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from the author.

COMMENTS
ON
CONVULSIVE DISEASES.

BY
CHARLES BLAND RADCLIFFE, M.B.
LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS.



LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.

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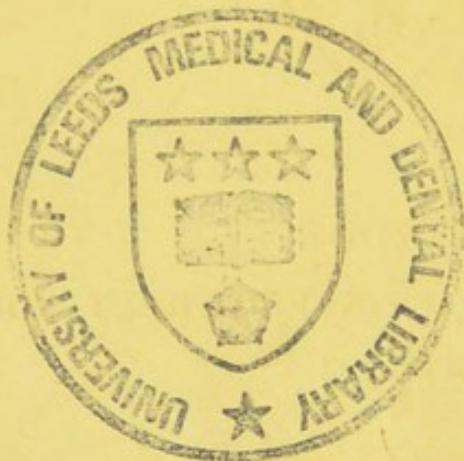
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NOTICE.

THE following "Comments on Convulsive Diseases" are reprinted from the pages of the "Medical Times," with the addition of a few remarks that suggested themselves on revision. The original text is especially amplified in the section which treats of the attack of Epilepsy; and for this particular alteration my thanks are due to J. Russell Reynolds, Esq., of Leeds, in a correspondence with whom, partly public and partly private, I was led to the fuller extension of this branch of my subject.

4, HENRIETTA STREET,
CAVENDISH SQUARE.
August, 1851.



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COMMENTS
ON
CONVULSIVE DISEASES.

I. *Of the Convulsive Temperament.*

1. Some preliminary conjectures respecting the nature of the *convulsive temperament* may be gathered from the history of ordinary tremulousness. The want of vital tone in this affection appears in the fact that the subjects of it are more or less weakly and delicate—that they are women rather than men, or men who approach most nearly to the feminine habit—and not the strong and stalwart of mankind;—that the affection itself happens at a time when the system has been exposed to cold, or other depressing influences;—and that cramp, or a still more decided form of muscular contraction, is not unfrequently substituted for tremulousness when the effects of such exposure are unusually marked. The want of vital tone in the severer and palsied tremblings of advanced life is further set forth in the signs of declining life and vigour—in the snowy locks, the fireless countenance, the cold hand, the wasted limb, the feeble pulse, the forgotten energy; and also in that softened and functionless state of the brain which is met with when the shakings are most unmanageable, and the kindred cramps proportionally severe and frequent. And, lastly, the same want of vital tone is seen at the moment of dissolution, when former tremulousness has merged into convulsive struggling,—and in death itself, when this final trouble of the muscular system has quieted down into fixed rigidity.

As seen in these several instances, therefore, it would seem as if the muscular contraction became more decided in proportion to the want of energy in the system,—tremulousness being in connexion with evident feebleness, palsied shakings with decay, cramp with still more marked degrees of these conditions, con-

vulsion with mortal exhaustion, and tetanoid rigidity with complete extinction of life,—and hence the conjecture that there is some inherent weakness or want of tone in the temperament under consideration.

2. In hysteria and chorea the special characteristics of the convulsive temperament are obscured by a crowd of symptoms, but they are to be brought to light if the search be conducted with sufficient care.

The frequent chilliness of the limbs, the inability to encounter fatigue, and the tardiness with which the system recovers itself after exhaustion, with many similar indications of delicacy and debility, show that there is some fundamental weakness of constitution in the woman affected by *hysteria*, and this in relation, not merely to a masculine standard, but to the average powers of womanhood. It would appear, also, that this weakness has not been fanned into temporary and feverish strength during the convulsive display, for at this time the patient is paler than usual, and often comparatively pulseless, and not flushed and heated as she is when the hysteric paroxysm is marked by high nervous excitement, and excessive volitional action of the muscles. Her uterine functions, moreover, partake in the general condition, or are still more enfeebled, and any reaction from them upon the system, if the effect is appreciable, will be to aggravate the existing weakness. And so likewise with the functions of other organs, and their possible reactions.

Passing to *chorea*, we notice a similar order of facts. It is still found that women are more frequently the subjects of this malady than men; and the women whose parents were infirm or aged, or who themselves had been enfeebled by illness or injudicious habits, more so than the stronger of the same sex. In convalescence from severe and exhausting diseases, choraic symptoms (which in this case may be considered as intimately allied to the subsultus of typhoid depression) are very common. There are few cases, also, in which we do not find unmistakable signs of anæmia and chlorosis. During life the countenance is pale, and the lips and tongue blanched; and after death the muscles, both voluntary and involuntary, are found shrunken and flaccid, and in colour not very different from those belonging to white-fleshed animals; or, if there is more blood in the system, its watery and depraved character is seen in the pastiness of the skin, the presence of effusion in the serous cavities, or in solid depositions of a rheumatic character.

In chorea, also, as in hysteria, there is no reason to suppose that the convulsive symptoms are dependent upon any local vascular activity. If one organ be more affected than another, it is by being more enfeebled. To use the words of Dr. Watson, "the instrument is not broken anywhere, but slackened, jangling, and out of tune; and (to pursue the metaphor) we have to restore its harmony by bracing it up again."

So far, therefore, the convulsive temperament appears to be one of undue delicacy, in which the signs of local and general activity are alike wanting.

3. The constitutional peculiarities of *epileptics* may be learnt most readily in a large lunatic asylum, where numbers of these poor people are gathered together. On paying a visit to such an establishment we find the objects of our search in the wards devoted to demented or fatuous patients, where, for the most part, they are scarcely distinguishable from the mass of miserable wretches who sit moping and drivelling for hours together, whose eyes stare upon you without any meaning, and whose tongues forget to answer after a few syllables are uttered. Some are of a more vigorous habit, but this vigour is only in comparison with their companions;—indeed, if we for a moment leave the dingy atmosphere of these wards and observe the appearance of ordinary maniacs, we shall be fully sensible on our return that these more active epileptics are considerably below the standard of health and strength. In all, the hand has a frog-like coolness and clamminess; the pulse also is feeble, and not unfrequently twenty beats below the proper rate of rapidity;—and the want of animal heat, is further seen in a disposition to huddle around the gratings which guard the fire, or to lie down in the neighbourhood of the tubes of warm water which serve to heat the cells and corridors. And beside all this, the complexion is generally pale and leaden, the cheeks without colour, the countenance languid and dejected, the limbs wasted, and the entire muscular system shrunk and flaccid, particularly if the malady is of any continuance.

The innate debility of the system in these cases is further indicated by unmistakable signs of a scrofulous disposition, a fact which is insisted upon by the chief authorities of our own times who have written upon this subject. Indeed, some of greatest name believe that there are no exceptions to this complication. In cases also where such signs are not conspicuous, we may often trace the injurious workings of the syphilitic or mercurial poisons, or find traces of scorbutic or some other cachectic

disposition. It has been well remarked, also, that where epilepsy has shown itself in persons who have been distinguished for their talents or genius, it has not been until the vital powers had been exhausted by exertion and excitement. In fact, there is no one of these distressing cases in which we are not able to find traces of some organic degeneration such as we have mentioned, or else of that peculiar prostration which follows undue vital activity.

At times, undoubtedly, epileptics may become maniacal, and exert themselves violently, but between this state of excited and erring volition and that of suspended consciousness in which the body is violently convulsed, as in the fits, there is no resemblance whatever. They are indeed antagonistic and incompatible, for the one is marked by the presence and the other by the absence of fever. At times, moreover, there may be a certain fulness of the vessels, but this also does not involve excitement of the system; on the contrary, (if I may judge from the cases which have fallen under my own notice,) this condition is totally opposed to that which is found in the well-fed butcher, and is only another proof of the want of activity in the system. It is, in a word, venous congestion, and not true plethora.

It is also to be remarked, that no local disturbance is a necessary complication of the epileptic temperament. In the brain and spinal cord all manner of morbid appearances have been described; but no other proof than their inconstancy is necessary to show that they are not essential to the malady. Upon this, indeed, Esquirol has expressed himself in words which require no comment: "*De toutes ces recherches,*" he asks, "*particulièrement de celles de Bonnet, de Morgagni, Baillie, Greding, Mechel, Wenzell, que pouvons nous conclure? Rien, sinon que ces mêmes alterations ont lieu chez des individus qui ne sont pas épileptiques, comme Wepfer Lorry l'ont prouvé. Avouons franchement que les travaux de l'anatomie pathologique n'ont jusqu'ici répandu aucune lumière sur le siège immédiate de l'épilepsie.*" This applies equally to all organs which have been supposed to have any immediate concern in the induction of this malady; for any change which has been described has been noticed also in cases in which there were no convulsive symptoms.

Other points might be noticed, but these are sufficient to show that the temperament in epilepsy, as in the cases we have previously considered, is marked by debility or exhaustion, and not by vigour,—not even by local vigour.

4. Similar conclusions arise out of the history of the convulsive movements associated with febrile affections. Initial rigors are attended with feelings of sinking and coldness, with feeble pulse, sunken countenance, and corrugated skin. It is the same also with the cramps of cholera; only in this case, coolness of the skin has become coldness and clamminess; the pulse no longer beats at the wrist; paleness and sallowness are deadened into blueness; while depression, with an obscure sense of melancholy, have lapsed into indifference and hopelessness. At the very time the frame is racked with spasm, everything indicates the most overwhelming depression. And that these rigors and spasms are connected with this state is evident, for a twofold reason. It is evident, from the mitigation which takes place as the system rallies, and from the complete cessation when the pulse and heat have returned. It is evident also from the recurrence when the stage of feverish excitement has passed off. Subsultus, indeed, is as constant an accompaniment of the last stage, as rigor is of the first; and it is equally in proportion to the depression of the system at the time, for it is aggravated into convulsion at the moment of dissolution, and into tetanoid rigidity when life is at an end.

This conclusion is borne out also in other cases where an animal poison has been introduced into the system, as in tarantism and rabidity. In the first affection, the symptoms resemble those which succeed the bite of a snake. After being stung, we are told that the person falls down without sense and motion, in which state he is when the involuntary dancing originates; so that, whatever influence music may have in the matter, it is clear that the movements themselves are preceded and accompanied by depression. In rabidity, also, it is well known that the influence of the virus is to induce debility. At the beginning, and before the system is fully mastered, there may be a fair amount of activity and vigour; but this passes off as the malady progresses, and, if life be prolonged, death is preceded by extreme exhaustion. Now, it most generally happens that the convulsions keep pace in increasing severity with the progressing weakness; and we have no alternative, therefore, but to suppose, in this case, as in those which occupied the former parts of this paragraph, that convulsion and feverish activity are incompatible conditions.

Nor can we ascribe the muscular contractions under consideration to any local vascular orgasm. The entire system is poisoned, and any local affection is obviously of a secondary character.

All, therefore, that we can say of the convulsive movements with which we are here concerned is, that they are associated with a certain state of the entire system, in which the only marked feature, when compared with the normal standard of health, is expressed by the word "prostration."

The consideration of these circumstances is calculated to illustrate two very important points in connexion with the history of the convulsive temperament, to one of which we have already referred. In the first place, the fact that the muscular contractions associated with febrile disorders are invariably coincident with a state of collapse, and that they disappear when the system rallies, is a strong argument in confirmation of what has been already said when speaking of hysteria and epilepsy—namely, that the convulsions in these cases are connected with a state which is the very opposite of vascular activity. In the second place, we are able to obtain some light as to the relation of the hysteric or epileptic to the strumous habit of body; for, as febrile convulsions are not confined to persons of strumous, sanguine, nervous, or any particular temperament, but happen to all alike when the system is sufficiently prostrated, so also we may argue (as, indeed, experience teaches us) that hysteric or epileptic convulsions may manifest themselves in the most different habits when the vital energy is sufficiently reduced. Be the force of the analogy what it may, however, it is sufficiently clear that the convulsive symptoms in connexion with the febrile condition arise at a time when the system is in a state of prostration.

5. It is still the same lesson in a different guise when we come to consider the cases in which the muscular contractions are prolonged and continuous. In the subjects of *cataplexy*, all that is observable in the intervals between the fits is an appearance of delicacy, the skin being pale and the pulse more readily affected by external agencies than it ought to be. A man whom I occasionally see, and who at times is affected by this singular malady, has the appearance and manners of an hysterical and excitable woman; and I understand that he is pale and cold during a fit, so arguing that the predisposition may be this paleness and coldness of which I speak. The onset of *tetanus* may be attended with varying excitement, but this gives way as the disease progresses, and death is preceded by great exhaustion. From the beginning to the end there is no true fever. We may conclude, also, that any excitement which may exist at first is not essential, from the fact, that the convulsion continues, or even increases in severity, after it has passed away, and even when it has given place to mortal exhaustion.

In one sense, moreover, this is in accordance with the experience of army surgeons, for they tell us that soldiers are most liable to this malady when dispirited, exhausted, ill-fed, and exposed to cold; and hence in tetanus, as in catalepsy, we may argue, that the true predisposition consists in a depressed state of the vital powers.

6. In order to complete this sketch of the history of the convulsive temperament, it is necessary to pay a moment's attention to certain cases which do not come under any of the preceding heads.

In children, then, convulsions often usher in febrile disorders, and, as in the case of rigors in the adult, they are attended with manifest depression. At other times they are connected with teething, or other causes of irritation; in which case (if we judge from the subsequent feverishness) they seem to replace the initiative rigors of hectic; and here, also, there is no evidence of any vascular excitement.

Adults, moreover, are liable to many convulsive affections which belong neither to the hysteric nor epileptic group; but we need only speak of those connected with pregnancy and childbirth, and of those which are brought about by excessive hæmorrhage.

In puerperal women, the convulsions may arise under various conditions and circumstances; but in none of these have we any proof that the powers of the system are intensified, and in others the evidence is altogether contrary. When they occur during the latter months of pregnancy, the strength of the mother may be supposed to be exhausted by the great appropriation of her nutrient juices by the fœtus. When they arise from uterine hæmorrhage, the conclusion is obvious. Nor is it different when they serve to usher in that fearful fever which is occasioned by the inoculation of poisonous matters. In none of these cases can it be supposed that the convulsions are connected with any true excitement; but, on the contrary, everything leads to the conclusion, that this frightful addition to the natural troubles of woman happens in a state and at a time when the system is prostrated, and this in an extreme degree.

And, finally, all these considerations are borne out and confirmed by the occurrence of fierce convulsion in persons previously in perfect health, or in the lower animals, during the progress of mortal hæmorrhage; for at this time there can be no conceivable excitement of the system, whether partial or general.

7. In conclusion, therefore, we gather from this survey, that

the *convulsive temperament* is one of prostration, and not excitement,—of delicacy, and not vigour; and that these characters, though presented in an infinite number of aspects, both in different people and in the same person at different times, are never lost.

II. *Of the Convulsive Attack.*

1. In the more simple and familiar phenomena of morbid muscular action, it is not difficult to obtain some light as to the cause of the attack. Thus, we all know that the ordinary tremulousness of delicate persons is induced by cold, by want of food, or by fear and grief, and that relief is obtained as soon as these depressing influences are counteracted. We know, also, that the palsied shakings of advanced life are aggravated or assuaged under similar circumstances. It is, in fact, a matter of ordinary experience in which there is no manner of doubt, that the immediate cause of the movements under consideration is the withdrawal of some vital stimulus.

Again, it is difficult to suppose any increased excitement of the system in the convulsions of dissolution, or in the stiffness of death; and hence it seems necessary to assign these phenomena, as well as the more insignificant movements of which we have just spoken, to some failure in vital energy.

2. The appearance of any one during an attack of hysteric convulsion is not unlike that of a person in a swoon, and so far as we can see the causes which have determined the mischief, are likely to have induced such a state; the system, in a word, is depressed, and has been subjected to depressing influences, and when it is otherwise the symptoms are raving and violent volitional action of the muscles, and not partial insensibility and convulsion. The appearance of any one during a paroxysm of chorea is equally against the hypothesis of excitement, and so are the circumstances which have favoured the display. Indeed, with few, if any exceptions, we are able to obtain distinct proof that the immediate antecedent has been abstinence, mental depression, unwonted exposure to the weather, or some cause which must have lowered the vital energy for the time. We find, indeed,—so far as we are able to judge from the scanty evidence which belongs to this part of our subject,—that whatever induces or aggravates ordinary tremulousness, has a like influence upon hysteric convulsion or choraic agitation.

3. In epilepsy it is of great moment that we divide the symptoms of actual convulsion from those which usher in and close the fit, for without this it will be extremely difficult to discriminate between what is essential and what is merely accessory.

(a.) Upon the eve of a fit, then, epileptics are generally observed to sit or move about in a moping or listless manner, and their behaviour exhibits in various indefinable ways a decided want of vital energy. They are mostly silent and moody, and if questioned, they complain probably of creeping or chilly feelings, of occasional shudderings, or else of faintness and sickliness, and not unfrequently they show sufficient reason for these complaints while we are talking to them. The countenance is rarely otherwise than pale and sad; often it is dusky, and bedewed with cold and clammy perspiration; and in confirmed cases there is a pinched and anxious expression which is not readily mistaken when once seen. The respiration is sensibly disturbed and frequently interrupted with sighs; and the pulse is weak, irregular, and slower than natural. These symptoms are more decided where the malady has been of some continuance, and especially in such cases as we find congregated together in the wards of lunatic asylums or workhouses, but they are always present in a greater or less degree. In a word, we may always detect proofs of defective energy or impending prostration, and never the reverse.

(b.) The fit itself is very variable in its characters, and especially in the manner of its onset. In the slighter forms the patient pauses suddenly in the midst of anything he may happen to be doing at the time, the countenance flushes and darkens, the expression is fixed and confused, the veins of the temples and neck stand out prominently, and there are spasmodic twitchings in various parts of the body, especially in the neck and hands. After a moment or two these symptoms pass away without leaving any traces in the memory, and thus we perceive that the mental faculties had been suspended for the time. The attack, indeed, is so slight and transitory, that it would pass unnoticed if attention had not been accidentally directed to it.

In other cases, and these the more ordinary ones, the convulsion is ushered in by a cry or scream, and the patient is at once prostrated upon the ground. Instead of a few passing starts limited to the hands or neck, the whole frame is seized with spasm, the features are horridly drawn, the eyes seem as if about to start from the lids, the tongue is protruded between the teeth and so crushed by the action of the jaws that the

mouth overflows with bloody foam, the limbs dash violently about in all directions, and, to crown the whole, the patient is thrown into an agony of suffocation by the spasmodic inaction of the muscles of the chest. The face and neck are greatly discoloured and swollen from the stagnated mass of venous blood. Consciousness is lost, and there is an utter insensibility to any injuries which may be inflicted during the fit. The pulse, also, is weak and depressed, and instead of becoming full and excited by the violence of the convulsion, as might be expected, it fails more and more, until at last it is scarcely perceptible, or altogether wanting. The heart, it is true, may act tumultuously, and frequently does so, but this action (as we see by the pulse) is too irregular for the discharge of its proper function. And lastly, there is often, during the height of the fit, a throbbing movement in the deep vessels of the neck, which might be supposed to be arterial if the pulse was not almost silent at the time, but which in reality seems to be due to the action of the right side of the heart upon the column of venous blood, which (from the impediment to the pulmonary transit) had accumulated to such a degree as to separate the curtains of the tricuspid valve, and so make the ventricle, auricle, and large veins one continuous cavity.

In other cases epilepsy is ushered in by signs which indicate the temporary suspension of the heart's action; and here, though the fits may be every whit as violent, and the consciousness and feelings completely paralyzed, the countenance and neck remain pale or livid from beginning to end, without any of the venous engorgement which characterizes the malady in its usual forms. Cases like these are not so common as the others, but still they are often to be met with in individuals whose bodily and mental powers are broken down, and especially in those miserable old people who are at the same time demented and epileptic.

(c.) For some time after this violent struggle is over, the limbs are shaken by passing quivers, and the breathings interrupted by sobs or gasps; but at length these residuary troubles pass off, and the patient lies spent and exhausted. In this state the lungs gradually resume their action, and as this change takes place, the venous congestion of the head and neck subsides, the colour, warmth, and pulse are restored, and the brain being thus relieved from the load which had pressed upon it, and once more supplied with red blood, the patient wakes to an obscure and troubled consciousness. All these changes take place slowly, and it is usually not until some time after waking that the sys-

tem has rallied in any decided manner. Sometimes, however, the circulatory powers are more vigorous, and the restoration of consciousness is deferred for some time in consequence of the rapid supervention of increased arterial action in the brain; but this result is by no means so common as that in which the patient wakes before the circulation has fairly recovered itself, and in which any subsequent reaction, instead of passing beyond bounds, stops short even of the healthy standard.

These are the chief symptoms which accompany and attend upon convulsion in epilepsy, and from them it is no difficult matter to distinguish what is essential from what is not.

In the first place, it is easy to perceive that increased arterial action has no share in the matter. The state of the temperature and of the pulse upon the eve of the fit, are sufficient proofs of the absence of any such condition at this time. In the paroxysm itself, also, the only symptom which could lead to a contrary conclusion is the throbbing movement of the vessels in the lower part of the neck, but even this objection is without foundation. Thus, this phenomenon is found to be cotemporaneous with the most unequivocal signs of arterial inactivity, and with a condition of venous engorgement, so very decided in degree, that there is no difficulty in believing the right side of the heart to have been distended until the curtains of the tricuspid valve are no longer sufficient to close the entrance to the ventricle. It occurs, in short, under circumstances in which increased action in the arteries is not to be supposed; but where a throbbing movement in the veins is perfectly intelligible, if not inevitable. It may, indeed, be objected that there are no stethoscopic signs of this tricuspid patency, and no pulse in the external jugular; but to each objection there is an answer. To the first, we may urge the difficulty of using the stethoscope when the body is writhing to and fro in convulsions, as well as that of distinguishing any thing so vague as the signs in question in the midst of the rubbing sounds occasioned by the action of the thoracic muscles. To the second, it may be answered, that the circumstances under which we ordinarily have pulse in the external jugular are so different from those which are found in the asphyxial engorgement of epilepsy, that we need not be surprised at its absence in the latter case: thus, in tricuspid patency from organic disease, (when there is pulse in the external jugular,) the heart is hypertrophied, and greatly increased in power, and the vessel in all probability dilated until its cavity is no longer cut off from the larger and valveless veins by the valve which ought to discharge

this office; but in the transitory patency of epileptic asphyxia, where the pulse in question is wanting, the heart is weaker than natural, and flagging in its action at the very time; and not only so, but the vein itself has not undergone any remarkable alteration in size. It is as natural, therefore, that there should be a pulse in the external jugular in the one case, as that there should not be such a movement in the other; and thus we may set aside this second objection to the idea that the cervical throbbing in question is a venous and not an arterial phenomenon. In the paroxysm itself, then, as well as in the state in which the paroxysm is impending, there are no symptoms which demonstrate the existence of increased vascular activity. It is the same also in the last stage of the paroxysm, and even more conclusively, for the circulation, which had gone on progressively failing, is at this time well nigh arrested. The independence of increased arterial action is further seen in those forms of epilepsy where the suspension of the heart's action would seem to be the immediate occasion of the fit, and where the patient from beginning to end remains pale, cold, and comparatively pulseless. It is seen in the admitted fact, that the fit is more apt to be violent in persons who are weak and bloodless than in those who incline to a sanguineous habit. It is seen also in many other ways,—but sufficient has been said to show that the convulsion of epilepsy is independent of increased arterial action.

In the second place, we find sufficient reason to doubt that venous congestion in the head and neck, (which is so marked a phenomenon in epilepsy,) is essentially connected with convulsion. A primary doubt suggests itself in the fact that hysteria, tetanus, catalepsy, and many other convulsive affections, are without any such congestion; and this doubt receives weight and character in the existence of cases of epilepsy, and these as bad as any, in which the face and neck remain throughout the paroxysm in the pale and pinched condition in which they were at its commencement. Evidence of a similar character is found in the history of the ordinary fit, and a short examination is sufficient to show that the convulsion holds no immediate relation to this particular fulness of the vessels. Thus, it is very certain that the spasms in the cervical muscles, which are the alleged cause of this congestion, cannot be the consequence of the congestion. It is certain also that the slight and fleeting spasms in the limbs, and elsewhere, which are distinctly cotemporaneous with the cervical spasms, are equally

independent; and thus there is evidence of the existence of general as well as partial convulsive phenomena when the congestion makes its first appearance. And further, the sequel of the fit agrees with the commencement, for, on tracing the history, we find that the perfect paroxysm ceases abruptly when the congestion is at its height. Every way, therefore, this theory meets with contradiction, and if it be not discarded, we are compelled to admit that the fit begins before there is any occasion for it, and ceases at the very time the occasion is most pressing. What the effect of the congestion is, it is not our province to inquire; but it may be suggested that it is more in accordance with known physiological results to suppose it to be the symptom which mostly distinguishes epilepsy from tetanus, hydrophobia, and other convulsive maladies—namely, *coma*. What is its cause?—is a question still further trenching upon our limits, but one which from its own special interest, and from an opinion lately expressed in very high quarters, may excuse a passing notice. We venture, then, to doubt that this congestion is *entirely* due to spasm in certain cervical muscles. We grant this to be an important cause, but, at the same time, we are disposed to ask whether some share is not due to asphyxia, the approach of which was indicated before the fit by the tendency to sighing, and afterwards by the most obvious and unequivocal signs? At any rate we know that there is a frightful engorgement of the cranial and cervical veins, whenever the breathing is seriously and suddenly obstructed, and we have yet to learn that contraction in the cervical muscles could in itself produce such marked results, independently of any asphyxial impediment of a more recondite character. But for the present we must be content to leave in abeyance the cause as well as the effects of this particular congestion; and to rest satisfied with the negative information that it is not essential to the convulsion of epilepsy.

In the third and last place, a review of the history of epilepsy enables us to understand that the convulsion is not connected with an increased supply of nervous influence. Judging from the state of the circulation, and from the appearance of the face (which is a proper index of the state of things within the head), as well as from the loss of volition, consciousness, and sensibility, the brain is far less active than it ought to be. Judging also from the appearances presented after death, we are led to the same conclusion. In early cases, and especially where epilepsy is associated with madness, the traces of active mischief

are not unfrequent, but in confirmed cases these have given place to indications of degeneracy and want of tone—such as pallor of the brain, with atrophy of its substance, and superabundant serosity. The former signs, however, are not only inconstant, but they are more common, and far more conspicuous in ordinary mania and in many other instances, and therefore they cannot be considered as essential to the convulsive malady. The latter signs, on the contrary, are always present in some degree, and most marked in the worst and oldest cases, and thus their connexion with epilepsy is more than probable. Similar signs are also coexistent with the palsied shakings or spasms of old age, and this fact is an additional argument in favour of the connexion of the convulsive symptoms of epilepsy with indications of degeneracy and want of tone. At any rate the evidences of vascular excitement are absent,—and therefore we are at liberty to conclude that the disclosures after death and the history during life are alike opposed to the idea of any increased cerebral activity in epileptic convulsion.—We have less tangible proofs of the functional changes in the other sources of nervous power, and here, therefore, it is more difficult to give an opinion; but there is one fact which is well nigh conclusive as to the absence of any increased activity during the fit, and that is, the depression of the circulatory powers—for in such a state it may be maintained, without much fear of contradiction, that an increased generation of nervous influence is impossible, and this not only in the brain, but in the spinal cord, and in all other centres. However we regard the matter, therefore, the only conclusion would appear to be that the convulsion of epilepsy is independent of increased innervation.

Analysing the symptoms of epilepsy in this manner, we are compelled to discard vascular activity, venous congestion, or nervous exuberance as causes of convulsion, and to perceive the connexion of this phenomenon with a condition devoid of energy, and expressed by the terms prostration or collapse; and thus we are conducted to the same conclusion as that to which we arrived in our examination of the simpler and more familiar varieties of convulsion.

Finally, it but remains to say that this conclusion is further borne out by what we know of the so-called *exciting* causes of epilepsy, for in this respect the experience of epileptics agrees with that of hysterical or choraic persons. Thus, it is not joy, but fright or fear, to which the seizure is referred,—it is not to the temperate indulgence of the appetite, but to excess and abuse,

with the exhaustion consequent thereon,—it is not to a good meal, but to the want of one. Indeed, in many scores of cases, with the particular history of which I have made myself acquainted, I have not found a single instance in which the occasion of the seizure was not something, whose immediate or remote operation, was to depress the vital powers.

4. There are no signs of excitement during the initial rigors of fever, but there is on the contrary, a most unequivocal evidence of bodily and mental depression. In cholera these rigors are aggravated into spasms, and hence it would appear that the severity of the convulsion which ushers in fever and the allied affections, is in direct relation to the depression; and this conclusion is further supported by the history of the last stage of fever, for it is found that the subsultus which made its appearance when the powers of the system began to fail, is exaggerated into convulsive struggling at the time of death.

At these times, also, there is no evidence of the existence of any residuary focus of energy from which an excess of motive influence could be supplied to the muscles of the shivering or convulsed patient. Local affections of an inflammatory character may, indeed, arise in the progress of the malady, and these may be in the brain or elsewhere, but they are neither constant in their occurrence nor yet fixed in locality. They are, moreover, distinctly secondary in point of time; for when they appear, the rigors or spasms are at an end, and while they remain all subsultoid movements are absent; and thus we may conclude that local, as well as general, excitement, is incompatible with the convulsive phenomena of fever.

5. During the fit of catalepsy the appearances are so death-like that it is scarcely possible to avoid the conclusion that the contraction in the muscles is the anticipation of the stiffness which happens after dissolution. The patient, indeed, (to use the words of Dr. Watson) “looks like a waxen figure, or an inanimate statue, or a frozen corpse,” and everything shows that his life is upon the verge of extinction. In tetanus, also, the attack would appear to be altogether independent of excitement. Indeed, the fact that the seizure happens unexpectedly and without any warning after a preliminary stage of depression, together with the fact that the spasms are often unabated when the vital energy is well nigh spent, may be considered as arguments which tend to show that the attack is at a time when the system is depressed below the natural standard. And, lastly, it is the same with the rigidity of death; for in this case the accession is

immediate if the bodily strength has been previously worn away by an exhausting disease like fever, or by the slower waste of consumption or old age; but is deferred for a long period, often for days, when a person has been cut down in the full glow of life. In other words, it would seem as if this peculiar phenomenon of muscular contraction were resisted by the lingering vitality of the system.

6. Among the vaguer forms of convulsions which do not come under any of the previous heads, we find many additional confirmations of the previous conclusions. In one case, the operations of some depressing poison may be traced in the system, as in puerperal fever; in another, the immediate and sole cause is loss of blood. Always, indeed, there is unequivocal depression, and often, as in the last-named case, the history is such, that it is impossible to doubt the inseparable connexion of the convulsion and exhaustion.

7. In conclusion, the lesson which would seem to be deducible from these considerations is, that the *convulsive attack* is accompanied, and, so far as we can judge, determined, by a depressed state of vital energy.

III. *Of certain ulterior considerations relating to the Pathology of Convulsion.*

1. In our previous papers we have found reason to conclude that the predisposition to convulsion is marked by debility or prostration of the system, and that the attack itself is accompanied by signs similar in character, but more exaggerated in degree; in other words, we have found reason to conclude, that convulsion is dependent upon a diminished supply of vital force *in* and *to* the muscles. We had already arrived at the same conclusion in reference to the phenomena of healthy muscular contraction in a work recently published under the title of "The Philosophy of Vital Motion;" for here we had found that the contracted condition of all organic tissues and of true muscle among the rest, is induced by ordinary molecular attraction upon the abstraction of some agent or agents of a *repellent* character,—the shortening of a muscle, in fact, being precisely similar to that which takes place in a bar of iron when its temperature is reduced, instead of being, as we have been taught to believe, the effect of some active stimulus whose direct operation was to in-

duce contraction. So far as we can see, therefore, the result at which we have arrived in these pages is borne out by the dictates of physiology as well as pathology,—by the general law of muscular action, as well as by certain isolated and imperfectly understood phenomena of disease,—but as the facts upon which the higher generalization rests are too numerous and complicated to be introduced here, we are unwillingly obliged to refer the reader to the work in question for all further information.*

It is not sufficient, however, to say that convulsion is connected with debility and prostration, except we can account for the occurrence of this phenomenon in some cases, and the absence in others; and it remains, therefore, that we endeavour to point out the special as well as the general characteristics of this state.

What, then, we may ask, is the ultimate idea at which we can arrive in the investigation of this pathological condition? Is it distinguished by any local affection? That it is not, would appear to be evident in the mere fact, that no one single affection is to be pointed out as a constant and unvarying accompaniment, as well as from other considerations which have been already entertained. An organ may become affected after the disorder is set up, and this—as we are taught by the first physiologist of the age—is most likely to be the spinal cord, but that this centre is the primary and sole source of mischief is not maintained by Dr. Marshall Hall himself. Indeed in his division of convulsive affections into *centric*, or those arising in the spinal cord, and *excentric*, or those originating elsewhere, it is fully evident that this physician is disposed to seek for the causes of these affections beyond any organic or functional changes in that portion of the nervous system with which his name stands connected, and will stand connected so long as physiology is a science. But, be this as it may, we have stated the ground upon which we venture to found our own opinion, and upon this we must stand or fall.

The result is different if we proceed to inquire whether there be any general disorder upon which the convulsive symptoms can be supposed to be dependent. Thus, there is a remarkable diminution in the contents of the vascular system at the time of the seizure, which diminution would appear to be intimately connected with the seizure. Persons apt to tremble in the cold,

* "The Philosophy of Vital Motion." London: J. Churchill, Princes-street, Soho. 1851.

will find, if they pay proper attention, that the first consequence of the exposure is an abundant secretion of urine, and an almost irresistible necessity to empty the bladder. It is well known also, that a seizure of hysteria or epilepsy is generally ushered in by a similar copious secretion and discharge; and that it is the same in the initial rigors of fevers. Again, we have frequent proof in women that hysteria is induced by copious menstruation; and that epileptoid convulsions are the direct consequence of excessive hæmorrhage. In cholera the urine is suppressed, but in place of this, there is an abundant serous discharge from the bowels; and in the subsultus of the last stages of fever we have most generally a free colliquative diarrhœa. In fact, wherever there is convulsion, we find that the vessels have been emptied to a greater or less degree, either by natural or unnatural secretions, or by direct hæmorrhage.

Now, there are certain reasons by which we are led to suppose that this change is intimately connected with muscular contraction. Filling of the vessels of erectile tissue, for example, is as necessary to the state of turgidity, as emptying is to the return to the quiescent condition,—in other words, the vessels must be emptied, in order to allow a state of contraction in the irritable fibres of the vascular coats and interstitial spaces. It may be objected, indeed, that this contraction is not that which takes place in muscular structures; but, at the same time, it is to be remembered, that there is a complex vascular web in muscle which differs but little from that which forms the basis of erectile tissue, and which, therefore, may be supposed to be affected in the same way by the removal of the blood, and also that the fibrous parenchyma in each case is allied by intermediate gradations in such a manner as to be in reality but varieties of the same irritable fabric. The illustration, however, may be admitted without contending for the analogy, and from it we may understand, in some measure, that a full state of the muscular web of vessels may oppose a mechanical bar to contraction in the parenchymatous fibres, and that emptiness will facilitate, if not induce this state.

Here, then, we may perhaps find *one* reason why convulsion does not always attend debility or prostration. At times, for example, a person liable to hysterical fits, being overcome by the sudden communication of some painful intelligence, may fall down in a state of syncope; whereas, if the disclosure had been gradual, the kidneys, or skin, might have acted freely, and (the vessels having been emptied to the requisite extent) convulsion, and not syncope, have been the result. Again, an epileptic may

fall down in coma instead of convulsion, and still the reason be that the suddenness and extent of the disturbing impression has not allowed time for the vessels to part with any of their contents.

It does not concern us in this place to inquire into the ultimate cause of the change of which we have been speaking; but it is worthy of remark, in passing, that it may depend upon a contraction in the fibrous elements of the vascular coats, by which the internal capacity of the vessels is rendered too straight for the former contents; the contraction itself being analogous to that which takes place at a later period in the interstitial fibrous textures, and referring to the same causes for its origin. In this way of regarding this phenomenon we gain, moreover, some light as to its probable importance, for the emptying of the vessels, whether through natural channels of secretion or by accidental outlets, may be indicative of contraction—*convulsion* in the fibres of the vascular coats, or in the tunics of the ultimate cells. In fact, it may be an initial phenomenon of the convulsive attack.

2. The tendency to periodicity in many convulsive affections is a subject of great interest, and we must not pass it by in silence. At the same time it is one of such obscurity that, at best, we can only hope to throw out some hints which may help to future investigations.

It is no difficult matter, however, to perceive that there must be some law of periodicity in health, and by investigating this we shall prepare ourselves to cope with the confused and apparently anomalous phenomena which are witnessed in disease; indeed, this is the only true method of inquiry of which we can avail ourselves. Let us begin, then, with the common diurnal changes of sleep and wakefulness, and inquire into the causes and agencies which operate here. In doing this we are, at first, disposed to confine our search to the body; but eventually we are obliged to pass to a wider field. The fact, indeed, that innumerable myriads of plants and animals wake and sleep at the same moment, is a proof that these states refer to a common cause, and not to one which is peculiar to each individual; and this conclusion is borne out by the consideration of a single case. In the sheep, for example, wakefulness commences at dawn and continues until nightfall, and sleep is measured with equal exactness by the period of darkness. The one condition is short or long according to the day, the other according to the night,—there being a sliding change by which this relationship is constantly preserved. Under these circumstances, therefore, it is scarcely possible to refer the sleep to exhaustion consequent upon waking,

for it is short and light after the accumulated exhaustion of a long summer day, and profound and continued in winter, when the length of the day and the degree of weariness are reduced to the lowest limit. In other words, the times allotted to renewal and waste are inversely related to each other, or nearly so; and hence it is difficult to suppose that either of these processes is the sole cause or effect of the other.

And if the efficient agents for which we seek are not to be found in the animal itself, where are we to turn? Are we to look for them in those grand changes which take place in the heavenly bodies, and which affect the whole creation at one and the same time? That we are, is perhaps to be argued from those changes in the economy which evidently refer to this source for their cause. An ordinary plant, for example, becomes bare and dead at the end of summer and remains in this state until spring; and that it is the returning light and warmth which bring back the life, is evident in the fact, that the same plant continues to flourish throughout the year in a more genial climate. A common squirrel becomes torpid and motionless when the country is wrapped in snow and ice, but in winterless regions the capacity of active existence is never lost. As we pass from southern to northern latitudes, we further find, that animal and vegetable life becomes less energetic in exact relation to the declining lustre and intensity of the solar beams; and that this loss is the cause of the difference, may be argued from the changes which take place in a wintry country when the revolutions of the heavens have placed it in more friendly relation with the sun, for then the plant recovers its leaves and flowers, and the frozen life once more begins to throb in bosoms which had long been without sense or feeling. In this way, indeed, we learn that there is a certain vivifying influence in the sunbeams by virtue of which life rouses into activity, or sinks into a state approaching to death, or death itself, according to the changes which take place in summer and winter; and hence it is no unphilosophical deduction to presume, that similar changes mark the daily periods of the heavens, and that the presence of the sun is *one* cause of wakefulness, which state, when compared with sleep, is expressive of a higher degree of vitality; and, for the same reason, the absence of this luminary *one* cause of that less vitalised condition we call sleep.

To this view, however, it must be admitted that there are sundry apparent objections, and of these the chief are, the nocturnal waking of some animals, and the extreme irregularities in man himself.

As to the first objection, however, it must be stated, that our knowledge of natural history is not yet sufficiently accurate to allow us to ground any final conclusions upon it. We know, indeed, as a general rule, that these animals lurk in holes and caves during the day time, away from the light and heat of the sun; and we may conjecture further, that light is not inimical to wakefulness in their case; for although afoot in the evening and early part of the night, yet they slink away to their dens before morning, and (for anything we know to the contrary) they sleep as soundly during the latter part of the night as the animals which wake in the daytime.

Nor do the irregular habits of man afford any serious difficulty if we consider the peculiar circumstances in which he is placed. The shepherd, for example, when following his calling upon the hills, sleeps and wakes with his flock; and, at other times, when he seems to conform to a different law, it is not difficult to detect a reason for this. When he wakes after sunset he enjoys in all probability the warmth and light of the fire-side, with many other genial influences, and so experiences in himself what may compensate in some degree for the withdrawal of the solar rays, and counteract that disposition to sleep which otherwise would have overcome him at an earlier period. That this may be so we may argue from what we see in the common hot-house, where not only our own plants, but the more delicate denizens of tropical countries continue to flourish, when all without is wrapped in snow or ice; or from the history of the common fly, which remains in the kitchen after all its kindred have disappeared from the rest of the house. In the shepherd, moreover, there are irregularities in regard to the character and times of meals, which must affect his economy, and make him more or less sensible, as the case may be, to the cosmical influences which predispose to sleep or wakefulness. Thus the irresistible drowsiness which is felt under intense cold when the system is not properly fortified by food, shows that the food is productive of an influence by which he is enabled to supply in some measure the want of the solar stimulus. It is impossible, therefore, that there should be such irregularities as those of which we speak without some perturbation in the workings of that periodical law which is impressed upon the economy by the changes of the heavenly bodies. We may argue, also, that this is the true explanation from the disappearance of these irregularities when the supposed causes of disturbance are partly obviated; thus it is, that in infants and young children, sunrise (or rather the opening of

the window-curtains) marks the hour of waking almost as exactly as in the canary, whose cage hangs in the nursery. Many additional considerations will suggest themselves to the mind of the reader, and we would willingly have dilated upon them under other circumstances; but sufficient has been said to direct attention to the proper method of inquiry, and not only so, but (as we would presume) to allow us to argue, that the main cause of the periodicity of sleep and wakefulness, and other diurnal phenomena, is to be found in the revolutions of our planet upon her axis, any seeming irregularity being produced by disturbing agencies under our own control, which agencies supply vital force, and so enable us to keep alive when the grand natural source and fountain of vitality—the sun—is withdrawn.

The same mode of inquiry will enable us to understand that the monthly movements of the economy, in spite of seeming irregularities, are chiefly ascribable to the moon. It is evident, for example, that the period of menstruation is not contemporaneous in all women, neither is it always correspondent with any certain age of the moon in the same woman; but the arguments we have already used will show that this is the necessary consequence of the differences of diet and habit which prevail. If these be corrected, as they are to a certain extent in large asylums, the conformity is so great, and so distinctly related in all to the same age of the moon, as to lead us to conclude that any difference would altogether cease, if the habits and diet were adjusted with a little more accuracy. Another reason for confusion in these matters is found in the careless habit of referring to the moon alone, as if she were the sole orb which acted upon the frame; whereas, to arrive at any correct result, it is evident that she must be considered as associated with, and assisted or antagonised by, the sun; for as the oceanic tides are not to be explained without taking into consideration this conjoined agency, neither are the ebbs and floods which sway the streams of animate nature.

And, finally, any remaining obscurity as to the chief cause of diurnal or monthly periodicity is made to disappear when we consider the vital changes which preserve a yearly period, and keep pace with the summer and winter; for in this case there can be no manner of doubt that the changes are mainly dependent upon the seasons; indeed, so little individual energy is there in plants or in the lower animals, that they may be said to live and die in mute obedience to the outer necessity.

In considerations of this nature, we find the clue to the inter-

pretation of the darker and less intelligible phenomena of periodicity in disease; and though much undoubtedly remains to be done before the subject can be satisfactorily explained, we may see enough to anticipate the result which will be obtained when we possess a greater number of accurate observations. We can understand, indeed, that the wonder is, not that there should be periodical laws in convulsive or other affections, but that they should be so obscured; and as the irregularities of diet and habits, with the thousand nameless things to which man is subject, produce equivalent disturbing impressions, there is no longer room for this wonder. Indeed, when we find that a convulsive attack is most likely to happen at night, this is what we should anticipate from the previous remarks, if, as we have endeavoured to show, these affections are significant of a lowered state of the vital powers; or when we find that the fits are more numerous and severe in winter, this is equally the consequence of the same premises.

Above all, however, in the attempt to comprehend the spring of periodicity, we must be careful not to neglect those vital influences which are seated without the body. We must bring to the task the enlarged views of Mead* and some of the elder physicians, as well as the microscopic and chemical lore of the present day; and we must learn to consider the heavenly bodies not merely as ornaments of creation, but as vital necessities in existence. For in this way alone can we hope to obtain any exact knowledge in the profounder problems of medical science.

IV. *Of the Treatment of Convulsive Diseases.*

In this practical and important subject there are few points in which all are agreed, and many in which we would venture to differ; and it is necessary, therefore, (if we would hope to gain audience,) to discuss the reasons upon which any opinion is to be founded. In order to this, then, we shall first attend to the questions relating to *hygiène*, and next, to those which concern medicine,—again resorting to the plan of passing the entire class of convulsive maladies in review, and appealing to the collective as well as individual testimony, when we wish to arrive at the correct principle of practice in any point.

I. In connexion with the history of convulsive affections, there are certain considerations which appear to indicate, that a pri-

* *De imperio solis ac lunæ in corpora humana et morbis inde oriundis, auctore Ricardo Mead, Londini 1746.*

mary and essential duty is to secure, as far as possible, a pure atmosphere, and a free exposure to the sun. The first necessity is shown among other illustrations, in the evident connexion between the pestiferous emanations of sewers or marshes, and the cramps and rigors of cholera and ague; and we need not dwell upon what is an admitted fact, not only in convulsive, but in all other diseases. The latter necessity follows out of the first,—for light is a chief agent in the purification of the atmosphere,—but it receives its own proper confirmation in the exsanguine appearances of the body generally, and in the flaccid and uncoloured state of the muscles after death,—phenomena well known to point directly to the want of the same energising influence. And, further, the sun is necessary as a source of warmth as well as light, as, indeed, we may gather from the relief which mere artificial heat affords in the shiverings or shakings of delicate or aged persons, in the agitation of chorea, and in many other instances which are too familiar to need special mention.

These are obvious points, upon which there can be no difference of opinion, and upon which we need not dwell; but with the next point, on the contrary, there is so much uncertainty that the correct rule has yet to be laid down. What, then, we may ask, is to be the character of the diet? Is it to be generous or frugal? If we argue from cases in which convulsive phenomena appear in their simpler guise, we should reason in favour of the former alternative; for it is well known that a person is more disposed to shiver before a good meal than after it. The comical and annoying movements of chorea are influenced in the same manner, and there is no doubt that a well-spread table is of great importance in the cure; and, as a general rule, it is equally certain that all kinds of hysteric affections are most aggravated when the bodily strength is depressed by abstinence.

In epilepsy, also, if we consider the practice pursued in large lunatic asylums, we find no reason for the prohibition of animal food, but, on the contrary, we learn that patients affected with this disorder are invariably injured by starvation, and, (if anything) require more nutritious food than the other inmates. Our conclusion, moreover, is similar if we consider the results of ordinary practice. Here, indeed, an opposite plan is usually pursued, but, on examination, it is found that theory or experience is equally silent in its favour. The former affords no warranty, for the only hypothesis which would serve this purpose (namely, vascular fulness as a cause of the malady) has been shown to be untenable. The latter, also, is equally unfavourable, for we

may challenge the warmest supporters to adduce unequivocal evidence of beneficial results. I have watched this point with great attention, and there is no doubt in my own mind upon it; indeed, I have invariably found, that epileptics exhibited speedy and unequivocal signs of improvement, whenever a diet of animal food was substituted for one consisting chiefly of farinaceous articles. At any rate, I think there is sufficient evidence to induce us to pause and consider well before we decide upon restricting the quantity or forbidding the use of the most nutritious article of food; and not only so, but to require the observance of a liberal rule until some better reason than we yet have is advanced to the contrary. We may not argue directly as to the influence of food upon the convulsive symptoms which usher in febrile affections, but still we know that the appetite has been deficient for some time, and the assimilation faulty. We know, also, that the best way of securing the resident medical officers and nurses of fever hospitals from the poisonous atmosphere of these places is to allow them a free supply of nutritious food. And that a full diet might have done something to prevent the initial rigors, we may argue further from the known fact, that a timely administration of appropriate nourishment will prevent the subsultus which is apt to supervene when the stage of feverish excitement passes off. There is no plethoric fulness in connexion with the accession of tetanus, and so far, therefore, there is no evidence that the attack was accelerated by any excess of food; and, on the other hand, it is found that beef-tea and soups are soon needed to counteract the tendency to sinking which marks the progress of this disease. The spasm, in fact, is often found to gain head when the system is actually fainting from exhaustion, and, therefore, any hint which is to be gathered here can scarcely be said to be in favour of starvation as a means of cure in convulsion. In catalepsy any evidence is negative rather than positive, but there is nothing, either in the history of the predisposition or the attack, which is opposed to the previous conclusions. And, finally, the argument in favour of a nutritious animalized diet in the treatment of the maladies under consideration, receives confirmation from the history of that convulsive condition of the heart, and of the system generally, which often results from excessive hæmorrhage, for in this case there is no doubt that an essential part of the plan to be pursued is to endeavour to replace the blood which has been lost, by the most nutritious food within the reach of the patient.

Now, in all these several cases the lesson which would seem

to be taught is this, namely, that it is a serious error—so serious, indeed, as to threaten to negative a practice otherwise beneficial—to withhold animalized and generous food in the treatment of convulsive maladies. Of this we may be satisfied, if we reflect patiently upon any individual form of the malady, but more especially upon the one last mentioned, in which, indeed, there cannot be two opinions as to the principle to be carried out.

The question as to the expediency or in expediency of stimulants is to be discussed in the same manner, namely, by proceeding from what is plain and obvious to what is obscure and doubtful. Beginning, then, where we began before, it is well known that a glass of wine is an excellent remedy for the shivering occasioned by cold, and that it is of great efficacy in the shaking tremulousness of old age. A glass of wine, moreover, is very likely to afford relief in a paroxysm of chorea. It would appear, also, as one of the results of the investigations of sanitary commissions, that the dram-drinking habits of the lower orders, though productive of incalculable evils when carried to excess, are of use (when restrained within the bounds of moderation) in counteracting the pestiferous atmosphere of close and ill-drained habitations. It is clearly established, also, that wine and fermented liquors are necessary to health in the case of persons engaged in fever hospitals: so that, from this consideration, as well as from that which has preceded, we should argue that stimulants are necessary to prevent the convulsive symptoms which usher in febrile affections. At any rate, wine must be poured into the system in liberal quantities when subsultus supervenes, and thus this conjecture receives some confirmation. It is well known also, that the peculiar and distressing movements of delirium tremens are to be relieved by these means. In tetanus and hydrophobia the testimony is of a negative character, but what we may gather is in harmony with what has preceded. At any rate, large quantities of wine have been given, in both affections, without aggravating the spasmodic condition, and, in some instances, with sensible benefit; and that this latter result has not been more constant, is possibly to be accounted for by the fact, that opium has generally been administered at the same time, and in large quantities. In the convulsive affections induced by certain mineral poisons, there can be little or no doubt as to the expediency of stimulants. In an interesting case of mercurial trembling recorded by Dr. Watson, the patient stated that he could not attend to his work except he prepared himself by taking a small quantity of gin, and that

by this means he became steady, and remained so for some time ; and, as a parallel fact to this, it may be stated, that persons engaged in the working of lead are fully satisfied as to the necessity of stimulants in one form or another. Nor is it different with those cases of agitation of the heart or of the body generally, which refer to exhaustion, and particularly to hæmorrhage ; for in those cases a free and persevering administration of stimulants, in conjunction with nutritious food, is our chief means of insuring relief. From these considerations, then, we may gain some direction as to the conduct to be pursued in the chronic affections to which we have not yet referred. In hysteria, however, there is not much difficulty ; for it is well known that a glass of wine will afford considerable relief, and this almost equally in the convulsive attack or in the commoner state of excitement,—which state, in fact, is more nearly allied to delirium tremens than to anything more positive and active. In epilepsy, also, there are some cases in which it is found expedient to adopt a liberal practice ; but in the majority of instances this is said to be altogether inadmissible. Here, however, the remarks which were made upon the solid ingredients of the diet may be repeated ; and again it may be said, that a better reason is wanted for this prohibition than an imaginary plethora. Judging also from the history of the epileptics confined in lunatic asylums, where beer is in daily use, we do not find that matters are the worse for the addition ; and, on the other hand, no unequivocal benefit can be shown to have resulted in cases where stimulants have been withheld ; for, as we well know, this miserable malady has hitherto baffled the efforts to subdue it. In fact, there is nothing in the history of epilepsy itself to prevent us from applying to it the conclusions which have already been drawn, but the contrary ; and for this reason I venture to recommend and practice a liberal conduct in this malady as in all the others. I may add further, that so far as I have been able to carry out this plan, the result has been satisfactory ; indeed, I have found the moderate use of wine and ale to be a most essential part of the treatment, and in not a few cases I have satisfied myself that an attack has been warded off by their timely use.

Additional arguments will present themselves in the sequel, when we speak of medicinal agents ; but in the meantime sufficient has been said, if care be taken to apprehend the full value of the collective testimony, to allow the conclusion, that convulsive affections require a liberal diet, both in regard of fluids and of solids.

There is yet another topic to be noticed before we quit the

subject of hygiene, namely, exercise; and this I mention last because of its importance,—indeed it is that which, considering one seat of the affection to be in the muscles, especially recommends itself to our notice. What, then, we may ask, is the rule to be observed here? Is active exercise admissible, or is it not? That it is not, we think is sufficiently evident, if our previous conclusions respecting the nature of convulsion are correct; indeed, so far from this, it would appear that any exercise verging upon fatigue is to be avoided, for until the muscles have recovered their tone so far as to be able to resist involuntary contraction, it is natural to conclude that we should be careful not to throw away what strength they have in voluntary efforts. With the views we have professed it would indeed appear as unwise to try muscles already overstrained, as to persevere in mental efforts with a paralytic brain, or to hurry the respiration when the lungs were incapacitated by disease; and, therefore, we must conclude that *rest*, in contradistinction to exercise, is the rule to be observed in the treatment of convulsive affections.

II. The medicinal treatment of convulsive affections involves the consideration of many debatable points, and it is very difficult to arrive at the possession of any fixed and constant principle of action; indeed, it is only possible to do this by a careful and separate examination of the nature and effects of the chief forms of remedial agents. And to this, therefore, we will endeavour to apply ourselves.

1. Our first inquiry shall be into the merits of the measure which occupies the head of the list, namely, *bloodletting*. Now, in doing this, it may be said, without any fear of contradiction, that bleeding would never be thought of as likely to relieve the tremulousness of delicate or aged persons. Experience has also decided against this remedy as a means of cutting short the initial rigors of ague or fever, or the cramps of cholera,—in which latter case, indeed, it rarely happens that blood will flow if a vein be opened,—and whatever doubt there may be at the onset, vanishes towards the sequel, for no one could be mad enough to resort to it for the relief of subsultus. Again, there is no imaginable benefit to be expected in the agitation or epileptoid convulsions consequent upon hæmorrhage. And, in catalepsy, there would scarcely seem to be any more likelihood of good resulting from it than in the rigidity of actual death.

Bloodletting is manifestly improper in the greater number of choraic or hysterical subjects. At times, indeed, the circulatory

powers may be somewhat active, and the symptoms those of excitement rather than of convulsion; but it does not follow that, because bloodletting may be then expedient, (which is by no means certain,) that it is so in the convulsive forms of the malady. There are cases of epilepsy, also, in which all are agreed that no blood can be spared with impunity, but in the majority an opposite opinion is entertained. It would appear, however, that the practice has greatly changed of late years, and is still in process of change, and that the lancet is now resorted to with far more hesitation than formerly. Attention, indeed, would seem to have been drawn to the fact that an attack is very apt to follow accidental or intentional hæmorrhage, and that a like result is the invariable attendant upon death in the shambles; and, on the other hand, faith seems to have been shaken as to the benefits resulting, even when the depletion has been very guarded. Cases illustrating the first doubt are related in great numbers in medical writings, and are of continual occurrence in every-day practice. A few months ago, for example, I was called to a youth residing in Paddington, who had been under my care for some time, and who had almost recovered from a liability to frequent and severe epilepsy. He had had a violent fit immediately after a very free hæmorrhage from a wound which he had inflicted in his hand with a chisel. Since this accident the fits have been as frequent as they were before, and the loss of blood is the only cause to which I can assign the relapse. In another case of epilepsy occurring in the same neighbourhood, which had been relieved in like manner by a generous plan of treatment, and in which the fits had been absent for nearly two years, a relapse took place during a visit to the country, within a few hours after a free bleeding, which had been thought advisable to relieve some acute and accidental mischief. Another objection to this mode of treatment is also to be found in the fact, that convulsions are most violent where the system is most emptied of blood and most debilitated in other respects, and that coma, and not convulsion, is the characteristic phenomenon in sanguineous habits; and hence we should argue, that any measure which would lessen the vascular fulness would be likely, *cæteris paribus*, to increase the liability to the epileptic seizure. We do not object to bloodletting, therefore, merely because convulsion is the consequence of excessive hæmorrhage, but on this ground also, namely, that the severity of the attack would seem to be in proportion to the impoverished character of the blood and the emptiness of the vessels.

Many, however, will agree in discountenancing the use of the lancet, and yet at the same time contend that local bleeding is attended with great advantages. It seems to me, however, that the arguments against the one are equally against the other, and that to reason differently savours somewhat of the times anterior to the discovery of the circulation. Moreover, it not unfrequently happens that the advocates of this practice find it necessary to associate it with tonics; and this itself is a great objection, for if the one be necessary (if we reason upon ordinary rules) the other is unnecessary,—and not only so, but injurious. Nor can it be urged that local depletion is needed for the relief of congestion; for, supposing such a state to exist, it has been shown to be not the cause of the disease; and even granting this, it may be objected that the mere taking away of blood, by increasing the general debility of which the congestion is symptomatic, would be more likely to aggravate than relieve the evil.

It would appear, therefore, that there is a great mass of direct evidence against bleeding in these affections, and, on the other hand, we can find no proof that certain benefit has resulted from the practice. Indeed, as we shall see in the sequel, the voice of experience is in favour of a contrary plan.

2. The true value of *purgatives* in the treatment of convulsive affections may be ascertained by considering their effect in varied as well as in particular circumstances. In the first place, then, we find no difficulty in deciding upon the question of fitness in persons where the convulsive symptoms assume the form of tremulousness, whether this be in early life or advanced age. Here we find them occasionally necessary to correct a loaded state of the bowels, but beyond this they are not wanted; and this is as we might expect, for the muscular agitation does not depend upon the irritation of any acrid matter lodged in the digestive canal, or upon any plethoric fulness of the vascular system, which might be relieved by a free and copious action of the bowels, but simply upon general delicacy or decline. In chorea and hysteria much good is done by a judicious use of aperients, in the relief of the obstinate constipation which is so frequent and troublesome a symptom; but we find that the articles selected by experience as best fitted for securing this end are endowed with stimulant and tonic properties. Indeed, a most successful plan is to associate some remedy which is a tonic-bitter as well as aperient, as aloes or rhubarb, with some decided tonic. The bowels, in fact, resume their action most readily under means which impart tone to the system generally; and, unless this end

be secured, anything which merely hastens excretion will be likely to do harm rather than good, and lead to greater torpidity. Hence, we should argue, that purgatives, as purgatives, are not called for under ordinary circumstances in the treatment of chorea and convulsive hysteria. Again: the history of the shivering, starting, and spasmodic movements, associated with fever, are of like significance. In initial rigors the system presents evident and unmistakable signs of depression, and we should argue, therefore, as to the inexpediency of remedies which themselves are directly calculated to aggravate this state. In cholera, indeed, it would seem as if the consequence of such a practice were shown to us experimentally, for here we find that the severity of the cramp is in proportion to the purging. It is often found, also, that the subsultus of the latter stages of fever is in great measure due to the exhaustion consequent upon diarrhœa. So that from all points of view alike, the evidence is unfavourable to the use of purgatives in these particular cases. Again: it is found that the movements in the bowels occasioned by these remedies are very apt to intensify the spasms of tetanus. This result is attributed to irritation; but it is equally, if not more reasonable (considering the premises) to suppose it due to the depression resulting from the evacuation, as in cholera or colliquative diarrhœa. Nor is any evidence in favour of purgatives to be gathered from the history of catalepsy, or any other state in which the muscular contraction is continuous.

Unless, therefore, there be a loaded state of the bowels, we find as yet no reason for the employment of purgative remedies in the treatment of convulsive maladies. And, this being the case, we have next to inquire into the rule which applies in epilepsy. Here, then, it is not to be denied that purgatives are given and given largely, and that an exceeding prejudice exists in their favour; but, notwithstanding this, it is difficult to adduce any satisfactory reasons, either theoretical or experimental, for the practice. We cannot recommend them for the removal of plethoric fulness, for this has been shown to have no existence as a cause of the disease. We cannot recommend them on account of any certain good which their use has produced, for of this there is no evidence. It is well known that benefit has frequently resulted from a combination with tonics, but in this case it is begging the question to ascribe the chief share to the purgatives. It is well known, also, that benefit is almost invariably found in the use of oil of turpentine; but here, again, the purgative action is quite secondary to the stimulant, at least

we may so suppose, for this remedy is much more nearly allied to pure stimulants than to any other class of medical agents; and not only so, but the benefit itself in many instances is altogether irrespective of any action upon the bowels. Nor does mercury deserve the exception which is so often accorded to it in this country. There are, undoubtedly, innumerable cases in which this drug is of the highest value; but that convulsion is not one of these, may be argued from the known fact, that the convulsive phenomena called mercurial tremblings are actually induced by it, when introduced into the system in poisonous quantities, as is the case in gilders. In fact, there is no evidence that any purgative is necessary in epilepsy, any more than in other convulsive affections, unless to remove some accidental accumulation in the bowels.

I would insist upon these remarks as of much practical importance; for on several occasions I have found reason to believe that a treatment otherwise judicious has been effectually counteracted by the administration of purgatives. A friend of my own, for example, has a child of about ten years of age, in whom epilepsy gradually developed itself upon infantile convulsions. The habit of the patient was very delicate, with a strong tendency to strumous disease; and to counteract this evident evil, good food and wine, with chalybeates and other suitable remedies, were recommended. Every attention was paid, and with some benefit; but still the fits continued, and there was reason to fear that the sequel would be as unfortunate as it too often is. While matters were in this state, however, I happened to discover that the mother, at the instigation of the grandmother, had been long in the habit of dosing the child with frequent supplies of calomel and castor-oil, or salts and senna. On this coming to my knowledge, I caught at the hope which presented itself, and representing the evil consequences of this conduct as strongly as I could, I gained a promise of compliance with my wishes. This was two years ago; and mark the result! In a short time there was a manifest improvement in the general health; and as this change took place, the fits became less frequent and severe, until at last they entirely ceased. Twelve months, indeed, sufficed for the cure, for I learned only the other day that a year has now elapsed since the last. Now, I mention this case because I had an opportunity of watching it closely from beginning to end, and because I could discover nothing which can account for the beneficial change in the symptoms, unless it be the discontinuance of the habit of continually drenching the patient with purgative remedies.

3. The beneficial influence of *tonic remedies* in the treatment of convulsive affections would appear to be well established in many instances. In chorea, iron is the sheet-anchor of practice; and in hysteria the same remedy is scarcely less necessary. Iron, also, has been of infinite service in cases of epilepsy, where the evident weakness of the system has caused the practitioner to disregard his theoretical notions about an excited condition of some part of the nervous system. Induced by these results, and especially by what takes place in chorea, Dr. Elliotson has given the same remedy in tetanus, and he says with advantage. It is well established, also, that quinine has the power of curing ague, and of furthering convalescence in ordinary fever when the vascular excitement is subsiding and when the muscles begin to be shaken with subsultus,—so that, in two points of view, we would seem to have proof of the efficacy of this alkaloid in combating the convulsive condition associated with fever.

Now, it is well known, that the ferruginous constituents of the blood are deficient in persons who, like the majority of those affected with convulsive diseases, are wan and pale, and therefore we may readily suppose that benefit should result from the administration of iron in such cases. We may understand, also, that quinine is desirable to counteract a specific poison, like that of ague, and further, perhaps, to assist the bitter principle of the bile in the process of digestion. Iron, in fact, may be useful to correct the debility resulting from pure exhaustion, and quinine to relieve that which is determined by the presence of some depressing poison; but, whatever the explanation, there is no doubt that both remedies are beneficial in the proper time and place.

There are other metallic remedies as well as iron, which have been employed in the treatment of convulsive affections, but none which are so sanctioned by experience. Sulphates of zinc and copper, nitrate and oxide of silver, have each their advocates, and not unfrequently they seem to act indirectly as tonics in relieving some irritable condition of the alimentary canal which has interfered with the perfect discharge of nutritive absorption, or in assuaging some exhausting diarrhœa. In relation to the salts of silver, no benefit whatever would seem to have resulted from absorption into the system. In epilepsy, at least, many cases are on record of patients who have been completely blackened without any relief to the fits; and in other convulsive affections there is no unquestionable evidence that good has resulted from its use. It is not impossible, however, that arsenic may

have a beneficial constitutional action, and this we may argue from its known mecurial-like powers in relieving the system from the specific poisons of ague or syphilis. It is not impossible, also, that sulphate of zinc may properly deserve to be the favourite which it has been during the last three or four years; and the explanation of this may possibly be in the relief which it afforded to the frequent diarrhœa which preceded the late outbreak of cholera, and which has not yet passed away. I have not had much opportunity of testing the operation of this remedy, but an intimate friend, who has had abundant means for arriving at some definitive result, assures me that the benefit was very decided where care was taken to regulate the dose so that no sickness was occasioned by it—a result not unlikely to happen from an overdose.

Where tonics are necessary we often find, also, acids or alkalis in constant use, a change being made from one to the other, without (as it seems to me) sufficient reason, or without any reason at all. Now, as to the first of these remedies, I conceive that we may possibly expect some benefit where the first stage of digestion is defective; and as to the second, that it may be indicated where the duodenal functions are tardily discharged. In reference to alkalis, however, I must confess that I find a strong objection to their use, in the fact that a great majority of persons subject to chronic convulsive affections exhibit unequivocal signs of a strumous disposition. I know that in these very cases these remedies have been recommended for the purpose of favouring the absorption of any deposit which has already taken place, and this from the fact that tuberculous matter is seen to break up under the microscope into a granular fluid when a drop of alkaline solution is added to it; but in opposition to this view, I would say that it is by no means proved that this softened matter is more absorbable than the solid. I would ask, indeed, whether the contrary conclusion is not rather necessary? At any rate it would seem that an ordinary indurated gland in the neck or groin disappears far more readily before softening than afterwards; and for this reason, therefore, I would pause until this question has been more carefully examined, before I would give alkalis with the view of correcting any strumous disease, whether this be associated with convulsive symptoms or not. About acids, on the contrary, there is less difficulty, for we have no such doubtful evidence in connexion with them. It yet remains to be shown, however, what is the precise action of sulphuric or nitric acid; and I cannot but think that until more

is known upon this subject, it would be well to substitute for them—as was recommended some time ago—some artificial combination which should represent as nearly as possible the gastric juice.

While upon this subject, I must not neglect to refer to a measure to which tonic powers are ascribed, and this to object against it. I refer to the cold bath. There is no doubt that benefit may result from it in warm countries, where life is cherished by a glowing sun; but that it should be equally beneficial for us, who, notwithstanding our warmer clothing and richer diet, find great trouble in keeping up a feeble existence, is very doubtful. Under any circumstances, I conceive that it is to be deprecated in the cases under consideration, for if it will cause violent shuddering or severe cramps in a state of health, I think it should be avoided where there is a marked convulsive disposition; and this not only on account of the direct influence which it would seem to have in exciting spasm, but also from its likelihood to increase that congestive state of the brain and other visceral organs which is the consecutive evil most to be dreaded. Indeed, it is difficult to see why a delicate person should not obey the natural instinct which prompts him to avoid cold, and at once endeavour to secure the healthy glow which succeeds upon bathing, (which, and not the feelings of depression and internal congestion or the blueness and coldness of the limbs, may be presumed to be the effect sought after,) by the most direct and likely means, namely, by the substitution of warm water for cold. Nor must I neglect to record an objection to a tonic of supposed efficacy in convulsive affections, namely, strychnia, and this on the ground that the remedy itself is a most powerful means of inducing convulsion. I know there is high authority in its favour, and that the very property which suggests the doubt to me has led to its selection, but still we must not close our eyes to the fact that experience is a blank, and that we thus lack the only evidence which could set the objection aside. Under these circumstances, therefore, it would be perhaps well to pause until our knowledge is more certain before we venture to employ so powerful a remedy in the treatment of convulsive affections.

Many remedies, indeed, have been recommended in virtue of their tonic properties, either real or supposed; but the conclusion at which we arrive, after passing them in review, is, that our choice is restricted to very few. Zinc may be necessary in one case, and silver in another, and this in consequence of some

accidental peculiarity which these remedies are calculated to relieve ; but iron and quinine are alone deserving of confidence in ordinary circumstances. Judiciously selected and administered, however, we may conclude that tonic remedies are of great value in the treatment of that constitutional debility which is the fundamental error in convulsive affections.

4. The question of the propriety of *stimulants* in the treatment of convulsive affections has been anticipated and partly answered in the remarks upon hygiene. A glass of wine has been found to be an excellent remedy in tremulousness, whether this be in early life or advanced age ; and not only so, but also in the severer movements of shaking palsy, as well as in the paroxysms of chorea or hysteria. Wine and other alcoholic drinks have also been found to be indispensable in the treatment of the subsultoid jerkings of the last stage of fever. In tetanus, indeed, the indications were more doubtful. Stimulants, however, have been given in large quantities, and are still given ; and, if we have no evidence that they have relieved this spasm, it cannot be shown that they have aggravated it.

Experience has also decided in favour of the warm bath as a remedy in the treatment of many convulsive affections. In the fits of childhood, the relief obtained by this is generally immediate and effectual. In the agitation of chorea, or in the paroxysm of hysteria, the calmative influence is most decided. Even the fierce spasms of epilepsy would seem to be assuaged by it ; for I am told at Hanwell, that whenever a fit is unusally violent or protracted, the patient is placed as soon as possible in a warm bath, this plan having been found more decidedly beneficial than any other. It is well known, also, that the low and miserable feelings and shiverings connected with ordinary colds are speedily terminated if we muster resolution to undress, and avail ourselves of the relief which this means affords. And, finally, it may be said,—and this is very strong evidence in its favour,—that notwithstanding the universal prejudice which ascribes convulsive affections to excitement, it has never been said that the warm bath is productive of any mischievous results. Prejudice has no doubt prevented its use in many cases, but it has never so far prevailed as to vitiate the evidence, and cause it to be asserted that it had done harm where it had been employed ; and this is the more surprising, for, of all means, it is most likely to favour any state of vascular activity.

Passing to the remedial stimulants the evidence still continues of the same character. In ordinary nervous tremulousness, or

in the severer distress of chorea or hysteria, the popular custom is to breathe the stimulating vapours of volatile salts, or to swallow a solution of the same in water; and, in cases where medical interference is deemed necessary, the practitioner in all probability has recourse to the same remedy, either alone or in conjunction with something still more powerful, as a preparation of ether. A similar practice is of undoubted benefit in the subsultus of feverish prostration. Compound spirit of nitric ether is another popular remedy for the relief of the shiverings, which are the most distinctive features, and which mark the onset of what are called "colds;" and I have been told by several medical men who practised in the fenny districts of Lincolnshire, when ague was more common than at present, that a good dose of this remedy was found to be one of the most effectual means of cutting short the cold stage of this malady. In epilepsy, again, it is found that turpentine is the remedy which has met with most general, and, as it would appear, with most deserved support; and this not because of any action it may have upon the bowels, (for the benefit is often altogether irrespective of such action,) but on account of its stimulant properties. Turpentine, also, by itself, or in conjunction with various stimulants, is of great service in relieving the convulsive agitation, which sets in towards the close of typhus; and the fact, that the benefit in this case is to be mainly ascribed to the stimulant properties possessed by the remedy, is an argument that it affords relief in epilepsy, in virtue of the same properties.

It would appear, therefore, that we arrive at the same conclusion in reference to these purely medicinal agents, as we did, when considering the question of wine and the warm-bath; and hence we may conclude, that stimulants are necessary to the treatment of convulsive maladies.

5. So far as we are concerned there would not appear to be any but an accidental necessity for remedies which possess *anodyne properties*. At times, perhaps, these may be needed to entice sleep, to remove any irritability which interferes with the use of tonics or stimulants, or in other and analogous circumstances; but most generally, (as indeed we might anticipate from the absence of pain in this class of affections) they are not wanted. In chorea, hysteria, or epilepsy, opium is apt to cause dizziness and sickness, with great restlessness, if given at the times when the fits are expected. In fevers, also, it is well known that there is an extreme susceptibility to the depressing influence of this drug, and as this is the case during the stage of

vascular excitement, we may argue that it would be still more so in the cold or shivering stage. On the other hand, however, there is said to be a great tolerance of opium in tetanus; but, here again, it is to be observed, that this supposed tolerance may be due, not to the disease, but to the large quantity of wine which is usually given along with the drug.

In speaking in this way I would be understood to refer merely to doses large enough to produce a narcotic action. In smaller quantities the result might be different, for there is no doubt that morphia in many instances is a tonic remedy of the highest value; but still I must confess, that (so far as I have been able to judge) the cases where this alkaloid acts in this manner, are those in which the innate activity of the system is considerable, and the morbid disposition marked by pain rather than spasm.

It would appear, also, that experience and theory are equally silent in favour of the remedies allied to opium, as henbane, hemlock, foxglove, and others. There may be, no doubt, peculiar circumstances which require the occasional employment of anodyne remedies; but there appear to be no general facts and considerations which indicate their special fitness for the cure of convulsive affections.

6. We have found that there is no reason to suppose that convulsive affections are dependent upon any inflammatory or congestive condition of a visceral organ; and in this discovery we lose the grand argument for the employment of *counter-irritants* in their relief. In the majority of cases, also, we have some reason to believe that the determining cause of the malady is of a general and not of a local character; and hence, if we wished to have recourse to these particular appliances, we should be at a loss where to find a seat for them. However useful in other cases, therefore, we may doubt their utility here; indeed, if we are satisfied that convulsive affections are irrespective of any local disturbance of an inflammatory or congestive character, it follows as a direct consequence that we discard remedies which have been recommended on the supposition of this disturbance.

If, then, we regard convulsive affections collectively as well as individually, we obtain—what is the great object of all practical researches—a fixed and constant rule of action, as well for the attack itself as for the predisposition to the attack.

1. In the first place, I conceive there are no cases of convulsive seizure in which we need stand balancing in our mind as

to the propriety of blood-letting, for, under all circumstances, this measure would appear to be altogether unjustifiable. On the other hand, stimulants have been found to be beneficial; and the question therefore is, of the one we should select, if any interference be necessary. Is it to be the warm-bath, or ammonia, or the spirit of nitric ether? In ordinary febrile shuddering there is no doubt that the first and last may be associated with great advantage; and it is the same, also, in aggravated paroxysms of hysteria and chorea. The cases of most difficulty and doubt are those of epilepsy and tetanus, but even here we need not depart from the same rule of practice. In the former affection it may be sufficient to unloose any band upon the neck, and to place the patient on a mattress laid on the ground; but if the fit continues, there is no better plan than to place him in a warm-bath (if this be practicable), and to cause him to inhale the vapours of hartshorn, giving a good dose of nitric ether when he has recovered so far as to be able to swallow.

This practice of avoiding bleeding with the most religious dread, and of employing a warm-bath in conjunction with the stimulants I have mentioned, I have tried repeatedly without ever finding any reason to doubt of the beneficial results. I have had no opportunity of putting these views in practice in a case of tetanus, but I am prepared to carry them out without any faltering on the first opportunity. I would abstain, in short, from bleeding, from purging, from narcotics, and I would try the effect of long and continued immersions in hot water, with wine and soups, and with or without, as the case might be, ether, ammonia, turpentine, or other remedial stimulants. I have never had a case of catalepsy under my care, and here also I cannot speak from experience; but, I see no reason why a similar practice may not be pursued, and especially the immersion in a hot bath,—indeed, from its known influence upon the corpse which it is desired to prepare for injection, this latter means may be thought especially fitted to distend the vessels and rouse the circulation of the corpse-like cataleptic; for if cold and dead arterial and capillary tubes may be expanded by artificial heat so as to receive the waxy fluid which is used for purposes of injection, it is not unreasonable to suppose that by artificial heat also we may cause the same vessels, while some vitality still lingers in them, to open for the return of their natural contents—the blood.

2. Similar principles must guide us in our endeavours to prevent convulsive affections. No low diet, no fatiguing exercise, no bleeding, no purging, no narcotics, no counter-irritation, must

be the constant rule; but on the contrary, we must urge with steady purpose a free supply of animal food, with wine or beer, warm bathing, medicinal stimulants, and tonics.

After insisting upon the desirability of good food and rest with occasional warm bathing, what we have to do in chorea or convulsive hysteria is, to give common steel mixture, or iron in conjunction with quinine, and some bitter extract in the form of a pill, while we take care not to counteract the good we may expect from this course by leeching, purging, or cold baths.

In epilepsy the greatest care and most unfaltering perseverance are necessary to bring matters to a satisfactory issue, but if these be had there is much reason for encouragement. Here, as in the former cases, the essential indications require rest, and a nutritious and generous diet, with warm bathing, and the most sedulous avoidance of all debilitating practices. First and foremost to be guarded against is unnatural activity of the sexual function, for without this little good is to be expected from any measure. Next, we must never be tempted to apply leeches for the relief of any transient fulness in the head; but if such condition be present we must endeavour to master it by the local application of cold. And further, we must discountenance altogether the old practice of administering purgatives, except occasionally for the purpose of dislodging any alvine accumulation. If these things are attended to before any consecutive mischief is established, we shall find a manifest improvement without the employment of any other means. We shall indeed require infinite care and patience, with unwavering steadiness of purpose, but we shall find no reason to despair if we are fortunate enough to commence our treatment at an early period in the history of the malady.

In more difficult cases we must call to our aid medicinal tonics and stimulants. Whenever there is sallowness and other evidences of the want of good blood, but with no very serious deficiency of strength and energy, I have great confidence in the juncture of the two, as in a pill consisting of iron and quinine with camphor, or in some similar form. When more diffusible stimulants are wanted, as is more usually the case in winter than in summer, I have found great benefit in associating with, or substituting for, the pill just mentioned, turpentine, in conjunction with cod-liver oil, this combination being suggested by the frequent association of the consumptive with the epileptic habit. I generally recommend a draught like the following to be poured carefully upon the centre of the surface of a small cup of milk or

coffee, and drunk suddenly before it has had time to touch the edge of the vessel, for in this way the unpleasant taste may be avoided in great measure.

℞ Ol. terebinthinæ, ℥ij.—℥iv.; ol. jec. asselli, ℥ss.—℥j.; ol. cinnamoni ℥j. Fiat haustus.

When turpentine is objected to, which is often the case, I believe nitric ether may be substituted with advantage, either along with the cod-liver oil, or in combination with some bitter infusion. The secret in this case is, not to be afraid of quantity, and to act as you would with an ordinary stimulant. A patient of mine, who was once subject to epilepsy, but who has now been well for some time, assures me, that when he feels any of his former threatenings he finds very speedy relief from a dose of nitric ether, varying in quantity from a dessert to a table-spoonful; and from other cases in which I have been able to test the effects of this remedy, I should say that this quantity is not more than what may be given to an adult in ordinary cases, with the most beneficial results.

It is not intended to say that these are the only tonics, or only stimulants, which may be employed with advantage; but until the claims of others are better established than at present, it is, perhaps, as well that we keep to these. Any way, we are not to forget that the chances of the disease are far too serious to allow any delay from experimental tampering with doubtful remedies, or merely fashionable empiricism.

In the prevention of tetanus, all that we can do is to preserve health from failing, and, in order to this, we must have recourse to the ordinary means which experience has pointed out; and in catalepsy, any preliminary treatment will not differ from that necessary in chorea or hysteria. It is unnecessary, also, that we refer specially to the prevention of the initial shuddering or spasms of fever or cholera, for it is now very well known, that all that is necessary is to remove out of the foul atmosphere, and not stint the quantity of food or wine, and so prevent the system from sinking to a certain state of lowness. Just, indeed, as in the prevention of the subsultus of the latter stages of these complaints, we must watch carefully, and begin to administer food and wine before the system is left prostrate and exhausted; so in the prevention of the muscular movements which mark the onset, must we endeavour to prevent the glow of health from slipping away, and this by the very same means. It is unnecessary, also, that we refer particularly to the prevention of those vaguer forms

of convulsive affections which originate in direct exhaustion, as loss of blood, for here the indication is simply to avoid this exhaustion.

In conclusion: The whole resolves itself into this,—that in convulsive maladies we have to remedy weakness or exhaustion by direct means, as rest, good food, stimulants, tonics, while we avoid with extreme care everything which would counteract this intention, namely, fatigue, abstinence from animal food or wine, sexual excesses, or artificial depletion, whether this be by abstracting blood, or by inducing increased discharge from the bowels or cutaneous surface by purgatives or counter-irritants. Success, indeed, often depends upon the care we take not to throw down with one hand what we raise with the other.

APPENDIX.

THE following description of a case of *hydrophobia*, supplied to me by my brother, will be found to be in strict harmony with the doctrines set forth in these pages; and I print it without any comments, as valuable additional evidence, though there was no expectation on the part of the writer of any such publicity.

MY DEAR CHARLES,

Leeds, June 17, 1851.

On Monday last I had an opportunity of seeing a case of hydrophobia, and though I had not much time for making observations, I saw enough to make me wishful to send you some account of it, and this the more as your attention is now particularly directed to convulsive diseases.

The patient was a boy of fourteen years of age, residing near Holbeck-moor. He had been bitten in the hand by a mad dog about three months ago, and no measures had been taken at the time to obviate the consequences. On Tuesday and Wednesday last he appears to have complained of fleeting pains in the cicatrix and arm, and on Thursday these pains had become so severe as to oblige him to discontinue his work and to call in medical aid. I saw him about two hours before death, when the disease had been fully developed for three hours,—and as the symptoms at this time differed only in degree from those which had existed from the commencement, I shall content myself with detailing what I then saw.

The boy was in a miserable hovel, laid upon an old sack, his head propped up with a hamper, and a ragged sheet spread over him. When I approached he turned his head towards me with a rapid convulsive jerk, and, looking at me intently, displayed a countenance marked by a peculiar expression of anxiety, and somewhat livid. A strange face absorbed his whole attention for a short time, and I was thus able to take hold of his arm. I examined carefully, but I could not detect the least pulsation either in the radial or ulnar arteries. I next attempted to ascertain the condition of the heart's action, and for this purpose I made as if

I would place my hand on the bosom; but this movement destroyed the temporary abstraction of the boy's mind, and determined a full display of the most prominent symptoms of the malady. He shrunk from the touch with an expression of horror, and at the same time a series of peculiar, rapid, fleeting convulsions agitated the muscles of the chest, and face, and gullet, apparently causing great agony. He talked almost incessantly with a quick, sharp enunciation, occasionally shrieking as if suffering from pain. There was constant motion in the arms, but the lower limbs were paralysed, and had been so, I understood, about two hours before I saw him. He was sensible to this loss, and apparently much distressed by it, for he exclaimed more than once in my hearing, "If I could only walk I should be all right; but I can't walk." The respiration was panting and irregular, the surface cool, the secretions and excretions natural, but I was unable to judge of the state of the alimentary canal by the appearance of the tongue, for he could not be induced to protrude this organ.

The mental sensibility was preternaturally acute, and the slightest *annoying* impression determined a paroxysm of the convulsions. He had taken an aversion to any white object and to hats, and having my hat in my hand while examining him, I was the unwitting occasion of a very furious fit. Immediately on seeing it he shrieked out for it to be put on one side, and at the same time made a convulsive effort to strike it from me. This being, as it appeared, the explanation of these fits,—some object annoying him, and the impression upon the morbidly sensitive mind prompting to preternatural and violent actions.

He was perfectly sensible, and though talking almost incessantly, it was never the incoherent rambling of a delirious person, but remarks upon his own state and sufferings, and requests for this or that article to relieve them with.

The irritability of the muscles of the fauces and esophagus rendered the act of drinking a peculiar and terrible spectacle. Complaining of great thirst, and a cup containing a little tea having been placed in his hand, a struggle commenced which was painful to witness. The intense desire to drink, and the fear of the paroxysm which would be induced by the effort, were so vividly depicted in the countenance as to suggest the idea that the patient was struggling with some unfriendly demon who had taken possession of him. On attempting to bring the cup to the mouth the head was involuntarily retracted, and the arms were so disobedient to the will that the vessel would have been dashed

to the ground if it had not been steadied by a second person. After a few futile attempts the hands were brought near the mouth, and then, after a pause, in which he seemed watching for a moment in which the muscles were off their guard, he with a desperate effort thrust the cup half into his mouth, and swallowed the contents with a convulsive sobbing sound, throwing back his head at the same time with an expression of extreme exhaustion. There was constant retching, and liquid swallowed was almost immediately rejected by the stomach; but notwithstanding this he seemed to have some satisfaction in gnawing a hard crust of bread. It was evident, also, though deglutition was difficult, that the attempt to swallow solid material did not occasion the marked trouble that was occasioned by a liquid.

What is further to be noticed is, that the patient was an ill-fed, overworked, lank, pallid boy, residing in a miserable hovel, in a neighbourhood, the unhealthy "endemic constitution" of which was indicated at the time by numerous cases of carbuncle, phagedænic ulcers, unanticipated deaths after operations, typhus, and, lastly, tetanus,—for I find a case of this latter malady has just been brought into the hospital from this district.

I send this account with the hope that it may be of some service to you in your investigations in the pathology of convulsive disorders. The case to me was one of great interest, and the more so from the thought that the habit of the lad, the circumstances in which he lived, and the cool surface and pulseless state when the malady was at its height, were all in perfect accordance with the principles you are enunciating. Adieu.

Ever yours affectionately,

JOHN N. RADCLIFFE.

The patient is a male of 45 years of age, who has been suffering from a chronic cough and expectoration for several years. He has been treated with various remedies, but without success. He has been advised to take a course of medicine, but he has not been able to do so. He has been advised to take a course of medicine, but he has not been able to do so. He has been advised to take a course of medicine, but he has not been able to do so.

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JOHN W. HARRIS

