 . . .	41	1,300	31.5
60 to 70 . . .	54	1,000	54.0
70 to 80 . . .	30	500	60.0
80 and upwards .	4	200	
Total	215	10,300	

424. “We learn from the Report of the Registrar-General,

1843, that 814 persons died of apoplexy in the metropolitan district during the year 1842. Sixty-one of these persons died under twenty years of age, and which we shall exclude from our present calculations; there will therefore remain 753 deaths from apoplexy, which have been arranged by the registrar in successive decennial periods.

Age.	Deaths from Apoplexy.
20 to 30	24
30 to 40	67
40 to 50	113
50 to 60	171
60 to 70	185
70 to 80	152
80 and upwards .	38

425. "In comparing the above with the previous table we observe the same increase of numbers with increase of age. It must be borne in mind that the relative numbers appear larger in the earlier stages in the former table, and at the later periods in this table, because many cases of apoplexy *occur* at an early, but terminate at a much later period of life. The above table refers only to the age at the time of death.

426. "The first general inference from these tables is, that the relative frequency of apoplexy steadily increases from twenty to eighty years; and the second, which is more remarkable, is, that the actual number of apoplectic cases increases in each successive decennial period upwards, from twenty to seventy years of age, while the numbers living gradually diminish."¹

¹ In the excellent reports of the Registrar-General the number of deaths from *apoplexy* in both sexes, which occurred in England in 1842, was 5,361, and the number of deaths from *palsy* in both sexes was 5,559. The deaths from *apoplexy* in males were 2,358, and in females, 2,189. The deaths from *palsy* in males were 2,290, in females 2,493. In the metropolis in that year the deaths from apoplexy were 814, from palsy 776, but the proportion in the sexes is not given for the metropolis in that year.

"Dr. LEE, in his edition of my '*Dictionary of Practical Medicine*,' published at New York, appends to the chapter on the causes of apoplexy, the following note:--

"In the city of Philadelphia, between the years 1807 and 1826, inclusive,

427. *The form and habit of body* may also predispose to the attack; but, I believe, much less frequently than is usually supposed. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency, are generally considered signs of disposition to apoplexy; but the heart's action, and the state of the circulation through its cavities, with a plethoric state of the vascular system, has a more marked influence than these in causing an attack, as will appear in the sequel. In the sixty-three cases which have been minutely analysed by M. ROCHOUX, only ten were fat and plethoric persons, twenty-three were thin, and thirty were of the ordinary habit of body. He therefore maintains, that there is no external appearance of habit and temperament whereby the disposition to apoplexy is indicated.

428. Long and intense thought, disappointments, depressed and anxious states of mind, chagrin, losses and changed positions in life and society; the habitual indulgence of the temper, passions, and appetites; the irritable and sanguine temperaments; sedentary and luxurious living,

there were 800 cases of death from *apoplexy* reported, and 548 of *palsy*, in a population of 121,980; and of *apoplexy*, 12 occurred under one year; 8 between 1 and 2; 10 between 2 and 5; 5 between 5 and 10; 14 between 10 and 20; 68 between 20 and 30; 122 between 30 and 40; 154 between 50 and 60; 131 between 60 and 70; 80 between 70 and 80; 30 between 80 and 90; 4 between 90 and 100; 1 between 100 and 110. Of *palsy*, 4 occurred under 1 year; 5 between 1 and 2; 2 between 2 and 5; 3 between 5 and 10; 14 between 10 and 20; 26 between 20 and 30; 45 between 30 and 40; 76 between 40 and 50; 106 between 50 and 60; 113 between 60 and 70; 106 between 70 and 80; 42 between 80 and 90; 2 between 90 and 100. (*Emerson.*)

“In New York, during the years from 1819 to 1834, there were 1,388 cases of death from *apoplexy* reported (being in the ratio of 1 to 60 of the population), the mortality of the disease during the different months being as follows: January, 49; February, 59; March, 56; April, 47; May, 57; June, 45; July, 109; August, 59; September, 45; October, 59; November, 55; December, 57. From an examination of the statistics of mortality of this city, the deaths by apoplexy are most numerous between the ages of 50 and 60, and during the month of July. In 1838, out of 94 deaths by apoplexy, 44 occurred during the month of July, and 27 were between the ages of 40 and 50. From 1805 to 1836 the number of deaths by apoplexy in the city of New York was 2,075, or 1 to 58 of the population; of *palsy*, 1,057, or 1 to 114. The liability of the different sexes to the disease appears to vary greatly in different years from some causes unknown. Thus, in 1837, the number of deaths by apoplexy among males was 93; females, 36. 1838, males, 94; females, 57. 1840, males, 58; females, 35. 1841, males, 70; females, 65. 1842, males, 51; females, 57.”

the use of too much animal food; too great sexual indulgence, particularly when accompanied with full living; habits of intoxication, or the too free or constant use of wine and malt liquors; laborious employments, especially when they require the stooping posture; the suppression of accustomed hemorrhages, discharges, or habitual diseases, particularly those which are accompanied by evacuations, and the neglect of vascular depletion after their suppression; the influence of other diseases, particularly those of the heart, liver, lungs, kidneys, and digestive organs, as fully shown in several preceding chapters; a gouty diathesis; extremes of temperature, particularly when conjoined with moisture; sudden vicissitudes of temperature; frequent indulgence in sleep after a full meal; the use of neckcloths worn too closely around the neck; sleeping with too low a pillow, particularly soon after a meal; and lying too long in bed; are among the most common predisposing causes of an apoplectic attack.

429. ALBERTI and SEIZ have insisted upon the greater frequency of this disease amongst the *studious* than in other classes. FRANK says, that a greater proportion of his apoplectic patients had been previously subject to hemorrhoids. The use of *tobacco*, particularly in the form of snuff, has also been considered to favour the occurrence of apoplexy. As to the influence of *weather and seasons*, it may be stated, that MORGAGNI and LANCISI observed this disease most frequently in hot weather suddenly following cold and rainy seasons. KAISER says, that he met with the greatest number of cases in the months of October and November; and HIPPOCRATES, GALEN, FORRESTUS, KELLIE, and others, have noticed the influence of cold in producing apoplectic coma. I believe that very *cold weather*, or cold conjoined with moisture, favours the occurrence of an attack in very old subjects; and that very hot and moist seasons occasion apoplexy in robust and plethoric persons. The influence of hot weather in producing this disease has been insisted on by MORGAGNI and CHEYNE. The FRANKS found apoplexy most prevalent at Petersburg and Wilna during the height of summer. (J. FRANK, *Prax. Med. Univ. Præcep.*, t. ii., p. 308.)

430. Apoplexy seems to be as frequent in the *poorest* as in the *richest* classes; but in the former it is more com-

monly attended by paralysis, and oftener assumes an asthenic or *weak* character, the attack chiefly proceeding from frequent exposures to the vicissitudes of season and temperature, from severe and long-protracted exertion and anxiety of mind, and a less nutritious diet. In the latter it more generally assumes the *strong* or active form, arising most frequently from ease, luxury, and various indulgences. It will be observed that nearly all these causes act by habitually favouring determination of blood to the head, or by impeding its return, and by diminishing the vital energy of the brain at the same time that they favour a plethoric state of its capillary vessels. These derangements of vital manifestation and of circulation, when frequently produced, will occasion further changes, and sometimes will, upon the occurrence even of the slightest exciting causes, terminate in those lesions which constitute the disease itself.

431. *ii.* THE EXCITING CAUSES frequently act in a similar manner to the foregoing; but generally in a more sudden manner and intense degree. These are immoderate perturbations of mind, as consternation, terror, fear, despondency, anger, disappointments, anxiety, distress of mind from losses, sorrow, violent chagrin, great joy, immoderate fits of laughter, and all painful, depressing, or exciting mental emotions and exertions. Numerous illustrations of the immediate influence of the above passions in producing the disease are to be found in the writings of ARETÆUS, FORESTUS, ZULLIANI, PORTAL, BOUCHER, CHEYNE, COOKE, ABERCROMBIE, &c., and are furnished by the experience of most practical physicians.

432. *Intemperance* in eating and drinking is amongst the most common exciting causes of the disease, and numerous instances of its immediate ill effects are adduced by the above writers, and by BONET, MORGAGNI, MEAD, FOTHERGILL, and others. Oppletion and distension of the stomach prevent the descent of the diaphragm, impede the dilatation of the cavities of the heart, obstruct the circulation through the lungs and the return of blood from the head, whilst the vital energy is abstracted from the brain, and determined to the digestive organs, in order to dispose of the load by which they are oppressed. Owing to this procession of phenomena the vessels of the encephalon are engorged at

a time when their vital energies are diminished; while the rapid influx of fluid matters into the circulation as the progress of digestion advances, tends to heighten the vascular fulness and disposition to congestion and effusion. Besides, habitual intemperance of this description generates a plethoric state of the system, with congestions of internal viscera. Spirituous liquors are seldom productive of apoplexy until after a continual addiction to them, unless they are taken in excessive quantities; and perhaps the habit of drinking much malt liquors or wine is still more frequently a cause of the disease than indulging in spirits, which, when they occasion apoplexy, act more upon the vital endowments of the brain than in causing extravasation of blood; the chief changes produced by them being serous effusion with injection of the vessels. Sir A. CARLISLE has adduced a case of apoplexy arising from drinking an immense quantity of gin. Upon dissection, the odour of the spirits was detected in the serum effused in the ventricles of the brain; and similar facts have been adduced by Dr. OGSTON and others.

433. Connected with the use of spirituous or fermented liquors, I may here allude to the influence of the class of *narcotics*, particularly opium, stramonium, hyoscyamus, tobacco, &c., the excessive use of which sometimes occasions all the symptoms of congestive apoplexy, and even extravasation. Of all the narcotics the different species of monkshood most readily occasion apoplexy, when taken by mistake. I was consulted in the case of a young man who had incautiously chewed some seeds of this plant; he was shortly afterwards seized with a sense of numbness of the face, soon followed by complete apoplexy, from which he recovered with great difficulty, and with palsy of one side, with which he continued to be affected.

434. Nearly allied to the operation of narcotics is that of the fumes of charcoal, and various *mephitic gases*, which, whilst they diminish, or altogether arrest the changes affected by respiration on the blood, thus occasioning asphyxia and carus without stertorous breathing, sometimes produce all the symptoms of complete apoplexy, owing to their effects upon the vital endowment of, and circulation in the brain. In respect of the *modus operandi* of narcotics and deleterious gases on the system, somewhat dif-

ferent opinions have been entertained by CULLEN, GOODWIN, CURRIE, ORFILA, BRODIE, and others, who have investigated the subject. There can, however, be no doubt that they act chiefly upon the ganglial system, particularly on that part which actuates the brain when they produce apoplexy, destroying the influence of this system on the vessels of the encephalon, and thereby retarding the circulation in, and favouring congestion of its capillaries, and interrupting the functions of the organ.

435. Violent straining in lifting heavy weights, or *muscular exertions*; straining at stool; the venereal act, particularly under unfavourable circumstances, or too frequently repeated; the extension of erysipelas from the face or scalp; the metastasis of other diseases, especially of gout and rheumatism, as shown above (§§ 331, 379); whatever impedes the return of blood from the head, as a dependent posture of the head, or holding it long in an averted position, or looking backwards without turning the body, particularly when the neck is short; sleeping soon after too full a meal, especially with a neckcloth or other ligature around the neck; violent fits of coughing or sneezing; pregnancy and childbirth, exertions of the body, with an anxious mind; stumbling; the use of the warm-bath, and sudden exposure to heat and cold, are among the most frequent exciting causes of apoplexy.

436. The effect of the *sun's rays* in producing what is commonly called *coup de soleil*, is well known. Many of the seizures thus occasioned amount to complete apoplexy in some one of its forms. But other conditions of *heat* will also sometimes occasion an attack, as heat combined with moisture, and the exhalations from a number of persons crowded together in ill-ventilated apartments. The influence of crowded rooms and assemblies in causing apoplexy is well known, and in occasioning headache and sense of fulness in the vessels of the encephalon, even in persons not predisposed to an apoplectic attack; the contaminated air not only lowering nervous power but also affecting the blood.

437. *Cold* also, particularly when applied suddenly to the surface of the body and lungs, or when prolonged, excites the disease in aged persons, whose vital energies are already greatly impaired. The vessels of the brain in this class of

subjects are weak, fragile, and liable to rupture, owing to ossific or atheromatous and fatty deposits in their coats, and are disposed to permit a portion of their serous contents to escape. Besides, cold depresses still lower the vital powers of the frame, and tends to retard the circulation, whilst it drives the blood from the surfaces into the large viscera, and particularly into the encephalon, which, from its unyielding case, is more obnoxious to congestion, retarded or interrupted circulation, and pressure from vascular fulness, than any other organ; occasioning lethargy in the robust or young, and apoplexy in the old or predisposed. Cases illustrative of apoplexy produced by long exposure to great cold, particularly when the disposition to sleep which it induces is yielded to; by the incautious use of the cold bath, and of ice applied to the head; and by the practice in Russia and Poland of using a snow bath after the warm bath; have been recorded by WEPFER, WALTHER, PENADA, MACARD, BRANDIS, KELLIE, PORTAL, and FRANK. Of about fifty perfect cases of the disease the *causes* were analysed by Dr. CHEYNE, and ranked as follows: 1st. Drunkenness and habitual indulgence in exciting liquors; 2d. The form of the body; 3d. Temperament, sanguine, sanguined-choleric, choleric; 4th. Gluttony; 5th. Indolence; 6th. Mental anxiety; 7th. Fits of passion; 8th. External heat; 9th. The use of tobacco. (*On Apoplexy and Lethargy*, p. 149.)

438. *iii.* MODUS OPERANDI OF THE ABOVE CAUSES.—If we endeavour to trace the relation subsisting between these causes, and what we know of their uniform effects either upon the brain or on other parts of the body, we shall find that they lead first to excite and afterwards to exhaust the vital energy, and to distend the capillaries of the part. Now, as the brain is enclosed in an unyielding case, it must follow that, when the capillaries are excessively distended, the veins, which are the most yielding, will be proportionally compressed, whilst the force of the circulation in the arteries will tend to perpetuate this distension, and consequently the compression of the veins. Thus, the circulation will be retarded; the portion of the ganglial system supplying the brain be likewise, to a certain extent, benumbed by the increased pressure to which it is subjected, and the functions of the organ abolished, even without extravasation having

occurred. Upon dissection after death, the blood, which had distended excessively the capillaries, will be found to have passed into the veins, giving the appearances of venous congestion merely, as is uniformly observed in other parts of the frame which have been the seat of congestion without inflammation,—venous congestion, at least to any considerable extent, being incompatible with the physical condition of the encephalon during the life of the patient, unless it be occasioned by impeded return of blood through the sinuses and large veins, although partial or more general congestion of the cerebral capillaries undoubtedly often takes place.

439. When portions of the brain become *softened*, or when the *vessels of the brain* are weakened by atheromatous or fatty degeneration, then increased action of the heart on the one hand, or impeded return of blood from the brain on the other, will endanger rupture of one or more capillaries, and apoplexy or palsy will be the result, owing to the hemorrhage thus produced. When *hemorrhage* thus takes place to a considerable amount, a vital shock is thereby produced, and the effused blood will occasion more or less pressure, according to its extent; but, from the condition of the encephalon, the pressure will almost equally affect all parts of it; the blood being thereby prevented, to a certain extent, from returning by the veins, whilst the capillaries and arteries will be unnaturally distended. This state, however, will pass off after death; and venous congestion only, with extravasation, present itself. When, however, the extravasation is large, the pressure will prevent both the veins and the capillaries from receiving their due proportion of blood; whilst the ganglial system of the encephalon will be analogously or injuriously affected. When hemorrhage attends or follows the state of organic nervous influence supplied to the brain, and the consequent congestion, there is generally associated palsy, most frequently in the form of hemiplegia, which usually becomes more manifest as the congestion or the pressure occasioned by the vascular effusion is lessened or more or less removed by the treatment adopted, the apoplectic state being removed and the paralytic remaining.

CHAPTER II.

THE REMOTE, CONTINGENT, AND EXCITING CAUSES OR OCCASIONS OF PALSY.

440. THE *remote causes of palsy* are strictly the causes of those diseases in the course of which structural alterations of the cerebro-spinal axis most frequently occur; and are entirely the same as those which I have adduced in the preceding chapter, and which are often common not only to *apoplexy* and *palsy*, but to *epilepsy*, to *inflammation of the brain*, and to *insanity* also. Those remote causes, therefore, which are more especially or commonly concerned in the production of palsy, require merely an enumeration at this place.

441. A. The *predisposing causes* are chiefly hereditary predisposition, advanced age, the male sex, mental labour, luxurious habits, and sexual indulgences. I have observed a greater frequency of palsy in the offspring of those who have died of diseases of the brain than in others. Palsy is much less common in children and young persons, or in those under thirty years of age, than in persons further advanced in life. According to the registrar-general's report the deaths in the metropolis, in two years, from palsy, were 33 under fifteen years of age, 614 from fifteen to sixty, and 932 at sixty and upwards; and from the same authority it would appear that the number of deaths is as great in females as in males. Palsy in *children* is chiefly caused by scrofula, by tubercles in the brain or membranes, and by scrofulous caries of the vertebræ; and these lesions are favoured by teething, by weaning, and by the eruptive fevers, especially by scarlatina. The frequency of palsy increases with the advance of age; the increase being the greater the more advanced the epochs of life, especially when the numbers living at each epoch are taken into consideration. Palsy is most frequently observed in persons whose habits are sedentary, and in those of feeble constitution. It is said to be more frequent in the sanguineous and nervous than in other *temperaments*; but this is not established. There can be no doubt of mental labour, depressed and anxious states of

mind; disappointments, losses, chagrin, &c.; luxurious habits, and venereal indulgences, being most influential causes of predisposition to palsy. Indeed, the various circumstances which I have assigned as predisposing to APOPLEXY (§ 420, *et seq.*), have a similar influence in respect of palsy. Amongst these, the excessive use of animal food, occasioning altered nutrition of the arteries and capillaries, and vascular plethora may be mentioned; and when these states are present, hemiplegia, either alone or complicated with, or consequent upon apoplexy, is the form of palsy most frequently observed.

442. Various *arts* and *employments* remarkably predispose to palsy, especially all those in which lead, arsenic, and mercury are much used; as painters, plumbers, glaziers, &c., &c.; and in persons thus exposed the disease occurs at earlier epochs of life than in other circumstances. It is least frequently observed in those who lead a sober and active life, and are much in the open air. It is rarely met with in sailors and soldiers; but this is partly owing to comparatively few of them being far advanced in life. The influence of the *seasons* or of *weather* in favouring attacks of palsy has not been shown with any precision; but cold and moist seasons and weather, and cold, humid, and miasmatic localities, are certainly more productive of paralytic affections than other seasons, weather, or situations.

443. *B.* The *exciting causes* of paralysis are—1st. *Physical, mechanical, and external agents*;—2d. The *mental emotions, and mental exertion*;—3d. *Pathological states or pre-existing lesions*;—4th. *Poisonous substances*. These may act—(a.) directly upon the ramifications or trunks of nerves;—(b.) or directly or mediately upon the cerebro-spinal axis.

444. *a.* Of the *physical agents*, the most influential is certainly *cold*; particularly when severe in grade, or long applied to any part, or to the general surface. Cold directly depresses the nervous power and benumbs sensation, thereby affecting the nerves themselves; it may also occasion congestion of the nervous centres, and particularly of the veins and sinuses of the spine, and consequently more or less complete forms of paraplegia or general palsy, as in the cases already alluded to.¹ All applications to the surface of a

¹ The celebrated SCARRON was deprived of the use of his limbs by pro-

part that conduct either the animal heat or the electricity from it, may excite paralysis of it, particularly when long-continued; as sleeping, sitting, or lying on the ground, or on stones; wet or damp clothes; the continued contact of metallic or earthen substances, &c. Pressure of any kind upon a nerve, whether produced by external substances or by tumours, abscesses, aneurisms, dislocations, or other lesions in the vicinity of the nerve, or by disease of the nerve itself, or of its neurilemma; and wounds, contusions, or other injuries of one or more nerves, are occasional causes of local palsy. Causes of a similar kind implicating the brain or spinal cord, especially depressions or displacements of the cranial or spinal bones; concussions or other injuries of the cerebro-spinal axis; depending or constrained positions of the head or spine; congestions, tumours, morbid depositions or other changes in the nervous centres, their membranous envelopes or bony cases, occasion hemiplegia, paraplegia, or general palsy, according to the seat of lesion, as above assigned. To these may be added intemperance, fatigue or exhaustion, changes of temperature and of the atmosphere, inanition, losses of blood, anæmia, &c.

445. *b.* The influence of *mental exertion*, and of consequent exhaustion and fatigue, more especially when conjoined, as it often is, with chagrin, disappointments, and losses, is most obvious. The agency, also, of the *mental emotions* in causing palsy is undoubted; but it is not so directly manifested on the brain, in all cases, as may be at first supposed. The emotions, whether exciting or depressing, act primarily upon the heart and circulation, and through them upon the brain and spinal cord. Undue excitement of the imagination, sudden mental shocks, fits of anger, and venereal excesses or masturbation, are not infrequent causes of palsy. Indeed, the several states of paraplegia and general palsy are oftener produced by the last of these causes, or by masturbation, than by any other.

446. *c.* *Pathological states* or lesions occurring in the

longed exposure to cold during a fit of dissipation. His mental faculties were, however, unaffected, as in most instances of paraplegia, and of general palsy caused by lesion of the spinal cord. The fascinations of his wit were unimpaired; and he became the husband of the beautiful and witty Mademoiselle d'AUBIGNE, afterwards the famous Madame de MAINTENON. SCARRON lived 23 years in a paralysed state.

course of pre-existing disease, as already stated and sufficiently insisted upon when describing the different forms of palsy and apoplexy, are the most frequent and immediate exciting causes of the several varieties of palsy in their primary and associated forms. These, in fact, constitute the *chief morbid appearances* furnished by paralytic cases, and consist chiefly of exostosis, tumours, or morbid growths in the cranial bones,—tumours, effusions of blood or of serum, fungoid productions, congestions, and the more common consequences of inflammation of the membranes of the brain,—syphilitic disease of the bones of the cranium, or of the membranes of the brain,—congestion and inflammation, extravasations of blood, effusion of serum, abscesses, softening, induration, atrophy, ulceration, apoplectic cysts, tumours, tubercles, malignant productions, &c.; hydatids, watery cysts; sloughing or gangrene consequent on severe injuries in parts of the brain; effusions into the ventricles, or between the membranes; disease of the bloodvessels, as aneurismal tumours, ossification of the coats of the arteries, atheromatous or fatty degeneration of the arteries and capillaries, varices or dilations of the veins or sinuses, and coagula, or fibrinous or other concretions in these vessels, are the chief lesions which have been found in cases of hemiplegia, and of partial palsy of the senses.¹

447. The changes just particularized, affecting the spine, or the membranes or substance of the spinal cord or medulla oblongata, are the usual causes of the spontaneous cases of paraplegia and general palsy, or those cases which occur independently of the more direct effects of external injuries. The occurrence of these forms of palsy in the course of caries of one or more of the vertebræ, owing either to the extension of inflammation to the membranes, to effusion of lymph or of serum, or to pressure on the cord owing to the acute angle formed by the consequent curvature, is sufficiently familiar to physicians. But *cancerous* or *malignant disease* of the vertebræ, consecutive of cancer of the mammæ, or occurring primarily in these parts, may also occasion paraplegia. Mr. CÆSAR HAWKINS has adduced three interesting cases of paraplegia from this cause, and my friend Dr. ABER-

¹ For a minute account of these lesions see the articles ARTERIES, BRAIN, CRANIUM, and EPILEPSY, in the author's "*Dictionary of Practical Medicine*," &c.

CROMBIE, of Cape Town, has communicated to me a similar case to two of those observed by Mr. C. HAWKINS, which had occurred in his practice. In this instance, the breast was greatly enlarged, was quite adherent to the ribs, and its lower surface ulcerated. A prominence was observed in the situation of the second and third dorsal vertebræ, with tenderness on pressure; paraplegia, followed by its most unfavourable consequences, shortly afterwards took place.

448. *Periostitis*, especially *scrofulous periostitis*, and *tubercular disease of the vertebræ* (§§ 351–354), are not infrequently productive of partial palsy, and of paraplegia, or even of more general palsy, when affecting portions of the vertebral column. In these cases, particularly when occurring in adults, as far as my observation has enabled me to state, the bladder is more or less paralysed, the urine soon becoming alkaline; and neuralgic pains of the limbs are often present to a distressing degree.

449. *d.* Sufficient notice has been already taken (§§ 165, *et seq.*) of the *poisonous substances* which occasion palsy. The slow introduction of mineral poisons, as lead, arsenic, mercury, &c., sometimes is followed by this effect; and in some cases, at least, their influence is exerted as much, if not more, upon the nerves supplying the paralysed limb as upon any part of the nervous centres. The poisonous effects consequent upon the vegetable or acro-narcotic poisons are owing more to contingent lesions sustained by a part of these centres, whilst they and the circulation in them are under the influence of the poison, than to any effect produced by them on the nerves themselves.

CHAPTER III.

REMARKS ON THE PATHOLOGICAL STATES PRODUCING OR CONSTITUTING APOPLEXY.

450. *i.* OF THE PHYSICAL CONDITIONS OF THE BRAIN AND SPINAL CORD.—The physical conditions of the cerebro-spinal axis ought to be taken into consideration in estimating the

influence of remote causes, and of organic lesions of this part, or of its envelopes, in producing apoplexy or common palsy. These conditions are—1st, the bony and unyielding cases enclosing them; 2d, the membranes interposing between them and these cases; and 3d, the fluid interposed between the membranes, especially between the arachnoid and pia mater.

451. *a.* *The unyielding cases inclosing the cerebro-spinal axis* give rise to several accidents and changes consequent upon external injury, notwithstanding the influence of the membranes, of the processes of the dura mater, and of the fluid interposed between the membranes in preventing them. The pressure, laceration, &c., caused by fractures, depressions, &c., of portions of these cases; the concussions, counter-strokes, shocks, and succussions produced by falls on the back, shoulders, feet, and extremities; the direct pressure following the extravasation of blood, or of serum, the development of tumours, or venous congestion and interrupted return of blood; the counter-pressure consequent upon these changes, and exerted chiefly on parts distant from, or opposite to, the seat of lesion or effusion; and the shock sustained by the vitality and organic nervous power of the frame, upon severe injury of the nervous centres, should all be taken into the account when we attempt to explain resulting phenomena; inasmuch as they complicate the effects, and render their causes or sources more obscure and doubtful.

452. *b.* *The physical influence of the membranes* in preserving the nervous masses they inclose from injury and disease is obvious. They support, secure, and protect their contents, whilst they interrupt or prevent the extension of injury or of disease from the external cases to the contained vital parts. Still, when they are themselves the seat of disease, particularly of tumours or of inflammation, the pressure or irritation, or the extension of the disease and its more remote consequences, affect more or less the nervous centres, and interrupt or disorder their functions, although the interposed fluid tends to prevent or to lessen these effects.

453. *c.* *The cerebro-spinal fluid* interposed between the arachnoid and pia mater is not merely requisite to the healthy discharge of the functions of the brain and spinal

cord, as shown by COTUGNO, MAGENDIE, and TODD, but is also most serviceable in preventing the extension of injury and disease from the bones and membranes enclosing these organs. The motions alone of the spine would be productive of serious consequences if this fluid, which is more copiously interposed in this part of the nervous system, did not prevent them from materially affecting the cord itself and the roots of the nerves which it transmits. When we consider the effects of this fluid upon the functions of the cerebro-spinal axis, it is impossible not to infer that the quantity of it will vary with the states of the nervous masses and of vascular determination to, or congestion of, them and their membranous envelopes. It may reasonably be concluded that, when these structures and the blood supplying them do not sufficiently fill the unyielding cases of the cranium and spine, the fluid interposed between the arachnoid and pia mater will supply the defect, and prevent the existence of any vacuum; and that, on the other hand, when the states of these centres, and of the circulation in them, are such as give rise to much fulness, the quantity of this fluid will be diminished. Anæmia will thus be attended by an increase of the cerebro-spinal fluid, and vascular turgescence by a diminution of it, the included masses being thereby preserved from much diminution of pressure in the one case, and from much increase of it in the other. Thus, also, in cases of atrophy, partial or general, of the brain or spinal cord, the quantity of this fluid is increased, showing the importance of it to the functions of these parts, whilst in cases of hypertrophy it is diminished or almost wanting.

454. It is obvious that in health the presence of a considerable portion of the cerebro-spinal fluid is always necessary to protect the nervous centres with which it is in immediate contact. It is very justly remarked by Dr. R. B. TODD, that by the interposition of a liquid medium between the nervous mass and the walls of the cavity in which it is placed, provision is made against a too ready conduction of vibrations from the one to the other. Were these centres surrounded by one kind of material only, the slightest vibrations or shocks would be continually felt; but when different materials on different planes are used, the surest means are provided to favour the dispersion of such vibra-

tions. The nervous mass floats in this fluid, being maintained *in equilibrio* in it by its uniform pressure on all sides, and the spinal cord is further secured by an additional mechanism, preventing its lateral displacement. The abundance of this fluid at the base of the brain and medulla oblongata protects these parts, the nerves and vessels, from unequal or excessive pressure and counter-pressure during disease, or from accidents; while a diminution of it favours or even induces most serious consequences, as shown by the experiments of M. MAGENDIE.

455. From what I have now adduced it may be inferred, that the effects often imputed to the abundance of this fluid, particularly in the spinal canal, by several pathologists, when detailing the morbid appearances after death from diseases of the nervous system, have been imputed to a wrong source; that the serous effusion in these cases, as I have elsewhere argued, is neither the cause of pressure upon, or of induration of the nervous centres, nor the source of the palsy sometimes observed in these cases; but that it is a result of those changes of the nervous structure, and of the local circulation with which it is found associated, in connection with or aided by the unyielding state of the surrounding parts.

456. *ii.* THE PATHOLOGICAL STATES CONSTITUTING APOPLEXY have been in part comprised in the observations offered on the principal kinds of apoplectic seizure, and on the *modus operandi* of the remote causes. There can be no doubt that much misapprehension has existed on this subject; and, consequently, that the treatment adopted has been frequently either nugatory or injurious. The opinion that the disease depends upon compression solely has been too generally adopted, without considering the relation in which such compression, granting its existence, stands in to the causes which occasioned it, and the symptoms it produces. The idea that compression is indispensable to the existence of the disease has thus been empirically assumed and acted upon in practice. A careful consideration, however, of the morbid appearances on dissection, in relation to the symptoms, and to analogous changes and their phenomena, have led me to infer that compression of the brain never can take place; and that, although pressure may exist in the majority

of cases, it is not indispensable to the apoplectic state. Admitting that *retarded* circulation, whether produced by pressure or by any other cause, very frequently obtains in the apoplectic state, it does not follow that it constitutes the only morbid condition of the brain in this disease; or, in other words, that apoplexy is not merely a disease of the vessels of the brain, although these vessels are either consecutively or coëtaneously affected. It should not, however, be overlooked, that even those who argue for compression being the cause, do not thereby imply, as their opponents would make it appear, that the tissue of the brain is actually compressible, but contend for the effects which pressure undoubtedly produces upon living and sensible parts. Therefore, although the brain is not compressible, it does not follow that it may not be affected by *pressure*, even independently of the obvious effects which pressure must produce on its vessels and the circulation through them, and notwithstanding the protecting influence of the cerebrospinal fluid (§ 450-455).

457. Before entering further on this subject it will be necessary to premise that the circulation of the brain, like that of other important organs, is chiefly under the dominion of that portion of the organic or ganglial system of nerves which is ramified on its bloodvessels, and is distributed otherwise to the organ itself; and that an exhausted or morbidly depressed state of the influence those nerves exert on the circulation and manifestations of the brain, with the consequent effect this state has upon the capillaries, particularly in dilating or congesting them, or altering their nutrition and organization, and disposing to their rupture, or to the escape of a portion of their more fluid contents, is the principal cause of, and often constitutes the apoplectic seizure, whether this influence emanate from the chief centre of this system, or from the local and especial sources provided for the peculiar offices of the organ, as the pineal and pituitary glands.

458. From this it may be inferred, that the proximate cause of a large proportion of the cases of apoplexy, not omitting even those which are attended with retarded circulation and hemorrhage, is here imputed primarily to the condition of that part of the ganglial system which supplies the bloodvessels of the brain and the brain itself. That this

actually is the case is shown by the nature and mode of operation of the remote causes of the disease; by the frequent affection of the functions of the brain previous to an attack; by the nature of the principal part of the phenomena accompanying the attack; by the disorders observed subsequently when partial recovery takes place; by the tendency to relapse; and by the morbid appearances which present themselves on the dissection of fatal cases.

459. It is obvious that the appearances in these cases are merely ultimate lesions, as in all fatal cases of *organic disease*, and some of them even *post-mortem* changes; and yet, although the most advanced in the procession of morbid phenomena, they are often of themselves obviously insufficient to occasion death. Leaving out of question those cases which are unattended by extravasation, the venous congestions, even admitting their existence, or the serous effusion found in the other cases, are seldom such as to account of themselves for the event; inasmuch as they are frequently observed to an equal, or even greater, extent in cases where neither apoplectic nor comatose symptoms had preceded death; and are, as I have already shown (§ 438), the result of the accumulation in the veins, after death, of the blood which had distended the arterial capillaries during life, and thus had been instrumental in abolishing the cerebral functions.

460. The circumstance of the morbid changes being insufficient to account for the result had induced various writers, particularly KIRKLAND, KORTUM, ZULIANI, SCHELLER, SCHÆFFER, and HUFELAND, to consider apoplexy frequently to proceed from the state of the nervous power which they consider defective; and led WEICKARD to contend that it seldom depends upon compression. Dr. ABERCROMBIE, evidently influenced by the above considerations, refers the disease to interrupted circulation in the vessels of the brain, owing to pressure from the effused blood, or to other causes. It is extremely probable that a *retarded*, if not an interrupted, state of the circulation very generally obtains; and that, partly in consequence, the sensific and motific powers are not generated. This, however, is only a matter of inference; for we have no evidence that complete interruption of the circulation of an organ or part can exist for any time, and its functions be so rapidly restored, as is sometimes observed in apoplectic

seizures, or without gangrenous disorganization being sometimes the result; and even if we admit this state of the circulation we must still refer it to some antecedent and more general morbid condition.

461. That a congested state of the vessels and retarded circulation of the brain should, however, exist, owing to the diminished or exhausted or suppressed state of that influence which undoubtedly actuates the vessels, and the organ itself, may readily be conceded; but that, even in the brain, the effusion of a small portion of blood should occasion pressure sufficient to *interrupt* the circulation through it, requires further proof, especially when the provision noticed above, which guards the brain against the occurrence of pressure, is taken into consideration. It seems most probable and consonant with facts observed in other parts of the body that, in cases where the extent of effusion, extravasation, or external injury warrants the admission of pressure, this state gives rise to the apoplectic attack as much by its effects upon the ganglial apparatus of the encephalon as by interrupting the circulation through the cerebral vessels.

462. That apoplexy, more especially when complicated with palsy, and when large effusions of blood take place sufficient to produce pressure, is often occasioned by disease of the vessels, more especially of the arteries and capillaries of the brain, cannot be disputed. Ossific or cretaceous deposits in the coats of these vessels, or atheromatous or fatty changes in them, disposing them to rupture upon increased action of the heart, or inordinate excitement of the cerebral functions, are doubtless very common immediate causes of apoplexy, especially in aged persons and in those who have been addicted to the excessive use of animal food; the consequent hemorrhage, according to its amount, to its situation, to the severity of the vital shock it occasions, and to the power of vital resistance, producing either simple or primary apoplexy, or apoplexy associated with palsy, or hemiplegia merely.

463. *The pathological conditions of the brain*, therefore, in apoplexies, may be stated as follows:—*a.* That the brain is not sensibly *compressible*, but, being lodged in an unyielding case, it may be injuriously affected by *pressure*, especially when extravasations are large, chiefly by displacing whatever quantity of the cerebro-spinal fluid existing for the protection

of the organ and its membranes, or by displacing or otherwise altering the contents of its bloodvessels, or by diminishing or otherwise affecting the healthy relative proportion of their contents in each of the series of vessels, and impeding the circulation through a part or whole of the organ; and that pressure exerted in one part, whether from distended vessels, extravasated blood, or the development of tumours, when reaching a certain pitch, will almost equally affect the whole of the organ, particularly when the pressure is great; the yielding nature of the cerebral structure, as well as the unyielding case in which it is placed, must necessarily give rise to this result.

464. *b.* The various states of vascular impulse and action, impeded circulation in the veins and sinuses of the brain, and distension of its capillaries, whether arising from the influence of the organic nerves on the bloodvessels, or from morbally-increased action or from obstruction in the large veins, the lungs, or the right side of the heart, will, either individually or in partial conjunction, occasion the above effects, owing chiefly to the unyielding walls of the encephalon.

465. *c.* Owing also to this physical condition of the brain, the pressure of the atmosphere which influences the venous circulation of all other parts of the body, cannot modify in so direct or sensible a manner that of the brain; and hence the cranial cavity must always contain nearly the same quantity of blood during life, the differences which occur being chiefly those of rapidity of circulation and of relative proportion in each part of the series of vessels; an increased quantity in the capillaries thus causing a proportionate diminution in the veins. Owing, likewise, to this condition, the forcible injection and distension of one set of vessels will necessarily diminish the capacity of, and obstruct the circulation through the other; and that part of the series which is nearest to the propelling power, the first to receive the impulse of the heart, and the nearest capable of being much distended by it, will, from relative situation, overcome the distension, and diminish the capacity of that beyond it. Thus, the arterial capillaries of the brain will be the first distended from the increased action of the heart and large arteries; and by their distension will soon overcome that of

the veins, if it have previously existed; and hence, by compressing them, impede the circulation through them.

466. The frequent *inflammatory character* of apoplexy, or the common occurrence of *reaction*, will be readily accounted for from what has now been stated; for whether the attack commences with dilatation or increased action of the arterial capillaries, or with exhaustion or deficiency of their vital power, or with retardation of the circulation through the veins and venous capillaries, the result will generally be augmented action of the arteries going to the brain, extending itself in some measure to the heart, and this state will continue until the abolition of the cerebral functions shall have impaired or altogether destroyed the heart's action.

467. *d.* Upon tracing the relation subsisting between the various causes of the disease, the symptoms and the appearances on dissection,—upon remarking, as far as my own observation has gone, the frequency of change in the pineal and pituitary glands of apoplectic patients, I am induced to infer that functional lesion, or organic change, often commences in that portion of the ganglial system which supplies the encephalon and its bloodvessels; and that, owing to exhaustion of its influence, the capillaries lose their vital tone, have their circulating functions impaired, become more or less dilated and changed in structure, and are disposed to rupture.

468. *e.* When apoplexy proceeds from causes of an obviously *exciting nature*, or from *sur-action* of the heart and arteries, it seldom occurs until a certain degree of exhaustion of the vital tone of the capillaries has taken place, whereby they become dilated and congested, so as either to press the encephalon against its unyielding case, and, owing to the pressure, impede the return of blood by the veins (§ 438), or to give rise to extravasation, which, when considerable, has a similar effect; injection of the arteries of the brain and its membranes, resulting equally from both, owing to the obstructed circulation through the veins.

469. *f.* When pressure unequivocally exists, it may also benumb or suppress the vital influence of that part of the ganglial system which supplies the encephalon, thereby

heightening the effect produced both on the organ itself and on its circulation.

470. *g.* There are cases of apoplexy that present the phenomena, which have given rise to the appellation of *weak or nervous apoplexy*, and which occur from *depressing causes*, operating upon exhausted states of the encephalon and frame generally. These causes directly suppress or abolish the vital influence of the organic or ganglial nerves of the brain, and, consequently, the cerebral functions, without producing further change of its vascular system than retarded circulation, in so slight a degree as not to amount to great distension and compression, and without occasioning extravasation of blood, although extravasation often does supervene on this state, giving rise to pressure and its consequences, so as to heighten or prolong the primary lesion, and to occasion paralysis or the ingravescent form of apoplexy, or this form associated with palsy.

471. *h.* In cases proceeding from *depressing causes* acting on a plethoric habit of body, the effect is also more or less directly produced on the organic nerves of the brain, whereby the capillaries lose their tone, are congested and dilated, or ultimately ruptured, and the return of blood by the veins retarded, whilst the smaller arteries and capillaries are more and more engorged by the impetus of the blood in the large arteries, the pressure thereby occasioned suppressing the cerebral functions as in the other cases.

472. *i.* When the disease proceeds primarily from *impeded return* of the blood from the head, the congestion only commences in the veins; but, as the action of the heart and arteries continues, the capillaries are soon afterwards injected and dilated; and, in proportion as they enlarge, from the distending power to which they are more immediately subject, the veins are compressed, owing to the physical condition of the brain, more or less emptied, and admit of the greater dilatation of the capillaries, some one or more of which may be even ruptured from the increased action and distension, especially if the brain has been already more or less softened, or the coats of the vessels diseased as above described (§§ 205, 462).

473. *k.* In cases accompanied with *hemorrhage*, and consequent laceration of the cerebral structure, the deprivation of function may be as much an effect of suppression of the

vital influence of the organ, owing to the shock produced by the injury, as of pressure upon the veins, and consequent injection of the arterial capillaries. In cases of this description the state described above (§ 438–440) may exist, and be followed by hemorrhage and laceration of the part in which it occurs, producing the abolition of the cerebral function, great vital depression, sickness, vomiting, and other signs of dangerous injury sustained by a vital organ. The pressure occasioned by the hemorrhage will be followed by obstructed circulation, and, under favourable circumstances, by increased action of the arteries and heart to overcome it.

474. *l.* In apoplexy presenting on dissection *congestion* and serous effusion, these states may be often considered rather in the light of *post-mortem* changes than the pathological states which had existed previously to death; it may even be presumed that the distension and congestion of the capillaries, chiefly the arterial capillaries, had overpowered the functions of the organ; and that, as in other parts, when the injection of the blood into these capillaries no longer is continued, and the distending cause has ceased to exist, they have gradually discharged their contents into the veins, which now had space given them for dilation, owing to the emptying of the capillaries; and thus the blood has passed into the veins soon after death.

475. *m.* Apoplectic coma, or apoplexy with or without stertorous breathing, or with slow respiration, occasionally with deep sighs, and, more rarely, apoplexy associated with hemiplegia, may proceed chiefly from a *morbid or contaminated state of the blood*. This state of the blood may be connected with local congestion, or with general plethora; with *excrementitious plethora*, as when the attack supervenes upon suppression of the urine or disease of the kidneys. The blood may have been contaminated consecutively upon interruption or suppression of the excretions; by impaired depuration; or by animal, or by vegetable, or by mineral poison. But in all such cases, whether the motive or the sensory powers, or both, be affected, the apoplectic state is not so much the effect of pressure, resulting either from congestion or local plethora, or effusion, as it is the result of the morbid blood itself upon the brain,

and, not improbably, more especially upon the ganglial system distributed to, and especially actuating the brain.

476. *n.* It has been stated by Dr. GULL and others, that *morbid or contaminated states of the blood* are most productive of *anæsthetic forms* of palsy; but this result depends in a great measure upon the nature of the poison contaminating the blood, and cannot always be imputed to the state of this fluid; for even in cases produced by the direct introduction of a poison, or by the absorption of toxic agents from the stomach, or from any other part, the primary and consecutive influence of the poison on the nervous system should not be overlooked. Besides, anæsthetic forms of palsy may be caused also by different agencies, as by exhaustion of organic power from venereal excesses, by hysterical affections, by intense anxiety of mind, by hepatic obstruction, by affections of the peripheral nerves, as well as by numerous lesions of the cerebro-spinal axis, of which this state of palsy is a prominent, a persistent, or a temporary effect, either singly or in connection with more or less loss of motion.

477. *o.* *Hæmorrhage* in the brain or between the membranes may result from the following changes:—*α.* Exhausted vital energy of the organic or ganglial nerves supplying the bloodvessels and organ, thereby favouring the distension of, and effusion from these vessels:—*β.* A contaminated or morbid state of the blood, with or without congestion of the vessels of the head:—*γ.* Diseased states, and the organic changes already mentioned, of the coats of the vessels themselves:—*δ.* Organic change, more especially softening of the cerebral structure, extending to, or influencing the state of the vessels ramified in it:—*ε.* Increased impetus of blood from augmented action of the heart and larger arteries, combined with either of the other states:—*ζ.* Impeded return of the blood from the head, similarly associated.

478. *p.* The vital energy of the organ, resulting chiefly from the mutual influence of the ganglial and vascular systems, may be so far affected as to occasion the attack with all the organic changes observed in fatal cases; and sometimes in such a manner as to constitute the disease, even without these changes having taken place;

although they are most frequently produced, thereby heightening the primary lesion.

479. *q.* As corollaries from the foregoing, I infer that apoplexy often originates in exhausted or suppressed influence of the ganglial apparatus of the encephalon, with a congested state of its arterial capillaries, or impaired condition of their circulating functions, and still more frequently in extravasation of blood, especially in old persons, who have lived fully, owing to cretaceous, ossific, atheromatous or fatty degeneration of the coats of the cerebral vessels, either or all of which changes must necessarily exist to the extent of interrupting or suppressing the functions of the organ; and that as apoplexy does not uniformly depend upon the same pathological state of the nervous influence and circulation of the brain, in all cases, particularly in respect of the kind or degree of vital depression and vascular reaction, or structural change, a due regard ought therefore to be had to the nature of the change in each case, as far as it may be ascertained, and a treatment strictly appropriated to it adopted.

CHAPTER IV.

OF TOPICS CONNECTED WITH THE PATHOLOGY OF PALSY AND APOPLEXY.

480. *i.* OF THE IMMEDIATE SOURCE AND TRANSMISSION OF THE PARALYTIC EFFECT.—It is obvious that some attention should be directed to the connection subsisting between the nature and seat of the lesion causing the palsy and the particular part or limb which is paralysed. This connection is possessed not merely of physiological and pathological interest, but also of great practical importance. It is obvious that palsy may be caused by *two distinct conditions* of the cerebro-spinal system and nerves, viz.: 1st. *By the suppression, or diminished evolution of the cerebro-spinal nervous power and of volition*, owing to interrupted circulation, to depressed vital influence, or to other alterations in that

part of the cerebro-spinal axis which is chiefly concerned in producing or originating that power, and which actuates in health the part paralysed: and 2d. *By whatever may prevent the transmission of cerebro-spinal nervous power and volition* from the parts concerned in producing them to the limbs and organs which they actuate.

481. *a.* If it be conceded that the gray substance of the brain and spinal cord is chiefly concerned in *originating volition and the other cerebro-spinal functions*, we may readily admit that when this substance becomes manifestly diseased throughout the convolutions of the brain, a general state of palsy, more or less complete according to the extent of change experienced by it, may be anticipated; and this is actually observed in all cases where the gray structure is extensively changed, more particularly in those cases of general palsy complicated with *insanity*, as shown in that chapter (§§ 298, *et seq.*). In these, the cerebro-spinal functions—the emotions, intellects, volition, &c.,—are more or less impaired, and the gray matter of the brain and spinal cord is generally found atrophied, indurated, or otherwise changed, and the structure especially concerned in the manifestations of these powers is no longer in a state capable of originating or developing them.

482. *b.* The *transmission of cerebro-spinal nervous power and volition* may be prevented, although they are produced by injury, disease, or pressure of the medullary substance of the brain or spinal cord, or of the nerves. Most of the lesions adduced when describing the several forms of palsy and their efficient causes act chiefly by arresting or interrupting the transmission of volition; although, even in these or in other cases, many alterations of structure both interrupt the transmission and prevent the evolution or the production of nervous power and volition; as when the lesion implicates both the gray and the medullary substance—both the origins and the course of certain nerves.

483. *c.* The *crossed effect generally produced by structural lesions of the encephalon* has been a topic of much discussion among pathologists. That disease of one side of the brain causes palsy of the opposite side of the body has been attributed to the decussation of fibres in the medulla oblongata. This decussation was supposed to be confined to the anterior columns only. But although it might account for

the crossed paralysis of motion, it could not equally explain the circumstance of paralysis of sensibility following the same law. Sir C. BELL has, however, shown that the middle columns decussate as well as the anterior, and thus accounted for the crossed effect in both cases.

484. It has, moreover, been objected, that lesions of the *cerebellum* also produce a crossed effect, although this organ is seated above the point of decussation; and that paralysis of the face follows the same law, and arises from disease in the opposite side of the brain, although the nerves distributed to this part also arise above the decussation. As to the first objection, it may be remarked that the dissections of Mr. SOLLY have demonstrated that numerous fibres run between the spinal cord below the corpus olivare and the cerebellum, which he believes to decussate with their fellows of the opposite side, forming in fact part of the apparatus of decussation. But this discovery establishes merely a direct communication between the cerebellum and spinal cord in the immediate neighbourhood of the decussation, without proving the fact of the crossing of these fibres. As to the second objection, it may be answered in the words of Dr. BENNETT, that Sir C. BELL has shown that the fifth pair of nerves arise below the decussation, and Mr. SOLLY has traced one of the origins of the *portio dura* from the fibres he has described, which run between the spinal cord and cerebellum. Thus, the sensitive and motor branches of the face ought to follow the same law as the other spinal nerves, which is consonant with what generally takes place.

485. Cases have been recorded, however, in which paralysis has occurred on the same side as the lesions in the brain. Mr. HILTON has endeavoured to explain this exception by referring it to a disposition of fibres in the decussation; but, as Dr. BENNETT has justly argued, there is strong reason for doubting whether disease in the brain ever causes a direct influence; for of the many thousand cases of cerebral hemorrhage, tumours, &c., which have been recorded, we are acquainted with twenty-one only in which paralysis is said to have resulted from disease in the same side of the brain as the palsied side of the body, and, on analysis of these, more than one-half are imperfect and doubtful. As the instances, therefore, of this occurrence are so few, may we not consider that the palsy even in them was produced

in the usual manner, and that the lesion which attracted attention had no reference to the complaint? Numerous instances have occurred of abscesses, softening, and other alterations of the brain having been found, but in which no paralysis had been observed during life; and a still greater number are on record, in which there was well-marked paralysis, but no appreciable lesion of structure after death. It is by no means improbable, therefore, as paralysis may be induced without leaving any traces, that in those few cases where the palsy and the lesion in the brain were in the same side, it was really caused by undetected changes in the opposite hemisphere of the brain; and, as is sometimes the case, that the disease found in the hemisphere of the paralysed side had not occasioned the loss of motion.

486. It has been surmised that the lesion of the *cerebellum* should cause palsy of the same side as the lesion, inasmuch as the restiform bodies which concur in the formation of the cerebellum do not decussate as the anterior pyramids. Generally, however, the paralysis occurs on the opposite side to that which is the seat of lesion, although in a few cases the palsy has been said to have been on the same side. But Mr. SOLLY has shown that there is a direct communication between the motor tract of the spinal marrow and the cerebellum; that not more than one-half of the anterior or motor columns of the spinal cord enters into the composition of the corpora pyramidalia, which were formerly supposed to be made up of their entire mass; and that another portion, which he names the "antero-lateral column," when traced on each side in its progress upwards, is found to cross the cord below the corpora olivaria, forming, after mutual decussation, the surface of the corpora restiformia, and ultimately becoming continuous with the cerebellum.

487. Lesions in the vertebral portion of the *spinal medulla* produce not a *crossed*, but a *direct effect*; and when they interrupt the functions of this part of the nervous system, all the parts furnished with nerves arising from beneath the seat of lesion are affected. Hence, the paralysis is the more general the nearer the disease of the cord is to the brain. But disorganization has sometimes gradually proceeded to a considerable extent in the spinal cord as well as in the brain, while such fibres or portions of the former as remained unaffected appeared sufficient to perform the limited extent

of function which the state or exertions of the patient required. Cases have even been recorded, in which individuals have performed voluntary movements of the lower extremities almost up to the time of death, and yet, on examining the cord, it has been found entirely destroyed. Such statements should, however, be received with distrust; for although the presence of sensibility in the lower limbs may be explained in these circumstances (see §§ 521, 522, *et seq.*), the transmission of volition so as to act upon the extremities cannot be accounted for. It is much more probable that the lesions observed had taken place chiefly after death, and had only commenced shortly before it: for the spinal medulla when inflamed, and even in health, often undergoes rapid changes after dissolution. We know, also, that when the spinal cord is inflamed or is undergoing softening, involuntary, spastic, and automatic movements are produced in the muscles and extremities, that may be mistaken for voluntary motion; and it will hereafter be shown that, even when extensively diseased and incapable of transmitting the usual acts of volition, various reflected movements of sympathy may be made by the paralysed limbs. Several cases have been recorded where the spinal cord has been said to have been softened throughout, disorganized, quite diffuent, or even entirely divided, and yet sensibility, and even voluntary motion, have been preserved or but very slightly impaired. The case of DESSAULT, that recorded by M. RULLIER, and others, are of this kind; but they are related with insufficient precision for implicit confidence, and they may, moreover, be explained as just stated, and thus furnish no basis of argument.

488. According to Dr. GULL, the *seventh* nerve is subject, like the spinal nerves, to the law of "crossed action," and is usually somewhat affected, though commonly to a less extent than nerves of the trunk. This opinion is not, however, conformable with that of BURDACH (BALY'S *Translation of MULLER'S Physiology*, p. 843), who states that, although the facial paralysis is more commonly crossed like that of the body, yet that the exceptions are too many to allow this to be stated as a rule. According to BURDACH, of 38 cases of cerebral lesion of one side, the muscles of the face were paralysed in 28 on the opposite side, in 10 on the same side.

489. Dr. GULL believes that the *third* nerve is an excep-

tion to the law of decussated effect; but BURDACH has remarked, that paralysis of the *eyelid* was on the same side with the organic lesion in six cases, and on the opposite in five; that paralysis of the *muscles of the eyeball* existed on the same side as the lesion in eight cases, and on the opposite in four; and that paralysis of the *iris* was on the same side in five cases, and on the opposite in five.

490. Dr. GULL states,—1st, that the pupil is largest on the side of the disease, vision being lost; 2d, that the eyes are turned from the affected side; 3d, that ptosis is on the side opposite to the paralysis of the extremities and face; 4th, that although no obvious affection of the iris or recti may exist, yet a patient may turn his eyes most readily from the affected side, and open the eye widest on the side of the paralysis. He concludes that when the third nerve is affected, either slightly or considerably in hemiplegia, it is the nerve on the same side with the lesion in the brain that suffers; but that the paralysis of the facial and spinal nerves is *crossed*. Cases have not hitherto been observed with sufficient precision and in sufficient numbers to warrant positive inferences; for observation furnishes too many exceptions to the above to admit of the establishment of a general rule or proposition as to this topic.

491. The *exceptional cases* to what is usually observed in palsy, have been enumerated by Dr. GULL, as follows:—1st. The greater affection of the leg than of the arm; 2d. Paralysis of the seventh nerve only; 3d. Palsy of the third nerve, either alone or in an extreme degree, and on the same side as the seventh; 4th. A greater loss of sensation than of motion.—*a*. When the leg is more affected than the arm in hemiplegia, either some additional lesion may exist in the cord, or hysteria may be associated with the lesion, or some other special cause of palsy of the lower extremity may be allied with the alteration producing the hemiplegia.—*b*. The sole affection of the seventh nerve is owing chiefly to causes which implicate the nerve at its origin, or in its course, as first shown by Sir C. BELL. But those exceptional cases insisted on by BURDACH and by an able reviewer (*British and Foreign Medico-Chirurgical Review*, No. ix., p. 46), in which the paralysis of the facial nerve exists on the side opposite to that of the body, and on the same side with the encephalic lesion, and of which I

have seen a few instances, as well as (*c.*) the sole affection of the third nerve, have hitherto not been satisfactorily accounted for. When either of these nerves is affected alone, or in a greater degree, or in what may be viewed as exceptional to more common occurrences, we can infer only some change implicating the nerve at its origin or course, or some alteration of the intimate structure of that part of the encephalon in which it arises. The state of adjoining vessels, or morbid formations, or plastic effusions, &c., may occasion the paralytic effect; although they may escape detection after death.—*d.* As to predominance of anæsthesia over loss of motion, I need not add to what has been already observed respecting it. As far as it is connected with apoplectic attacks and with epilepsy it is generally only temporary; but it is much more complete and permanent in some states of paraplegia noticed above (§§ 106).

492. ii. OF THE SUPPOSED RELATIONS SUBSISTING BETWEEN THE LESION OF THE BRAIN AND THE SYMPTOMS ACCOMPANYING AND FOLLOWING THE ATTACK.—M. CRUVEILHIER states, that those parts of the brain most subject to hemorrhage or laceration from external injuries occasioning counter-stroke of the cranium most commonly present extravasation of blood in apoplexy and palsy. This seems to some extent correct, or as far as relates to corresponding frequency: but there are parts of the encephalon, occasionally the seats of apoplectic or paralytic hemorrhage, which are seldom or never so affected from this kind of external injury.

493. M. SERRES many years ago endeavoured to establish the following propositions, which have received support from more recent observations, although the exceptions also observed prevent them all from being received as established facts:—1. That every apoplexy has its seat in the encephalon, or envelopes;—2. That apoplexies without paralysis principally proceed from the meninges, and are occasioned by effusions from the meninges;—3. That apoplexies complicated with paralysis have their seat in the encephalon itself, which is always materially altered in structure, whether there is consecutive effusion or not;—4. That the seat of organic lesion varies according to the diversity of the paralysis;—5. That he was the first to point out and establish the peculiarities of apoplexy of the cerebellum.

To this last both he and other pathologists more recently have directed attention.

494. *a.* It has been supposed by MM. SERRES, FOVILLE, and PINEL-GRANDCHAMP, that lesions of the *corpora striata* are followed by paralysis of the lower extremities, and those of the *thalami* by palsy of the upper. This inference is, however, neither supported by anatomy nor borne out by facts: a mere coincidence of internal lesion with external signs cannot always warrant the inference that the disordered function has its origin in the part diseased, especially when we are ignorant of the offices of such part. The upper and lower extremities are most frequently paralysed from apoplexy; and the *corpora striata* and *thalami* are the parts in which the apoplectic hemorrhage most frequently occurs. Hence, the coincidence of these lesions of structure and functions must be frequent. But these parts of the brain are sometimes diseased without the corresponding affection of the limbs contended for; whilst, on the other hand, the extremities are often paralysed without any lesion of those parts.

495. *b.* The disciples of GALL consider the *anterior lobes* of the brain to preside over the organ of speech, and to be the seat of the memory of words, &c., and that, therefore, lesions of this part affect this organ, as well as this particular state of recollection. M. BOUILLAUD has supported this opinion by the history of several cases; and M. CRUVEILHIER has controverted it by adducing the details of others. (*Nouv. Biblioth. Méd.*, 1826.) Several other French pathologists have also espoused opposite sides, and adduced cases supporting their views. The inference deducible from the facts already accumulated is, that a coincidence of lesion of these functions and of these parts of the brain is sometimes observed; but the relation between them is neither so uniform nor so precise as to warrant the opinion that there exists any necessary dependence of these particular functions upon the parts of the brain to which they have been ascribed. Without reference, however, to the part of the brain on which the memory of words depends, it has been remarked by M. ITARD, that aged persons struck by apoplexy frequently lose the recollection of proper names, next of substantives, afterwards of verbs and adjectives;

which last are often the only words which can be recollected.

496. *c.* It was contended by MM. DELAYE, FOVILLE, and PINEL-GRANDCHAMP (*Nouv. Journ. de Méd.*, 1821), that disturbance of intelligence depends upon lesion of the *gray substance* of the brain, whilst disorder of locomotion proceeds from change of the white or *medullary structure*. This doctrine seems somewhat better founded than the preceding, although open to the same objections which have been urged against them. Lesion of the cineritious substance is, perhaps, more frequently accompanied with spasms and convulsions at the commencement of the attack than when it is seated in the medullary structure.

497. *d. The cerebellum.*—MORGAGNI has recorded that VALSALVA once stated to him that a case of apoplexy to which he was called was seated in the *cerebellum*. Dissection verified the *diagnosis*; but he does not mention the symptoms on which VALSAVA founded his judgment. M. SERRES, adopting the doctrine of GALL, says, that erections, or seminal emissions, in man, and discharges, sometimes of a sanguineous appearance, from the female organs, are the distinguishing signs of apoplexy of the cerebellum. M. CRUVEILHIER states, that he has seen apoplexy of this part, but that these symptoms were not present. Some cases have certainly occurred to countenance the opinion of SERRES, and others to overthrow it; but neither the one class nor the other have been recorded with precision. It seems more probable that the sanguineous effusion in the cerebellum, especially in that part more immediately connected with the *medulla oblongata*, occasions a partial asphyxia and stasis of the blood in the lungs, owing to the influence of this part of the nervous system upon the respiratory nerves, and thus produces a state favourable to erection. CRUVEILHIER failed to produce this symptom by irritating the cerebellum of dogs; and it has been said to have been observed in cases where the cerebellum has been found sound on dissection, and not to have been remarked in others where the cerebellum has been diseased. But it is not unlikely that this symptom may depend upon that part of the cerebellum which is most nearly connected with the *medulla oblongata*, and not upon the lateral lobes. Facts, however, have been observed, although loosely and

inconclusively, sufficient to draw more precise attention to this and other functions of the cerebellum, than they have hitherto received.

498. GALL, in his work on the "*Functions of the Brain*," has recorded several cases of apoplexy, both in males and females, in whom during life and after the incursion of the attack there were present symptoms of great sexual excitement, and after death effusion of blood was found in the cerebellum, and, in some of these cases, the incursion of the disease took place during coitus. The adoption of GALL'S doctrine in part by M. SERRES, and the deservedly great repute of this pathologist, have directed attention to this matter. I was lately consulted at my own house by a gentleman, for remarkable sexual excitement, and frequent seminal emissions even during the same night, and most intense pain in the back of the head. I prescribed cupping, active purging, and antimonials, and desired him to see me again in two days. I heard no more of him until some days had elapsed, when I was informed that he had deferred having recourse to the means I had advised, had continued the quackish plan of treatment which he had previously been pursuing, and was, shortly after I saw him, seized with apoplexy, which terminated fatally. This case would have very probably, if I had had an opportunity of satisfactorily observing and examining the results, furnished important evidence as to this matter.

499. Some years ago, my friend Professor DUNGLISON, of Philadelphia, published some facts supporting the views of MM. GALL and SERRES; and very recently Mr. DUNN (*Medico-Chirurg. Transact.*, vol. xxxii., p. 112), after detailing a very interesting case of apoplexy of the cerebellum, remarks that the objections which have been urged against the hypothesis of VIMONT, which locates the sexual instinct in the lateral hemisphere of the cerebellum, do not affect the allocation of SERRES, who, from pathological researches, fixes its seat in the central lobe; in support of which Mr. DUNN refers to his own cases. In the case to which I have just directed attention there were not only exaltation and subsequent depression of the sexual propensity,—the first with irritation and inflammatory indications, the latter with structural degeneration and abscess,—but also a defective co-ordinating power in maintaining the equilibrium of the

body. That the cerebellum is subservient to the co-ordination of voluntary and locomotive actions has been admitted by Dr. TODD and Mr. BOWMAN, who remark that "No other part of the encephalon has such extensive connections with the cerebro-spinal axis. It is in union with each segment of the great nervous centres upon which all the movements and sensations of the body depend; the antero-lateral columns of the cord, and the anterior pyramids and olivary columns, supplying all the anatomical conditions necessary for the development of acts of sensation and volition." This opinion is in accordance with that entertained by MM. FLOURENS, FODERA, FOVILLE, WALKER, and PINEL-GRANDCHAMP, who have viewed the cerebellum as the regulator of all the voluntary movements, and the source of sensibility; and it does not oppose the hypothesis of ROLANDO, professor at Turin, that the cerebellum, especially its hemispheres, performs a function analogous to the Voltaic pile, in generating a fluid or principle requisite to the functions of voluntary muscular action; and that it transmits this fluid, under the influence of the brain and through the channels of the spinal cord and nerves, to the muscles;—an hypothesis which seems in accordance with comparative physiology, and with the pathology of the nervous system. For the cerebellum may be concerned in the development or perfection of more than one function, although it may be difficult to demonstrate the extent or the diversity of its influence.

500. The *functions* of the cerebellum, as illustrated by pathology, especially by cases of apoplexy and palsy, deserve further and more precise investigation, especially as to the particular seat of lesion and the order or course of procession of the morbid phenomena,—a more precise observation of the alteration of structure, and a more correct history of the cases in which lesion of this part occurs. But, as Professor LEE remarks, inferences as to the functions of this as well as of other particular portions of the encephalon, from organic lesions, and especially from sanguineous effusions, are uncertain, in consequence of the brain being a double organ, and of the fact, already insisted upon both here and on former occasions, that owing to the unyielding case inclosing the brain, pressure on any one part is inevitably followed by counter-pressure on every other part, and to an equal degree.

501. *Hæmorrhage into, or apoplexy of, the cerebellum* occasions *cæteris paribus*, a more serious lesion of the functions of circulation and respiration, and is more dangerous than apoplexy of the cerebrum. It is more generally, also, preceded by severe pain, especially in the back of the head, and attended by vital depression, sickness or vomiting, convulsions, and general paralysis of sensation and motion.

502. *e. The annular protuberance, or frons Varolii*—the point of junction of the spinal cord, brain, and cerebellum—the centre of the cerebro-spinal system, is sometimes the seat of apoplexy, notwithstanding its density. When the extravasation of blood in this part is to any considerable extent, immediate and complete paralysis of the trunk, and of both the superior and inferior extremities, is produced, with the most profound lesion of respiration, quickly followed by death. When the effusion is to a small extent, and in one side of the protuberance, the paralysis which results is on the opposite side of the body; as may, indeed, be inferred from anatomy. The extravasation must be to a small extent to admit of recovery. Sometimes the effused blood is observed to have been disposed in layers between the lamina of white matter entering into the structure of the protuberance. The reparation of the apoplectic lesion of this part takes place in a similar manner to that which I have already described (§§ 219, *et seq.*). It would seem that the smallest division of the fibres of this part is followed by permanent affection of feeling and motion.

503. Connected with this subject, M. FLOURENS concludes, from his experiments and observations, that the *cerebral lobes*, the *cerebellum*, and the *tubercula quadrigemina*, may lose a considerable but limited portion of their substance, without losing the exercise of their functions; and they may re-acquire them after being totally deprived of them: that the *spinal marrow* and the *medulla oblongata* are the only parts which directly affect the same side of the body with that in which they themselves are affected; whilst the *tubercula quadrigemina*, the *cerebral lobes*, and the *cerebellum*, alone produce these effects upon the opposite sides to that in which they are diseased,—the former acting in a direct course, the latter in a cross direction. These inferences have upon the whole been fully confirmed, although a few exceptions to certain of them may be adduced.

CHAPTER V.

OF CERTAIN TOPICS MORE ESPECIALLY CONNECTED WITH THE
PATHOLOGY OF PALSY.

504. i. THE REMOTE CHANGES IN THE SEAT OF HEMORRHAGE.—The *more immediate changes* consequent upon hemorrhage in the encephalon have already been described (§§ 219, *et seq.*). The *most remote alterations* which have been observed in the ruptured part of the brain, from which the coagulum has been absorbed, are, in some cases, a complete cyst, either empty or enclosing a little reddish serum, or a loose cellular substance; in a few instances, a firm nucleus, seemingly consisting of the fibrinous remains of the coagulum, and in others, according to CRUVEILHIER, merely a linear induration from the cicatrization of the lacerated cerebral structure. In whatever form the remains of the coagulum and laceration may present themselves, at periods remote from the seizure which these lesions occasioned, no *direct* union of the divided fibres of the brain is observed to have taken place. Even when an *apparent* union of the divided cerebral structure is noticed, it will be found to have been brought about indirectly, and through the medium of the cellular or fibrinous substance left after the absorption of the coagulum; the cavity having gradually closed, owing to the atrophy of the ruptured fibres and the hypertrophy of those surrounding them, from having had to perform additional offices.

505. Some pathologists, however, suppose that the cerebral fibres in those cases are directly united, and refer to the experiments of FONTANA, HAIGHTON, MICHAELIS, and MAYER, who had shown, in opposition to ARNEMANN, that the filaments of divided nerves are, after a time, directly produced in the direction of their axis across the cicatrix. But intimate examination of the cicatrix of a lacerated portion of brain, or of a hemorrhagic cyst, or cicatrix, shows that this does not take place in the medullary structure of the brain.

506. The number of hemorrhagic cavities and cicatrices

found in the brain vary from one to many. When several are found in the same brain they generally present different appearances, owing to their having been formed at different periods. This is generally the case when the patient has experienced several attacks of apoplexy or palsy. M. ANDRAL remarks, that effusion of blood seldom occurs in the cerebellum without appearing also in the cerebrum; whereas it may take place in any part of the cerebral hemispheres without occurring elsewhere. As I have stated above (§§ 205, 462), the hemorrhage producing laceration of the brain, and consequent palsy or apoplexy, or both, arises most frequently from fatty or atheromatous degeneration of the coats of the capillary or arterial vessels of the brain, or from ossific or cretaceous deposits in their coats, or from softening of the cerebral structure, leaving the capillaries without support. It is not improbable that changes of the vessels may occasion the softening of the cerebral structure, especially in aged persons; but when the softening occurs in young subjects it may be viewed as a form of scrofulous change, whether attended or not by hemorrhage. This source of hemorrhage being clearly owing to changes in the vessels accounts for the number of hemorrhagic cavities often found in the same brain, and for the reiteration of the hemorrhage after it has once occurred.

507. There are *various other lesions* seated in the brain and its membranes which, as I have already stated, occasion palsy, or even apoplectic coma, and these may exist either singly or in various combinations, or may be conjoined with hemorrhages or with the cysts, or cicatrices consequent upon hemorrhage. These lesions are commonly the immediate causes, or concur with each other in the production of palsy; but certain of them, especially atrophy of portions of the brain, may be the consequence of the prolonged paralytic state. My limits do not permit me to enumerate, far less to describe them at this place; nor, indeed, is it requisite for practical purposes to do either the one or the other. The reader who is desirous of pursuing the subject will find it fully discussed in the article on the Diseases and Organic Lesions of the Brain and Membranes, in my work on "*Practical Medicine.*" (See vol. i., pp. 201-244.)

508. ii. INTERRUPTED CIRCULATION TO, OR ANÆMIA OF, A PORTION OF THE BRAIN MAY OCCASION PALSY.—It was con-

tended above (§§ 458, 470), that suppression or interruption of the organic nervous or vital influence actuating the brain and its bloodvessels would necessarily be productive of apoplectic coma, and more especially of that form which was termed the nervous by KIRKLAND, and the weak, serous, congestive, &c., by various writers. Although this state of the organ is deducible from an attentive and intimate observation of the phenomena attending it, yet it seldom admits of demonstration after death; as this organ rarely presents, owing to the more immediate cause of death, and the changes attending and directly following dissolution, more or less congestion of its vessels. But that the brain may be the seat of anæmia, especially relatively to the usual states of its circulation, cannot be doubted. Indeed, the circumstance has been satisfactorily shown by the experiments of Dr. BURROWS, and often illustrated by the effects occasionally produced by ligature of the common trunk of the carotid artery.

509. Some of the most conclusive proofs not only of the production of palsy, most commonly of hemiplegia, by anæmia, or an interrupted supply of blood to a portion of the brain, but also of the development of non-inflammatory or pale softening and imperfect nutrition of the part thus deprived of its supply of blood, are those furnished by the operation just adverted to. I have not had an opportunity of observing any case of hemiplegia produced by ligature of the carotid artery; but several have been recorded, and have been referred to by Dr. T. R. BENNETT, in his very able account of the recent Progress of Pathology and Practical Medicine (*Brit. and For. Med. Review*, vol. xx., p. 259). After the operation of ligature of the right common carotid by M. SEDILLOT, complete palsy of the right side of the face and left side of the body followed; and the patient was deprived of intelligence so far as to be hardly able to comprehend questions put to him. He died nine days after the operation, and the right side of the brain was found somewhat diminished in consistency, and deprived of its due proportion of arterial blood. In a case by Dr. FAIRFAX (*Med. Gazette*, vol. i., 1843-4, p. 351), hemiplegia of the opposite side, but without palsy of the face, followed a similar operation. Mr. VINCENT recorded a case which terminated fatally on the seventh day, after

the right carotid artery was tied, with hemiplegia of the left side. Pale softening of the right hemisphere of the brain was found after death.

510. A most interesting illustration of the effects produced by interruption of the circulation to, and consequent anæmia of, a portion of the brain, has been furnished by Dr. TODD (*Medico-Chirurg. Transact.*, vol. xxvii., p. 301). A stout man, aged 37, became the subject of dissecting aneurism of the aorta, innominata, and right carotid arteries: the blood having formed a new channel for itself, splitting up the middle coat along these arteries, and plugging up the right carotid artery, and completely arresting the circulation through it. The patient had suddenly been seized with syncope, followed by heaviness and drowsiness, and these soon afterwards by paralysis of the left side of the face and left side of the body, attended by a subsultus of the palsied arm. Sensation was not affected, and reflex movements of the palsied limbs could not be excited. He gradually sank, and died on the eleventh day from his seizure. On examination after death, the right side of the brain was much paler than the left. When the hemispheres were cut into the exsanguineousness of that on the right was very manifest from the total absence of bloody points, which, however, existed in their ordinary number in the left hemisphere. The vessels of the circle of Willis were pale and empty, especially the right carotid and its branches, but free from disease. "The cut surface of the centrum ovale on the right side presented the appearance as if it had been worm-eaten in patches. Each patch was from half an inch to an inch in diameter. It had the same colour as the surrounding brain-substance, but was evidently diminished in consistence: the slightest lateral friction with the edge of the knife completely disarranged it; and when a stream of water was poured upon it, it was broken up into shreds, which floated in the water. These patches were very numerous: they were found in all that part of the hemisphere which is above the fissure of Sylvius; each was surrounded by cerebral substance of nearly natural consistence. Many of the patches were superficial, and involved portions of the gray matter of the convolutions, which exhibited the same degree of softening. They were all perfectly free from admixture with any foreign material, such as pus or blood. I

searched for the former by the aid of the microscope, but could find no trace of it. Nerve tubes were seen in their ordinary number, which seemed easily broken up, and very varicose. The right half of the fornix, and the septum lucidum were likewise extremely soft. The paleness of the gray matter of the convolutions on the right side particularly attracted notice. No appearance of red blood was visible to the naked eye. On the left side the colour was perhaps a little paler than is natural. The bloodless state of the right side was strikingly evinced by the extreme paleness of the choroid plexus on that side, while that of the left side retained nearly its natural colour. That part of the right hemisphere which was below the floor of the fissure of Sylvius appeared much paler, and rather softer than is natural; but did not exhibit the patches of softening above described. The same remark is applicable to the right hemisphere of the cerebellum." (Pp. 314-316.)

511. The above is an admirable description of changes sometimes consequent upon a complete obliteration, whether by ligature or by disease of the common carotid artery; and most satisfactorily illustrates the non-inflammatory form of softening described above (§§ 262, *et seq.*), and the dependence of palsy occasionally upon anæmia of a portion of the brain, and upon the consequent softening of that portion which, in this case, as well as in those produced by ligature of the carotid, arises in a similar manner to the senile gangrene caused by obstruction of the arteries supplying the gangrenous part, as suggested by M. ROSTAN, or rather by the more immediate death of the part, owing to the supply of blood to it being cut off.

512. iii. OF THE MECHANISM AND FUNCTIONS OF THE SPINAL CORD.—It is necessary to the due consideration of certain topics connected with an important class of paralytic cases to premise a few remarks on the mechanism and functions of the spinal marrow.—A. According to the researches of STILLING, VAN DEEN, and BUDGE, the spinal cord consists, *firstly*, of perpendicular fibrils, forming the white substance of it; *secondly*, of transverse fibrils, and of very delicate longitudinal fibrils, constituting the cineritious or gray substance of the cord; the transverse fibrils crossing at right angles, and forming a net-work with the longitudinal both of the gray and of the white substances; *thirdly*, of

corpuscles of an angular form, with nucleated or projecting processes, scattered in groups through the anterior gray matter only, and most numerous at the origin of the anterior roots of the nerves; *fourthly*, of transverse fibres passing directly from the posterior to the anterior gray substance of the cord.

513. The roots of the nerves are direct prolongations of the gray substance. Fibrils pass from the gray through the white substance into the roots of the nerves. Dr. STILLING traced fibrils from the posterior roots to the anterior gray masses. And fibrils, almost as soon as they enter the cord, run between bundles of fibrils of white substance to join other bundles of fibrils from adjoining nerves. Others, in fasciculi, form loops with fibrils coming from the next nerve; and others appear as continuations of the transverse ray-like fibrils of the posterior gray substance, while the connection of the anterior roots with the anterior gray substance is still more distinct. The nucleated processes or corpuscles of this substance are in immediate connection with the primitive fibrils of the roots of the nerves.

514. The afferent properties of the posterior, and the efferent properties of the anterior divisions of the cord are rendered more manifest by the above results, at which the above-mentioned anatomists have arrived. But, according to Dr. STILLING'S experiments, the longitudinal fibrils of the anterior white substance do not transmit volition to the nerves, this office being performed by the longitudinal fibres of the anterior gray substance. As the transverse fibrils are prolonged into the nerves, and as we know that the posterior nerves are necessary to sensation, so it may be inferred that the posterior transverse fibrils are excitors of the posterior longitudinal fibres of the gray substance, and that a sensation, or rather the sensitive impression, is transmitted by the posterior transverse fibrils, and by the longitudinal fibres, to the sensorium; the same relations, *mutatis mutandis*, being conceded to the anterior gray fibres. As centripetal impressions pass from the sensitive nerves along the transverse and longitudinal fibres of the posterior gray substance to the brain, so centrifugal impressions may pass in a contrary direction; that is, from the brain along the longitudinal and transverse fibrils of the anterior gray substance to the roots of the motor nerves.

515. Such being the mechanism of ordinary sensation and motion, according to the recent researches of STILLING, VAN DEEN, BUDGE, and others, it can be no longer difficult to account for those involuntary movements which are produced in a paralysed limb when the surface of it is irritated, pinched, or tickled, and which have been termed by Dr. M. HALL reflex actions, depending, according to him, upon a reflex function of the spinal cord, which function he refers to a distinct mechanism in the cord. But no such mechanism exists, for these actions are sympathetic, and result from the conformation of this part of the nervous system, transverse fibrils passing, as shown by the anatomists just referred to, directly from the posterior to the anterior gray substance, to convey impressions from the sensitive fibrils and to excite the roots of the motor nerves. That no appropriate and peculiar structure exists in the cord for the purpose of performing these sympathetic or reflex movements, beyond what has now been noticed, is the opinion not only of the author, but also of the writers already mentioned, as well as of many others who have investigated the subject.

516. *B.* Dr. M. HALL has contended that the spinal cord is the source of *muscular irritability*, and that this irritability is exhausted by volition. In proof of this opinion he states that paralytic limbs are more readily agitated by galvanism and strychnine than sound limbs, when the cause of palsy is in the brain; the paralysed muscles being in such cases more irritable than natural, whilst they are less irritable when the palsy proceeds from changes in the cord. The irritability is thus considered to be increased in the former case, owing to its not being exhausted by volition, and to be diminished in the latter, owing to the lesion affecting its source. But experience shows the inaccuracy of this inference; for the paralysed muscles in cases of cerebral paralysis are not more irritable than the sound muscles, but on the contrary less so; and Dr. TODD and Dr. PEREIRA have come to a similar conclusion. But Dr. HALL contends, that the greater irritability of these muscles, in cerebral paralysis, is shown by the more marked effects of weak currents of voltaic electricity in these than in the sound muscles. Certainly in some cases in which I employed this agent in paralysis, the results agreed with those of Drs. TODD and PEREIRA; but these results have been imputed by Dr.

HALL to the much greater power of the agent employed. When treating of *irritability* in another work, I have adduced my views, as promulgated many years ago, respecting the source of this property,—have stated that it proceeds from and depends upon the organic or ganglial nervous system; and have contended that it does not arise from the spinal cord and nerves, although it is rendered more energetic and perfect in the voluntary muscles by the supply of nerves which they receive from the cord. The truth is, that the tone, rigidity, and irritability of all paralysed muscles are more or less impaired,—the less so when the lesion is in the brain, and high in the cord. Still, it cannot be doubted that strychnine or nux vomica affects these muscles more readily and more remarkably than the sound muscles. These facts may be explained, partly by referring to the minute structure of the cord, and partly by the circumstance that this substance is rapidly absorbed, and acts energetically on the structure of the cord and origins of the spinal nerves, the weakened nerves and muscles being more susceptible of the stimulus than those which still retain their healthy energy and tone.

517. The fact that mental emotions often excite parts which are paralysed, is also explained by the mechanism of the cord, and by the circumstance so strongly insisted on by BICHAT, but since so much overlooked, that mental emotions powerfully affect the ganglial and sympathetic nerves, and, through them, the spinal cord and the nerves proceeding from it; the sympathetic nerves communicating freely with the cord and roots of the spinal nerves, and contributing numerous fibrils to the latter, to be distributed with them to the parts they supply.¹ That volition, when continued

¹ The views published by the Author in 1822, in the *London Med. Repository*, and, in 1824, in his *Physiological Notes, &c.*, to M. RICHERAND'S *Elements of Physiology*, as to the independent and distinct constitution of the organic or ganglial class of nerves, as to the functions and relations of this part of the nervous system, and as to the influence exerted by this system on the vascular system on the one hand, and on the cerebral system on the other,—in short, the positions thus taken, from researches in various classes of animals, that all organs and parts which are necessary to the life of the individual animal, and to the perpetuation of its species, are supplied by ganglial or organic nerves in proportion to the importance of each organ, and to the activity of the several organic processes,—have been recently fully confirmed by the researches of STILLING, BIDDER, VOLKMANN, WALLACE, HANNOVER, R. LEE, and others.

or energetic, exhausts the irritability of voluntary muscles, is admitted; and hence the sense of fatigue, lassitude, and even of soreness or pain, which often follow such exertion.

518. *C. The relaxation of the sphincters*, occasionally observed in palsy, especially in paraplegia and general palsy, has been viewed as a phenomenon of more general occurrence than it really is. The fact is, that the sphincters are not so frequently relaxed as they are imperfectly influenced by the will, or are not at all affected by it. They still retain much of their tonicity; but volition is not so energetically exerted on them as to counteract the actions of the hollow viscera, when these viscera are excited by an accumulation of their respective contents, or by medicine.

519. The *tonicity* or power of the sphincters has been attributed by Dr. M. HALL entirely to the spinal cord, and without reference to any influence they may derive from the organic or ganglial nervous system. But although they derive a share of their power, more especially the voluntary increase of power as circumstances may require it, from the cerebro-spinal axis, their continued state of tonicity is chiefly to be attributed to the organic system of nerves. This is shown in paraplegia and in general palsy, in both which the sphincters very often retain a natural condition of contraction; but that contraction is frequently not increased by volition, so as to resist the actions of the bowels or urinary bladder. In some cases of these states of palsy, the sphincters are not much affected, especially when the palsy is incomplete, or seated high in the cord.

520. Pathological evidence, indeed, clearly leads to the inferences,—1st, that the power of the sphincters is attributable chiefly to the organic nervous system, but that it is increased by volition exerted through the medium of the spinal nerves, especially in circumstances requiring such increase, as when the actions of the bowels or bladder are to be resisted, and 2d, that it is chiefly this latter influence, or that which is exerted through the spinal cord, that is either lost or impaired, in cases where the voluntary contractions of the sphincters are insufficient to prevent the passage of the excretions when the patient wishes to retain them. It is not, therefore, to be inferred that, where there is insufficient control over the evacuations, the sphincters are either relaxed or materially deficient in power; but that they are

only insufficiently influenced by volition, relatively to the power which overcomes their natural tonicity.

521. *D. Of the influence of the different columns of the spinal medulla and roots of the spinal nerves upon the sensitive and motor powers.*—Since the researches of Sir C. BELL and M. MAGENDIE on this subject, it has generally been supposed that, whilst the antero-lateral columns of the cord convey the motor power, the posterior transmit sensations. Several pathological facts, independently of the experiments of some physiologists, have, however, made it appear doubtful whether or not the power of motion and sensation are severally conveyed through these channels only, and in the precise manner just assigned. There can be no doubt, however, that volition is transmitted along the anterior columns of the cord, the anterior roots of the nerves, and the corresponding nervous fibrils, to the muscles which are acted upon; and that sensation generally is conveyed in an opposite direction, namely, from the surface of the body along the sensory nervous fibrils, the posterior roots of the nerves, and the posterior columns of the cord, to the brain. But, although it seems satisfactorily proved, that the acts of volition cannot be fully and precisely performed, unless the channels by which volition is transmitted continue sound or not materially injured, together with the corresponding portions of the fibrous structure of brain, still it is very doubtful whether or not the posterior columns of the cord are as exclusively devoted to the conveyance of sensation as the anterior are to the transmission of volition. Indeed, the cases recorded by various writers, and especially those by RULLIER, STANLEY, WEBSTER, and others, prove either that the lesions observed in the posterior columns of the cord have taken place at the moment of, or immediately after dissolution, or that sensation may be transmitted through other channels besides these columns, or even independently of the spinal cord itself. That the former of these alternatives cannot be the cause, at least to any considerable extent, is shown by the history of the cases and the nature of the changes which have been observed. It should, however, be admitted that, where softening of the cord is observed, greater doubt may be entertained; for this change, when it has commenced before death, particularly as a consequence of inflammation, will often proceed and extend

very rapidly immediately afterwards, so as to be both complete and extensive at the time of inspection. Still, conceding all that may be inferred from this circumstance, pathology furnishes sufficient proofs that sensations may be conveyed to the brain by other channels in addition to the spinal cord, especially when the alterations in the cord, rendering it incapable of discharging this function, take place slowly or gradually.

522. Experimental proofs of the existence of these other channels, and evidence respecting them cannot be furnished with the force of demonstration; for however conclusive experiments performed on the higher animals, with the view of furnishing such evidence, may appear in the eyes of the experimenter, they will admit of other and often very different conclusions from those which he may draw from them, and the phenomena observed in the lower animals, particularly those which cannot audibly express their feelings, may be ascribed to other than the real causes, or differently explained. We can, therefore, in the present state of our knowledge, only infer, from the history of diseases implicating the spinal cord, and from what we know of various inconclusive and not always truly or correctly observed experiments, that changes produced in parts or surfaces of the body may become objects of consciousness, in certain circumstances at least, without the intervention of the spinal medulla; but as this cannot take place unless sensation may be transmitted by a different channel, it remains to inquire what that channel is, or whether or not various parts of the nervous system may, in certain circumstances, or to a certain extent, perform this function.

523. When we recollect that communicating branches run between the ganglionated or posterior roots of the nerves and the great sympathetic on each side; that ganglial nerves may be traced in their course from the sympathetic into the spinal ganglia and cord on the one hand, and from the latter into the sympathetic and ganglia on the other, we cannot but infer, not only that sensation may be transmitted, or more correctly that impressions on the surface may be conveyed to the brain so as to excite consciousness, by a different route than that of the spinal cord, especially under circumstances of gradual change in the cord, rendering it ultimately incapable of discharging this function, and that this other route is through the sympathetic nerves and

their communications with the posterior roots of the nerves and spinal medulla.

524. The indirect character of this channel may appear an argument to some against the accuracy of this inference; but we know that, in cases of obstruction to the usual channels of circulation in the vascular system, very circuitous courses are developed in order to preserve an organ or limb, and the nervous system presents many points of analogy with that system, especially a transmission of sensation from the periphery of the body, and from the several organs and structures to the more central nervous masses, and a similar circulation or return of nervous agency in the form of motion and determinate muscular contraction. The analogy may be further pursued; but the several points are so obvious that they require not even enumeration at this place. Moreover it should be considered that, in respect of sensations excited in any of the abdominal or other viscera, it is very doubtful whether the spinal cord is the channel by which the impressions or changes in the viscera are transmitted to the brain, or whether the sympathetic nerves and communicating branches between the ganglia are the courses which are pursued. Indeed, there appears little doubt of the latter being the actual channel of conveyance; for impressions on or changes in the viscera, especially those of digestion and assimilation, are as vividly and as rapidly conveyed to, and made objects of consciousness in, the brain, in cases of injury or even of complete division of the cord, as in sound health.

525. The above considerations may serve as reasons wherefore sensation remains unimpaired, or but little affected, in very many cases where the cord is diseased or injured so as to be incapable of transmitting the impulses of volition, particularly when the lesion is high in the cord, and when it has advanced slowly or gradually. They may also account for the rare occurrence of entire loss of sensation in connection with any form of palsy of motion.

526. *E. Various sympathetic phenomena occur in connection with paralysis*, especially with the paraplegic states of the disease, that require particular notice. Some of these admit of different explanations, and thus have been differently accounted for, both by former and contemporary writers. Of these, the *reflex motions*, which sometimes are

observed upon irritating the surface of a paralysed limb, have attracted most attention, and have directed the researches of physiologists more particularly than heretofore to the structure and functions of the *spinal cord*. I need no further advert to these researches at this place than to remark, that the phenomena which Dr. M. HALL has assigned to a reflex function of the spinal cord were fully recognised by WHYTT, but not explained by him as occurring independently of sensation. He, however, believed that the power of feeling was not limited to the brain, but was extended to the spinal cord. PROCHASKA afterwards more correctly appreciated the true source and relations of these phenomena. In my appendix and notes to M. RICHERAND'S *Elements of Physiology*, I attributed these and other phenomena to *reflex sympathy*; and when explaining the involuntary muscular movement in *cholera*, *chorea*, and *convulsions*, in my work on *Pathology and Practical Medicine*, I ascribed these movements to reflex actions excited in the voluntary muscles by irritations transmitted to the roots of the spinal nerves and spinal cord. Subsequently to the publication of these, Dr. M. HALL'S researches appeared. He referred these phenomena to a special organization of the cord; and his opinion received the support of Mr. GRAINGER, Mr. NEWPORT, and others, although opposed by some eminent anatomists. The structure of the nervous system, in the class *articulata*, is the chief circumstance that can be adduced in favour of the existence of a spinal organization for reflex actions in the higher animals. But reflex actions—phenomena which I denominated many years ago (1824) "*reflex sympathies*"—are performed not only by the spinal cord, but also by the *brain*, and by the *organic* or *ganglial nervous system*.

527. *a.* As respects the *brain*, no sooner are the impressions on the senses made objects of sensation or consciousness than they are reflected upon or treasured in the memory, and, either instantly or at some future period, excite to action. The manifestations of life, through the medium of an encephalon, are the phenomena to which the term *mental* has been usually applied; which consist chiefly of impressions on the senses, rendered objects of consciousness and of reflection by this organ, and which subsequently are re-combined, compared, &c., and thus often

become causes of volition. Many of the impressions on the senses are so strong as instantly to impel to action, without any intermediate state of reflection; or, in other words, the actions or volitions are so instantaneously consequent upon the impressions and impulses, that the intermediate reflections are not made objects of consciousness, or are not remembered. This is especially the case when the impressions on the senses excite the emotions or passions, and when the individual has been habituated to act upon them without allowing, or being capable of, intermediate reflection. These reflex actions, even when not directly proceeding from impressions on, or reports of, the senses, are nevertheless the results of such impressions or reports, received, remembered, or reflected upon at some antecedent period.

528. β . The reflected actions of the *spinal cord* may occur, as Dr. M. HALL has shown, independently of sensation, although sensation often attends, or is excited by, the impressions which occasion them. They may even be so morbidly strong as not to be controlled by the will, when the individual is most conscious of their presence, as in tetanus.

529. γ . The reflected actions of the *ganglionic nervous system* are only objects of consciousness when they are excited by powerful stimulants or irritants; and in diseases affecting the viscera which this system actuates, more especially the hollow viscera, and involuntary muscular structures.

530. Thus, there may be said to be *three classes of reflected actions*, viz., 1st, that class of actions which may be denominated *psychical*, or *cerebral*, or which results either directly from impressions made upon the senses, or indirectly or reflectively from these impressions:—2d, that class which may be termed *animal* or *spinal*, which proceeds from impressions or irritants transmitted to the spinal cord or roots of the spinal nerves, and is reflected thence by the motor nerves to voluntary muscles, and which may occur independently of the brain:—and 3d, that class which is *organic* or *vital*, which takes place in parts supplied only or chiefly by the ganglial system, and which is independent of both the brain and spinal cord.

531. But if it be conceded that the reflex actions of voluntary muscles be the result of a “function” which the

spinal cord is organized and destined to discharge, as contended for by Dr. M. HALL, instead of being merely reflex sympathetic contractions, as I have stated on various occasions, how can the phenomena characterizing catalepsy be reconciled with, or explained by, the former doctrine? for in the cataleptic state, however induced, the muscles of voluntary motion—even those of the face and the eyelids—do not contract upon irritating them; nor are they influenced by the will of the patient, which is generally attempted to be excited when consciousness is not altogether abolished. The sensibility, indeed, is generally not lost altogether during the cataleptic attack, although it is more or less obscured in most cases. In a patient who is liable to attacks of this complaint, and whom I have often seen during their continuance, the eyelids and all the voluntary muscles retain the positions in which they are placed; but not the least appearance of contraction of any part is manifest upon the most energetic irritation. Still, this lady feels, sees, and hears obscurely during the continuance of the seizure. She even wills the action of the muscles; but volition is not transmitted to them. The voluntary muscles of respiration are generally the first to act upon the return of voluntary power. In another case which I had an opportunity of observing during the attack, the sensibility was somewhat more diminished than in the foregoing; but I have not met with an instance of its entire abolition. The sphincters are always unaffected in this disease. The respiratory movements are slight, and perceived with difficulty; the impulse of the heart is weak, and the pulsations generally accelerated and soft, sometimes slow or irregular; but in neither of these cases, which recently came under my close observations, nor in others which I had previously seen or treated, could reflex movements,—“excito-motory actions”—be produced in any muscle by the most intense irritation.

532. The movements which take place in *sleep* have been adduced in support of an inherent reflex function of the spinal cord occurring independently of sensation. A person turns or moves whilst asleep, owing to a feeling of uneasiness, which, although not remembered by him when awakened, has, nevertheless, been produced, so as to cause the change of position which could not be produced without

an exertion of volition; for it is not established that a momentary sensation, and a consequent act of volition, are not the immediate causes of the change. Even in experiments showing the occurrence of motion after the removal of the hemispheres of the brain, or even of the whole encephalon, the non-existence of sensibility in the animals thus experimented upon, at least for a short time after decapitation, is not demonstrated; more especially in the lower animals, in which animal sensibility is so intimately connected with organic sensibility, and with contractility. Indeed, sensation has not been proved to be limited to the cerebral hemispheres, nor even to exist in them; they having to perform other functions, of which the sentient principle, presiding most probably in some other part of the encephalon, as the medulla oblongata, or its vicinity, takes due cognisance.

533. iv. OF THE INFLUENCE OF CONGESTION OF THE VENOUS SINUSES OF THE SPINE IN CAUSING PALSY.—
Congestion of the venous sinuses, seated between the theca of the cord and the bodies of the vertebræ, has been already assigned as a pathological cause of palsy, or one of the most important changes upon which the paraplegic states of palsy depends. It seldom is found unassociated or alone after death, and in the most complete states of the disease, as it generally superinduces more or less extensive changes in the cord and its membranes before dissolution takes place. Several of the more remote causes of palsy act by producing, in the first place, congestion of these *sinuses*, which were even imperfectly described by anatomists, until M. BRESCHET directed more particular attention to their structure and connections. But the pathological relations of congestion and of obstruction by fibrinous coagula or concretions in these sinuses have been entirely overlooked.

534. It will soon become obvious to those who make the early phenomena of disease objects of observation and study, that whatever depresses organic nervous power will soon be followed by venous congestion, and when this depression—whether primary or consecutive of nervous or vascular excitement—has been preceded, or is attended by circumstances producing increased determination to, or fulness of blood in, the capillaries of the cord or its membranes, this

consecutive congestion of the spinal sinuses is the more prone to occur. In its primary or uncomplicated states it seldom produces more serious effects than pain, stiffness, or weakness of the back, loins, and lower extremities, sometimes amounting to incomplete palsy of motion of the latter; or numbness or impaired sensibility of the lower limbs; often with pain and constriction around the abdomen; and when the weakness or imperfect power of motion is associated with pain, this state is generally confounded with rheumatism or with neuralgia, if the pain is severe and follows the course of a nerve, or with an attack of gout when it occurs in the gouty diathesis, or is followed, as it often is, by a regular gouty attack.

535. Congestion of these sinuses occasions first retarded circulation in the cord and its membranes, subsequently an increased serous secretion or effusion between the membranes. Unless the congestion be very great it can hardly be expected that it should act injuriously on the cord by pressure, or counter-pressure of it against the posterior parietes of the spinal canal. Still, one injurious effect may be produced in this way, particularly when the congestion has superinduced distension of the capillaries of both the cord and the membranes with increased serous effusion between the latter.

536. In these more extreme cases, when ulterior changes have taken place, it is not unlikely that *the roots of the nerves* will also suffer from unaccustomed pressure, and, in those cases, the posterior or gangliated roots are the more likely to experience it, and paralysis of sensation will be present in a greater or less degree, and even be the more complete, inasmuch as the lesion implicates those parts of the roots of the nerves which communicate with the sympathetic, as insisted upon above (§ 523). In cases also of caries and angular curvature of the spine, where not only congestion of the vertebral sinuses but also pressure and counter-pressure of both the cord and roots of the nerves, and even of the nerves themselves, as they pass through the spinal foramina, are apt to take place, palsy of sensation is then present, but only in degree proportionate to the extent of pressure on the roots of the nerves, and only in those cases where the nerves or their roots, especially the posterior, are implicated.

537. Congestion of the spinal sinuses, with more or less of the consequences now mentioned, is a frequent attendant upon *fevers*, particularly the more adynamic and congestive forms of fever, occasioning not merely pains and weakness of the back and limbs, and incomplete palsy of motion of the lower extremities, but also more or less of the affection of the urinary organs already mentioned (§ 102, 103). Many of the cases described as those of spinal irritation, of hysterical neuralgia, or of uterine irritation, &c., actually are instances of congestion of the spinal sinuses, occasioning remote or sympathetic phenomena in addition to those which are more strictly local. These are often removed or partially relieved for a time by the natural recurrence of the catamenia; but when more extensive or severe, or when associated with suppression of this discharge, they sometimes lapse into paraplegia or partial palsy, especially when neglected or injudiciously treated, owing to an increase of the congestion, or of its consequences. In this way paralytic affections may supervene upon various diseases, and more especially on those already noticed in connection with palsy; for changes seriously or structurally affecting the circulating apparatus of the spine will ultimately implicate the sheath, and the membranes of the spinal cord, and even the cord itself.

SECTION VII.

OF THE TREATMENT OF PALSY AND APOPLEXY.

538. THERE are no diseases which require greater powers of discrimination in the physician, or greater acumen in detecting important pathological conditions, or a wider range of resources on his part, or more appropriate means of cure, than the maladies under consideration. According to the nature of the morbid actions and organic lesions which occasion these maladies, not merely modified, or different, but even very opposite agents are required. Even when the states of the disease may appear identical to the uninstructed observer, yet to the learned, the experienced, the close and the discriminating physician, these states may furnish indications requiring very different or even opposite plans and measures of cure.

539. A due consideration of the treatment of *Apoplexy* and *Palsy* hardly admits of the separation of these maladies. Their intimate connection has been already commented on (§§ 1, 2); and at this place their treatment will be discussed, both in connection and separately, according as they may present themselves in practice. I shall therefore consider—1st. The means which should be pursued when an attack, either of apoplexy or of palsy, is threatened,—the preventive or prophylactic treatment: 2d. The treatment of the forms and complications of Apoplexy: 3d. The treatment of the several forms and complications of Palsy; and 4th. The consecutive treatment,—the method to be pursued during convalescence from Apoplexy and Palsy, in order to prevent a renewed or a more severe attack.

CHAPTER I.

OF THE MEANS WHICH SHOULD BE EMPLOYED WHEN AN
ATTACK OF PALSY OR APOPLEXY IS THREATENED.

540. THERE are certain *indications, symptoms, and signs* which may be viewed as the *preludes* of an attack either of apoplexy or of palsy. These are not always observed; or they are sometimes so slight, so evanescent, or so closely precede an attack, as not to be brought under the cognizance of the physician, or not even to rouse the fears of the patient. But they are much more frequently sufficiently indicative of the event to excite the attention of both the patient and the physician, especially when they are produced by softening of the brain or by inflammatory action in any of its forms or states affecting a portion of the brain or of the spinal marrow, or of their envelopes. Whenever one or more of the symptoms enumerated above as premonitory of an attack of apoplexy or palsy, are observed, more especially great impairment or loss of memory, or of the mental powers generally; irritability of temper; great mental depression; pains in the head, attended by sickness of stomach; a hesitation of speech, difficulty of articulation, or the substitution of one word for another; startings of the limbs, or numbness, tingling, or darting neuralgic pains in them; partial or local states of incomplete palsy; a marked weakness or a manifest and persistent change of temperature of one or more of the extremities, especially a burning heat of the soles of the feet or palms of the hands, and any of the other indications enumerated above (§§ 181, *et seq.*) are present, then the case should be carefully watched, and means ought to be used, which may appear appropriately to the circumstances of the case, the most likely to remove the existing ailment, and to prevent its issue in a more severe attack.

541. It is difficult, however, to state the means which may be resorted to with this view, as they always ought to be prescribed with strict reference to the particular circumstances of the case, which are almost always different, and

not infrequently even opposite, in different cases. A strict regard must necessarily be had to the habits, age, and constitution of the patient; to the predisposing and exciting causes; and to the evidences of previous ailment or existing disorder in remote but related organs. The character of the countenance; the state of the pulse, particularly in the carotids; the temperature of the head; and the abdominal functions, secretions, and discharges must be our chief guides. It should not be overlooked in this stage any more than when the disease is fully formed; that it may result from nearly opposite states of vascular action in the brain, and of the circulating system generally; that although the majority of cases are attended with that appearance of countenance and action of the arteries which warrant the inference of existing congestion, retarded circulation, or even increased vascular action in the brain,—there are others in which the external characters of the head, the face, and action of the carotids would lead us to infer, either that the vital energy of the organ is so far depressed as to give rise of itself to impairment of the cerebral functions, or that the incipient extravasation of blood or softening of the structure of the organ has occasioned either a slight shock to the vitality of the organ, or a proportionate loss of certain of the functions or manifestations which belong to the brain. Upon these changes vascular reaction sometimes supervenes, in either case, and thus imparts to the attack similar characters to those possessed by seizures which originate in, or are, from their commencement, attended with vascular turgescence or increased action.

542. In the premonitory state of either apoplexy or palsy it scarcely can be admitted that extravasation of blood or its consequences has yet occurred, unless in those cases where paralysis has already appeared, and which often pass into apoplexy; but the signs of incipient congestion, or increased action, are frequently present; whilst, also, in many other cases, the symptoms of exhausted or depressed vital power are manifest; this latter state being more frequently antecedent to congestion of the capillaries than is generally supposed, although the fully-formed disease may evince inordinate action, with all its usual consequences. Even in the early stage of an attack this state of the vital power of the organ will often constitute so important a part of the disease, and will yet be attended only by simple congestion

and retardation of the circulation, that the use of stimulants may then be beneficially resorted to ; whilst soon afterwards, when reaction has supervened, these means would no longer be admissible, vascular depletions, &c., being then required.

543. We should, therefore, endeavour to interpret correctly the origin of the premonitory symptoms, and prescribe accordingly. If the countenance is full or flushed, or the veins in the temples turgid, the eyes prominent or suffused, or the head hot, or the pulse in the carotids full or strong, or if the pulse be hard or accelerated, *bloodletting*, general or local, but preferably cupping on the nape of the neck, should be prescribed. If these symptoms have come on after the disappearance of hemorrhages and discharges, this treatment is still more imperatively required, and means should be directed to the restoration of the pre-existing disorder, assisted by other means, such as irritating purgatives, *revulsants*, and external derivatives.

544. When, on the other hand, the action of the carotids is weaker than natural, the countenance sunk or pale, and the head cool, &c., opposite measures are called for: *restoratives*, antispasmodics, and stimulants are here of service, but their use requires caution ; for if the pulse in the carotids is full, or strong, or at all above the natural standard, although the countenance be sunk or pale, and if the attack threatens to commence with paralysis, stimulants given internally, or even the outward use of them, as volatile substances held to the nostrils, would be hurtful. In such cases, bloodletting must be resorted to ; and a *purgative* of quick operation, assisted by enemata, exhibited.

545. There are few cases, presenting even the premonitory signs of an attack of either palsy or apoplexy, that will not be benefited by a judicious use of *purgatives*, particularly such purgatives as are suited to existing disorder of the digestive and biliary organs. In those cases which evince a disposition to vascular excitement of the brain,—where the premonitory signs are accompanied with plethora, heat of the head, injection of the conjunctiva, distension of the veins in the temples, and flushed countenance,—after depletions and purgatives have been resorted to, the potassio-tartrate of antimony, or *James's powder*, given in moderate doses, and combined with saline medicines so as to act gently

upon the skin or the bowels, and continued for some time, has always appeared to me productive of advantage: but it is only in such cases that antimony is useful as a prophylactic; where, also, *digitalis* may be given with the view of lowering the action; but its use, in these cases, requires great caution.

546. When the incipient symptoms present much of the character of vital exhaustion of the brain, the combination of purgatives with gentle *stimuli* and *vegetable tonics* and stomachics has proved the most successful in my practice. If the symptoms appear after the suppression of hemorrhoids, *aloetic* cathartics, or the extract of *colocynth*, combined with *calomel*, are amongst the best that can be employed; as they tend to induce, by their action on the rectum, a return of the hemorrhoidal affection.

547. In threatened apoplexy, or palsy from congestion and impeded circulation through the heart, lungs, or liver, local bloodlettings and purgatives are necessary. But when the obstruction is in the heart, bloodletting must be practised with great caution and moderation. In cases characterized by a combination of either of these states with exhaustion or debility, the abstraction of a small quantity of blood by *cupping*, and afterwards *dry-cupping*, issues, or blisters, are sometimes very serviceable. These may afterwards be followed by gentle restoratives.

548. The insertion of *setons* or *issues* in the nape of the neck, or the use of the tartar-emetic ointment; and in very urgent cases, large or long issues in the scalp of the occiput, particularly when the precursory symptoms evince a paralytic character; cold-sponging the head night and morning, or the shower-bath, with a free state of the alvine secretions and excretions, especially where there is a disposition to congestion, or increased action in the brain, and after bloodletting has been employed; stimulating or irritating *pediluvia*, or a blister applied to the nape of the neck and kept open for some time, in similar cases and preceded by the same measures, constitute important items of the prophylactic treatment of both apoplexy and palsy.

549. If the history of the case and of the symptoms suggests the existence of *softening of the brain* (§§ 262, *et seq.*), or incipient inflammatory disease of the spinal cord; and if general plethora, or determination of blood to, or congestion

of the brain be present, local depletions by cupping, according to the apparent amount of these disorders, are indicated, and are beneficially followed by external *derivants*, and by *alteratives*. In these, as well as in similar or allied cases, or whenever an attack of palsy or apoplexy is dreaded, the *bichloride of mercury*, in doses varying from the twenty-fourth to the twelfth of a grain, may be given twice or thrice daily, with any of the preparations of *sarza*, or in any other vehicle suggested by the peculiarities of the case; or the *iodide of potassium*, or the *iodide of mercury*, or FOWLER'S *solution of arsenic*, or the solution of the *iodide of arsenic and mercury*, or the *liquor potassæ*, may be prescribed, in small doses, and in prolonged courses, either singly or in conjunction with other medicines, as *sarza*; these being the most likely to remove the morbid states of the arteries and capillaries of the brain, and the tendency to softening of the cerebral structure, upon which the majority of cases of palsy and apoplexy depend (§§ 205, 262).

550. When indications of *incipient paraplegia* appear, the symptoms and signs more directly depending upon the state of the spinal marrow and its envelopes should be then carefully investigated, and the causes of the affection and the entire history of the case attentively considered. If symptoms denoting inflammatory action, or even congestion, be present, scarification and cupping over the spine, followed by external derivation and discharges, and the medicines just mentioned, will be necessary: but if the affection be not thus characterized, and, more especially, if it be traced to exhausting influences, and particularly to venereal excesses or manustupration, the restorative means which I shall have to advise for the more fully-developed states of paraplegia arising from these causes, especially the muriated tincture of iron, or the nitro-hydrochloric acids, should be employed.

551. There are no diseases for which it is more requisite most sedulously to avoid all the *predisposing* and *exciting causes* (§§ 419, *et seq.*), as soon as premonitory indications of their approach can be detected, than those now under consideration. These causes should be rigidly investigated in relation to the case under treatment, and their influence upon health fully explained to the patient. If the patient has been accustomed to partake too freely of animal food,

or of malt or vinous liquors, these should be very much diminished, and reduced to the lowest amount necessary to the support of the powers of life. All mental efforts, especially numerical or algebraical or other calculations, ought to be avoided; and whatever besides that may excite or exhaust the cerebral functions or the nervous power should be especially shunned. Crowded assemblies, overheated and ill-ventilated apartments, violent mental emotions, extremes of temperature, exposures of the head or back to great heat, especially to the sun's rays, and the application of cold to the lower extremities, should be guarded against. Accustomed discharges ought to be promoted or increased; and the abdominal secretions and excretions freely evacuated, and the *juvantia* and the *lædentia* most carefully observed.

552. *Exercise* in the open air, and especially walking exercise, should be taken regularly, but short of fatigue, and the mind be agreeably employed by whatever may gratify and amuse, without causing ennui or fatigue on the one hand, or excitement on the other. *Travelling* in various parts, during favourable seasons; short passages by sea; change of air and of residence; the enjoyment of a dry, temperate, and airy dwelling, and mental tranquility, are amongst the most beneficial means which can be recommended, whenever an apoplectic or paralytic seizure, the latter more particularly, is dreaded. But, in these circumstances, travelling on railroads ought not to be attempted, especially after a full or heavy meal; and if travelling on these roads cannot be avoided, the patient should not sit with his back to the engine.

553. When any of the *premonitory symptoms* of palsy or apoplexy occurs in a person whose parent or parents have died of either of these maladies, the above means and cautions are more especially required; for there is more or less tendency to cerebral or nervous diseases in the offspring of those who have been the subjects of them, especially when they arrive at that age in which their parents were attacked, and when they are exposed to other predisposing, and to the exciting causes of a seizure. At the time of writing this, there is a gentleman under my professional care for incomplete hemiplegia, whose father died of apoplexy, and his mother of paralysis, which terminated in coma; the latter at about the same age at which he has arrived: and some

months ago I attended a gentleman for hemiplegia, whose father and uncle had been similarly attacked. When premonitory symptoms of apoplexy, or the incipient signs of palsy, appear in persons thus hereditarily circumstanced, an external issue or drain, as a seton in the nape of the neck, or a course of one or other of the powerful alterative medicines particularized above (§ 549), should be entered upon, and duly persisted in; and if the constitutional powers of the patient be originally weak or exhausted, the *bichloride of mercury* should be conjoined with, or given in, the decoction or compound tincture of cinchona; or the preparations of *iodine* may be prescribed in these or similar combinations, or with the preparations of sarza. In the circumstances now more especially adverted to, as well as in others, when the treatment has prevented the accession of more serious disorder, without altogether removing the tendency to an attack, then the external and internal means already advised should not be relinquished, unless those which are prescribed hereafter for the consecutive treatment of the attack be substituted.

554. The *diet* of all persons disposed to or threatened by palsy or apoplexy, should be abstemious or even spare, especially when there is any tendency to vascular plethora; but it should not be too low where this state of the vascular system does not exist, and when the vital energies of the brain are already depressed or exhausted. In these latter, it should be of moderate quantity and digestible quality. In all cases, not merely ease of mind, but often an amused and a moderately exercised mind at intervals, should be encouraged; but care should be taken that, in cases attended by a determination of blood to the encephalon, or by increased vascular action in this organ, mental exertion should be altogether avoided; and that these states of the cerebral circulation should be gradually removed by moderate local depletions, by purgatives, by external derivatives and mustard pediluvia, and by the shower-bath or douche, commencing with slightly tepid water, and lowering the temperature gradually to that of a mean or spring temperature.

555. Although *exercise*, taken regularly and moderately, is generally requisite, especially when duly regulated according to the age and strength of the patient, all physical efforts or great exertion should be avoided, and stimulating *bever-*

ages interdicted. A few exceptions, however, may be made in favour of a very moderate recourse to the latter, especially when marked cerebral and constitutional exhaustion exists: in such cases the beverages should be gently strengthening, but not heating, and be used in great or cautious moderation.

CHAPTER II.

THE TREATMENT OF THE DIFFERENT STATES AND COMPLICATIONS OF APOPLEXY.

556. *The treatment of apoplexy* has long furnished subjects for discussion, not only as respects the more subordinate means of cure, but also as regards the most energetic measures, and the intentions with which they should be employed. This diversity of opinion is evidently owing to the difference which has been long acknowledged to exist in the pathological states constituting the disease, but which has recently been questioned. Without recurring to the changes so fully described above, I may remark that a person is seized with apoplexy, and, instead of being blooded, is treated with stimulants and restoratives, and yet he recovers without paralysis having supervened. Another person is blooded largely, and he also recovers. A third is treated in a similar manner, and he becomes hemiplegic in the course of the attack; and a fourth is also blooded and he dies. Now these are very common occurrences, and point to very important considerations, which I shall pursue a little further. A thin, spare, and debilitated man staggers as he walks, and falls down in the street, with pale countenance, feeble pulse, and laborious or slightly stertorous breathing. He is blooded by the nearest medical man almost immediately, and recovers. A large man, of a full habit and lax fibre, suddenly becomes apoplectic, and is instantly treated with stimulants, and volatile substances held to the nostrils, and his consciousness and voluntary motion are restored in a few minutes. One practitioner of large experience states, that he never draws blood from a patient in apoplexy, excepting under peculiar

circumstances, and avers that he is more successful in his treatment than those who do. Another considers that when one full bloodletting fails of giving relief, no benefit will be derived from pushing it further, but much risk of giving rise to paralysis. A third physician, equally eminent and experienced, confides in bloodletting almost solely, and carries it often to a great amount; and a fourth, whilst he discards depletion, trusts to stimulants chiefly.

557. But if we examine into their success, we shall find, perhaps, that some difference as to degree may exist; and that, whilst many patients seem benefited, others experience no relief, if they be not actually injured, by the kind of practice thus exclusively adopted. There is, however, one part of the treatment which is more or less adopted by all; this is the use of purgatives; which, when judiciously administered, are the most generally applicable and beneficial of all the means usually advised. Were it possible to ascertain during life the exact pathological condition obtaining in the various cases of apoplexy, and to convey a correct description of the signs by which each may be known, then the basis for a rational method of cure could be firmly laid; but the skilful practitioner is guided in the treatment he adopts by considerations, circumstances, and appearances, which scarcely admit of description; and all attempts to impart his knowledge comes far short of his wishes.

558. *Immediately upon an apoplectic attack*, the patient should be carried into a well-ventilated and spacious apartment, and placed with his head and shoulders very considerably raised, or in a sitting or semi-recumbent posture, with everything removed from his neck. Directions should also be given to have hot water in readiness. The countenance, state of the eyes and pupils, the degree of fulness, flushing, or pallor of the face, the temperature of the head, state of the pulse in the carotids, and condition of the limbs in respect of sensibility, capability of motion upon their being pinched, &c., ought to be carefully examined; and, according to the evidence thus obtained as to the state of internal lesion, the propriety of depletion, and the extent to which it is to be carried, should be promptly decided on.

559. *i.* TREATMENT OF APOPLEXY UNATTENDED BY DEPRESSION OF VASCULAR ACTION, OR BY MARKED EXHAUSTION OF

VITAL POWER.—*A.* If the pulse be strong, or full, and especially if the countenance be flushed, livid, and tumid, *general bloodletting* to a considerable amount, or according to its effect, is to be instantly employed. Much discussion has taken place as to the propriety of opening a vein of the paralysed or non-paralysed side, when paralysis accompanies the attack. ARETÆUS, VALSALVA, MORGAGNI, and CULLEN advise it to be performed in the sound side, whilst BAGLIVI prefers the other; this is, however, a matter of little importance.

560. *a.* The next points are the *extent* to which *bloodletting* may be carried, and how far certain states of the frame and pulse warrant the practice. In robust, plethoric, and full-living persons, particularly when the attack has proceeded from exciting causes, and paralysis is not present, from twenty to thirty ounces may be abstracted at once; and the operation may be performed a second or even third time to a less amount. When, however, the habit of body is spare, the person far advanced in life, the pulse not full or strong, or little fuller than natural, the heat of the head not increased, and the countenance neither full nor flushed, we must be cautious, and not carry bloodletting too far. In cases of this kind, *local depletions*, particularly *cupping* between the shoulders, or on the occiput, and leeches to the neck and behind the ears, seem preferable. *Age* is no reason against venesection, if the symptoms indicate its propriety; but very old age, even when the operation is otherwise indicated, is a strong reason for great caution in its adoption and performance. In aged persons local depletions are more serviceable; but even these employed either indiscriminately or too largely may occasion a very dangerous or even fatal collapse.

561. An *intermitting* or irregular pulse has very justly led practitioners to hesitate as to the employment of bloodletting. But a single symptom is not to guide us in the use of this, or any other remedy. If conjoined with either of these states there be slowness or fulness of pulse, stertorous or strong breathing, constitutional vigour and fulness of habit, tumid, flushed, or livid countenance, bloodletting, even to a very considerable extent—either general or local, or both—may be practised; but when, with irregularity and intermission, the pulse is also small, weak, or quick, the counte-

nance pale, the temperature of the head either not increased, or somewhat depressed, and the respiration weak rather than strong, bloodletting would be highly injurious: a very opposite treatment is then called for.

562. In cases where it is a matter of doubt whether or not general bloodletting should be carried further, or be adopted at all, *local bloodletting*, to an extent which circumstances will point out, may generally be still employed, and often with great advantage. Vascular depletion being indicated in one form or other; the *situation* in which it should be performed next remains to be considered. The temporal artery has been recommended to be opened by some: others advise the jugular vein. When the disease arises from congestion, and when the face is livid, the attack strong, and the operator expert, the jugular vein may be opened, as sanctioned by VALSALVA, MORGAGNI, HIESTER, FRIEND, LANCISI, STOLL, BORSIERI, and PORTAL. But undue pressure of the vein, either before or after the operation, must be avoided.

563. *Bleeding from the feet*, they being plunged in warm water, has been very generally prescribed by continental physicians; and in those cases which have occurred after the disappearance or retention of hemorrhages and periodical discharges, or from metastasis, as well as in many others, the practice is very judicious, and should be preferred. I have often prescribed this mode of depletion.

564. *b. Local depletions* in this disease are usually directed on the temples, nape of the neck, or between the shoulders. I prefer the latter situation, as well as *cupping*, to the use of leeches,—the former being much quicker and more decided in its operation, and producing a more rapid derivation of blood from the brain. HIPPOCRATES, ARETÆUS, and MORGAGNI advised cupping to be performed on the occiput; and I unequivocally agree in the practice. If leeches are applied, the neck, occiput, and behind the ears, are the best situations. LANCISI and CRUVEILHIER advise them to the inside of the nostrils, after general bloodletting, particularly in apoplexy preceded by epistaxis; and WALTHER (*De Apop.*, p. 88) to the veins near the canthus of the eye. In cases of suppressed hemorrhoids or menses, the application of leeches to the anus, the anterior part of the insides of the thighs, particularly after bloodletting from

the feet, certainly is frequently productive of advantage, even although it very often fails of restoring the suppressed evacuation.

565. Some physicians rely almost entirely on bloodletting, whilst others too frequently discard it. Others more rationally view it as a most important, and a frequently but not generally required remedy. It is by not attending to the pathological states which I have endeavoured to point out (§ 462, *et seq.*), and to the changes of vascular action which take place during the attack, that such difference of opinion exists, and the indiscriminating practitioner is led to the injurious adoption of one mode of practice only. Among those who prescribe bloodletting almost unreservedly, and to a great extent, I may adduce the respected authorities of CULLEN, CHEYNE, PITCAIRN, COOKE, and ABERCROMBIE; whilst the injurious effects of the practice in many cases, and its applicability to certain states of the disease only, have been ably urged for by KIRKLAND, FOTHERGILL, HEBERDEN, BARBETTE, and DARWIN. There can, however, be no doubt of the propriety of having recourse to vascular depletion in the states of apoplexy now under consideration,—the general character of the symptoms, circumstances of the case, and the effects produced by the first bleedings, being our chief guides as to the extent to which it should be practised.

566. But in the forms of apoplexy *characterized by marked deficiency of vital power and action*, shortly to be noticed; and sometimes at *the commencement of the seizure*, when the symptoms, owing to the *severe shock* sustained by the brain and by vitality generally, very closely resemble those of concussion, and before the powers of life recover themselves, and react (§ 473), bloodletting would generally be attended either with fatal sinking, or with effusion, giving rise to hemiplegia, where effusion had, as yet, not taken place, and with a fatal increase of it in some where it had already existed. In these cases there is not only the *vital shock*, which for a time contra-indicates the propriety of bleeding in any form; but there is also the alarm of the patient, when the attack is not so severe as entirely to suppress sensibility or consciousness. In many of these *reaction* supervenes, either by means of treatment or by the sole preservative influence of vital resistance, when

this is not altogether overwhelmed by the severity and seat of the local lesion. It is at the time of the development of reaction, which if allowed to proceed would either increase hemorrhage or disorganization, where either is proceeding, or superinduce inflammation and inflammatory softening when hemorrhage has already taken place, that *bloodletting* and other active antiphlogistic measures are most required and most beneficial.

567. Many modern authorities, some of them more recent than the first edition of this treatise, support the views here stated respecting the employment of bloodletting in this form of apoplexy, and the propriety of omitting it entirely in the weak or asthenic form of the disease about to be considered (§§ 577, *et seq.*). HIPPOCRATES, CELSUS, and ARETÆUS, insisted upon the propriety of discrimination, in all states of the disease, in having recourse to this practice; and similar views have been promulgated by BAILLOU, LIEUTAUD, LETTSOM, CLUTTERBUCK, HOLLAND, MACINTOSH, WATSON, and many others, and by Drs. HOSACK, PAINE, and LEE, in America.

568. During my own experience, I have often had cause to regret that apoplectic, as well as epileptic, paralytic, and other *sudden seizures*, had been treated by bloodletting by the first medical man who had seen the patient. For many years, an idea had been entertained by medical practitioners that active practice was good practice; that bloodletting was the best part of active practice; and that this constituted the chief and greatest part of a medical reputation. They could not perceive the fact, that bloodletting could be injurious in any of these cases; and they fully believed that patients died notwithstanding the bleeding, and not in consequence of it. The "*post hoc*" reasoning, so generally followed in medical subjects, was adopted in cases of recovery, but thrown aside or overlooked in cases of death. Now matters have somewhat amended with the progress and diffusion of medical knowledge; but there still remains much to reform even in this and other practical measures.

569. Mr. COPEMAN has published the analysis of 155 cases of APOPLEXY, most of these cases being taken from different authors. The number might have been easily very much increased, and especially in support of the views which he

has espoused, and which had been fully insisted upon by myself and others long before he wrote. He remarks, that "the universal *Remedy*, as it is called, for apoplexy is bloodletting." Now, this is not a faithful representation of the practice at the time when he wrote (1845), nor for many years previously; for the circumstances requiring and contra-indicating this practice—the states of the disease which *did* require, and those states which *did not* require this practice, were pointed out by myself, with full particularity of detail in 1832, and by several other writers between this date and that at which he wrote. In matters of the great importance which this possesses, truth should be the object of investigation, without endeavouring to make out a case in favour of a particular doctrine or hypothesis. Mr. COPEMAN states, "that of 155 cases, in which the treatment is specified, 129 were bled, and only 26 were not: of the 129 who were bled, 51 recovered and 78 died:" "of the 26 who were not bled, 18 were cured and 8 died." These results certainly do not agree with my experience during a practice of upwards of thirty years. But there is no remedy which may not furnish unfavourable statistical results, if it be employed generally and without discrimination as to the nature, the stage, and circumstances of the case. The following is more deserving attention: "The mortality varies a good deal according to the particular method in which bloodletting was performed. In 2 cases, the temporal artery was opened, both died. In 11 cases, cupping only was employed; 6 were cured, and 5 died. Fourteen were treated by leeching; 4 were cured, 10 died. Seventeen were bled in the foot, a plan strongly recommended by M. PORTAL, of which 13 were cured, and 4 died. Eighty-five were bled generally and copiously, of which number 28 recovered and 57 died; that is to say, two in every three cases terminated fatally."

570. *B. Active purgatives* are next deserving of notice, as being generally applicable and beneficial. In many of the most severe and dangerous cases it is often difficult, and sometimes almost impossible, to administer purgatives, especially in the usual form by the mouth. But we shall always succeed by mixing from 10 to 15 grains of calomel in fresh butter, and by placing them upon the root of the tongue.

In sudden and severe cases two or three grains of powdered camboe may be added, or a drop of croton oil.

571. *d.* Whilst we are waiting the operation of the purgative it will frequently be advisable, particularly when there is much heat of head, and increased action of the carotids, to plunge the feet and legs in warm water, and apply *cold to the head*, either in the form of *effusion* of cold water, or of cold or iced epithems. Great care is necessary not to continue effusion too long, nor to depress the temperature too low, as the risk of inducing hemiplegia will be increased by the practice, particularly when vascular action is not considerable. After the effusion has depressed the temperature to about the natural standard, cold lotions or epithems, or even frequent cold-sponging, will be sufficient; but increased heat generally returns, and the effusion should be again resorted to. In general, as soon as the temperature of the head becomes natural, and continues so for some time, and the fulness of the features entirely subsides, cold applications may be omitted. As thus used, they have received the sanction of THILENIUS, CRELL, WEICKARD, CARRETTE, WEBER, and ABERCROMBIE; but QUARIN very judiciously cautions against their indiscriminate and too long-continued use. CRUVEILHIER and other French physicians advise the application of ice for an hour or two, twice or thrice daily. *Pounded ice* confined in a bladder is frequently of use in the strong sanguineous or inflammatory states of the attack, when there is great heat of the scalp. For these cases, the heat of the occiput and the parts of the head which press upon the pillow is generally very great, and is lowered with difficulty. In these, a horse-hair pillow should be used; or a large piece of the common floor-cloth should be doubled, covered by a napkin, and placed between the pillow and the patient's head, with the doubled side nearest the neck. The head will thus be kept cool by the cold floor-cloth, and the use of cold applications will be thereby rendered more general as respects the head, and more efficient. These means are not required, or may even prove injurious in the weak or low state of the disease about to be considered.

572. *b.* If the purgative already exhibited does not operate in about four hours, one or two drops of *croton oil* should be placed upon the tongue, mixed with a few drops

of castor oil, or in a little sweet butter, as advised above; and, about an hour afterwards, the action of the bowels ought to be promoted by the following enema:—

R. Olei ricini, ol. terebinth., āā ℥j. ad. ℥jss.; decocti avenæ, ℥xij.
M. Fiat enema.

This will generally succeed; but if it come away without feculent or copious evacuations, it should be repeated in from one to six hours, according to the amount of its effect. In obstinate cases, one part of croton oil added to about eight or ten of castor oil, may be assiduously rubbed over the abdomen. This, however, will seldom be requisite, as a repetition of the enema will rarely fail, and will act more beneficially on the disease than the introduction of so irritating a substance as croton oil into the circulation. For some cases it may be advisable to render the enemata more irritating by the addition of compound extract of colocynth. Irritating injections are enjoined by ARETÆUS, FORESTUS, and many modern authors, particularly THILENIUS. In cases following hemorrhoids, they are more especially indicated after leeches have been applied to the vicinity of the anus.

573. *c.* After the bowels have been fully evacuated we must still endeavour to excite the abdominal secretions, and excretions, particularly those of the liver. The region of the liver and epigastrium should be examined: and, if there be fulness there, cupping may be performed in this situation. The calomel may be repeated in smaller doses, oftener than once, and combined with a *preparation of antimony*, or James's powder. In all cases where the apoplectic seizure is attended by increased vascular action, antimony may be given; but sickness or retching should be guarded against, unless the attack has been caused by a full meal or indigestible food, and bloodletting has been premised. It will frequently be observed, that a repetition of the calomel, particularly after full depletions, will soon be followed by a flabby state of the tongue, indicating its incipient action on the mouth, and the propriety of omitting it and of continuing the purgatives. It is frequently not until this state appears, particularly where the apoplectic seizure has been preceded by much torpor of the liver, and accumulations of viscid bile in the gall-bladder and hepatic ducts, that the

purgatives succeed in bringing away dark, greenish black, offensive motions, the discharge of which is often followed, in robust subjects, by rapid amendment.

574. *d.* When the disease is attended by *hemiplegia*, or when paralysis appears in the course of the attack, we may generally presume that extravasation has taken place. In these cases, large or repeated depletions will not much accelerate the removal of the effusion; this is a work of time. The object rather is to arrest the hemorrhage by the bloodletting; but even this will not be so readily accomplished, owing to the physical condition of the organ. Indeed, if the depletion be carried beyond a certain extent, in relation to the peculiarities of the case, the risk of renewing the hemorrhage will even be increased; for, as already stated, when pre-existing irritation or inflammation, or softening of the brain is present, the quantity of blood in the brain can only be partially diminished; we only accelerate its circulation by large depletions, and thereby risk an increase of the mischief. On this account, therefore, the intentions with which bloodletting is to be employed are,—first, to arrest the hemorrhage, and, second, to diminish or keep down the action of the heart and arteries: but although essentially requisite in many cases, full bloodletting will be of itself insufficient to accomplish these purposes; and we have therefore to bring to its aid the application of cold to the head, active purgatives, derivatives, and a judicious combination of antimonials and cooling saline medicines, which ought always to be exhibited at short intervals, and continued for some time during convalescence; two or three grains of blue pill being also taken at bedtime, and an aperient draught the following morning. Any of the following saline medicines may be employed when we wish to lower the action of the heart, or of the arteries of the brain:—

R. Vini antimonii potassio-tart., ℥ xvj. ad ℥ss.; liq. ammon. acet., ℥ijss.; potassæ nitratis, gr. v.—℥x.; aquæ puræ, ℥x.; syrapi croci, ℥ss. M. Fiat haustus, tertiâ vel quartâ quâque horâ sumendus.

R. Potassæ carbon., ℥j.; succi limonis recentis, ℥j. vel q. s.; aq. fœniculi, ℥ijj.; vini antimonii pot. tart., ℥ij.—℥ijj.; syrapi toltan., ℥ij. M. Fiat mist. cujus sumantur cochlearia duo larga, secundâ vel tertiâ quâque horâ.

R. Potassæ nitratis, gr. x.; aq. cinnamomi, ℥j.; liq. ammon. acet., ℥ijss.; spirit. æther. nit., ℥ss.; syrapi limonis, ℥ss. M. Fiat haustus, tertiis horis capiendus.

575. When the measures stated above leave considerable exhaustion, and particularly if this be accompanied with sopor, weak action of the carotids, a cold state of the head, and unperspirable surface, it will generally be necessary to venture upon the use of very gently restorative and diaphoretic medicines. These ought, however, to be cautiously commenced with; and when we have reason to infer that the attack has proceeded from extravasation, which is most frequently the case, particularly when the attack is attended by hemiplegia, we should carefully watch their effect, or delay them till after the twelfth or fourteenth day from the seizure. Inflammatory action in the surrounding portion of brain, consequent upon the extravasation, usually supervenes from the fifth to the fourteenth day. During this time, therefore, perfect quietude of body, stillness, and silence, and disengagement of the senses and mental faculties, should be enjoined, and febrifuge medicines prescribed, in order to suppress local action, and the consequent fever which often manifests itself at this period. The patient should either be kept in bed, or on a couch, with his head and shoulders well elevated; and visitors ought not to be admitted to him. The eighth day is generally the most dangerous, as respects either a renewal of the hemorrhage in the immediate vicinity or surface of the parietes of the hemorrhagic cavity, or in a different part of the brain, or the occurrence of serous effusion between the membranes or in the ventricles. During the first days, therefore, of the attack, we should only venture on the more gentle febrifuge diaphoretics, and after the second or third week, somewhat more restorative means may be employed, if the state of the vital energies requires them. The following may be resorted to in the order in which they are placed:—

R. Potassæ nitratis, gr. v.—vij. ; mist. camphoræ, aq. foeniculi, ãã ʒivss. ; liq. ammoniæ acet., ʒij.—ʒiij. ; spirit. æther. nit., ʒss. ; syrupi limonis, ʒss. M. Fiat haustus, quartâ quâque horâ sumendus.

R. Vini antimonii pot. tart., ℥ xii.—xx ; mist. camphoræ, ʒiij. ; aq. cinnamomi, ʒss. ; liq. ammon. acet., ʒij. ; syrupi aurantii, ʒj. M. Fiat haustus, quartâ vel quintâ quâque horâ capiendus.

R. Mist. camphoræ, ʒj. ; liq. ammon. acet., ʒijss. ; spirit. ammon. arom., ℥ xx.—ʒss. ; syrupi tolutan., ʒj. M. Fiat haustus.

R. Infusi calumbæ (vel infusi valerianæ), mist. camphoræ, ãã ʒv. ; sodæ carbon., gr. x. ; spirit. æther. sulphur. comp., ʒj. M. Fiat haustus, bis terve in die sumendus.

576. Before I proceed further in noticing the other

remedies which may be resorted to, or have been recommended, I will state the means which are most appropriate to the weaker states of the disease, and when the system is greatly depressed by the shock of the local lesion, or before increased action has taken place.

577. ii. TREATMENT OF THE DEPRESSED STATES OF APOPLECTIC SEIZURES.—It will be apparent from the particular details I have given of the symptoms, causes, and pathological states of the disease,—first, that much depression or exhaustion of the vital powers of the brain exists in some cases throughout the attack, even rapidly terminating in death without any effort at vascular reaction, particularly when this state is mistaken, and treated by excessive vascular depletion, or by any other depressing remedies,—and, second, that this depression is often analogous to concussion of the brain, owing to the extent of the local lesion, and consequent vital shock; and, like this result of external injury, is frequently followed by reaction of the heart and arteries (§ 473), when the lesion constituting the seizure is not so great as to overwhelm the powers of life altogether, and thus to produce rapid dissolution.

578. It is owing, in my opinion, either to the employment of too large bloodlettings in such cases, to the having recourse to them at all in others, or to practising them without sufficient regard to this early period of the seizure, and before the occurrence of reaction,—the time when they are imperatively called for,—has supervened, that the practice has disappointed many who have adopted it, and led others to employ an opposite mode of treatment in an equally exclusive, and hence dangerous manner. The judicious use of *gentle stimuli* during this state of depression will have the effect in some cases of bringing about a moderate reaction, when death would be the result of other means; and by diminishing and shortening the stage of depression in others, and thereby lessening the congestion of the capillaries of the brain, that inordinate degree of arterial action consequent upon the obstruction, and indirectly produced by it, will be prevented. In some doubtful cases, as when the pallor of the countenance is connected with a natural, or not very depressed state of the pulse and temperature of the head, and when there are vomiting and other symptoms, indicating that hemorrhage and laceration of a por-

tion of the cerebral structure have occurred, moderate bloodletting may be advantageously conjoined with cordial remedies, calculated to restore the tonic contractility of the vessels of the brain.

579. It will appear, from what has been stated, that those who deny the efficacy of bloodletting are, in some respects, justified by the frequent deficient vital energy of the brain, and by the injurious effects of the practice in some cases, whilst they err in a too general recommendation of opposite means. Both parties, however, place great dependence upon active purgatives, and I believe that much of the success obtained by the abettors of both modes of practice is to be ascribed to these.

580. In apoplectic cases, therefore, with signs of deficient vital energy of the brain and constitution,—and, when we refer to our experience, or consider the nature of many of the exciting causes, as well as the very far advanced ages of the great majority of apoplectic patients, the number of such cases will appear by no means small,—and at the commencement of some seizures, before reaction has supervened, when the countenance is pallid or sunk, the pulse of the carotids weak or small, the temperature of the head not increased, and profound sopor, rather than very stertorous or strong breathing, is present, gentle restoratives, administered either internally or externally, are the most serviceable. The propriety, then, of attending to the fact, that apoplexy is often *originally* dependent upon the state of the sensorium—upon the depressed vital energy of the encephalon, as well as upon extravasation, or primary or consecutive vascular turgescence, and increased action—is manifest. And hence will appear the reason that restorative measures are required in some cases and not in others, or at one stage of an attack and not at another; physicians being led, by the success obtained from one method of cure on some occasions, to employ it too generally, and hence in many instances in which it is inappropriate.

581. The restorative means that may be resorted to scarcely admit of particular notice. The practitioner must be guided in his choice of them by the circumstances of the case. Where there is sopor, or coma, or lethargy, without much stertor of breathing, and when hemiplegia or paralysis is not present, *camphor* in moderate doses, either alone, or

combined with *ammonia* or the *spir. æth. sulph. comp.*, the *tinet. lavand. comp.*, and various others, may be adopted. It is only in such cases, and when the action of the carotids is weak, the head cool, and the countenance sunk, that the *infusions* of *arnica* or of *serpentaria*, which have been recommended by QUARIN, AASKOW, WERNER, and THOMANN, are admissible. In more doubtful cases, the preparations of *ammonia*, the *spiritus ætheris nitrici*, or the infusion of *valerian*, may be cautiously exhibited. In some, particularly at the commencement of the seizure, *volatile substances*, such as the preparations of ammonia, or aromatic vinegar, held to the nostrils occasionally, will be of much service. Where the attack is either preceded or accompanied by hemiplegia or paralysis (§ 208, *et seq.*), stimulants, whether exhibited internally or held to the nostrils, may be more hurtful than beneficial. In these, even the use of cold applications to the head, excepting there be marked increase of temperature, is seldom productive of much advantage. *Purgatives* are, however, required, but the choice and repetition of them should entirely depend upon the state of the secretions, the torpor of the bowels, and the character of the stools.

582. *b.* In some instances, the apoplectic seizure commences and continues for a time in the weak form now being considered, and passes into a state of moderate reaction, with more or less marked cerebral disorder, or determination of blood to the head, especially after a recourse, necessary at the time, to restorative means. The following case, illustrative of this, occurred to me many years ago, and I have observed similar instances since then:—When travelling in the summer in one of the short stages, I sat opposite an aged and corpulent man, who, very soon after our leaving town, suddenly lost his consciousness and power of motion. His countenance became first pale, then bloated and inexpressive, his breathing slow and slightly stertorous, all his muscles completely relaxed, and he fell, in a few seconds, upon those sitting around him. We were only a few doors from a chemist's shop; the coach was stopped, and he was carried thither. He was now profoundly apoplectic; a copious perspiration flowed from his face and forehead, the veins of which were distended, and all his senses were completely abolished. There was no sign of

hemiplegia, but there was general and complete loss of motion and sensation. His neckcloth having been removed, the pulsation of the carotids was found to be slow, and of natural strength and fulness. Whilst he was held in a sitting posture in a chair, cold water was squeezed gently over his head from a sponge, and his head frequently sponged with it; volatile salts were also held for a short time, and at intervals, to his nostrils. The power of deglutition was at this time abolished, so that it was impossible to immediately administer a draught, chiefly consisting of a small quantity of spiritus ammoniæ aromaticus and camphor mixture, which was prescribed. In a very few minutes his consciousness returned, he took the draught, and in a short time afterwards he walked to a coach, in which I accompanied him home. He now complained only of a very slight confusion of ideas, with scarcely any headache, but his carotids beat more firmly. One moderate bloodletting, and an active purgative, were now directed. The next day he was perfectly well, and has continued so. What would have been the result had he been largely bled previously to the reaction?

583. iii. MEANS WHICH ARE ADMISSIBLE IN CERTAIN STATES OF EITHER THE STHENIC OR ASTHENIC FORMS OF ATTACK. — It is unnecessary to remark further than has already been done upon the employment of *bloodletting* and *purgatives* in this disease. — *a.* *Emetics* are amongst the means the admissibility of which has been most questioned. The young practitioner will, if he have recourse to written authority, be quite bewildered by the diversity of opinions respecting the use of them in this disease. He will find SYDENHAM, PITCAIRN, KIRKLAND, SELLE, FOTHERGILL, COLOMBIER, CONRADI, and FABER in favour of them; and HAGENDORN, BORSIERI, QUARIN, WALTHER, CULLEN, TUES-SINK, RICHTER, PORTAL, and CHEYNE opposed to them. But when the attack has been brought on by an overloaded state of stomach, by intoxication, narcotic poisons, or other hurtful ingesta, and more especially when hemiplegia is not present, or if the attack be of the active kind, and full depletion has been performed, then emetics may be both safely and advantageously administered. This opinion seems agreeable to the recommendations of HIPPOCRATES, MORGAGNI, STOLL, BLANE, and GREGORY.

584. *b.* The propriety of having recourse to *blisters* has likewise been questioned. The great majority, however, of authorities are favourable to the practice in some state or other of the disease, the situation, the period, and form of attack being the chief points of dispute. BARTHOLINUS, CANDLER, CULLEN, and many others, recommend them to be applied to the head. Whilst TODE, BAGLIVI, STOLL, PORTAL, and PICQUE consider them injurious in this situation. In the active states of the disease, in those forms which are complicated with hemiplegia, or are preceded by it, blisters on the head seem hazardous remedies, and are, moreover, in the way of more appropriate means; but in the weakest forms of the disease, when, from the depressed state of vital energy of the brain and lowered action of the carotids, the sensorium requires to be excited, they may be of service. Where, however, there is any doubt respecting the propriety of applying them in this situation, it will be better to omit them, or to direct them to another part. When stupor or coma exists, and the symptoms are not of the strong character, they may be applied to the nape of the neck, between the shoulders, or insides of the thighs or legs, after general or local bloodletting has been practised. In the weak form of apoplexy I have applied a turpentine epithem over the scalp with benefit.

585. *c.* *Sinapisms*, or *stimulating frictions and liniments*, applied to the lower extremities, are very generally applicable, particularly after resorting to pediluvia, mustard and salt having been added to the water, and care being afterwards taken to preserve a continuance of the increased flux of blood to these parts, when thus procured, either by warm applications, or by a frequent renewal of the above means. *Sternutatories* have been considered injurious by BAILLOU, MORGAGNI, BUCKNER, and others, and I conceive with great justice. A nearly similar opinion may be given respecting *electricity* and *galvanism*, which have been recommended to be tried by some authors.

586. *d.* The exhibition of *mercury*, chiefly in the form of calomel or blue pill, in large doses, so as to act upon the biliary secretion and bowels, and subsequently to excite *salivation*, has been recommended by DOLÆUS, SCHURIG, GHISI, and HORN. My experience of the practice has induced me to think favourably of it in several apoplectic

states, especially when the powers of the constitution are not too far reduced, and the patient not very far advanced in age. But I have most frequently proceeded no further in the exhibition of mercurials than to affect the mouth slightly, and have trusted to the use of purgatives, especially those which are chologogue, and to other measures appropriate to the circumstances of the case.

587. *e.* *Antimonial preparations* have been already noticed (§§ 573, 574). They are of much service in the more active or strong forms of the disease, whether accompanied with hemiplegia or without it. They are not so admissible, however, in the very depressed states of vascular action, and in the forms of attack which commence slowly, or are preceded by, or attended with paralysis, indicating hemorrhage into, or softening and infiltration of the cerebral substance. *James's powder*, and the *potassio-tartrate of antimony*, are the best preparations, the former of which may be advantageously combined with calomel, the latter with saline medicines.

588. *f.* *Setons, issues, and moxas* have also been advised, particularly when stupor continues after the more urgent symptoms have been mitigated. I concur with LANCISI and LA MOTTE in considering them very deserving of adoption in such cases. *Moxas* applied on the occiput produce a more rapid effect, and are, therefore, preferable during the period of attack; setons are more useful in the prophylactic and consecutive treatment. The *actual cautery* and *moxas* have been strongly recommended by ALBUCASIS, who directed them to be applied in the course of the cervical suture; by MARCELLUS DONATUS, who prescribed them to the occiput; by SCHELHAMMER, to the vertex; by SCHREIBER, to both the vertex and soles of the feet; by MISTICHELLI, to the feet; and by THILENIUS and SEVERINUS. These means are very generally applicable, and may be resorted to in the worst cases of apoplexy, particularly those complicated with hemiplegia, and when brought in aid of appropriate means.

589. In cases characterized by a full, tumid, flushed, and livid countenance, full or strong pulse in the carotids, heat of head, with or without hemiplegia, I prefer, after copious general depletion, *scarifications* of the scalp, more or less deep and extensive, to be made over the occiput, so as to

allow of a free sanguineous discharge. The practice has been recommended by HIPPOCRATES and MORGAGNI. Cupping-glasses may be also applied over the scarifications when we desire to procure a more copious discharge. In the low or weak states of the disease, *dry-cupping* on the nape of the neck may be tried, as advised by ARETÆUS.

590. *g.* When the faculty of deglutition is recovered, or when it is retained, whether hemiplegia be present or not, I have often seen decided advantage derived from a draught consisting of equal quantities of the *oleum terebinthinæ* and *oleum ricini*, particularly when the bowels required to be fully acted upon. If the attack possess the sthenic character, and signs of fulness of blood about the head still continue, about half an ounce of each may be exhibited on the surface of mint-water; and, if necessary, repeated a second or third time, from twelve to twenty-four hours intervening between each dose. This will promote a more complete revulsion from the head than any other means that can be employed, particularly when preceded by calomel, or other cathartics, or followed by the enema prescribed above (§ 572). In the weaker states of attack, when we wish the medicine to act partially by being absorbed into the circulation; and in cases where, from the mode of seizure and progression of the disease we suspect hemorrhage or infiltration of blood in the brain, the following draught may be exhibited. I have found it serviceable in such cases, even in some attended by the most unfavourable symptoms, as a very frequent, small, and intermitting pulse, and unconscious discharges, &c:

R. Olei ricini, olei terebinth., āā ℥ss.—℥ij.; tinct. capsici annui, ℥ iij.—vj.; olei cajaputi, ℥ iv.—vi.; aq. menthæ virid., ℥jss. Fiat haustus, omne bihorio sumendus ad secundam, tertiam, vel quartam vicem.

591. In some instances, where the lethargy has been profound, and the constitutional powers far depressed, I have derived much advantage from *camphor*, *ammonia*, and *æther*, given in suitable doses in the intervals, and continued after the above medicine had been carried as far as was considered either necessary or prudent.

592. It is generally requisite to have the hair of the patient cut very close, or shaved off, as soon after the seizure as possible; and to attend to the injunction of MORGAGNI,—

never to omit inquiring after the state of the urinary discharge and examining the hypogastrium, lest accumulations of urine take place, which should be immediately removed by the catheter, to prevent their injurious effects on the bladder, on the blood, and on the disease.

593. iv. OF THE TREATMENT OF CERTAIN CONSECUTIVE AND COMPLICATED STATES OF APOPLEXY.—*a.* A great majority of such cases requires but very slight modification of the measures already stated. The importance of directing our means so as to restore *suppressed discharges*, &c., when the attack arises from this cause, has already been pointed out. When the seizure proceeds from the extension of inflammatory action in the brain, and its termination in abscess, effusion, &c., the principles stated above are still applicable. If the disease possess either a *gouty* or a *rheumatic character* (§§ 331—335, 379), bleeding from the feet, local depletions, sinapisms, or other rubefacient applications, &c., to the lower extremities, or to the joints and parts antecedently affected by gout or rheumatism, active purgatives, and the preparations of colchicum, combined with soda or magnesia, and moderate doses of camphor, are the most advisable remedies. In most cases of this description accumulations of morbid sordes have formed on the digestive mucous surfaces, and thick or viscid dark bile has collected in the gall-bladder and hepatic ducts; therefore, after cupping on the nape of the neck, active calomel purges, promoted by enemata, are to be given previously to having recourse to *colchicum*, which ought to be combined with alkalies, or with *ammonia* or other restorative medicines, if the attack presents the asthenic character, and with aperients; active *revulsants* being simultaneously employed.

594. *b.* *The association of apoplexy with epilepsy*, or the *supervention of the former on the latter* (§ 291, *et seq.*), should be treated in the same way as the convulsive form of apoplectic coma. But, according to my experience, bloodletting cannot be carried so far with safety in this as in true or sthenic apoplexy; and if vascular depletions be at all adopted, they should consist of cupping on the nape of the neck; or of leeches applied to the occiput or behind the ears or temples, or around the anus, or of a small bleeding from the feet. Purgatives frequently repeated, chologogues, brisk

cathartic enemata, setons, or issues, or other external derivatives, are chiefly to be confided in for this complication. After recovery from the seizure, the measures appropriate to the habit of body and other circumstances of the case should be resorted to (§ 595).

595. *c.* *The intermediate states between apoplexy and epilepsy* (§ 293) require either local depletion, or alvine evacuations and restorative medicines, according to the evidence furnished of vascular fulness in the one case, or of vital or nervous depression in the other. In the intervals, stomachic purgatives, and antispasmodic tonics, with a regulated diet, change of air, &c., will generally be necessary. When these states are connected with disorder of any of the thoracic or abdominal viscera the treatment advised for these complications, and the consecutive treatment and regimen about to be described, should be directed.

596. *d.* When the apoplectic state arises from *erysipelas* of the head and face (§ 332), or from *suppression of urine*, or *disease of the kidneys* (§§ 340, 341), then incisions made into the scalp of the occiput, so as to allow a free discharge; cupping, followed by blisters on the nape of the neck; active purgatives, consisting first of calomel combined with the potassio-tartrate of antimony or with James's powder, and compound extract of colocynth, followed by the draught of turpentine and castor oil advised above (§ 590), by the turpentine enema, and by saline medicines, with diuretics and the vinum antimonii, are the means most to be depended upon. In cases of this description the most active purgatives are required, and must be frequently repeated. The *croton oil* may be here exhibited, as already advised (§ 570), and enemata should be administered from time to time. These already prescribed (§ 572), are most to be depended upon in this state of disease. Revulsants, and rubefacient pediluvia, are also serviceable aids; turpentine epithems being applied over the loins.

597. *e.* When the apoplectic attack occurs on the invasion or in the advanced stages of *fevers* (336), the general principles of treatment already laid down cannot be departed from. When it comes on at the commencement of fever, general or local depletions are required, with the cold affusion on the head, purgatives, saline medicines, and counter-irritation. But even here, the probable state of the circu-

lation within the head should be inquired into previously to the adoption of the means of cure; for, if the head be cool, the action of the carotids natural or below the healthy standard, and the attack be unattended by paralysis, restorative measures are called for, although the subsequent occurrence of reaction will afterwards require active antiphlogistic measures. When the attack occurs in the last stages of continued or eruptive fevers, it most frequently presents the asthenic character, and is often an aggravated state or a modification merely of coma, unless hemiplegia accompany it. In these cases, local depletions from the occiput, the neck, and behind the ears; active purgatives revulsants; and counter-irritants,—as blisters or sinapisms to the lower extremities, nape of the neck, or epigastrium; camphor, combined with ammonia, æther, and liquor ammoniæ acetatis, particularly when the head is cool, and the pulsation of the carotids is neither full nor strong; and, in the most asthenic cases, camphor in larger doses, the infusions of arnica, or of serpentaria; and terebinthinate epithems applied over the scalp,—are chiefly to be depended upon. After local depletion and revulsants have been prescribed, and one or more doses of calomel and rhubarb premised, the draughts directed above (§ 590), followed by terebinthinate enemata, may be exhibited.

598. *f.* The association of apoplectic seizures with disorders of the *digestive organs*, particularly those of the liver (§§ 337, 338), requires local depletions from the right hypochondrium and epigastrium, followed by blisters in this situation, and a strenuous use of purgatives and mercurial preparations, until the secretions assume a healthy appearance.

599. *g.* When the attack proceeds from *impeded circulation through the lungs and right side of the heart* (§§ 320—325), local depletions, counter-irritation, and diaphoretics, are then chiefly to be depended upon. But, in these cases, care must be taken not to deplete too much, as the circulation may be still more impeded by the loss of power thereby produced. In some instances of this kind it will even be necessary to support the vital energies by suitable means, and to deplete the vascular system at the same time. When the attack is occasioned by *hypertrophy of the left ventricle*, general and local depletions are better borne than in the foregoing cases, and may sometimes be carried to a consid-

erable extent. In both descriptions of cases, revulsants and counter-irritants, particularly by issues or setons, or the tartar-emetic ointment, are beneficial. In all the complications of apoplexy with cardiac disease the treatment should be directed to the particular state of that disease. But, as I contended in 1822, and as above (§ 320), before the nature and frequency of this complication were fully recognized, the circumstance of the changes which take place in the heart, especially with the progress of age, being frequently of the same nature as those which supervene in other parts of the vascular system, more particularly in the vessels of the brain, should not be overlooked, and, whilst accounting for the frequency of this complication, ought to influence our practice. And, as these changes in the heart and in the vessels of the brain are often characterized by impaired and altered nutrition, care should be taken not to employ those means which will further impair nutrition, or lower still further organic nervous power, and thereby accelerate the morbid degeneration of structure to which altered nutrition always tends.

600. The great frequency of this complication as shown by Dr. BURROWS,—a frequency of association increasing, I may add, with the advance of age,—should excite our especial attention to the treatment most appropriate to it in all its states. Unless when the apoplexy is consequent upon simple hypertrophy of the left ventricle, vascular depletions should be prescribed with due moderation and great caution, and with reference to its effects; and those means which may be expected to produce an alterative effect—to improve the healthy nutrition of these organs, as several of those mentioned above (§ 549), in connection with the preventive treatment of apoplexy, should be preferred.

601. *h.* When the apoplectic attack is occasioned by *narcotics* or *sedative poisons*, or by *spirituous liquors* taken in immoderate quantities, the stomach should be emptied by the stomach-pump or by an emetic, a moderate blood-letting having been premised where the propriety of having recourse to it is manifest; and afterwards the cold affusion on the head; internal stimuli, as camphor, ammonia, and æther; warm strong coffee, and purgative enemata, should be prescribed.

602. *i.* The occurrence of the seizure, also, during *child-*

labour, or after *puerperal* or *hysterical* convulsions, requires bloodletting, preferably from the feet, the cold affusion on the head, cathartic injections, &c. I was many years ago called in consultation to a case of puerperal convulsions which had terminated in the apoplectic state. When I saw the patient, the labour had not proceeded so far as to admit of delivery by means of instruments. The pulse was slow and full; the breathing slow, laborious, and stertorous; the lips puffing and frothy; the countenance tumid and livid; all the limbs flaccid, insensible, and incapable of motion. She had been bled before I was called. The feet and legs were directed to be placed in a pan of hot water, and the saphenæ veins to be opened. Whilst the blood flowed, cold affusions on the head were employed. These means were evidently beneficial, though insufficient. A terebinthinate cathartic enema was thrown up immediately. Consciousness slowly returned; when the decoction of the secale cornutum, with as much biboras sodæ as it could dissolve, was administered. Uterine action afterwards came on, and the patient recovered.

603. *k.* Attacks consequent upon *colica pictonum* (§§ 339, 363), two instances of which have occurred to me, generally require local depletion, full doses of calomel, followed by active purgatives and enemata (§§ 570, 572, 590). The draught of castor oil and turpentine (§ 590), or the croton oil, followed by injections, are here chiefly to be confided in. If purgatives given by the mouth are thrown off the stomach,—a circumstance which not unfrequently occurs in these cases,—a large dose of calomel will generally be retained, and will allay the irritability of the stomach; other medicines may be afterwards exhibited, or a mixture of croton and castor oils rubbed over the abdomen, and cathartic injections thrown up.

604. *l.* The *other states and complications of the disease* should be treated according to the views and principles already explained, and with due reference to the nature of the pre-existing disorder, when it appears to be a consecutive affection, or principal part of a complicated state of disease. *Inflammations* of parts of the brain may not only attend, but supervene upon the apoplectic seizure, especially when blood has been effused in that part or its vicinity. When the inflammation or inflammatory softening is thus a con-

secutive event, then it usually appears a few days after the attack—from the sixth to the fifteenth day, and is commonly indicated by increased frequency of pulse, and augmented action of one or both carotid arteries. The heat of the scalp, or of some part of it, is also increased. In these cases, moderate depletions, active cathartics, diaphoretics, external derivation, &c., are required.

605. *m.* When *apoplexy* is associated with *palsy*, or the former state is removed, the latter still remaining, the measures about to be considered, with reference more especially to the several forms of paralysis, will be appropriate, due importance being assigned to the pathological states and circumstances of the case.

CHAPTER III.

OF THE TREATMENT OF THE SEVERAL FORMS AND COMPLICATIONS OF PALSY.

606. PALSY, as well as apoplexy, requires a very careful consideration of the history of the case as far as the information can be procured, and an intimate view of existing pathological conditions, as respects the nervous centres and their ramifications, of the states of vascular action and of the blood, and of the functions of the secreting and excreting viscera.

607. The seat, grade, pathological condition, and constitutional peculiarities of paralytic maladies are so diversified, that each case should be made a separate study, and such means only as are appropriate to existing pathological conditions ought to be employed. I shall endeavour—1st, to point out the plans of treatment which are most serviceable in the principal forms, states, and complications of palsy; and 2d, to appreciate the character and value of the numerous medicines and methods of cure which have been recommended for this disease, and their applicability to the several conditions in which it comes before the physician.

608. i. TREATMENT OF PARALYSIS OF SENSATION. — The means to be employed in this form of the disease should be selected with strict reference to the remote causes, to the pathological conditions inferred to exist in each case, and to the particular circumstances of the individual.—If *Anæsthesia* occur in a spare habit of body, if it be unconnected with general or local vascular plethora, and if it have been caused by cold or other depressing agents, the means about to be recommended for the more chronic states of paralysis of motion (§§ 613, *et seq.*) may be employed; especially local stimulants and irritants, internal excitants, external derivatives, warm and medicated baths, electro-magnetism, galvanism, &c. In all cases, however, the strictest attention should be paid to the several digestive, secreting, and excreting functions.

609. Local congestions are concerned in producing many, probably the majority, of cases of *anæsthesia*. If the loss of feeling be associated with hesitation or other affection of the speech, these conditions may be more confidently inferred; and if the anæsthesia be hemiplegic, a limited congestion, hemorrhage, or softening of some parts of the brain, probably exists. When anæsthesia occurs in plethoric and robust habits of body, in persons who have lived fully, or of sedentary habits, or consecutively of suppressed evacuations or discharges, then these pathological states most probably exist, and the affection, if not quickly removed, will often soon be followed by paralysis of motion. In these circumstances, the treatment advised for the acute state of palsy of motion, especially general and local vascular depletions, chologogue and other purgatives, and derivatives, is that which is most appropriate. Subsequently, external excitants, as sinapisms, vesicants, urtications, issues, &c., or the other means noticed for the more chronic states of palsy (§§ 618, *et seq.*), may be prescribed. When the anæsthesia occurs in thin or spare habits of body, the treatment should be guided by the state of the pulse, especially in the carotids; by the appearance of the veins in the temples and forehead, and by the history of the case. When anæsthesia is associated, as it generally is, with loss of motion, the treatment is in all respects as about to be stated with reference to palsy of motion, which is then the most

important phenomenon, and the one which should chiefly engage attention as respects its immediate cause.

610. If the *senses* of *sight*, *smell*, or *taste* are singly or generally affected, the same principles of treatment should be adopted as are here espoused in respect of *anæsthesia*; the several means being selected or modified according to the peculiarities of the case, and the organ especially disordered. The means, also, most likely to improve the general health, according to the particular states of disorder in each case, with especial attention to the digestive, secreting, and excreting functions are generally required, especially when either of these forms of paralysis of sensation occur at advanced periods of life.

611. For *amaurosis*, more especially, the treatment just advised, as well as the more particular recommendations about to be offered, is altogether applicable, but with strict reference to the states of vascular action, general and local, and of vital power. In some cases of *amaurosis* associated with palsy of the extremities from lead, and with lead colic, Dr. ALDERSON (in *Med. Chirurg. Trans.*, vol. xxii., p. 82), found benefit accrue from causing the patients to wear a bandage night and day over the eyes, so as entirely to exclude the light. The same means may be tried on other states and complications of *amaurosis*, especially after more active measures have been employed, and the acute or urgent symptoms have been removed.

612. ii. TREATMENT OF PALSY, CHIEFLY OF MOTION, &c.—When the faculty of motion is paralysed either alone or conjointly with partial or more complete palsy of sensation, the treatment should be directed with the same intentions as have been just mentioned, viz.—1st, with the view of removing the morbid states or the structural lesions inferred to exist in each case which may present itself; and 2dly, with the object of restoring the transmission of nervous influence to the paralysed muscles.

613. A. *When the palsy is strictly local or partial*, the treatment should necessarily depend upon the peculiar features of the case. In this state of the complaint (§§ 55, *et. seq.*) the lesion may be either in the origin or in the course of the nerve supplying the paralysed muscles; but it may also be limited to the ramifications of the nerve, as

when the affection is caused by the continued influence of cold, &c. If the lesion be inferred to exist at or near the origin of the nerve, local depletions, derivatives, alteratives, especially a carefully-regulated course of mercury or of the iodides, with sarsa, &c.; external irritants and drains; and a due promotion of the several secretions and excretions, comprise the most efficient means of cure.

614. If the nerve have its functions interrupted by changes in any part of its course, as by thickening of the periosteum, by abscesses, tumours, &c., alteratives, particularly the iodides with the solution of potash and sarsaparilla, various external applications, particularly the tincture of iodine, or solution of the iodides, the plaster of ammoniacum with mercury, &c., and other means suited to the nature of the case, may be resorted to. If the ramifications of the nerve be chiefly affected, and particularly if cold, or currents of cold air, have been the cause of the disorder, sinapisms, blisters, or applications containing capsicum or mezereon may be prescribed, and if these fail, the part may be stimulated by either of the means hereafter to be mentioned (§§ 660-666).

615. *B. The Hemiplegic form of Palsy*, whether occurring *primarily and simply*, or *associated with apoplexy or convulsions*, or *appearing consecutively of these*, is the most common form of the disease, and requires the greatest discrimination in estimating the pathological changes, and in prescribing the means of cure.—*a. In the acute or early periods of the malady*, prompt and decisive measures are generally required; yet these should be varied according to the mode of accession and character of the attack, as already described (§ 76, *et seq.*). If the complaint approach in the *gradual manner* above noticed (§ 81), alteratives and derivatives are chiefly indicated with the view of removing or arresting the lesions which may be inferred to be the causes of the complaint, and of allaying the irritation they may be supposed to occasion. Local depletions, especially by cupping on the nape of the neck; sinapisms or blisters in this situation and behind the ears; purgatives and alteratives; setons in the nape, and mustard pediluvia, are severally indicated. In this form of palsy, vascular depletion, unless local and moderate, is seldom of much service. Purgatives are generally required; and mercurials, in alterative doses

and combinations, especially Plummer's pill with soap, or the bichloride of mercury in small doses, taken either soon after a meal or with preparations of sarsaparilla, sometimes either ameliorate the symptoms, or arrest for a time the further progress of the disease. It is in this form of hemiplegia that the iodides are more particularly indicated. I have given the iodide of mercury, or Plummer's pill nightly, and the iodide of potassium with solution of potash and compound decoction of sarsaparilla during the day, with manifest advantage, a seton being kept open in the nape of the neck.

616. *b.* When the attack of palsy seems consequent upon *inflammatory softening of a portion of the brain, &c.* (§ 262, *et seq.*), local vascular depletions, or even general bloodletting, are manifestly required. Active purgatives and mercurials are also requisite; and in the intervals between the exhibition of purgatives, the bichloride of mercury should be given in small and frequent doses until the gums become affected, external derivation being also produced by the usual means, whilst the head is kept cool and elevated. In this form of the disease I have not seen any advantage accrue from the iodides, especially in the *early or acute stage*, or whilst inflammatory action continues to exist.

617. *c.* If hemiplegia occur in a *sudden manner* (§ 81), the treatment should be as prompt and energetic as in cases of apoplexy (§ 558, *et seq.*). In many cases, particularly in robust and plethoric persons, general or local bloodletting, or both general and local, is required; and either one or the other, or even both, may be again necessary some days after the accession of the attack, owing to the vascular reaction consequent upon it and the previous depletions, or attending the inflammatory action produced by the extravasation of blood causing the seizure. In this form of palsy the pulse and the veins in the temples should be carefully watched during the first fourteen or twenty-one days after the accession of the symptoms; and as soon as they acquire increased action and fulness, bloodletting, according to the circumstances of the case, should be repeated. But, in order to prevent the necessity of recurring to depletions, purgatives, external derivatives, and refrigerents or cooling diaphoretics, should also be prescribed at the commencement of the attack. In this variety of the disease I have seen

much benefit derived from the bichloride of mercury, either alone, and taken soon after a meal, or with sarsaparilla until the system became affected by it; but vascular depletions should be premised, and the secretions and excretions duly promoted. In this state of the malady, as well in that which is *associated with, or immediately follows, the apoplectic seizure* (§ 209), the treatment in the early or more acute stage is in every respect similar to that which I have recommended for *Apoplexy*, when that state of disease is attended or followed by hemiplegia (§§ 589, *et seq.*).

618. *d.* *The chronic or persistent state of hemiplegia* is seldom altogether removed. The injury received by the fibrous structure of the brain in the great majority of cases is such as admits not of the restoration of the complete power of volition over the paralysed limbs. In this state, setons or issues may be tried, but they should be kept discharging for many weeks before much advantage can be expected from them. At the same time the iodides, particularly the iodide of potash, may be exhibited either alone or with liquor potassæ, or as already recommended; and the bowels should be kept freely open by means of cholagogue purgatives.

619. During this period of the disease, various internal and external stimulants and irritants have been advised with the view of accomplishing the *second indication of cure* (§ 612); but the selection of these requires great discrimination as regards their respective properties and the existing pathological conditions. The preparations of nux vomica, strychnine, &c., have been recommended in this state of hemiplegia, but I have rarely or never found them of service in this form of palsy; but, on the contrary, productive of more or less mischief, especially whenever increased determination or fulness of blood in the head was present. They are indicated only when an opposite state of the cerebral circulation is inferred to exist, and in some other forms of the disease. The same may be said of the use of other internal stimulants, when a disposition to increased vascular action or effusion exists in the substance and membranes of the brain; for, in such cases, the preparations of iodine, aconite, cantharides, serpentaria, phosphorus, camphor, electricity, galvanism, &c., of which more particular notice will be taken hereafter, are very rarely of use, but often

injurious. The remarks which I shall have to offer respecting certain modes of cure, and various medicines more or less praised for this complaint, apply so entirely to this period of hemiplegia, that I shall add no more at this place as to the means which may be further employed in the treatment of it.

620. iii. TREATMENT OF PARAPLEGIA AND GENERAL PALSY.—*A.* *The treatment of paraplegia* so entirely depends upon the nature of the lesion producing this form of palsy, that a continual reference to such lesions must be had in the observations which I shall have to offer on this subject. I have stated above (§ 97) the several changes causing paraplegia; and it will be seen that these require a treatment appropriate to each individually.—*a.* It is obvious that the means required for paraplegia consequent upon *concussion* or *fracture* of the spine, or upon *laceration* of, or *pressure* on, the cord by displaced bone, are chiefly surgical at an early period; and that the selection of these means should depend upon the peculiar features of the case and the extent of local injury. At a later period, when the palsy still continues, the treatment will necessarily hinge upon the physical condition of the parts and the presumed consequences of the lesions immediately resulting from the injury. In such cases the paraplegia sometimes persists, although the physical condition of the spine appears but little or not at all altered. In these it may be presumed that softening, effusion, or some other consequence of inflammatory action is present in the cord or its membranes; and consequently these cases come under the same category as others about to be considered (§ 621).

621. *b.* In cases of paraplegia which commence with severe pains or tenderness in the spine or loins, or with a sense of heat or burning, followed by spasms, numbness, and loss of power of the lower extremities, indicating an *acute* or *inflammatory character* (§ 258), a decided antiphlogistic treatment is requisite, especially at an early period. In these, cupping on each side of the spine near the seat of pain or tenderness, repeated according to circumstances, mercurial purgatives and terebinthinate enemata, are the most efficient remedies, especially when these symptoms have not been of long duration. If pain or spasms still

remain after a due recourse to these means, calomel or other mercurials should be given with opium until the mouth is slightly affected, attention being paid to the states of the urinary bladder and bowels, and of their excretions.

622. In cases of paraplegia of a more insidious character—in those which occur gradually and slowly, or which are consequent upon exposure to cold, or are attributable to congestion of the spinal sinuses, to increased serous effusion, or to chronic lesions affecting the cord, or to scrofulous changes in this part, its envelopes or vertebræ, the bichloride of mercury as exhibited above (§§ 350–353), or conjoined with the compound tincture of bark; or the iodide of potassium with liquor potassæ and the fluid extract of sarsa, or an alternation of these; stomachic purgatives; warm salt water baths followed by active friction of the trunk and limbs, and strict attention to the excreting functions and to the states of the discharges, are the measures which have proved most beneficial in my practice. The bichloride of mercury, or Plummer's pills, should be exhibited until the gums are affected, or until recovery takes place; and when the motions are tar-like, and are procured with difficulty, calomel should be given with active cathartics, such as the compound extract of colocynth, scammony, &c., sometimes quickened with a drop of croton oil. Blisters or rubefacient applications may be placed on the back, and be repeated according to circumstances. The following *liniments* may be kept applied as *embrocations* in the course of the spine, from time to time, or be rubbed assiduously in this situation:—

R. Linimenti camphoræ comp.; linimenti terebinthinæ, āā ℥jss.; olei olivæ, ℥ss.; olei cajuputi, ℥j. ʒ. Fiat linimentum vel embrocatio. Vel

R. Linimenti camphoræ comp.; linim. saponis comp., āā ℥jss.; olei terebinthinæ, ℥ij.; saponis duri, ℥ij.; olei limonis et ol. cajuputi, āā ℥j. ʒ. Fiat linimentum.

623. Setons or issues on each side of the spine have been advised, and in some instances have proved serviceable, particularly when aided by a judicious internal and constitutional treatment, but they require discrimination in respect both of the pathological causes of the paraplegia and the general health of the patient. When the disease appears to have proceeded from exhausting causes, as masturbation, venereal excesses, &c., or to have been aggravated by these,

then setons or issues are generally injurious, especially when the constitutional powers are much exhausted. Stimulating and invigorating measures are required in all such instances. In these and similar cases I have found the tincture of the sesquichloride of iron with the tincture of cantharides; the compound galbanum pill with the sulphate or oxide of zinc; the aloes and myrrh pill with the resinous extract of nux vomica; and the valerianate of zinc, lately introduced by Mr. J. SAVORY, of more or less service. Sir B. BRODIE has recommended a grain of the sulphate of zinc to be given three times a-day, increasing the dose, and to be washed down by a draught containing twenty minims of the tincture of cantharides. In cases of this nature, the preparations of iodine, particularly a weak tincture, or the compound tincture of the pharmacopœia; or small doses of the bichloride of mercury in the compound tincture of cinchona and tincture of capsicum, or an alternation of these, have been of essential benefit. Sir B. BRODIE has made favourable notice of the bichloride of mercury in doses of one-sixteenth of a grain three times a-day, with a moderate dose of the tincture of cantharides; I have tried this mode of exhibiting the bichloride, but the effects should be watched. The compound tincture of camphor will be conjoined with these two medicines with advantage. Warm pediluvia, mustard and salt, having been liberally added to the water; or the nitro-hydrochloric acid foot-bath may also be employed, especially when the disease has proceeded from suppressed secretions or evacuations, or from cold; or when it is associated with torpid states of the liver.

624. *B.* *The treatment of general paralysis* in most instances is much the same as that just recommended for paraplegia; for the former generally depends upon similar lesions to the latter, or is merely an extension of it.—*a.* When the general palsy is a symptom of the more violent states of *apoplexy*, the means appropriate to these should be prescribed (see § 558, *et seq.*). When it is the result of *concussion* of the brain, or of the spinal cord, or of *fracture* or other *injury* of the cervical vertebræ, the treatment must depend upon the violence of the shock, on the presence of the primary symptoms, or the supervention of reaction—on the state of the heart's action and of the circulation, both locally and generally, and on various circumstances which

will influence the experienced physician. The intentions of cure should therefore be not only varied but different, or even opposite in different cases and circumstances.

625. *b.* In cases of general palsy from *caries* of the cervical vertebra, after the acute symptoms have been removed by local depletions, blisters, mercurials, &c., issues, setons, or moxas, &c., should be placed at a little distance from the seat of lesion; and an embrocation, consisting chiefly of the compound camphor and turpentine liniments, placed from time to time along the spine. In the case of *caries* of two of the cervical vertebra referred to above (§ 130), the treatment consisted of active mercurial and other purgatives, of an alternation of a short course of the bichloride of mercury dissolved in the compound tincture of bark, with a more prolonged course of the iodide of potassium and solution of potash, with the fluid compound extract of sarsa. A protracted discharge was procured by means of blisters and savine ointment applied to each side of the neck just below the occiput. The recovery has been complete. The neck, however, is shorter and much stiffer, obviously owing to absorption and ankylosis of the diseased vertebræ.

626. *c.* When the general palsy is of an *acute* character, or is caused by inflammatory congestion or by any of the more immediate consequences of inflammation of the membranes or substance of the cord, then local depletions near the seat of pain, and the prompt use of mercurials, of blisters, or of the terebinthinate embrocation in the course of the spine, and of the other remedies recommended above (§ 622) for paraplegia should not be neglected.

627. *d.* When the disease is *chronic*, or has been neglected, or has not yielded to these means, then the bichloride of mercury, the sulphate or the valerianate of zinc, the iodide of potassium, the tincture of cantharides, the tincture of capsicum, &c., may severally be employed as already advised (§ 625). Indeed, the treatment of general palsy, in its several forms, is in every respect the same as that advised for paraplegia (§ 621, *et seq.*).

628. *iv.* PARALYSIS IN CHILDREN should be treated according to the principles above developed, and with strict reference to the presumed pathological condition. If the

palsy be *partial* or *hemiplegic*, and be inferred to have arisen from injury during parturition, or apparently *acute*, the application of a leech behind the ear (of the unaffected side in the hemiplegic variety), and repeated doses of calomel, should be prescribed. Minute doses of the iodide of potassium may be given subsequently, and the bowels ought to be kept freely open. If the palsy be congenital and independent of injury, the iodide of potassium or the iodide of mercury, or the bichloride of mercury, may be tried in minute doses and with due caution. In the more *chronic* cases of infantile paralysis these constitute the chief remedies, but they should be continued for a considerable period and gradually increased, a course of the one being alternated with that of the other, as already advised.

629. Paralysis in infants and children is very often caused by teething, weaning, &c., and still more frequently by scrofulous or tubercular lesions, and it is sometimes associated with or consequent upon rickets. These circumstances should not be overlooked, as they determine the indications and means of cure. In several cases, thus originating and complicated, I have given the cod-liver oil with marked benefit. In a case of paraplegia, in a child of a medical friend, this medicine was perfectly efficacious.

630. If the infant be able to take the breast, recovery to some extent may be expected, although it may not be complete. I have at present under my care a patient in a fit of gout, aged between forty and fifty years, who was hemiplegic from earliest infancy, but he is unable to state whether it was congenital or caused by injury during parturition. The limbs of the paralysed side are considerably smaller than those of the sound side, and their movements weak, difficult, and constrained. The imperfect growth of paralysed limbs in infancy is owing chiefly to the very imperfect use made of them during the epochs of development.

631. v. TREATMENT OF SHAKING PALSY.—Amendment has not followed any mode of cure which I have tried, and I have tried the most energetic means for this form of palsy, when it appeared *gradually* and in a *chronic form*. When, however, the tremor occurs in a more *acute form*, or consecutively of suppressed evacuations, in strong or plethoric patients, as in the case adduced from FRANK (§ 162), or

when it is attended by pain in the head or in the course of the spine, then antiphlogistic remedies, particularly local depletions, blisters, or the terebinthinate embrocation in the course of the spine, purgatives, mercurials, &c., followed by the iodides, the bichloride of mercury, or the valerianate of zinc, and a seton in the nape of the neck, may be severally employed, according to the peculiarities of the case; or other energetic means about to be noticed may be tried.

632. In all cases of *paralytic tremor*, the existence of an arthritic or rheumatic diathesis should be ascertained, and the treatment modified accordingly. In such instances, tonics, opiates, and antispasmodics, with ammonia or other alkaline substances, may be prescribed. When the disease has probably arisen from masturbation or excessive sexual indulgence—the most frequent of its causes—then the preparations of iron with the tincture of cantharides or of capsicum, or with camphor; or the nitro-hydrochloric acids, internally and externally; or the extract of nux vomica, or opium conjoined with aromatics, may be tried according to the peculiarities of the case, and to the effect produced; and they may be aided by stimulating liniments or embrocations (§ 622), or plasters applied on the spine, or the emplastrum thuris comp., &c., &c. In this form of palsy, perhaps more than in any other, the treatment should be directed especially to the promotion of the general health, and to warding off determinations of blood to, or congestions on the brain; and to the prevention of exhaustion of vital or nervous power.

633. vi. PARALYSIS CAUSED BY POISONS (§§ 165, *et seq.*) requires a treatment appropriate to the nature of the deleterious agent.—*a.* When the affection is caused by the preparations of *lead*, the state of the digestive organs first requires attention. After the alvine secretions and excretions are more or less improved, and their discharge is rendered more regular and healthy, the preparations of *nux vomica* or *strychnia* may be exhibited, but their effects should be carefully watched. In this disease I have preferred the resinous extract of nux vomica to strychnia, and have generally prescribed it in combination with the purified extract of aloes and inspissated ox-gall. In aid of these, the external stimulants hereafter to be mentioned, suitable exercise of

the paralysed parts as far as they may admit of it, and the application of splints extending from the elbows to the fingers in cases of palsy of the wrist or arm, should not be overlooked. In addition to friction with various stimulating substances, electricity and galvanism, or electro-galvanism, or electro-magnetism, warm salt-water bathing, and warm baths containing stimulating substances, may be employed. Cleanliness and the removal of the cause always should be enforced. During the treatment, the regular discharge of the alvine functions ought to be promoted, and the patient should be allowed a generous diet.

634. *b.* The states of palsy caused by other poisonous substances should be treated conformably with the principles already explained—with strict reference to the states of vascular action and vital power, both general and local. The tremulous form of palsy sometimes caused by *mercury* (§§ 170 *et seq.*) requires similar means to those just recommended for palsy from lead. This observation also applies to the palsy of the extremities sometimes produced by *arsenic*. In all these, internal stimulants, tonics, and restoratives; attention to the digestive and defecating processes; external excitants, electricity, &c., and nutritious diets are requisite.

635. Palsy consequent upon *narcotic poisons* (§ 175, 176) should be treated according to the states of vascular action and nervous power. After due recourse to their respective antidotes, &c., local depletions, purgatives, external derivatives, &c., in order to remove congestion of the nervous centres, should be prescribed; and if the malady still persists, the several alterative, restorative, and stimulating remedies recommended for the *chronic states* of palsy ought to be employed according to the peculiarities of the case, and the circumstances of the patient.

636. The narcotic poisons occasion more frequently states of general palsy, anæsthesia, and apoplectic coma, than hemiplegia or more partial forms of palsy; and for these, the affusion of cold water on the head, as long ago recommended by me for the poisonous action of *opium* and for that of *Prussic acid* (see *Lond. Medical Repository*, vols. xviii., p. 29, 1822, and vol. xxiii., p. 33, 1825), will be found the most efficacious, especially when aided by the means already mentioned (§§ 634, 635), and by suitable restoratives. Dr. CHRISTISON has published, as this sheet was going to press,

an interesting case evincing the good effects of the cold affusion on the head in a case of poisoning by Prussic acid, and he remarks that "Dr. HERBST of Göttingen was the first to propose the cold affusion as a remedy for poisoning with hydrocyanic acid. Mr. BANKES, of Louth, seems to have been the first to substitute the cold *douche* of the head only. For many reasons, the latter would seem, *à priori*, to be the more suitable; and the present case shows that it is an energetic remedy when the other means available in so urgent an emergency are inefficacious." (*Monthly Journ. of Medical Science*, vol. i., *New Series*, p. 99.) In the matter of priority Dr. CHRISTISON is mistaken, for Dr. HERBST was *not* the first to propose the cold affusion for poisoning by hydrocyanic acid; for it was *first* proposed by me in the Number of the *London Medical Repository* for July, 1825, and was directed to be applied to the head. In the same article I likewise advised the cold affusion on the head to be resorted to in cases of poisoning by belladonna, &c.; and it was not until some years afterwards that the recommendation of Dr. HERBST appeared.

637. vii. The TREATMENT OF THE COMPLICATIONS OF PALSY requires but few remarks.—A. I have already noticed that *palsy may either follow or precede inflammation of the nervous centres*, and have explained how this may arise (§ 255). Hence it is requisite to watch carefully all cases, especially of hemiplegia, where it is inferred that the palsy is caused by extravasation of blood, particularly during the first three or four weeks of the disease; and, upon the first indication of inflammatory irritation or of *inflammatory softening*, to have recourse to antiphlogistic measures co-ordinately with the indications for their use. The evidence of inflammatory action in the vicinity of the lesion producing paralysis, at whatever period it may appear, as described above (§ 263, *et seq.*), is a sufficient reason for the having recourse to local depletion, purgatives, external derivatives, and alteratives, and for relinquishing tonics, stimulants, or excitants of any kind, should those have been resorted to.

638. B. The *complication of general palsy with insanity* admits of little or no hope even of partial benefit. Still, the alteratives already noticed, combined with tonics and restoratives, should be prescribed, particularly the iodide of potas-

sium with sarsa or with bitter infusions; the extract of nuxvomica with aloetic or other aperients; the bichloride of mercury with the compound tincture of cinchona; the valerianate of zinc and other means already noticed (§§ 613, *et seq.*). In the association of palsy with *puerile imbecility*, or with *idiocy*, the case is hopeless, for the reasons assigned above (§ 299).

639. In those cases which admit of reasonable hopes of benefit being derived from treatment, not only should medical means be employed, but hygienic measures ought also to be used. Care should be taken to prevent the bowels from becoming *constipated* on the one hand, or much *relaxed* on the other. In either case, inflammation rapidly passing into sphacelation generally results. In some instances, the removal, by mechanical means, of hardened fæces from the rectum becomes necessary when the constipation has been prolonged. *Retention of urine* is an equally frequent and dangerous occurrence in the paralytic form of imbecility and incoherency, and requires a frequent recourse to the catheter. *Incontinence of urine*, or a frequent dribbling, owing to over-distension of the bladder, is also a common symptom. In this latter case, especially, care should be taken to keep the patient dry and clean,—as unconscious or involuntary discharges of either the urine or fæces soon occasion gangrenous sores of the sacrum, or adjoining parts, in this class of patients. Care is also requisite to preserve them from falls, and from injury from fire. Dr. CONOLLY found, during his extensive experience, that nothing was of avail in this complication, excepting in one instance; and, in this, the muriated tincture of iron appeared to have been so beneficial as to admit of the patient's discharge from the asylum. This able physician remarks that "the rich class of patients are, unfortunately, often worse situated in this malady than the pauper. The pauper is taken ample care of in the county asylum; everything is carefully regulated for him; and all those attentions are secured to him which his advancing weakness, and, at length, his utter helplessness, require. Richer patients are often left a longer time without control, and are usually then placed, by the unhappy privilege, in detached private residences, where, although enormous expense is generally incurred, there can be no security for the daily, nightly, hourly attentions they require. Their

paroxysms of impatience, their restlessness, and, after a time, their inability to attend to personal cleanliness, make it impossible to keep them in their own houses with their families, except where the family is small, and the house so large that a portion of it and of the grounds can be exclusively allotted to the patient's use. When, as is generally the case, removal from home is indispensable, I should always most strongly advise that the removal should be to a well-conducted asylum. There, and there only can every attention be secured to this particular class of patients, and all risk of neglect and severity avoided."

640. *C.* The *association of palsy with cardiac disease* arises from the same pathological states as associate the latter with apoplexy, as shown above (§§ 320, *et seq.*); and the treatment does not materially differ from that advised for this latter association (§§ 599, 600). In most cases, medical treatment should be directed primarily to the disease of the heart, according to the nature of the lesion detected in this organ, and contemporaneously or subsequently, as the state of complication may suggest, to the paralytic affection. Not only should the states of these associated diseases suggest the plan of treatment and choice of means, but the age, habit of body, previous disease, the history of the case, and the habits of the patient, ought also to furnish indications for both the medical and regimenal management.

641. *D.* The treatment of *disease of the cranial bones or of carious or scrofulous or tubercular alterations of the vertebræ associated with palsy*, may be said to have been already noticed (§ 623, *et seq.*), since the same means as have been advised for the more chronic cases of paraplegia or of general palsy are also appropriate to this complication. In the more common cases of this kind, namely, in those where the vertebræ are diseased, but little can be done with rational hopes of success beyond what has been recommended above (§ 625). But in the course of treatment, the intercurrent inflammation of the membranes or even of the cord itself should be guarded against and watched for, and be promptly opposed by the means already indicated (§ 621).

642. *E.* The *association of palsy with neuralgia or rheumatism*, or with pains resembling these affections, should always lead to the suspicion of congestion, or inflammatory

action, on or near the origins of the nerves which are the seat of pain or which supply the pained parts; and when the palsy is moreover complicated with *spasms* or *cramps*, the same lesions should be inferred and a treatment based upon the inference be prescribed.

643. *F.* I have already contended that the *association of palsy with disease of the kidneys and urinary organs* is most frequent and important; and that the latter morbid condition, even when it is apparently the primary one, is generally the consequence of congestion of the vertebral or spinal sinuses, causing pressure on the cord, or increased effusion into its sheath (§§ 340, *et seq.*). In these cases, the urinary functions may be disordered to a most serious extent, or even for a long time, before symptoms of paraplegia are evinced, or the movements of the limbs are materially affected. When the spinal congestion interrupts or otherwise changes the functions of the kidneys, the consecutive excrementitious plethora may occasion either hemiplegia, or coma with general palsy. In some cases, the congestion of the spinal veins and sinuses is soon followed by acute congestion, or inflammation of the kidneys, or by suppression or retention of urine, paralytic symptoms not appearing until the renal malady is far advanced. In these circumstances the treatment is obvious. Cupping on the loins, or near the part of the spine chiefly affected, according to the severity of the attack and the habit and constitution of the patient, should always be directed, and afterwards terebinthinate embrocations ought to be applied to the loins and spine.

644. *G.* The complication of *partial palsy or hemiplegia with epilepsy* (§§ 291, *et seq.*) requires measures of an alterative and restorative rather than of an exhausting and perturbing nature. At the commencement of this association of the disease, the means already suggested for the mixed form of apoplexy and epilepsy (§ 595) may be resorted to, according to the age, habit of body, &c., of the patient; and after the epileptic seizure has subsided, the treatment appropriate to the circumstances of the case and to the state of the paralytic affection should be adopted. During the continuance of the epileptic seizure, mischief is often done by a too officious interference of the medical practitioner, and especially by vascular depletions, which should never be practised during the paroxysm, unless urgent indications for

them exist. The paralytic affection generally follows the fit, and the symptoms after the fit has ceased will commonly suggest to the experienced and closely-observing practitioner the means which are appropriate to individual cases.

645. This complication, however, unless the palsy be partial or incomplete, and unless benefit be derived in a short time after the epileptic seizure, when it may be inferred that the paralysis has been owing to the congestion attending the convulsion, is seldom altogether removed, the epileptic seizure generally sooner or later passing into fatal apoplectic coma. When the patient is young, of a full habit, or of unimpaired powers, *bloodletting*, general or *local*, or repetitions of the latter in small quantity, will be requisite, aided by purgatives, setons, and the other means advised in the apoplectic complication (§§ 594, 595). But in persons presenting evidence of asthenia or depressed organic nervous power, or inanition, the preparations of *iodine*, especially the iodide of potassium and ioduret of iron; the oxide or the nitrate of silver; the extract of *nux vomica* with aloes or the aloes and myrrh pill, or even *strychnia* in either of these forms of combination; and the metallic sulphates with the antispasmodic tonics, especially valerian, serpentaria, assafœtida, 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 one of its most dangerous states, although his health may appear quite re-established. In a case to which I was called these symptoms disappeared after a moderate bleeding from the arms, free 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.

646. *H.* The nature of the occasional connection of *palsy*, especially *paraplegia with hysteria*, has been already noticed (§§ 370, *et seq.*). The irregularities often observed in the urinary functions of hysterical patients may be often

attributed to the irritation propagated from the uterus and ovaria, either directly by the ganglial nerves to the kidneys and bladder, or indirectly to the spinal cord, and thence to the urinary organs along the nerves communicating between them and the cord. In those cases where the protracted irritation of the uterine organs, in connection with exhaustion of nervous power, disorders not only vascular action in these organs, but extends itself and its effects upon the vascular system, both to the spinal cord and to the urinary organs, pain or aching in the loins, and even tenderness on pressing the spinous processes of the vertebræ are often observed: and if the vascular disorder consequent upon the local excitement or irritation advances far, so as to occasion certain of its most prominent effects, numbness, cramps or spasms of the lower extremities; retention or suppression of urine, sometimes alternating with an unusually large secretion or flow of it; occasional nausea, vomiting, and irregularity of the bowels; irregularity or difficulty, or suppression of the catamenia; and, ultimately, even more or less complete paraplegia may result. Several cases of this kind have occurred to me, and have long resisted treatment until they were submitted to energetic courses of the alterative medicines above advised (§ 623), particularly the bichloride of mercury, or the iodide of potassium, variously combined, aided by terebinthinate enemata and embrocations, by the extract of nux vomica, and by such of the remedies already mentioned as most appropriate to the peculiarities of the case. In some cases, a regular course of the compound mixture of iron, conjoined with the compound decoction of aloes, with or without the iodide of potassium, has been most efficacious. In the remarkably severe and prolonged instance noticed above (§ 372), for which all the usual means had been exhausted, in addition to several of those now noticed, a pea-issue was made in the inside of each thigh, and kept freely discharging until the amendment was complete. The recovery was rapid in this instance, and the lady is now in the enjoyment of good health.

647. *I.* The *complication of palsy with hepatic disease* has been observed by me on several occasions: the palsy being generally hemiplegic, and the right side being that affected in nearly all the cases I have seen. Although in some cases the liver has appeared to have been primarily

affected, still it is very probable that the loss of power in the voluntary nerves and muscles of the right side may have in some degree affected the functions and circulation of the liver, and, in prolonged cases, ultimately induced disease of it. In these associations the principles of treatment and the choice of medicines will readily suggest themselves to those who have perused the foregoing remarks, and what I have adduced on the treatment of diseases of the liver in another work.

648. *K.* Palsy may, moreover, be associated with *scurvy*, and it not unfrequently occurs in the *gouty* or *rheumatic diathesis*, more especially after irregular, displaced, or suppressed gout. In these circumstances the treatment should be varied according to the diathesis. In the *gouty* association of the malady the usual means should be employed to develop the gout in the lower extremities; and the treatment be in many respects the same as already advised for the connection of this disease with apoplexy (§ 593), especially at an early period of the paralytic attack.

649. viii. THE APPRECIATION AND APPROPRIATION OF REMEDIES FOR PALSY.—In discussing the treatment of the several forms of palsy it has been, as will be seen above, a principal object to advise the use of such means as appear the best calculated to remove the morbid changes upon which these forms severally depend; and mention has been made chiefly of those remedies which seem to me most likely to produce this effect, and of which I have had more or less experience. It is necessary, however, to a full exposition of the treatment of palsy, to review the application of the more energetic means to certain states of the disease and of the constitution, and to notice other medicines which have been favourably mentioned by writers of reputation.

650. After devoting due consideration to the *seat* and *nature of the lesion* of which palsy is the prominent and most manifest phenomenon, it next is of importance to estimate correctly the states of vascular action and of nervous and vital power—to ascertain, as nearly as may be, how far the affection may be considered, from these states, in connection with its cause and duration, to be *acute* or *chronic*, and *sthenic* or *asthenic*. These terms, it is true, are merely

conventional; but they nevertheless assist us materially in our attempts at briefly indicating the conditions of the patient which powerfully influence the operation, and which should therefore guide our choice of medicinal agents for this malady. The age, habits of life, antecedent disorders, existing states, and constitution of the patient, and the presence of any complication should be taken into account as circumstances powerfully influencing the intentions and means of treatment.

651. *a.* Of *bloodletting*, general and local, it may be briefly stated that they are generally required early in the attack, especially in acute and sthenic cases, and more particularly in the hemiplegic or sanguineous form of the disease. In the paraplegic and partial states of the malady local bloodletting is commonly to be preferred to general; and in all cases the quantity, as well as manner and repetition of the depletion, should depend upon its effects, the state of the pulse, and habit of body and age of the patient, as well as upon the predisposing and exciting causes of the attack. We must not, however, inconsiderately prescribe either venesection or cupping in all cases even of hemiplegia, because we find them to have been advised by CELSUS, ZACUTUS LUSITANUS, HOME, ABERCROMBIE, and many other eminent writers. The most recent of these writers recommends it too profusely, too generally, and too exclusively, at least as regards the inhabitants of large cities and manufacturing towns, wherein the causes of the malady and the asthenic states of a very large proportion of those attacked either admit not of depletions, or require very different or even opposite means of cure. During the treatment of both hemiplegic and paraplegic palsy, intercurrent inflammatory action may appear, and require, generally, small or at most moderate depletions by cupping or leeches; and the physician should be alive to such an occurrence when he has recourse to stimulating medicines in doubtful circumstances and in young persons.

652. The opinions which were stated, when treating of apoplexy and palsy many years ago, in my work on "*Practical Medicine*," respecting a recourse to bloodletting in these diseases and their associations, and regarding the states which indicate, as well as those which contra-indicate vascular depletions, have been fully and ably supported by

more recent writers, especially by Dr. HOLLAND (*Medical Notes and Reflections*, 8vo., Lond., 1839, p. 38), and by Dr. WATSON (*Lectures on the Principles and Practice of Physic, &c.*, 2 vols. 8vo., Lond., 1846). Professor LEE, in his edition of my work published in New York, remarks that "the dangers of excessive bloodletting are well understood by American physicians, and the principles of treatment laid down by Dr. COPLAND are extensively received and carried out in practice." (*Op. Cit.*, vol. i., p. 112.) Professor PAINE (*Medical and Physiological Commentaries, &c.*, 8vo., New York, 1840, vol. i., p. 344) has also ably advocated the same opinions in respect not only of apoplexy and palsy, but also of several other diseases.

653. *b.* Of *evacuants, purgatives* and *diuretics* are the most appropriate; and of the former of these, the most active should be selected, and such as influence most energetically the principal secreting viscera, as calomel, colocynth, jalap, scammony, &c. In paraplegia, and even in hemiplegia, the bowels are very torpid, and require repeated and full doses of these, and even of still more energetic cathartics, as croton oil or elaterium in some obstinate cases, or a combination of either of these with milder purgatives. In many, recourse should also be had to purgative enemata, particularly to those in which the oleum terebinthinæ is an ingredient. It is not merely necessary regularly to evacuate fæcal matters by means of these, but to employ them so as to derive from the cerebro-spinal axis any increased flow of blood to it which may have occasioned or prolonged the attack. Indeed, with these conjoined objects they are advised by HALLE, DALBERG, BRODIE, and others who have insisted on their use.

654. The ancients advised a recourse to *diuretics* in palsy, and some of the medicines prescribed by modern physicians, and considered by them to influence the disease merely as stimulants, owe no small share of their good effects to their operation on the kidneys. Of these, the most efficient are the tinctura lyttæ, the preparations of iodine, and spirits of turpentine—substances of which further notice will be taken hereafter—which require caution in their use, and which are suited chiefly to chronic and asthenic cases, and to the paraplegic states.

655. *c.* Of *alteratives* the most beneficial and most gene-

rally appropriate are *mercurials*, *iodine*, and the *iodides*, and *sarsaparilla*.—(a.) *Mercurials*, employed so as to affect the system, and chiefly by inunction, have been recommended for palsy by SHENCK, SCHNEIDER, CAVALLINI, and J. P. FRANK; and, both internally and externally, by VAL-LISNERI, BURGER, and many others. I have seen them of service, when judiciously prescribed, in both hemiplegic and paraplegic palsy. J. P. FRANK prescribed them more especially for saturnine palsy, in which he has seen them of great service. In acute and sthenic cases, calomel given with antimony, after bloodletting until the pulse is sufficiently reduced, should be preferred; afterwards, the milder mercurials may be substituted; and, in chronic and asthenic cases, the *bichloride* may be given in the decoction or tincture of bark until the gums are slightly affected, especially in scrofulous and rheumatic constitutions. I have prescribed, in several cases both of hemiplegia and paraplegia, the bichloride of mercury in this combination with the best results, having frequent recourse to purgatives and to a seton in the nape of the neck.

656. (b.) I have prescribed *iodine* and the *iodides* in several cases of the various forms of both partial and general palsy; but in no case of the disease have I ventured to employ them otherwise than in very small doses at first, carefully watching their effects, and cautiously increasing the doses. Dr. MANSON was the first who published cases of palsy in which iodine had been employed; and these cases show not only the good effects of this substance in certain states of palsy, but also its injurious influence in the more acute and sthenic cases, and when prescribed in too large doses. Dr. MANSON employed only the tincture of iodine; but, both before and after the publication of his cases, I had used both this and the iodide of potassium for this disease, as well as for some others, in public and private practice; and more recently the iodides—the iodide of potassium and the iodides of mercury—more frequently than the pure iodine. These preparations, especially the last, are best suited to the more chronic and asthenic cases, or after depletions and other evacuants have been pushed sufficiently far. Even then the doses should at first be small, and the effects upon the pulse be carefully watched. The occurrence of headache ought to cause an interruption

in the use of these medicines. The iodide of potassium may be conjoined with liquor potassæ and sarsaparilla, commencing only with one or two grains, and gradually increasing it. I have even given only one grain in the twenty-four hours with advantage.

657. *d. Stimulants and tonics* were employed internally for palsy much more frequently by the older writers than by physicians of the present day, who are more conversant than they generally were with the true seat and nature of the lesion causing the paralytic attack. These substances are contra-indicated in all acute and sthenic cases of palsy, and whenever there is reason to infer the existence of inflammatory irritation, hemorrhage, or vascular extravasation, or even of active congestion; whilst they may be employed with reasonable hopes of benefit in chronic and asthenic cases, and when the disease has appeared after exposure to cold or to other depressing influences, or has followed exhausting causes. Indeed, a cautious recourse to agents of this class is more generally of service, especially in the cases just mentioned, than has been admitted by many writers; and is very often required when free discharges are procured from artificial drains or issues.

658. (*a.*) Of this class of medicine, the resinous *extract of nux vomica* and *strychnine* have been more frequently employed than any other in recent times. Of the two preparations my experience induces me to prescribe the former as more manageable than the latter, and equally efficacious. I have usually prescribed it in conjunction with purgative or aperient extracts. It, as well as other internal stimulants, should never be given in palsy, especially hemiplegia, when the pulsation of the carotids, or the temperature of the scalp, is at all increased; and if the pulse become strong or frequent, or the face flushed during its use, it should be discontinued, and local depletions, with an antiphlogistic treatment and regimen, instantly adopted. It is most serviceable in paraplegia and in lead-palsy.

659. (*b.*) The *Arnica montana* was much praised, and is still much used in Germany and Denmark for paralytic cases. It has received the commendations of ANGELI, DE MEZA, CONRADI, AASKOW, and others; but I am not aware of any other British physician beside HOME who has given it a trial, and his evidence is not much in its favour. The

Rhus radicans or *Toxicodendron* has been recommended in this disease by BRERA, DESGRANGES, VAN MONS, KOK, and ALDERSON; but ZADIG considers it quite inefficacious. A decoction of the *Chenopodium ambrosioides* has been advised by RUDOLPHI, BALDINGER, and LENTIN; *serpentaria* and *capsicum* by FALCONER; *guaiacum* by FOTHERGILL and JOHNSTON; *ammoniacum* by BOURGET; *pyrethrum*, internally, by OXLEY; *cajuput oil*, both internally and externally, by PEREBOOM and THUNBERG; *naphtha* by RAMAZZINI; *camphor* dissolved in turpentine by SHUMACHER; this substance dissolved in naphtha by REICHSANZEIGER; *musk* by TRUENER, LÖEFFLER, and others; *castor* by PAULI; the tincturæ *lyttæ*, internally, by VAUGHAN, MAY, BRISBANE, &c.; *phosphorus* dissolved in ether, internally and externally, by BRERA and GAULTIER-CLAUBRY; and the *nitrous oxyde gas* by BEDDOES, HILL, and PINEL. It is very probable that these may severally prove of service when judiciously prescribed, especially in those circumstances of the disease to which I have above (§ 657) limited the use of stimulants and tonics. In the same category *aconite* may also be noticed; it having been recommended by STÆRCK and GREDING; also *opium* and *belladonna*, which have, severally, been used by STOLL, THOMANN, and others, in palsy from lead.

660. (c.) The circumstances which admit of the internal use of stimuli also allow a recourse to *electromotive agencies* in the several forms in which they have been employed; and in no disease have they been more generally and more empirically resorted to than in this. *Electricity*, in the form of shock, bath, sparks, &c., although chiefly prescribed by persons ignorant of medicine, has received the cautious sanction of VANDER BELEN, HART, and others, in the most chronic and asthenic cases. MEYER, BANG, and PERCIVAL, advise it chiefly for paraplegia and lead palsy; and they, with STOLL, DE HAEN, QUARIN, and FALCONER, doubt its efficacy in other circumstances. The *electro-galvanic* influence was first recommended by VOLTA in this disease; and it was soon afterwards adopted by WALTHER, HALLE, MARCUS, and GRAPENGIESSER for those cases in which powerful stimulants seemed to be required.

661. *Electro-Magnetism* has lately been very extensively employed by a very scientific physician, Dr. GOLDING BIRD, in paralytic affections; and still more recently by Dr. W.

DAVIES and others. There can be no doubt of the benefit which may be derived from this and other modes of employing electrical agency when prescribed with discrimination. It is more especially serviceable in old asthenic cases; for palsy caused by cold, malaria, by lead, and for those states of the disease which are not connected with existing inflammatory action, or inflammatory softening, at the origins of the paralysed nerves.

662. I have had several opportunities of employing electricity in the treatment of paralysis, chiefly in the form of shocks from the Leyden jar, of sparks from the parts affected, and of the electro-magnetic current. When active disease exists in the nervous centres, and when it may be inferred that the palsy is consequent either upon softening of a portion of those centres, or upon disease of the bloodvessels supplying such portion, electricity, galvanism, and electro-magnetism are then inefficacious, and they may even then be injurious. They are manifestly inapplicable when there are spasms or contractions, or cramps in a limb, when there is augmented or morbid sensibility of the surface or of a limb, when the head is hot or the face flushed, with or without headache, when the pulse is at all excited, or the temperature of the surface increased. If the paralysis has been preceded, or is attended by neuralgic pains, electricity in any form should not be employed. Dr. GOLDING BIRD considers that it may be resorted to with advantage in cases of lead palsy; in paralysis produced by cold; in palsy limited to the portio dura; in paralysis following local injury to a limb; in hysterical and anæmic palsy; in local anæsthesia, and in cases of paralysis caused by chronic or persistent lesion in the cerebro-spinal axis. In this last state of the disease electricity may, however, be either injurious or beneficial; for if either the pathological states just mentioned, or the symptoms contra-indicating its use be present, it may prove injurious. In one of the most frequent forms of *paraplegia*—that consequent upon chronic inflammation of the membranes of the spinal cord—I have had recourse to it with the precautions just alluded to. In one such case it appeared to be injurious. When symptoms of active inflammation can be referred to these parts, this agent is out of the question. In the more prolonged or chronic cases of this form of palsy, the "electric moxa,"

suggested by Dr. G. BIRD, deserves a trial, as combining an electro-magnetic influence with that of an external derivative or drain.¹

¹ Dr. GOLDING BIRD recommends the feeble current of electricity from a single pair of zinc and silver plates, to be applied in the direction of the ramifications of the nerves, as a remedy in the forms of paralysis to which electricity or electro-magnetism is appropriate. This simple arrangement he has termed the "*electric moxa*;" and the following is the mode of employing it:

"We are often anxious to produce a persistent discharge from some part of the body, in cases where an issue or seton, or discharge from the moxa or actual cautery, would be desirable. Now the knife for the issue, the needle for the seton, and the ignited tinder or red-hot iron for the moxa, all have their terrors for timid patients, and there is often the greatest unwillingness to induce patients to use such means. There are, therefore, considerable advantages in the use of a plan which, while it is perfectly competent to produce a copiously discharging sore, shall at the same time not excite the alarm of the most sensitive patient. Now the effect, noticed in the case just related, points out such a means. It was long ago observed by HUMBOLDT, and afterwards by GRAPENGEISSER, that when a single galvanic arc was applied to a blistered surface, the part opposed to the most oxidisable metal was more irritated than that to which the negative plate was applied. But neither of these philosophers has noticed the effects arising from a continued application of the plates. As I believe this *electric moxa*, as I have termed it, is often of very great value, I may be excused giving more minute directions for forming it. Order two small blisters, the size of a shilling, to be applied to any part of the body, one a few inches below the other: when the cuticle is thus raised by effused serum snip it, and apply to the one from whence a permanent discharge is required a piece of zinc foil, and to the other a piece of silver; connect them by a copper wire, and cover them with a common water dressing and oiled silk. If the zinc plate be raised in a few hours the surface of the skin will look white, as if rubbed over with nitrate of silver. In forty-eight hours a decided eschar will appear, which (still keeping on the plates) will begin to separate at the edges in four or five days. The plates may then be removed, and the surface where the silver was applied will be found to be completely healed. A common poultice may be applied to the part, and a healthy granulating sore, with well-defined edges, freely discharging pus, will be left. During the whole of this process, if the patient complains of pain at all, it will always be referred to the silver plate, where, in fact, the blister is rapidly healing, and generally not the slightest complaint will be made of the zinc plate, where the slough is as rapidly forming. A very interesting physiological phenomenon is observed in making an issue by these means. If the plates be applied to a limb, and on different places, contraction of the subjacent muscles will always be observed most severe when the patient is in the act of falling to sleep; and, in a few cases, these sensations have been sufficiently annoying to induce the patient to untwist the wires fixed to the plate, when, by interrupting the current, these feelings ceased. But if the plates were applied to opposite sides of the body, as, when on the chest, to different sides of the mesial line, no contractions whatever occurred. This admits of explanation by reference to the fact of the nerves not crossing the middle line of the body. My friend Dr. GULL once met with a case in which the application of these plates, with the view of forming a moxa,

663. *e.* The numerous means, which may be strictly called *external*, and which have been so generally resorted to in this disease, operate either (1) by rousing the circulation and exciting the nervous influence in the part as simple or medical friction; (2), or by deriving irritation or other morbid action from the nervous centres to superficial parts, as issues, setons, &c.; (3), or by a combination of these modes of operation, as blisters, sinapisms, urtication, &c.; (4), or by trephining the cranium, or by otherwise removing the cause of pressure, when hemiplegia is caused by accidents or fractures producing this effect. These means are severally appropriate to most of the forms of palsy; and, when judiciously selected, they may be safely used in the various states and relations of the disease.

664. (*a.*) *Frictions* in a simple form, although advised by STOLL and HILSCHER, are seldom employed; for some medicinal substance with which frictions may be used is requisite to impart confidence to the patients in their efficacy. However, they may be advantageously employed by means of the hair-glove, or of the kheesha or Indian glove. Frictions of the palsied limbs with various stimulating substances, as with phosphorus dissolved in oil or ether; with camphor, soap, and turpentine; with cajuput oil, camphor, olive oil, &c., have been often advised; and may in a few instances prove of service.

665. (*b.*) *Issues and setons* are upon the whole the most efficacious modes of permanent external derivation in palsy; and the most generally adopted, especially in this country. The former may be made in the scalp itself by incisions in or near the occiput, peas being afterwards inserted; the latter may be worn in the nape of the neck. They have been praised by POTT, APPLETON, LATOUR, SCHREGER, PRICHARD, and LODER; and I have had several occasions of witnessing their good effects. *Moxas*, which have been for ages employed in the East, as the usual mode of external derivation, have been strongly insisted upon by LARREY and others in this and other diseases, and have been much employed on the continent of Europe; but their superior

produced intolerable distress. The patient was the subject of spinal disease, and this probably accounted for the extreme sensibility of the cutaneous nerves." (*Lect. on Electricity and Galvanism, &c.*, 8vo., Lond., 1849, p. 131, 132.)

efficacy to issues or setons is very doubtful. The *actual cautery*, mentioned by PAULUS ÆGINETA and others of the ancients, has been recommended also by RICHTER, PORTAL, and J. P. FRANK. NERI NERI, a Neapolitan physician of the sixteenth century, directed it to be applied to the occiput in hemiplegia. Amongst the usual means of derivation, *dry-cupping*, mentioned by CELSUS and others in this disease, should not be overlooked.

666. (c.) *Blisters*, kept discharging for a considerable period, or frequently repeated, as advised by BOERHAAVE, FORDYCE, and DICKSON; or *artificial eruptions*, produced for a longer or shorter period, by means of tartarized antimonial ointment, or by croton oil, are also frequently of service both in acute and chronic cases; but in the former especially, after local depletions and evacuations have been freely practised. The same remark is applicable to the use of *sinapisms* and to a frequent recourse to *urtications*, which latter has been advised by PAULUS ÆGINETA, MUYS, HOME, HUFELAND, and many others, or to *embrocations* containing capsicum or its tincture, or pyrethrum, all which exert the double effect noticed above (§ 663), when applied to the paralysed limb, as they should generally be applied, unless in cases where the sensibility and temperature of the paralysed limb are morbidly increased, as sometimes observed; and then they may even prove injurious, especially in asthenic cases. In these, also, blisters applied to the palsied limb may be followed by sloughing.

667. (d.) Injuries or fractures of the cranium, especially such as produce depression of a portion of bone, or effusion of blood underneath, or consecutive inflammation and suppuration, are often followed by hemiplegia. In such cases, a recourse to the operation of trephining, in order to remove the cause of pressure, may succeed, as it actually has succeeded on some occasions; and should not be neglected when the indications are sufficient to warrant a recourse to it.

668. f. *Simple and medicated and mineral warm baths* have been much praised in palsy. But it is obvious from the nature and forms of the disease that, although they may be of service in some instances, they may be injurious if inappropriately or indiscriminately employed. I have seen them of service in chronic and asthenic cases, and in those

states of the disease caused by exposure to cold. Medicated warm baths—with warm and aromatic substances—were most beneficial in a case of general palsy arising from this cause that came under my care. J. P. FRANK notices favourably simple and sulphureous warm baths, and states that those of Baden have been of service in some obstinate cases of chronic palsy. In recent, acute, or sthenic cases he justly dreads the use of warm baths, whether simple, mineral, or medicated, as he has known apoplexy supervene where they had been injudiciously prescribed. The sulphureous thermal baths of Baden were recommended by STOLL, chiefly in lead palsy after electricity had been employed. It may be noticed further, that the warm mineral springs of Bath, Toeplitz, &c., have been frequently resorted to by paralytic patients, and sometimes with more or less advantage, when neither general nor local plethora or congestion existed, or when opposite states of the vascular system obtained; that sulphureous warm baths have been favourably noticed by BAKER, SUMMERS, TOLBERG, WAITZ, and HUFELAND; that aromatic and spiced warm baths were recommended by RIEDLIN; warm salt water baths by REIL; and even warm chalybeate water baths by GRAEFE, in this malady.

CHAPTER IV.

THE CONSECUTIVE TREATMENT OF APOPLECTIC AND PARALYTIC SEIZURES.—*Or the Treatment directed to the Prevention of a Return or of an Exacerbation of the Disease.*

669. IN the great majority of cases, the physicians should at this stage—when the attack has been removed, or the more urgent symptoms are abated, or when the more acute state of the paralytic seizure is removed by an appropriate treatment—confine his means chiefly to the promotion of the salutary efforts of nature to repair whatever lesions may have caused, or attended, or supervened upon the attack,

and to the guidance of these efforts, controlling such as are excessive or at all exalted, and aiding such as are insufficient or ineffective. Care should be taken not to depress the powers of life below that state which is necessary to a salutary resistance to morbid changes, on the one hand, or to excite them beyond that state on the other, and thereby to rekindle vascular reaction in those parts of the nervous centres which have been or are still the seat of disease. Every step of the treatment in this period should be taken with extreme caution, and after a due consideration of every circumstance in the history and present state of the case.

670. *The treatment subsequently to an attack of apoplexy or palsy* has been already, in most respects, discussed, especially as regards palsy and apoplectic seizures associated with or followed by palsy. For these the means which have been noticed above are required according as each may be appropriate to inferred pathological states. When the apoplectic attack has been primary and simple, and has been removed by treatment, the means that should be adopted in order to prevent a recurrence of the attack are chiefly those of regimen and diet, aided by such as will promote the secretions and excretions, and prevent general plethora and determinations of blood to the head, or congestions of blood in the encephalon.

671. When the apoplectic attack has been complicated with, or followed by palsy, the consecutive symptoms have a relation to the changes which take place in the seat of lesion. The absorption of the blood, and the process of cicatrization, require several months for their completion. During this time great care should be observed to prevent inflammatory action from taking place around the extravasated blood, and a return of the hemorrhage. This object is best attained by adopting very nearly the same measures as have been recommended to prevent the accession of the attack (§§ 540, *et seq.*). A too sedentary or studious mode of life, watchfulness, much indulgence in sleep, frequent stoopings, and all the remote causes of the disease, must be carefully shunned. The strictest temperance and moderation in respect both of eating and drinking; moderate exercise in the open air; tranquillity of mind, sedulously avoiding the least approach to bodily or mental fatigue, and excite-

ment of the feelings or passions; the preservation of a free state of the alvine secretions and excretions, by means of mild and deobstruent purgatives and cathartic enemata; topical bloodletting, particularly every spring and autumn, when there is a tendency to vascular plethora; low living or a vegetable diet; caustic issues, or setons in the nape of the neck, or in the course of the cervical spine; the use of the tartar-emetic ointment, so as to keep out for a considerable time a pustular eruption on the part to which it is applied; sleeping on a hair mattress, with the head and shoulders slightly elevated, and early rising, are amongst the most efficacious means that can be adopted during advanced convalescence from the disease.

672. For persons who are prone to plethora, in addition to periodical depletions and low diet, the following pills and electuary may be taken on alternate nights:

R. Pilul. hydrarg. chloridi comp., gr. iij.; pulv. jacobivi, gr. iij.; saponis castil., gr. iv. M. fiant pilulæ ij. h. s. s.

R. Potassæ bitart., ℥j.; sodæ biboratis, gr. x. (vel magnesiæ calcin. ℥j.); confectionis sennæ, syrupi zingiberis, āā ℥j. M. fiat electuarium, pro dose, horâ somni, alternis noctibus sumendum.

673. When the disease is connected with the gouty diathesis, vegetable diet, the carbonates of the fixed alkalies, with the extract of taraxacum or the preparations of aloes, the occasional use of an active cathartic, and the careful avoidance of whatever causes flatulence or acidity of the digestive canal, are more especially required. In all cases much benefit will now accrue from a strict attention to regimen and diet as from medicine. The food should be light and digestible, of very moderate quantity, chiefly farinaceous, and taken at regular hours. Suppers should be avoided, or be extremely light, and taken a considerable time before the usual hour of repose. Fish and ripe fruits may be partaken of in moderation; and the waters of Cheltenham occasionally tried, or the following used as a substitute:

R. magnes. sulph., ℥ss.; potassæ sulph., ℥ij.; infus. rosæ co, et mist. camphoræ, āā ℥ijss. M. capiat coch. iij. ampla primo mane quotidie.

674. After attacks of the asthenic states of apoplexy, a more tonic regimen than that directed above may be adopted; but it should be conjoined with the same attention to the digestive, secreting, and excreting functions. Attacks of

this description most commonly proceed from depressing or exhausting causes, which ought either to be avoided or counteracted; and when they are not characterized by plethora, or disposition to increased action, gentle tonics, combined with aperients, a light strengthening diet, and the other means advised for palsy, when the apoplectic attack is followed by hemiplegia or any other paralytic affection, are appropriate to them. For these asthenic or non-inflammatory cases, *strychnine*, or the extract of *nux vomica*, or the preparations of *iodine*, or the *bichloride* of mercury with the decoction of cinchona, or with the preparations of sarza, or the various modes of employing the *electro-galvanic* agents, may be severally tried, as noticed above. Change of air, and travelling by sea or land—on the latter by easy and slow journeys, and a strict attention to *diet* and *regimen*—to a vegetable or farinaceous diet, when there is a marked tendency to plethora—are generally more or less beneficial, both after an attack of simple apoplexy, in order to prevent its recurrence, and during the persistence of palsy, when it is present either primarily or consecutively. When palsy occurs in young or middle-aged persons, exercise taken in the open air, so as to produce free perspiration, aided by an abstemious or vegetable diet, has been found most beneficial; most of the instances of recovery from hemiplegia which I have observed have demonstrated the utility of this regimen.

675. As I believe that the structural changes in the arteries and capillaries—the alterations in the nutrition of these vessels—which I have stated above (§ 205) to be so frequently connected with the production of both apoplexy and palsy—are favoured, if indeed they be not directly produced, by an excessive use of animal food, especially during advanced epochs of life, so I would recommend abstinence in this kind of food, not merely as a means of preventing a first attack, or a recurrence of an attack, but also as necessary to the removal of the paralytic state. There can be no doubt that highly azotised articles of diet often change the state of nutrition, not only in the several compound structures, but to some extent also in the coats of the blood-vessels, giving rise either to osseous, cretaceous, or earthy deposits, or to changes amounting to a fatty degeneration, or consisting of matters nearly, if not altogether, approach-

ing those possessed of a fatty or oleaginous nature or appearance; and that these changes favour the rupture of the vessels in which they occur, especially when the circulation is either excited or obstructed by the causes of the disease above enumerated. Hence, it may be inferred that the choice of food should be guided conformably with this view, whenever the supervention of apoplexy or palsy is dreaded, and subsequently to an attack of either the one or the other.

676. During the treatment of the consecutive symptoms, especially the paralytic, certain *mineral springs*, or factitious *mineral waters*, may be tried; but, like all other means, they should be prescribed appropriately to existing conditions of the digestive, assimilating, and excreting viscera, and to the states of the vascular system. When there is a gouty or rheumatic tendency in connection with the paralytic state, and with marked debility, the mineral waters of Bath, Leamington, or Buxton may be beneficial, if judiciously employed. When there is a manifest oppletion or torpor of the abdominal viscera, then the Seidschutz, Pullna, Cheltenham, or Carlsbad waters may be taken; or the saline mixture just prescribed, or the following, may be occasionally substituted:

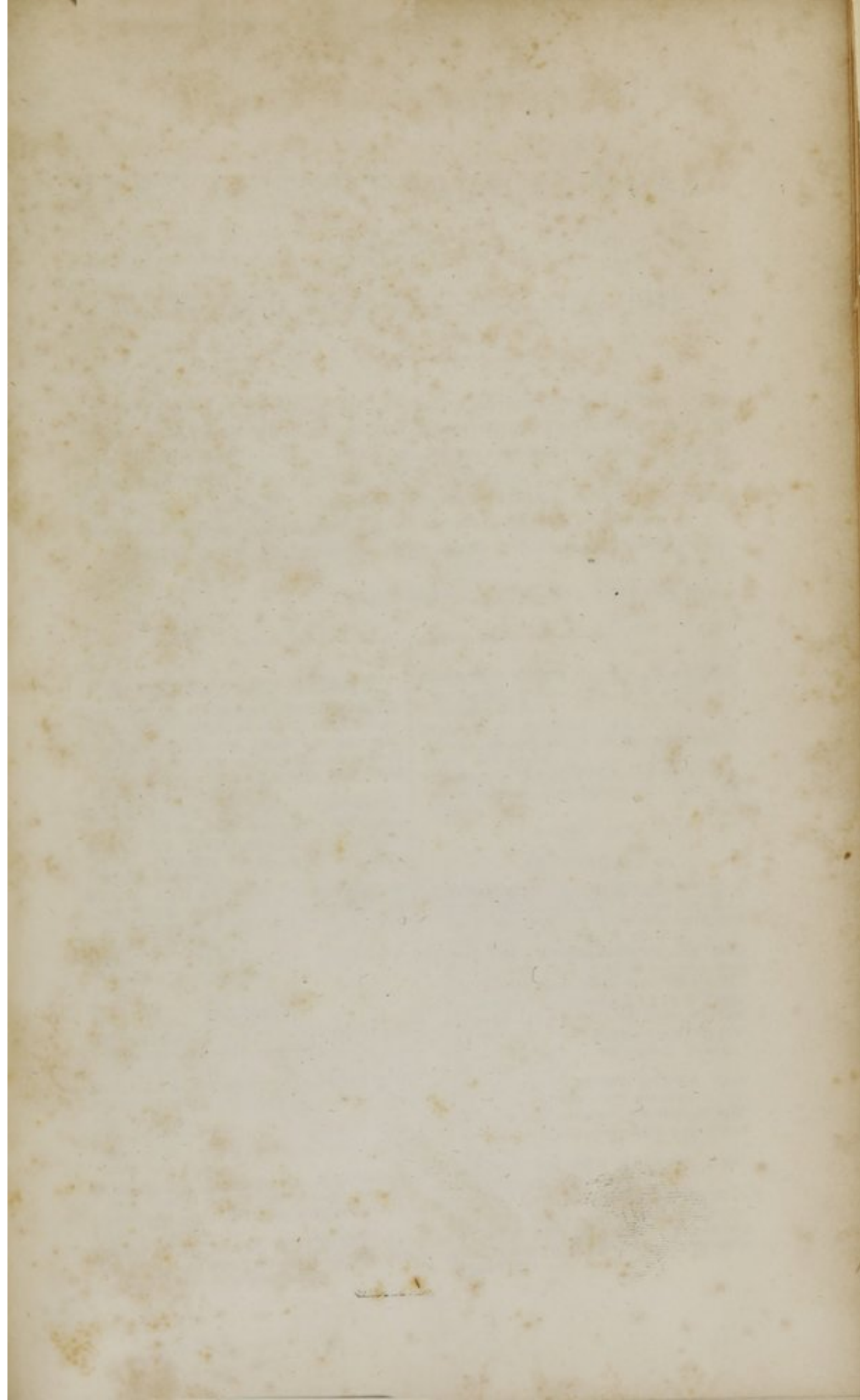
R. Potassæ sulphatis, ℥ij. ; infusi rosæ co., ℥vijss. ; acidi sulphur. arom., ℥j. ; tinct. aurantii, ℥ss. M. capiat coch. iij. ampla primo mane.

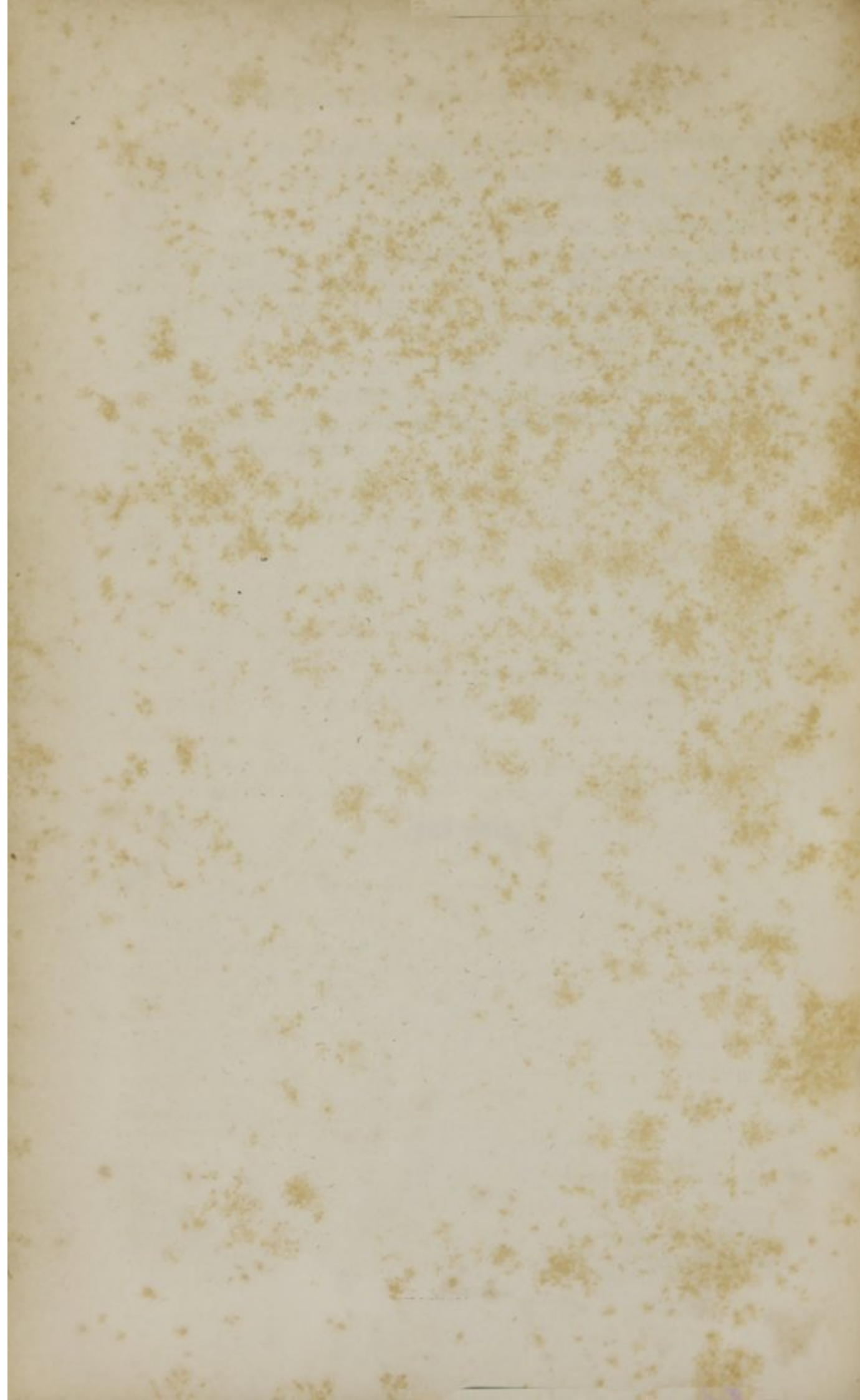
677. During the consecutive treatment the progress of the paralytic or hemiplegic affection towards removal should receive attention. In the more favourable cases, as the period of attack recedes, first sensation, and afterwards motion, return in the paralysed limbs; and generally the lower extremity experiences the amendment before the upper. As recovery proceeds the patient should always wear his hair cut short, and sponge his head with spring water night and morning. In summer he may use the shower bath daily, if he be not far advanced in life, or much debilitated.

678. I may conclude, respecting the *diet* and *regimen*, as well as the other means of *treatment*, that they should depend entirely upon the peculiarities of the case. In most cases of hemiplegia, in all acute and sthenic cases, or whenever general or local plethora is inferred to be present, or is liable to supervene, either during this affection or during convalescence from an apoplectic attack, the diet and regi-

men should be strictly antiphlogistic; a farinaceous and vegetable diet, with lemonade or simple diluents only, being adopted. In chronic, asthenic, and anæmic cases, light, digestible animal food in great moderation, or a diet consisting, in great part, of the white kinds of fish, may be allowed; but in every instance the predisposing and exciting causes should be viewed in connection with the pathological conditions, and all these should be duly estimated before either the *treatment*, or the *diet*, or the *regimen* is assigned. The chief part of the regimen in all cases is the careful avoidance of the predisposing, contingent, and exciting *causes* (§ 419, *et seq.*) of the disease.

THE END.





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