A treatise on the tonic system of treating affections of the stomach and brain: comprehending an account of the causes and nature of impairment of the constitution, indigestion, determination of blood to the head, impairment and morbid excitation of the brian, paralysis, apoplexy, and insanity / [Henry Searle].

A TREATISE

ON

THE TONIC SYSTEM

OF

TREATING AFFECTIONS

OF

THE STOMACH AND BRAIN:

COMPREHENDING

AN ACCOUNT OF THE CAUSES AND NATURE OF IMPAIRMENT OF THE CONSTITUTION, INDIGESTION, DETERMINATION OF BLOOD TO THE HEAD, IMPAIRMENT AND MORBID EXCITATION OF THE BRAIN, PARALYSIS, APOPLEXY, AND INSANITY.

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INTRODUCTION.

The object of the following pages is to direct attention to that part of the prevailing system of medical practice which is called the Antiphlogistic, or lowering, system of treatment; to endeavour to show that this system of treatment is calculated to create, rather than to remove, disease; and that the Tonic, or supporting, system of treatment is that which is indicated in most diseases coming under the notice of the physician, and that which will be found eminently beneficial.

The public, though constantly witnessing the unsuccessful results of the antiphlogistic treatment, seldom question its propriety; the fault being usually ascribed either to the severity or the in-

curable nature of the disease, or to the defective constitution of the patient.

Several appeals to the Faculty have been already made by the Author, through the medium of the medical journals, on behalf of this proposed change in medical practice. Three of these appeals are reprinted as an Appendix to this work: one, "On the Influence of the Antiphlogistic System in the Treatment of Diseases;" the second, "On the Nature of Inflammatory Fever;" and the third, "On the Treatment of Inflammatory Diseases." It might be supposed, *à priori*, that whatever good effects might result from the tonic system of treating disorders in general, it would be perfectly inadmissible in regard to inflammatory diseases. So far, however, from this being the case, it will be found that the maintenance of the powers of the body protects it from falling into that weak and irritable condition which is so essential both to the production and continuance of high inflammatory action, and that, therefore, the tonic system is indicated in this class of diseases, as well as in those of a different character. Daily and attentive observation of disease has convinced me of the accuracy of my opinions with regard to the dangerous tendency of the antiphlogistic system; and I now venture to submit them to the public. My claim upon its attention is, that I have given each system a fair

trial. I was during several years a rigid pursuer of the antiphlogistic treatment, and found it, after ample experience, to be a most unsuccessful system. Since relinquishing it, and adopting the supporting system, a period now of more than eighteen years, during which I have been constantly engaged in contrasting the respective effects of these opposite modes of treatment, I have realized such a degree of success as, in my opinion, fully warrants me in denouncing the antiphlogistic practice as highly injurious to the constitution, and scarcely less destructive of life than disease itself.

The healing art consists in the theory and practice of medicine, and can, more than any other, boast of its alliance with the sciences. The theory of medicine comprehends the knowledge of the mechanism and functions of the human body, both in their healthy and in their disordered states, and includes the knowledge of anatomy, physiology, morbid anatomy, therapeutics, and pharmacy. The sciences connected with these branches of medicine are, mechanics, hydrostatics, chemistry, electricity, botany, and meteorology.

The practice of medicine consists in treating diseases on principles deduced from the theory of medicine; and it might be expected that a practice founded on principles deduced from a theory connected with so many sciences, would be tolerably

certain in its operation, and generally conducive to the accomplishment of its object. In surgical practice this is, generally speaking, the case; but that it is far from being so in medical practice, is proved by the conflicting opinions daily put forth by medical writers.

The diseases which fall within the province of the Surgeon are, for the most part, such as affect the external parts of the body only; and are therefore such as, with a fair knowledge of medical science and moderate experience, are in general obvious in their nature, many of them originating in external and known causes. And if some surgical diseases, from their deep-seatedness or uncommon characters, are involved in obscurity, they are at length, if they terminate fatally, brought into view by the morbid anatomist, and their real nature is then reduced to ocular and unequivocal demonstration. With regard to the treatment of surgical diseases, the course to be pursued is in general obvious, being rarely founded on the consideration of subtle or obscure causes.

Many of the diseases which come under the notice of the Physician are, on the contrary, involved in great obscurity, being frequently unaccompanied by such symptoms as would faithfully indicate their nature: a great diversity of opinion therefore exists with regard to the nature of many of these diseases.

The treatment is attended by corresponding difficulties, and should be regulated in strict reference to the causes, when ascertainable, of the disease; but these being often obscure, conjectural causes are frequently allowed to disguise the real causes, and thus to misguide the practitioner. The disorder, moreover, whether its nature and causes be evident or not, is too frequently viewed with a prejudiced eye. The occurrence of inflammation, or of fever, is apprehended in nearly all diseases, and the antiphlogistic system of treatment is accordingly adopted; and even in cases in which it is admitted that no inflammation exists, fever is anticipated, and lowering means are employed.

Morbid anatomy has of late years very properly become the basis of our medical knowledge. It has however, as might have been expected from the ardour with which it has been cultivated, led to the adoption, in many instances, of erroneous and extravagant views of disease, and to corresponding errors in practice. Hospital physicians, in pursuing the science of morbid anatomy, and in conducting post-mortem examinations, occasionally find more disease than they had anticipated; and some are thence inclined to conclude that a more active treatment than that to which they had resorted should have been adopted. On revisiting the sick wards, they are consequently induced to employ

more severe antiphlogistic measures than they had hitherto considered necessary in similar cases; and, in lecturing to large classes of pupils, they recommend a rigid antiphlogistic treatment, as affording the only chance of saving a patient under any severe form of inflammatory disease. These pupils, witnessing cases of acute inflammation, the severe antiphlogistic treatment employed to combat them, and the post-mortem displays of inflammation, are confirmed in the opinions and practice inculcated in the lessons of their teachers. On entering into practice, the young morbid-anatomists perceive, in almost every case, either the threatening signs or the actual existence of inflammation. They adopt the antiphlogistic treatment, thereby exhausting the strength of their patients, and rendering many of them exceedingly excitable—the most favourable condition to inflammatory action—and they thus often cause a mild degree of inflammation to assume an acute character. When this occurs, extreme measures of depletion and other antiphlogistic means are resorted to, which, by still further increasing the excitability, raise the inflammatory action to a degree of excess which cannot be long sustained by a frame thus deprived of its powers; and death soon takes place. One or two neighbouring practitioners are invited to witness the post-mortem examination, and both are struck at the evident marks of acute

disease. One, a disciple of the antiphlogistic school, is still further confirmed in his opinion of the necessity of employing prompt and energetic means in similar cases. In accordance with these views, he proceeds in future to a bolder system of treatment, and soon realizes in his practice more decided symptoms of inflammation than he had been accustomed to witness ; but instead of taking a plain cause-and-effect view of this fact,—viz. that since he has resorted to more severe measures of treatment, he has realized, as the unhappy consequence, more inflammation in his practice,—he strangely imagines that he has now become more shrewd in detecting inflammation. But the other practitioner, more observant of the course which disease pursues during life, and less influenced by the traces it presents after death, returns to the bedside of his patients, and perceiving debility in most cases of illness, far from feeling himself warranted in venturing upon extreme lowering measures, endeavours, by a supporting system of treatment, to defend the constitution against the fatal ravages which disease often makes upon it when not so defended : he at the same time bears in mind that the resources of nature are great, and that he has not been often disappointed in confiding in them. Thus, in his timidity, as it is termed by the more desperate of the Faculty, he proceeds successfully, seldom wit-

nessing those fatal effects of inflammation to which thousands fall sacrifices every year. He is looked upon, however, as a timid and inefficient practitioner by those who are too confident in their presumed knowledge of morbid anatomy to bow to the dictates of nature, or to confide in her resources.

In medicine, morbid anatomy has of late years been made the basis of a sort of Baconian philosophy, and medicine has been rather pompously styled an inductive science. The ultimate effects of disease, as brought into view by morbid anatomy, are taken as correct data, the inquiry ascends to the supposed causes of the disease, and its nature is then considered to be unequivocally determined. Unfortunately, however, for this mode of investigation and reasoning, the physician overlooks the possibility, or rather the great probability, of his having treated the disease under prejudiced views, and therefore improperly; he accordingly starts upon the false premises, of the ultimate being the legitimate effects of the disease, instead of their being rather the effects of the treatment. By such processes of reasoning, numerous false hypotheses have been raised in medicine, and almost numberless have been the volumes written in support of them. In every age various and conflicting doctrines have sprung up relative to the nature of fever, which in the succeeding age have been superseded by as

many others; and the present is not the least prolific in this particular. Out of a number which might be mentioned, the respective doctrines of Broussais, Dr. Clutterbuck, Dr. Armstrong, and Dr. Southwood Smith, may be instanced. Broussais (Histoire des Phlegmasies, ou Inflammations chroniques, fondée sur de nouvelles Observations de Clinique et d'Anatomie pathologique: 3 vols. Examen des Doctrines médicales et des Systêmes de Nosologie: 4 vols.) maintains that the symptoms of fever arise from a disease of the mucous membrane of the intestines, which sometimes extends to the stomach (*gastro-entérite*); and he accordingly directs his remedial measures to the removal of the supposed local affection. In fatal cases, morbid anatomy is had recourse to to determine the seat and nature of the disease; and sufficient evidence is then supposed to be unfolded in favour of his peculiar views, and consequently of his treatment, of fever. Numerous physicians on the Continent, and many of whom are men of acknowledged talents, uphold the supposed truth of Broussais's doctrines, adopt similar treatment, and find similar morbid results. Dr. Clutterbuck (An Inquiry into the Seat and Nature of Fever. Second edition, 1825.) has for several years advocated a doctrine different from that of Broussais, viz.—That the seat of fever is in the brain; his treatment has

accordingly been principally directed to that organ, and his experience confirms him in the supposed correctness of his views and treatment. According to the experience of the late Dr. Armstrong, who was during several years physician to the London Fever Hospital, the symptoms of fever are such as characterise internal inflammation ; which, in some cases, is seated in the brain ; in some, in the chest ; in some, in the abdomen ; and in others, in all these parts at the same time. He treated fever according to these more enlarged views, and the usual fruits of his treatment were the realization of his anticipated forms of inflammation. Dr. Southwood Smith, his successor at the Hospital, adopts similar views of the inflammatory nature and of the treatment of fever, and on examining his fatal cases discovers similar decided and extensive proofs of internal inflammation in lines (to use his own words) "legible, deep, and extensive." (A Treatise on Fever, 1830.)

It is a curious and startling fact, that those physicians who attempt to determine the nature of febrile and inflammatory diseases by morbid anatomy, and found their treatment on the views they thus acquire, frequently aggravate, by the severity of their treatment, the very disease they intend to remove; morbid anatomy, instead of being made useful to medical science, becoming in such instances

the source of dangerous errors, and the basis of absurd and conflicting hypotheses. In making post-mortem examinations, it is not usual to refer any of the morbid appearances to the treatment, but, on the contrary, to consider them all as the legitimate results of uncontrolled disease; a theorist, in search of disease, never regarding as the work of his own hands any part of the lesion he discovers. On the contrary, he returns from the examination satisfied that he had acumen enough to trace the disease into existence and through its course; that he had throughout closely and rigidly adapted the treatment to every stage of the complaint; and that the most prompt antiphlogistic means could not arrest its progress,—so strong, he imagines, was the tendency of the patient's constitution to favour the disease, or so violent was its form.

With regard to what has been said respecting the aggravation of a disease by the improper system adopted in treating it, it must be admitted, either that the treatment of a disease has no influence upon it, and that the practice of medicine is therefore a mockery; or that different modes of treatment influence disease differently, and produce the different morbid appearances which are discovered after death, and form the bases of the respective theories entertained of the nature of the disease. It is clear that if the morbid

appearances discovered after death indicated the real nature of fever, and were not the effects of the treatment, the question at issue could be settled at once, and without any reference to treatment, by the morbid anatomist. But many of the symptoms during life, and the morbid appearances after death, vary as the treatment varies, the most strenuous advocates of the antiphlogistic treatment finding most inflammation, while those opposed to this system of treatment find, on the contrary, great debility and very little inflammation. Thus, Dr. Southwood Smith, a great advocate of the antiphlogistic system, states, that "the account of the pathology of fever is the history of inflammation, and the description of the individual changes that take place in the organs that constitute the febrile circle is an enumeration of the various products of inflammation." But those who treat fever on different principles find neither the severe symptoms during life, nor the appearances of inflammation after death described by Dr. Southwood Smith; and they therefore reject, as erroneous, his views respecting the treatment and pathology of fever, and conclude that much of the fatality which takes place in his practice is the result of the severity of the treatment, and not of the incurable nature of the disease.

It might be expected that Dr. Armstrong, Dr.

Southwood Smith, and others of their school, who discover so much more readily than their opponents in doctrine the signs of inflammation in fever, would, under their prompt treatment, speedily remove the inflammation; and that those who overlook the symptoms of inflammation, and therefore neglect to administer remedies for it, ought to be those, and not Doctors Armstrong, Smith, and others, to discover by the "scalpel" "traces of inflammation legible, deep, and extensive." Dr. Southwood Smith thinks that the scalpel must ultimately determine the nature of fever. He says, "It may be difficult to eradicate this mischievous opinion [alluding to the opinion that debility characterizes fever] where it was first engendered, and where it still continues to be fostered, in the study of the falsely reasoning theorist; but it is easy to confute it at the table of the pathological anatomist; and it must ultimately fall, if not by the pen, by the scalpel."

While the scalpel has done much to unite the opinions of surgeons, it has also done much to sever those of physicians and to give rise to discordant doctrines; and we have sufficient experience to satisfy us that it will never settle the disputed question of the pathology of fever. The bedside is the only place where discordant doctrines can be settled and great errors in practice corrected. If Government would appoint com-

missioners to investigate these matters, and invite those who advocate opposite doctrines to treat a given number of cases, each according to his particular views, the commissioners, by witnessing the respective results of different modes of practice, would readily distinguish between truth and error, and thereby speedily settle these vitally important differences among the Faculty, to the triumph of truth and humanity.

Unfortunately for the medical profession, as well as for the cause of humanity, the public bestows encouragement and patronage where they are least merited. For example: When a case of scarlet fever is treated upon the rigid antiphlogistic system considerable inflammation in general presents itself, which convinces the friends of the patient of the supposed propriety of the treatment—indeed, it appears indispensable; and whether the patient recover or not, they are satisfied that "everything was done which could be done," and the practitioner obtains both the confidence and the gratitude of the friends of the patient. But when a case of a similar nature is treated by a disciple of Sydenham, who states that "scarlatina simplex is only dangerous from the too great officiousness of the physician"; when the treatment consists in merely assisting the efforts of nature to throw out the rash and thus dispel the poison from the frame,

the disease assumes, in consequence, a mild and simple form, not being complicated with inflammation and inordinate fever, and the patient, not having been reduced in strength, recovers in a few days. The friends of the patient, under these circumstances, entertain a very different sentiment regarding the practitioner; they imagine that skill was neither required nor displayed, but that nature did everything. In this way truth, humanity, and justice are daily sacrificed.

In objecting to the antiphlogistic system of treating disease, both the advocacy and rationale of the opposite—the supporting—system are to a certain extent necessarily advanced. It is requisite, however, to enlarge upon the views on which the beneficial influence of the latter system is maintained, the special object of this work being, to advocate this system as the proper mode of preventing, as well as of treating, disease.

First, of the supporting system as preventive of disease. It is universally admitted, even by the most strenuous advocates of the antiphlogistic treatment, that the more weak and delicate the constitution, the more liable is the individual to disease. It is also admitted, that in a sound constitution no undue susceptibility to be influenced by disease exists; and, moreover, that a sound constitution possesses within itself the power

of resisting, to a very considerable degree, the accession of disease. Mere exciting causes are not, as morbific agents, in general sufficient to produce disease ; predisposing causes being, in most cases, also essential. Predisposing causes originate in defective constitutions, and create in the individual the susceptibility of being influenced by exciting causes. A sound constitution, on the contrary, resists exciting causes by not affording predisposing causes, the cooperation of which with exciting causes is essential to the production of morbid action. Cases of hydrophobia afford exemplification of the influence of morbid agents on different constitutions. The majority of infected individuals become in a few days hydrophobic ; but it occasionally happens that, in those of strong constitution, months, and in some rare instances years, elapse before the morbific agent takes effect ; at length the health of the individual, probably from other causes, becomes impaired and hydrophobia appears, the constitution being no longer capable of resisting the influence of the poison, which had hitherto remained latent. In measles, scarlatina, and other infectious disorders, the imbibed poison takes effect, in some individuals, in twenty-four hours ; while in others, of stronger constitution, many weeks elapse before the frame becomes susceptible of its agency. The

different effects produced on individuals of different constitutions by exposure to the inclemency of cold and wet weather may also be adduced in illustration of the foregoing position. The result of such exposure is a condition in which the blood, to a certain extent, leaves the surface and extremities, and accumulates in the central organs of the body. In one individual, whose constitution affords no predisposing causes to disease, and if he take the means usually resorted to for obviating the ill effects generally apprehended from exposure to the weather, reaction, resembling that usually experienced after cold bathing, succeeds, and he feels invigorated. But in another, whose constitution predisposes him to disease, no reaction takes place; he feels depressed, has rigors, and may in the course of a few hours have an attack of internal inflammation. In the latter case an undue susceptibility in the constitution to be influenced by morbific agents exists: the internal accumulation of blood is the immediate exciting cause, and takes effect in producing inflammation of one or more of the central organs. These examples show that exciting causes alone are not in general sufficient to produce disease, but that other elements—predisposing causes—usually cooperate with them in the production of morbid action.

To prevent the occurrence of disease, therefore,

it is essential to maintain the constitution in a sound state, and this is to be accomplished chiefly by means of nutritious food, air, and exercise. Those whose constitutions are thus protected are regardless of the morbific agents to which they are constantly and necessarily exposed ; but those whose constitutions are not duly supported acquire a predisposition to disease, which renders them liable to be influenced by any exciting cause. Some individuals make it the business of their lives to defend themselves against atmospheric and other external agents ; they avoid, to the utmost of their power, the exciting causes of disease, but take no means of remedying the predisposing causes : they should understand that no ordinary exciting cause of disease will take effect without the cooperation of a predisposing cause, and that predisposing causes can be removed only by improving and invigorating the constitution.

Secondly, of the Supporting system in the treatment of disease. The supporting system, as has been shown, is of the utmost importance in the prevention of disease, and it is scarcely less important in the treatment. Supporting measures exert their agency chiefly upon the constitution ; they therefore relieve disease so far only as the constitutional—the predisposing—causes are influenced. And this is not of secondary import-

ance ; for, if predisposing causes be essential to morbid action, to diminish them is to diminish disease, and to remove them altogether is to remove disease. But as the efficacy of supporting measures upon a constitution already debilitated is slow, other means, such as exert a quicker agency in subduing urgent symptoms and in remedying functional derangement, are also required.

In no complaints is the supporting system of treatment more beneficial than in those of an inflammatory nature ; but in the treatment of such complaints, above all others, prejudice rises up in strenuous opposition to it. The more desperate advocates of the antiphlogistic treatment are continually railing against any administration of nutriment in cases of inflammation. Their lowering system of treatment induces a state of high excitability,—a state in which the patient is either incapable of taking nutriment, or is raised to a still higher state of excitement if it be administered, and they conclude that the administration of nutriment in inflammatory diseases is highly prejudicial. They are blind to the error of having induced this excitable condition by their lowering treatment, and of having reduced the powers of the constitution still further by persisting in such treatment, thereby allowing an acute disease to prey upon an unsupported constitution.

Attentive observation and long experience have convinced me, that when the powers of the constitution are supported by the administration of nutritious food from the commencement of an inflammatory disease, the inflammation throughout its progress generally assumes a mild and simple character, being unaccompanied by fever. That the administration of nutritious food prevents the occurrence of fever, and that a low diet, on the contrary, tends to produce fever, can be made clear to the unbiassed. In the first place, an excitable condition of the body is, generally speaking, essential to the occurrence of fever; and it is well known that those of excitable constitutions are more predisposed than others to fever. In the second place, debility is an essential element of excitability, the most debilitated individuals being also the most excitable. If, then, fever depend on excitability, and excitability on debility, it follows that debility is a *sine quâ non* to fever. A low diet therefore tends, under an exciting cause, to produce fever. It is strange that, the several parts of this proposition being admitted, it should, in its integral form, be generally considered erroneous.

Inflammatory and febrile diseases, when treated under the antiphlogistic system, frequently assume either a very acute or a dangerously low character,

and often prove fatal. The same diseases, when treated under the supporting system, and unless the patient be at the time of the attack in a delicate condition, or have been reduced by lowering means since the attack, generally appear under a mild form, and rarely proceed to a fatal termination. The constitution of the patient, moreover, is by the depleting system often reduced to so low a degree, that considerable time and much attention are required for its re-establishment. The supporting system, on the contrary, improves a bad constitution, and maintains a good constitution uninjured by the disease.

CHAPTER I.

INFLUENCE OF INNUTRITIOUS DIET UPON THE CONSTITUTION.

ALTHOUGH the climate of this country is calculated from its changeableness to occasion disease, yet it does not, in general, supply any such powerful morbific causes as might not be resisted by a sound constitution; many of the immense variety of diseases to which we are liable being attributable rather to the state of the constitution than to external causes. The constitution in its natural state is not only capable of resisting the agency of most morbific causes, but the human frame possesses within itself extraordinary powers of preservation and reparation, and, though composed of fine and delicate materials, is nevertheless capable, in consequence of the yielding and elastic nature of the tissues into which these materials are wrought, of resisting to a great extent external violence. It is true, the superficial observer might, on viewing

the anatomy of the body, notice how slight a wound inflicted on the heart, or large vessels, would prove mortal, without observing, at the same time, how well these organs are protected from external violence. Or, upon closer examination, the mechanism might appear too delicate, diversified, and complex, to be compatible with continued and harmonious action, and it might be concluded that man is constitutionally liable to the numerous diseases which befall him. But it could be shown that man, whether his mechanism be viewed physically or functionally, is securely constituted; and in viewing the construction of the human mechanism, we find it composed of a great variety of organs and textures, and so happily and wonderfully endowed, that the extreme delicacy of the materials is compatible with great physical strength and perfect functional power. We find every constituent portion of the body, whether it be bone, muscle, tendon, or any other structure, complete in itself, having blood-vessels and nerves, by which it elaborates, nourishes, and, if required, even repairs, within certain limits, its own mechanism. With regard to its powers of reparation, not only will the ends of a fractured bone, or a divided muscle, become reunited as firmly as before, but even a large bone, when from injury or disease it loses its vitality, will be replaced by a new case

of bone, formed around the old one, which isolates it from the living parts, and within which the dead bone will waste and escape piecemeal, the new case filling up as this takes place, and an entirely new and solid bone being produced. But it forms no part of the object of this work to enter into the proofs that the human constitution is secured by the most perfect mechanism, or that every part is endowed with its own internal powers of preservation and reparation; it will, however, be necessary to show, that for the healthy maintenance of these powers a sufficient quantity of good blood is indispensable.

If, as it has been stated, the human mechanism be so perfect and secure, and if it be so abundantly endowed with preservative and reparative powers, it would appear that man is not, as is generally supposed, the legitimate heir to the numerous diseases which befall him. How, then, it may be asked, is he subject to such a variety of disorders? The reply is, the constitution, through neglect and mismanagement, becomes impaired, and a predisposition to disease is thus acquired. However perfect the mechanism of a steam-engine may be, yet, unless it be duly supplied with fuel, water, &c., it will not long work well. Nor will the human frame, however perfect, secure, and beautiful its mechanism, continue long in functional in-

tegrity unless it be duly and properly nourished, and its preservation in other respects regarded.

In the arts and manufactures, very fine textures can be wrought out of the best materials only, and articles so formed, however delicate, are specifically stronger than those of coarser manufacture. And so with the animal frame: unless it be formed out of blood the best in quality, its constitution will be defective; and unless it be continually supported by good blood, it will, according to circumstances, become impaired either in function or in structure, or in both. Contrast the respective constitutions of those who are properly and of those who are insufficiently nourished. The former—provided the other parts of their regimen be in keeping, as regards air, exercise, and clothing—are healthy, enjoying vigour of both mind and body; and nature, in case of injury from external violence, is amply provident, and institutes, in general, by itself, though the assistance of art be occasionally required, a speedy process of restoration. How different are the constitutions of the latter—of those who subsist under a system of innutritious diet! They are subject to a long catalogue of diseases, some of which are of the most distressing kind. From poor blood the several structures of the body are, in infancy, very imperfectly elaborated and developed: hence the

bones may be too brittle, or too soft, according as they contain too little animal, or too little earthy substance: thus fractures from slight causes may happen, and the reunion of the bones be attended with difficulty and delay; or the long bones may become curved, and their extremities spongy and enlarged, constituting rickets. The cartilages may be disposed to ulceration, and the lymphatic glands to suppuration; the muscles may be slender, flabby, and devoid of power, favouring thereby various kinds of deformity. In later periods of life, all the solids of the body may be more or less in a state of innutrition, and incapable of performing their respective functions with the energy compatible with health. The ligaments and muscles lose their tone and elasticity, and are incapable of supporting moderate exertion; thus severe sprains and other injuries may arise from comparatively slight accidents. The heart, in consequence of the laxity of its tissue, is liable to become enlarged from the increased circulation attending even moderate exertion, or mental excitement. The blood-vessels may be impaired in tone, and dropsies may be the result; or hemorrhages may take place, in consequence of rupture of the minute vessels. Distressing symptoms of dyspepsia manifest themselves, the stomach and intestines performing their functions with difficulty.

Thus poorness of blood may lay the foundation of many diseases, which from this cause alone, and without the coexistence of any exciting cause, may develop themselves, and induce a life of protracted suffering.

Paucity of blood also impairs the constitution and renders it predisposed to numerous forms of disease, which, however, require the cooperation of morbific agents for their production.

A large proportion of persons of all ages, especially those in the earlier periods of life, have delicate constitutions, and have therefore a greater or less predisposition to disease, the cooperation of an efficient exciting cause being alone wanting to enlist them among the sick. Many parents, perceiving that their children are of this class, some being dull and inactive, others excitable, and all delicate and predisposed to disease, withhold the chief means of improving their blood, and consequently their constitution, by prohibiting the use of animal food, under the false apprehension of its being too stimulating, and therefore liable to become the exciting cause of disease.

A distinction being made between *poorness* and *paucity* of blood, as causes of disease, a difference might be expected, and to a certain extent exists, in the characters of those diseases which respectively result from each of them ; but as both causes

are in most cases combined, this difference will not be particularly insisted upon in this place. This much, however, may be said, that individuals who take a sufficiency of food, but of an innutritious kind, mostly derive from it blood sufficient in quantity, but deficient in quality. A sufficiency of blood, though the blood be poor in quality, is indeed calculated to support the bulk of the frame, and many whose diet is innutritious, though plentiful, become corpulent; but corpulency supported by poor blood is accompanied by debility, rather than by muscularity and strength. Corpulent persons generally entertain the mistaken notion that corpulency is a proof that more nutriment is taken than is required, and they are therefore led to a practice which tends to perpetuate rather than to remove the impoverished condition of the blood. Whether this condition of the blood occur in a corpulent or in a slender frame, the constitution becomes impaired and predisposed to diseases, which are for the most part of a chronic kind, such as, according to the age of the individual, rickets, worms, pustulous eruptions, scrofula, phthisis, hemorrhages, and dropsies.

Those who, on the other hand, take an insufficiency of food, but of a nutritious nature, derive from it blood, good in quality but deficient in quantity. These are in general of slender frame

and of somewhat excitable constitution, and subject to disorders of a more acute character, as inflammatory and febrile disorders, also to affections of the head, erroneously supposed to arise from a determination of blood to the brain.

When the two causes are combined,—when the blood is deficient both in quantity and quality, and to a considerable extent,—an indication is often given, from infancy upwards, of premature age, the individual assuming a general expression of both mental and corporeal debility. This depraved condition of constitution is, above all others, the most capable of engendering disease; and individuals of this constitution are predisposed to low and infectious fevers, the worst kind of eruptions, to scrofula, and in short to almost every disease of a cachectic description.

Since good and sufficient blood is essential to the preservation as well as to the perfect development of the human fabric, it may be useful to make a few remarks upon the composition of this fluid, and to point out the particular uses of each of its component parts; these remarks may also tend to lessen the prejudices of those who entertain the absurd notion that they "make blood too fast," and are thereby creating a tendency to apoplexy. This class of persons make it the business of their lives to study the best method of preventing this ima-

ginary evil; as if the object of nature in providing them with blood, on which the strength and health depend, were merely that of endangering their lives! Their best friend is deemed their worst enemy, and one that requires to be constantly combated. It is important they should know, that with the fullest powers of digestion only a certain proportion of blood can be formed from a given quantity of aliment, and that it is as absurd to imagine that they obtain from food an undue quantity of blood, as to suppose that a greater quantity of butter might, by the process of churning, be obtained from milk than is really contained in it. In accordance with their erroneous opinions, these persons live abstemiously, and have therefore less blood than others; they are nevertheless apprehensive of possessing a redundancy of blood, as if a large quantity of this fluid could be obtained from a small quantity of aliment. A florid complexion often tends to support this misapprehension regarding apoplexy: this is a false indication, for the brain of an individual naturally florid does not receive more blood, *cæteris paribus*, than that of a person naturally pallid. These erroneous notions, though very prevalent, will not bear the test of examination.

In the subsequent account of the composition and uses of the blood, it will be seen that a considerable quantity of blood is daily consumed as the

building and repairing materials of the body, that a still larger quantity is expended in the various secretions, and that if nutriment sufficient to supply the loss thus occasioned be not taken, the constitution will necessarily become impaired.

The blood is the fluid from which all the materials of the body are derived, and varies considerably in quantity in different individuals, Müller stating that it varies in the adult from eight to thirty pounds.

The blood while circulating in the vessels preserves its fluid state, but in a few minutes after it has been drawn from the body, its more solid parts separate by coagulation from the fluid portion; the former being termed the coagulum or clot, and the latter the serum.

The coagulum is chiefly fibrin, and is combined with the red colouring-matter, from which it can be separated by washing for some time in water. In order, however, to extract pure fibrin from the blood, fresh-drawn blood should be freely stirred by means of a bundle of twigs, by which process the fibrin adheres to the twigs in a colourless state, leaving the red particles floating in the serum. The proportion of fibrin in the blood varies in different animals, and is greater in carnivorous than in herbivorous animals. The proportion varies also in the human subject, being less under twenty and

above sixty years of age than during the intermediate period. It is less in women than in men, and in the phlegmatic than in the sanguine temperament, while, on the contrary, the aqueous portion of the blood is greater. Fibrin is the substance which forms the basis of the muscular system, on the development of which depend the physical power and movements of the body. A full proportion of fibrin is therefore essential to the support of the healthy tone and vigour of the frame.

The red particles are, in the human subject, in the form of flattened circular discs, and are, according to the measurements of different observers, from a three-thousandth to a four-thousandth part of an inch in diameter. They are composed of nuclei, which are supposed to be formed of fibrin, and of colouring-matter which encases them, but which can be readily washed off. Although the colouring-matter deeply reddens the blood, yet in weight or bulk it forms a very inconsiderable proportion of that fluid.

Müller states, that "it is not known whether the parts which appear to contain colouring-matter, as for instance the muscles, derive it from the blood—a part of the colouring envelope of the red particles having been dissolved—or whether this matter, which becomes still more highly coloured by the ac-

tion of the atmosphere, is formed in the muscles themselves. But, however this may be, the red particles themselves do not unite in substance with the tissues: they certainly perform some very important office in the animal economy. In their passage through the lungs they acquire the bright arterial colour, and in their subsequent transit through the capillaries of the body a reciprocal action takes place between them and the component particles of the organs, by which they lose this bright colour, becoming again of a dark red; but they still move on in a continuous current, exerting their influence on the tissues in their transit through them, without being arrested by them. In each circuit of the blood, which occupies less than three minutes, they undergo two changes of colour: one from dark red to bright scarlet in the lungs, and another from scarlet to dark red in the capillaries of the body. In twenty-four hours each of these changes takes place about four hundred and eighty times. In their arterialised condition the red particles exert on the organs of the body, and especially on the nerves, a stimulating action, which is essential to life, but which is a very different thing from contributing new nutritive matter."

The Serum is the aqueous part of the blood, holding albumen with a small proportion of certain salts in solution. The albumen is analogous in composition

to the white of egg, from which it takes its name; its quantity in the blood is about a fourth less than that of fibrin. Albumen is the chief constituent of the brain and nerves, of the cartilages, tendons, ligaments, nails, and hair.

It was formerly considered that gelatine or jelly was held in solution by the aqueous portion of the blood: this is not now admitted to be the fact; gelatine, however, enters into the composition of bone, tendon, cartilage, serous membrane, cellular tissue, and skin; but whether gelatine exists chemically in the blood or not, fibrin, albumen, and gelatine are composed of the same elements or ultimate principles in different proportions, viz. nitrogen, hydrogen, carbon, and oxygen, with a trivial proportion of phosphorus and of one or two other substances. The relative proportions of the chief components of the blood are as follows:—

Coagulum, which is fibrin and the colouring-matter combined	12·92
Albumen	8·69
Water	78·39

The saline parts of the blood are to be found in the various fluids secreted by the glands and surfaces of the body; some of which fluids acquire, however, by the secerning functions of the glands, properties which cannot be discovered in the blood

itself; but it is certain that they are elaborated from it alone. The salts of the blood enter into the formation of the solids also, contributing to the formation of the earthy part of the bones, teeth, &c. Hence it is obvious that the component parts of the blood can be traced to their respective destinations, in becoming the building and repairing materials of the several organs of the body, and the elements of the various fluids secreted. The following observations by Müller on this subject merit particular attention :—

"In the process of nutrition is exemplified the fundamental principle of organic assimilation. Each elementary particle of an organ attracts similar particles from the blood, and by the changes it produces in them, causes them to participate in the vital principle of the organ itself. Nerves form nervous substance, muscles muscular substance, even morbid structures have the assimilating power; warts on the skin grow with their own peculiar structure; in an ulcer the base and border are nourished in a way conformable to the mode of action and secretion determined by the disease; and the assimilation of the nutrient materials of the blood to form an organ with diseased action may induce the destruction of the life of the animal.

"The proximate elements of the tissues exist in

part ready formed in the blood. The albumen which enters into the composition of the brain and glands, and of many other structures in a more or less modified state, is contained in the blood; the fibrin of the muscles and muscular structures is the coagulable matter dissolved in the lymph and blood; the fatty matter, which contains no azote, exists in the free state in the chyle; the azotised and phosphoretted fatty matter of the brain and nerves exists in the blood combined with the fibrin, albumen, and cruorin. The iron of the hair, pigmentum nigrum, and crystalline lens, is also contained in the blood; the silica and manganese of the hair, and the fluor calcium of the bones and of the teeth, have not hitherto been detected in the blood, probably from their existing in it in but small proportion. The matters here enumerated are attracted from the blood by particles of the organs analogous to themselves, partly in the state in which they afterwards exist in the organs; in other instances their ultimate elements are newly combined in them, so as to form new proximate principles; for the opinion that all the component elements of the organs exist previously in the blood in their perfect state cannot possibly be adopted: the components of most tissues, in fact, present, besides many modifications of fibrin, albumen, fat, and osmazome, other perfectly peculiar matters, such as the gela-

tine of the bones, tendons, and cartilages,—nothing analogous to which is contained in the blood. The substance of the vascular tissue, the different glandular substances also, cannot be referred to any of the simple components of the blood.

" . . . Assimilation, then, does not consist merely in the component particles of the organs attracting the fibrin, albumen, and other matters of the blood which flow through them, adding to themselves the matters similar to their own proximate principles, and changing the composition of those which are dissimilar; besides these actions, the assimilating particles infuse into those newly assimilated their own vital properties. . . . . .

" The nutrition of all parts of the body, in conformity with the original type, presupposes the persistence of that power which produced all the distinct parts—all the organs—originally as 'members of the whole,'—as parts necessary to our idea of the being,—and which exists in the germ before any distinct organs are formed, when the animal exists as yet merely 'potentially' in the form of the germ. Nutrition, then, is the continued reproduction as it were of all the parts of the animal by this internal power: but in the adult the reproduction can only be effected by the process of assimilation, that is, by the union of the new matter with the assimilating parts; while in the embryo,

in which no organised 'groundwork' as yet exists, the parts are formed—their 'groundwork,' in fact, created—by the formative power which is still undivided. However, until the whole body is destroyed, all the organs are directed by *one* formative principle so as to produce the concurrent action of all assimilating tissues; it is the operation of this principle that we admire, as the *vis medicatrix naturæ*, in the correction of the subtle material changes which are induced by diseases; but organised parts of the body, once formed, cannot, in most cases, if wholly destroyed, be again restored by this power. . . . .

"*Life is attended with a constant change of the material of the body.* This is evidenced by new nutriment being required in proportion to the quantity of the excretions. The question, however, presents itself—Do the components of the fluids merely undergo this change, or are the particles of the organised tissues also renewed?

"1. *Renewal of the material of the fluids.*—It is most natural to suppose that the change of material takes place primarily in the fluids of the body, and that the fluids only are implicated in the change by which several pounds of nutriment are received daily in place of several pounds of decomposed matters, which are expelled in the cutaneous transpiration, in respiration, with the urine, and other

excretions, and that the solids themselves have little share in it. The fluids, while they maintain the life of the body, are constantly undergoing decomposition, and in this respect the animal machine might be compared with other machines,—for example with the steam-engine.

"2. *Renewal of the material of the organised solids.*— . . . . In most parts, the nerves excepted, there are many unequivocal signs of the change of material; and the bones themselves, which at first sight appear the most fixed and stable parts of the body, and nevertheless exhibit such distinct traces of renewal of their material, seem to prove that this process is not limited to the fluids of the body, but is a phænomenon which prevails extensively even in the organised solids. Among the evidences of the renewal of the material of bones are the formation of the cells, the development of the frontal and sphenoidal sinuses in childhood, the absorption of bones under the pressure of swellings, the absorption of the alveoli of the jaws, and the thinning of the cranial bones in old age, &c. The enlargement of the cavities of the bone, with the enlargement of the whole bone itself, and indeed the mere growth of so solid a body by interstitial assimilation, and the changes that its form undergoes during growth, are not conceivable without a constant removal of osseous particles from certain

parts, and the deposition of similar particles at other parts, consequently not without a change of material. In other parts of the body the proofs of the renewal of the substance are less evident. Such proofs, however, are found in the constant decomposition on the surface of a fungus, as of fungus hæmatodes, concurrently with its reproduction,—in the wasting of the solids of the body during abstinence from food, in atrophy, and in several chronic diseases,—and in the growth, change of form, and wasting of tumours and warts, and their frequently rapid reproduction after previous wasting....

"The exchange of old for new matter in the solids of the body might be presumed, if merely from the constant changes which are taking place in the form of parts. From childhood upwards the organs are continually changing their form, and this change in the form of the whole organ can only be effected by means of a change in the minute elementary particles which compose it. . . . . D'Outrepont supposes that life itself subsists with, and consists merely in, a constant exchange of material in the fluids and organised solids. It has already been shown that life is attended with a constant decomposition of the material of the body. Every action produces a change in the composition of the active part, and excites a call for the restoration of the natural composition, which is gra-

dually effected during the state of rest. It appears, therefore, really that even the organised solids undergo a gradual decomposition of their component particles, which is inseparable from their state of action, and which itself induces renovation. . . . .

" The exchange of material, lastly, is most considerable in youth, and diminishes more and more as age advances."

It has been seen from the foregoing quotations, that all the parts of the body are constantly appropriating to themselves the nutrient substances contained in the blood ; that secretions, of which some are exceedingly copious, are constantly being formed, and that an adequate renewal of this fluid is therefore essential. But in a great proportion of individuals, and perhaps even in the majority, this renewal is inadequately achieved. There are comparatively few complaints which are not ascribable, in some measure, to this cause ; which, although it be not in general the ostensible, is the occult cause, creating a predisposition in the constitution to become disordered by causes which could not otherwise take effect. The number of persons who, although not ill, are seldom perfectly well, especially females of the more respectable classes in society, is very great, and the deficiency in health is referred to various causes, but scarcely ever to the right one, —a poorness or paucity of blood.

A sufficient quantity of blood, constantly and duly nourishing all the parts of the body, and enabling its organs to carry on their respective functions with freedom and vigour, is therefore essential to health; and as the blood is formed from the food, the observance of a proper system of diet is of the highest importance. Not only should an abundance of blood be insured by means of suitable food, but it should also be well vivified by fresh air, and properly circulated by the aid of exercise.

Fresh air is essential to the perfection of the arterialisation of the venous blood in its passage through the lungs; and unless the carbon—with which the venous blood is charged, and which is the result of the chemical changes this fluid undergoes during its general circulation—be constantly excreted, the blood becomes so overcharged with it, that its vitality, or at least its animating properties, become inversely diminished, and the constitution suffers to an equal extent.

The utility of exercise in increasing the circulation of the blood is too well known to require much comment. In the languid state of the circulation, the extremities and other parts of the body receive less than their due proportion of blood, and are accordingly reduced in temperature; a deficiency in the arterial circulation occasioning,

at the same time, an accumulation of blood in the large veins. On the contrary, under a vigorous state of the circulation, the blood is freely and equably distributed, imparting both warmth and nourishment to the whole frame. Those organs, however, which are specially called into action during exercise, as the muscles, derive more nourishment by this mode of increasing the circulation than any others; hence exercise produces muscularity and strength, and while it promotes muscularity, it tends to prevent obesity. Other beneficial effects result from exercise: the blood-vessels improve in tone, thus obviating the occurrence of various diseases arising from a defective condition of these vessels; the respiratory function is aided; and lastly, the digestive function is considerably promoted.

The influence of innutritious diet upon the constitution is therefore of the most injurious tendency, by yielding a supply of blood poor in quality and deficient in quantity, and incapable of sufficiently nourishing the tissues and organs on which the health and strength of the body depend.

CHAPTER II.

ON DIET.

The knowledge of the composition of the blood does not necessarily suggest the best means of keeping up a supply of good blood in the system. To determine which kind of food is best adapted for the full development and support of the body, has been a greatly controverted question. It has been contended by some that a vegetable diet is the most simple and natural, and therefore the most proper. The reply to this argument is found in the language of nature. Essential distinctions exist in the construction of the masticating and digestive apparatus of animals, and unerring instinct accordingly prompts them to select that kind of food which is adapted to their particular organisation, the natural food of some animals being entirely flesh, that of others strictly of a vegetable kind; while man, from his organisation, requires both animal and vegetable food. The main question therefore to be decided with regard to man is, as to the relative and absolute quantities of

animal and vegetable food of which his diet should consist.

The respective qualities, as well as the facility of digestion, of animal and vegetable food are widely different. As animal food is composed of the same materials as the blood, and is indeed blood in a solid and organised form, its digestion is necessarily as simple as possible, requiring little more than mere solution, as far at least as the function of the stomach is concerned, to convert it into fluid blood. The quantity of nutriment contained in animal food is therefore nearly weight for weigh . How much more elaborate must that process of digestion be, which converts a vegetable substance into an animal fluid! Compare, for example, hay, the most abundant of all vegetable food, with blood, and they will be found to be almost heterogeneous substances. To convert hay into blood requires a much more extensive digestive apparatus than carnivorous animals possess. Some herbivorous animals have several stomachs, and all have a great length of intestine. A carnivorous animal obtains as much blood from the digestion of six pounds of animal food, as an herbivorous animal extracts from twenty pounds of hay and corn, which would be increased to thirty pounds if moistened by water, to bring the comparison upon equal terms. Animal food is therefore

more easily digested, and much more nutritious than vegetable food. A due proportion in the quantities of the two kinds of food ought to be observed, as animal food in too large a quantity may occasion in some, especially in those who take no exercise, plethora or corpulency; it also sometimes produces a redundancy of bile attended by diarrhœa, which last effect, when it occurs, tends to obviate the others. Vegetable aliment, in too large a quantity, often occasions, on the contrary, a deficiency of bile, constipation, &c.; but if the two kinds of food be taken together in suitable proportions, they correct the ill effects of each other.

Of late years a popular prejudice has existed against the use of vegetables. It has been concluded that, because they have occasionally an acescent tendency in dyspeptic individuals, they are unwholesome; but an indiscriminate practice should not be pursued on such partial grounds.

During the existence of cholera in this kingdom the "Board of Health" proscribed the use of vegetables and fruit; as if the food which nature had provided, and which, in moderate quantities, had been hitherto found wholesome, should all at once create a predisposition to disease. This proscription tended greatly to strengthen the growing prejudice against vegetable food. Animal food also has its opponents. It is supposed to be too nutri-

tious and stimulating, and accordingly calculated to give rise, especially among children, to inflammatory disorders. It is considered prejudicial to the complexion and general appearance of young ladies; they therefore partake of it very sparingly: those also of a corpulent tendency are particularly abstemious in regard to animal food. But these, as will be shown hereafter, are unfounded prejudices.

Rules for diet are liable to many exceptions. As the purpose of food is to support the life, growth and powers of the body, and as the substance of the body is consumed and its powers are exerted according to the different pursuits of individuals, so the quantity and quality of the aliment should be regulated.

The number of meals taken in the day by different individuals is far from being uniform, and varies from two to five. Those who are in the habit of taking five meals a day, cause the digestion of one meal to interfere with that of another. Of this number of meals also some are necessarily innutritious, and therefore subject the stomach to a somewhat fruitless exertion of its powers, and thus often derange its function and render it incapable of perfectly digesting a better meal. If three meals were taken at intervals of six hours, the objections just raised would be obviated, and

the practice would be found conducive to a regular and perfect digestion, and to good health. All persons actively engaged, and who take much exercise ; those subject to much anxiety or exertion of mind ; and all who are in a languid condition of body, should take animal food twice a day, the periods of taking it being regulated by circumstances. Those who dine at a late hour should take meat at breakfast, and those who dine early should take it at supper. In Australia animal food constitutes a part of each meal, and the inhabitants enjoy better health than those of almost any other part of the world ; and although this salubrity is referable more particularly to the climate, yet it must at least be conceded that a liberal quantity of animal food is compatible with, if not conducive to, the health there enjoyed.

Complaints of the stomach were by no means prevalent before the introduction of tea into England ; and at the present time it will be found that those who take little or no tea or coffee are for the most part free from indigestion. It is not intended by these remarks to advocate a general disuse of tea, but to recommend the use of animal food, with a more moderate quantity than is usually taken of tea or coffee at breakfast. A nutritious breakfast and an early dinner would obviate the necessity for luncheon ; after a nutritious breakfast

a less heavy dinner than is usually taken would be sufficient, and would obviate the drowsiness and inactivity which a fuller meal so often produces, and would thus conduce to a less frequent and more moderate use of tea.

Supper is absolutely necessary for those who dine early. But those who only occasionally take supper complain that this meal, especially when it consists partly of animal food, occasions uneasiness and restlessness during the night, and is therefore unwholesome. That this objection is invalid will appear from the following considerations, viz. that those who are in the habit of taking supper find in general that they cannot sleep well if they depart from their usual practice; that it is universally admitted that dinner—the most substantial of our meals—has a strong tendency to promote sleep; that it is therefore inconsistent to suppose that, of two similar meals, one should promote, and the other prevent, sleep; again, that animals, in following the dictates of nature, sleep after feeding. The truth is, that those who experience the ill effects of supper indulge too freely in tea, by which means the function of the stomach is impaired, and the organ is rendered incapable of readily digesting aliment taken within a few hours afterwards; and supper is thus brought into disrepute. Those who dine early, and take a nutri-

tious supper, sleep soundly, and rise in the morning with renewed strength ; while many who take nothing after tea are troubled with restless nights, and feel more fatigued on rising than on going to bed.

A few general remarks regarding the choice of animal food may be here made. In the description of the composition of the blood, it was stated that fibrin is the chief element of the muscles, and that the physical and moving powers, as well as the health of the body, depend upon a due development of the muscular system. That kind of food, therefore, which contains most fibrin, affords the most support. It is generally admitted that the flesh of full-grown and well-fed animals constitutes the most nutritious description of food, being convertible by digestion into the richest blood ; so the reddest meats, as beef and mutton, contain more nutriment than veal or lamb. In young animals, the muscles, not being fully developed, are of a whitish colour, and contain much albumen and gelatine ; the flesh of these animals therefore does not afford much more than half the support to be derived from meats containing a full proportion of fibrin.

Veal, lamb, poultry, eggs, and fish are nearly upon an equality respecting their nutrient properties. Wild animals are generally very muscular,

and their flesh is redder than that of tame animals; game therefore constitutes a nutritious article of food. Of fish, the sturgeon and salmon are allowed to be the most nutritious. Shell-fish, as lobsters and crabs, are thought to be unwholesome; some invalids, however, find them exceedingly grateful, and experience no inconvenience after having partaken of them. As gelatine is the least nutritious of the animal substances, so cow-heel and calf's-foot jellies are not the best kind of aliment for those who are greatly debilitated. It is a delusion to suppose that these articles of food are strengthening for invalids. This notion is derived from the circumstance of water, when holding a certain quantity of gelatine in solution, assuming when cold a solid form, a pound of which, however, does not contain so much nutriment as is contained in an ounce of meat.

In recommending two nutritious meals a day, it is requisite to make certain qualifications, suited to the exigencies of different individuals. For example, those whose daily exertions are not inordinate should take about eight ounces of meat in the course of the day, with an adequate proportion of bread and vegetables. Those who daily undergo fatigue should increase the quantity of animal food to twelve ounces. Six ounces of animal food a day are sufficient for individuals who are not

subjected to either bodily or mental exertion, and for these the white meats are not objectionable; this reduced allowance is not, however, sufficient for those of delicate constitution.

Deviation from proper rules of diet is attended by worse consequences in regard to liquids than in regard to solid food; and they are infringed upon to a much greater extent than those which relate to solid food.

Water, not containing a particle of nutriment, must be considered, not as an article of food, but merely as a solvent: in this capacity it is useful in softening and preparing the solid food for digestion. Although the palate is educated to desire something less insipid than water, yet it is all that is necessary to those who take a sufficiency of animal food, especially if they take but little exercise.

Milk is both mild and nutritious. It is the aliment provided by nature for the young of all the mammary class of animals. Milk is the best beverage for children, even up to the age of fourteen; and the chief advantage which can be claimed on behalf of a school-diet is, that milk, though diluted with water, constitutes the morning and evening beverage. Those parents who give young children tea instead of milk are sadly in error; the bad effects of this practice are described in the Chapter on Indigestion. Milk is an excellent substitute

for substantial food; and to invalids who are disinclined to take solids, it in general affords ample sustenance without creating any degree of excitement.

Beer being the most nutritious and the most used of the fermented liquors, it is desirable that it should be taken in its most wholesome condition. New beer contains the most nutriment, but it is liable to ferment in the stomach, and to occasion acidity or flatulency; and it contains certain gross materials, from which, as it acquires age, it becomes depurated. This depurating process is termed a second fermentation, and goes on slowly and imperceptibly until the beer has attained its highest state of perfection; if it exceed this point it becomes slightly acid, but this acidity is counteracted by the quantity of spirit it contains, while it is in all other respects light and wholesome. Beer taken in this condition is seldom found to disagree, and it should not be taken in any other state by those who have a tendency to corpulence. The quantity of beer taken at a meal should not exceed half a pint, a larger quantity tending to impede digestion and to create flatulency. This quantity can be taken once, twice, or thrice a day, according to the exertions and exigencies of individuals.

Some individuals, from general abstemiousness, acquire an exceedingly delicate state of constitu-

tion, and, by continuing their rigid system of diet, either nurse up disease itself or the tendency to it, and from long-continued habit they cannot take sufficient animal food to emancipate themselves from their morbid condition: to these persons the use of malt liquor frequently proves highly serviceable. Some precaution is required, however, in first administering it in such cases, otherwise it produces flatulency, headache, and general excitement; it should be taken in small quantities and diluted, or mixed with an equal proportion of gruel, sweetened or not; and taken in this manner it often proves a suitable method of inuring such individuals to this kind of beverage.

Wine, being less nutritious and more stimulating, is less wholesome than beer, and being used more as a luxury than as a necessary beverage, no remarks upon the use of it are here requisite.

Brandy, though the most wholesome of the spirits, cannot be recommended otherwise than medicinally. Diluted with water, it is often beneficial to those who are subject either to disorders of the stomach, or to relaxation of the bowels; it is also particularly useful in promoting warmth and sleep in the advanced in years and in the debilitated, who from languid circulation have cold feet at night. It is salutary to those who are long exposed to the depressing agency of cold and wet

weather, and who at the same time do not support the circulation by exercise, and especially if they are subject to attacks of inflammation. As it is generally supposed that stimulants are more calculated to produce inflammation than to prevent its occurrence, a brief explanation may be here given of the agency of cold in occasioning inflammation, and of the mode in which stimulants obviate that effect. When an individual is thoroughly chilled by exposure to cold and wet, the circulation is depressed; that is to say, the blood does not flow in its accustomed quantity to the surface and extremities of the body so as to impart due warmth to these parts; but it accumulates centrally, overcharging the internal organs—as the lungs, liver, and bowels—with the excess of blood, and thereby often occasioning inflammation in one or other of them. If under these circumstances stimulants be administered, the entire circulation becomes invigorated, and warmth is restored to the whole frame: the blood is again freely and equally distributed to all parts of the body, and the accumulated blood, and with it the inflammation, if any be formed, is withdrawn from the central organs. Stimulants, taken seasonably, are therefore highly salutary, both in the prevention of disease and in arresting it at its onset.

Tea.—Excess in the use of tea is the most pre-

valent error in diet, and is frequently attended with pernicious consequences; but these consequences take place in general too gradually to be traced to their real cause, unless some immediate ill effects, as tremors, sleepless nights, &c., be produced; effects which almost every one has occasionally experienced. The usual quantity of tea, even of moderate strength, taken morning and evening, will sooner or later occasion dyspepsia in the generality of persons. This quantity of tea impairs the tone, not only of the stomach, but frequently of the muscular system also. Those dyspeptics who dispute the injurious agency of tea can ascertain the truth by substituting milk, or cocoa, for tea, during one or two weeks, at the end of which time they will be sufficiently relieved from their symptoms to be convinced of the ill effects of tea. Previously to the introduction of tea into this kingdom, disorders of the stomach were by no means so prevalent as they have been since. Tea in the evening is found particularly refreshing, and is therefore considered an indispensable article of diet; but the refreshing effects of tea are not always unalloyed, most unpleasant symptoms of indigestion being sometimes experienced immediately after it. As tea-drinking is an universally established practice, it would be in vain to recommend its discontinuance; but it may be

strongly urged that tea should be taken in small quantities and of moderate strength, and that those who are troubled with indigestion should combine with it a large proportion of milk.

Coffee, like tea, has three different kinds of effects, viz. when very strong it is a powerful antinarcotic, exerting an immediate and injurious agency upon the stomach and upon the nervous system; when taken of moderate strength and in moderate quantities, it is more wholesome than tea under similar restrictions; and when taken weak and in large quantities, like tea and all other warm innutritious liquids, it relaxes and debilitates the stomach, producing flatulency, oppression, and the usual symptoms of indigestion.

The preservation of the strength and health of the body depends in a great measure on the adoption of proper rules of diet, and the infringement of these rules induces a great variety of diseases and derangements in the economy, among which may be enumerated indigestion, heartburn, flatulency, habitual costiveness, colic, headache, depression of spirits, and languor of mind and body; from all of which individuals might keep themselves exempt, without medical aid, by proper attention to diet.

CHAPTER III.

ON INDIGESTION, AND ON THE INFLUENCE OF INNUTRITIOUS DIET UPON THE STOMACH.

INDIGESTION, being a very common disorder, has, as might be expected, engaged the attention of numerous authors; little however, as it appears to me, has been done by them in illustration of the real nature of this complaint. The reason that so little relief is afforded in its treatment is, that, among its various causes, the most frequent—innutritious diet—is not suspected, and therefore not obviated; but is, on the contrary, adopted as an indispensable measure for removing it. When the real cause of a disease is not ascertained, a host of conjectural causes is assigned, and means to counteract them are employed, some of which, it is true, palliate the disorder, but seldom prove effectual remedies.

In order to show the influence of innutritious diet upon the stomach, it is necessary to consider the different forms under which, according to individual habits and opinions, it is adopted. These

forms are comprised under the following arrangement: first, innutritious liquids in too large a quantity; second, innutritious solid food in too large a quantity; third, food generally in too small a quantity.

Innutritious liquids in too large a quantity.—The use of innutritious liquids, composed of a small portion of nutriment dissolved in a large quantity of fluid, is a great error in diet. When food, so prepared, is subjected to the digestive process, the fluid prevents to a certain extent the action of the gastric juice on the nutrient particles, rendering this process tedious and imperfect, and therefore not calculated to afford materials for the formation of good blood. The habitual use of such liquids also, especially in large quantities, produces injurious effects upon the stomach itself. In the first place, by resisting the action of digestion, the fluid becomes a source of irritation, occasionally producing nausea and eructations. In the next place, after the nutrient part of the liquid has macerated in the stomach during some time at a considerable temperature without being digested, it undergoes a chemical change—a fermentation—attended by the evolution of gas, which distends, and produces, in the course of time, a permanent dilatation of the stomach and laxity of its coats. These are the more simple effects of this descrip-

tion of food upon the stomach. Thus, a diet consisting of innutritious liquids, as tea, coffee, broths, and gruel, with a small proportion of solid food, and that for the most part of a farinaceous and vegetable kind, can scarcely fail in producing, sooner or later, the above-mentioned effects on the stomach.

The dyspeptic and other symptoms more immediately arising from this system of diet are one or more of the following, viz. a sensation of fullness and oppression after meals, acidity, heartburn, pains in the stomach and bowels, pain between the shoulders, constipation, a gurgling noise in the bowels; during the night, pains in the stomach, called spasms, cramps in the legs, palpitations, and a feeling of suffocation accompanied by perspiration; in the morning, cough, phlegm, disagreeable taste in the mouth, nausea, headache, giddiness, languor. This description of diet produces poor blood, the injurious effects of which upon the constitution, which it predisposes to numerous forms of disease, have been already described. When dyspeptic persons, complaining of some of the symptoms above enumerated, apply for medical assistance, the plan of treatment usually recommended consists chiefly in palliating the more urgent symptoms by medical means, and in adapting, as it is supposed, the food to the morbid state

of the stomach. Accordingly, the principal modification of the accustomed pernicious diet consists only in the more uniform adoption of farinaceous food, both in the liquid and solid forms, such as gruel, barley-water, arrowroot, sago, &c. By thus suiting, in some measure, the aliment to the stomach, a less degree of uneasiness after meals is experienced, which encourages the patient with the hope that he is under a proper system of diet. After pursuing it for a considerable time he is induced to make trial of a small quantity of animal food, which, in consequence of his being unaccustomed to it, renews his former symptoms of indigestion, confirming him in his false notion that a farinaceous diet is best suited to the morbid state of his stomach. As rationally might a drunkard argue, that because his baneful habit cannot be relinquished without his feeling greatly distressed, it ought to be continued. Dyspeptic persons, who consider such reasoning conclusive, confine themselves to the diet which produced, and will therefore perpetuate, their disorder, and are contented in remaining valetudinarians for life.

The only effectual mode of removing this complaint is, instead of palliating the effects to attack the cause, by substituting a more solid and nutritious diet for the innutritious liquids; and this can be done much more easily than is supposed by

proceeding in a gradual and cautious manner, having recourse at the same time to such medicines as are calculated to improve the condition of the stomach.

Another occasional effect, in some constitutions, of innutritious liquid diet, is one which is not suspected, viz. corpulency.

Corpulent persons, especially females, adopt this description of diet, notwithstanding the debility as well as indigestion resulting from it, under the mistaken notion of its diminishing this tendency; and some ascribe their incapability of much exertion entirely to the physical incumbrance attending obesity; whereas it is chiefly owing to the debility resulting from insufficient nutriment and the want of fresh air and exercise.

It is daily proved that a diet consisting of farinaceous, oily, and saccharine substances, copiously diluted, is the most favourable to obesity that can be adopted, it being that which, under the forms of barley-meal, oil-cake, and those vegetable roots which contain a large proportion of saccharine matter, is specially used in fattening animals. Although the fattening effects of this diet, conjoined with rest, upon animals are well known, yet this is the same description of diet as that selected, with strange inconsistency, by many inactive individuals to prevent or diminish corpulency.

Innutritious solid food in too large a quantity.—The term innutritious solid food is here applied to a diet consisting for the most part of farinaceous and herbaceous substances, animal food being seldom, or only in small quantities, combined with them. It is true that nourishment and strength may be derived from this kind of diet, provided it form part of a regimen which includes constant exercise in the open air; and agricultural labourers and others whose diet is of this description, and who are constantly in active occupation in the open air, may be adduced as examples. The factory people, on the contrary, whose diet resembles that of agricultural labourers, but who have not the advantage of fresh air and exercise, are subject, not only to affections of the stomach, but to a long catalogue of diseases of a much more serious nature. These examples afford no evidence in favour of a farinaceous and herbaceous diet; they only prove that exercise in the open air constitutes a highly important part of regimen, nothing tending so much to invigorate the body and raise the digestive powers. In individuals who are not subjected to any kind of exertion, innutritious solid food in too large a quantity, in addition to oppressing the digestive organs, is calculated to occasion a bloated condition of the body, rather than to afford it proper nourishment. Children in particular are subjected

to the influence of this improper description of diet. It is a common practice among mothers and nurses, in order to appease the fretfulness of a child, to give it some description of farinaceous food, and some children soon acquire in this way a constant craving for food, and not unfrequently an aversion to animal food. This mismanagement of children during the period when the constitution is being formed is very reprehensible. The stomach of a child thus fed is oppressed with more food than can in general be digested, which passing into the bowels overloads and disorders them, occasioning a tumid abdomen, and frequently the production of worms. From this description of food, which is bad in itself, and which, moreover, can be only imperfectly digested, poor blood is formed, and from this vitiated material is built up a bad constitution. It is often remarked, that the children of the poor who live much in the manner just condemned, are seen running about in perfect health; but it must not be forgotten, that air and exercise enable those who are not properly fed to digest that kind of food which under other circumstances would be injurious.

There is a prevalent prejudice against the use of animal food for children between the ages of one and two years. This prejudice should yield to the following considerations: that children who have

been recently weaned are deprived of a considerable quantity of milk, and therefore require an adequate substitute for this nutritious aliment; that they have entered the period of dentition, and that, unless they are amply supported, they will greatly suffer, for it is well known that weak and delicate children suffer more during this process than the more strong and healthy; that at this age a child commences to walk, and that, unless the development of its bones and muscles be duly advancing, its limbs will not have power to sustain the weight of its body, and that distortion will be the consequence. The support to be derived from animal food is therefore highly requisite for young children, and strong beef-tea, in small quantities, is the best form in which this kind of food can be administered, until it can be taken in a more solid form.

Food generally in too small a quantity.—Although it is a very common assertion that persons in general eat too much, yet abstemiousness to an injurious extent is by no means uncommon, especially among females. Some of the worst forms of indigestion arise from this cause, which, not being often suspected, is rarely counteracted. Great abstemiousness in diet reduces the stomach to so delicate a state, that a slight overcharge distresses it and produces an attack of indigestion, confirming the supposed propriety of pursuing an abstemious diet.

The Faculty readily sanction this notion; for this system of diet not unfrequently originates in the recommendation of the Faculty, the prevailing doctrine of the present day being, that abstinence is essential to the cure of most diseases: consequently, in disorders of long standing, patients frequently acquire injurious habits of abstemiousness. In tracing out the influence of a spare diet on the body generally, as well as on the stomach, let us consider its influence during the period when children are at school. Those who have the charge of children are not aware that an abundance of good blood in a child is essential to the proper development of both mind and body; their chief object being to educate the mind, the body is deemed of secondary importance; though even as regards the mind alone, it should be recollected that its development will be cramped, and its energy impaired, if the brain be not duly nourished.

In order to place this subject on a fair footing, let the expenditure which the constitution of a boy at school sustains, and the supply he obtains by way of nourishment, be briefly considered. The expenditure is very considerable, as both the body and mind are in constant action; and the growth of the former occasions an incessant consumption of the building materials of the frame—the blood. The supply consists in three meals a day; two of

which are innutritious, and one nutritious. For breakfast he has a limited quantity of bread and butter and half a pint of milk and water. For dinner he has, according to his age, from three to six ounces of meat, pastry, &c. His supper is similar to his breakfast. This system of diet is very inadequate to support the full development of the frame; it produces, it is true, just blood enough to maintain a tolerable state of health among the majority of a school; but the others are languid, and some are engendering disease. The latter are strangely considered to be naturally of delicate constitutions, and the attempts which are made to improve their condition are rarely attended with success, the real cause, innutritious diet, being overlooked. Some really defective constitutions cannot be much improved by any system of diet and regimen, however well directed; these are happily few in number; but the attempt should be made and persevered in, and will not unfrequently be attended with success. It is unreasonable to suppose that boys, especially those between ten and fifteen years of age, who take but a moderate meal at an early dinner-hour, require nothing more than a few slices of bread for supper: twelve hours intervene between this and the next meal, which consists of no better fare. The spare supper is completely digested in three hours, and the stomach is there-

fore empty for the next nine hours, during which time the gastric juice, having no food to dissolve, preys upon the inner coat of the stomach itself, producing various degrees of irritation, and thus impairing the digestive powers of the organ. Through the prejudice of parents against animal food for supper, their children, instead of rising in the morning in the enjoyment of health and vigour, often experience languor, pain in the head, and nausea; and not only does the constitution in this way suffer, but the languid circulation attending this condition of the frame affects the mind also, and renders it less capable of acquiring knowledge. It may be objected, that a child would be feverish and restless after taking a meat supper; and such might be the effects of the first trials; those however who *habitually* take animal food at supper experience neither restlessness nor any other ill effects from it: and it is of general observation that a disposition to sleep is felt after dinner, the meal at which the largest quantity of animal food is taken. It should be borne in mind that an abundance of nutriment is necessary for the support of that free exercise of the body which alone can fully develop the muscular powers of youth; that the usual school allowance is insufficient; and that an additional quantity of nutriment—three or four ounces of animal food for supper, and milk at breakfast—would improve and strengthen the constitution, and there-

by diminish the tendency to disease; and that this system of diet would secondarily, by its beneficial effects upon the brain, tend to invigorate the mind and enlarge its capacity for study. Fortunately for boys, they are in vacation during three months in the year, and are thus offered opportunities of correcting, to a certain extent, that impoverished condition of the blood which is acquired at school. These opportunities are not, however, always taken advantage of by parents, who, blind to the necessities of their children, indulge them with tea and other innutritious and often indigestible kinds of aliment, instead of augmenting their daily allowance of animal food.

If the foregoing remarks on diet be applicable to boys, they are still more applicable to girls at school, whose diet is not only more scanty, but whose constitutions are more delicate, a great proportion of them being constantly languid. This state of languor, however, scarcely ever suggests the propriety of improving their diet; indeed, the digestive apparatus of delicate girls is, in the generality of instances, so enfeebled from abstemiousness, that it becomes oppressed if additional food be taken. If the quantity of nutriment taken by girls at school be compared with that which nature supplies for an infant six months old, it will be found exceedingly defective. An infant takes from two to three pints of pure milk in the twenty-four hours;

the food of a girl ten or twelve years old scarcely exceeds in nutriment that of the infant ; whereas at least double that quantity is required by nature for the proper development of the body. After several years of restriction in diet, abstemiousness becomes habitual ; added to which, girls are then at an age when they are particularly desirous of preserving their delicacy of form. These circumstances, combined with a delicate appetite, dispose the majority of them to continue in their abstemious mode of living. The milder effects of this system of diet are indigestion, languid circulation, cold feet, inability of taking much exercise, and occasional palpitations. The most severe forms of indigestion sometimes occur among those who dine sparingly at an early hour and take no supper, allowing a feeble stomach to be empty, and to be exposed during twelve or fourteen hours to the action of the gastric juice. The symptoms of this form of indigestion are, according to its intensity, more or less sickness, sensations of burning and of pain in the stomach, cramps, pains or numbness in the limbs, thirst, coldness and dampness of skin, alternated by paroxysms of heat, lassitude, emaciation, sleepless nights, &c.

In families in which there are several children, it is not uncommon to see those under four or five years of age robust and healthy, while the others, proportionally as they are older, are thin and deli-

cate. This is readily accounted for: about this period tea is substituted for milk, and the diet of children in other respects is not, as it should be, improved as their growth proceeds. Is it then surprising that so many females become deformed, scrofulous, consumptive, or dyspeptic, or subject to fever or hemorrhages?

In many children great delicacy of frame coexists with great sprightliness of mind; and while some of them are daily exhibiting much vivacity and happiness, they are gradually, though not apparently, declining in constitution, and disease overtakes them when it is least expected. Parents should not be guided by mere appearances; they should make the constitutions of their children a subject of serious consideration: every parent should understand, that for the proper development of the body of a child a considerable allowance of nutriment is requisite, and that although an abstemious system of diet may not always engender actual disease, yet that this is no justification for the continuance of such diet, it being more than probable that a constitution predisposed to disease—if not disease itself—will be the result. In children whose mind and body are more in keeping with each other, the former indicates whatever depression takes place in the latter, and constitutional diseases are in such cases often anticipated in time to be obviated.

The pernicious agency of the gastric juice upon the inner coat of an empty and feeble stomach, as a cause of dyspepsia, has been completely overlooked. It is indeed asserted by some physiologists that the secretion of the gastric juice is suspended during the empty state of the stomach. Others however have shown by experiment, that the gastric juice is secreted in the empty state of the organ, but that it is of a less degree of acidity than when the stomach is occupied by substances, whether of a digestible or indigestible nature. It is well known that gastric juice is occasionally ejected from the stomach of those who have fasted several hours, some individuals experiencing in the morning a sensation of nausea, burning in the stomach, and pain in the head, and, before having taken anything into the stomach, eject a quantity of gastric juice, mixed with a quantity of an aqueous and more or less acid fluid. The gastric juice occasionally creates so much irritation of the coats of the stomach, that after it has been thrown off everything that is taken is rejected; and bile is at length, by the repeated efforts of vomiting, forced into the stomach and rejected also; a circumstance which is erroneously considered by the patient as an indication of a bilious attack. Some individuals also, without being dyspeptic, are liable to risings of the gastric juice if they pass an hour or two longer than usual without food. It is therefore evident that the gastric

juice is not only secreted in the empty state of the stomach, but that it is often a source of irritation to the coats of that organ.

This view of the nature of many cases of dyspepsia, attended by severe gastric irritation, is, to a certain extent, confirmed by their having been successfully treated in accordance with it, after other measures, suggested by other views of the nature of the disorder, had proved ineffectual.

Loss of appetite from mental anxiety, in persons not habitually abstemious, is frequently followed, in a short time, by symptoms of indigestion. The mental anxiety, it is true, is, in instances of this kind, the primary cause of the derangement of the digestive function; but the remedies usually adopted in such cases, viz. abstinence, and depriving the stomach of its accustomed stimulus and means of support, seldom fail to increase the derangement of the stomach, and will always occasion a languid circulation and general debility. In this condition of the body the predisposition to disease is greatly increased, and exposure to any of the ordinary morbific agents is liable to produce it. Hence it happens—and it is by no means an unfrequent occurrence—that individuals suffering from mental anxiety are affected with complaints of a serious nature and of long duration, solely through mismanagement and neglect in diet.

CHAPTER IV.

AFFECTIONS OF THE HEAD.—DETERMINATION OF BLOOD TO THE BRAIN.

No complaint so frequently gives rise to false alarm as that usually termed determination of blood to the brain. Scarcely can an individual complain of pain and occasional throbbing in the head, or of giddiness, without being pronounced to have a determination of blood to the head, or without being recommended to lose blood and to adopt an abstemious diet.

That the brain does occasionally become overcharged with blood cannot be denied. For example, it occurs under great excitement of the mind, during intoxication, and in cases of inflammation of the brain, &c. The term, determination of blood to the brain, is not, however, usually applied to any of these instances, but to certain sensations which, although supposed to result from fullness of the blood-vessels, almost always indicate, in my opinion, the very opposite condition—a deficient supply

of blood to the brain, and require, instead of the abstraction of blood and a low diet, repletion by a liberal diet.

Determination of blood to the head is generally considered to be an affection of very frequent occurrence, and to be the cause of numerous and serious diseases of the brain. M. Andral, a distinguished French pathologist, supposes that it occurs under a great variety of circumstances, and attributes it to causes of the most opposite nature. He commences his lecture on the subject by saying, "Hyperemia of the substance of the brain, or, in other words, cerebral congestion, is a very common disease of the nervous system, and the different forms under which it may present itself are numerous and various." In enumerating the causes of this disorder Andral commences with atmospheric temperature, and exemplifies the influence of an elevated temperature in the production of cerebral congestion, by instancing the occasional occurrence of sudden death among reapers and others in consequence of exposure to the intense heat of the sun during summer. Andral having thus attributed congestion of the brain to the influence of heat, next attempts to exemplify the influence of intense cold in the production of the same state, by recording the retreat of the French armies from Russia, in which "the greater part of the persons who died during

that retreat were affected at first with vertigo, stupidity, &c., and then fell into a state of somnolence, followed by coma and death. . . . . Thus, in Holland, it has been shown that cerebral congestions are more frequent in winter than at any other season; this has been determined from a statistic of twenty years; and at Turin, observations made with the same object for twenty-five years lead to a similar result." Andral next speaks of unknown causes: "There are cases in which we see this hyperemia declare itself suddenly, without any known cause, in a number of individuals at the same time, and reign in a manner altogether epidemic. M. Leuret has published some interesting cases of this kind in the 'Journal des Progrès': Three individuals were suddenly attacked at Charenton with the symptoms of cerebral congestion; two died, and the substance of the brain appeared excessively injected, without any other alteration: at the same time many other individuals in the neighbourhood presented some slight symptoms of cerebral embarrassment." Electricity and light are alluded to by Andral as causes of determination of blood to the head. With regard to the latter as a cause, he says:—"We do not possess sufficient data to form a judgement; all we can say is, that only one sixth of cerebral congestions commence in the night." Stimulants and narcotics are next enumerated as

causes:—"The effects produced by alimentary substances on the development of hyperemia have been considered by some writers as demonstrated: we can conceive how a rich and exciting diet may, by generating a greater quantity of blood in the system, favour a determination towards the head; but we think that at the same time a predisposition must exist on the part of the individuals. On the other hand, alcoholic drinks have, beyond all doubt, a powerful influence in the production of the congestions under consideration. . . . . Narcotics also may have a direct influence in determining cerebral hyperemia." Andral then speaks "of congestions from causes within the brain." "We can discover various conditions of the brain itself that favour in the most evident manner the production of cerebral congestion: thus, a forced exercise of the intellect, long-continued and severe study, powerful emotions, such as fear and joy, the passions, &c., may in turn give rise to several accidents that characterise hyperemia of the nervous centres." Epileptic fits are also mentioned by Andral as a cause of cerebral congestion:—"Accidental products in the brain, as tubercles, &c., the cysts which succeed on old apoplectic effusions, hydatids, and several other products of the same kind, may all act as so many centres of irritation, and give rise from time to time to an hyperemy, varying in inten-

sity and extent according to the cause which produces it."

Andral next enumerates those causes of hyperemia which do not originate within the brain, under the title of "derangements in other organs and systems;" as acute and chronic affections of the stomach and bowels, constipation, &c., including derangements in the circulation, whether such as are attended by an acceleration of the circulation, as palpitations, well-marked inflammatory and febrile diseases; or such as are attended by an impediment to the free return of the blood from the head, as pressure caused by tumours or by other means on the jugular veins; also certain straining efforts, as coughing, vomiting, &c. Among the causes of this description are mentioned changes in the position of the body, whether from the vertical to the recumbent, or *vice versâ*. Andral also states, that congestions of the brain may not only accompany the high action attending inflammatory and febrile diseases, but that it may precede or succeed it, especially in diseases of an eruptive character. He considers that the *quality* of the blood exercises an influence on the production of symptoms of congestion of the brain: "We cannot doubt," he says, "that persons whose blood contains a great deal of fibrin and colouring-matter, in a word, individuals endowed with what is called a sanguineous

temperament, are predisposed to cerebral congestions; but, on the other hand, the absence of this temperament by no means ensures a patient against the dangers of hyperemia, a disease which may be occasioned by so many other causes." The suppression of discharges, whether normal or morbid; the changes which the circulation is supposed to undergo in females at certain periods of life; and the excitement attending any abuse of the passions, have, according to this author, the same tendency to produce hyperemia of the brain. "With regard to the influence of age," Andral observes, that "individuals at every period of life, from infancy to decrepitude, are subject to the disease which has just occupied our attention;" but that "the maximum of intensity may be placed after the age of forty." Andral concludes by saying, that he has touched upon only *some* of the principal causes which give rise to congestion of the centre of the nervous system. Thus, according to Andral—and similar opinions are entertained by others—the brain is not only subject to a great variety of diseases in common with other organs, but it is subject also to a determination of blood, which supposed determination of blood, it is considered, distresses it in a peculiar manner, and so formidably, as to be regarded with serious apprehension. Andral not only depicts this disease, hyperemia, in melancholy colours, but assigns such a numerous

catalogue of causes capable of producing it, that its occurrence is inferred to be much more frequent than that of any other disease. It is alleged to result from both a high and a low temperature of the atmosphere, from both stimulants and narcotics, from the high action attending inflammation in other organs and the different kinds of fever, and from the low action which precedes and succeeds high action; from powerful emotions of the mind, whether of an exciting or a depressing tendency; from a mere change in the position of the body, whether to the erect or to the recumbent posture; from different derangements in the digestive organs; from various accidental morbid products in the brain; from electricity; from light; from the suppression of habitual discharges; from rich blood; from constitutional tendency; and it may occur as an epidemic. And these, according to Andral, are only "*some* of the principal causes."

The assertion, that dissimilar and even opposite causes produce similar effects, necessarily involves an error; and although the anatomical facts adduced by Andral in support of this assertion cannot be disputed, yet the conclusions he draws from them are untenable; for whenever anatomical facts are made subservient to views of disease which involve premises discordant with reason, it may be fairly suspected that those facts are the effects,

either entirely or in part, of medical treatment, and not the causes of the disease.

Andral, in speaking of the symptoms of hyperemia, says, "these are extremely different in different cases, and vary according to a multitude of circumstances which it is not in the power of the physician to seize; we may however lay it down as well established by observation and experience, that the symptoms vary according to three principal circumstances: the first is the intensity of the lesion, which produces a variety in the symptoms of all diseases in general; the second is the duration of the congestive state; thirdly, and finally, the symptoms vary according to the diversity of the parts of the nervous system which may be affected." With regard to the parts of the nervous system in which congestion may exist, Andral considers congestion as it may occur separately in the brain, in the cerebellum, and in the spinal marrow. It is sufficient for our purpose to confine ourselves within the limits of the first division, viz. congestion of the brain, which Andral divides into five varieties. The first variety is considered "the most simple and least dangerous form." . . . "The principal modifications of sensibility characterizing this simple form of hyperemia are, pain in the head, which is sometimes carried to a severe extent; vertigo; ringing and singing in the ears;

momentary aberration or loss of sight, &c. The locomotive powers are at the same time variously affected: in some cases you find the movements executed with dulness and evident disinclination; the patient is heavy and inclined to sleep; while in others he is tormented with a constant desire of exercise, he is constantly on his legs, and cannot rest for a few moments without experiencing a troublesome feeling of anxiety and restlessness; in other cases, again, you will remark nothing but some *fourmillemens* in the limbs, or sometimes about the face:" . . . . "violent palpitations of the heart, throbbings of the arteries, &c.," are also considered sometimes to attend cerebral congestion. Although M. Andral describes the above symptoms as those of hyperemia of the brain, and although they are usually so considered, yet, according to my own experience, such symptoms decidedly indicate an impaired condition of the brain, originating in a deficient supply of blood to this organ.

The more intense form of the first variety of congestion next described by Andral manifests, in my opinion, the only true symptoms of hyperemia of the brain, the chief of which is increased arterial action in the head. "When congestion of the cerebral hemispheres is carried to any remarkable degree of intensity, the symptoms become more general, and the economy at large seems to partake

in some measure of the disturbance in the brain. The temporal arteries now beat with considerable force, in some cases so violently that their pulsations may be recognised by the eye as well as the touch; the cheeks are suffused with a brilliant red colour; the vessels of the ocular conjunctiva become injected; even the forehead sometimes partakes of the coloration of the face, and the whole veins of the head show marks of congestion; the small and large branches are equally distended with blood." . . . . . "The species of cerebral hyperemia which now occupies our attention may present itself under two varieties, according as it is accompanied by signs of febrile reaction or not—according as it exists with what is called inflammatory fever, or is not attended with any symptoms of general derangement of the circulation. In the first case, when congestion of the brain is attended with fever, its duration is generally very limited; in the second its duration is indeterminate. Thus, in some cases, the disease does not seem to exist beyond a few hours, after which the headache, giddiness and other symptoms completely disappear. In other cases the signs of cerebral hyperemia may continue with little or no intermission for several months, or even for whole years together; thus, I have seen patients who showed the first symptoms of congestion in the head at the age of twenty, and

still continued subject to more or less severe attacks up to the age of forty, fifty, or fifty-five, or even during the whole life."

In this extract, which merits particular attention, the symptoms of hyperemia of a "remarkable degree of intensity" are enumerated, but it will be observed that no symptom of functional lesion of the brain is mentioned, showing that the disease —determination of blood to the head—when it really occurs, is, after all, of no serious importance. When, however, this disease is treated according to the antiphlogistic system, the brain sometimes becomes so weakened and irritable that excitation of this organ ensues on every slight cause, and in some instances may continue to recur "even during the whole life." It is the mismanagement of these cases which occasions their return at frequent and sometimes regular intervals, as will be more particularly pointed out under the head of "Excitation of the Brain."

Second variety of cerebral congestion.—"In this variety of the disease, the individual, either after having suffered for a greater or less period from giddiness, confusion of sight, and other symptoms of congestion, or without having previously experienced any of these accidents, suddenly falls down, deprived of all consciousness; this form of the malady is hence called '*coup de sang*,' and is characterised by an instantaneous loss of conscious-

ness, with or without previous symptoms. The patient suddenly falls to the ground, deprived at once of intelligence, of motion, and of sensation, as if hemorrhage to a considerable extent had taken place in one of the cerebral hemispheres; however, it is distinguished from this latter affection by the circumstance that it is very rarely accompanied by hemiplegia; the symptoms connected with locomotion, in cases of cerebral hyperemia, are much more frequently those of general paralysis than hemiplegia. Sometimes, however, although the individual lies without motion and consciousness, the limbs are not, properly speaking, struck with paralysis; when raised up they do not fall down in that dead helpless manner which distinguishes palsy, but may even remain elevated."

"In the second form of cerebral congestion death may suddenly take place; the *coup de sang* carries off the individual as rapidly as an attack of apoplexy; in other cases the attack may last for some hours; the patient may remain in a comatose state from a few minutes to twenty-four or thirty hours; nothing is more variable. Finally, in other cases the accidents go off by degrees; the intelligence, motion, and sensation are gradually re-established, and after a lapse of time, which varies as much as the duration of the attack itself, the patient is restored to the full enjoyment of his health. It is astonishing to see how rapidly the

recovery may take place from a state in which the patient has lain, perhaps for a considerable time, without consciousness, power of motion, &c.; in a word, with all the symptoms of an apoplectic stroke: yet such a case frequently occurs in practice; and we find the individual, whom we left labouring under the most alarming symptoms, restored to perfect health, without any lesion of movement or sensation being left behind. In cases of this kind, we are certainly forced to admit the existence of simple hyperemia of the cerebral substance; we cannot for a moment imagine that actual hemorrhage has taken place, for the sudden and perfect recovery of the functions is quite incompatible with the latter supposition."

Here again particular attention is merited. In the above description of the second variety of hyperemia of the brain, although not a single unequivocal sign of increased circulation of blood through the head is mentioned, yet all the symptoms, including some of the most formidable character, compromising at once all the functions of the brain, are ascribed to a determination of blood to the head, called '*coup de sang*.' Even the most eminent pathologists take the prejudiced view, that determination of blood to the head is the common cause of this class of diseases; and ascribe all the symptoms of these disorders, however contradictory

they may be, as effects, in relation to the alleged cause, to this same cause—determination of blood to the head. If, however, we lay aside prejudice, and compare the symptoms of this second variety of congestion with those of the intense form of the first variety, we shall find that the symptoms of the two varieties cannot be justly ascribed to the same cause. The intense form of the first variety presents all the unequivocal signs of an increased circulation of blood through the head; and what are the effects on the functions of the brain of this admitted hyperemia? According to Andral himself, there is no functional derangement whatever: "its characteristic marks are, the intelligence intact, sensibility but slightly modified." The second variety, on the contrary, presents none of the unequivocal signs of an increased circulation of blood through the head; and what are the effects on the brain of this *supposed* hyperemia? All the signs of the brain having lost its functional powers now present themselves; "the patient suddenly falls to the ground, deprived at once of intelligence, of motion, and of sensation." An unbiassed observer, witnessing the two forms of disease in question, would without hesitation say that there was an increased circulation of blood through the head in the preceding form; but regarding the latter form of disease, he would say, that there were none of

those unequivocal signs of hyperemia which he found in the preceding form, and that the great majority of cases, so far from depending on an increased circulation in the head, were referable rather to an opposite state of the circulation, and more allied to syncope.

Many years since I witnessed a case of this description treated according to the view of its nature entertained by M. Andral, viz. of a '*coup de sang*' being the cause of the attack. A man fell down in the street deprived of all consciousness and remained comatose; he was taken into a house and placed in a sitting posture; he was bled, and died immediately afterwards. If this case had not been supposed to be one of determination of blood to the head, if no blood had been abstracted, and if means to re-establish the circulation of the blood through the brain had been employed, it would not have proved fatal. I feel satisfied that, if Coroners would require an examination of the brain in all the numerous cases of this kind which come under their jurisdiction, and would also ascertain in what number of instances bleeding had been practised, it would be found that hemorrhage in the brain occurred in a small minority of cases, that blood had been abstracted in a great majority of cases, and that the abstraction of blood had therefore been, in numerous instances, the cause of death.

A report of this nature would greatly tend to decide upon the propriety, or otherwise, of blood-letting on these momentous occasions.

The depressed state of the circulation, and the symptoms arising from the suspended powers of the brain, so exactly correspond with what is observed in a fit of syncope, that it is surprising they should be considered as characteristic of disorders of a directly opposite nature. In the following pages it will be shown that the symptoms indicating Andral's second variety of supposed hyperemia of the brain may be more consistently ascribed to an opposite state of this organ, viz. that of being insufficiently supplied with blood. The same may also be said of Andral's remaining varieties of this supposed form of disease.

Third variety of congestion.—Andral in describing this variety says, "In this form we observe precisely the same accidents of intelligence, motion, and sensation as in the former one, but we have something more . . . . viz. hemiplegia," which he says may "present itself in conjunction with a simple determination to the head." . . . . . "Independently of the rapidity with which these accidents disappear, we have further reason for referring them simply to congestion, from the fact that the state of the circulation in the brain during the attack not unfrequently leaves traces of its effects

on the patient's countenance. Thus, in some cases, the patient presents small ecchymoses on the conjunctiva, cheek, or forehead, which disappear in three or four days. Hence, whenever the accidents which succeed an attack of the kind we now describe do not persist beyond the space of a few days, we may rigidly conclude the absence of any hemorrhage into the substance of the brain." While Andral considers these ecchymoses, which occasionally present themselves after an individual has fallen down in a fit, to be signs of internal hyperemia, others consider them of a still more serious character, and as indications of hemorrhage having taken place in the brain. My own opinion is, that they afford no proof whatever of a determination of blood to the head, and that they are the mere effects of the concussion attending the fall, as I have endeavoured to explain when treating of Apoplexy.

The fourth variety of congestion.—This variety manifests itself principally by a paralytic seizure, the intellect remaining intact. "The first symptom which shows itself is paralysis, often confined to some muscles of the face, but in other cases extending to the whole of one side of the body. This paralysis often disappears in a rapid manner a few hours after its production; and here certainly we cannot attribute it to the effects of cerebral hemorrhage."

According to these views, paralysis, when it assumes a mild character and soon disappears, is ascribed to simple hyperemia of the brain; but when it continues many months, or becomes permanent, it is always supposed to arise from hemorrhage into the substance of the brain. This form of paralysis appears to me frequently to arise, on the contrary, from a deficient circulation of blood in the brain, which is, at the same time, locally softened, as described under the head "Paralysis"; and if this be the case, the abstraction of blood, which is usually resorted to in order to remove the supposed redundancy in the head, will often, by increasing the cause of the disease, convert a case, which would otherwise be mild and of short duration, into one of a more decided and permanent form; and which is then erroneously concluded to have arisen from a more serious cause than simple hyperemia, viz. hyperemia accompanied by hemorrhage.

In support of these views the following cases may be adduced:—Two females, one about fifty years of age, and the other a few years older, both stout and of florid complexion, were seized with paralysis, the intellect at the accession remaining intact. The former was not bled; on the contrary, stimulants were administered, a nutritious diet was recommended, and the recumbent position was ob-

served during a few hours every day. On the fourth or fifth day the paralysis, which was of the arm, had completely disappeared. This individual had lost blood on two or three former occasions for symptoms of supposed determination of blood to the head. In the latter patient the paralysis of the arm was not more severe at the accession than in the former case, but the muscles of the face were also affected. In this instance bleeding was had recourse to, and soon after the abstraction of the blood the arm became sensibly worse, the patient complaining of it as a fresh seizure ; after this her intellect gradually gave way. However, by means of nutritious diet, stimulants, and mild aperient medicines, the paralysis was in a few months almost entirely removed, and has since continued very slight ; but the imbecility, although less, has not diminished in the same degree.

Andral would probably have pronounced the above cases, at their accession, to be cases of simple hyperemia of the brain ; and the former patient had indeed, for several years, been considered by different practitioners to be subject to determination of blood to the head, and had been treated accordingly. However, the respective results of treatment, viz. the beneficial effects of repletion in one case, and the injurious consequences of depletion in the other, tend to prove that they were

not cases of hyperemia, but, on the contrary, of deficient supply of blood to the brain; and, moreover, the latter instance shows that a case of this kind, when aggravated by the abstraction of blood, may become so disguised by additional symptoms as to be further mistaken, and be then considered as a case of hyperemia combined with hemorrhage into the substance of the brain. The following case may be narrated as evincing the fatal effects of blood-letting.

An individual had, as I then considered, in accordance with the prevalent notions of such cases, premonitory signs of apoplexy, for which I bled him freely from the temporal artery; and being under the impression that the recumbent position would favour an excessive return of blood to the head, I recommended him to remain in the sitting posture. I had not long left the house when he was seized with what was deemed an apoplectic fit, and he died the next day. Andral would probably have considered this case as one, in the first instance, of simple hyperemia of the brain, and in the second, hyperemia attended with hemorrhage. I entertained, at that time, a similar view; but, according to my own more recent experience, there are no symptoms which can be fairly deemed premonitory of apoplexy. The symptoms in this case were those of a deficiency of blood in the brain, and

would most probably have speedily disappeared, if, instead of abstracting blood, means had been employed to restore the due circulation through the brain. The loss of blood at so critical a juncture deprived the brain of what little support remained, and a cessation of functional power, manifested by coma and death, was the consequence.

"In the *fifth variety of cerebral congestion* . . . . the principal phenomenon is the sudden appearance of furious delirium, accompanied by an extraordinary development of muscular force. . . . In some cases the delirium is accompanied with so violent a perturbation of the brain that the patient dies in the attack, vociferating loudly, agitated in the most severe manner, or making such powerful and long-continued efforts that life becomes extinct in the struggle. . . . The autopsy reveals nothing but a vivid injection of the substance of the brain."

This vivid injection of the brain is no proof whatever of its being a cause of the disorder; indeed no supposition can be more gratuitous; but there is reason for concluding that it was the effect, and not the cause, of the perturbed state of the mind. For example: a man of an irritable temper, suddenly subjected to great provocation, breaks out into a violent rage; in a few minutes his face becomes deeply flushed, his eyes redden, and his temporal arteries throb—would it be doubted that

this rush of blood to the head was the effect of the excitement of the mind? Can then the furious delirium described by Andral play a less part in causing a determination of blood to the head?

Having examined the five forms or varieties of hyperemia of the brain described by M. Andral, it appears that he leaves out of consideration a very important circumstance, viz. the influence which the posture of the body exerts in occasioning some of the worst symptoms characterising these particular forms of disease. For example: the sudden and entire loss of consciousness and power of motion, giddiness, and even paralysis when it occurs unconnected with the loss of consciousness, almost always take place while the body is in the erect posture, and, excepting paralysis, speedily disappear after the patient assumes the recumbent posture. The kind of slight paralysis above alluded to is also frequently, although not often so readily, relieved by the recumbent posture and other means which increase the circulation of blood through the brain. If therefore the worst symptoms occur while the body is in the erect position, in which the quantity of blood circulating through the brain is less, and are removed by the recumbent position, in which the circulation through the head is greater, it is fair to conclude that the symptoms in question do not arise from hyperemia,

but, on the contrary, from a deficient supply of blood to the brain. This omission regarding the influence which the posture of the body has upon these symptoms, in my opinion, accounts, in a great measure, for the uncertainty manifested by Andral in concluding his remarks upon the symptoms characterising his five forms or varieties of hyperemia of the brain. He says:—"These are the principal forms under which cerebral congestion may present itself to us; each you see has its characteristic mark. The phenomena accompanying each form are distinct, and on passing them in review we cannot help asking ourselves these questions: How comes it that the same identical lesion gives rise to such a variety of symptoms? Can we discover any principle to reconcile the apparent contradictions we meet with? Can we explain the diversity of functional lesion by a difference in the seat or duration of the organic lesion? I think that a solution of the questions we have now put is chiefly to be found in the different parts of the brain which are affected; and that observations establish this general rule, that the discrepancy of symptoms which present themselves in the various forms of cerebral hyperemia depends not only on the duration of the malady, but still more upon the seat it may occupy in the central organ of the nervous system; but if you wish to know what

particular parts of the brain are implicated when such or such symptoms appear, I must confess my ignorance: the state of the science does not yet permit me to arrive at the solution of this most interesting problem, although we may have excellent reasons for thinking that by it alone we can clear up the difficulties which now pursue us in our study of diseases of the nervous system."

Andral appears to have commenced his researches by assuming that which he has been unable to substantiate, viz. that a determination of blood to the head is the cause of all the various assemblages of symptoms constituting his five different forms or varieties of the disease. He appears to me to have described, as one disease, the causes, symptoms and characters of two totally opposite disorders—one depending on an increased, and the other on a diminished circulation of blood through the brain; and being unable to account for the discrepancies he detects, satisfies himself that the present "state of the science" is in fault.

Andral describes three principal Indications of Treatment:—"The *first*, and perhaps I might say the principal, is to combat the cause which has produced or keeps the determination of blood to the brain; this is a point of the utmost importance, and without attention to it other means will frequently fail. . . . . The *second* indication which

naturally presents itself is to empty the vessels of the brain. . . . . This is done by copious and repeated bleeding, according to the emergency of the case. . . . . I have frequently seen the beneficial effects of this practice in cases where the headache, ringing in the ears, numbness of the limbs, &c., suddenly disappeared after the abstraction of a copious quantity of blood."

Although these beneficial effects do frequently take place after bleeding, yet that they do not justify the abstraction of blood will appear from the following considerations. For example : an individual engaged in an employment requiring much stooping may complain of symptoms of hyperemia of the brain, as giddiness, headache, &c. ; or a labourer accustomed to take large quantities of malt-liquor without inconvenience while at work, may, in consequence of an accident, be obliged to remain several days in the recumbent posture, when, unless he diminish his usual allowance, he will soon complain of symptoms of congestion in the head. In both these instances venesection will afford immediate relief ; but this mode of affording it is unnecessary. In the former case, by counteracting the influence of the stooping posture, by walking and maintaining the erect posture, the increased quantity of blood in the brain would be soon diminished and the symptoms disappear ; and

in the latter, raising the head by an extra pillow, and abstaining from malt-liquor, would be equally successful. Again, an individual subject to excitation of the brain experiences immediate relief by the abstraction of blood. Keeping the hair wet in cases of this kind, during two or three hours, not only allays the increased circulation in the head, but obviates the debilitating effects of depletion, which, by increasing the irritability of the brain, seldom fails to ensure, at no distant period, a renewal of the excitation.

In many instances the relief ascribed to the abstraction of blood arises solely from the alteration produced in the circulation through the brain by the recumbent posture. For instance: an individual while walking is seized with giddiness, pain in the head, and numbness of one of his limbs; he is bled, kept in the recumbent posture, and experiences great relief. This relief, however, is felt, not in consequence of the abstraction of blood, but because, even after the loss of blood, the circulation through the brain is greater while in the recumbent posture than it was at the time of the attack in the erect posture. The different influences of the recumbent and erect posture may be observed in those pallid, emaciated and exsanguineous invalids, who while lying in bed are remarkably lively, not complaining of any uneasiness in the

head, but who are unable to sit up long without being seized with a fit of syncope. Thus it may be comprehended how individuals seized with symptoms arising from deficiency of blood in the brain may appear to be relieved by the abstraction of blood, the relief being, in reality, derived from the recumbent posture alone.

Andral admits that the abstraction of blood in his cases of hyperemia does not always succeed. He says, "However, you should not forget that in many other cases, after sanguineous emissions have been multiplied, the signs of congestion persist, or, yielding apparently, and for a short time only, to the loss of blood, they return again with renewed intensity." This admission of Andral is quite of a negative kind. Not suspecting that the abstraction of blood in these cases has an injurious tendency, he necessarily leaves out of consideration the positive evil resulting from it. The two following cases of every-day occurrence may be contrasted in support of this remark. Two young men on the same day, "without previous symptoms," to use Andral's words, "suddenly fall to the ground, deprived at once of intelligence, of motion, and of sensation, as if hemorrhage to a considerable extent had taken place in one of the cerebral hemispheres." In one instance the case is treated as a case of syncope; the patient is placed in the recumbent posture, sal

volatile is applied to the nostrils, and diluted sal volatile, wine, or other stimuli are administered, until the circulation is restored, which in general, together with the recovery of the functional powers of the brain, takes place in less than an hour. In the other instance the case is misunderstood; the head is kept high, and the patient is placed in the sitting posture, which, diminishing the circulation through the head, often occasions a slight stertorous respiration to supervene. The medical attendant recognizes the "suddenly falling to the ground, deprived at once of intelligence, motion and sensation," as symptoms described by a distinguished pathologist of a severe form of cerebral hyperemia called '*coup de sang*,' and for which large abstractions of blood are recommended. The patient is accordingly bled, placed in bed, and has the usual stimuli applied to restore the energy of the brain, which latter means are not considered incompatible, in the first instance, with the abstraction of blood. The patient lies in a state bordering on coma for some little time, after which he gives signs of recovery; at length consciousness returns, the patient merely suffering from great prostration. The next day he will, in consequence of having preserved the recumbent position during a number of hours, feel better, though incapable of sitting up in bed, on account of the giddiness it occasions.

If he be now allowed a nutritious diet, he will in the course of a week be almost completely restored; but if he be subjected, as is often the case, to the other parts of the antiphlogistic system of treatment, viz. to drastic purgatives and other lowering medicines, together with an abstemious diet, his debility will rapidly increase, and an excitable condition of the brain will present itself, which condition will be considered an indication that a further abstraction of blood is necessary, cold lotions to his head and a rigidly abstemious diet being also enjoined. These measures will afford temporary composure, but the next day the patient will be found verging upon a most critical state, viz. of extreme prostration on the one hand, and of a strong disposition to excitation of the brain on the other. The zealous advocate for the antiphlogistic treatment thinks he can yet prudently attack the excitement; he accordingly applies leeches to the head, and pursues the other parts of this system of treatment a little further. The extremely prostrate state of the patient at length suggests the proper course to be adopted; for if the patient do not sink into an irretrievable state of coma, his prostration so imperatively calls for the restitution of his powers that nourishment is at length unhesitatingly administered, and the patient, after remaining a day or two almost lifeless, begins to manifest slight signs

of improvement, and progresses in a very gradual manner, many weeks and sometimes months being occupied in his recovery. Such cases as these, which assume, according to the rigidity to which the treatment is carried, and to the state of the constitution, age and habits of the patient, every shade of mildness and severity, are ranked among those which display the successful results of the antiphlogistic treatment.

Having stated that, in the great majority of cases, the symptoms usually ascribed by Andral and others to a determination of blood to the brain arise, on the contrary, from a deficient supply of blood to that organ, the following points of consideration relative to the circulation of the blood through the head are offered in support of the latter view.

Under a variety of circumstances, the blood is liable to be reduced in quantity, and its circulation to be diminished in force, to a greater or less extent, below the healthy standard; and these states of the blood and of the circulation are of such general occurrence as to constitute together the principal cause of the predisposition to a great variety of diseases. I shall now endeavour to show the influence of a languid circulation upon the brain. When the general circulation is in a languid state, the circulation in the head, owing to

a combination of two causes, is subject to occasional modifications, to which no other part of the circulation is liable, and to which the symptoms usually attributed to a determination of blood to the head are referable. One is, the exclusion of atmospheric pressure from the brain after the complete formation of the skull; the other is the influence which gravitation, when the powers of the circulation are impaired and the body is in the erect position, exerts upon the motion of the blood in that part of the circulatory system which pertains to the head. Previously however to describing the combined agencies of these two modifying causes, it is requisite to explain the nature of the former—the exclusion of atmospheric pressure from the brain—its occasional influence upon the brain having been hitherto totally disregarded.

A certain degree of pressure is essential to the maintenance of the due solidity of all the parts of the body. This pressure is derived from the atmosphere, and is equal to fifteen pounds weight upon every square inch; but after the complete formation of the skull, the influence of atmospheric pressure is no longer exerted upon the brain. It is however evident that the brain does not require less pressure than other parts, as the skull during infancy is composed of several bones, which, by being only closely connected with each other, admit

the full pressure of the atmosphere upon the brain during that period; and when these bones, in the progress of their growth, become so closely and firmly united together as to exclude this kind of pressure, another description of pressure, not less in degree, is substituted. This pressure is produced by the progressive expansion of the brain against the inner surface of the skull; and this expansion of the brain is caused by its growth, which continues to the meridian of life. A sufficient pressure is thus produced to occasion an enlargement of the cavity of the skull correspondently, not only to the general, but also to the particular growth of the brain, creating depressions moulded to the more projecting portions of the brain. While this enlargement of the cavity of the skull is going on, enlargement of the bones is also proceeding by the deposition of bony matter. In this manner the skull, which is too dense in structure to be distended, adapts itself to, and increases with, the growth of the brain. On examining so dense an encasement as the skull, and one so accurately adapted to the uneven surface of the organ it contains, it might be deemed well suited to afford the brain an uniform pressure; but on taking into consideration that, in addition to the brain, a great quantity of blood is contained within the skull, which is constantly flowing into and out of it, and

liable to vary in quantity under numerous circumstances, some of which may be of sudden occurrence, it will be seen that the skull, instead of being calculated to impart uniform pressure, tends occasionally, in consequence of the unyielding nature of its materials, to the formation of a vacuum within its cavity. For the skull possesses only the passive power of resisting pressure; it cannot contract, nor can it, like the atmosphere, exert an active agency, and adapt its pressure to any sudden variation of volume. When the brain becomes reduced in volume, in consequence of any considerable diminution in the quantity of the blood which flows through it, the rigid skull cannot contract its cavity and maintain the usual degree of pressure upon the brain; the tendency to the formation of a vacuum therefore takes place, to counteract which, either the brain must expand, or the due circulation of blood must be restored.

Gravitation does not offer any appreciable obstacle to the ascent of the blood to the head while the circulation is carried on at its ordinary momentum; but when, from any cause, the action of the heart and arteries becomes diminished, rendering the circulation languid, the blood is not, in the erect posture of the body, transmitted to the brain, against the influence of gravitation, in that quantity or with that force requisite for the sup-

port of the due pressure and energy of the brain; and while gravitation prevents the due influx of arterial blood into the skull, it favours the efflux of the venous blood out of it. This double deprivation of blood produces a tendency to the formation of a vacuum within the skull.

Hence it appears that the combined influence of these two causes, the exclusion of atmospheric pressure from the brain, and the influence of gravitation upon a languid circulation, is to produce a tendency to the formation of a vacuum within the skull. In the next place it is requisite to explain the influence which this tendency to the formation of a vacuum exerts upon the brain and its blood-vessels; and to which influence certain symptoms, usually attributed to determination of blood to the head, are chiefly referable.

Whenever a tendency to the formation of a vacuum is occasioned, certain natural efforts are simultaneously exerted to prevent its occurrence. When this tendency is produced in the skull, the natural means employed to counteract it are three: viz. expansion of the brain by virtue of its elasticity,—venous congestion, resulting from incomplete restoration of the circulation,—and the complete restoration of the circulation.

The power of *expansion of the brain* arises from the compressible and elastic nature of the substance

of which it is composed. After the period of infancy, when the bones of the skull are perfectly united together, and therefore unyielding, it sustains considerable compression in consequence of its growth; and it is accordingly more capable of expansion, and more efficient in counteracting any tendency to the formation of a vacuum within the skull during the earlier periods of life than during the middle and later periods. When however this tendency is but slight, the expansion of the brain is, at all periods of life, sufficient to counteract it. Expansion of the brain is called into operation during the erect posture only, and this expansion takes place to compensate for the deficiency of blood which occasionally occurs in the skull in that posture, under circumstances already explained. It is of primary importance, and takes place as the accustomed pressure derived from the blood is withdrawn from the brain; and although only an inferior degree of pressure is thus obtaianed, yet it prevents the fatal consequence which would attend any considerable and sudden removal of pressure. The support it affords the brain continues until the return of the due quantity of blood restores the natural pressure.

Venous Congestion takes place in the horizontal posture only, and in the following manner: when, from the causes just mentioned, the brain becomes

completely deprived of its power of consciousness, the heart and arteries become deprived, almost in the same degree, of their power to circulate the blood; the consequence is, that the vessels of the brain are replenished only by a slight and feeble influx of blood, which flows slowly and in small quantities through the arteries into the veins and sinuses until they become filled, the expansion of the brain diminishing in the same proportion. The blood thus accumulated in the veins and sinuses offers a dead weight to the feeble power of the heart and arteries, they having merely sufficient power to propel the blood into the veins, but not the further power of overcoming the inertia of the accumulated venous blood, and of forcing it on towards the heart. Thus the veins and sinuses of the brain become inordinately congested: the expansion of the brain and the tendency to the formation of a vacuum are indeed completely counteracted, not however by the circulation being properly re-established, but, as already stated, by an excessive accumulation of venous blood in place of the due quantity of arterial blood. As, in consequence of the languid arterial circulation, the brain does not receive that degree of stimulus which is essential for the restoration and maintenance of its function, the patient remains in a comatose state until the circulation be properly re-established.

The complete restoration of the circulation within the skull effectually counteracts the tendency to formation of a vacuum. In order to restore the circulation in the brain, it is indispensable that the influence of gravitation should in the first place be removed. It has been already stated, that in the erect posture of the body gravitation exerts a twofold influence upon the circulation in the brain when the general circulation is in a languid state; that it not only impedes the ascent of the arterial blood to the head, but that it facilitates the descent of the venous blood from it, depriving both sets of vessels of their due quantity of blood. The removal of this obstacle—gravitation—takes place in the horizontal posture of the body. When a languid circulation, resulting from any temporary cause, nausea for instance, occurs, and the brain no longer receives its due quantity of blood, the due pressure and stimulus of the blood are removed from that organ; a sudden deprivation of consciousness is the result, and the patient falls to the ground. While in the horizontal posture the further influence of gravitation upon the circulation is removed; and if the natural resources of the patient be good,—if, for example, he be young and free from disease or other cause which might deprive him of the powers of reaction, the heart and arteries speedily recover their powers

and freely transmit the arterial blood to the brain, restoring its natural degree of density and imparting to it its accustomed stimulus, by which means the patient recovers consciousness. If, on the contrary, the natural resources of the patient be not good; if he be advanced in life, or have been long in an impaired state of health, or if his powers of reaction be considerably impaired, the horizontal position, although it counteracts the further influence of gravitation upon the circulation, which would otherwise have had an immediately fatal tendency, yet the complete restoration of the circulation in the brain does not readily take place, and congestion of the veins and sinuses is the consequence.

The symptoms which are usually considered as indicating a determination of blood to the head, but which, as it appears to me, depend on a deficient supply of blood to that organ, may be arranged into two classes.

First class of symptoms.—The symptoms of this class indicate that the amount of pressure removed from the brain is not great, and that the tendency to the formation of a vacuum is therefore slight, not requiring any other natural means to counteract it than a corresponding degree of expansion of the brain. Syncope only occurs when the amount of pressure and the degree of stimulus removed from

the brain are considerable: syncope therefore is not enumerated among the symptoms of this class. The symptoms of this class are numerous, and each may occur singly, or in combination with one or more of the others. They are sensations of giddiness, lightness, throbbing, heaviness, and of pain in the head, dimness of sight, deafness, singing and other noises in the ears. Other symptoms occur which form the connecting links between the symptoms of this and those of the second class: for example, an individual while walking may be suddenly seized with a sensation of swimming in the head; he finds that he is losing consciousness, and that he is about to fall down. The alarm which these symptoms create sometimes excites the brain, invigorating and restoring the circulation in that organ; he staggers for a moment and recovers himself, the attack not amounting to a complete fit of syncope.

As many of the above symptoms occur in the erect posture only, and are relieved by assuming the recumbent, they appear to be more immediately connected with the partial removal of the due pressure and stimulus from the brain. The other symptoms, as dimness of sight, deafness, and noises in the ears, occur both in the erect and in the recumbent posture; they are more constant, and appear to depend upon a deficient nutrition of the brain, owing to a continued deficient supply of

blood to that organ; and requiring, for their removal, in addition to the recumbent posture, the administration of preparations of ammonia, bark, iron, and, in some cases, of opium. To this latter description of symptoms may be added several others, as pain and tension of the muscles extending from the back of the head, and a variety of sensations in the skin, as burning, itching, numbness, &c.

Some symptoms, as the sensations of throbbing, and of weight with pain in the head, occur chiefly in the recumbent posture; and as they are considered almost unequivocal signs of determination of blood to the head, it is requisite to describe the circumstances under which they take place, in order to show that they ought not to be so considered.

Throbbing.—When this sensation occurs in the recumbent posture, it in general indicates that the brain is in a weak and sensitive state, rather than that its circulation is in excess. For example: a slight throbbing in the head for a short time after assuming the recumbent posture is experienced by those in whom there is a particular deficiency in the circulation in the brain, consequent upon a general deficiency of blood in the body: this sensation however merely indicates that the circulation in the brain is re-establishing itself, and that the organ

itself is in an unduly sensitive state. Should the brain be in a more excitable condition, the return of blood to the head may occasion a degree of excitement similar to the reaction which takes place on the re-establishment of the circulation in any other part of the body after it has been deficiently supplied with blood. For instance: when the hand is cold the circulation of blood through it is languid, and on the restoration of the due circulation, sensations of heat and throbbing are often experienced. This reaction in the hand does not attract attention; but a precisely similar reaction in the head is strangely considered of a serious nature, and causes false alarm in the mind of the patient. Again, those who, engaged in intellectual pursuits, temporarily exhaust the powers of the brain by sitting up to a late hour, and who afterwards retire to bed without taking any support, are liable to experience a throbbing in the head which continues a considerable time: this throbbing merely indicates that the brain is in a highly sensitive state, occasioning it to be distressed by the return of its due quantity of blood. Let those who cannot readily conceive the existence of throbbing in the head without distension of the vessels, raise the hand above the head, and in a few seconds they will experience throbbing in the arteries of the fingers, although the quantity of blood in them is then considerably

less than when the hand is pendent, in which latter position no throbbing is experienced.

Throbbing in the head may, it is true, arise, in some instances, from real hyperemia of the brain: for example, enlargement of the heart, an excited state of the mind, the excitement of wine, the excitement attending eruptive fevers and inflammatory diseases, are all instances in which throbbing in the head may occur as a symptom of real hyperemia; but these are not cases in point. In these instances the throbbing may occur whether in the erect or the recumbent posture of the body, and is not necessarily preceded by a languid state of the general circulation, nor connected with any of the symptoms which have been just described as indicative of a deficient supply of blood to the brain.

Sensation of weight with pain in the head.—In the recumbent posture a languid circulation is conducive to an accumulation of blood in the veins and sinuses of the brain, occasioning a sense of weight and pain in the head. This accumulation is strictly passive, and cannot therefore be considered as a determination of blood to the head. The arteries of the head, in the erect posture of the body, are relieved from the exertion of forcing the blood through the corresponding veins, the venous blood, by the influence of gravitation in this position of the body, flowing freely downwards to the

heart; but in the recumbent position, the arteries, having to overcome the inertia of all the venous blood proceeding from the head to the heart, are not so relieved: consequently the arteries of the brain cannot, when languid in action, sufficiently overcome this resistance to prevent an accumulation of blood in the veins and sinuses of the brain. Thus, while a languid circulation occasions a deficient arterial circulation through the brain in the erect posture of the body, it, on the other hand, occasions an accumulation of venous blood on the brain in the recumbent position. Hence many individuals in a delicate state of health, having a languid circulation, experience in the morning before rising a sensation of weight and pain in the head; and after rising, the sensation of heaviness is, by the influence of gravitation upon the accumulated venous blood, immediately relieved, but is succeeded by sensations of lightness and giddiness. In such cases, if the patient be of florid complexion, the symptoms are usually considered indicative of a determination of blood to the head, and however debilitated he may be, he is subjected to the process of cupping or general bleeding. These are, on the contrary, symptoms of a languid circulation, and for their removal a generous diet and other renovating means are requisite.

A few years ago I witnessed, at a post-mortem

examination, an extraordinary case of accumulation of blood in the veins and sinuses of the brain. The only appearance of disease which presented itself was an enormous distension of the numerous veins on the surface of the brain; even the small veins had become as large as crow-quills, and were exceedingly tortuous and prominent. The patient had been treated for a determination of blood to the brain, and had accordingly been repeatedly blooded, by which means the arterial blood circulating through that organ had been considerably reduced in quantity, and the space in the skull caused by this deficiency had been filled up by the accumulation of venous blood on the surface of the brain, which accumulation was in this case to an inordinate degree. In general the deficiency is compensated for partly by serous effusion, and partly by engorgement of the veins and sinuses, rendering the latter much less striking than it was in this instance.

This case shows what erroneous conclusions may be deduced from the appearances in post-mortem examinations. The most eminent pathologist, not taking into consideration the tendency to the formation of a vacuum within the skull—this idea, in reference to these diseases, not having been hitherto entertained—would have pronounced this extraordinary accumulation of blood in the head an un-

equivocal proof of great determination of blood to this part. So far however from this being the case, the accumulation arose from the very opposite cause—a deficient supply of blood to the brain, and which was increased by the repeated abstractions of blood, creating a tendency to the formation of a vacuum within the skull, which, by preventing the blood from passing duly out, occasioned it to accumulate within the skull.

The second class of symptoms.—The symptoms of this class originate in a greater degree of deficiency in the supply of blood to the brain than gives rise to those of the former class: the amount of pressure removed from the brain, and the consequent tendency to the formation of a vacuum within the skull, are therefore greater. Taking then for data that, in the erect posture of the body, a languid circulation often occasions a deficient supply of blood to the brain and a consequent diminution of pressure, and that nature employs certain means, already mentioned, of restoring the due pressure, let us, instead of indiscriminately referring nearly all affections of the brain to a determination of blood to the head, endeavour to ascribe them to their real causes, viz. to the loss of pressure and stimulus, to which must be added the influence of age, previous state of health, &c., and other causes arising from the mismanagement of the patient.

As these different causes vary in their proportional cooperation, so their conjoint influence upon the brain varies, modifying the effects, producing in some cases a simple fit of syncope; in others a complicated form of attack, in which, in addition to the symptoms of mere syncope, epileptic convulsions, hysterical fits, temporary paralysis, excitation of the brain, stupor, coma, lethargy and death may supervene. Thus the sequelæ often disguise the original character and nature of the attack, so as to occasion the adoption of erroneous views and injurious treatment.

Syncope.—Andral, in describing the signs of the *coup-de-sang*, well describes the symptoms of syncope in the following words: "The patient suddenly falls to the ground, deprived at once of intelligence, of motion, and of sensation." In addition, however, to these, another symptom should be mentioned: the pulse is scarcely to be felt, the powers of the circulation being reduced nearly in a corresponding degree to the collapsed state of the brain. At the earlier periods of life, and under other favourable circumstances, the patient will, by the natural means before explained, almost immediately recover. If the patient be subject to epilepsy, or to hysteria, one or other of these disorders may supervene, complicating the character of the attack, which, however, is still recognised as one

not requiring any lowering treatment. In many cases stertorous respiration takes place; and this symptom is occasionally one of the first in the accession of syncope. In other cases it supervenes, as when the patient is raised to the sitting posture; it occurs also in the recumbent posture, after large abstractions of blood; and its occurrence is liable to create the mistaken notion that it is indicative of an apoplectic seizure. In cases in which the patient has long been the subject of mental anxiety and loss of appetite, the brain is in so impaired a state, that, when once completely deprived of power, as in a fit of syncope, restoration does not speedily take place, and the patient lies beyond the usual time without affording any sign of recovery. This circumstance is erroneously deemed sufficient to distinguish the case from a fit of syncope, the state of insensibility being considered that of coma, and the attack viewed as a severe form of determination of blood to the head —"*coup-de-sang*"; or a suspicion may be even entertained of hemorrhage having taken place into the substance of the brain. It is treated, accordingly, by the abstraction of blood, &c.: if reaction do not ensue soon after the abstraction of blood, congestion of the veins and sinuses of the brain, attended by more or less serous effusion, will take place, and the patient will remain in a state of

stupor during several days; if a further abstraction of blood be practised while the patient is in this state, the case will prove speedily fatal; if, on the contrary, reaction succeed the first abstraction of blood, the brain being in a weak and irritable state, excitation of this organ will often manifest itself, a condition which is erroneously supposed to warrant the persistence in antiphlogistic means, which render the case also difficult to manage, and sometimes fatal. In the former of these two instances,—which are of frequent occurrence,—and supposing the patient to have arrived at the middle period of life, when the brain does not so readily expand, and is less excitable than at an earlier period, venous congestion immediately follows an attack of syncope, and fills up the space in the skull occasioned by the deficient supply of arterial blood to the brain, which turgescence of the veins relieves itself, to a certain extent, by the serous effusion it occasions. Accordingly, in this case the want of arterial blood continues, and a corresponding deficiency in the action of the brain, or stupor, is the consequence. In the latter instance, supposing the patient to be younger, both the expansibility and excitability of the brain are greater, —venous congestion therefore takes place in a less degree, offering less resistance to the enfeebled action of the arteries; and as the arteries are more

capable of being excited to action, reaction speedily ensues in the arterial circulation of the brain; but this organ, in consequence of a deficient supply of blood, is rendered weak and irritable, and instead of deriving immediate renovation from the reaction, its impaired function is over-excited, and delirium ensues. In this case, in which excitation of the brain succeeds the abstraction of blood, it is indispensable to the well-being of the patient to adopt means for restoring the due nutrition of the brain. Depletion produces but a temporary reduction of the excitation, while it renders more permanent the excitability of the brain; on the contrary, the sedative agency of cold lotions applied to the head is as efficient as depletion in reducing the excitation without increasing the excitability. And as regards the removal of the excitability, it is erroneous to suppose that it can be permanently accomplished by other means than those which restore the substance of the brain to its proper state of nutrition.

At the middle, and especially at the more advanced periods of life, an attack of syncope is often indicative of more serious derangement in the brain and circulating organs than at the earlier periods, and more serious consequences sometimes ensue than are usually apprehended from a fainting fit. If, however, the chief circumstances under which

syncope occurs be taken into consideration, the consecutive symptoms which complicate and otherwise disguise the real nature of the attack may be fully accounted for. Not only the expansibility and excitability of the brain diminish as age advances, but both the substance and functions of this organ have in general, in these cases, been impaired by anxiety of mind and other causes; the different organs and powers of the body have, in addition to what impairment age may have produced, been subjected to the depressing influence of this condition of the brain; the blood also is poor, and therefore deficient in its stimulating properties; and the organs of the circulation are not in a condition, especially when completely deprived of power, as in a fit of syncope, to be called on a sudden into action, to meet the extreme urgency of the case. Deep and long-continued coma, or sudden death following an attack of syncope, is satisfactorily accounted for by the consideration of the circumstances just mentioned, without resorting to the mistaken opinion that such serious effects can result only from a violent cause, as "*coup-de-sang*," or effusion from ruptured blood-vessels in the brain. According, therefore, to the extent to which the above-mentioned circumstances exist, is the degree of danger under which syncope occurs.

A middle-aged person may, it is true, have a

simple form of syncope and recover from it immediately, but it frequently happens that the attack assumes a more severe character. For instance, the substance of the brain may be in an impaired state, but more impaired, as often occurs, in one part than in any other. A fit of syncope in such a condition of the brain, by suddenly and powerfully reducing its already impaired powers, terminates in an attack of paralysis, the patient, on recovering from the syncope, finding that a paralysis of his side remains. Renovating measures may in time remove the paralysis; but if it be treated by antiphlogistic means, under the erroneous impression of its being caused by a determination of blood to the head, or by hemorrhage in the brain, it will most probably become permanent. This form of attack is very common, and mostly occurs between the ages of forty and sixty. In another instance the brain may be less impaired, but the patient may have been a long time laid up under the antiphlogistic treatment for some inflammatory disease, and, although convalescent, his frame remains in an enfeebled and exsanguineous state, in which, at an advanced period of life, a fit of syncope is nearly allied to death. He falls apparently lifeless, and such is the quality of his blood and the feebleness of the circulating organs, that the blood does not

flow into the brain in sufficient quantity, quality or force to impart any stimulus to this organ, and its veins and sinuses consequently become engorged with venous blood. If there be a slight stertorous respiration, the case is at once concluded to be one of sanguineous apoplexy ; bleeding is resorted to, and the patient dies ; but if he escape the loss of blood, he may, after remaining one or more hours in a comatose state, present signs of improvement, and ultimately recover. In a fourth instance the patient may be a few years older, and in addition to an impaired brain may have an impaired constitution ; he is seized with a fit of syncope, but the tendency to the formation of a vacuum within the skull, in consequence of the diminished expansibility of the brain, dependent on age, cannot be immediately compensated, and the pressure requisite for the support of the functions of the brain being removed, this organ is so completely atonized that life becomes in a few minutes extinct. Such cases are called cases of serous apoplexy, a certain quantity of fluid being found in the ventricles of the brain, to the presence of which death is attributed ; but it is by no means an unfrequent occurrence, in cases of sudden death, that no morbid appearance of the brain sufficient to account for such a catastrophe presents itself. It is well known that in diseases in which the powers

of the body are rapidly and greatly exhausted, fatal syncope occasionally takes place during the act of getting out of bed; and in other cases of extreme debility, especially in Asiatic cholera, patients have expired in the mere act of being raised up in bed; but when fatal syncope occurs in the street, the true nature of the attack is frequently mistaken, so alarming an incident being referred rather to some violent cause, as the rupture of a blood-vessel, than to the sudden removal of the pressure and stimulus exercised by the blood upon the brain. The suddenness of the occurrence of death in certain cases of syncope distinguishes such cases from apoplexy; for when the rupture of a blood-vessel in the brain takes place, the hemorrhage rarely, perhaps never, destroys life so instantaneously as a fatal fit of syncope. This distinction is important in diagnosis, for almost all cases of sudden death are referred to apoplexy; and if by chance an examination of the brain is made and no effusion of blood is found, death is ascribed to what is called serous apoplexy —a disease which does not exist: for neither effusion of blood from a ruptured vessel, nor the gradual process of serous effusion, can destroy life suddenly; while the more powerful agency of the tendency to the formation of a vacuum within the skull, when not instantaneously counteracted by natural means, at once completely arrests those

functions of the brain immediately essential to life, occasioning sudden death, without leaving a trace of its instrumentality for the anatomist to discover.

Hence it would appear that a languid general circulation occasions, according to the posture of the body, two distinct modifications in the circulation through the vessels of the brain, each producing its respective order of effects. In the erect posture, both the arterial and the venous blood become deficient in quantity; and proportioned to that deficiency is the withdrawal of the pressure and stimulus of the blood from the brain, and the consequent expansion of that organ; the symptoms of which are, according to the degree of the cause, sensations of lightness, giddiness, and pain in the head, syncope, and occasionally death. In the recumbent position, the balance between the arterial and venous blood is destroyed, the latter being increased as the quantity of arterial blood circulating through the brain is diminished; the deficiency of arterial blood in the brain impairing its energy, and the excess of venous blood on its surface producing sensations of weight and pain in the head, and sometimes stupor, lethargy, and death.

CHAPTER V.

IMPAIRED CONDITION OF THE BRAIN.

HAVING in the preceding pages several times alluded to an impaired condition of the brain, and as this condition appears to be the most essential element of cerebral disease, constituting the sole predisposition to those forms of disease hereafter described, it is requisite to explain, before proceeding further, what is to be understood by the term "impaired brain." There are many reasons for believing that insufficient nourishment of this organ and over-exertion of its powers induce changes in its substance, which neither pathological anatomy nor animal chemistry is yet sufficiently advanced to detect. When the brain derives its nourishment from blood deficient both in quantity and quality, it cannot be doubted that it, like other parts of the body, under the same circumstances, is liable to become deteriorated in the composition of its substance. For example, paucity and poorness of the blood occasion, in some instances, deficiency either

in the earthy or animal portion of the bones; in others the muscles become loose and soft in texture, and the glands and other organs acquire a condition which predisposes them to disease. And why should not the brain suffer under similar causes of disease? The continental physiologists have shown that the brain, at different periods of life, undergoes changes in the elements of its composition, in its dimensions, and in its specific gravity. It has been ascertained, that in childhood the aqueous component of the brain is greater than at any other period; that in the adult the phosphoric matter is greater, and that this matter diminishes in quantity as age advances. M. Cazauvieilh (Archives de Médecine, vol. xiv.) has shown, that after seventy years of age, whether the individual parts or the whole be measured, the brain is found equally diminished in volume; that its longitudinal diameter is diminished a quarter of an inch, and its transverse diameter two lines. This reduced dimension in the circumference of the brain indicates a considerable reduction in the entire mass. It is a curious fact, that this effect of age takes place in the cerebrum alone, and not in the cerebellum or little brain, which undergoes no diminution of volume with the advance of years. M. Desmoulins has discovered, that after seventy years of age the specific gravity of the brain is from a twentieth to

a fifteenth less than in the adult. The above facts prove that a deterioration in the composition of the brain is incidental to age.

The following is the result of Vauquelin's analysis of the chemical composition of the healthy brain:

Albumen		7·00
Adipose matter	Stearine 4·53 Elaine 0·70	5·23
Phosphorus		1·50
Osmazome		1·12
Acids, Salts, and Sulphur		5·15
Water		80·00
		100·00

With reference to the *diseases* of the brain, no chemical inquiry has been pursued. M. Andral supposes that in those numerous instances of disease of the brain in which no appearance of disorganization exists, an alteration in its chemical composition takes place; and he denominates such affections "lesions of innervation." Andral offers this as a conjecture; he does not appear to have made it the basis of any system of inquiry or of practice. Dr. Justus Liebig, the distinguished chemist, asserts, that "all the parts of the animal body are produced from a peculiar fluid, circulating in its organism, by virtue of an influence residing in every cell, in every organ or part of an organ.

Physiology teaches that all parts of the body were originally blood; or that, at least, they were brought to the growing organs by means of this fluid. The most ordinary experience further shows, that at each moment of life, in the animal organism, a continued change of matter, more or less accelerated, is going on; that a part of the structure is transformed into unorganized matter, loses its condition of life, and must be again renewed. Physiology has sufficiently decisive grounds for the opinion, that every motion, every manifestation of force, is a result of a transformation of the structure or of its substance; that every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids; that every thought, every sensation, is accompanied by a change in the composition of the substance of the brain." Dr. Liebig here asserts that a constant change is going on in the substance of the brain, and in the following quotation he endeavours to establish in chemistry the same principle which I am endeavouring to establish in medical practice. He says, "However strange the idea may at first sight appear, that the alkaloids of opium or of cinchona bark, the elements of codeine, morphia, quinine, &c. may be converted into constituents of brain and nervous matter,—into organs of vital energy, from which the organic motions of the body

derive their origin; that these substances form a constituent of that matter, by the removal of which the seat of intellectual life, of sensation, and of consciousness is annihilated; it is, nevertheless, certain, that all these forms of power and activity are most closely dependent, not only on the existence, but also on a certain quality of the substance of the brain, spinal marrow, and nerves; insomuch that all the manifestations of the life or vital energy of these modifications of nervous matter, which are recognised as the phenomena of motion, sensation, or feeling, assume another form as soon as their composition is altered. The animal organism has produced the brain and nerves out of compounds, furnished to it by vegetables: it is the constituents of the food of the animal, which, in consequence of a series of changes, have assumed the properties and the structure which we find in the brain and nerves." The only point of difference between Dr. Liebig's views and my own upon this subject is, that while he upholds certain nitrogenized vegetable substances, I give preference to the most nutritious animal substances, as the best restoratives of the substance and powers of the brain and nervous system; and while Dr. Liebig has been occupied in establishing his views in relation to Chemistry, I have been engaged in establishing mine in relation to the Practice of Medicine.

It is evident that if one or more of the chemical components of the brain become either increased or diminished in proportion to the rest, this organ suffers changes in its substance calculated to disturb its functional integrity. That such changes take place is supported by the fact that the physical characters of the brain are in numerous instances decidedly altered as regards consistence, colour, specific gravity, or dimensions; and these changes are sometimes all found to coexist in an obvious degree. This being the case, it cannot be doubted that every shade of variation between the apparent and the inappreciable grades must exist, and constitute so many degrees of impairment of the brain, though the latter may not be distinguishable by the pathological anatomist.

The physical changes, detected by anatomical investigation, of great general impairment of the brain are the following: emaciation, the brain not filling the skull, the space being occupied by a collection of serum; and general softening with paleness of the cortical substance, and often a soiled appearance of the medullary substance. These characters are generally found in connexion with some more decided disease of the brain, which engrosses the attention of the pathological anatomist, and frequently causes him to underrate the importance of the emaciation and softening. It some-

times happens that the emaciation and softening are accompanied by engorgement of the veins on the surface of this organ and by increased vascularity of its substance, numerous injected points in such instances being observed on the surfaces of sections; in which case also the signs of impairment are disregarded, and those of congestion are hailed as sufficient to account for the symptoms of whatever disease may have existed, whether indicated by giddiness and pain in the head, by fits, excitation of the brain, stupor, paralysis, or insanity.

As general impairment of the brain is viewed neither as a distinct form of disease capable of giving rise to a certain group of symptoms, nor as constituting a predisposition to any of the more decided forms of disease just enumerated, it is not surprising that the less apparent grades of impairment should be altogether overlooked. They must, however, necessarily exist, and must be regarded as the progressive effects of a deficient supply of blood to the brain; deficiency of blood occasioning that innutrition of the organ, which, as manifested by emaciation, softening, and other signs, constitutes impairment of this organ.

The symptoms of a decidedly impaired condition of the brain are, diminished capability of mental exertion, difficulty of fixing the attention, depres-

sion of spirits, irascibility, restlessness, dimness of sight, deafness, unpleasant sounds in the ears, tingling of the skin, various delusive sensations, headache, giddiness, dyspepsia, and general lassitude. It sometimes happens that all the above symptoms occur in the same individual.

Although these symptoms of an impaired condition of the brain are of frequent occurrence, yet they have hitherto been mistaken for those of other forms of disease, particularly for dyspepsia, determination of blood to the head, or general debility; and have been treated, according to the most strongly-marked symptoms, for one or other of these complaints, and sometimes for all of them in succession. If, for example, the symptoms of dyspepsia be very decided, the other symptoms are also considered to depend, though more remotely, upon the morbid state of the stomach. If the symptoms of dyspepsia be slight, and those of supposed determination of blood to the head urgent, the treatment is directed to the removal of the latter, the dyspepsia being considered as only accidentally connected with it. If, again, the symptoms of general debility be most conspicuous, the brain and the stomach are supposed merely to participate in the same state, and merit but secondary attention. When, therefore, a case of impaired condition of the brain connected with decided sym-

ptoms of dyspepsia presents itself, it is liable to be treated for an affection of the stomach; and as the stomach and brain are to a certain extent reciprocally dependent upon each other for functional integrity, whatever is beneficial to the stomach temporarily ameliorates the condition of the brain. A patient applying under such circumstances to a physician obtains considerable relief; but as the impairment of the brain progresses, he is induced to consult another physician. The predominant symptoms being now those of an affection of the head, he is treated for supposed determination of blood to the brain, and cupping and an abstemious diet are recommended. Under this treatment he finds that he is obliged to recline on the sofa during the greater part of the day, in consequence of the giddiness and confusion of mind experienced on attempting to rise; after a few days his diet is cautiously improved, and a slight amelioration of some of the symptoms is the result. As however no satisfactory improvement takes place, another physician is applied to, who finds both the bodily and mental powers of the patient greatly reduced, and considers the complaint to be one of great general debility, and that the abstraction of blood has had an injurious effect. He accordingly places the patient under a renovating system of treatment, from which very considerable benefit is derived;

but the seat of the complaint not being particularly attended to, some of the original symptoms persist, and, in addition, perhaps a numbness and weakness of one hand, or excitability of the brain, is experienced. Thus in the same case the symptoms of an impaired brain may be so modified by the treatment, as to subject the patient to three different modes of practice in succession, all the symptoms being combated in turn without being permanently removed, or the real nature of the disease discovered. This description of case is exceedingly common.

In the same manner, cases occur in which other symptoms of an impaired condition of the brain predominate, and in which the organ most affected is considered and treated as the seat of the disease. For instance, when the vision becomes particularly defective, and the other symptoms of impairment of the brain are comparatively slight, the remedies are fruitlessly directed to the eye; and so in some instances of deafness, the remedial means are applied to the ear without the least benefit being derived from them, the brain being the seat of the disorder, which is overlooked.

An advanced state of general impairment of the brain is often to be observed after death as the consequence of some debilitating disease, as diarrhœa, hemorrhage, &c., but most frequently after typhus

and scarlet fever, when treated upon the rigid antiphlogistic system. The first stage of fever is that of depression, as indicated by depression of the circulation and of the functional power of the brain: rigid abstinence, repeated abstractions of blood, and cold applications to the head constitute the treatment, and the result is innutrition of the brain to a considerable extent; the cerebral symptoms from first to last, before and after the accession of inflammation, manifesting a progressive loss of the powers of the brain. Dr. Southwood Smith, in his Treatise on Fever, page 181, endeavours to prove by morbid anatomy that idiopathic fever consists chiefly in inflammation of the contents of one or more of the great cavities of the body, and in this attempt he gives an excellent description of an impaired condition of the brain, which he confounds with the results of inflammation. The signs of impairment are distinguished by italics:—

"MORBID APPEARANCES IN THE HEAD.

"Of the membranes of the brain, the arachnoid is the most constantly diseased. It is seldom or never in a healthy condition. It is always either more vascular than natural, or when in this respect unchanged, it is altered in structure, being thickened, opake, and milky: when in this latter state, a gelatinous fluid is usually effused beneath it. Not

uncommonly it is united at several points to the membranes above and below it. To the dura mater it very often adheres, particularly at the angles of the hemispheres, or along the course of the longitudinal sinus; and in these cases the adhesion is always peculiarly firm at the vertex. The dura mater itself is less constantly changed in appearance, although this membrane also is sometimes more vascular than natural; and frequently it either adheres with preternatural firmness to the skull-cap, or, on the contrary, it is quite detached from it, in consequence of effusion between it and the bones of the cranium. To the pia mater, the arachnoid is also very often adherent at several points: it is seldom that the pia mater is changed in structure, but it is generally preternaturally vascular. In like manner, the theca which incloses the spinal cord is frequently highly vascular, and contains a larger quantity of fluid than natural.

"The brain itself is seldom or never in a healthy condition; the morbid changes to be distinguished in it differ greatly in degree in different cases, but still, in almost every case, some morbid change is to be discerned. These changes consist of an altered state of its substance, or of its cavities, or of both. The most usual change apparent in its substance is a higher degree of vascularity than natural. This increased vascularity is sometimes

confined to the surface; sometimes it is more manifestly deep in its substance; and, while common to both, it may exhibit different degrees of intensity in either. When on the surface, this preternatural vascularity is denoted by a greater fullness of the vessels, and apparently by an increase in their number; when within its substance, by a greater number of bloody points, which are rendered visible by an incision with the scalpel. And in both situations it may exist in all degrees, from a faint blush to a deep and vivid redness. *The substance itself is sometimes softer, sometimes firmer than natural. The softening differs in degree and in extent. Sometimes the entire cerebrum is manifestly and considerably softer than natural; at other times only particular portions of it are found in this softened state. Now and then, but very rarely, abscess is discovered within its substance. It is remarkable that the cerebellum is always considerably softer than the cerebrum: whence these two portions of the organ are often observed to be in opposite states, the cerebrum being preternaturally firm, and the cerebellum being almost always softer than natural. The pituitary gland also is very constantly softened, and often in a state of suppuration. When the cerebrum is preternaturally firm, the firmness is usually general.*

"*The morbid change observable in the cavities of the brain consists in their containing an excess of*

secretion. This increase of secreted fluid is usually accumulated in the lateral ventricles: the quantity varies from a drachm to several ounces; when thus great, the lateral ventricles themselves are enlarged, the third and fourth ventricles are likewise distended with fluid, and the passages connecting them are proportionally full.

" Common as it is to find a preternatural quantity of fluid in the ventricles, it is still more common to find it in excess between the membranes; often between the dura mater and the arachnoid, almost always between the arachnoid and the pia mater. It has been already stated, that the fluid effused between the arachnoid is of a gelatinous appearance and aspect; everywhere else it possesses the physical properties of serum, being thin, transparent, and of a straw colour: now and then it is thicker in consistence, opake, and even bloody, and sometimes that beneath the membranes contains flakes of lymph, or is mixed with pus.

" It is observable that the two morbid conditions now described, that of excessive vascularity and that of increased secretion, are never coexistent. If the vessels of the brain and its membranes are loaded with blood, there is little or no fluid within the former or between the latter: if, on the contrary, the effusion be great, there is little or no appearance of vascularity. Effusion is the effect and the termination of vascularity; it is the ultimate result of vascular action, and

the effect having ensued, the cause ceases to be apparent."

In the above quotation are described the true and decided physical signs of impairment of the brain, accompanied by certain traces of inflammation. The latter being chiefly what are sought for, they are unfortunately allowed to disguise the true character of the former, which are considered, either wholly or chiefly, the results of inflammation: whereas most probably the inflammation is, on the contrary, the combined result of the impairment of the brain and of the treatment. The brain in such cases is subjected by the treatment to a rapid process of innutrition; a process which occasions, in different individuals, various degrees of excitability, dependent on age, constitution, &c.; in some, however, instead of excitability, it occasions deep depression. Accordingly, all grades of action, between those of deep depression, excitation, and the highest degree of inflammation, are indicated by corresponding symptoms during life and by corresponding appearances after death. Objections might be made to what Dr. Southwood Smith says respecting the alleged signs and products of inflammation; and with regard to the venous congestion and serous effusion mentioned by him, remarks have been already made on them in the description of the condition of the brain in Syncope, and upon the

post-mortem appearances observed in the brain under the head "Insanity." It may however be observed here, that when the effusion of clear serum occurs in other parts of the body, as is very frequent, it is not usually ascribed to inflammation, especially when there is no accompanying increased vascularity, as in ascites and hydrocele for instance; but Dr. Southwood Smith, on finding serous effusion in the head without increased vascularity, attempts to explain away this incongruity with his doctrine of inflammation, by saying that effusion "is the ultimate result of vascular action, and the effect having ensued, the cause ceases to be apparent." This consequence occurs when the effusion is the result of venous congestion, but not when it is the result of the arterial action constituting inflammation: when recent productions of inflammation are observed, arterial turgescence is apparent also. The more probable fact is, that venous congestion takes place in consequence of deficient pressure upon the brain, dependent upon deficient supply of arterial blood to that organ, as before explained; and that, as the impoverished condition of the brain proceeds to emaciation, venous congestion is no longer adequate to supply the deficiency of pressure, and serous effusion takes place, removing the cause of the venous congestion, which in consequence ceases.

It is scarcely asserting too much to say that Dr. Southwood Smith is so exceedingly prejudiced in his pathological researches into the inflammatory nature of fever, that it would be difficult to fix upon a single morbid appearance in the head, described in Dr. Southwood Smith's work, which he does not ascribe to inflammation. Indeed it cannot be denied that much prejudice exists regarding the pathology of the diseases of the brain; the antiphlogistic system—the prevalent mode of treating these diseases—disposing the Faculty to view every kind of vascularity in the brain as traces of inflammation, and every kind of morbid change in the substance of this organ and its membranes, as well as every kind of deposition, as the results of inflammation. It is true the Faculty has not hitherto entertained any defined notion of the tendency to the formation of a vacuum within the skull, and of its influence upon the circulation within this cavity; and therefore, not knowing how to account for turgescence of the blood-vessels, unless as a consequence of determination of blood to the head, no proper distinction has been made between arterial and venous congestion, between the products of inflammation and the effects of innutrition, all of which have been confounded and considered as evidences of inflammation. Hence pathological anatomy, as applied to the diseases of the brain, has been a falla-

cious guide, leading to injurious and fatal practice in many of the diseases of this organ.

Impairment of the brain constitutes the predisposition to nearly all the diseases of this organ. General impairment gives rise under efficient causes to excitation of the brain, and stupor; and it not only affords a predisposition to syncope, but often occasions it to be attended by coma and lethargy. Partial impairment, when it occurs in the convolution, affects the intellectual functions in every degree between mere defective memory and the worst forms of insanity. When it occurs in the more central parts of the brain in the form of decided softening, it lays the foundation for apoplexy and paralysis. When it occurs in the cerebellum, medulla oblongata, or other parts at the base of the brain, it occasions a predisposition to the convulsive forms of disease. The description of excitation of the brain, stupor, paralysis, apoplexy, and insanity, as arising from either general or partial impairment of the brain, will be found in the following pages of this work.

Professional writers do not admit that the condition of the brain, as examined after death, affords any satisfactory illustration of the causes or nature of epilepsy, chorea (St. Vitus's dance), or of hysterical fits. Regarding epilepsy, however, there are many facts which appear to prove that an impaired

condition of the cerebellum, medulla oblongata, &c. form a predisposition in at least a great proportion of cases. The German Society, formed expressly to investigate the pathology of epilepsy, found that in fifteen cases out of twenty the cerebellum was altered in consistence, colour and size; that the pineal gland was diseased, but that the cerebrum was sound. So little importance does the Faculty attach to changes in the substance of the brain, unless of a very decided character, that it has been asserted in the face of these facts, that nothing was discovered explanatory of the causes of epilepsy. In several fatal cases of epileptic convulsions in children I have found considerable softening and wasting of the cerebellum, medulla oblongata, and other parts at the base of the brain, with collections of fluid at the base of the skull and in the spinal canal.

A lady eight months pregnant with her first child, of abstemious habits, and who frequently refrained from animal food, sometimes for several days in succession, arose in the morning complaining of pain in the head. In the evening of the same day she fell down deprived of consciousness, and was seized with epileptic convulsions, which returned after shorter or longer intervals, until about twelve o'clock the next day, when she died. In the first instance a few leeches and cold lotions

were applied to the head; the fits continuing however to return, a large quantity of blood was abstracted from the arm, after which she became exceedingly restless. After the interval of upwards of an hour, a stronger fit than any of the preceding, followed by stertorous respiration, took place. Previously to the last fit, consciousness had returned in the intervals of the fits, but not after it. From this period throughout the night the fits recurred about every quarter of an hour, succeeded by an apoplectic stertor. I first saw her between six and seven in the morning, and an eminent physician extracted the child about an hour afterwards. During this operation, and for an hour and half afterwards, no fit returned; but considerable hemorrhage took place, she became extremely restless, the pulse was much depressed, and the surface of the body cold. Under this exsanguineous state of body the fits and apoplectic stertor returned, and continued until her death. The epileptic struggles were throughout confined to the left side, inclining the head and body towards the right side. The surgeon had treated the case as one originating in a determination of blood to the head, which view and practice were fully approved of by the physician. The post-mortem examination took place on the following morning. There was no extravasation of blood upon the brain. The veins on the

surface were congested, and there was a slight effusion under the arachnoid. There was no hyperemia of the substance of the brain; a few injected vessels were observed in a small portion, but in the remaining portion scarcely a red point was to be seen. The brain indicated, on the contrary, that it had been insufficiently nourished, its general consistence being rather less than natural; the left lobe of the cerebellum was softened, and presented on its under surface a considerable depression, indicative of emaciation having taken place. A small quantity of serum was found at the base of the skull and in the spinal canal. The intestines, &c. were perfectly bloodless.

Although the symptoms in this case were strongly marked, the apoplectic stertor inducing the physician in attendance to be apprehensive that the rupture of a vessel in the brain had taken place, yet both the history and the autopsy of the case prove that it was one very different in its nature from apoplexy, and even opposite in its nature to hyperemia of the brain. The patient had lived abstemiously, and for some days previously to the attack had taken no animal food, nor an adequate substitute for it. She arose in the morning, as many persons do under similar circumstances, with considerable pain in the head, arising, not from the brain being overcharged with, but from its being

inadequately supported by, blood. If, in this case, the brain had been, as is usually supposed in such cases, overcharged with blood, a large abstraction of blood would have been an effectual remedy for a disease which had not then been in existence above an hour; but so far from its proving beneficial, the patient became worse: the next fit was stronger, apoplectic stertor and loss of consciousness came on; and although the extraction of the child, by the removal of the exciting cause, suspended the fits and the stertorous respiration for a time, yet the further loss of blood, by the spontaneous occurrence of hemorrhage, reproduced both. What can be more evident, than that the abstraction of blood in such cases is strongly counter-indicated? In this exsanguineous state of body all the symptoms persisted to within a few minutes of death. Can it be maintained, in the face of these facts, that epileptic convulsions arise from a determination of blood to the brain? The examination of the brain proved that the stertorous respiration, a symptom which is generally considered as a distinguishing sign of apoplexy, and sometimes occasioning a fit of syncope to be viewed and fatally treated as apoplexy, was not a sign of effusion of blood upon the brain. This case affords an exemplification of softening and emaciation of the cerebellum in connexion with epilepsy, and of that generally impaired

condition of the brain which constitutes the predisposition to serious diseases of that organ.

It is probable that chorea and hysterical fits also depend upon local impairment of the brain, though of a slighter degree than that which gives rise to epilepsy. Although no anatomical facts can at present be adduced in support of this opinion, yet facts and arguments derived from observation and practice may be alleged in its favour. These disorders recur in the same individuals very frequently, and however frequent their recurrence, they always assume precisely the same determinate form; some fixed cause must therefore necessarily exist in the brain to occasion the recurrence of the same peculiar morbid action in that organ. It cannot be conceived that three individuals—one subject to epilepsy, a second to chorea, and a third to hysterical fits—should each have a sound brain, and upon being exposed to the same efficient causes, viz. great bodily fatigue and mental anxiety, should be attacked with distinctly different forms of disease. The only rational conclusion at which we can arrive is, that in such cases there exists a certain modified condition of the brain peculiar to each. In two children having worms, or other exciting cause in the bowels, the brain of one becomes irritated to a degree which occasions epileptic convulsions, while that of the other is in no way disturbed. The brain

in both of these children cannot be perfectly sound; in one it is more susceptible of irritation than in the other; and this morbid susceptibility must depend upon a particular condition of the brain, which however cannot be detected in post-mortem examinations.

In whatever condition the substance of the brain may be in these diseases, the efficient causes are such as either debilitate or irritate this organ, and especially such as exert the twofold influence; while renovating measures, as nutritious diet and tonic medicines, are particularly beneficial; indeed, they seldom fail to remove chorea in its more recent states. The history of almost every case of hysterical fits tends to show that the predisposition to this complaint chiefly depends upon an impaired condition of the brain, generally however combined with other causes, and that any considerable or sudden reduction in the circulation of this organ is an immediate cause of their occurrence. For example: a great proportion of women of delicate health are more or less hysterical whenever the general circulation is rendered more languid than usual, whether by indisposition, fatigue, mental anxiety, or loss of blood. The most violent and continued hysterical fits I ever witnessed occurred in the case of a young lady who was subject to fits of this nature, and which were supposed by

her medical attendant to originate in a determination of blood to the head. An abstemious diet had accordingly been recommended; but as the fits returned more frequently than before, more severe measures were deemed necessary; she was therefore copiously blooded, the consequence of which was, an attack which lasted fifty hours, during the whole of which time she was in a state of insensibility, having fits at short intervals. Whatever renders the circulation in the brain unusually languid, is a producing cause of fits of this description; and whatever renovates and affords strength to hysterical patients, tends to emancipate them from the liability of their recurrence.

With regard to the causes and nature of softening of the brain, Lallemand (Recherches Anatomico-Pathologiques sur l'Encéphale) appears to have been the most strenuous advocate of the doctrine that this alteration is always the result of an inflammatory process. Rostan, on the other hand, in a work of great excellence (Recherches sur le Ramollissement du Cerveau), considers that inflammation is merely an occasional cause; and compares softening of the brain to gangrene of the feet in old people, ascribing both diseases to ossification of the blood-vessels. Although Rostan, in taking this view, evidently regards softening of the brain as a state of innutrition, yet to the cause to

which he assigns the softening it must be objected, —that ossification of the arteries is found only in a minority of cases; that considerable softening is often met with unaccompanied by ossification of the vessels, and *vice versâ*, that considerable ossification is often observed unaccompanied by softening; that when these two morbid alterations are coexistent, it as often happens that the degrees of softening and ossification are in inverse proportions as otherwise. Andral states, that "the causes which give rise to softening of the cerebro-spinal axis are very little known. Indeed, the only one whose existence we can consider as actually demonstrated is external violence, and in these cases the ramollissement is an immediate effect of irritation or inflammation. In cases where we can find no trace of irritation,—where the nervous pulp, far from being injected, is, on the contrary, discoloured, and where the whole lesion consists in a simple diminution of cohesion,—in these cases we must acknowledge that the present state of the science does not permit us to explain the causes of ramollissement."

To the concluding remark of Andral it may be replied, that it is not the present state of the science which is in fault, but the present method of investigating the causes and nature of the disease. The symptoms which attend softening of the brain being

usually deemed those of determination of blood to that organ, while, on the contrary, they characterize a deficiency in the supply of blood, a wrong bias is given to the entire view of the nature of the disease. Softening arises from the brain being insufficiently nourished with blood, and copious abstractions of blood and other lowering means of treatment tend greatly to increase the disease where it already exists, and to induce general softening and impairment in cases in which only local softening had previously existed.

Case 1.—Mr. M., aged 40, of spare habit, sallow complexion, and not of strong constitution, but whose diet had been good, placed himself under my care. His engagements were sedentary, and occupied him until twelve o'clock on five nights in the week throughout the year. After some years spent in this manner, his brain, by over-exertion of its powers, became so impaired, that he was at length rendered incapable of reading or writing without experiencing confusion of ideas. He also complained of great depression of spirits, and occasionally of great excitability, of giddiness, headache, deafness, dimness of sight, and a constant pain and sensation of contraction in the muscles at the back part of the head and neck. For these symptoms he was recommended to recline during several hours in the day, and to adopt a more nutritious diet than ordinary;

the medicines prescribed consisted of stimulants, preparations of iron and opiates; the latter consisted of a grain of opium combined with blue pill, which he took three times a day for about ten days, and which proved in his case highly beneficial. In the course of a month his health was restored, and he returned to his duties, a part of which however he prudently relinquished. He has had no relapse since that time, a period now of nearly five years.

Case 2.—Mr. W., aged 42, had been during two years under constant medical treatment for the following symptoms, viz. considerable pain in the head, occasional giddiness, noise in the ears, deafness, dimness of sight, and partial loss of memory. His intellectual powers were so considerably impaired, that he had been during twelve months wholly unable to attend to business; nor could he read many sentences without experiencing great confusion of mind. He became irritable in temper, greatly depressed in spirits, restless by day as well as by night, and complained of general lassitude. He had every symptom of indigestion, as flatulence, heartburn, nausea, disinclination for food, and an irregular state of the bowels. The treatment which had been adopted produced no alleviation of these distressing symptoms, and at the time he consulted me he considered that they were progressing. I considered his case as one exhibiting marked sym-

ptoms of an impaired condition of the brain. He had accumulations in the bowels, by removing which the symptoms of indigestion were much diminished. Under the system of treatment advocated in this work, he gradually recovered; the condition of his brain was sufficiently improved in less than four months to enable him to resume his daily avocations, and the symptoms in a few weeks afterwards were entirely removed.

Case 3.—Mr. F., aged 33, had been subject during three years to an affection of the brain, which had been considered as one of determination of blood to the head, and the treatment had accordingly consisted in repeated abstractions of blood, in purgatives, and low diet. Each successive year the attacks became of a more serious character. When he consulted me, his symptoms were the following:—a painful sensation of weight on the crown of the head; constant pain extending through the orbits and root of the nose; pain and sensation of dragging in the muscles, extending from the back of the head down the neck: when he moved his head he imagined that something within the skull moved; he experienced giddiness, noise in the ears, occasional paroxysms of cerebral excitement, accompanied by throbbing and increase of the temperature of the head, numbness and diminished power of the right arm, and

sometimes of the leg of the same side, a sensation of violent burning on the surface of nearly half the trunk on the same side, together with great tingling of the skin of the whole body. His mental powers were so impaired that he could neither read nor fix his thoughts upon any subject; in short, his mind was in a constant state of agitation, accompanied with extreme restlessness of body; his temper had become irascible, and during several weeks he felt an almost irresistible propensity to destroy his children, which gave him the most grievous apprehensions whenever they came into his presence. He had no rest at night, being tormented with various kinds of delusive sensations, and imaginary objects occasionally presenting themselves before him. His bowels were in a very disordered state, and he had other symptoms of indigestion.

I viewed this case as one of a very impaired condition of the brain, and likely to terminate in insanity and paralysis. He was immediately placed upon a liberal system of diet, which, contrary to what would have been under such circumstances generally expected, in no degree increased either the cerebral excitement or the symptoms of indigestion; he reclined during several hours in the day; the medicines prescribed were, preparations of bark, iron, ammonia, and opium with aperients.

In about a month after the commencement of this renovating system of treatment, his mind gradually became more composed, the paroxysms of cerebral excitement as they arose being controlled by keeping the head cool during an hour or two by means of cold lotions, and at length the threatening symptoms of insanity disappeared; but the removal of some of the other symptoms took place more gradually. In about ten weeks he returned to his avocations; this was however sooner than was advisable, as he still complained of the affection of the arm and of some of the sensations in his head, though in a greatly diminished degree. His engagements require his attention until a late hour every night, and therefore do not admit of his pursuing the treatment requisite for the perfect re-establishment of his health; and although he occasionally complains of some of his former symptoms, yet during the twelve months, with the exception of one day, which have since elapsed, they have not been such as to render him incapable of attending to business: his brain, therefore, though in a much improved condition, is not, for want of perseverance in the remedial measures, yet restored to a perfectly healthy state.

In this case the symptoms were those of general impairment and local softening of the brain. The sensation of pressure on the head probably indi-

cated that the pressure within the skull was not equal to the atmospheric pressure external to it. This sensation, coupled with that of movement within the skull, affords a fair presumption that the brain was emaciated. Had the antiphlogistic treatment been employed in this case, I feel convinced that it would not only have had the effect of augmenting the already impaired state of the brain, but would have produced furious mania, of the occurrence of which there were at the commencement strong forebodings.

Case 4.—Mr. S., about forty-eight years of age, had experienced during nearly three years various symptoms of impairment of the brain and of indigestion, for the latter of which he had been under the care of two physicians for some time. He had been an abstemious liver, and had been in the habit of passing from eight to ten hours every day in mental and bodily exertion without taking any kind of nourishment. He had pain in the head, giddiness, and confusion of thought, and all those symptoms which are usually supposed to indicate determination of blood to the brain. For these symptoms he was ordered to lose blood, and the result was a further reduction of the nutrition and powers of the brain, and an aggravation of the symptoms, which daily increased in severity. After being bled he went into the country for a month,

and at his return to town he consulted me. At this time his symptoms were the following: a painful sense of weight on the crown of the head, experienced more particularly when he was in the erect posture, but which nearly disappeared while he was lying down; a sensation of pressure immediately below the brow; occasional pain in the muscles at the back of the neck, with an inclination to draw his head backwards; noises in the ears and dimness of vision; numbness and diminished power of the left hand; while standing and when he attempted to walk, it appeared to him that the ground was giving way under his feet; and while in the recumbent position, as if the sofa or bed on which he was reclining was sinking under him; he sometimes felt as if his body was constantly revolving; he also experienced occasionally a tremulous and convulsive action in the muscles of the limbs, especially of the legs, and sometimes creeping sensations in various parts of the body. In addition to these symptoms, he had those of indigestion, which were however slight in degree when compared with those arising from the cerebral affection. Being much emaciated, and in an extremely debilitated and exsanguineous state, and as in this state the powers of digestion are considerably diminished, he entered only gradually upon a nutritious diet, which was improved as his digestive

powers improved. He reclined during several hours every day. The medicines used consisted of tonics, aperients, diffusible stimulants, with sedatives or opiates at night; mustard poultices were occasionally applied to the pit of the stomach, and small blisters to the head. So great however was the deficiency in the quantity and quality of his blood, and so great was the impairment of his brain, that a highly nutritious diet, persisted in during four months, appeared to produce but little improvement in him; but feeling confident that he was pursuing a right system of treatment, he persevered in it, increased the daily quantity of nutriment, and even exceeded the bounds of my recommendation. The cerebral symptoms now diminished more rapidly, his frame increased in bulk and strength, and after six weeks he was enabled, on a temporary emergency, to attend to his usual avocations. From the progressive improvement which is still taking place in all his symptoms, no doubt can be entertained that both the substance and powers of his brain will be perfectly re-established.

CHAPTER VI.

MORBID EXCITATION OF THE BRAIN.

EXCITATION of the brain may be healthy or morbid, according to the previous condition of this organ. Excitation of a sound brain increases its healthy vigour; but excitation of an impaired brain is likely to produce morbid action. For example: joyfulness, argumentation, &c. excite the mind and increase the circulation of blood through the head, by which means the healthy brain becomes heightened in its functional powers, and imparts new vigour to the whole frame. Moderate indulgence in wine produces nearly similar effects: in this case the mind is excited through the medium of the brain; in the former the brain is excited through the medium of the mind. But when the brain is in a state of innutrition, as it often is in cases of general debility, whether produced by abstemiousness in diet, by severe illness, or by frequent losses of blood, slight exciting causes, especially of the mental kind, occasion morbid action of this organ.

In these cases, unlike the former, in which strength is raised to a higher degree of energy, debility characterizes the excitement, which, instead of imparting general animation and vigour, prostrates nearly all the powers of the body, and is attended by confusion of thought, giddiness, throbbing, and often by acute pain in the head, the temperature of which is increased, while the extremities of the body are cold, and the pulse feeble and quick.

Morbid excitation of the brain may be illustrated by the following example. A young lady, after having adhered to an abstemious diet during several years, or after having been subjected to the antiphlogistic system of treatment for an inflammatory disease, as pleurisy or inflammation of the lungs, necessarily exhibits the symptoms arising from a deficient quantity of blood and a languid circulation; she is liable to headache and giddiness in the erect posture, and to throbbing in the head on resuming the recumbent posture. These symptoms being considered as those of determination of blood to the brain, a small quantity of blood is abstracted, and leeches are applied to the temples; these means generally afford temporary alleviation. The loss of blood is however, in some instances, followed by considerable excitation of the brain, with delirium; and when this is the case, a larger abstraction of blood is practised, cold lotions are applied

to the head, and mercury is, perhaps, exhibited. These measures produce great alteration in the symptoms, the cerebral excitation ceases, and the whole frame is rendered prostrate. Under this state of things, one patient will, in a few days, die of what is strangely termed brain-fever ; another, after remaining several days in a doubtful state, will gradually recover, many weeks elapsing before the mind is capable of being moderately exercised. In cases of morbid excitation of the brain, if the treatment above described be resorted to, the organ becomes so seriously impaired, that the slightest occasion of excitement produces a relapse.

In another case, a young man accustomed to a generous diet, and having hitherto enjoyed the full vigour of health, may, from some derangement of the digestive organs, or in consequence of a considerable change from cold to warm weather, experience giddiness or pain in the head, which symptoms, especially if he have a florid complexion, are liable to be deemed those of determination of blood to the brain. Blood is accordingly abstracted, which remedy we will suppose is repeated more than once in the course of a week or ten days, and that he is further reduced by the rigid observance of an abstemious diet. At the end of this time symptoms of an excitable brain present themselves ; to subdue which he is cupped, and cold lotions are

applied to the head; at length it is considered advisable that the antiphlogistic should give place to a tonic system of treatment, and the patient becomes apparently restored. The brain, however, by these lowering measures, becomes so impaired and irritable that trifling causes reproduce the paroxysms of excitement; and this circumstance, added to a florid complexion, is erroneously deemed a convincing proof that the patient is *subject* to determination of blood to the brain, and the precaution in diet, which is adopted with the view of preventing the reproduction of the paroxysms, becomes the perpetuating cause of their recurrence.

Many individuals labour under this impoverished and excitable condition of the brain, which renders them liable to habitual attacks of morbid excitation of this organ; and the remedial measures to which they resort, viz. the abstraction of blood and abstemious diet, are the very means which in the first instance laid the foundation of the complaint, and are therefore best calculated to perpetuate it. It is true that bleeding frequently affords immediate relief: this is however unfortunate, as it induces both the physician and the patient to consider loss of blood as the proper remedy. It should be borne in mind, that while temporary relief is obtained by the removal of the exciting cause, the predisposing cause is increased, and therefore a

more or less speedy return of the complaint is ensured. The condition of the brain is that of innutrition, dependent on a deficient supply of blood, whereby it is rendered highly excitable; and this excitability becomes so exquisite, that whenever the circulation in the brain is augmented in a slight degree beyond its usually reduced state, the organ is irritated, any effort of nature to nourish it and to restore its powers producing at the same time morbid excitation. Should this restorative effort be combated for the sake of preventing its accompanying morbid excitation? Certainly not: for it is injudicious to remove a temporary excitation by the abstraction of blood, which not only brings the brain back to its morbid condition whenever it makes the least advance towards restoration, but, as the abstraction of blood is usually greater than is requisite for the removal of the excitation, it still further impoverishes this organ and increases its excitability, thereby ensuring a more speedy recurrence of the morbid excitation. Thus some persons acquire this condition of the brain, and are cupped every six months; but the complaint returning at shorter intervals, the cupping is had recourse to every three months, then every month, and at length in some cases every fortnight, the repetition of the remedy rendering the recurrence of the disease habitual.

Should it be inquired,—what treatment ought to be adopted if blood is not to be abstracted, when it is admitted that the abstraction affords relief, and that the cause of the excitation is an increase in the circulation of blood through the brain?—the answer is—Remove the predisposing, instead of the exciting cause; for the removal of the exciting cause—the blood—increases the predisposing cause—innutrition of the brain; and therefore, while the withdrawal of blood affords temporary relief, it ensures the future recurrence of the disease. Produce blood instead of abstracting it; let the patient take as much animal food, either in the solid or liquid form, as circumstances will allow; and as the brain becomes more nourished with blood, the predisposing cause will become diminished, and the restoration of the powers of the brain will be progressively accomplished. The morbid excitation need not in general be attended to, as it will gradually subside by removing its foundation—the predisposing cause; should it however be thought requisite to have recourse to specific remedies, the ammoniated tincture of valerian, opiates combined with the blue pill, and cold applications to the head, will, according to circumstances, be found useful. The last of these remedies is in general to be preferred; but in cases of great debility, in which the powers of the circulation are

much depressed, it should not be resorted to, as it sometimes produces stupor.

Stupor.—Although Stupor is the opposite state to that of excitation, yet it arises for the most part from similar causes, viz. an impaired condition of the brain as a predisposing cause, and a deficient supply of blood as an efficient cause. In one case, the more the brain is debilitated the more excitable it becomes, as already described; while in the other, the effect of withdrawing the blood and its stimulus is a diminution of consciousness and of the other powers of the brain, constituting Stupor. The difference in these respective effects may be accounted for by the circumstance that morbid excitation of the brain occurs more particularly in young persons, in whom the brain readily expands, and thus occupies the space in the skull, which in the healthy condition is occupied by a normal quantity of blood; while stupor is witnessed in those who have attained the middle and later periods of life, in whom the expansibility of the brain is more limited, favouring the occurrence, as before described, of venous congestion and serous effusion, a condition of the brain which often occasions stupor. Stupor may occur not only as a distinct symptom of disease, but it may supervene upon and complicate other symptoms arising from any disease which tends greatly to reduce the cir-

culation of blood in the brain, especially in cases in which either a general or local impairment of this organ exists. Stupor may also occur at any period of life, as in cases of Continued Fever, in which malaria produces in the first instance a particular depression of the powers of the brain, and in which those powers are still further depressed by the antiphlogistic means of treatment.

In the treatment of Stupor renovating means are imperatively necessary. As solid food cannot be taken, strong beef-tea should be frequently administered, and occasionally wine and other diffusible stimuli. Sometimes, however, considerable difficulty attends the administration of remedies, as the patient cannot in general be sufficiently roused to induce him to swallow. The bowels are mostly in a torpid state and require to be relieved, and for this purpose strong injections should be used: a table-spoonful of ox or sheep's gall mixed with a pint of warm water, forms the most efficient injection. Should this not succeed, it is not advisable to administer strong purgative medicines, as they produce copious liquid secretions, which rapidly exhaust the powers of the patient; it is preferable to wait until the stupor shall have gone off, when aloëtic purges should be employed. Cold lotions to the head should be avoided, as they still further diminish the energy of the brain; on the contrary,

an irritating liniment, composed of equal parts of the tincture of Spanish flies, liquid ammonia and olive-oil, should be employed, a space on the crown of the head being first shaved for the purpose of applying it. The head should not be raised, the brain requiring all the stimulus from the blood that can be obtained. After pursuing these measures during a few days, improvement will gradually take place. The patient should not even then be allowed to sit up in bed, as this is generally succeeded by a return of the stupor. If the patient be a free liver and have been accustomed to take more than a moderate quantity of wine, he should be allowed a liberal share of it, otherwise he will pass from the state of stupor into that of delirium tremens. After recovery a highly nutritious system of diet should be adopted; nothing less will restore the brain completely and obviate the predisposition to further disease.

CHAPTER VII.

PARALYSIS.

The causes and nature of Paralysis do not appear to have been sought for with any great zeal by the physicians of this country. Determination of blood to the head and effusion of blood from ruptured vessels have been too exclusively considered as the chief causes of this disease. Softening of the substance of the brain has been altogether overlooked, or considered, when mentioned at all, as a mere occasional cause, as abscess, cancerous and other morbid growths in the brain, and injuries from accidents, are admitted to be. The continental physicians, zealous inquirers into pathological anatomy, were not only the first to detect and bring to light this morbid change in the brain and spinal marrow, but they have also shown that softening is the most frequent cause of paralysis, and that when hemorrhage is the efficient cause, the brain is, in the great majority of cases, softened at the part in which the rupture of the vessels takes place. Andral, in speaking of "Le-

sions of motility" as symptoms of softening of the brain and spinal marrow, says, "Exceptions do indeed exist, in which we find no lesion of motility; but these cases are very rare, and we may lay it down as a general principle, that modification of motility is the lesion which characterizes most specially softening of the brain."

In considering softening of the brain as the chief cause of paralysis, another and an auxiliary cause of frequent occurrence should not be overlooked, viz. deficient supply of blood to the brain; and especially as the symptoms of deficient supply of blood are those which are usually, though erroneously, deemed indicative of determination of blood to that organ, and which therefore convey a complete misconception of the true nature of this disease.

The causes of local softening have been already explained in the description of the impaired condition of the brain, in which they were ascribed to innutritious diet, loss of blood, and over-exertion of body or mind. Local softening generally occurs at the middle and later periods of life. When it occurs below the convolutions of the brain, paralysis is sooner or later the result; and according to the degree and extent of the softening is the degree and extent of the paralysis, which may accordingly be confined to a mere numbness of one

hand, or may involve the whole of one side of the body. A considerable degree of softening may, however, exist during several years without producing paralysis, provided a good circulation of blood be maintained in the brain. The functional powers of the brain depend as much upon the quality and quantity of the blood circulating through this organ as upon the quality and quantity of the cerebral substance itself; and although softening of the brain is the chief cause of paralysis, yet the auxiliary cause, a deficient supply of blood to that organ, often supervenes and accelerates the accession of the disease.

If, as occurs in syncope, the functional powers of the entire healthy brain be completely suspended by an insufficient supply of blood, how much more readily must a softened portion, which is already impaired in structure and composition, be rendered incapable of performing its functions under any considerable reduction in the circulation! Entertaining these views, in which I have been confirmed by repeated dissections, of the nature of paralysis, I shall now proceed to describe the mode of accession of the several forms and grades of this disease.

The gradual and slight form of Paralysis arises from a comparatively slight local softening of some portion of the brain, generally accompanied by a

gradual reduction of the circulation. For example: an individual having a slight local softening of the brain, but which may not have manifested its existence by symptoms, may be attacked with vomiting and other symptoms of indigestion; in consequence of which he may take only a very small quantity of nutriment during two or three days: whether from this cause, or from any other indisposition, or from mismanagement of the constitution, by which the circulation becomes to a certain degree reduced below the natural standard, the softened portion of the brain is rendered incapable of performing its function with integrity, and numbness of one hand with diminished power of grasping is the result. If the softening be very circumscribed, the patient may experience no other symptom; but if it be more extensive, he may, in addition, experience in walking a slight inability in the leg of the same side.

The gradual form of Paralysis attended by imbecility.—In this form, in addition to a slight local softening, there is a generally impaired condition of the brain; and whether this diseased state arise from the advanced age of the patient, combined with long-continued disease, dissipation, or from any other cause, innutritious diet is a powerful, if not an essential auxiliary in the production of the paralysis. In cases of this kind, as the power of

one side of the body declines, the mind also declines, the memory becoming impaired, the intellect obtuse, and the temper peevish and fretful. The patient may remain several years in this state, or he may progressively become completely paralysed and childish.

Sudden and complete Paralysis unattended by imbecility.—In this form, the brain may not be, in the first instance, softened to any great degree, the disease resulting more from some great or sudden reduction of the circulation; as in the attempt to walk too soon after large and repeated losses of blood, in which case, in consequence of the erect posture of the body, combined with the debilitated state of the circulatory organs, the brain is suddenly deprived of its blood; or as a consequence of the exhaustion arising from purging, and privation of food during several days, or from any other cause producing syncope. Under such circumstances paralysis may take place suddenly, but is not attended by loss of consciousness unless the attack commence with syncope, in which case, if the patient be not far advanced in years, and if the powers of the circulation be not too much depressed, the circulation in the brain soon recovers itself sufficiently to dispel the symptoms of syncope, leaving the paralysis alone to be combated. The influence of the above efficient causes in depressing

the circulation is so great as to deprive the diseased portion of the brain, though not much softened, as completely of its functional powers, as would, under milder efficient causes, result from a much more softened state of a portion of the brain. In order, therefore, to form a correct diagnosis in such cases, we should endeavour to estimate the force of the efficient causes as compared with the previous condition of the patient. In other cases in which the softening of the brain is greater, but in which the efficient causes are of a less powerful description, the degree of paralysis is the same. For example: an individual having a considerable local softening of the brain may be subjected to great mental anxiety, and in this state a day's fatigue and loss of appetite may be attended with sufficient depression of the circulation and exhaustion of the brain to occasion during the night, notwithstanding the recumbent posture of the patient, a paralytic seizure of a decided character, though without loss of consciousness.

Sudden and complete Paralysis attended by imbecility.—Not only a considerable local softening, but general impairment of the brain is indicated by this form of disease. An individual having this condition of the brain, and being subjected to one or more of the causes before mentioned as capable of producing any sudden or considerable deficiency

in the supply of blood to the head, is particularly liable to an attack of syncope ; and on being seized with a fit of this kind, instead of recovering his consciousness within the usual period, as when the general condition of the brain is sound, he remains many hours in a comatose state, great venous congestion having under such circumstances taken place in the head, as described in the section "Syncope." During this period, the entire brain, and the softened part in particular, suffers further innutrition, in consequence of the arterial circulation in the brain being almost suspended. When paralysis occurs connected with syncope, it is generally mistaken for an apoplectic seizure. The suddenness of the attack in the first place, the continued coma arising from want of power in the brain to restore the circulation in the second place, and thirdly, the paralysis, are viewed together as originating in one common cause, viz. pressure caused by an escape of blood from one or more ruptured vessels. Indeed, a case of this description can never with certainty be distinguished from apoplexy. If, however, the patient had previously presented symptoms of an impaired brain, and if the attack occur under causes liable to produce syncope, these circumstances will sufficiently account for all the symptoms connected with the paralytic seizure, without considering them as re-

sulting from effusion of blood; but under such circumstances there can be no certainty, as the concussion attending the fall may have occasioned a rupture of vessels, and a consequent effusion of blood. If, on the contrary, the individual, previous to the attack, had been in perfect health, and had had no symptoms of impairment of the brain, and had not been subjected to measures calculated to produce syncope, nor subjected to the abstraction of blood after the attack, effusion of blood into the substance of the brain can alone account for continued coma combined with paralysis.

Apoplexy.—Effusion of blood into the substance or upon the surface of the brain is undoubtedly a frequent cause of paralysis, though not so frequent as it is alleged to be, many cases of paralysis in which there is no effusion of blood being confounded with apoplexy. Almost every attack is considered apoplectic the accession of which is announced by sudden loss of consciousness and power of motion with continued coma, and which terminates fatally within a few hours, although hemorrhage into the brain rarely destroys life so speedily. Many cases of paralysis commencing by a sudden seizure, and rendered permanent by the antiphlogistic treatment, are also considered of an apoplectic origin: and to the same origin are usually referred fits of syncope when attended by ster-

torous respiration; a fit of this nature when occurring in a stout and florid person, even if it be unattended by paralysis, being treated as an apoplectic seizure.

It is usually considered that ossification of the arteries is the predisposing cause of the rupture of these vessels, and of the consequent effusion of blood which constitutes apoplexy; and that their being overcharged with blood is the efficient cause. These views are principally founded on the circumstance of apoplexy and ossification being chiefly incidental to persons advanced in years, and to their being therefore frequently found coexistent. Andral has remarked that enlargement of the heart and ossification of the arteries are frequently met with in cases of apoplexy, and he is of opinion that the inordinate action of the heart is the cause of the rupture of the vessels. It is also a very generally received opinion that stout and florid persons are particularly liable to determination of blood, and, in advanced years, to rupture of the vessels of the brain. The view that the ossified state of the vessels and determination of blood to the head are the causes of the rupture of the vessels, appears to afford so satisfactory an explanation of the occurrence of apoplexy, that its accuracy is not doubted, and it is without further examination admitted to be correct. This view, however,

of the cause of apoplexy appears to me to have been too hastily adopted.

With regard to the state of the blood-vessels in apoplexy, it is admitted that they are generally found more or less ossified; but this state is confined to the larger vessels, and rupture of any of these is of rare occurrence. Apoplexy also occurs in cases in which no calcareous deposits are found in the coats of the vessels, and it is said sometimes to result from transudation through the coats of the minute vessels. It appears therefore that no decisive proof can be adduced that the ossified state of the vessels predisposes them to rupture; on the contrary, there is abundance of presumptive evidence in favour of the view that rupture of vessels can be rarely attributed to ossification: for example, hemorrhage takes place in the nose, the lungs, the stomach, bowels, uterus, and in other parts, much more frequently than in the brain, though ossification never takes place in the vessels of these parts; deficiency of tone in the vessels being the cause generally assigned, and astringent tonics and styptics being accordingly employed as remedies. Again, if the ossified state of the vessels of the brain were, as is supposed, a frequent cause of hemorrhage, we ought to find rupture and effusion of blood as a consequence of the ossified state of the vessels of the legs in elderly persons, and this ought to occur more

particularly during the action of walking, when the whole force of gravitation assists in distending these vessels; yet, although ossification of the vessels is found in all degrees, from the slightest to that in which they are converted into completely ossified tubes, no rupture takes place. It may also be remarked, that ossification of the arteries within the skull is confined, as far as can be ascertained by dissection, to the vessels which ramify on the external surface of the brain, and that it is not known to extend to those smaller vessels which enter the substance of the organ, where hemorrhage most frequently occurs. As deficiency of tone, and not ossification, is the predisposing cause assigned for hemorrhages in other organs of the body, there is no less reason for ascribing hemorrhage in the brain to this cause also, and especially as, according to Andral and others, those central parts of the brain which are most frequently softened, are also the parts in which hemorrhage most frequently occurs. It rarely happens, I believe, that hemorrhage into the substance of the brain occurs without softening. In the examination of the brain in cases of apoplexy, softened parts may be found where there is no effusion of blood, and where the substance is slightly stained with blood, but where the effusion has taken place the substance immediately surrounding it is always softened. We may

therefore, as it appears to me, conclude that softening of the brain, and not ossification of the vessels, is the predisposing cause of the rupture of the vessels, and of the effusion of the blood in apoplexy.

Determination of blood to the head is alleged to be the chief efficient cause of rupture of the vessels of the brain; but the frequency of the occurrence of this supposed cause is greatly exaggerated, as has been already stated in the chapter on "Determination of blood to the head." When the blood-vessels are greatly deficient in tone, any forcible or sudden distension of them, such as occurs during the efforts sometimes attending costiveness, violent purgation, coughing, vomiting, &c., and sometimes under the excitement of intoxication and strong mental emotion, may cause rupture of these vessels, or occasion transudation of blood through their coats, and thus sometimes become the efficient cause of apoplexy. But these are accidental causes of determination of blood to the brain, and do not constitute that peculiar morbid phenomenon, understood by a spontaneous rush of blood to the head, which is supposed generally to depend upon a plethoric condition of the body; a phenomenon, however, which is probably more ideal than real. Instead, therefore, of being dependent on a spontaneous rush of blood to the head as an efficient cause, apoplexy appears principally to arise from

the following two efficient causes, viz. forced distension of the vessels of the brain, under circumstances just enumerated; and rupture of the vessels of the brain, arising from falls or other violence to the head.

The vessels of the brain are more liable to be ruptured in consequence of violence than those of any other part of the body; for this organ being incased in bone, the percussion derived from a blow is greater than that which is communicated to soft parts. In most cases of severe injury of the head, a rupture of blood-vessels takes place either in or upon the brain, although these vessels may have been previously in a healthy condition; but when the vessels of the brain are defective in tone, and especially when they are deprived of their proper support, as when surrounded by a softened portion of the brain, a less degree of violence, such as may arise from falling to the ground in a fit of syncope, is liable to produce an amount of concussion adequate to cause rupture of the vessels of the softened portion of the brain, and thus to occasion an effusion of blood and apoplexy.

It is probable that in all cases of violence, whether from falls or other causes, the hemorrhage proceeds from ruptured vessels; but that in those cases in which straining efforts constitute the efficient cause, the hemorrhage may result either

from ruptured vessels, or from transudation, or from both. It occasionally happens that an individual in a violent fit of passion is seized with apoplexy; it is then clear that the rupture of the vessels takes place independently of external violence: but in those instances of apoplexy in which an individual falls senseless to the ground, and in which no circumstance at the time of the attack warrants the conclusion that an undue circulation of blood in the brain is its efficient cause, the rupture of the vessels is to be attributed rather to the fall, than to a "*coup-de-sang*," or sudden rush of blood to the head; and such cases may be more justly considered as commencing in syncope and terminating in apoplexy. And it must also be remarked, that unless, as in extreme cases, the hemorrhage be very great, and take place from one or more large vessels, or unless it occur in the Pons Varolii, the most essential part of the brain, the patient is not suddenly and completely deprived of consciousness; sudden and complete deprivation of consciousness being characteristic of syncope, and not, as is generally supposed, and as the term implies, of apoplexy. M. Le Dran, in his 'Traité des Opérations de Chirurgie,' in treating of injuries of the head, makes a distinction between the sudden loss of consciousness consequent upon accident, and the subsequent symptoms arising from

extravasation of blood in or upon the brain: in like manner we ought to distinguish, in a great proportion of cases of apoplexy, between the first symptoms of syncope and the subsequent symptoms of apoplexy, syncope and apoplexy often occurring in one and the same attack.

Treatment of Paralysis and Apoplexy.—Paralysis and Apoplexy are very generally considered incurable; and when the treatment usually adopted is examined, the want of success is in some degree accounted for. On perusing the accounts of the numerous cases reported by different authors, and on witnessing the results of the numerous cases treated in hospitals and dispensaries which have come under my notice within the last twenty years, during which time I have been connected, in the capacity of surgeon, with one of the largest benefit-societies in London,—the treatment of the cases, however, forming no part of my duty,—it appears that the antiphlogistic treatment is almost universally resorted to and is persisted in, although with little or no success; this treatment being supposed to afford the patient the best, and indeed the only, chance of recovery. The abstraction of blood is practised both to prevent the occurrence of these diseases when premonitory symptoms are supposed to present themselves, and to remedy them after their accession.

Premonitory symptoms attract, on the part of the Faculty, great attention, and are viewed as those of determination of blood to the head; whereas they are, as before observed, either those of deficient supply of blood to the brain, or those of a more advanced affection—an impaired condition—of this organ; and therefore, when treated according to the former mistaken view, the anticipated disease, instead of being prevented, is often realized. The realization of the disease is considered a proof of the propriety of the practice; whereas it ought to be considered as the best proof of the unsoundness of a doctrine which suggests a treatment that so often realizes the very disease it is intended to prevent. Let us take, for example, the signs and symptoms which are more particularly considered as premonitory of apoplexy. A corpulent person of florid complexion, and complaining of occasional throbbing and pain in the head, and giddiness, is without hesitation bled, and recommended to pursue an abstemious diet, in order to ward off an attack of apoplexy, to which, it is thought, he is constitutionally liable. I have already attempted to show, that the above symptoms are not those of fullness of the vessels of the brain; and that the abstraction of blood, by further diminishing the quantity of this fluid in the brain, is calculated to induce an impaired condition of that organ; but

as this condition has not hitherto engaged the attention of the Faculty, the symptoms indicative of it are considered those of increasing fullness of the vessels; and if the patient should have a fit of syncope, to which, with an impaired condition of the brain, he is very liable, the fit is considered and treated as one of apoplexy, and appears to confirm the propriety of the practice. The antiphlogistic treatment is the worst that can be adopted, for hemorrhage, in whatever part of the body it may occur, is increased by reducing the tone of the blood-vessels; and in the same manner the vessels of the brain are predisposed to hemorrhage by this treatment, and anticipated apoplexy is realized in cases in which, under other treatment, it would not occur. The case of Mr. T., related at page 204, is a good example of this kind.

Indiscriminately to ascribe corpulency and a florid complexion to redundancy of blood, and to apprehend the occurrence of apoplexy unless this supposed plethora be removed, is drawing mischievous and often fatal conclusions upon the most superficial evidence. While it is assumed that corpulency is the effect of too much blood, it is not considered that the quantity of blood requisite for the preservation of health must be proportioned to the bulk of the body: nor is it considered, that while vain efforts are made to reduce the corpulency, the sub-

stance of the brain itself is suffering, the symptoms of which suffering are also ascribed to plethora of an apoplectic tendency; as if the patient could possibly make a large quantity of blood when merely a small quantity of innutritious food constitutes his diet. A florid complexion, although natural to the individual, gives rise to the idea, that because the superficial vessels of the face appear full, those of the brain must be ready to burst unless the abstraction of blood be practised. The circumstance that many corpulent and florid persons are prematurely carried off by fits, whether of apoplexy or syncope, is not surprising, when the treatment to which they are subjected is borne in mind; but it is surprising that such false and fatal principles should continue to encumber Medical Science!

When the premonitory symptoms are those of an impaired condition of the substance of the brain, rather than those of simple deficiency of blood, and when they are mistaken for symptoms of an increased circulation of blood through this organ, the lowering system of treatment is calculated to advance the accession of any form of disease to which it may be predisposed. While general impairment of the brain is progressing, local softening may take place; and if it have already commenced, it will, under the lowering

system of treatment, proceed more rapidly, and occasion an attack of paralysis. Some patients suffering from impairment of the brain, and who exhibit evident indications of general debility, are not treated by general bleeding; a few leeches only, or a blister being applied to the head, and an abstemious diet being enjoined; and it is thought by some practitioners that this does not constitute lowering treatment, because blood is not freely abstracted. Of all parts of the body, the brain can least sustain its powers under privation of food or of any accustomed stimulus; and when this organ is in an impaired state, it is materially influenced even by slight causes. If a patient with this condition of brain be deprived of part of his accustomed support, and be fatigued in body or mind by unusual exertion during the day, he will be troubled in the evening with either giddiness in the head or singing in the ears; or in the night he will be kept in a restless state for several hours by imagining that he hears the ringing of bells, or by that intolerable tingling over his whole frame called by the French pathologists "*fourmication*," or by other indescribable sensations; or he will experience giddiness and pain in the head after rising in the morning, accompanied with depression of mind and body throughout the day. If the impaired brain be so readily and so much influenced

by slightly depressing causes, it must be admitted that the antiphlogistic treatment is of destructive tendency, and that paralysis is frequently induced by the very means employed for its prevention. Let those practitioners who imagine, when they place patients of this description upon an abstemious diet, that they are not lowering them because they abstain from bleeding, reflect upon the acknowledged physiological fact already mentioned, viz. that upwards of a quart of blood is daily consumed in supplying the different secretions, and in supporting the several functions of the body; and that if the diet consist of materials which cannot daily restore this quantity, so considerable a reduction of the quantity of the blood will take place in a few days, as will often endanger life. Those practitioners who are apprehensive of the evil consequences of bleeding, inconsistently reduce the patient in an equal, and often to a greater degree, by systematic purgation; a practice therefore which is not less pernicious than the abstraction of blood itself.

The only real premonitory symptoms of paralysis are numbness in the fingers, diminished power of grasping, a slight affection of one leg, usually attributed by the patient to weakness, and occasional hesitation of speech. One or more of these symptoms may occur accompanied or not by sym-

ptoms either of a deficient supply of blood to the head, or of general impairment of the brain. These premonitory symptoms may in some cases be of occasional occurrence only, and will present themselves only when the circulation from any cause is unusually depressed; in other cases they are of a more permanent character, fluctuating however with the state of the circulation in the brain, diminishing when the health and spirits of the patient improve, and *vice versâ*. Exercise sometimes increases the symptoms of paralysis, and the recumbent posture sometimes relieves them, provided the patient have not sustained much fatigue. Under these circumstances it is clear, that to improve the condition of the blood and of the circulation is the great and sole indication; for whether the slight degree of local softening of the brain which gives rise to these symptoms can be removed or not,—and I believe that in many cases it can be,—a vigorous circulation of good blood through this organ will supply the deficiency of power resulting from slight local softening of the substance of the brain.

The lowering system of treatment is practised not only in all cases in which premonitory symptoms of apoplexy and paralysis are supposed to exist, but also in all cases of paralysis assuming the apoplectic form, and in most of the other forms of this disease. It is true that in those cases, in

which paralysis comes on gradually and with evident signs of feebleness of body and mind, emaciation, &c., the abstraction of blood is not resorted to, but that, on the contrary, wine and a nourishing diet are sometimes recommended; but if a patient be corpulent or florid, and have symptoms of paralysis, even the infirmities incidental to advanced years will not protect him from the treatment suggested by the erroneous opinion that the brain is dangerously overcharged with blood, in consequence of inordinate sanguification; and few individuals, be the state of their constitution what it may, when suddenly seized with paralysis, escape the abstraction of blood, setons, and other lowering means. It must be admitted that patients so treated occasionally recover; on the other hand, it will not be denied that such cases are mostly those in which slight hemorrhage has taken place into the substance of a brain in other respects healthy, and in which the constitution is good; nor will it perhaps be denied that the abstraction of blood, &c. in no degree promotes those changes which the effused blood and the surrounding portion of brain undergo, on which changes the removal of the symptoms in a great measure depends. Admitting, therefore, that in some few instances the abstraction of blood is of service, I am nevertheless satisfied that in the great majority of cases it is injurious,

that many lives are lost which under a different system of treatment would be saved, and that the severity of the treatment fully accounts for the small proportion of those, who, surviving an apoplectic attack, recover completely their intellectual faculties.

It must also be admitted that the abstraction of blood often affords immediate relief in those cases of apoplexy in which the respiratory functions are considerably impeded, as evinced by the swollen and livid state of the neck and face, dependent upon the great accumulation of venous blood which extends from the right cavities of the heart to the brain itself. In these cases the abstraction of blood disgorges the veins, the blood in the lungs becomes aërated, the heart stimulated, and the general circulation restored; and the brain receiving properly arterialized blood, consciousness in a greater or less degree returns. The relief experienced in such cases is usually referred to the withdrawal of the blood from the veins and sinuses of the brain; but that this relief is to be attributed to the stimulus communicated to the brain by the influx of arterial blood, is evident from the fact that consciousness does not in any degree return until the arterial circulation in the brain is re-established.

Hemorrhage into the brain from ruptured vessels, as into the substance of other parts of the body, pro-

ceeds with a rapidity corresponding to the size and number of the ruptured vessels, until the mass of extravasated blood meets with sufficient resistance to form a counter-pressure upon the bleeding vessels: if the part be not much softened and the ruptured vessels small, this counter-pressure soon takes effect; but if, on the contrary, the ruptured vessels be large and numerous, and the brain extensively softened, or if the hemorrhage take place near the surface of a free space, as the lateral ventricles, the quantity of blood effused will be great, in which case the abstraction of blood will have no other effect than that of sinking the patient more rapidly than if he be left to the mere agency of the hemorrhage.

Whether bleeding be practised to arrest hemorrhage, or to diminish supposed determination of blood to the head, it is based on equally false principles; for in apoplexy the abstraction of blood proves beneficial only when the pulse rises immediately afterwards and the general circulation becomes energetic, and the circulation through the brain consequently more vigorous; and unless this improvement in the circulation take place, the skin becomes cold and profusely moist, and the coma becomes more profound. It is clear therefore that in those cases of apoplexy which are accompanied by impeded respiration and venous congestion, and in

which the abstraction of blood causes the circulation through the brain to be augmented, the hemorrhage is not arrested by the withdrawal of blood; but the universally received opinion being that it has this effect in all cases, the restorative effects derived from the improvement in the circulation are overlooked; and the consequence is, that instead of supporting the improved energy of this organ, measures are adopted which can scarcely fail to impair its powers. Notwithstanding the facts, that the rising of the pulse is attended by improvement in the cerebral functions, and unattended by increased effusion of blood, means are taken to reduce the salutary reaction of the circulation; the abstraction of blood is in many instances repeated, a seton is inserted in the neck, purgatives are administered, and a rigid system of low diet is enjoined. It is well known that if a muscle be lacerated, or a bone broken, or even if the skin be lacerated, the restoration of the part will take place slowly if the constitution be in an enfeebled state, and if means of invigorating it are not adopted. Is it not inconsistent, then, to adopt means of enfeebling the constitution when a portion of the brain has sustained injury?

As all straining efforts of the body are calculated occasionally to produce hemorrhage, they are still more likely to reproduce it when it has once

occurred, and they should be carefully avoided; violent purgatives therefore should not be given, as they may occasion secondary hemorrhage. Of all such causes, vomiting is the most calculated to renew the hemorrhage. In a case of apoplexy in which the abstraction of blood had been resorted to, and in which consciousness had returned, the medical attendant considered, that as the fit took place soon after dinner, an emetic would remove the exciting cause; forgetting, at the same time, that the process of digestion had most probably nearly accomplished that object. The effort of vomiting, as might have been expected, reproduced the hemorrhage, and to a degree which occasioned death within twelve hours.

In the objections which in the foregoing pages have been made to the antiphlogistic treatment of Paralysis, and especially of that form of this affection which arises from apoplexy, the merits of the opposite system of treatment have been in a great measure implied. With regard to the pathology of the disease, the opinions respecting hyperemia, coup-de-sang, and inflammation of the brain must be abandoned, and this organ must be considered as deficiently supplied with blood and as locally softened in nearly all cases, and in a state of general impairment in many cases. The efficient cause—the deficient supply of blood to the brain—is the first point to

merit consideration. To restore the due circulation of blood in the head is beneficial in every respect: in mild cases it not only induces a speedy recovery from the shock attending the fit, but it often at once removes the paralysis. In those cases in which the paralytic seizure commences with syncope, it dispels the syncope before congestion of the brain to any extent can take place: by thus preventing congestion, it obviates the coma which so often gives the attack an apoplectic character; and by preventing the suspension of the circulation which attends coma, great consequent injury to the softened part of the brain is obviated. While, therefore, the speedy renovation of the circulation in the brain restores that succour to the softened part, the privation of which had occasioned suspension of its functions, it also arrests the progress of the softening process, thus either removing at once or tending greatly to diminish the severity of the paralysis. The first indication of cure is therefore to invigorate the circulation in the brain. The means to be employed are the following:—the patient should be kept during several hours in the recumbent posture, whether the accession be attended by loss of consciousness or not; the head should be kept warm; and stimulants, the best of which are volatile alkali and wine, should be administered. In cases in which consciousness appears to be wholly lost, the admini-

stration of internal means is deemed impracticable ; attempts should, however, be made at intervals, and in most cases they will be found to succeed. After the restoration of the circulation, the next indication is to improve the condition of the brain itself; and this applies to those cases in which the accession is gradual as well as to those in which it is more sudden ; and whether the symptoms indicate that local softening alone exists, or that it be accompanied by general impairment of the brain, the remedial means are the same, the extent to which they are to be administered being modified according to the exigencies of the case. On placing the patient upon the repleting system of diet, attention should be paid to the state of the digestive organs ; and medicines calculated to relieve the bowels once or twice a day, but without purging, should be administered. Such extreme care has always been taken to prevent any increase of the circulation in the brain, that few persons are aware of the quantity of nutriment which is required to restore its substance to a healthy condition after it has suffered from innutrition. Those who assert that softening of the brain cannot be removed, have never resorted to the only means calculated for its removal. A patient with either softening or impairment of the brain should take as much animal food as he can digest, with a fair allowance of malt-liquor or wine.

Those who have lived abstemiously, and are in consequence in an almost exsanguineous state, sometimes pursue a nutritious system of diet during several weeks before they experience any benefit ; but this circumstance should not always be considered as discouraging, as it merely indicates a deficiency in the quantity and quality of the blood, which must be to a certain extent supplied before this fluid can impart general nourishment and strength. In those who are not in this state of general debility, the brain in general soon derives nutrition and power from this description of diet. Should the patient appear of robust constitution, this circumstance should not deter the physician from adopting the tonic system of treatment ; for should the constitution be in as good a condition as it appears to be, which in such cases is very questionable, the brain requires particular restoration, and this can be accomplished only by improving the general mass of blood and directing it to the brain. To fulfill the latter intention, those who are not confined to bed should recline during a few hours in the course of the day. This method of treatment, by increasing the nutrition of the brain, will very frequently so far repair its substance as to restore its functional powers ; and in those cases in which it is not completely successful, it is calculated to prevent that general and progressive declension of the mental and bodily

powers which so often succeeds an attack of paralysis when treated upon the lowering system.

When a patient is sufficiently recovered from an attack of apoplexy or paralysis to attend to his daily avocations, he should persist in a nutritious diet, should avoid long intervals between meals, and great fatigue whether of mind or body, and should continue to recline during an hour or two in the course of the day. In cases in which the paralysis completely disappears, the circulation in the brain should still be well supported, as the local softening continues to exist, although no doubt in a less degree than before ; for if this organ be again allowed to suffer innutrition from a deficient supply of blood, a return of the paralysis may be expected.

In the gradual form of paralysis, in which the patient experiences merely numbness and weakness of one hand, or a slight affection of one side of the body, or an occasional affection of the speech, very little calculated to arrest the progress of the disease is done ; no defined idea of the condition of the brain, which might suggest the proper indications of cure, being entertained. The remedial means already described for improving the circulation and nutrition of the brain seldom fail to be useful in such cases, unless they be attended by certain unfavourable circumstances about to be enumerated, and which may oppose the cure of any form of

paralysis. These circumstances are,—the advanced age of the patient, in which case there is reason to expect ossification of the blood-vessels of the brain; a constitution completely debilitated, either by a long course of dissipation or by chronic disease; habitual abstemiousness, practised to a degree which renders the patient incapable of taking or of digesting nutritious food.

Paralysis following apoplexy requires some modification of the treatment recommended in the other forms of the disease. In those cases in which congestion occurs to a great degree, extending from the heart to the veins and sinuses of the brain, the abstraction of blood, as already stated, is highly useful in unloading the congested vessels, and thereby enabling the respiratory function to proceed without oppression; after this kind of relief is obtained, stimulants should be employed with the view of improving the circulation, and of thus completely removing the congestion of the veins of the brain. In cases in which the respiratory function is less oppressed, the abstraction of blood is not requisite; stimulants alone being sufficient, unless the hemorrhage into the brain be so great as to prevent any description of means taking effect. By supporting the circulation in the brain, the energy of that organ is, to a certain degree, maintained, and it is thus far defended from the radiating influence of the

local pressure derived from the extravasated blood. If the return of consciousness be not very protracted, we may conclude that the hemorrhage is not considerable, and a fair prospect is afforded that the paralysis will be in the course of time greatly diminished, if not completely removed. The extent to which the supporting system should be carried depends upon the symptoms of local injury and general impairment of the brain, and upon the signs of impairment of the constitution. In cases in which the patient's health was good at the time of the attack, and in which the effusion of blood is not considerable, the diminution of the coagulum and the reparation of the surrounding portion of brain will most probably proceed favourably under a moderately nutritious system of diet.

It would therefore appear, that the only proper mode of treating the different forms of Paralysis is the stimulating and repleting system; which in the first instance, when the circulation in the brain is greatly depressed, and the functional powers of this organ are to a greater or less extent suspended, tends to restore the cerebral circulation, and with it to restore consciousness, and to prevent or remove venous congestion and the consequent coma. In the second place, it imparts nutrition to the substance of the brain, thereby tending to lessen the local softening and the consequent paralysis, and

to prevent or to remove more or less general impairment and the consequent imbecility. In addition to these beneficial effects, this system of treatment tends not only to defend, but also to improve the constitution of the patient.

Case 1.—Mr. T., aged 55, short in stature, of florid complexion and of very abstemious habits, sometimes taking no animal food during several days in succession, was seized with a fit of syncope. The percussion caused by the fall ruptured a few vessels of the conjunctiva of one eye, producing a slight ecchymosis, and a small quantity of blood escaped from one ear. These signs, perhaps in conjunction with the supposed apoplectic constitution of the individual, were considered by his medical attendant as indicative of hemorrhage into the brain having taken place, although the patient had been deprived of consciousness during only a few minutes, and although no paralysis occurred. The antiphlogistic system was accordingly practised, and a still more rigid system of diet than the patient had been accustomed to was enjoined; whereby a debilitated state of the frame was maintained, under the mistaken view of preventing a relapse. I was acquainted with this gentleman, and was satisfied that the system pursued was calculated to ensure a relapse. Two years afterwards he was seized with another fit which was considered apo-

plectic; he was bled, and died immediately. No examination of the brain took place.

This case illustrates several points. The ecchymosis of the conjunctiva proves how easily the percussion resulting from a fall may cause rupture of the blood-vessels of the head, as stated at page 184, and therefore that M. Andral is not warranted in ascribing ecchymosis of the eye in such cases to fullness of the blood-vessels of the brain; it proves that syncope, when occurring in individuals of supposed apoplectic constitution, is frequently mistaken for, and treated as apoplexy; it exemplifies also—what has been much insisted upon in the foregoing pages—that many cases of apoplexy originate in syncope; for had rupture of vessels taken place in this case in the substance of the brain, as well as in the conjunctiva, paralysis would have been added to the sudden loss of consciousness, and a fit of syncope, as often happens, would then have terminated in a fit of apoplexy.

Case 2.—Mr. A., 63 years of age, of abstemious habits, and having a phthisical affection of the lungs, had lost the use of his right hand; the paralysis came on gradually, and had existed about nine months at the time he consulted me. By improving the nutrition and powers of the brain by tonic medicines and renovating means, the paralysis was in a few months completely removed.

The respiration was by the same means greatly improved. He then went into the country to reside. He died two years afterwards of disease of the lungs, having had no return of the paralysis.

Case 3.—Mr. S., aged 51, stout and healthy in appearance, had during many months laboured under great anxiety of mind, loss of appetite, and restlessness at night, and had latterly experienced numbness and diminished power of the left hand, which symptoms of paralysis were in walking not only in general increased, but extended to the leg on the same side. This patient, by adopting a nutritious diet, and the recumbent position during two hours in the middle of the day, and by taking renovating medicines, was in about two months completely restored to health.

Case 4.—A young woman, aged 30, had been treated on six different occasions for supposed determination of blood to the head, by bleeding and other lowering means. When she applied to me she complained of constant pain in the head and giddiness while in the erect posture, and sometimes felt apprehensive of losing her senses; she also complained of numbness and weakness of one hand. I recommended renovating and aperient medicines and a nutritious diet; but she could not adopt the latter to the requisite extent in consequence of want of appetite, which, together with an occasional

bleeding from the nose, retarded any improvement in her health. In the course of a few weeks she was seized while walking with a temporary loss of vision, and a few days afterwards with a fit of syncope, attended by paralysis of the left side, but from which by renovating means she soon recovered, with the exception of a slight inability of the arm. She then went into the country, where after six weeks, by means of a highly nutritious diet, tonic medicines, and by reclining during several hours every day, the pain in the head, giddiness, hemorrhage from the nose, and paralysis of the arm had gradually disappeared.

CHAPTER VIII.

INSANITY.

INSANITY is confessedly the most important and interesting of all diseases. That its nature is very imperfectly understood, is evident from the numerous causes which have been alleged to be individually capable of producing it; and in the attempt to ascertain these causes, the chief and most frequent cause—an impaired condition of the brain—has been overlooked. An impaired condition of the brain is not, however, always a cause, and in its absence other powerful causes may, in those of naturally weak intellect, give origin to it. For instance, when the brain is so constituted that the propensities greatly predominate over the intellectual faculties, and when this unfortunate predominance has not been corrected by moral or religious instruction, those portions of the brain which are in constant exercise may become so much developed at the expense of the intellectual parts of the brain as to occasion a wholly incurable form of

insanity. The great majority of cases, however, are not of this nature, but depend on an impaired condition of the brain as the foundation of disease, and on certain efficient causes about to be described.

It would be difficult to classify all the alleged causes of insanity; and it is unnecessary to enumerate them, as there are but three modes through which they can influence the brain, and which are common to all of them. The remote causes of insanity may influence the brain,—first, through extreme and continued exertion of its powers; secondly, through excitement; and thirdly, through depression of the mind. For instance, literary, commercial, political, or other pursuits, and the various moral affections, involve each a distinct object to be accomplished, and the accomplishment of which is attended by more or less mental exertion, more or less excitement from hope and other impressions, and more or less depression from the fear of disappointment. Therefore, however numerous the *remote* causes of insanity may be, they influence the brain in these three modes only, which may be considered as the *efficient* causes of insanity.

These efficient causes may, either singly or in combination, exert their influence upon the brain; but they seldom produce insanity unless the brain

be already in an impaired condition, as the following brief remarks tend to show. Excessive mental exertion injures the powers of even the healthy brain; but when this organ is already in an impaired condition, excess of mental exertion is calculated to occasion insanity. The genial influence of hope upon the brain tends rather to prevent the occurrence of insanity; but in an imaginative mind the excitement of hope sometimes carries the thoughts beyond the bounds of reason, and this kind of excitement terminates in exhaustion; the individual being one day raised by hope to the highest degree of excitement, and on the next, without any alteration in circumstances, he may be thrown into the deepest state of depression of both mind and body; and when the brain is impaired, and the mind in consequence weakened, this kind of excitement may in some cases induce alienation of mind. Nothing affects a weakened mind more than a long-continued state of suspense between hope and fear; and a high degree of hope succeeded by disappointment tends to induce despair. The excitement of anger is also admitted to be an efficient cause of insanity. The various causes of vexation which are incidental to almost every kind of pursuit and to domestic life, by keeping the mind in a state of alternate excitement and depression, sometimes occasion an attack of

insanity. The dread of an expected disappointment has a more depressing influence upon the brain of some timid individuals than the disappointment itself would occasion, worse consequences than could possibly arise from the disappointment being apprehended by them ; and when such apprehensions are of long continuance, they so weaken and disturb the brain, that the mind becomes haunted by various kinds of imaginary evils and illusions, even relatives and intimate friends being sometimes viewed as the worst of enemies.

From the above remarks it would appear, that however diversified and numerous the remote causes of insanity may be, the efficient causes are in most cases those already mentioned, viz. exertion, excitement, and depression of the mind, which may singly or in combination exert their influence upon the brain. These constitute, in the majority of cases, the efficient causes of insanity ; but in order that they may act as efficient causes, they must supervene upon a predisposing cause already in existence, viz. an impaired condition of the brain ; a condition in which its functional powers are so weakened, that the mind is incapable of sustaining great exertion or strong impressions ; and when subjected to the influence of either, and especially to that of both, it suffers a lesion constituting insanity.

Accessory causes, as great fatigue of body, in-

sufficient rest, all kinds of exciting or debilitating excesses, and long-continued constipation of the bowels, increase the tendency to insanity. There are some few causes which in some instances require no predisposition in the brain to render them efficient in the production of insanity, as traumatic injuries of the head, certain diseases of the brain, as cancerous and other growths, fevers, &c.

In order to prove that an impaired condition of the brain is the essential cause of insanity, it is necessary to investigate the morbid anatomy of this organ, and to ascertain the nature and extent of the alterations which have been discovered after death in the brain of those affected with this disease.

M. Georget, in his Treatise on Mental Alienation, has embodied the opinions and statements of the best authors relative to the nature of this disorder; we cannot, therefore, have recourse to a better source of information. Neither M. Georget, nor any of the authorities he quotes, pretend that they have arrived at any satisfactory view of the nature of insanity; on the contrary, M. Georget (De la Folie, ou Aliénation Mentale, p. 45) commences the section on the morbid anatomy of the brain in this disease in the following words:—

"Mental alienation has excited more strongly than most diseases the curiosity and zeal of physicians and philosophers, to discover its causes in the

brain. In searching for the causes of madness, they have endeavoured to trace those of reason. Notwithstanding the assiduity with which researches have been made in all ages, no satisfactory conclusion respecting the morbid appearances of the brain in the insane has been arrived at. The results published by Willis, Morgagni, Greding, Meckel, Haslam, M. Esquirol, &c. are often contradictory, and always insufficient to establish any relation between delirium and organic alterations: it extends even to this, that physicians generally are of opinion that scarcely any morbid alteration is formed in the brain of maniacs. This opinion is however without foundation; but, as most authors say, after having described the signs of the alterations they have observed in the head, that these alterations cannot explain the nature of madness, they confound the result of their reasoning with the result of their investigation, and they repeat that they can discover nothing in the brain of the insane."

From this it is evident that M. Georget admits that numerous morbid alterations are found in the brain; but he maintains that these morbid appearances are not of such a character as to establish their relation to insanity, in the way of cause and effect, and that they are not of such constant occurrence as to identify, in all cases, the nature of

the disease. Thus "Morgagni found (among other alterations) the substance of the cerebral hemispheres almost always indurated, and that of the cerebellum softened; yet he does not attach any great importance to this augmentation in the consistence of the cerebral substance, as this same alteration is met with among sane individuals, and as some insane have not presented this morbid change." On the want of uniformity and identity in the morbid appearances, as noticed by Morgagni and others, is founded the general belief of physicians, admitted by Georget, that morbid anatomy does not elucidate the nature of insanity. For instance, thickening of the skull has been found by some pathologists in a very small proportion, and by others in a very large proportion of the insane: the brain has been found in some instances indurated, in others softened: in some instances both induration and softening have been found in different parts of the same brain, while in others this organ has apparently sustained no change in its consistence; the vessels of the skull, or of the brain, or its membranes, are sometimes injected with blood, at other times they are deficient in blood; serum is often found within the ventricles, or upon the surface of the brain, but sometimes this is not the case. It is therefore generally considered that, from the conflicting evidence pro-

duced by different authorities, no constant morbid alteration can be seized upon; no alteration which, if evinced in some, is not absent in others. It is considered too by some, that such alteration in the brain should be found as to account for the mental disease as unequivocally as the symptoms of disease of other organs are sometimes accounted for by the changes observed in them; as, for instance, when pain in the lumbar region and other symptoms are satisfactorily accounted for by finding a calculus in the kidney; as when certain sounds of the heart, ascertained during life, are accounted for by finding some of the valves of this organ ossified; or as when difficult respiration and other symptoms are found to depend on induration of the naturally soft spongy texture of the lungs. It should be borne in mind, however, that the respective functions of these organs depend upon a particular mechanism, the alteration of which, to a certain extent by disease, proportionally affects the function itself; but the brain is a mass of matter, consisting of two substances, called, from their colour, white and grey, the functions of which, it would appear, depend more particularly upon their quantity and quality, the mechanism of the structure being unknown, or at least conjectural. It is not surprising, therefore, that we do not find any very striking organic changes in the brain of the insane, as it

may present no other morbid appearance than that of being reduced in size; this reduction in size or emaciation of the brain alone being sufficient to impair the reasoning faculties. Its substance is however more often deteriorated in quality, as well as reduced in quantity. It is true that the brain possesses a certain determinate form, as convolutions, &c.; but the mental function is not supposed to depend upon the form, but upon the quantity of matter which may modify that form, and it is generally admitted that the greater the bulk of any convolution of the brain, the greater is the functional power of that portion. That the convoluted form of the brain is not essential to its function, is proved in instances of chronic hydrocephalus, in which, as the water accumulates in the ventricles, the convolutions unfold themselves to such an extent, that the brain becomes expanded into a bag, containing, according to the progress of the disease, one, two, or more pints of fluid. But notwithstanding this extraordinary alteration in the convoluted form of the brain, the intellect often remains intact.

Innumerable are the facts which nature supplies to prove that both intellect and instinct are developed in proportion to the quantity of the matter of which the brain is composed; abundant also are the instances which disease and age afford in proof

that any considerable reduction in the size of the brain influences either the capacity or the soundness of the intellect. The animal creation displays a graduated scale of the development of the brain, and in each class of animals it is found that the larger the brain, in proportion to the size of the animal, the greater the instinct; and it is well known that the highest order of instinct possessed by certain quadrupeds is nearly allied to the reasoning faculty. In comparing the relative size of the human brain, the truth in question becomes particularly manifest; the constant and only difference known between the brain of the idiot and that of an individual gifted with the highest order of intellect, being as to their respective dimensions; and the essence of phrenological science consists in distinguishing this relation between the size, partial and general, of the brain, and the corresponding mental manifestations.

No truth is better established than that the intellectual powers are always in ratio with the size of the brain, and that the development of the functional power keeps pace with the development of the brain; and it may be inferred that as this organ diminishes in size, or becomes emaciated, the mind proportionally loses its power. Morbid anatomy furnishes evidence that in insanity, softening and emaciation of the convolutions of the

brain take place; and to establish this view of the coexistence of insanity with these alterations, I shall avail myself of the valuable observations contained in M. Georget's work on Mental Alienation.

Morbid Anatomy of the Brain.—"Although Morgagni dissected the brain in only seven or eight cases of insanity, yet this excellent observer describes several morbid changes of this organ. He says he almost always found the cerebral hemispheres rather firmer, and those of the cerebellum much softer than natural; he does not however attach much importance to this augmentation in the consistence of the cerebral substance, as he met with it in the brain of those who had not been insane, and as it is not discovered in every instance of insanity. In one case, Morgagni found the white substance of the hemispheres firm and of a brownish colour, its blood-vessels, as well as the plexus choroides, much engorged with blood; in another case he noticed induration of the hemispheres, softening of the fornix, fullness of the vessels of the brain, and adhesion of the pia mater to the surface of the cerebrum, cerebellum, and medulla oblongata; in a third, he observed injection of the membranes and of the plexus, induration of the cerebrum, and softening of the cerebellum. He sometimes makes mention of collections of serum existing in the meshes of the pia mater, or in the

ventricles, and he speaks of lesions of the pineal gland, &c.

"Among the morbid changes observed in the brain of the insane by Greding, the following are particularly mentioned: viz. the skull thickened either partially or generally, in one hundred and sixty-seven out of two hundred and sixteen maniacal subjects; in seventy-eight out of one hundred furious maniacs, and in twenty-two out of thirty cases of imbecility; without taking into account those cases in which the skull was increased in density but not in thickness. The plexus choroides contained hydatiform vesicles in ninety-six frantic maniacs, and in twenty-four cases of melancholy; the brain, though healthy, emitted a fetid odour in four cases out of twenty-nine of phrensy; the brain was softened in fifty-one out of one hundred, especially in cases complicated with epilepsy; the optic layers were atrophied in two instances of dementia. This author makes mention of several other morbid appearances of the brain or of its membranes; such as, strong adhesion of the dura mater to the skull; the pia mater thickened and bluish; the ventricles either dilated or contracted, dry or loaded with serum; the corpora quadrigemina shrunken and softened; osseous concretions in the cerebellum, &c.

"Haslam is of opinion that under whatever form

insanity presents itself, it is always accompanied by changes in the cerebral organs, and he thinks it is in those changes that the primary cause of mental derangement must be sought for. Haslam has published in a lengthened series thirty observations on insanity, with the examinations after death; he notices the following lesions, viz. the pericranium only slightly adherent to the cranium, nine times; the opposite state, fourteen times; thickening of the bones of the cranium, three times; the bones reduced in thickness, three times; diploë, once; greatly injected with blood, once; the dura mater strongly adhering to the bones, twice; less adherent, twice; the substance of the brain indurated, nine times; softened, four times; of its natural consistence, seventeen times; serous deposit between the membranes, sixteen times; in the lateral ventricles, eighteen times. This author speaks of having observed the integuments of the head much relaxed after paroxysms of phrensy.

"M. Esquirol describes the morbid appearances of the encephalic organs, observed in a great number of post-mortem examinations, in the following manner: bones of the skull thin and spongy in seven patients; indurated, resembling ivory, in five; injected with blood in three; bones of the skull thickened and spongy in twelve; like ivory in ten; injected with blood in twenty-nine; skull of irre-

gular shape relative to its different diameters, and to the two portions of its cavity, in twenty-nine; membranes thickened in eleven, injected with blood in nineteen; ossified basilar arteries in five; the substance of the brain indurated in fifteen, softened in twenty-nine; the cerebellum hardened in twelve, softened in seventeen; grey substance abundant in five; grey substance discoloured in fifteen; white substance injected with blood in nineteen; adhesions of the membrane lining the ventricles in fifty-four; frequent serous effusion between the pia mater and arachnoid as well as in the ventricles; plexus choroides almost always containing serous cysts. Various other changes, such as tumours, cysts, partial softenings, ossifications of the arachnoid, &c. are also mentioned. We may also add, that M. Esquirol, having made an extensive collection of the skulls and busts of insane persons, will be able at a future period to publish valuable information on the relations of the form of the head with the different disorders of the mind, and thus will throw light on many points of the phrenological doctrine of the function of the brain as taught by Gall.

"M. Georget, in his work 'On Inflammation of the Brain,' has related two cases of acute insanity, observed by M. Esquirol, which at the post-mortem examination presented traces of acute inflammation

of the brain. Dr. Gall is of opinion that in chronic insanity the brain becomes emaciated, the convolutions shrunken, and the entire brain diminished in volume; that the internal table of the skull follows the emaciation of the brain, and that the bones become thicker, and at the same time more dense and compact, resembling ivory. Dr. Gall asserts, moreover, that the bones of the skull are dense, heavy, eburnated and thick in cases of chronic suicidal melancholy.

"Dr. Spurzheim remarks, that in insanity combined with great activity of the faculties in precocious children, who after cerebral fevers lose their intellectual powers, in cases of dementia succeeding chronic mania and melancholy, and in the insane who have died of apoplexy, he has *always* found organic alterations in the substance of the brain, in its vessels, in its membranes, or in the skull."

The following are the results of M. Georget's own experience:—"The skull in some insane persons appears as if twisted, one half being placed more forward and the other more backward; in some others the skull appears to have been unequally developed, being more convex on one side, and generally on the right side; in many the lateral diameter of the skull is equal to the antero-posterior, and the roof much elevated: the cavities at the base of the cranium are also in some cases of

unequal dimensions, those on one side being larger than those on the other; in about one in twenty the skull is thickened, partially or generally, and sometimes only at the coronal bone; some were nearly five lines in thickness; most frequently the bones are very hard, very white, and without diploë, sometimes resembling ivory; some, on the contrary, are almost wholly spongy, and of extreme lightness. The dura mater itself appears seldom altered in structure; sometimes it adheres firmly to the cranium; in many cases it appeared thickened; in three cases ossific deposits were found in the falx major: the arachnoid presented here and there, in a few cases, red, or greyish and unequal patches, and fibrinous deposits. I may add, that this membrane is generally smooth and transparent, but occasionally it is thick, opake and unyielding, without losing the shining appearance of its internal surface. The pia mater is sometimes injected with blood, its vessels being red and hard; the same membrane was found thickened, and containing an infiltration of serosity forming an apparently gelatinous layer, of a line or more in thickness; this layer, however, consisting only of a limpid fluid, which flowed out on making an incision into the membrane. The brain is sometimes reduced in volume, so as apparently not to fill the cavity of the skull; it is sometimes much indu-

rated, being cut with difficulty; the white substance glutinous, elastic, and sustaining considerable extension before it breaks; frequently the brain is soft, the grey substance being then sometimes pale or yellowish, and the other substance of a brownish white, the two substances resembling each other both in colour and consistence. The convolutions are sometimes shrunken, separated by serum and by the thickened pia mater; the ventricles are in some subjects very large, in others very small, and are often filled with a generally clear and limpid serum. The plexus choroides is in general devoid of blood, discoloured, and often filled with hydatiform vesicles; partial softenings of the brain; erosions and ulcerations on the surface of the ventricles; carcinomatous tumours; the cerebellum generally softer than the cerebrum, sometimes partially softened and reduced to a pulp. The corpus callosum, the medulla oblongata, and medulla spinalis are very seldom altered. We have observed, with M. Mativié, many cases of phrensy which proved fatal at the end of some months, in which we saw a considerable injection of blood, with a decided augmentation in the consistence of the brain; and several cases of chronic madness attended with general paralysis, with epileptiform or apoplectiform fits, in which the convolutions were softened and adherent to the pia mater. MM. Delaye,

Foville, and Pinel-Grandchamp, house-surgeons to the Salpêtrière, have noticed evident changes in the external grey substance of the brain in all cases in which there had been continued disordered intellect until death. Thus, in the greater number of the insane they perceived sometimes a more or less vivid mottled redness in the superficial grey substance, sometimes an increase of consistence, or a remarkable softening of the same substance, often partial adhesions of the pia mater to the surface of the brain, particularly at the anterior part: in other instances the adhesion was so firm to the whole surface of the cortical substance, that in raising the membrane a layer of the external grey substance of remarkable thickness was raised with it: the intense redness of the cortical or grey substance corresponded with the acute symptoms of the disorder. In dementia, on the contrary, were generally found only disseminated, slightly marbled appearances, and between them the grey substance was very pale, softer or harder than in the natural state; it often appeared diminished in thickness, and in some cases the line of demarcation of the two substances could not be distinctly seen. [These facts are recorded in M. Rostan's work on Softening of the Brain, second edition.] M. Bayle has related six cases of dementia accompanied with general paralysis, in which the pia mater was adhe-

rent to the softened surface of the brain, of which portions were raised in raising the membrane.

"In recapitulation, the more remarkable cerebral alterations observed up to the present day in the insane are the following (M. Georget's work was published in the year 1824) :—First, the bones of the skull sometimes thickened, sometimes without diploë and dense like ivory, sometimes spongy and light, inequalities in the form of the cranial cavity. Second, injection, thickening, and infiltration of serum into the pia mater. Third, the surface of the brain softened and adherent to the pia mater, so that in removing the membrane, portions of the brain are removed with it ; injection of the cerebral substance; redness of the grey substance, and violet-coloured marbling of the white, increased consistence of both ; discoloration and general softening of the brain, the grey substance having a yellow tinge, and the white of a brownish white ; accumulations of serum in the ventricles, particularly the lateral, and partial softenings ; the other alterations are much less common ; the tuber annulare, the crura cerebri and cerebelli, the medulla oblongata and medulla spinalis, are very rarely altered to an appreciable extent."

From this summary of evidence, derived from morbid anatomy, ample proof, both direct and indirect, is obtained, that the substance of the brain

is impaired both as to quantity and quality; that is, that its substance is reduced in quantity and deteriorated in quality; no other conclusion can indeed be drawn from the evidence; it includes, it is true, a few indications of disease which incidentally attend some cases, but which are not essential, and upon which therefore it will not be necessary to comment.

The direct evidence regards the substance of the brain itself. It is stated that its volume is sometimes less than the capacity of the skull, and that the convolutions are often considerably reduced in size. These are admissions of general or partial emaciation of the brain. It should also be taken into consideration, that these facts were observed by those who had no idea of their being adduced as evidence of the immediate cause of insanity: it may therefore be presumed, that had the examination been conducted with this view, the lesser degrees of emaciation would have been recognised, proving these alterations to be of more general occurrence. In the next place, it is admitted that the substance of the brain is altered in quality as regards its consistence and colour. The proportion of cases in which these alterations occurred is not mentioned, but on referring to the extracts taken from the different authorities, it is found that one or more of these changes took place in a great

majority of instances. Morgagni admits that the consistence of the brain is altered in almost every case; but this alteration is not stated by others to be so frequent. Esquirol enumerates many instances and alludes to others. MM. Delaye, Foville, and Pinel-Grandchamp observed in every fatal case of insanity decided alterations in the grey substance of the convolutions of the brain, sometimes in its consistence, sometimes in its colour.

These, then, are sufficient proofs of alteration in the quality of the substance of the brain, and it cannot be doubted that any change from the healthy condition is a deterioration. These alterations can only arise from alterations in the component materials of the brain; and as these components are not less than ten in number, it is clear that any great variation in their relative proportions will render the brain harder or softer than natural, more or less elastic, and of divers shades of colour. Whether adventitious matters enter or not into the composition of the brain in cases of insanity, chemistry has not determined; but be this as it may, a great deficiency takes place in one or more of its proper materials, for the bulk of the brain is considerably reduced in every case, as will be proved by the indirect evidence next to be considered.

The indirect evidence of emaciation of the brain is derived from the occurrence of thickening of the

skull and of the membranes in some instances, and of the presence of serous accumulations in almost all cases. In order to show the importance of these facts, it is requisite to premise that the brain in its healthy condition completely fills the skull, and that when the brain becomes emaciated, nature adopts extraordinary means of maintaining the due pressure upon it. These means are of two different kinds: one is the thickening of the skull, which proceeds *pari passu* with the emaciation of the brain, and by means of which the cavity of the skull becomes diminished; the other is the secretion of serum within the ventricles, or upon the surface of the brain. The thickening of the bones and the formation of fluid are gradual processes, and suited to become permanent substitutes for the deficiency which is taking place in the substance of the brain; and it is evident that either will fulfill the intended purpose; and that when they exist to any extent, they are indications of the brain having in the same degree become diminished in volume. The temporary means adopted by nature to maintain the degree of pressure required by the brain on sudden emergencies, as in syncope, have been already described, and consist in the expansion of the brain by virtue of its elasticity, and in the accumulation of blood in the veins and sinuses.

As may be seen in the extracts from the different

authorities quoted by M. Georget, a considerable difference exists relative to the frequency of thickening of the skull among the insane. According to Greding, the proportion is as three to four; according to others, this state of the skull is of much more rare occurrence. M. Georget, in stating the proportion to be about one in twenty, evidently disregards the authority of Greding, who, however, appears to have paid particular attention to this point. Greding must have examined the skull very closely, and have noticed every partial thickening, to have discovered such frequency in its occurrence. Many of his observations of thickening might have proved valuable, could they, as they most probably might, have been shown to have corresponded with local emaciations of the brain. But Gall actually ascribes a thickened condition of the skull to an emaciation of the brain. "Dr. Gall is of opinion," observes M. Georget, "that in chronic insanity the brain becomes emaciated, the convolutions shrunken, and the entire brain diminished in volume; that the internal table of the skull follows the emaciation of the brain, and that the bones become thicker, and at the same time more dense and compact, resembling ivory. Dr. Gall asserts, moreover, that the bones of the skull are dense, heavy, eburnated and thick in cases of chronic suicidal melancholy."

This point cannot be supported by higher authority; but it matters not whether thickening of the skull occur in few or many instances, for in those in which it does not occur accumulations of serum take place, and increase in quantity as the emaciation of the brain proceeds; indeed it would be laying either too little stress upon the extent of the emaciation, or too much upon that of the thickening, to suppose that even in the majority of cases the one keeps pace with the other; for it mostly happens that a certain quantity of fluid is also found either upon or within the brain, which assists in filling up the cavity of the skull. The thickened and ossified state of the membranes of the brain which is occasionally observed, also contributes, however slightly, to the same end.

Let us next consider the existence of serous accumulations as a proof of an emaciated state of the brain. Dr. Haslam gives the dissections of thirty cases, among which there were only three of thickening of the skull; but sixteen presented serous collections between the membranes, and eighteen within the ventricles, so that fluid was probably found in every case either upon or within the brain. M. Esquirol also appears to have met with only a small proportion of cases in which he observed thickening of the skull; but he states that serous collections between the membranes of the brain as

well as within the ventricles were "frequent," and that the plexus choroides "almost always" contained serous cysts. After these eminent authorities we need not adduce others to prove that the brain in insanity suffers emaciation.

That senile imbecility also arises from emaciation of the brain, is the opinion of MM. Gall and Desmoulins. M. Gall states "that senile imbecility depends upon atrophy of the brain, the convolutions of which become slender and separated." The following remark of M. Georget shows that he agrees with M. Desmoulins in ascribing imbecility to atrophy: "a fact observed by M. Desmoulins, and which tends to prove that senile imbecility may sometimes depend upon a kind of atrophy of the brain, is, that after the age of sixty this organ commences to diminish in volume."

While senile imbecility arises from emaciation of the fully-developed convolutions, the imbecility attending idiocy arises from a deficiency in the development of the convolutions, a condition which is essential to idiocy. Imbecility supervening upon chronic insanity, especially of the melancholic form, would also appear generally to arise from emaciation of the convolutions; Dr. Gall stating in general terms, that in chronic insanity "the convolutions become shrunken, and the entire brain diminished in volume."

In summing up the evidence derived from the morbid anatomy of the brain in cases of insanity, it appears, by the existence either of thickening of the bones of the skull, or of collections of serous fluid, or by the coexistence of both, that the brain is emaciated in most cases; and by the alterations discovered in its consistence and colour, that the brain suffers deterioration in its elementary composition, in a great proportion of, if not in all, cases. It should be taken into account, however, that insanity is a disease not often destructive of life, and therefore that dissection generally exhibits morbid changes in their more advanced state; while those recent cases, in which death is occasioned by some other complaint, and in which no considerable morbid alteration is discovered, afford some appearance of truth to the opinions of those pathologists who maintain as a general fact, that no morbid alteration is found in the brain of the insane which accounts for the disease.

According to the views here maintained regarding the morbid anatomy of the brain in insanity, it is not to be expected that the brain should, at an early period of the disease, present any striking appearances of a morbid character, a slightly softened state of the convolutions being alone a sufficient indication of that deterioration in the chemical composition of the substance of the organ which is

incompatible with its functional integrity. Previous to the accession of insanity, in its ordinary form, the brain becomes impaired by being insufficiently nourished with arterial blood, and by being in this state subjected to the influence of more continued mental exertion or anxiety of mind than it can support. Thus the brain is not only injured by defective nutrition, but those parts which are particularly influenced by mental exertion or anxiety doubly suffer, and are at length rendered incapable of performing their functions with integrity. Not unfrequently the abstraction of blood is added to these causes, and becomes the producing cause of insanity by suddenly diminishing the nutrition, and consequently the functional power of that part of the brain least capable of resisting so depressing a means. Softening is most probably the chief alteration which the substance of the convolutions undergoes in the first stage of insanity; and as the disease advances, especially in cases of melancholy, another alteration takes place, viz. emaciation.

As general impairment of the brain proceeds, impairment to a greater degree may take place in particular parts, and thus the foundation for more than one disease of this organ may be laid. Insanity, therefore, may become, sooner or later, complicated with epilepsy or paralysis. In these complicated forms, the morbid alterations of the substance

of the brain which exclusively pertain to insanity may be less apparent than those on which epilepsy or paralysis depends, and pathologists appear not to have sufficiently distinguished these alterations from each other. In the impaired state of the brain one individual acquires great excitability and another acquires the opposite state, that of great depression; and when the disease proceeds to insanity this excitability or depression becomes still more manifest; being in one case characterized by frequent and violent excitations of the mind, and in the other by constant melancholy. The morbid appearances which the brain, in the excitable form of insanity, presents, are, softening, mottled redness of some of the convolutions, and increased vascularity, manifested by numerous red points, of the medullary substance; in addition to which, opacity, adhesion, and injection of the membranes, with infiltration, may be found. In the melancholic form, the convolutions are more frequently shrunken than softened; the substance of the brain is in general more pale than natural, and serous effusion on the surface of the brain is almost always present. In the progress of the disease the above-mentioned changes become more or less modified, and others present themselves; as the emaciation of the brain becomes more considerable, the serous accumulations increase, taking place in the cavities

as well as on the surface of the organ; and the membranes become sometimes opake, thickened, or ossified, and the skull in various ways deformed and more or less eburnated.

Regarding the turgescence of the blood-vessels a few remarks should be made, in order to point out that this state of the vessels is not, as is usually supposed, a proof of the disease having been of an inflammatory origin and nature. Venous engorgement on the surface of the brain being often one of the first morbid appearances which strikes the eye, it is liable to be hailed as a proof of great determination of blood to the brain, and to give a wrong bias to the subsequent part of the examination. This condition of the vessels is mostly connected with a slight serous effusion, which, if accompanied by the slightest opacity of the arachnoid membrane, is at once considered as the product of inflammation. Venous congestion and serous effusion are, on the contrary, effects of a deficient arterial circulation through the brain, as before explained.

Arterial turgescence is an indication of the brain having been much excited, but this morbid appearance cannot, in fairness, be deemed the cause, for it might as rationally be considered the effect, of excitement; this point therefore should be determined by the circumstances of the case. In maniacs the mind is in an exceedingly irritable state;

but if patients of this description are indulged, soothed, and properly supported, they are tolerably tranquil, a state in which the arteries of the brain are not supposed to be unduly turgid; but if they are harshly treated or kept in a constant state of irritation and excitement, the arteries of the brain display, in such cases, considerable evidence of morbid turgescence, which is the effect of the excitement, and does not indicate the cause of the disease, or that it is of an inflammatory nature. It cannot be denied that an inflammatory irritation may, without forming an essential part of the disease, supervene at any stage; nor can it be denied that morbid anatomists, in examining the brain, are so zealous in searching for traces of inflammation, that they are very liable to mistake passive for inflammatory congestion.

The chief difference between insanity and senile imbecility, both as regards their respective causes and nature, appears to be this: insanity, to speak in general and brief terms, is caused by over-exertion and perplexity of mind, the brain at the same time not being duly supported; in consequence of which those parts of the organ most engaged are so far impaired as to be no longer capable of performing their functions: this partial lesion of the mind may occur at almost any period of life. Imbecility is generally caused by disuse of the mind.

The brain of an individual become imbecile from age may have possessed all its functional powers up to an advanced period of life; if at this period, in consequence of a change of habits and pursuits, the mind ceases to be actively employed, the circulation of the blood through the brain becomes diminished in proportion to the reduction in the mental stimulus, and the result is, especially in the brain already predisposed by age to decay, a gradual and general emaciation and loss of mental power. In some cases, however, imbecility cannot be traced to disuse of the mind: the individual may be naturally of a feeble constitution, and, being abstemious in diet, premature decay of body and mind overtakes him while continuing in his daily pursuits, the whole frame, including the brain, suffering at the same time emaciation, and declining in its powers. In melancholia the mind sinks into disuse, which tends to occasion a general wasting of the convolutions, as in imbecility from age. Thus, while insanity at its accession is a partial alienation of the mind, and frequently curable, imbecility is a general and mostly incurable decay of the mental faculties.

In making a distinction between insanity and imbecility we also recognise an alliance between them; for the mind, in the melancholic form of insanity especially, is so completely inactive, that

the intellectual portions of the brain undergo the same general emaciation as they do in senile imbecility, imbecility generally supervening upon continued melancholy. A difference occurs, however, in the respective modes of filling up the space in the skull, occasioned by the atrophy of the convolutions in these two forms of imbecility. According to Gall, the skull in melancholia, to use his own expression, thickens inwardly, thereby following the shrinking brain; while, according to Desmoulins, when the brain shrinks from age an effusion of serum takes place, and occupies the interstices between the atrophied convolutions.

It is evident, therefore, that as the function depends upon the matter of the brain, composed and arranged as it is under certain laws as to quantity and quality, any considerable alteration in either or both of these particulars must be attended by a corresponding degree of injury to its function.

Treatment of Insanity.—No system of treatment has hitherto been discovered for the cure of insanity. Urgent symptoms are palliated, paroxysms of violent excitement are often subdued, the digestive organs when disordered are attended to, and moral means are practised; beyond these no remedial efforts are made, and these, as will hereafter be shown, are frequently employed in a very objectionable and inefficient manner. The result is, ac-

cording to statistical accounts, that only one case in four, or, at most, one in three recovers; and of this small proportion the majority relapse, and are ultimately added to the list of incurables. This want of success is not exaggerated; and it may be truly said, that the medical art has made slower progress towards ascertaining the nature and treatment of insanity than those of most other diseases. Up to a recent period, the personal management of the insane was barbarous, and the medical treatment, even at the present day, is conducted on the antiphlogistic system—the most pernicious that can be adopted: undue restraint in the personal management and the antiphlogistic treatment have of late years been denounced; the former is now almost entirely discontinued, and the latter has, through the efforts of M. P. Pinel and the Doctors Willis, been greatly discountenanced.

"It frequently happens," says M. Pinel,—than whom, on the subject of insanity, there is no greater authority,—"that bleeding, practised as it is without rule or bounds, is found to exasperate the complaint, and to cause periodical and curable mania to degenerate into dementia or idiotism. . . . . What are we to think of the practice of repeated bloodletting, which is so universally the fashion of the present day, without attention to the distinctions of the exciting causes, the varieties of sex or of

individual constitution, and the different species and periods of the complaint? Let not the results of experience and observation be confounded with the errors of a doctrine depending for its support upon prejudices, hypotheses, pedantry, ignorance, and the authority of celebrated names." (Treatise on Insanity, by Phil. Pinel, translated by D. D. Davis, M.D.)

Dr. F. Willis observes, that "Remedies which have a powerful tendency to weaken the body, are sometimes, I fear, in the worst cases of delirium unskilfully resorted to; whether the patient be old or young, strong or weak, whether labouring under the high or low state of this disorder, it is deemed a case for the lancet, or for cupping, and (erroneously I am persuaded) blood is copiously drawn from the patient. The advice of some authors concerning these measures betrays much inconsistency. While they extol blood-letting as most beneficial in the cure, nay, even essential to the safety of the patient, they at the same time very forcibly demonstrate its impropriety and mischievous tendency; they show, in fact, that the nature of the complaint forbids its use."

Although these distinguished men were convinced that the abstraction of blood was injurious, yet it does not appear that they tested the efficacy of a completely opposite practice. It is true that the

Willises adopted the ancient method of Aretæus, of allaying paroxysms of excitement by the administration of wine and bark, thereby soon restoring temporary tone to the nervous system and removing irritability; but in attending to the condition of the nervous system they overlooked the condition of the blood, the main cause of the disorder. They were eminently successful in their treatment; and the success of Dr. John Willis in particular was so great, that it was wholly discredited by a distinguished writer on insanity, but who was a strenuous advocate of the antiphlogistic system of treatment. Several other writers have protested against bleeding as a remedy in insanity, excepting in those recent cases in which the patients are young, strong, and plethoric. It is to be lamented that depletory means should be employed in any case; they will be continued, however, so long as the erroneous opinion prevails that insanity originates in a determination of blood to the brain.

It being generally admitted that only a small proportion of cases of insanity are curable by the usual measures, I will now proceed to describe a method of treatment, by means of which I feel satisfied, from my own experience, that recovery will be ensured in the great majority of recent cases. This system of treatment consists in removing the

proximate as well as the exciting causes of the disease. The proximate cause, or predisposition, has been already described to consist in an impoverished and emaciated condition of the brain, arising from its having been, during a certain period, insufficiently nourished with blood. The chief indication of cure, therefore, is to restore the circulation of blood through the brain to its natural and healthy state, by which means it will be duly nourished and invigorated, and in the course of time its functional powers will be re-established. This indication will be best fulfilled, first, by correcting any derangement which may exist in the functions of the digestive organs; secondly, by nutritious diet; thirdly, by causing the patient to remain during stated periods of the day in the recumbent position. A secondary indication consists in giving due exercise to the mind.

The correction of any derangement existing in the digestive organs is of primary importance, and mostly meets with early, but not sufficient attention, the real condition of the bowels not being always ascertained. It often happens that accumulations remain in the great intestines, though purgative medicines may have been freely administered; drastic medicines being often selected, which produce copious secretion, and consequently great debility, without unloading the bowels. The

most, and often the only, effectual means of dislodging these accumulations is, the daily injection of one or two tablespoonsful of gall, diluted with a pint of warm water; and notwithstanding the efficiency of this means, it will be often requisite to persevere with it during one or two months, in order to completely unload the bowels, the amount of the accumulation in some cases being truly astonishing. Long after this is accomplished, the injection should be occasionally repeated, as the colon remains in a distended condition, favourable to reaccumulations. It is sometimes advisable, on account of the torpid state of the bowels, to employ purgative medicines as well as the injections, and if both are administered at bedtime, the action of one will not interfere with that of the other; as the medicine administered on the former evening will, during the day, remove the recent accumulation, while the injection will act upon the old lodgements.

Nutritious Diet.—The insane are generally disposed to take food very freely, but while the bowels are much disordered, nutritious food is administered under disadvantage; it is notwithstanding of considerable service, and is the more requisite on account of the depression which is often occasioned by unloading the bowels. The diet should consist of as much animal food as can be conveniently taken. For men, a pound of animal food in the

course of the day is not too much ; they should also be allowed a moderate quantity of malt liquor or wine. Meat at supper is particularly serviceable, as it promotes sleep as well as nutrition : those patients who cannot take solid food for supper, should take strong beef-tea, or eggs, with a sufficient quantity of wine or beer. It is not in general advisable, if practicable, for patients to enter at once upon a full system of diet : a gradual system should in the first instance be adopted, and the diet improved according to the increasing capabilities of the individual to take and to digest solid food. Delicate and excitable females who have been accustomed to live abstemiously, should, during the first few weeks, adopt a preparatory system of diet, consisting of milk, beef-tea, and wine-and-water, administered frequently and regularly ; they may take a small quantity of solid animal food also : by this regulation in diet, they will soon be enabled to take solid animal food more freely. Lunatics who obstinately refuse every kind of aliment require that particular attention should be paid to their digestive organs : if the bowels be loaded, which is often the case, injections should be administered twice a day ; and if the stomach be also disordered, mustard poultices should be applied to the region of that organ ; every effort should be made to induce the patient to take food. Some patients,

with whom no solicitation prevails, will by stealth take food placed within their reach if not offered to them; if no other method succeed, it is requisite to resort to the forcible employment of the stomach-pump: this means soon surmounts the obstinacy of the individual, and no difficulty of this kind is afterwards experienced.

The first good effects of nutritious diet in improving the blood are speedily evinced: as soon as the brain is in some degree renovated, the temper of the mind improves; the excitable patient becomes more composed, the melancholic less sullen, and the timid is inspired with more confidence. If such are the effects of augmenting the quantity, and of ameliorating the quality of the blood, how injurious must that treatment be which consists in the abstraction of blood, in the application of cold lotions to the head, and in a low system of diet, under the supposition that the disease arises from a determination of blood to the brain! Such treatment, although it may relieve a paroxysm of excitement, generally plunges the patient into a deeper state of disease, from which it is very difficult to extricate him.

The Recumbent Posture.—While a nutritious diet is pursued for the purpose of increasing the quantity and improving the quality of the blood, the next object is to give the brain the full advantage

of its nutritive properties; and as the recumbent posture is more favourable than the erect to the flow of blood to this organ, it should be enjoined during two or three hours every day. During the first few weeks after the accession of the disease, it is advisable to keep the patient during many hours in the day, if not constantly, in the recumbent posture, especially in cases in which the abstraction of blood has been one of the producing causes.

The recumbent posture should be particularly enjoined after exercise: exercise tends to cause the blood to gravitate from the head, and when long continued, without adopting the recumbent posture after it, can scarcely fail, in the impaired state of the brain, to produce further innutrition; but the recumbent posture, by enabling the due quantity of blood to be restored to this organ, counteracts this injurious tendency of exercise. Of late years considerable importance has been attached, in the treatment of the insane, to employment, games, dancing, and music; and the exercise of both the mind and body is certainly desirable; but unless it be practised under such restrictions and regulations as accord with the object of nourishing an impoverished brain, it merely alleviates an effect, while the fundamental cause is allowed to remain. Partial benefit has accrued from this practice in a few instances only,

while in the great majority it has had no beneficial tendency. For example: employments and exercises which are attended by bodily exertion may temporarily divert the mind from its unhappy bias, and thus alleviate the effect of a diseased brain; but they, at the same time, aggravate the proximate cause of the disease, by diverting the blood from the head, while increasing the circulation through the muscles. It is true the muscular system becomes thereby strengthened, and the general health improved, but this improvement takes place at the expense of the brain. These effects are constantly witnessed at lunatic asylums, and the conclusion naturally drawn on these occasions is, that when patients improve in health and strength, and yet make no improvement in their mental condition, their cases assume a hopeless character. The prognosis in such cases is correct enough, but the opinions of the nature of the disease which suggest the treatment leading to such effects, and to such a prognosis, are, unfortunately for the patients, decidedly erroneous. However good it may appear to improve the general health, yet this amount of good must not be allowed to disguise the evil attending a system of treatment which not only involves no principle curative of the brain, but, on the contrary, tends to injure that organ; and such is the influence of every means which augments the

circulation in every part of the body rather than in the brain itself, which specially and above every other part requires nutrition and renovation, the very essence of the disease being an impoverished condition of this organ. It is undoubtedly desirable to exercise the body and to improve the health; but these should not be, as they usually are, the chief means employed in the treatment: after walking one or two miles, or after any other exertion, the patient should be required to assume the recumbent posture for an hour, in order that the brain may participate in the benefit to be derived from an invigorated circulation.

Diversion of the mind is of greater importance in the treatment of the melancholic than of the excitable maniac; for the inactivity of mind, and the languid state of the circulation in the brain, incidental to melancholia, are two conditions peculiarly calculated to advance the emaciation of the brain, and to occasion imbecility. That kind of exercise of mind is most beneficial to the insane which affords most cheerfulness: cheerfulness, by improving the circulation in the brain, renovates both its substance and its powers, and while the melancholic is thus enlivened, the excitable mind is not exhausted.

The general principles upon which insanity should be treated have now been described. Each case,

however, requires particular management; according to the bodily disease which may accompany the mental disorder, to the former habits of the patient, especially in reference to diet, and to any other peculiar features which may present themselves. I have found this system of practice much more successful than the usual method of treatment—if indeed doing nothing for the special relief of the brain, the seat of the disorder, can be called treatment. According to my own experience, I have reason to believe that the tonic system of treatment will be seldom found to fail in those recent cases which are not complicated with epilepsy or paralysis. When adopted in an early stage of the disease it generally arrests its progress, and as it is adapted to renovate the brain, it is the best calculated to restore the powers of the mind. It is a practice against which, however, and particularly in all instances of excitement, the strongest prejudice prevails. It is, notwithstanding, strikingly useful in cases of this description; for paroxysms of excitement, it must be repeated, do not originate in determination of blood to, but in debility of, the brain. Determination of blood to the brain is in such cases only the effect, and not the cause, of the excitement. One patient is annoyed at some circumstance, which, in the timidity of his weak and irritable mind, is magnified into an

insupportable grievance, and a fit of maniacal fury is the consequence. Another is terrified, and raves at objects which exist only in his own imagination. These are the operations of a broken-down mind, and are far from being indications of congestion of the brain. If a small quantity of wine, or bark and wine, be administered to such patients, a temporary power is speedily restored to the brain, their misapprehensions disappear, and they become more composed. These means also often promote sleep in cases in which opiates would be objectionable.

This practice is supported by high authorities. Dr. F. Willis states, that "Aretæus and Trallianus have pronounced 'wine to be most efficacious in mitigating the fury of a paroxysm, and promoting tranquil and refreshing sleep;'" and he relates the following strong case in illustration of the success of this practice. "The patient was a young lady of a naturally irritable constitution, who, having been in a very nervous state for many months, was, from domestic occurrences, thrown into a most violent delirium; on the sixth day from the attack of which, she was placed under my care. With short intervals of cessation, she had been continually raving for four successive days and nights; labouring at the same time under such irritability, that four persons had been employed to watch and prevent her from getting out of her bed. While in

this state, and previously to her becoming my patient, leeches had been applied to her forehead and temples, cupping-glasses to the back of her neck, and a blister to her head; purgatives also were given; barley-water with weak broth had been the only sustenance allowed. Her state, as I found it, was this: she had ceased to rave, probably from exhaustion, having been wholly without sleep; she had become obstinately silent, but was still in perpetual motion; her pulse was 130, her whole skin very hot, and completely parched; her face flushed and bloated; her eyes suffused with blood and wide open, yet she could discern nothing; she was also unconscious of her evacuations; her tongue was brown, her lips and teeth covered with sordes. In attempting to feed her with a spoon she clenched her teeth; if we succeeded in putting anything into her mouth, she spit it out after keeping it there a moment; so that it was impossible to administer any medicine without using force. Had the lady died in this state, and dissection been desired, a turgescence of the vessels of the brain, water effused into its ventricles, or some other deviation from the healthy state, would probably have appeared. Her death might then have been attributed to one or more of these circumstances.

"Viewing this case differently, and considering that she had been incessantly raving, till from ex-

haustion she could rave no longer; that she had not closed her eyes for five successive days and nights; that weak broth had been the only sustenance allowed her, I inferred, that although there might be some disease in the brain, either congestion of blood or effusion of serum, the patient was necessarily nearly worn out and her life in danger.

"Under this impression, therefore, I immediately ordered her two glasses of old port wine, and two hours afterwards three ounces of decoction of bark with some of the tincture, as the only means of saving her life. In four hours from my first seeing her she was in a sound sleep, but only for a short time. Upon her waking, the same quantity of decoction of bark was again given, when she slept for three hours together. On the following morning her life was comparatively safe: although she was still unconscious where she was, and took no notice of persons in the room, she no longer clenched her teeth or spit; but when breakfast was offered to her, she put the cup naturally to her mouth; and after obtaining more sleep from a continuance of these remedies, she was able to answer questions correctly; in short, her irritability began to subside, and her sense of feeling to return in some degree from the moment they were first applied.

"This is a strong case, and *by no means a solitary one in practice*: as in this instance a change from

a lowering to a strengthening plan brought the patient from a state of great danger into one of safety, is it not a fair conclusion, that tonics, in cases of delirium, ought to be prescribed, and that medicines which tend to enervate the patient should be avoided?

"We see, at least, that the stimulus, which many are so afraid to produce, by prescribing bark and wine, gave the constitution [brain?] on this occasion its proper tone and power. Instead of agitation or violence being thus created, sleep was the result; proving that however dangerous these remedies may appear in theory, they are found to be far otherwise in practice."

That the excitement of the mind in insanity originates in a debilitated state of the brain, and is relieved by stimulants, is verified by the following case, extracted from the fifty-ninth 'Report of the Visiting Justices of the County Lunatic Asylum at Hanwell.' In alluding to the various contrivances which had been most laudably adopted during the year 1841 for obviating the necessity of restraint, it states, "Incidents exemplifying the success attending the persevering application of diversified means to all kinds of cases, instead of restraint, are too frequent and too numerous to be reported. Thus (R. S. S.), labouring under *acute mania*, occasioned much trouble at night by his restless-

ness; various medicinal applications were tried without success, and his room and dress were so arranged that his restless nights could be followed by no bad consequences on his health, but he was never fastened to his bed. At length it occurred to the house-surgeon of the male side, that malt liquor sometimes proved an agreeable sedative. A bottle of Scotch ale was given to the patient at night with the most satisfactory effects, and continued for some weeks; the quantity was then gradually reduced, but its omission for a single night was still followed by bad effects. During this time, the patient, who had been reduced to the state of a skeleton, and was generally excessively noisy, has become fat, and in all respects greatly improved. He has been able to attend at chapel, and he sometimes plays the flute whilst other patients dance, and seems in good humour with everybody about him."

It is to be hoped that this excellent practice will not be confined to a solitary case at the Asylum. I am fully warranted by my own experience in asserting that malt liquor would be found highly beneficial in most cases, and still more so, if animal food were at the same time allowed. These means not only promote rest, but what is even more desirable, nutrition of the brain.

The violence which some patients manifest under

fits of excitement gives the idea that they possess great strength, and can therefore bear reduction by the abstraction of blood; violence is not, however, a proof of muscular strength, but of morbid excitement. That nervous excitement originates in debility of the brain, is occasionally exemplified in cases of weak and delicate females after the abstraction of blood. In these cases the brain suddenly loses its powers, and fainting results from the loss of blood; on recovering from the syncope hysterical fits supervene, and such is the violence manifested that frequently more than one person is required to overpower the patient. Thus maniacs sometimes break out into fits of great violence when the brain from any cause becomes reduced to an excitable degree of debility; and whatever will restore the due circulation of blood through the brain, will restore its powers and produce composure: accordingly animal food, stimulants, and the recumbent posture are the proper means to be employed. Some physicians allow the excited maniac to wear out the high action, as it is called, with the view of subsequently obtaining more complete composure; but this composure is neither more nor less than a complete prostration of the powers of the brain, and is therefore directly opposed to any sanative effort; for no sooner does this organ recover its energy in a slight degree, than its debility and irri-

tability being increased, the patient relapses into delirium. Under such mismanagement the brain cannot emerge from its impaired condition; on the contrary, epilepsy, paralysis, or dementia supervenes.

It has been already stated, that, under the usual treatment of insanity, the majority of the small proportion of patients who recover relapse after a longer or shorter period into their former state. This is a circumstance deserving serious consideration. It shows that most of those who are pronounced cured, are only temporarily relieved; that those in whom a decided predisposition to the disease exists may, by being removed from the influence of the producing causes, and by improvement of the general health, be relieved from the symptoms of insanity; but it also shows that the predisposition to the disease remains, and that the elements of the disorder merely require a renewed co-operation of the efficient causes for its reproduction.

When, however, insanity is treated according to the principles advanced in this work,—when the predisposition—the foundation of the disease—is removed at the same time that the function of the brain is restored, relapses seldom occur, provided a liberal system of diet be persevered in, and the recumbent posture maintained during a certain

time in the middle of the day. The same quantity of animal food may not be required to maintain the brain, in its restored condition, as was requisite to rescue it from its impaired state, but a nutritious diet, in the strict sense of the word, is absolutely essential.

Prevention of Insanity.—The prevention of insanity does not appear to have occupied much of the attention of any writer upon the disease. The occurrence of some inflammatory and other disorders may be prevented by merely avoiding exposure to the influence of certain obvious causes; but in regard to insanity, it generally happens that the individual is already far advanced in the first stage of the disorder before any grounds for precaution arise, and a considerable time frequently elapses before confirmed insanity manifests itself. The attempt to prevent insanity therefore consists in commencing the treatment of the disease at its onset, instead of waiting until it has reached the period of its full development; although it be most important that this should be done, yet it is by almost universal consent neglected: for premonitory symptoms are disregarded by the friends of the individual, either until it be too late, as is attested by the frequent occurrence of suicide from mental derangement, or until such urgent symptoms display themselves as imperatively call for assist-

ance. Relatives frequently feel a repugnance to communicating their suspicions to their medical attendants; sometimes they are under the impression, that as there is no bodily illness, no medical assistance is requisite; or, that as soon as the circumstances which oppress the mind of the patient shall be settled, he will recover his usual state of health. Some individuals in the first stage of the disorder may not labour under any kind of mental anxiety; but they are perhaps daily straining the mind by close attention to study, or by over-assiduity in business, while they are neglecting to support by sufficient nutriment the inordinate functional exercise of the brain. The countenance of such patients may not betray the state of the mind, but an alteration in their habits and manners may be observed, and slight eccentricities, and an occasional incoherence of ideas may be noticed; and such symptoms should be viewed with suspicion, and invoke immediate attention. The impaired condition of the brain, which lays the foundation for insanity as well as for the various other diseases of the brain already described, has hitherto been overlooked; while therefore the disease of the brain is progressing, and the intellectual functions are becoming as a consequence disordered, the affection of the mind, instead of being referred to the condition of the brain, is ascribed to the influence of

untoward circumstances, and the disease is considered wholly one of the mind, and not of the brain. Occasionally other symptoms of an impaired brain arrest the attention; but these symptoms are generally referred either to indigestion or to a supposed determination of blood to the head; the real nature of the disorder being still unobserved and therefore not corrected.

It may be asserted, in opposition to the views that have been taken in the foregoing pages, that an impaired condition of the brain cannot constitute the predisposition to insanity in the cases of insane patients of athletic frame. But in persons of this description the mind may be weak and easily subdued, though the brain may be healthy; they may be so devoid of moral courage, that when assailed by troubles they readily yield to anxiety, and especially if they have previously experienced uninterrupted prosperity. Such individuals, from mismanagement, soon fall into a state of deep depression, in which the energy of the mind being completely subdued, the circulation becomes correspondently depressed in the brain, which soon undergoes alterations in its substance. Some stout and florid-looking individuals, having all the appearance of health, but who live abstemiously, are far from being strong. When individuals of this description, suffering from mental anxiety, complain,

as they often do, of occasional giddiness, pain in the head, and confusion of thought, these symptoms are erroneously considered indicative of decided determination of blood to the head, and blood is freely abstracted; whereby the brain, already impaired and weakened in function, is rendered at once powerless; this supposed remedy becoming the efficient cause of an attack of complete alienation of mind, without being preceded by any premonitory symptoms of such an occurrence.

In the prevention of insanity, however desirable it may be to obviate the influence of all circumstances which prey upon the mind, this is not the chief object to be attained; particular attention should be directed to the state of the brain, which is always in an impaired condition before insanity takes place. The most important object is therefore to renovate the brain, a point always neglected, although to accomplish it is to remove the foundation of the disease. The importance of obviating every cause which may annoy the mind varies in different individuals, and is generally proportioned to the excitability of the individual, and the slightest cause of annoyance to a person of an irritable temperament may produce a paroxysm of violence; and circumstances which are constantly preying upon the mind are rapidly wearing out its powers, and producing irritation and confusion of thought, and

therefore should, if possible, be removed. But those who are falling into a state of melancholy are indifferent to surrounding objects, the world has lost its charms for them, no prospect can be made bright to their desponding minds, and existence is a burthen to them. Such patients in particular require the careful attention of an experienced attendant. The necessity of this precaution cannot be too strongly urged, especially as the frequent occurrence of suicide does not prove a sufficient warning to those who possess, but who neglect, the opportunity of providing against such a calamity. Under whatever character the accession of lunacy takes place, whether the individual be excitable, melancholic, or frantic, it is most essential to attend to the condition of the brain. The preventive means consist, for the most part, in those described in the treatment of insanity; the digestive organs should be put into order, a nutritious diet adopted, and the recumbent posture enjoined.

It is not out of place here to recommend those who experience a premature declension in the powers of the mind, although there may be no reason to apprehend the accession of insanity, to resort to means similar to those proposed for the alienated. Some individuals at fifty, especially those who have lived abstemiously, are as much decayed, both in mind and body, as others are at

seventy; and let those who persuade themselves that they have not been too abstemious, bear in mind, that some constitutions require much more support than others, and that as their accustomed system of diet has not prevented their premature decay, and that as renovating means are always indicated under such circumstances, it is at least advisable to make trial of them. An improved diet seldom fails to become beneficial in such cases, and frequently the good derived greatly exceeds expectation.

This subject cannot be concluded in a more useful manner than by again urging the importance of timely adopting the proper means of preventing insanity. Premonitory indications are generally given of an approaching attack; and if means were taken to correct the defective nutrition of the brain, the frequency of suicide would be greatly diminished, and the occurrence of confirmed insanity would in most instances be prevented.

In the foregoing pages an attempt has been made to prove the existence of an intimate connexion between the several affections of the brain which have been described; to prove that these several affections are different grades of the same disease—an impoverished condition of the brain,—and originating in the same immediate cause—a deficient supply of arterial blood to this organ;—to prove

that a deficient supply of arterial blood occasions, in the first instance, a slight deficiency in the pressure upon, and a reduction of the stimulus of, the brain, indicated by giddiness, and pain in the head, and depression of the powers of the mind and body;—that as the deficiency in the supply of blood increases, a greater reduction of the pressure and stimulus takes place, occasioning, in the erect posture, expansion of the brain by virtue of its elasticity, and producing sensations of lightness and swimming in the head, and often syncope; and in the recumbent posture, an accumulation of venous blood in the veins and sinuses, manifested by heaviness, pain, and other sensations in the head, and by coma or lethargy;—that continued deficiency in the supply of blood causes innutrition of the brain, in which condition both its substance and functional powers become impaired, occasioning an irritable condition of this organ, in which, according to the age of the patient and to other circumstances, it may be liable, from slight causes, to morbid excitation, or may be so devoid of excitability, as to occasion stupor, or depression of mind bordering on melancholia;—that the result of long-continued innutrition of this organ is an alteration in its substance, consisting generally of softening, occasionally of induration, and often of emaciation, of one or more of its parts, evinced by

epilepsy, paralysis, insanity, or imbecility;—and lastly, that—these affections of the brain, not depending, as is in general supposed, on a redundant flow of blood through this organ, but, on the contrary, on a deficient circulation of blood,—the formidable and incurable character which some of them assume, arises chiefly from the mode of treatment adopted, and that the opposite system of treatment is in general successful.

APPENDIX.

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APPENDIX.

ON THE INFLUENCE OF THE ANTIPHLOGISTIC SYSTEM IN THE TREATMENT OF DISEASE.

(*From the Lancet, January* 1835.)

The Antiphlogistic System of treatment has long been recognised as a standard system; and as though it were founded on scientific principles and correct judgment, and had been confirmed by experience, it has been, and continues to be, taught in all medical schools. It may therefore appear bold and presumptuous to denounce a system which is upheld by the authority of colleges, recommended by the physicians and surgeons of all hospitals, received by all students in medicine, and acknowledged and employed as the only proper plan of treating inflammatory diseases by the great body of practitioners. Although this system has been pursued for ages, yet it was not generally adopted until after the Brunonian doctrine had given rise to much discussion and caused much alarm. This doctrine, which was raised with much skill, was expected to subvert the antiphlogistic system; it was, however, based upon false premises, viz. that every individual had a particular quantity of excitability implanted in his frame; that all diseases consisted in either an accumulation or an exhaustion of this excitability, constituting either direct or indirect debility, and requiring the administration of different degrees of stimulus for their cure, according to the accumulation or exhaustion of the excitability. The ex-

cessive stimulation which, in certain cases of inflammation, this doctrine enjoined, proved so destructive to life, that, in order to avoid the fatality, the very opposite extreme was soon adopted, probably under the impression that truth lay at the furthest point from decided error.

From that period down to the present, the rigid antiphlogistic system of treating inflammatory diseases has prevailed, and the term "antiphlogistic" has not a little tended to perpetuate the system. The terms "fever" and "inflammation" being expressive of heat, antiphlogistic means are considered to be corrective of a phlogistic condition, whether general or partial, of the frame; precisely as antacids are corrective of acidity of the stomach.

Inflammation, though strictly a local disease, is much disposed to give rise to general excitement (inflammatory fever); those means employed for its removal, which are the most likely to be preventive of the supervention of inflammatory fever, therefore, form the most simple and proper method of treatment. Copious bleeding, which suddenly and considerably reduces the muscular power, and produces a morbid excitability of the whole frame, also violent purgatives and poor liquid diet, which derange the functions of the viscera, and thereby afford an additional local exciting cause, should therefore be most carefully avoided. The practice, founded upon the strict antiphlogistic system, is, of all others, the most certain of impairing the muscular power, and of deranging the functions of the viscera; in short, of giving rise to inflammatory fever, of converting a simple local disease into a disease of the most complicated, and often of a dangerous form, and of undermining a constitution which otherwise might have remained sound.

The merits of bleeding may be stated in a few words. The abstraction of twelve or sixteen ounces of blood often removes at once a recent inflammatory affection; no means could have done more, and probably none so speedily: and

further, when venesection does not completely stop the inflammatory action, it almost invariably subdues it for a certain time, and if this immediate relief were the sole effect of general bleeding, no reasonable argument could be brought against it. This benefit, however, must not be allowed to disguise the more remote influence of the practice upon the constitution.

When a single bleeding completely removes the inflammation, it is evident that the inflammatory diathesis is not very strong; it is therefore fair to suppose that the milder agency of a few leeches, or of a blister, would answer the same purpose, and without impairing the constitution. Some, it is true, are not injured by a *single* bleeding; but observation will convince any one who is not already assured of the fact, that those who are relieved from an attack of inflammation by general bleeding are much more liable to recurrence of the complaint on some future occasion, than those who are relieved by local means only.

The influence which considerable losses of blood have upon the human frame, is to render it less muscular and to induce corpulency. Those who are disposed to be corpulent, become more so after having lost much blood; and, with this view, horses, some time before being put up for sale, are phlebotomized, to make them appear sleek and in good condition. Bleeding also induces dropsy in corpulent persons and others whose constitutions have already been impaired by dissipation or by prior disease.

In those instances in which the abstraction of blood does not remove the inflammation, but merely affords temporary relief, it becomes injurious by suddenly reducing the muscular power, and thereby increasing proportionately the excitability of the whole frame, which then becomes irritated by the local affection, and fever supervenes; the inflammation assumes a more acute form, the pulse rises, and the character of the disorder is considered indicative of the necessity of a further bleeding. This being per-

formed, faintness is produced, the pulse is controlled, the pain nearly ceases, and, to all appearance, the disease subsides; sometimes, indeed, it does not return; but it too often happens that reaction takes place, and with it all the symptoms are renewed with increased violence; another bleeding is resorted to with the same temporary relief, but the reaction which now ensues is in general less complete; if delirium existed before, it is now increased, the countenance is sunken and anxious, the whole nervous system appears to have received a fatal shock, and the pulse, in this condition of the patient, frequently assumes the jerking character. That this state of the pulse is induced by the repeated losses of blood, appears to have been satisfactorily proved by Parry's Experiments (Experimental Inquiry into the Nature of the Pulse, page 39).

The attempt to reduce very high action suddenly, is a violation of one of the laws of the animal economy, so well illustrated by Mr. Hunter; it is not only unscientific, but often dangerous, either to the function of an organ or to the life of a part. It may even occasion death. It frequently happens that when a serous membrane is acutely inflamed, its vessels sink into a state of atony on being too suddenly deprived of power, and a rapid serous effusion ensues. Any one who has been much engaged in practice can recall to his mind cases, especially in corpulent persons and *bons vivans*, of acute attacks of pleurisy, in which large quantities of blood had been abstracted, and in which the patients in a day or two afterwards were reduced to a hopeless state from hydrothorax.

If the pulse do not rise after the first bleeding, a repetition of the operation is not recommended. The rising of the pulse is the golden rule which is thought to have justified the first bleeding, and to warrant its repetition. This rule, however, is fallacious; the rising of the pulse, which is considered a sign of strength, is, in fact, an evidence of debility, being a sign of excited action under di-

minished power. Too much stress cannot be laid upon the fallacy of this criterion, as the lives of thousands are balanced upon this critical point.

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By some practitioners the antiphlogistic treatment is not confined to inflammatory complaints, but is adopted in almost all other cases, with the view of *preventing* inflammation and fever. It is not surprising that those who pursue this system so indiscriminately should be constantly apprehending the supervention of fever; for the very means they employ as preventives are the most likely to occasion it, their daily practice thus confirming their apprehensions, which, under a different method of treatment, would be perfectly groundless. For instance, if means were taken to preserve the muscular power instead of to impair it, the body would remain firm and unexcitable under all circumstances short of very acute disease. It is extraordinary that any argument to this effect should be necessary, it being so generally admitted that irritability exists in proportion to debility. What is fever, but the general excitement of an irritable frame? And thousands there are, who, having been subjected to the antiphlogistic treatment for the removal of an inflammatory disease, have become so excitable, that a glass of wine, or a small quantity of animal food, produces fever for several hours; and this effect, which ought to be expected but not dreaded, determines the invalid to avoid a similar indulgence until he is quite recovered. Habit, however, becomes in time second nature; the invalid virtually remains a convalescent during the rest of his life, ever finding that a small quantity of stimulating food induces temporary fever; and so long as he continues thus over-anxious to prevent the recurrence of disease, he actually prevents the recurrence

of health; he becomes a perfect hot-house plant, liable to be influenced by every slight change of weather, clothing, or diet. It is astonishing that the common sense of the patient does not interdict such super-refinement of the medical art.

The antiphlogistic treatment impairs the tone of the heart and blood-vessels as well as the general muscular system, and lays the foundation for hemorrhages, which are perpetuated, by persisting in the same method of treatment. Much more might be said of the injurious tendency of this system.

The treatment of febrile and inflammatory disorders ought to be reconsidered by the profession. If proper care were taken to ascertain their causes, and a plan of treatment adopted in strict reference to their respective causes, a really scientific system of practice might be established; it would then be found that some cases require a very different plan of management from others, and that in comparatively few instances would the acute forms of disease appear.

ON THE NATURE OF INFLAMMATORY FEVER.

(*From the Lancet, October* 1835.)

The term "inflammatory fever," when properly applied, refers only to that general excitement which is preceded and accompanied by local inflammation. The terms "symptomatic" and "sympathetic fever," "pyrexia," and "constitutional irritation," are used, synonymously, to designate inflammatory fever.

Whether inflammatory fever ever occurs idiopathically, has been a question of some controversy. It is admitted

by some to occur, though seldom, in the simple form of the synocha of Cullen; but its appearance in the more complicated form of synochus, from which, in a few days, it becomes modified into typhus, is very generally acknowledged. It is, however, by no means proved that fever takes place without the existence of local disease as its exciting cause. Broussais, Clutterbuck and others are opposed to the doctrine of idiopathic fevers; while Dr. Southwood Smith's dogma is—"There are no fevers but idiopathic fevers."

Inflammatory fever may assume a mild or a severe form. The former is simple, consisting in a general excitement of the nervous and vascular systems; the latter is more complicated, being accompanied, in addition to the local phlegmasia, by more or less disturbance of the brain, liver, stomach, or other organs; so that the worst cases may more resemble typhus than simple pyrexia.

The different grades of inflammatory fever do not always correspond to the degree of inflammation, since it frequently happens that, in cases in which no predisposition to fever exists, even an acute inflammation is unattended by any constitutional irritation; and, on the contrary, in cases in which the predisposition is very great, the slightest inflammatory disease gives rise to considerable fever. It may therefore be inferred, that the predisposing causes play a greater part in the production of inflammatory fever than the inflammation itself.

The *causes* of inflammatory fever admit of being arranged into *exciting*, *predisposing*, and *secondary* or *perpetuating causes*.

Of exciting causes.—The most painful inflammatory affections are the most productive of fever; and the pain of inflammation depends upon the texture, mechanism, and office of the parts, together with the intensity and extent of the inflammation. Those textures, for example, which are dense and cannot easily swell,—parts which on

swelling become compressed by the unyielding structure of contiguous parts, and organs which, when inflamed, are subjected to sudden compression and distention, as serous membranes, ligaments, and synovial membranes of large joints, the fauces and the bladder—induce more or less pyrexia. Severe and painful injuries also, as compound fractures, burns, &c., frequently produce considerable fever.

The more intense and extensive the inflammation, the more acute the fever: when, however, the pain is so acute as to overwhelm the powers of the whole frame, instead of a high degree of fever, the consequences are, as in acute gastritis, a low pulse and cold perspiration.

Of predisposing causes.—These causes are always general, depending upon the nature of the constitution and the state of the health at the accession of the local disease. It is doubtful whether inflammatory fever ever arises in the absence of a predisposing cause, it being essential to the occurrence of this description of fever that the frame be in an excitable state, which state is inversely proportionate to the muscular power. It is true that a severe and painful injury often produces, even in a strong constitution, a certain degree of febrile excitement in a few hours; but may not this be ascribed to the sudden, although not considerable, exhaustion of the muscular power occasioned by severe pain? This, however, is at most an extreme case, and does not affect the general rule, that the lower the grade of muscular power, the greater the excitability of the nervous and vascular systems, and, consequently, the stronger the predisposition to inflammatory fever. Hunter observes, that "in inflammation, when the constitution is strong, then it will commonly be the most manageable, for strength lessens irritability." And according to Abernethy, "irritation is debility excited." Many eminent physicians and surgeons, however, are of opinion that there is no absolute debility when the fe-

brile action is characterized by a frequent and firm pulse. A frequent pulse, in the absence of inflammation, is an admitted sign of debility; and the annexed table will show that the frequent, although energetic, pulsation in fever is indicative of excited action under reduced power.

During the earlier periods of life, and in disease, a functional alliance exists between the nerves of sensation and those of motion, which places their respective powers in inverse relations. For example, very young infants possess the least degree of muscularity and the greatest degree of sensibility of frame; and as the former increases the latter diminishes, until the muscular system becomes fully developed, when they balance each other: this harmony is maintained so long as health is preserved, not only during the middle or stationary period of life, but during that of decline, when, as the muscular power declines, the sensibility also becomes impaired. Again, women and persons of delicate frame, whose muscular system is not well developed, are highly sensitive; and whenever the muscular power is greatly reduced by venesection, spare diet, anxiety of mind or disease, the sensibility is proportionally increased. On the other hand, whenever sensation is accumulated by super-excitation, as by the influence of fear, excessive pain, &c., the muscular power is lowered. Instances may, however, be adduced, in which certain depressing agents, as intense cold, marsh miasma, opium, &c., diminish both the sensibility of the nervous and the power of the muscular systems.

This law of inverse action obtains between the nerves of sensation and those of voluntary motion only. It does not involve those of involuntary motion, for the contractility of the heart and arteries always corresponds to the sensibility of the nervous system, as the pulse faithfully indicates.

In accordance with these views, the following table is

intended to exhibit a kind of analysis of inflammatory fever, by showing that the sensibility of the nervous system corresponds inversely with the tone of the muscular system; and that, according to the combined conditions of these two systems, the circulation becomes modified, so as to correspond respectively to them in the unexcited and the excited states of the body. In the table, inflammation is indicated as the chief exciting cause, in order to show by the pulse that inflammatory fever takes place inversely to the muscular power. Miscellaneous temporary exciting causes are also given, merely to afford an example of temporary general vascular irritation. In the last example in the table is exhibited an exception to this law of inverse action between the nervous and muscular systems, showing that the nervous and the voluntary and the involuntary muscular systems are, under certain powerful agents, all depressed together.

Condition of the Muscular System.	Sensibility of Nervous System.		Examples.	Pulse.
Least muscularity	Highest degree.	Unexcited	Infants in health	Very frequent and small.
		Excited by inflammation	Infants with inflammatory fever	Rapid, small, and tense.
Little muscularity	High degree.	Unexcited	Persons of delicate frame	Frequent, small, and soft.
		Excited temporarily, as by spirituous potations, fright, unusual exertion, &c.		More frequent, fuller, and less soft.
		Excited by inflammation		Very frequent, small, and tense.
Considerable muscularity.	Moderate degree.	Unexcited	Robust persons in health	Natural.
		Excited by inflammation	Ditto without pyrexia	Moderate, often slow and oppressed.
Ditto, suddenly reduced in power by loss of blood, &c.	Very high degree.	Excited by inflammation	Ditto, with inflammatory fever	Very frequent, full, hard, rebounding.
Ditto, reduced in power	High degree.	Unexcited	Ditto, convalescent	Frequent, full, and soft.
Subdued in power	Low degree.	Depressed by marsh miasma, intense cold, opium, &c.	Every description of person in the first stage of idiopathic fever, &c.	Smaller, weaker, and sometimes slower than natural.

The comparative view of the various conditions of the nervous and muscular systems, given in this table, tends to illustrate the nature of inflammatory fever, and shows,

at the same time, how much it hinges upon the deficiency in muscularity, or upon the sudden reduction of muscular power.

In infants, as is well known, a mere spark of internal inflammation will ignite the whole frame. In all persons, except the aged, in whom sensibility is much impaired, and even in these to a certain extent, the predisposition to inflammatory fever under exciting causes is proportioned to the deficiency in muscularity. Those, on the contrary, who are muscular and strong will sometimes have a phlegmasia during several weeks, unaccompanied by any constitutional excitement, so long as they observe their usual regimen, and are not subjected to such medical treatment as will deprive them of their muscular power.

There are other circumstances, besides the sudden reduction of muscular power, which render a muscular frame exceedingly irritable, and therefore predisposed to inflammatory fever, viz. *mental anxiety and the habit of inebriation.*

Few persons, comparatively, can long endure *mental anxiety*, and remain in a state of perfect health. Continued *mental anxiety* impairs the energy of the brain, and the tone of the muscular system, especially of the heart and blood-vessels; it renders the whole frame morbidly sensitive. The mind becomes charged with apprehensions, the feelings are readily irritated, the heart is subject to palpitations, and the functions of the several organs of the body, particularly those of digestion, become deranged. In this predisposed condition of the frame, an attack of inflammation attended by an acute form of inflammatory fever is likely to occur, which, if not soon subdued, will be accompanied by delirium, grave functional lesions, and other signs of low typhoid fever.

The habit of *inebriation* produces a conditional kind of predisposition; for unless it be suddenly and greatly restricted, it does not generally create a predisposition to

fever. The drunkard, when deprived of his accustomed stimulus, is deprived at the same time of his power, his muscular system becomes tremulous and feeble, and his whole frame irritable. If, then, he be subjected to privation during an attack of inflammation, he will, under this exciting cause, be highly susceptible of fever, which will be characterized by greater nervous than vascular disturbance, by delirium tremens, and generally by the absence of the hot skin of fever. The strictly antiphlogistic treatment almost invariably converts the disorder into a highly dangerous form of fever.

Secondary Causes.—During the existence of inflammatory fever, all considerable derangements of the visceral functions tend to perpetuate it, by giving support both to the predisposing and exciting causes. For example, an imperfect function of the brain and spinal marrow will prevent the due distribution of the nervous energy to the muscular system ; an imperfect function of the lungs and of the other excretory organs prevents that purification of the blood which is essential to the proper function of the nervous system ; an imperfect function of the digestive organs deprives the body of its due nutrition, so requisite to the maintenance of muscular tone. Derangements of the visceral functions not only become secondary causes of fever by reducing the muscular power, but frequently an additional source of excitement to the whole frame, especially to the inflamed part, thereby perpetuating both the local disease and the general vascular irritation. If inquiry be made as to the origin of these functional derangements, they may be mostly traced to that system of treating inflammatory disorders which suddenly reduces all the powers of the body.

It is universally admitted that a delicate and sensitive condition of body is favourable to the production of fever under the existence of inflammation; but notwithstanding the admission of this principle, it is most strangely lost

sight of at the bed-side; and why? because the antiphlogistic is the prevailing system of treating inflammatory diseases, before which any principle, however sound, and although recognised, must fall prostrate, rather than be allowed to violate or interdict a system so sacred as the antiphlogistic. It is however hoped, that, by invoking a more close attention on the part of the profession to the real causes of inflammatory fever, their relative importance will be more duly estimated; that it will be seen, that although the exciting cause, inflammation, be a *sine qua non* in inflammatory fever, yet that the predisposing causes are in most instances those which have the greatest influence in the production of fever; and therefore that the treatment will be so adapted, that, while attempting to remove the exciting cause, it will not be calculated either to increase or to produce the predisposing causes of inflammatory fever.

ON THE TREATMENT OF INFLAMMATORY DISEASES.

(*From the Lancet, September* 17, 1836.)

Acute inflammation in the human frame is considered to be as alarming an occurrence as a conflagration in a house. It is true, that if inflammation be not subdued it may prove destructive to life; and, as if it would spread as rapidly as flames, a host of means is all at once employed to overpower it. Blood is abstracted in quantity according to the boldness of the practitioner; aqueous liquids are plentifully supplied; while food, being deemed of an inflammatory tendency, is rigidly withheld. If these means prove insufficient to control the inflammation in one day, they are repeated on the next, with some additions, such as local bleeding, blistering, &c. When the patient survives this treatment, which is by no means always the

case, the constitution will often have sustained as much damage as a house which has been on fire, and will require several months to repair it.

It is questionable whether a trial would be made of so desperate a practice, if it were now for the first time proposed for the consideration of the profession. Would not a thousand objections to it be raised? Would it not be denounced as an outrageous attack upon an invalid? Would not even the legality of the means be questioned, which, consisting in the abstraction of large quantities of blood, the withholding of every kind of nutriment, &c., would in a few days reduce a hale-looking man to an almost lifeless being? If such a mode of treating inflammation were for the first time introduced in this enlightened age, it would be treated with deserved contempt, for the remedies would be justly held as worse than the disease. Yet this system prevails at this very time; and although every case of inflammation is not treated with extreme severity, yet many patients are daily subjected to this practice.

Desperate means can only be sanctioned in cases in which serious results are apprehended; but does the antiphlogistic system of treatment obviate such results? Those only who have pursued both this system of treatment and that which is opposed to it, can give the answer to this question, which is,—That the antiphlogistic system often destroys life when the disease would not; and that, even when life is preserved, a serious injury is often inflicted upon the constitution. If the amputation of a limb be considered necessary for the removal of a disease, although there shall not be the least probability of danger attending the operation, nor a doubt as to its expediency, yet the most eminent surgeons hold a consultation to confirm its propriety; while the strict antiphlogistic system of treatment, which is always injurious, and often of fatal tendency, is resorted to with little or no hesitation, and

sometimes wantonly, even where inflammation does not exist. The most distant prospect of the occurrence of inflammation is a sufficient inducement in the minds of some practitioners to oppose to it a host of violent measures; and although the remedies are tenfold more terrific than the disease, the disease, in their apprehensions, is tenfold more to be dreaded than the tendency of such measures.

This appeal is made in an urgent strain; and ought it to be otherwise, whilst the antiphlogistic system of treatment is so generally prevalent, and fraught, as it would appear, with such mischievous tendencies?

In the following pages are proposed rules of practice, which will, for the most part, render the treatment of inflammatory diseases simple and easy, and which will preserve both the lives and constitutions of those afflicted with this class of diseases.

In describing the treatment of inflammatory diseases, my object is rather to point out rules of treatment than to detail the remedies.

The treatment is usually divided into the "constitutional" and the "local;" but this division is objectionable, since it merely arranges the means to be applied into two classes, general and topical, without involving thereby any principle or rule of practice. It is therefore proposed to substitute for the "constitutional treatment," the *treatment of the constitution*; and for the "local treatment," the *treatment of the local disease*. By this alteration in the heads of treatment, and in the terms expressive of them, the objects in applying the means are fully distinguished. The usual "constitutional treatment" refers to those general means which are employed to influence the inflamed part through the medium of the constitution; but the "treatment of the constitution" includes only those measures which, without reference to the local inflammation, either prevent or subdue the con-

stitutional disturbance, inflammatory fever. The usual "local treatment" is restricted to topical agents merely; but the "treatment of the local disease" includes all remedies, whether topical or general, which bear reference to, and are curative of, the local disease, inflammation.

The Treatment of the Constitution.—In the treatment of inflammation it is very desirable to *prevent* the accession of inflammatory fever, and should it already exist, it is equally desirable to *subdue* it as speedily as possible.

The Prevention of Inflammatory Fever.—It having been shown, when treating, in a former essay, on the nature of inflammatory fever, that its predisposing cause is either a reduced, or a low grade of, muscular power, it follows, consistently with that view, that those depletory means which considerably diminish this power should be carefully avoided, whilst the diet of the patient, instead of being, as is usually recommended, almost devoid of nutriment, should be nutritious without being unnecessarily stimulating, not essentially differing from the accustomed diet, when it has been moderate, and sufficient to maintain a fair degree of muscular tone. Should it, however, have been of a too abstemious nature, and should the patient appear exceedingly delicate, a more nutritious diet should be adopted. On the other hand, should the patient have been in the habit of indulging too freely in fermented liquors, he should be permitted to take about half his usual allowance.

When vomiting or nausea attends an inflammatory disease, it forms an obstacle to this method of preventing the accession of fever; means should therefore be immediately taken for its removal. An irritable condition of the stomach may arise from several causes, the chief of which are,—sympathy with the inflamed organ, or the presence of bile or of some indigestible substance. In the first case, two or three doses of calomel and opium, and soda-water, will allay the sympathetic irritation, attempts

being at the same time made to subdue the inflammation itself. A mustard poultice, or a blister, may be applied to the præcordia, if painful under pressure. In the second case, an emetic and an aperient will be requisite.

By these means the irritability will in general be allayed, and the stomach will be enabled to receive mild nutritious food, the best forms of which are—arrow-root, or gruel, made partly with milk, to which a small quantity of brandy may sometimes be added—a caudle, composed of equal quantities of gruel and malt liquor—isinglass, boiled in milk—and strong beef-tea. Broths, as they are usually made, are objectionable, on account of the little nutriment they contain and of the flatulence they occasion. This diet will soon prepare the stomach for more solid food.

By these means the strength and the healthy functions of the body will be considerably maintained; at the same time the nervous, and, consequently, the vascular and visceral irritability, so often allowed to complicate cases of phlegmasia, which otherwise would be perfectly simple and manageable, will be obviated.

The Subdual of Inflammatory Fever.—To subdue fever is a less easy task than to prevent its occurrence. As inflammatory fever often depends as much upon the continual exciting cause, inflammation, as upon the predisposing cause, an irritable condition of body consequent upon reduced muscular tone, it is clear that a full description of the treatment for the removal of fever cannot consistently be given under this head, part of it bearing reference to the treatment of the local disease. The treatment of the constitution may, however, be here described so far as regards the predisposing cause.

The indication is to correct the irritability of frame; and as this condition of body depends upon reduced muscular power, an attempt should be made to restore that power.

For this purpose measures should be adopted similar to those recommended for the prevention of fever, limited only by the disability of the patient to pursue them so fully. These means may be sometimes aided by those medicines which have a direct tendency to subdue vascular irritability.

Exercise, for obvious reasons, cannot be numbered among the remedies for fever, although it may be useful as a preventive. Fresh air should be obtained by a free ventilation of the apartment. In aid of a cooling regimen the patient should lie on a mattress, and without bed-curtains. Animal food, in the solid form, cannot in general be taken if the fever be acute; but milk, whey, malt liquor, wine-and-water, eggs, or strong beef-tea, can be taken in small quantities, and frequently. If nourishment be judiciously administered the strength will gradually increase, while the irritability and consequent fever will proportionally diminish. This is so true that it is extraordinary that prejudice should so long have fostered the prevailing opinions respecting the nature of inflammatory fever, and that the plain, common-sense system of supporting the powers of the frame under disease should not have been long since universally adopted.

The *medicinal treatment* depends much upon the character of the inflammatory fever. If considerable fever attend sub-acute inflammation, it is evident that the constitution is in a weak and excitable condition. Under these circumstances, febrifuge medicines, especially those of a sedative nature, will in general produce a beneficial effect. But if, as in acute inflammation, the exciting cause play the greater part, febrifuge medicines will avail but little. Sedative medicines would appear, *à priori*, to be indicated whenever the general circulation is inordinately increased; but high and strong action of the arterial system cannot be controlled by sedative medicines, as tartarized anti-

mony and digitalis; for small doses of these medicines have no effect, while large doses occasion vomiting; and unless they produce an uniform sedative effect they are pernicious, as temporary depression of the circulation induces reaction, and thus defeats the object to be attained; and to nauseate the stomach without subduing the disease is worse than useless, as it renders the patient incapable of taking that nutriment which of itself alone would, according to the views which have been already given, tend to diminish fever.

The sedative agency of cold may be often employed advantageously, by placing the patient, who should at the same time be thinly clothed, in a current of cool air. No kind of danger need be apprehended from this exposure, unless the phlegmasia have originated from revulsion of blood occasioned by exposure to cold; then, indeed, to expose the patient to cold would be to renew the original cause of the disease. In such cases calomel and opium, in combination, form an exceedingly useful sedative, producing a general and uniform effect; while they allay inordinate action, they maintain an equable distribution of blood; if they fail to induce sleep, they compose both mind and body; they alleviate delirium when it exists, and in other cases prevent its occurrence.

The Treatment of the Local Disease.—In the treatment of inflammation three indications suggest themselves; viz. 1st, *To remove the cause, or to counteract its agency.* 2ndly, *To reduce the increased circulation of blood in the inflamed part.* 3rdly, *To correct the derangement in the function of the vessels engaged in inflammation.*

The fulfilment of any one of these indications will often accomplish that of the rest; but some cases require that the three should be fulfilled together.

First, to remove the cause, or to counteract its agency.

Systematic writers on inflammatory diseases recommend the removal of the primary cause; but if that cease to exist, and the inflammation proceed under the excitement of secondary causes, they at once propose antiphlogistic measures of treatment, without further allusion to the primary cause, whereas the treatment should still bear reference to that cause. To ascertain the cause, and the manner in which it produced the disease, is to discover the particular organic susceptibility and the sympathies of the individual; for all persons are not influenced by the same agent. What better guide can the practitioner have to direct his course, while attempting to remove effects, than a correct knowledge of their causes? and in what way can this knowledge be made available, but by employing those means which directly tend to counteract their agency? The attention of the practitioner, therefore, should not be entirely engrossed by the effect; it should rather be directed to the removal or counter-agency of the cause. But does the strict antiphlogistic system of treatment provide for the removal or counter-agency of causes? No; it is empirical in the extreme; it treats all cases of acute inflammation on the same principle, as if they all arose from similar causes. It does not follow that the treatment should be the same, because the effect, inflammation, is the same; the treatment should be adapted to the cause, and as the nature of the cause varies, so should there be various modes of treatment. It is sometimes necessary to raise, and sometimes to depress, the circulation; but the antiphlogistic system always aims at depressing it. It is not, therefore, surprising that inflammatory diseases should so often prove fatal under a system of treatment which does not recognise these important practical distinctions.

The most direct method of removing inflammation is suggested by observing the manner in which it was pro-

duced. For instance, if a local phlegmasia be brought on by excitement of the general circulation, the use of an agent which, like tartarised antimony, depresses the general circulation, is the most direct method of counteracting the agency of the cause, and, as it were, of undoing the disease; whilst stimulants, warm baths, or such means as excite the circulation, would, by renewing the cause, tend to perpetuate the inflammation. Again, if inflammation of an internal organ be brought on by any considerable depression of the circulation, as when the surface and extremities of the body are exposed during several hours to wet and cold, instead of refrigerants, sudorifics, warm baths, flannel clothing, and whatever excites the general circulation and diverts the blood from the diseased organ, are decidedly indicated. Should such means be insufficient to equalize the circulation throughout the body,—should the feet remain cold, for instance, which is often the case, a small blister or sinapism should be applied to each instep; and if the circulation be very languid, diffusible stimulants are indispensable; for a languid circulation, although not the first, was the second link in the chain of causes, and occasioned the central accumulation of blood which produced the inflammation, and now constitutes a perpetuating cause, maintaining the inflammation in spite of the remedial measures employed. Stimulants, therefore, by increasing the general circulation, whereby blood is conveyed to the extremities and outer surface of the body, reduce the circulation in the central inflamed organ, and prove particularly curative. In illustration of this principle, the following familiar example may be offered:—

A person, after exposure to wet and cold, may feel indisposed, having symptoms of an internal phlegmasia coming on, and in order to remove the chilliness which accompanies this state, indulges in wine or spirits before going to bed. During the night a febrile state of excite-

ment comes on, which towards morning subsides, and he rises free from disease. In this manner a severe illness is often prevented.

By many this practice would be considered very dangerous; by some its propriety might be admitted at the commencement of an attack of inflammation; but that it should be adopted at a stage of confirmed inflammation would be allowed by scarcely any one, although it offers no violation to any law in medical science. It is, on the contrary, easy to show that it is strictly in accordance with one of the laws of the circulation, viz. that any one portion of the circulation is an antagonist power to the other portions. Accordingly, if one portion, in being excited, as in inflammation, be raised in action above the rest of the circulation so as to command an undue afflux of blood towards it, it is strictly consistent that every other part should be raised to the level of that in the inflamed organ, in order to counteract this local appropriation or accumulation of blood. To increase the general circulation, therefore, whenever it can be achieved, in direct counter-agency to the primary cause, is not only the most scientific, but often the only successful mode of practice; and those who make a proper distinction between a temporary general excitement, artificially produced, and the excitement of inflammatory fever, will at once admit its rationality; but those who make no such distinction will denounce this system of practice as Brunonian and fallacious.

The foregoing rules of treatment are referable only to those cases of inflammation which originate from causes capable of being removed or counteracted,—causes which alone suggest the indications of cure; but other cases, in which the causes are transient and no longer in operation, require a treatment suited to the nature and seat of the inflammation and to the constitution, without particular reference to the primary cause.

As the causes of inflammation are numerous and variable, and some even of opposite natures, and as the treatment should in a great measure be regulated by our knowledge of them, they have been arranged in the following table under the separate heads of Continuous and Transient Causes; and, with the view of proposing more appropriate rules of practice than have been hitherto adopted, to the respective Causes have been annexed the chief Indications of Treatment, and to these again is appended a column of Remedies, not by any means intended as a complete remedial system, but merely as illustrations of the rules proposed.

TABLE OF THE CAUSES AND TREATMENT OF INFLAMMATION.

Causes of Inflammation.	Indications of Treatment.	Remedies.
CONTINUOUS CAUSES.		
Warm and wet, after cold and dry weather.	To counteract the stimulating influence of the increased heat, and the relaxing agency of the reduced pressure of the atmosphere.	Cold ablutions, astringent tonics, acids, &c.
Cold and wet, after hot and dry weather.	To counteract the revulsion of blood, by increasing the circulation on the surface and in the extremities of the body.	Warm baths, blisters, sinapisms to the feet, sudorifics, and a warm regimen.
Suppression of habitual discharges.	To restore the accustomed discharge, or to establish another.	Emmenagogues, deobstruents, alkalies, blisters, issues, setons, &c.; if the case be urgent, venesection.
The contact of vitiated and acrid secretions. Sympathy with the deranged function, or other irritation of some distant organ.	To remove the disorder of the organ primarily in fault ..... To soothe the part irritated or sympathetically affected.....	The organs primarily in fault should be treated by leeches, counter-irritants, fomentations, and by medicines which will correct any particular functional error. Those secondarily affected should be soothed by fomentations, opiates, alkalies, demulcents, &c., according to the circumstances of the case.
TRANSIENT CAUSES.		
Partial Excitement.—From mechanical violence, the application of heat, of corrosive and vesicatory substances, stings, &c.; also from the violent internal agency of medicines.	To select those means which are adapted to the nature and seat of the injury, and to the constitution, is the only rule in cases in which the causes and the effects are so varied that no indication common to all can be given.	Topical abstractions of blood, sedative and soothing applications, counter-irritants, &c.
General Excitement.—From violent exertion in hot weather, mental excitements, spirituous potations, &c.	To depress the general circulation.	Febrifuge and sedative medicines, cold ablutions, and a cool regimen.
From sudden exposure to inordinate heat after cold.	To preserve a low temperature of body, if the inflammation be seated externally.	A cool regimen, leeches, cold lotions, &c.
	If seated in the lungs, let the patient be subjected to external warmth, and to a cool air for respiration.	Warm clothing, a cool atmosphere, expectorant medicines, leeches, blisters, &c.
Partial or General Depression.—From exposure of the feet or other parts, or of the whole frame, to cold.	To restore the circulation in the extremities and surface of the body, and to produce a counter-excitement to the internal disease, by raising the general circulation above its natural standard.	Warm baths, warm clothing, blisters, sinapisms, sudorifics, and in some cases diffusible stimulants.

The second indication of treatment is to reduce the increased circulation of blood in the inflamed part.

When the primary cause of the inflammation is unknown, and the treatment, in reference to it, cannot therefore be adopted, this indication is especially to be adhered to. The various modes of fulfilling it are either of a physical or a medicinal nature, and consist of external and internal means.

The *external* means are for the most part topical. They consist of those which abstract blood from the inflamed part, as the application of leeches, scarifications, &c.; of those which occasion a derivation of blood from the affected organ, as exercise, dry cupping, blisters, sinapisms, fomentations, embrocations, and other counter-irritants; and of those which produce a sedative influence upon the vessels engaged in the inflammatory action, as the application of ice, of saturnine, spirituous and other refrigerating lotions, of laudanum, iodine, mercurial ointments, lunar caustic, &c.

The *internal* means of reducing the circulation in any particular part consist of those only which influence the general circulation, no medicine having been yet discovered which will exert a specific depressing agency upon any particular part. They affect the general circulation either by raising or depressing it; they are therefore of two classes, which, in their mode of operation, are opposed to each other; it is, then, important to distinguish the cases in which the one or the other of these principles should be enforced,—whether the general circulation should be raised by stimulants or depressed by sedative means. This distinction often depends upon the nature of the cause, as has been already described under the former indication of treatment. But, when the cause cannot be ascertained, the circulation should be raised in those cases in which it is exceedingly languid, and the inflammation is seated in any of the central organs of the body;

for a languid circulation tends to produce an internal accumulation of blood, and thereby to support the inflammation; consequently, by raising the general circulation, the blood becomes again equally distributed throughout the body, to the relief of the internal phlegmasia.

The lungs form an exception to this rule; for although they be situated centrally, yet, while other organs receive only their proportional quantity, these transmit the entire volume of blood circulating through the body; consequently, any considerable depression of the general circulation must be felt in these organs, and must therefore tend to reduce inflammatory action in them.

The circulation should be depressed in those cases in which the inflammation is seated externally, and is unattended by very high or very low vascular action, the external surface and extremities of the body being the first to be influenced by depression of the circulation. Tartarized antimony, and other powerful sedatives, are therefore useful in inflammations of the eyes, and in many other cases of external inflammation; but not in those which are extensive, and, at the same time, of an acute character; for the vascular action is too vigorous to be permanently controlled by these means, and temporary depressions, as before stated, in general induce subsequent violent paroxysms. On the other hand, when the circulation is very low, no benefit can be reasonably expected by depressing it still more, for the co-existence of inflammation with this condition of the circulation renders it more than probable that the latter is a perpetuating cause of the former.

In cases of gout, it is highly injudicious to attempt to produce a languid circulation, as it would tend to withdraw the blood which had accumulated in the extremities and to produce a central plethora, and thus to transfer the gout from an external to an internal organ.

However much, in some cases, the general circumstances may suggest the propriety of attempting to subdue

the inflammatory action by reducing the general circulation, yet, in very painful affections of the joints, of the eye, or of the head and jaw from a decayed tooth, it will seldom be found good practice. To employ any means which will reduce the muscular power, will heighten the sensibility of the frame,—a condition favourable to the maintenance of pain; and so long as the pain continues, inflammation continues: in such cases, large doses of opiates, and the application of poultices, are the most beneficial means which can be employed.

The third indication is to correct the functional derangement of the vessels engaged in the inflammatory action.

Since the mischief attending inflammation almost entirely results from the morbid action of the vessels, it is to be regretted that so little is known of the influence of medicines upon them. While this branch of the science of therapeutics is the most important, it is the most neglected, on account of the difficulties experienced in investigations connected with the various and peculiar powers of the nervous system. Although the virtues of a long catalogue of medicines have been ascertained, they are established as mere facts; their mode of action has not yet been in the slightest degree developed. It is a disputed point, whether medicines directly influence the secretory functions through the medium of the nervous system, or whether their properties are conveyed by the blood to the organ to be acted upon; it is not known whether the circulation in the organ be increased, diminished, or unaltered, or whether the agency of medicine be chemical, physical, or otherwise; and such is the alliance of action of certain organs of the body, that if the function of one be disturbed, that of another becomes deranged. The kidneys, for example, are affected by a disordered action of the liver, stomach, bowels, or skin; it is therefore questionable whether diuretics exert a direct

power over the kidneys, or whether they influence some other viscus, the altered function of which induces the increased function of the kidneys. And medicines which produce an immediate effect upon the stomach in occasioning nausea, affect the secretory functions of the lungs, kidneys, skin, and probably of other organs. These points of consideration might be greatly multiplied.

If, then, a comprehensive inquiry were made into all the agencies, direct and indirect, of different medicines on each organ separately, and on so many collectively as act in harmony with, or dependently on, each other; and if a classified arrangement were made of all the organs and structures of the body influenced by medicines, and if all the elementary agencies, as they were observed, were placed under their respective heads; and if this extended field of inquiry were occupied by men well versed in anatomy, physiology and chemistry, can there be a doubt that they would take such enlightened views of the multifarious operations of the several functions of the body, as would enable them to trace, in connected series, many of the agencies of medicines, and thereby develope a new branch of medical science, one that has not hitherto been sought on rational grounds? If the perfection of the medical art consists in supplying a remedy for every disease, or, in other words, in employing medicines which will correct every morbid function of the body, our present knowledge of medicine is truly humiliating.

Some structures have a plurality of functions, and are probably on that account more liable to become engaged in inflammation than those which have but one. Every tissue, every gland, and each surface of the body has its peculiar vessels. Of the surfaces, which consist of the mucous, the serous and the synovial membranes, and also of the skin, the mucous membrane is the chief structure upon which attempts are made to subdue inflammation by influencing its vessels; and that of the lungs, when in-

flamed, is the most frequently treated on this principle. Expectorant medicines form a numerous class of therapeutic means, and are so diversified in their properties, that, if judiciously selected, they are seldom ineffective in cases of simple bronchitis.

Although inflammation of the mucous membrane of the lungs can be so readily controlled by medicines influencing its vessels, yet very little can be accomplished in the treatment of inflammation of the mucous membrane of the alimentary canal on this principle. It is true that calomel, in large doses, will often subdue gastritis, and its immediate efficacy in controlling the copious secretion in cholera has in many cases been astonishing. Beyond these facts, nothing important has been established, and although all purgative medicines influence the vessels of this membrane, yet not one is efficacious in subduing inflammation. It is not improbable, however, that this may in a great measure, be owing to the violence offered to the inflamed surface by the peristaltic action of the bowels which is at the same time induced. Ipecacuanha is renowned for its remedial influence in dysentery, but nothing certain relative to its mode of action is known.

In inflammation of the mucous membrane of the urinary passages, accompanied either by a purulent or an increased mucous secretion, several medicines have proved beneficial in their influence upon the vessels engaged in the morbid action. Hence it appears that different portions of the mucous membrane require, when diseased, different medicines, according, no doubt, as the several portions vary in structure.

With regard to the influence of medicines on inflamed serous membranes, mercury is the only agent which appears to exert any control over the diseased action,—a remedy which is equally beneficial in inflammation of any of these membranes, as might be expected when the simplicity and uniformity of their structure are considered.

The cutaneous surface, when not inflamed, is readily acted upon by a number of medicines; but when inflamed, mercury and iodine are almost the only medicines which have been found to exert a direct influence upon the vessels of the skin. There are, however, several external applications which appear to have an immediate power over the cutaneous vessels.

Several of the glands are susceptible of the agency of particular medicines; but these medicines are not calculated to subdue inflammation in these organs. In hepatitis, mercury is a favourite remedy; but however useful it may be considered in hot climates, it is of doubtful efficacy in cold, and even in temperate countries. In nephritis, diuretics are allowed to be injurious. In inflammation of the brain, or of the spinal marrow, mercury is of great utility, and in many cases the only beneficial agent.

Inflammation, treated according to the rules just proposed, will be found, for the most part, simple and manageable:—simple, in being unaccompanied either by the inflammatory fever so often springing out of great and sudden privations of muscular power, or by the various pains which often complicate the disease, and are mistaken for additional symptoms of inflammation:—manageable, because the inflammation will seldom assume an acute character, but will yield to the comparatively mild means employed for its removal. Another advantage in the proposed system of treatment is, that the constitution seldom suffers during an attack of inflammation; the patient therefore does not require several weeks or months, as under the antiphlogistic system, for the restoration of the powers of his frame.

Difficulties will attend those cases in which the patients have an insuperable aversion to every kind of nutriment. In such cases the inflammation will in general be accompanied by pyrexia, and it is scarcely necessary to men-

tion, that difficulties will occur in the management of exceedingly delicate and excitable frames, in which organic lesions have long existed; but these are circumstances equally unfavourable under any system of treatment.

ON THE AGENCY OF THE ATMOSPHERE IN THE PRODUCTION OF DISEASE.

(*From the Lancet, April* 25, 1835.)

ALTHOUGH it is universally admitted that numerous diseases are occasioned by certain conditions of the weather, yet no systematic arrangement has hitherto been made, either of the atmospheric causes of diseases, or of the diseases themselves. An attempt to supply this deficiency, therefore, may not prove unacceptable.

There are three properties of the atmosphere, viz. its weight or pressure, its temperature, and its electrical states, which, it is allowed, influence the human frame. One or more of these properties is constantly varying in its proportional agency; hence the atmosphere is subject to multifarious changes, even at the same time, in different situations, according to local peculiarities. The influence of the electrical states is but little known; the present inquiry, therefore, will be confined to the more obvious effects of the pressure and temperature of the atmosphere.

Pressure of the Atmosphere.—The atmosphere is supposed to be about forty-five miles in height, and its weight upon the surface of the earth is about 15 lbs. on every square inch. Although it is 11,040 times lighter than mercury, it will, on a fine day, equipoise a column of that fluid thirty inches in height of the same base in an exhausted tube, as in a barometer. Its pressure upon the surface of the human body is equal to about fourteen tons. Its density, owing to its elasticity, is not uniform; it is greatest at the surface of the globe, and gradually decreases in a geometrical ratio, so that at the distance of

about five miles and a quarter it becomes too subtile to exert any appreciable pressure towards the earth; for if one cubic foot of air from a stratum at the surface of the globe were conveyed to that distance, it would, by its expansion, occupy a space of three cubic feet, and at forty-two miles it would expand into 4096 feet.

At every change of the wind alterations are produced in the electrical states, and consequently in the temperature and density of the atmosphere. The variations in density are occasionally so considerable that the mercury in the barometer may fall an inch or more in the course of twenty-four hours, indicating a diminution in the pressure of the atmosphere equal to half a ton upon the human frame. When so much compressing force is removed from the surface of the body, its more yielding materials become relaxed, and sometimes slightly tumefied; and from this cause arëonauts have, in some instances, experienced great inconvenience from the swelling of their limbs. But the ultimate effects of the diminished pressure are different according as it influences the muscular system, the circulation, or the brain; and according as it is combined with warm or cold weather. The simple effects will be first considered.

The influence on the *muscular system*, of diminished pressure on the body, is to relax its fibre and to reduce its power, occasioning lassitude. This effect will be slight or considerable, according to the tonicity of the muscular system; those who are in delicate health, therefore, will be most influenced.

The influence of diminished atmospheric pressure on the circulation is much more extensive than that on the muscular system, and produces more complicated effects. The blood, as well as the blood-vessels, participates in its physical influence. The air contained in the blood expands under diminished pressure, rendering the vessels turgid; and when the heart and blood-vessels become relaxed,

they are more dilatable, and the blood is accordingly circulated in greater columns, although with less energy. This altered state of the circulation is favourable to hemorrhages and dropsy. Of all parts of the body, the lungs are the most yielding in texture, and being at the same time permeable to the atmosphere, are the most susceptible of being influenced by its agency; under deficient pressure, therefore, their blood-vessels become congested, either giving rise to, or favouring the return of, bronchial affections. In humid climates, as in those of Holland and the Netherlands, in which the atmosphere is of inferior density, corpulency and phlegmatic habits are prevalent; while in very cold or hot climates, the atmosphere being more dense, the inhabitants are for the most part thin and muscular.

Temperature of the Atmosphere.—A very *high* temperature of the atmosphere, such as prevails in tropical climates, is a powerful stimulus, causing a general increase of the circulation throughout the body, but more particularly in those parts which are immediately exposed to its influence, viz. the skin and the air-passages.

A mild temperature, unless preceded by very cold weather, is not productive of any undue excitement or depression, and therefore cannot be considered as conducive to disease.

A very *low* temperature, on the contrary, is a powerful sedative, subduing the circulation in all parts of the body exposed to its influence, and thereby producing direct effects upon the parts exposed, or indirect effects upon the internal organs.

The direct effects are proportioned to the intensity of the cold and the duration of the exposure, and may vary from mere chilliness or numbness to the complete extinction of life. The indirect effect of the sedative agency of cold upon the circulation in the external parts of the body is excitement of the internal organs, consequent on the

revulsion of blood towards the centre, occasioning internal accumulations, active or passive congestions, phlegmasiæ, and apoplexy.

All persons in delicate health are sensible of the depressing influence of cold. It is however to be recollected that the effects of these high and low states of atmospheric temperature are relative and not absolute; and that sudden and considerable vicissitudes produce great, while gradual changes, to which the animal economy accommodates itself, produce slight effects. As heat and cold are relative states, that which produces a sensation of cold in the warm hand of one individual, feels warm to the cold hand of another; so the atmospheric temperature of 60° is oppressively hot after a severe frost, and produces pneumonia, rheumatism, &c.; whereas the same temperature of 60°, after the thermometer has remained some time at 80°, is exceedingly cold, and induces inflammation of the internal viscera, while it relieves that of the lungs and extremities.

When the different constitutions and habits of mankind are considered, there is no difficulty in perceiving that changes of weather are salutary to one class of persons, injurious to a second, and without effect upon a third.

These are the more simple effects of the different degrees of density and temperature of the atmosphere upon the human frame; the effects of their combined agencies are arranged in the following tabular view of the diseases, either induced or influenced by different states of the weather.

Density of the Atmosphere.	Temperature.	Diseases induced.
When the density of the atmosphere is great, neither rain nor moisture descends; on the contrary, the buoyancy of the air occasions the speedy ascent of moisture from the earth by evaporation.	If the temperature be very high, the evaporation will be rapid, and both the surface of the earth and the atmosphere will become dry, and the weather sultry and cloudless, as in tropical climates.	A very high temperature of the atmosphere produces general vascular excitement, occasioning profuse perspiration, swelling of the extremities, vertigo, syncope, hemorrhages, phrenitis. To this over-excitement succeed emaciation, lassitude of body and mind, fevers of various kinds, liver affections, &c. A dense air counteracts, in a slight degree, the tendency to some of the above diseases.
	If the temperature be moderate, the exhalations from the earth will proceed less rapidly.	To these states of the atmosphere, unless preceded by exceedingly cold weather, it would be difficult to ascribe any pernicious influence, whether upon a sound or impaired condition of the whole or of any part of the human frame; but when preceded by frosty weather, they are abundantly productive of inflammations of the air-passages, hemorrhages, rheumatism, &c.
	If the temperature be very low, little or no evaporation will go on, and the air will be dry and frosty.	Cold, by its sedative agency, diminishes the circulation of the blood on the surface and extremities of the body, and occasions in aged people apoplexy, palsy, and sphacelus of the feet; in others, inflammatory affections of the internal organs, diarrhœa, and other functional disturbances. In certain asthmatic patients a dense atmosphere, by its weight upon the inner surface of the air-cells, overpowers their already diminished resilience, and thereby increases the dyspnœa. This form of the disease is improperly denominated spasmodic asthma, and is erroneously considered to arise from constriction of the air-cells, whereas these cavities are most probably in an opposite condition—in a state of forced distention, owing to the increased pressure upon their internal surface.
When the density of the atmosphere is much reduced, its buoyancy is diminished, allowing the moisture in the higher strata to coalesce into clouds, and to descend in the form of rain.	If the temperature be high, the elasticity of the air will be brought into operation, which will in a slight degree counteract its deficient buoyancy; and if the atmosphere be still, it will be highly charged with electricity.	A warm and impoverished state of the atmosphere induces languor in invalids, and in persons of lax fibre; those subject to rheumatism, to chronic affections of the brain or of the joints, are sensible of its effects. It is also favourable to dropsy and hemorrhages.
	If the temperature be moderate, considerable evaporation and descent of moisture taking place at the same time, the whole atmosphere, especially the lower strata, will be highly charged with humidity.	It has been stated that certain asthmatic patients suffer under a dense atmosphere, while a warm and rarified air relieves them; it distresses those who are subject to other forms of the same disease, the dyspnœa being increased in consequence of the combined effects of vascular excitement occasioned by a high temperature, and of muscular relaxation resulting from deficient density of the atmosphere. The effects are, turgescence of the blood-vessels, and consequent contracted calibre of the air-passages, accumulation of mucus, increased weight of the lungs, and relaxation of the air-cells.
	The temperature and density of the atmosphere can never be at their lowest points at the same time; but often in this climate the density is inferior when the temperature is only ten or fifteen degrees above the freezing-point.	Mild wet weather, especially if it succeed frost, occasions inflammation of the lungs, larynx, fauces, and nares; rheumatism, hemorrhages, dropsies, and defluxions of all kinds. There are but few diseases of the inflammatory and febrile classes which may not result from exposure to this unfavourable weather; but those organs which are predisposed by prior disease are the most liable to inflammation from such a cause. The occurrence or the suppression of hemorrhages may arise from the revulsion of blood which takes place from cold feet.

It appears not only that most inflammatory and febrile, but that many other diseases may be traced to an atmospheric origin; that one character of a disease may be produced by a change in the temperature of the atmosphere, and another character by an alteration in its density; that most internal phlegmasiæ originate in a change from hot to cold weather, while external phlegmasiæ more generally arise from the contrary change—from cold to heat; that fevers may be produced by the exhaustion consequent on continued hot weather, or may be brought on by the depressing and combined agencies of cold and wet weather.

To distinguish those conditions of the atmosphere which induce disease is so important that no rational system of treatment can be adopted which does not bear strict reference to them; for the means which would remove an inflammatory disease occasioned by warm and wet weather succeeding to cold and dry weather, would not in all respects be suitable for a phlegmasia produced by cold in succession to warm and dry weather. This view of the atmospheric causes of certain diseases, and of the treatment as varied to correspond with those causes, if correct, goes far to prove the empiricism of the antiphlogistic system of treatment, which recognises none of these distinctions, but is adopted in all cases of acute inflammation, be the causes what they may.

These remarks cannot be better illustrated than by examining the causes and the mode of treatment of the influenza which prevailed during the months of April and May, 1833. That epidemic was ascribed to an atmospheric infection which influenced more or less those who breathed it. It however admitted, as it appears to me, of a much more correct explanation by ascribing it to the changes which occurred at the time in the conditions of the atmosphere. During the previous two or three months the average temperature of the atmosphere was 45° Fahr-

enheit; during the month of April, in which the influenza appeared, the average temperature was 55°, being an increase of ten degrees of heat, and the heat gradually increased until the middle of the month of May, when the thermometer reached 80°. The moderate temperature of 55°, after weather which was considerably colder, became a stimulus to the mucous surfaces exposed to it; but this increase of temperature alone, it is probable, would not have produced such extensive effects if the density of the atmosphere at the same time and for some time previously had not been below the standard by nearly four hundred pounds of pressure upon the body. This inferior pressure occasioned turgescence of those parts of the circulatory system more immediately exposed, and predisposed them to become inflamed under an increased temperature, and the consequences were, inflammation of the air-passages, ophthalmia, rheumatism, lassitude, hemorrhages, dropsies, and puerpera hæmorrhagica. The influenza continued until a sensible change took place in the weather, which occurred on the 18th of May, when the mercury in the barometer rose to thirty inches, and that in the thermometer sunk several degrees. Notwithstanding the temperature became a little more moderate, it remained sufficiently high to give rise to rheumatic affections, and to perpetuate others which already existed.

Consistent with the term *influenza*, most of the diseases which occurred at that time might have been called influenza; the same causes produced them, and they differed only according to the sympathies of different individuals. However, to restrict these remarks more particularly to those diseases which were considered influenza, the inflammation in some was confined to the nasal and pharyngeal mucous membrane; in others to the trachea; in some to the lungs; in others it extended over the whole surface of the air-passages; all experienced lassitude, and

in some this was the only symptom complained of: dropsy or hemorrhage supervened in many cases of protracted illness.

With regard to the treatment, it was generally acknowledged that the influenza did not yield to the remedies employed for its removal. What were those remedies? Did they bear reference to the causes of the disease? The remedies were chiefly those which are usually called antiphlogistic, and consisted in general and local bleeding, purgatives, poor liquid diet, and, for the most part, confinement in the house; to which were added the usual expectorants. By examining how far these means were calculated to counteract the causes of the disease, an explanation will, at the same time, be found of the want of success which attended them. The immediate causes of the disease were, a diminished tone, combined with an excited state, of the vascular system; the former depending on the diminished pressure of the atmosphere, the latter on its increased temperature.

With respect to the means of cure—*Bleeding*; its influence was to reduce the tone of the muscular and vascular systems: instead therefore of counteracting, it aided one of the causes of the disease. *Purgatives* produced a similar effect in a less degree. *Poor liquid diet.*—Nothing tends so much to overcharge the lungs with mucus as taking large quantities of liquids, which were particularly objectionable in a disease, one of the chief characters of which was a redundant secretion of mucus*.

Confinement to the house.—As the exciting cause of the inflammation of the air-passages was the increased tem-

* It was a curious fact that scrags of mutton rose in price to 11*d.* a pound, while the best joints fell to 6*d.*, so great was the demand for, and so incomparable in the estimation of the nurses were the properties of the scrags of mutton for the purpose of making broth, at that time.

perature of the atmosphere, breathing constantly the heated air within doors was little calculated to become a remedial measure. A decided proof of its ill effects was, that the complaint manifested itself most conspicuously in schools, work-houses, theatres, banking-houses, &c. This was so remarkably the case, that the influenza was supposed by many to be contagious; but it originated not only in crowded assemblies but even in private families, and it was very common for all those of a family who remained chiefly at home to be attacked with this complaint, while those who were in the open air the greater part of the day breathing a cooler medium, either escaped the disease altogether, or experienced only languor.

If these objections to the treatment which was adopted for the influenza be valid, the great fatality which attended this epidemic is sufficiently accounted for. The influenza of 1833 being a memorable occurrence, is offered as the chief exemplification; but there are in this variable climate numerous, although less marked, instances of similar effects attendant on similar atmospheric changes. The frosty weather of January last (1835) was succeeded by warm weather, and produced rheumatism and inflammatory affections of the air-passages in great abundance.

It is evident that the knowledge and observation of the particular conditions and changes of the atmosphere, and of their influence upon the human frame, are very essential in guiding the medical practitioner when treating the different disorders of his patients. Many diseases which are usually ascribed to the influence of cold, will be found attributable to more general causes,—to such as not only produce disease, but also modify those diseases which pre-existed. By noticing the barometer and thermometer in the morning, the reason will be often discovered why medicines fail to produce the good effects which have resulted from them on former occasions, and the propriety of re-

sorting to a different plan of treatment will suggest itself; occasionally, however, when the weather is powerfully influential, and continues in the same state for a long period, constitutions which are highly susceptible of its influence may resist any counter-agency of medicine, particularly in cases of chronic disease.

THE END.

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