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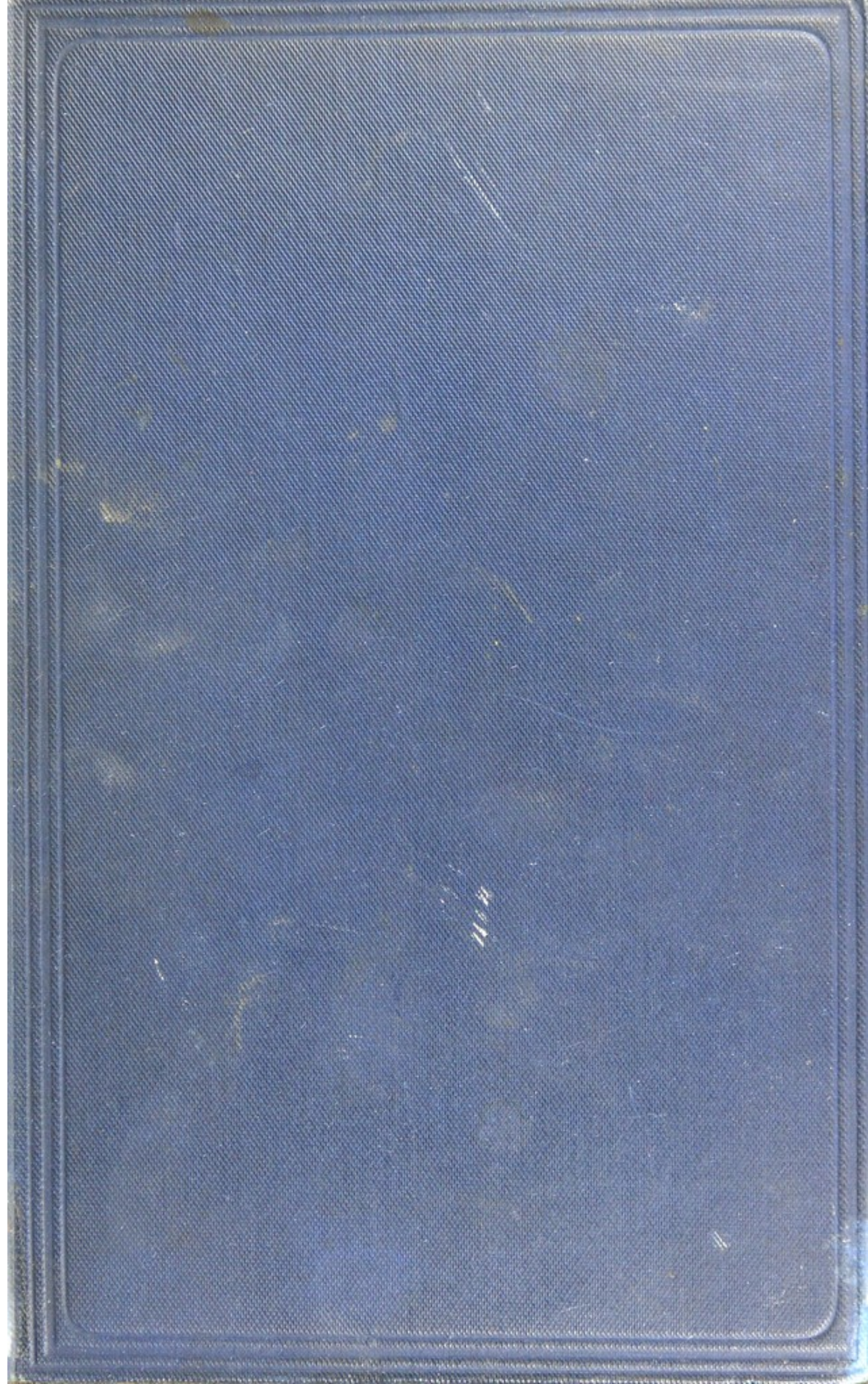
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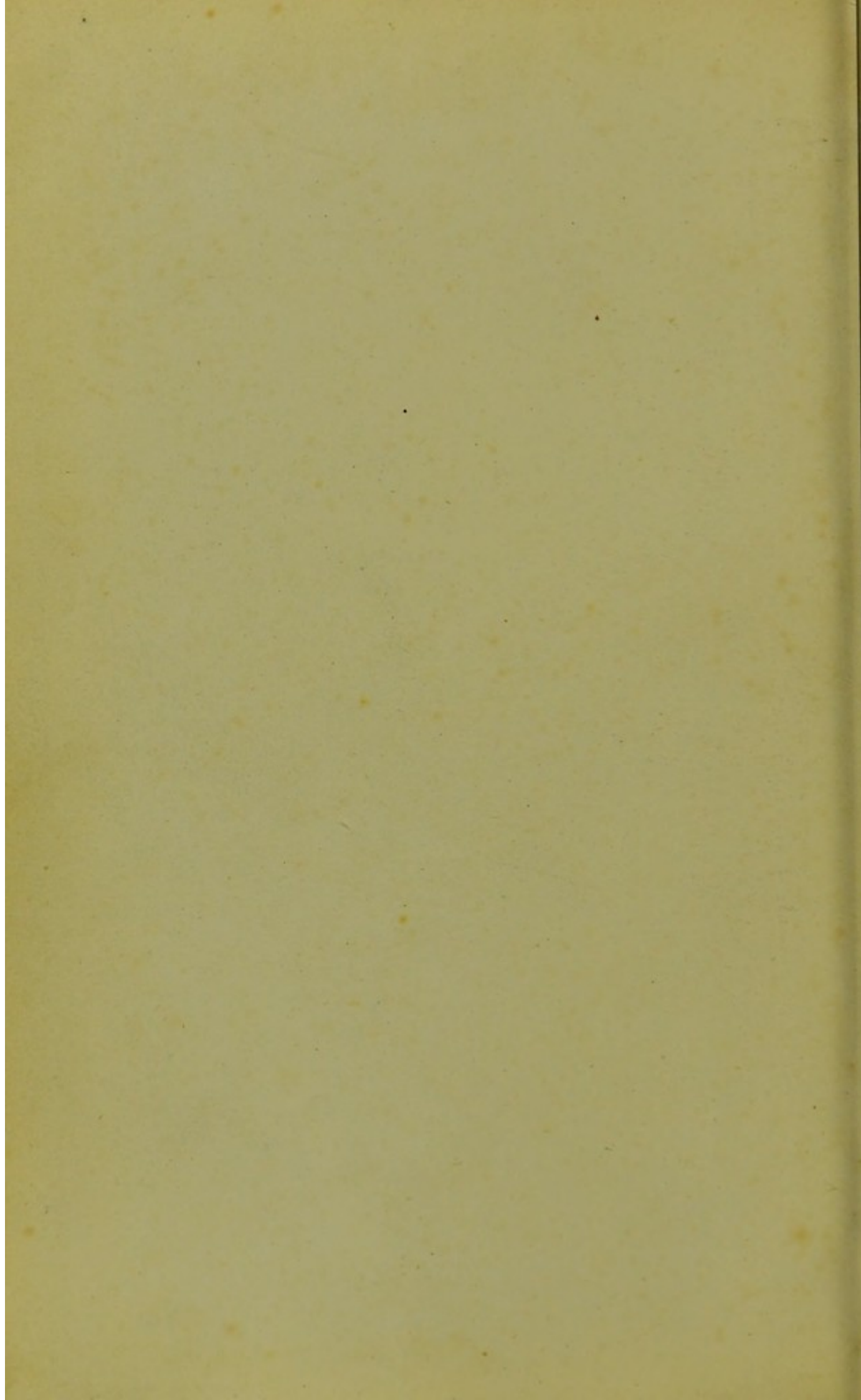


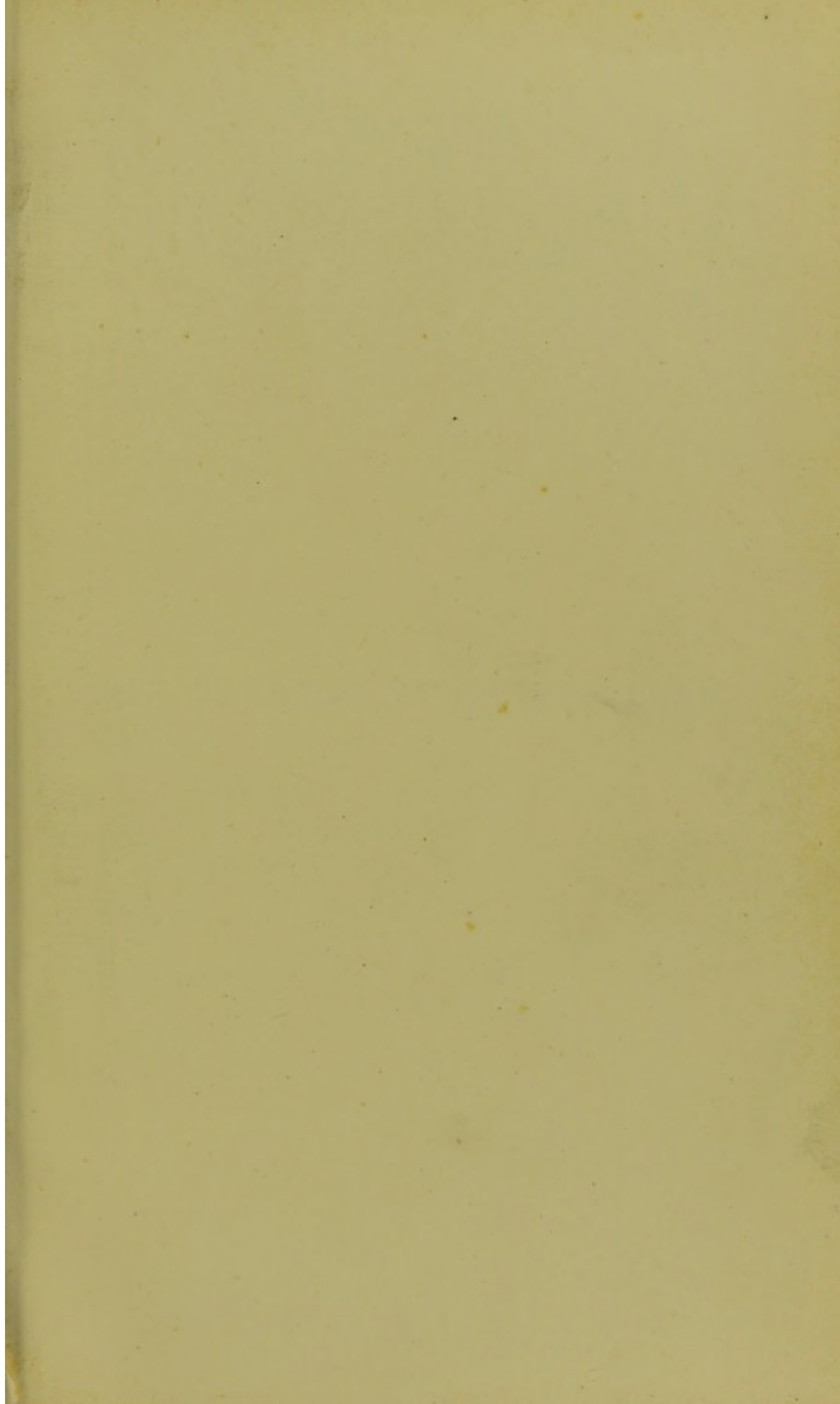
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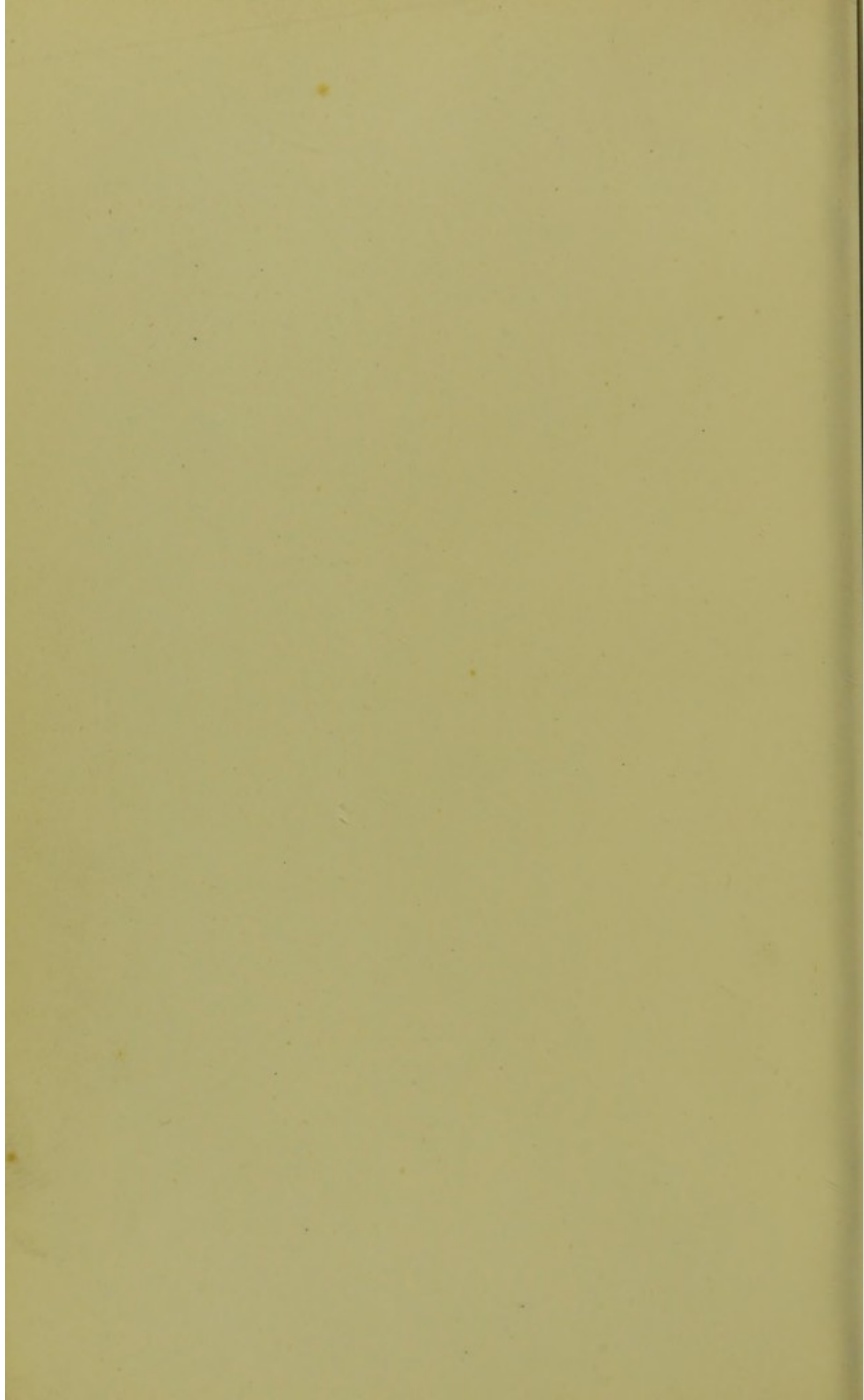


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THE TREATMENT OF EPILEPSY.

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Dr. Robert R. Hughes
Royal Southern Hospital
Liverpool
THE
TREATMENT

October
1961

OF
EPILEPSY.

BY

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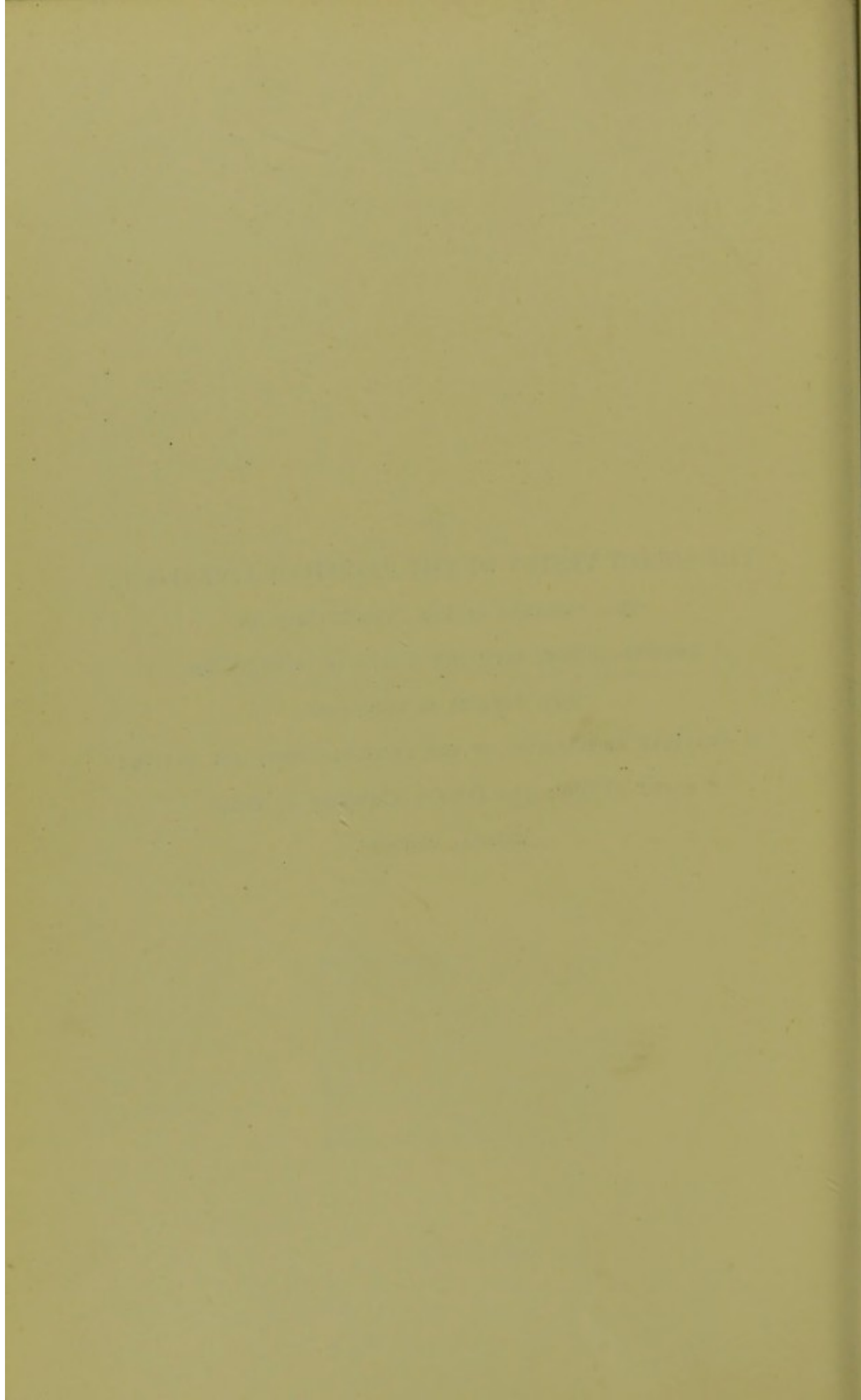
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TO
THE SELECT VESTRY OF THE PARISH OF LIVERPOOL;
THE PIONEERS IN THE INTRODUCTION OF
TRAINED NURSES INTO THE WARDS OF WORKHOUSES;
THIS VOLUME IS DEDICATED,
IN GRATEFUL RECOGNITION OF THE ENCOURAGEMENT AND SUPPORT
THE AUTHOR HAS ALWAYS RECEIVED AS THEIR
MEDICAL ADVISER.



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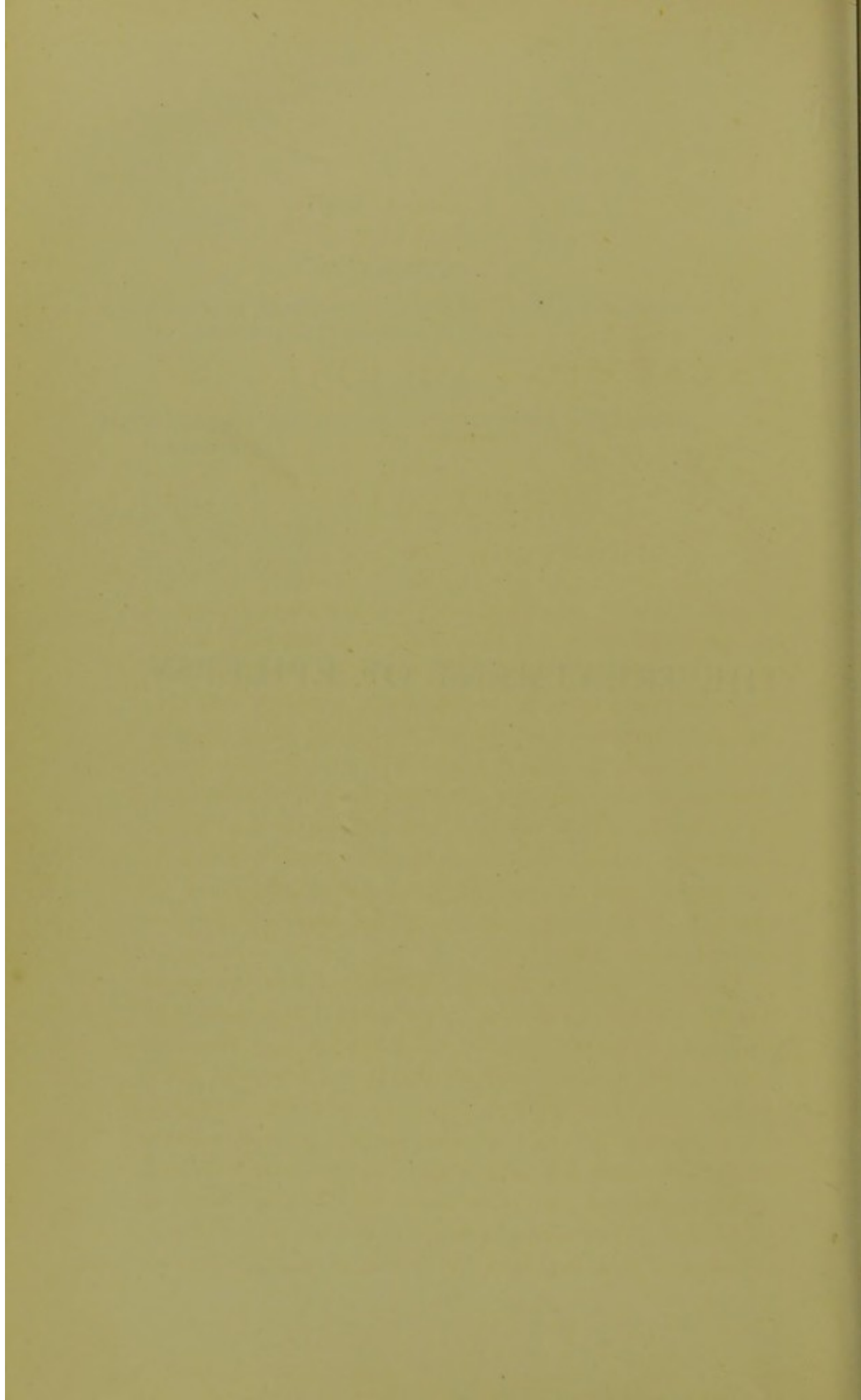
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THE TREATMENT OF EPILEPSY.



THE TREATMENT OF EPILEPSY.

CHAPTER I.

INTRODUCTION.

IN 1882, I placed before the medical profession an account of some beneficial results that I had obtained in epileptics by ligature of the vertebral arteries. A considerable number of these cases, and others operated on afterwards, promised well for a time, and several are, I believe, well, up to the present moment; but on the whole the operation proved of too temporary benefit to warrant its continuance, and I have ceased to recommend it.

For the sake of those who may wish to know my final conclusions on this matter, I quote from Heath's "Dictionary of Practical Surgery," vol. ii., page 786, where I have summarised the results in the following words, under the heading, "*Vertebral Artery, Ligature of the*":—

"This artery was first tied by Dr Smith, of New Orleans, on May 9th, 1864, as an adjunct in the surgical treatment of an innominate aneurism. In 1879, and following years, the writer performed the operation on thirty-six cases of epilepsy. After the first case, he mostly tied both arteries simultaneously. He also performed the same operation on two cases of infantile paralysis, two cases of locomotor ataxy, and one case of chorea.

"The operation is best performed in the following manner:—An incision, three to four inches long, is made in an upward and outward direction, along the hollow which exists between

the scalenus anticus and the sterno-mastoid muscles. The incision should begin just outside and on a level with the point where the external jugular vein dips over the edge of the sterno-mastoid muscle, or if the vein is invisible, about half an inch above the clavicle. The external jugular vein is to be drawn inwards with the sterno-mastoid muscle. The connective tissue now appearing in the wound is opened up by a blunt director, until the scalenus anticus muscle, the phrenic nerve, and the transverse cervical artery are seen. It cannot be too well remembered that the pleura is at the inner side of the wound, whilst below lies the subclavian artery. It is now only necessary to separate the edges of the scalenus anticus and the longus colli muscles, to see the vertebral artery lying in the space between them. The artery is generally covered completely by its vein, and the latter has to be drawn aside previous to ligature. Some surgeons look for the prominent transverse process of the seventh cervical vertebra, and this is a good landmark.

"Should the artery enter the vertebral foramina higher than usual, the vessel must be looked for to the inner side of its usual course. The overlying vein may be drawn outwards or inwards. Generally the former is more convenient, and may be easily managed by means of an aneurism needle. Another needle is now passed from without inwards behind the artery, its eye threaded with catgut, and the needle withdrawn carrying the ligature. The vein is then to be released, and the ligature tied and cut off short in the usual way. The wound is now to be sponged out with boracic or other lotions, a drainage tube inserted, and dressings—either strictly or modified antiseptic ones—applied. If the operation is performed with suitable retractors and a good light, the proceeding is a very easy one, and without both it is well nigh impossible. It is also safe, as no important structure need be at all interfered with.

"It has been recommended to tie the artery by cutting down upon it directly from the surface, but it is better not to describe that method here. It is only a dissecting-room operation, in which interference with the pleura and the subclavian branches and large veins does not signify much, and cannot compare

practically with the easy, safe, and natural operation already described.

*“ Value of the Operation in Epilepsy.—*It was performed by the writer, in the hope that a lessened supply of blood to the hinder brain and spinal cord would result in a diminution or cessation of the epileptic convulsions. On most theories of epilepsy the expectation was a very reasonable one, because it was hoped that the diminution would be more permanent to the parts supplied, after ligature of the vertebrals, than after ligature of other vessels, on account of the absence of anastomosing branches, and the restraints to dilatation of the unligatured vessels by the bony canals through which the cerebral vessels pass, as the experiments of Sir Astley Cooper on dogs tended to prove.

“ For a time these expectations were realised, but soon relapses occurred; and in May 1884 an analysis of thirty-six cases of operation for epilepsy showed only eight cases which have had so few fits since operation that they may practically be considered cures. Eleven were for several months so much improved that they seemed to be cured; and although the fits have recurred in all these, yet the improvement is still distinctly manifest in many.

“ In sixteen cases there did not seem to be any decided improvement, either of a temporary or permanent kind. Three died, out of the thirty-six, one from hæmorrhage, one from embolism, and one from pleurisy. All the cases operated on were chronic, hopeless epileptics, many of whom had gradually become mentally affected. None of the latter were permanently benefited to any practical extent. Of the others, the best case was an idiot boy, now in the Albert Asylum, Lancaster; and the next best a perfectly sensible, healthy lad. In two cases of traumatic epilepsy, one was cured and the other much benefited. It is impossible, therefore, to say, before operating, what cases would probably derive benefit from the operation, and what would not.

“ On account of this uncertainty, the writer has ceased to recommend or perform the operation for the last two years. Of

the cases of infantile paralysis, one patient was completely and rapidly cured, the other was unaffected. Great temporary advantage occurred in one case of locomotor ataxy. The pains and ataxy rapidly diminished for a time; the other case remained unaffected. The case of chorea ceased to twitch until hæmorrhage from a small vein set in, that, allowed to pass unnoticed, ended in death. The twitching reappeared after the onset of the hæmorrhage. As far as the writer can at present see, this chapter of surgery may be closed."

But with the close of the chapter just referred to, my interest in epilepsy did not cease. Indeed, at the time the article referred to was written, most of the investigations and operations now about to be described were complete, and time alone was wanting to realise their value. Sufficient time has now elapsed to test results, and these results are so encouraging and so interesting, that I do not think I should withhold them any longer from the profession.

A description of the effects of removal of the cervical ganglia of the sympathetic for epilepsy forms the chief feature of this book, and is the cause of the book being written. Other methods of treatment are, however, touched upon, but only as far as the light of my own experience enables me to speak. The tenth chapter I consider of great importance, and I trust it may be useful in bringing about in Britain a more organised, rational, and successful method of dealing with epileptics. My sincere thanks are due to Dr Blackwood for his valuable assistance in preparing the book for the press, and correcting the proof sheets.

CHAPTER II.

THEORIES THAT INFLUENCED THE AUTHOR IN HIS INVESTIGATION OF EPILEPSY, AND THAT GUIDED HIS ATTENTION TO THE SYMPATHETIC SYSTEM.

EDUCATED in the theory of epilepsy formulated by Van der Kolk and Russell Reynolds, and known as "the sensitive medulla theory," the attention of the author was at first directed to efforts and operations intended to control the supposed increased sensibility of the medulla oblongata; and hence the operation of ligature of the vertebral artery just described. It will be interesting here to give the theory as far as possible in the words of its author. In his work "On the Minute Structure and Functions of the Spinal Cord and Medulla Oblongata; and on the Proximate Cause and Rational Treatment of Epilepsy" (pp. 207, New Sydenham Society, London), Dr Van der Kolk thus writes:

"It is now many years since my investigations led me to the notion that the proximate cause, and, as it were, the starting-point of epilepsy and of convulsions, was to be sought in the medulla oblongata. In accordance with this view, I conclude my essay on the spinal cord, published in 1854, in the following words:—

"The medulla oblongata is the principal centre whence the more general reflex movements and convulsions derive their origin. I have for years been accustomed to seek in it the starting-point of epileptic attacks, and consider that to it the physician should direct his special attention.

"Even though the primary irritation may be remote, for example, in the intestines, a morbidly elevated sensibility and

irritation in the medulla oblongata always form the foundation of such attacks, and render the organ in question more capable of, as it were, discharging itself in involuntary reflex movements."

He then proceeds to show how the two halves of the medulla are so closely connected by commissural fibres, as easily to give rise to bilateral convulsions upon irritation of one side; how "the medulla is uncommonly rich in different ganglionic groups or nuclei, for sensory and motor nerves, to which several auxiliary ganglia are superadded, possessing the special property of immediately exciting in the healthy condition, on the application of any stimulus, numerous reflex phenomena in different definite groups of muscles"; how "the convulsive spasms in epilepsy affect by preference, and in the first place, those muscles whose nerves arise in the medulla oblongata, as the facial, accessory, hypoglossal, and the portio minor trigemini, the affection of these nerves being plainly manifested in the grinding motions of the jaw, or in the rigid closure of the mouth.

"The convulsive affections which occur in slighter cases, are limited within the sphere of these nerves. These spasms we may regard as constant, and as I have already observed, more or less violent disturbances of respiration attend them." . . . "The same is true (as to the starting-point) of most other convulsive affections, as eclampsia, chorea, in which commonly the muscles of the neck, head, and tongue are affected." . . . "Let it suffice for our object to show that precisely in the exalted sensibility of the medulla oblongata lie the starting-point and source of spasm in epilepsy."

This sensitive medulla theory held its ground for a long time, and probably would have stood much longer, had not the experiments of Hitzig and Ferrier upon the effects of irritation of the cerebral cortex, turned the attention of observers in a new direction.

Dr Hughlings Jackson, of London, is the chief apostle of the new doctrine, although "discharging lesions" and their effects were referred to by Drs Todd and Robertson. Dr Todd thought the discharge resulted from the accumulation of a poison in the blood.*

* *Edinburgh Medical Journal*, December 1869.

Dr Hughlings Jackson, in an Article on the Anatomical, Physiological, and Pathological Investigations of Epilepsies,* says, "Epilepsies are, briefly speaking, "discharging lesions," that "there is in a case of epilepsy, grey matter, which is so abnormally nourished that it *occasionally* reaches very high tension, and very unstable equilibrium, and therefore occasionally 'explodes.'

"It will be observed that the discharging lesion of epilepsy is supposed to be a *permanent* lesion. There is grey matter, which, since it is permanently under conditions of abnormal nutrition, is permanently abnormal in function. That the permanent abnormality is a varying state has been said. It has been remarked that the grey matter occasionally reaches high tension, and therefore *occasionally* discharges (or is discharged). There are waves of stability and instability. It follows from this, that the first fit is supposed to be a discharge of a part which has, *for some time* before, been in a state of malnutrition; and a still further inference is, that such 'causes' of epilepsies as fright, are only determining causes of the first explosion. Many of the 'premonitory symptoms' of a first attack are probably results of slight discharges—they are miniature fits."

Dr Jackson then goes on to show that his theory of a periodic explosion of nerve matter is not very new or strange. In accounting for the movements of the heart, a similar theory is generally accepted by physiologists in regard to the nutrition and action of the cardiac ganglia. Indeed, as we have already seen, Schroeder Van der Kolk assumes a discharge of nerve action in the hyper-excited cells of the medulla in epilepsy, so that Dr Jackson might be said to have transferred Schroeder Van der Kolk's theory from the medulla to the cortical cells of the brain.

The highly unstable condition of the nerve cells is, according to Hughlings Jackson, perhaps owing to the phosphorous ingredient being replaced by nitrogen, thus forming a similar, but more easily decomposed compound. Plugging of vessels, also, may lead to instability of grey matter, and hence chorea and epilepsy may be sometimes due to small emboli. Having formed

* West Riding Lunatic Asylum Medical Reports, vol. iii. p. 323, *et seq.*

his theory, Dr Jackson defines "epilepsy" to be "the name for occasional sudden, excessive, rapid, and local discharges of grey matter." There are two ways in which he thinks the discharge may spread, viz., by exploding "healthy lower centres," or by spreading "laterally to healthy associated centres in the brain." "The lateral spreading is by *arteries* and their *vaso-motor nerves*; the spreading is in the *arterial regions*." It should perhaps be stated, that Dr Hughlings Jackson considers every convulsive act to be an epilepsy,—such as a depraved or exaggerated sense of smell, deranged vision or hearing, or even a sneeze.

Into this question it is not necessary to follow him, as these epilepsies do not imply unconsciousness or convulsions, and are either only transient unimportant symptoms, or indications of grave cerebral changes. In the first class of cases, no serious trouble would be taken to cure the symptoms; and in the second class, the operations performed by Macewen, Horsley, Godlee, and others, would come under consideration. It is only when unconsciousness and convulsions occur that the case becomes distressing, and the individual is unable any longer to lead an independent existence. In other words, we refer in this work only to essential epilepsy.

Dr Hughlings Jackson ascribes the coma and convulsions to the violence of the explosion, in the cases in which it occurs. If the coma is profound, so should the convulsions be strong; but as these two phenomena do not vary proportionately to each other, he ascribes the profound coma without convulsions to an extensive superficial discharge of the higher centres; whilst, in cases where the convulsions are more severe, he explains the phenomena by the spread of the discharge to the lower centres. The aura is considered by Dr Hughlings Jackson to indicate the part of the brain where the discharge commences. Hespín, according to Brown-Séquard, anticipates Jackson in this, and thinks the aura depends on a change in the nerve centres, and that the seat of the aura varies according to the place where the change begins in these centres. Post epileptic mania and post epileptic paralysis are the results of the epilepsy in stimulating or exhausting the cerebral nerve cells.

Essential epilepsy, then, on this theory of the disease, is a malnutrition of brain tissue occurring in vascular areas, and depending on vaso-motor nerves. Dr Gowers, in his "Manual of Diseases of the Nervous System," at page 699, says, "The phenomena in epilepsy indicate, that there is a discharge of grey matter, and there is nothing to warrant us in going beyond the grey matter concerned in our search for the cause of the discharge. As regards the *cause*, Dr Gowers is perhaps right, but from a therapeutic point of view we cannot rest satisfied with this as the pathology of epilepsy. If we want to cure the disease, we must, if possible, ascertain the *causæ causarum*, till all the links in the chain are complete.

Microscopic observation, as we have seen, has not been able to indicate any serious disease anywhere in the nervous system. Malnutrition will explain all the microscopical phenomena, where any have been found, and Dr Gowers considers that the overaction of the nerve cells is consistent with imperfect nutrition. When we find malnutrition in the limbs, we do not rest satisfied with saying that the disease is in the muscle or connective tissue cells of the limb. We consider then that the movements of the limb are unnatural, the nervous supply is impaired, or the vascular supply is at fault, and by appropriate means we so modify the causes as to improve the nutrition of the limb till it becomes like its fellow.

The treatment adopted in such cases is always intimately associated with an improved vascular supply; and, whether the "vascular areas" and "vaso-motor nerves" have anything to do with the production of epilepsy or not, it occurred to me that they might both be utilised to improve the nutrition of the brain, and especially of the affected grey matter.

The only great system of nerves that is supposed to be vaso-motor, and that is at all within easy access to the surgeon, is the sympathetic. On turning up the work of Eulenburg and Guttman on the Sympathetic, I found at page 19 some remarks regarding the vaso-motor nerves that are supposed to issue from the sympathetic.

According to them, Donders and Callenfels noticed contraction

of the cranial vessels on irritating the cervical sympathetic, and Nothnagel was convinced, through several of his division experiments, that the cervical sympathetic, and especially the ganglion supremum, has a share in the innervation of the vessels of the pia mater. Powerful electrical irritation of the nerves of sensation of the skin produced, in rabbits, a reflex contraction of the arteries of the pia mater. The same occurred also after division of the sympathetic, between the superior and middle cervical ganglia, and less markedly, after extirpation of the superior ganglion, being then discernible only by means of a magnifying glass. Schultz, Riegel, and Jolly have, nevertheless, either quite denied, at at least admitted only in a very modified way, that the sympathetic exercises such a function.

In four experiments by Fischer, the simultaneous faradisation of both sympathetic nerves, was followed by a preliminary quick increase of brain pressure, succeeded by a decrease, when the irritation was diminished,—in all, four convulsions occurred in the form of clonic extensor-spasms and opisthotonos, which were never observed in unilateral irritation, and which were probably caused by the decrease or cutting off of the arterial blood supply to the brain. (Eulenburg and Guttmann, p. 20.)

Pavy, in "Researches on the Nature and Treatment of Diabetes," London, 1862, has noted the occurrence of diabetes after injuring the uppermost cervical ganglion; and Eckard (Eulenburg and Guttmann, p. 37) has produced diabetes after destroying the uppermost thoracic, and inferior cervical ganglia.

Brown-Séguard has noticed atrophy of the corresponding side of the brain in rabbits, after division of sympathetic on one side of the neck. (Eulenburg and Guttmann, p. 23.) The same writers, at page 137, say, "The relation of *epilepsy* to the sympathetic system is still very obscure. On the whole, the view formerly advanced by us appears lately to have gained ground, that many cases, especially of so-called peripheral epilepsy, are of an angio-neurotic nature, and owe their origin partly to a direct and partly to a reflex irritation of vaso-motor nerves.

Benedikt states, that, the epileptic attack is primarily caused by sudden spasm, or relaxation of the vessels, and presents the

most complete analogy to neuralgic attacks, only that here the irritation affects chiefly vaso-motor nerves, and so leads directly or indirectly to anæmia or hyperæmia of the brain.

The possible influence of the sympathetic nerve in producing progressive muscular atrophy, should also be pointed out as influencing my mind to undertake the operation on the sympathetic system.

Eulenburg and Guttmann, at page 78, ascribe to Schneevogt the merit of first drawing attention to the accompanying affection of the sympathetic in this disease, although Sir Charles Bell had previously mentioned the sympathetic as a probable causative agency.

Schneevogt supports the doctrine, "that the disease is of central origin, and includes both an affection of the anterior roots, and a disturbance of the sympathetic, or of the innervation of single ganglia.

Jaccoud found in two cases, in addition to atrophy of the anterior roots in all the cervical and the three or four upper dorsal nerves, that the whole cervical part of the sympathetic was transformed into fibrous connective tissue. Jaccoud regards it as unquestionable, from the stages of the different processes, that the disease began in the cervical part of the sympathetic, and spread thence, both centripetally (by the rami communicantes and the anterior roots), and centrifugally (as is indicated by the partial affection of the median nerve).

Throughout all the work on the sympathetic by Drs Eulenburg and Guttmann, the same uncertainty exists as regards the action of the sympathetic upon any function, as in the cases and experiments just described. No certain light is at present available to guide us as to the part really performed by the sympathetic ganglia. The general impression from the experiments quoted is, that it regulates nutrition, and may have therefore something to do with disorders of nutrition.

I may now call attention to some *opinions* of celebrated physicians that have also to some extent guided me into my new operation, although I was aware that these were *only* opinions, and therefore as likely (rather more likely) to be wrong than right.

In Ranking's "Abstract," vol. xxvi. p. 59, it is stated that "Dr Joseph Bell, physician to the Glasgow Royal Infirmary, was inclined to adopt the opinion, that the proximate cause of epilepsy is congestion of some portion of the nervous centres, and that it is the vascular state that gives rise to the paroxysms, even in those cases in which the exciting cause may be structural alteration, either of the nerve substance or of its coverings."

Dr Brown-Séquard found, that if certain parts of the spinal cord were cut across, especially between the seventh dorsal and first lumbar vertebræ, epileptic convulsions set in usually about three weeks after the injury. The transverse section might involve the whole cord, or any of its columns, or even a simple puncture would produce the same result. The fits either came on spontaneously, or were easily excited by arrest of breathing, or by pinching the skin in certain parts of the face and neck. These "*zona epileptica*" were much infected by lice, and seemed to be *more vascular* than the rest of the body.

I think, however, these experiments cannot be transferred to man at all, and that their real value in animals is debateable.

Many patients have their whole spinal cord destroyed in the regions described by Brown-Séquard as the most likely to produce epilepsy. These patients have lived for months, or years, and it is not recorded of many that epilepsy resulted. Again, the region injured, and the amount of injury, vary to such an extent, and yet with the same result, that it strikes me the *injury to the spinal cord* may have really nothing to do with the epileptic manifestations. May not the injury to the spinal cord be accompanied by an alteration of the sympathetic nerves? The effect of an affirmative answer to the question will be referred to again.

Dr Brown-Séquard, however, holds that in epilepsy the spinal cord is the seat of disease in many cases, but not the exclusive seat. The brain is not essential to the production of epileptiform convulsions, nor yet the cerebellum, for Dr Brown-Séquard could produce epileptic fits after removing the whole of the encephalon, except the medulla oblongata and pons varolii. Dr Brown-Séquard thinks, that when the excitation takes place in the spinal cord, and in the base of the encephalon, the nerve fibres which go to

the head are irritated, and produce a *contraction of the vessels of the face, the sympathetic in the neck being considered by him as the motor nerve of the blood vessels of the face.* At the same time that the blood vessels of the face are affected, the *blood vessels of the brain are also affected.* In some cases where contraction of the pupil takes place, the nerves of the third and fifth pairs are supposed to act, instead of the sympathetic. In epilepsy there is, according to him, an augmentation of reflex excitability, due to an increased nutrition of the nerve centres. His theories, therefore, come very near to those of Hughlings Jackson, previously described; and, like him, he ascribes this increase of nutrition to alterations in the vascular system of the brain.

Professors Kussmaul and Tenner, in their work "On Epileptiform Convulsions after Bleeding, and on Epileptic Convulsions Generally," conclude that the convulsions are produced by some sudden interruption to the nutrition of the brain, and proceed from the excitable portions of the brain, which lie behind the optic thalami; that the phenomena of the *petit mal* derive their origin from changes in the brain proper; those of the *grand mal* from alterations in the entire encephalon; and that in all probability there are certain forms of epilepsy which are confined to convulsive movements in the *muscular walls of the cerebral vessels*; and that the medulla oblongata, inasmuch as it is the point of origin of the constrictor nerves of the glottis, and of the vaso-motor nerves, would seem to be the most ordinary source of mischief in epileptic and convulsive attacks. These authors state many other conclusions in regard to their experiments, but I have only quoted those that show how general is the consensus of opinion, that epilepsy has its seat in malnutrition, and is dependent on vascular changes.

That these vascular changes depend on the action of the sympathetic system, the two following cases would tend to make us believe.

The first is by Dr Russel:—"A man, æt. 47, a night-watchman, was tending his engine fire, and felt such a burning in his left arm that he thought his sleeve had taken fire. At the end of an hour this sensation 'fled up the body,' affecting the left side of

* *Medical Times and Gazette*, April 7, 1866.

the face and trunk, as well as the left leg, and a profuse perspiration broke out over all the hot parts. When he went home he was unable to speak, and he had an epileptic fit, the face being drawn at first to the left side. About fourteen weeks after, he had another epileptic attack of a milder character, without loss of consciousness, but in the interval between the attacks, he had had frequent recurrence of the heat and perspiration, confined on every occasion to the left half of the body. As many as three or four perspirations may come on in a day, and sometimes as much as a fortnight may intervene between them. The perspiration is profuse. A slight amount of watering of the left eye accompanies the perspiration, with a little dimness of vision; but he adds, that since he has been subject to the affection, the left eye is exceedingly apt to water when exposed to chill air, even so much so, that tears trickle down his cheek. Any exertion produces sweating of the left side, with preternatural facility."

The second case was under the care of Dr Ramskill,* and was a healthy man, whose epileptic attacks did not differ from typical epilepsy. The sweating was limited to the right side of the face, and was produced by exertion. On the outer part of the cheek, under the angle of the jaw, the part supplied by a branch from the cervical plexus, there was no perspiration, but the lobulus of the ear supplied by a branch from the same plexus was much hotter than that of the opposite side.

That these symptoms are due to an irritation of the sympathetic, few people will doubt. According to Dr Gairdner, pressure of an intra-thoracic tumour will cause sweating; and Sir Andrew Clarke has pointed out a case where the symptoms accompanied intra-thoracic aneurism. The pupil has been found to vary in these cases, being sometimes contracted and sometimes dilated; but this will depend on whether irritation or destruction of the sympathetic fibres is the cause of the interference with the iris.

Dr Anstie, in his work on Narcotics and Stimulants, records a very interesting case of sweating on the left side of the face in a child who had epileptic fits. In this case the sweating occurred just before the paroxysm. The child had partial paralysis on the

* *Medical Times and Gazette*, April 7, 1866.

same side of the body, and this side was the one convulsed, or chiefly convulsed, in the fits. Both fits and unilateral sweating were clearly, Dr Anstie considers, dependent on distension of the colon with fæces.

Dr Ramskill, in the *Medical Times and Gazette*, May 28th, 1864, calls attention to a very common class of epileptics, who are affected with what he designates ganglionic epilepsy. "They have for an aura some disturbance of sensation, accompanied or not by abnormal feeling of motion in the abdomen. Patients described these feelings variously, as turning upside down, sinking, fainting, a sense of great coldness, or a rush upwards from the epigastric region of heat, trembling, borborygmi, shivering, or a feeling of complete collapse, and emptiness of stomach, sometimes with nausea." . . . "I believe the symptoms complained of arise from a disturbed condition of the solar plexus, and the ganglionic system of the abdomen generally. It may be a failure of action, or from a disturbed or intermittent action of the solar plexus and its dependent neighbouring ganglia. I believe the morbid action, starting in the ganglionic system, propagates itself, by way of the splanchnic nerves, to the cerebro-spinal centre, and a fit follows. . . .

"The ganglionic system presides over the circulation in the brain; it enters largely into the composition of its substance, and is abundantly distributed to all the viscera in the body."

It will be seen from the foregoing quotations, that there is no lack of authority for my idea, that the sympathetic nerves may have something to do with epilepsy, either as a cause or as a means of cure.

The only part of the sympathetic nerve that could be easily reached, and the part that probably has most effect on epilepsy, is the cervical portion. This cervical portion consists of three ganglia, with their connecting cords and branches. The connecting cords are very faint, not easily reached by operation, and apparently of little use as conducting or governing agencies. The upper cervical ganglion, on the other hand, is a substantial and easily recognised body; and although, perhaps, not so easy of access as the middle cervical ganglion, is more easily found,

on account of its greater size. The importance of the middle ganglion did not appear to me as likely to be, by any means, as great as that of the superior one. The inferior ganglion is much more difficult of access than either of the others; is in too dangerous proximity to the pleura, to be lightly disturbed by surgeons; and, probably, has not much direct effect upon the circulation in the brain.

On these grounds, after two preliminary sections of the cervical cord of the sympathetic, I turned my attention to the *superior cervical ganglion*. This ganglion lies on the rectus capitis anticus major, opposite the second and third cervical vertebræ, and behind the internal carotid artery. It is connected with the first four spinal nerves; with both ganglia of the pneumogastric; with the hypoglossal; and with the glossopharyngeal nerves.

It gives nervous supply to the internal carotid artery, to the cerebral and ophthalmic arteries, and to the arteria centralis retinae. The carotid plexus communicates with the sixth nerve gives a branch to the Gasserian ganglion, and to the sphenopalatine ganglion, and furnishes the tympanic plexus.

The cavernous plexus gives branches to join the third nerve, the fourth nerve, the ophthalmic trunk of the fifth nerve, the lenticular ganglion, and the pituitary body.

Downwards, towards the middle constrictor muscle, some branches pass to join with branches of the pneumogastric and glossopharyngeal nerves, thus forming the pharyngeal plexus distributed to the muscles, and mucous membrane of the larynx.

The upper left and right cardiac nerves pass downwards from the ganglion, to reach the superficial and deep cardiac plexus respectively, in which course they are joined by branches from the pneumogastric, and the lower ganglia, &c., of the sympathetic.

Nerves for the arteries on the proximal side of the ganglion supremum also spring from it, and twine round the trunk of the external carotid, and form slender plexuses on its branches. From the plexus on the facial the submaxillary ganglion is supplied; and from that on the middle meningeal artery, twigs are described as extending to the otic ganglion as well as to the

geniculate ganglion of the facial nerve. One filament descends from these nerves to the carotid gland.

Such is a condensed description of the anatomy of the ganglion, after Quain, ninth edition, vol. i., pp. 650-656.

Seeing its extensive connection with the cerebral vascular system, may we not hope, by interference with this ganglion, to alter the nutrition of the brain, and gradually render the equilibrium of the nerve cells more stable, in accordance with Hughlings Jackson's theory?

These ganglia have extensive connections with all the cranial nerves, and with the nerves of the upper part of the spinal cord. May the phenomena, called epilepsy, not be produced through a disordered use of these communications, such as a diffusion, misdirection, or accentuation of an ordinary mental or reflex act; and may not removal of the ganglia stop this disastrous abnormal nervous action?

May not epilepsy be produced by a reflex influence upon the medulla of either a central or peripheral kind, such as Van der Kolk and Reynolds supposed; and may not the influence of this reflex act travel outwards again from the medulla, not only along the various nerves, producing prodromata, or aura, but along the sympathetic, producing coma, pallor, and all the phenomena that the numerous communications of the ganglion supremum would render it possible for it to produce; and may not interference with the ganglion, by surgical means, render it impossible that some, or many, of the grave phenomena of epilepsy could afterwards be produced?

According to all the theories of epilepsy, the vascular system plays an important part in the production of the malnutrition, of the hyper-excitement, or, of the unstable equilibrium; and it therefore struck me as of importance in our study of epilepsy, to know the immediate and remote effects of removal of the superior cervical ganglia of the sympathetic, for removal of the ganglia was the only action worth consideration from a practical point of view. And if the remedy did not take effect in that way, we would be able to act permanently upon the ganglia in no other way.

CHAPTER III.

HOW IT WAS ASCERTAINED THAT REMOVAL OF THE SUPERIOR CERVICAL GANGLION WAS CAPABLE OF BEING DONE WITH SAFETY UPON MAN, AND THE DESCRIPTION OF THE OPERATION.

A DOUBT of the safety of the operation naturally constituted the chief obstacle to my prosecution of the idea of the removal of the ganglia suprema for epilepsy, and it was only by a fortuitous concurrence of circumstances that I was able to have the doubt removed, so far as to enable me to actually perform the operation.

In the first place, each ganglion supremum lies deep in the neck, is surrounded by important structures, and the *surgical procedure* alone might be so serious as to forbid its performance. Three months' practice on the cadaver removed this objection, by showing me how to get at the ganglion without injuring any other structure, and accustomed my hand and eye to the technique of the operation.

In any new operation this is a most important matter, and its value was proved in that other operation I have had the honour of placing before the profession, viz., shortening of the round ligaments for uterine displacements.

After my success in utilising the round ligaments was proved, it came out that others had tried to perform the operation (one indeed twenty years before), but had failed, and in one case the patient's life was for a time endangered. This occurrence stopped all efforts in the same direction wherever the event was known. My first round ligament operation, on the other hand,

was as easy as any I have performed since, and a good deal easier than several, and I ascribe the ease not only to my knowledge of how to do it, but to the facility my fingers had acquired in doing it. Hence I described the operation as an easy one, and was surprised that other operators by no means found it so, and thought I had intentionally minimised matters. I had only forgotten to give due weight to the training that had made it easy to me, and that other operators had not had the same training. Hence the failures and the fatalities that occurred in what with practice is an easy and safe operation.

Now, the region occupied by the ganglion is one where none but surgical and anatomical experts should intrude, as it is sure otherwise to end too frequently in failure or disaster. On the other hand, the path by which the ganglion can be reached by an expert in the matter is so safe and easy, that it almost seems a mark of design that the path should be there, and that the ganglion was waiting to be removed, through all the centuries. I look upon it now as a minor operation, both in regard to surgical difficulty, and danger to life.

In the second place, it was to be seriously considered whether epilepsy was not preferable to the condition in which the patient would be after operation. Reddened ears and face, drooping eyelids, and ophthalmia, seemed likely to be the immediate consequences. About the time these thoughts were passing through my mind, I removed a very large glandular mass from below and behind the parotid gland of a girl (No. 7 in sheet of photographs), and in her case the drooping eyelid and contracted pupil showed that the sympathetic cord was injured. No redness of ear, or cheek, or side of neck was, however, observed, and the changes in the eyelid and pupil gradually disappeared to the vision of the ordinary observer, being only patent to the vision of a scientific person. In C.'s case, who was admitted comatose for epilepsy, I excised a piece of each sympathetic in the neck, with an interval between each operation, without any bad effect, except that the patient improved, but whether *post hoc* or *propter hoc* I cannot say. Still, I had no evidence to show that the removal of one ganglion supremum was safe, except the evidence of numerous

vivisection experiments that had been performed with impunity, I believe, on rabbits. Experiments on the lower animals cannot however be performed in many cases on man with the same impunity, but it was extremely probable that the sympathetic was a less important structure in man than in animals. The following case coming opportunely to my hand, proved the safety of the operation, and put a stop to my hesitation.

One day a man of middle age came into my consulting-room, complaining of pain and spasm of the right side of the face and head to such an extent as to hinder him from doing any work. He wished to be admitted to hospital under my care. Soon after, I examined him in hospital, when suddenly during the examination his head turned over towards the right shoulder, the right eye was partially closed, and tears flowed down the corresponding cheek. The side of the face twitched spasmodically, and the countenance of the patient expressed intense pain. After the attack, the patient told me that the pain was excruciating. In a few minutes another attack came on, the duration and extent of which were about the same as the first.

History.—He is fifty years of age; a widower, with two daughters alive and healthy. He is now a labourer, but has been a collier. He states that thirty years ago he fell from a waggon of hay, and struck the right side of his head on the ground. He was stunned for a little, but otherwise felt no ill effects. Thirteen years last February, pains, like to the pricks of a needle, came at intervals in the region between the upper jaw and the top of his head on the right side. They continued for three months, and then disappeared for two years, to reappear and trouble him for nine months. He then remained free for three years, after which the pains have recurred every week, accompanied by twitchings. About three months ago they became incessant. He went to a neighbouring hospital and took medicines from various doctors, but without permanent benefit. When admitted to hospital the pupils were contracted, eyes inflamed, and had a melancholy, suffering expression, and there was a slight swelling behind the right ear. Patient describes the pains as beginning at the right upper jaw, and travelling over the top of the head, round back of

ear, and ending again where it started. The pains produce contortions of the mouth, cheek, and eyes, and tears run both from eyes and nostrils. The pains are much worse when out in the air, when going about, while eating, in damp weather, and when excited. On October 7, had seventeen attacks from 6 A.M. to 9 P.M. at irregular intervals.

After hearing this history, I tried to bring on an attack by running my hand roughly over his face. He guessed my intention, and pointed out to me that this could easily be done by touching a spot on the upper lip, midway between the median line and the angle of the mouth. Acting on his information, I found that even a slight touch there brought on an attack, that subsequent touches were less effective, and the attacks so produced less severe. I now placed a finger over the right common carotid, and on an attack being induced I compressed that vessel. The manifestations in the face *immediately* ceased, and I was thus able to make as many attacks abortive, after I had excited them, as I pleased. When I compressed the carotid, I failed to produce an attack by any amount of irritation.

Now the condition of this man was most pitiable, and was evidently due to a cerebral discharging lesion affecting the facial nerve, spinal accessory, and the sensory areas of the fifth nerve. It manifestly depended on the vascular supply of the same side of the brain, and ligature of the common carotid artery offered relief, judging from the effects of pressure on that vessel. Stretching of the superior maxillary nerve was also under consideration, but great danger of relapse would have arisen as soon as the stretched nerve recovered its tone. Stretching the facial was liable to the same objection, and the chance of paralysis, more or less permanent, of either nerve, was a still greater objection. Trephining over the affected ~~critical~~ centre was not then one of the ordinary *Cortical* resources of surgery, and all medicines had been tried in vain.

I proposed to the man to have his ganglion removed. This was done, the attacks gradually ceased, and I heard two months afterwards that he was quite well.

I tried to find him since, but failed. Beyond the drooping of the eyelid and the contraction of the pupil no deformity or in-

convenience was suffered, and the operation wound healed without any difficulty.

I cannot find the surgical notes of the case, and merely quote the salient points from memory. About a month afterwards, I operated on my first epileptic, quite satisfied that the operation was as safe as any other similar operation about the neck, and that no serious immediate evils would result from the operation. The remote results still had to be reckoned with, but they could hardly be worse than the patient's condition. My first case was the child Connor, whose mother was quite willing that anything should be tried. I only removed at consecutive times the lower half of each ganglion in her case, and was afterwards very sorry I had not been bolder, as the results might then have been better; but I wished to proceed cautiously, and was afraid as yet to go high up in the neck, amongst the nerves with which the ganglia are intimately connected.

Afterwards, with acquired confidence, I removed the whole of each ganglion, at first consecutively, but soon simultaneously. No ill results have as yet followed removal of the ganglia *per se*. The accidents in the cases to be described are accidents to which all operations are liable, and can, with antiseptics and experience, be completely avoided.

MODE OF PERFORMING THE OPERATION OF REMOVAL OF THE SUPERIOR CERVICAL GANGLION OF THE SYMPATHETIC.

As the operation is a new one, and to the surgeon a formidable one, I will give two descriptions of the method of its performance. The first short description will serve for those who read only for information, without any intention of operating. The second will be more extended, and will refer to landmarks that guide the operator, dangers to be avoided, and technical details that are unnecessary to lay before a general reader, but which are invaluable to the practical surgeon.

General Description of the Operation.—The patient should be anæsthetised with chloroform instead of ether, to avoid congestion of the veins of the neck. The head is placed on one side,

and the part to be operated on exposed to a good light. An incision is then made three inches in length, from half an inch in front of the mastoid process, just below the ear, straight down the middle of the sterno-mastoid muscle, until we are stopped by the fear of wounding the external jugular vein. The fibres of the muscle are separated until the sheath and fascia beneath are reached. The sheath is cut through, and the inner side of the wound is drawn well inwards and lifted up. The fascia now seen at the bottom of the wound is also cut through, care being taken not to wound the internal jugular vein. This vein is pulled well inwards with a retractor, when the internal carotid artery will come into view, and the superior cervical ganglion will be seen lying behind it. The ganglion will be easily recognised by its greyish colour and its large size, which rapidly diminishes into a thin cord as we follow it downwards. This cord should be cut below, the lower end of the upper fragment seized by the forceps, and the ganglion freed from its connection as high up as possible by snipping with fine blunt-pointed scissors that cut well out to the end. When the ganglion is freed as far as possible, its upper connection may be most safely and readily severed by traction. Some carbolic lotion is now used to wash out the wound, the inner side of the incision, which has been retracted, is allowed to fall outwards in apposition with the opposite side, after a drainage tube has been introduced, and the wound dressed with gauze, sublimate wool, or any other antiseptic dressing.

The spinal accessory nerve, and the internal jugular vein, are the parts in most danger.

Some branches of the cervical plexus of nerves are also in danger, if the operator go too far outwards.

When these nerves are seen, the surgeon should immediately make his way towards the middle line of the neck. The prominence formed by the styloid process just below the parotid gland, is the level at which the ganglion should be sought. If entrance is made below that level, the slender communicating cord will be come upon, and may be hard to distinguish. If above, we get involved in the vascular area of the parotid, which is rather embarrassing, and likely to be productive of

hæmorrhage. When the operation is well done, the pneumogastric and hypoglossal nerves are scarcely seen, and I need not say that if seen they should not be interfered with.

Landmarks that guide the surgeon in performing the operation, and special description of stages and dangers.—Just anterior to and on a level with extremity of the mastoid process, is the spot where the knife enters, and thence the cut is made vertically downwards through the skin and fascia, till the jugular vein is approached. We next separate or cut the fibres of the sternomastoid, until the posterior part of its sheath appears. This I cut boldly through, but beginners had better use a director. This is the first part of the operation.

The dangers of it are,—first, wounding the external jugular vein, and second, cutting the spinal accessory nerve. Neither of these dangers is great, and can only occur through carelessness or ignorance. The nerve may be exposed, but it is seen when the muscular fibres of the sternomastoid are being separated, and is generally so well seen that it need never be sacrificed. Should the vein be cut, ligature it above and below; should the nerve be cut, suture it.

The second part of the operation consists in cutting, or scratching through with a director, a layer of dense fascia that now appears in view. A small hole may be made with the knife, and this aperture enlarged with the fingers. Sometimes a small mass of glands appears, but with a little trouble, after careful teasing with a strong and blunt dissector, the internal jugular vein and the deep muscles of the front of the neck come into view. The second stage of the operation is complete when these structures are clearly seen.

The great danger of this stage is that of wounding the internal jugular vein. To avoid this requires some care, and is of course a serious, although not *very* serious danger. The remedy is, to stop the aperture in the vein at once with the finger, then to ligature the vein above and below the opening, and finally to cut the vein quite through between the points of ligature.

The internal jugular vein is most frequently wounded when we scratch through the glandular tissue too far forward. If we

go too far back, the danger is not so serious, but we there get involved amongst the nerves of the cervical plexus, and are likely to lose our bearings.

Having found the internal jugular vein, and the clean bed upon which it lies, we now with a *large-curved* retractor pull *inwards*, and *upwards* in the direction of the ceiling, the internal jugular vein. The internal carotid artery is now seen, and behind it or towards the operator the pneumogastric nerve. This nerve must not be touched. A little scratching with the director behind will expose the ganglion, if not already seen. The third stage is now finished.

With ordinary care there are no dangers in this stage. It is only a question of turning the vein inwards and out of the way, and looking for the ganglion amongst the tissues exposed. A great deal depends on the way the retractor is held, and the excellence of the light, for the wound is now generally a very deep one. Should the pneumogastric nerve be caught, by some mistake, a sharp cough made by the patient will at once warn the operator. When the bulging ganglion is seen tapering downwards to a point, it is unmistakeable. But I am often in doubt, at first sight, whether the pneumogastric nerve may not be the ganglion. In such cases I hook it a little into the wound, where its uniform size shows it to be a cranial nerve.

If in doubt, never cut anything; clear the nerves until all doubt is removed. The ganglion is a distinct and easily recognised structure, and cannot be mistaken for anything else, when properly seen.

If the retraction be performed too zealously, the jugular vein, carotid artery, and all the nerves may be drawn inwards and forwards by the retractor, and we may then look in vain for the ganglion. To prevent this, the operator must turn the vein over himself, and recognise the artery beating behind it. The artery should be in view all the time the nerves are searched for. The retractors that I use are half an inch broad, but it is well to have a full set, as a narrow one is often required in the next stage of the operation.

The fourth stage of the operation consists in removing the ganglion. It is hooked into the wound with an aneurism needle,

the thin cord connecting it with the middle ganglion is snipped through with scissors, and the lower end of the ganglion seized with forceps. On turning the ganglion from one side to the other, the numerous filaments connecting it with other structures are snipped through, *close to the ganglion*, so as to avoid wounding any of the cranial nerves in the neighbourhood. Should the tissues closely surround, so as to hide the upper end of the ganglion, a narrow retractor will pull them outwards, and expose the ganglion to view. Still snipping the connecting fibres as these appear, we follow the ganglion up the neck till it dwindles to a thread that slight traction will break, or that a final snip cuts through, and the operation is complete.

The wound is now filled with an antiseptic solution, a drainage tube inserted, the retractors withdrawn, and the edges of the wound allowed to fall together, when they are kept in apposition by two or three stitches.

The greatest danger of this part of the operation consists in removing anything else besides the ganglion. This may be avoided by keeping the scissors close to it. To wound the artery, or vagus nerve would be serious, but could only arise from a blunder that no one who undertakes the operation should be likely to make.

Drainage is very important, and should be continued in all cases for a week. Many cases would no doubt heal without drainage, but should burrowing of matter occur it might prove fatal, and it is better *to be always safe than generally fortunate*.

The wound is on a naked part of the neck, and it is well to leave as little scar as possible. Hence the edges of the wound should always be brought into exact apposition. The scar then becomes imperceptible in a few months. I dress the wounds on the day following the operation. If no suppuration occurs, I dress again at the end of a week, and remove the tubes. This second dressing remains on another week, when the wound should be soundly healed.

Should suppuration occur I dress daily, washing out the drainage tubes carefully, but in none of my recent cases has this been necessary.

CHAPTER IV.

REPORTS OF CASES IN WHICH THE SUPERIOR CERVICAL GANGLIA OF THE SYMPATHETIC WERE REMOVED, WITH SUMMARY OF RESULTS UP TO THE PRESENT TIME, *i.e.*, FOUR TO SIX YEARS AFTER OPERATION.

CASE I.

Mary A. C.; aged nine years, was admitted under my care on June 1st, 1883. She was a healthy-looking and apparently intelligent child, able to read fairly well, but rather precocious in her questions and answers. She had no physical defect or infirmity, and her family history did not exhibit any hereditary tendencies to which she might be the heiress.

When about a year and nine months old, the child was attacked with a slight weakness, thought by the mother to be "faints," but which were evidently attacks of petit m^al. She continued to be afflicted with these, more or less, until she was eight years old, when she had a very violent fit, "screamed and worked very hard." On that occasion she had ten fits, and afterwards became a confirmed epileptic. The fits had been increasing lately in number and frequency. The little patient knows when they are coming on by pains in the abdomen, that she described as "very severe; then something comes up to her throat." She was said to be queer in her manner, and incoherent in her statements for some time after. Before operating on this case, the following observations were made upon her condition:—

Her urine never showed the slightest trace of albumen, although it was examined daily for a fortnight. The specific gravity, taken in the morning before meals, varied, as the follow-

ing numbers will show:—1010, 1010, 1010, 1015, 1025, 1026, up to 19th, when she had “a sort of a fit,” screamed loudly, but was not quite unconscious. Specific gravity of urine after, 1026.

From the 21st to the 27th the specific gravity of the urine was 1026, 1029, 1024, 1028, 1030, 1026, 1024, 1026.

On the 28th she had a fit. There was no albumen in urine. Up to August 8th the specific gravity of urine varied from 1023 to 1028.

No further observations were made until the 20th, and the number of fits during the interval is unknown.

On the 20th she had a fit, and the specific gravity of the urine immediately after was 1025, free from albumen.

24th. She had a fit, and was unconscious for about three minutes; her face became quite congested, and she bit her lip.

28th. One fit. 30th. Two fits. September 5th. A severe fit.

On September 12th, I removed the half of the left sympathetic ganglion. No hæmorrhage occurred. The wound was dressed under the spray, and Listerian dressings applied.

After the operation, at twelve o'clock in the day, the patient lay for some time in the stupor of chloroform; the pupils of both eyes were then very much contracted. Pulse, 68. She awoke at 12.30 P.M. The temperature then was 98°, in the right axilla; the temperature of the left axilla not taken. She was restless for a few minutes, and then fell asleep till one o'clock. After this, she was rather restless again, and, lest she should disturb the dressings, ten drops of chlorodyne were administered. At two o'clock P.M., her pupils still remained contracted, and she continued restless, but there was no flushing over either her cheeks or ears. She slept from 3 P.M. till 4.30 P.M. When she awoke her pulse was 98. She had some milk, and immediately went to sleep again, awaking at seven o'clock P.M. Her temperature was normal; the left side of the face was warmer than the right side; pulse at 8 P.M., 110. At nine o'clock P.M. she seemed very comfortable, and both sides of the face were of the same temperature.

13th. Slept at intervals during the night, and took nourish-

ment well. At 5 A.M., vomited some milk. At 7 A.M., pupil of left eye very much more contracted than that of the right eye. At 7.30 A.M., she screamed loudly and had a slight fit, in which she "worked" chiefly on the right side, and only exhibited very slight movements on the left side. She was quite unconscious during the fit, and when it was over, she fell into a deep "snoring" sleep. Pulse at 10.30 A.M. over 160. Temperature, 102.8° F. Wound looks healthy. Carbolised lint and absorbent cotton wool substituted for the "antiseptic dressing."

Had a fit at 12 P.M. The pupils of both eyes were then very much contracted, that of the left eye being much more so than that of the right, and the left side of the face was warmer than the right side. The convulsions were chiefly on the right side. On the fit passing off the child at once recovered consciousness.

At 1.15 P.M., she had another fit, in which she was very much convulsed, and in which the pupil of left eye was much more contracted than that of the right. Both eyelids twitched violently, a phenomenon that only occurred to a slight extent in the previous fit. She was perfectly unconscious, her pulse beating more rapidly than it was possible to count. At 1.40 P.M. she was still convulsed, and frothing at the mouth. The house surgeon was called, who cleared her mouth of mucus, and administered chloroform, as I had directed, and gave a turpentine and starch enema. The fits ceased, and she awoke at 4.30 P.M. and had some milk. At 6.30 P.M. the temperature was 102.8°; pulse, 130. As the enema had not acted, it was now repeated with good effect. The temperature under the left arm was 100.2°; under the right, 101°. She did not sleep much during the night, but was free from pain, and had no return of the fits.

14th. Temperature under right arm, 99°; under left, 98.4°; pulse, 110. Left pupil distinctly contracted. The wound was dressed at noon, and looked clean and healthy. At 3.30 P.M. the temperature under the right arm was 100.6°; under left, 99.4°; pulse, 100. At six o'clock the child was easy and comfortable. The temperature under the right arm was 100.8°; under left, 100°; pulse, 130. Pupil of left eye still contracted.

15th. Patient passed a good night. Temperature under each arm, 98.4° F.; pulse, 90, in the morning. In the evening each axilla had a temperature of 98.4° F.; pulse, 70.

16th. Patient slept well during the night. Night nurse reported one slight fit. Temperature normal all day.

17th. Had a fit at 12.30 A.M. to-day. Child screamed loudly, and worked very much. It lasted about a minute, the patient afterwards sinking into a comfortable sleep. Temperature normal.

18th. Wound looked clean and healthy. Temperature normal; appetite good. Her parents had been to see her, in consequence of which she was rather excitable.

19th. Temperature normal; wound healing.

20th. Had a fit early this morning, screamed loudly, and was afterwards unconscious for about ten minutes. She then sank into a deep sleep, which lasted about an hour. Temperature normal.

24th. Had a fit, lasting about five minutes, in which she worked much more on right side than on left. Afterwards, she slept for two hours.

25th. Had a slight fit, without loss of consciousness. Had similar attacks on the 26th, 27th, 28th, and 29th. On the 3rd she had an attack of grand m^âl, that lasted two minutes, as well as an attack of petit m^âl; and on the 5th she had one attack of petit m^âl.

She had no more fits till the 9th, when the pupil of the left eye was now permanently about half the size of that of the right eye, and the left eyelid was somewhat drooping. No abnormal appearances or phenomena were to be observed about the cheek, or ear, or neck, of the left side. On this date, I removed the half of right superior ganglion of the sympathetic. The wound was treated as the one of the opposite side had been treated. She was very quiet after she came down from the operation room at 12.30 P.M., and slept till 1.20 P.M., when she awoke, and took a little milk. Both pupils were now equally contracted, and the upper eyelids drooped equally.

At 8.30 P.M., the temperature was 98°, on the right side, and

99°, on left. From this hour she slept till midnight; then she had a good drink of milk and soda-water.

10th. At 9 A.M. the temperature was 99.6°, on the right side, and 100°, on the left side; pulse, 70. She was still very quiet, and slept a good deal.

At 12 noon, the temperature was 98°, on right side, and 99°, on the left. At 6.30 P.M., she had a slight fit, which lasted two minutes. Chloroform was administered, according to directions, and the child went into a sound sleep. Her temperature, after the fit, was 101.8°, on the right side, and 102°, on the left side. Pupils a little dilated, and equal in diameter.

11th. At 1.15 A.M., she had a slight fit, and worked very much, till she had inhaled some chloroform. Temperature normal.

12th. Had a fit at 9 A.M., a very slight one. Sank into a sound sleep after it, without it being necessary to administer chloroform; temperature normal. At 12 noon, the temperature was 101°, on the left side, and 100.8°, on right side; pulse, 96. At 2.35 P.M., had a second fit.

13th. Temperature normal. Child comfortable; no fits.

14th. Urine examined to-day, and was thought to contain a trace of sugar; specific gravity, 1030.

15th. Urine examined; specific gravity, 1020. No appreciable quantity of sugar.

16th. Specific gravity, 1020.

17th. Specific gravity, 1025.

18th. A slight fit, lasting less than a minute. Temperature, normal; specific gravity of urine, 1030. No sugar.

21st. A slight fit this morning, "worked" on both sides, thus causing a little hæmorrhage from the cicatrix. Had another very slight fit in the evening.

23rd. At 8.30 A.M. had a rather bad fit, and another at 6.30 P.M. The wound was a little inflamed, in consequence of which a poultice was applied to it.

26th. Had a fit, with convulsive movements equally on both sides; temperature normal. No sugar or albumen in the urine; specific gravity, 1020.

29th. Child had a fit at 8.30 A.M., and another at 4.30 P.M.

She screamed when they were coming on, and "worked" on both sides.

31st. Had a fit, in which she worked very much on the right side, the mouth and lips being drawn very much to the right.

November 1st. Had a slight fit.

4th. Had a slight fit. She knew when it was coming, her face became quite *pale*, and she lay down in preparation for it. She then screamed, was convulsed for about a minute, acted in a silly manner for a few minutes, and then went to sleep.

6th. Had a severe fit, which lasted for ten minutes. Administered chloroform, which checked the convulsions, and the child went to sleep, and slept for six hours. Temperature normal.

9th. Had a very slight fit. Urine examined; specific gravity, 1025. No sugar.

12th. Had a very slight fit.

13th. Had five slight fits throughout the day, each only lasted about a minute. She did not sleep after any of them, but was rather silly in her words and actions, for a little while.

15th. A slight fit.

19th. A very slight fit, in which she was unconscious only for about half a minute.

21st. Two slight fits.

22nd. One slight fit.

23rd. One slight fit.

She was sent to the Dingle soon after. There, her fits gradually increased, and on May 12, 1887, she was sent back to the wards in the *status epilepticus*, quite unconscious, and with frequent convulsive attacks. As she was evidently dying, I trephined over the left motor region, as we had some reason for thinking the convulsive movements began in the right hand. No lesion was found. I removed the hand centre carefully. Seven hours after she sat up and looked about her, and seemed more intelligent than she had been for weeks. She afterwards relapsed into a half-stupid, half-unconscious state, and died suddenly at ten o'clock next morning.

Post-mortem examination next day. Wound quite clean and sweet, no blood or effusion. Brain weighed 48 ounces; hyper-

trophied, great excess of white substance. Lateral ventricles very small, mere slits; cerebellum small, compared with rest of brain. No gross lesion.

CASE II.

Charles J., aged eighteen years, was last admitted to hospital under my care, on September 12th, 1883. Father dead, cause of death unknown. Mother and one brother alive. None of his family suffered from epilepsy, or any other nervous or hereditary disease, as far as could be made out.

One day, five years ago, he fell in the street, and had his first fit; but before that, he had not been strong, and had suffered from pains in the head. Since then, the fits had come on frequently and regularly, about ten to twelve per month. They had been gradually increasing in frequency. The patient was a well-made, healthy-looking youth, of an intelligent countenance, when the fits were not, as he said, "hanging about him," or had just passed off. He was under my care in August last, and during a month, he was treated by percussion of the spine. The fits became less frequent under this treatment, and almost ceased, until a week after he went out, when they returned with redoubled frequency.

The fits were observed from October 1st. On that day he had one strong fit, lasting three minutes.

4th. One fit, lasting three minutes.

8th. One fit in the morning.

14th. One fit in the evening.

18th. I removed completely the left upper cervical ganglion of the sympathetic, at noon of that day. At 3 P.M., the patient had a slight fit, with twitching all over his body. Temperature, 99°.

19th. Had a fairly good night. At 6.30 A.M., had a fit; another at 8.30 A.M., which lasted three minutes, and a third at 11.30 A.M., lasting two minutes. Evening temperature, 99.4° on right side; pulse, 110.

20th. Slept well all night. Wound dressed to-day; looked well; left pupil contracted; tongue normal. Morning temperature, 98.6°; pulse, 96; evening temperature, 98.8°.

21st. All well, no fits; morning temperature, 97.6° ; evening, 98.0° .

22nd. All well, no fits; morning temperature, 98.4° ; evening, 99.6° .

23rd. All well, no fits; morning temperature, 97.6° ; evening, 99.4° .

24th. All well, no fits; morning temperature, 98.0° ; evening, 99.4° .

25th. Wound dressed with oiled lint, and absorbent cotton wool; looked well. No fits; morning temperature, 98.0° ; evening, 98.4° .

26th. Patient "fainted" this morning at 2 A.M., slept afterwards; morning temperature, 97.4° ; evening, 98.4° .

27th. Slept well; no fits; morning temperature, right side, 97.8° , left, 97.4° .

28th. Wounds almost healed; morning temperature, right 97.8° , left 98° ; evening, right 97° , left 97.4° .

29th. No fits; morning temperature, right 97° , left 97° ; evening, right 97° , left 98° .

30th. Complained of headache. This was the usual forerunner of fits, but none to-day; morning temperature, right 97° , left 97.4° ; evening, right 97° , left 97.4° .

31st. No fits; morning temperature, right 98.4° , left 98.2° ; evening, right 98.2° , left 98.6° .

November 1st. No fits; morning temperature, right $98^{\circ}0$, left 98.6° ; evening, right 98.0° , left 97.4° .

2nd. Had another "weakness" at 6 A.M. this morning, more like a fainting fit than anything else; morning temperature, right 97.0° , left 97.6° ; evening, right 98.4° , left 97.6° .

3rd. Diet changed from mutton to eggs; temperature uniform and normal. A slight fit at 2 P.M.

4th. Wound quite healed. A slight fit to-day. No more till the 13th, when he had one, of short duration and mild intensity.

On November 14th, the right superior cervical ganglion was completely removed. The wound was dressed antiseptically, and drainage tubes inserted. He slept none all the afternoon of that day; was very thirsty, and drank a great deal of soda water.

15th. Slept well all last night. Had a fit this morning at 7.15 A.M., which lasted about two minutes. He soon recovered after it.

16th. Slept well. Awoke quite bright; enjoyed his food, and felt hungry in the intervals between his meals. No fits.

17th. Did not sleep so well. A slight fit at 7 A.M.

18th. Profuse urticaria over chest, face, and arms, which lasted several days, gradually fading away. He was much better in every way.

24th. A slight fit.

27th. Up to-day, was much better, wounds healing.

28th. Complained of pain in abdomen; ordered bismuth.

29th. Slept well, but looked rather dull and stupid this morning. In the afternoon, had a fit lasting three minutes.

The further notes of this case here fail, and must have been mislaid or lost. I write the rest of the case from memory.

In the course of a month or so after the last date, the patient went out of hospital. He remained free from attacks for nearly six weeks, then he had some fits, and was readmitted to hospital. He stayed with us for some weeks, having occasional attacks marked by painful gastric troubles. He again went out improved. Some months after, I tried to find him, and lately a messenger spent some time trying to trace him, but in vain. The final results in this case are therefore unknown.

CASE III.

Florence Ogden, aged thirteen years, came under my care on October 3rd 1883. Father and mother both alive and well. Had one brother and one sister in good health. There was no family history of hereditary disease.

She had been suffering from fits for three years, brought on at first, her mother thought, from a fright. She had the attacks oftener this last month.

When first seen her face had a somewhat vacant, silly look, and she was unable to walk or stand by herself, and tossed her head about vacantly. She seemed of an affectionate, clinging nature.

On October 4th, she had a slight fit at 10 P.M. Next day she

was ordered ten grains of bromide of potassium, three times a day. She soon got up and walked about. Up to the 18th October, she kept well, and ran about all day unsupported. On October 18th, she had four fits during the night, and two during the day. In the fits, her eyes were turned towards the left side, her whole body was "convulsed," and she foamed at the mouth. Each fit lasted only a few minutes.

21st. A slight fit.

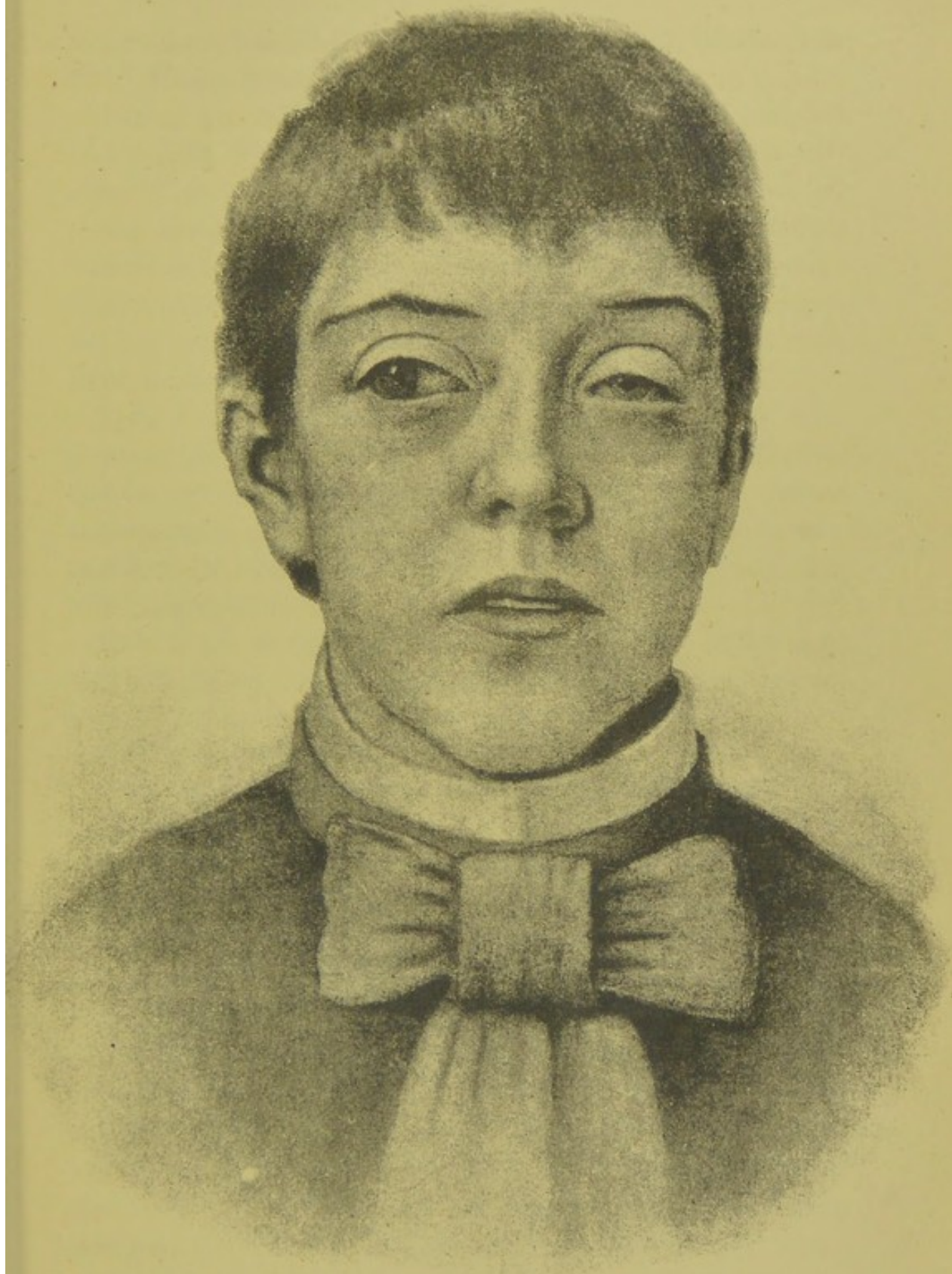
22nd. Two very slight fits.

23rd. Three fits, child cried when coming out of these attacks.

On October 24th, I removed the whole of her left superior cervical sympathetic ganglion, the patient being at the time under the influence of chloroform.

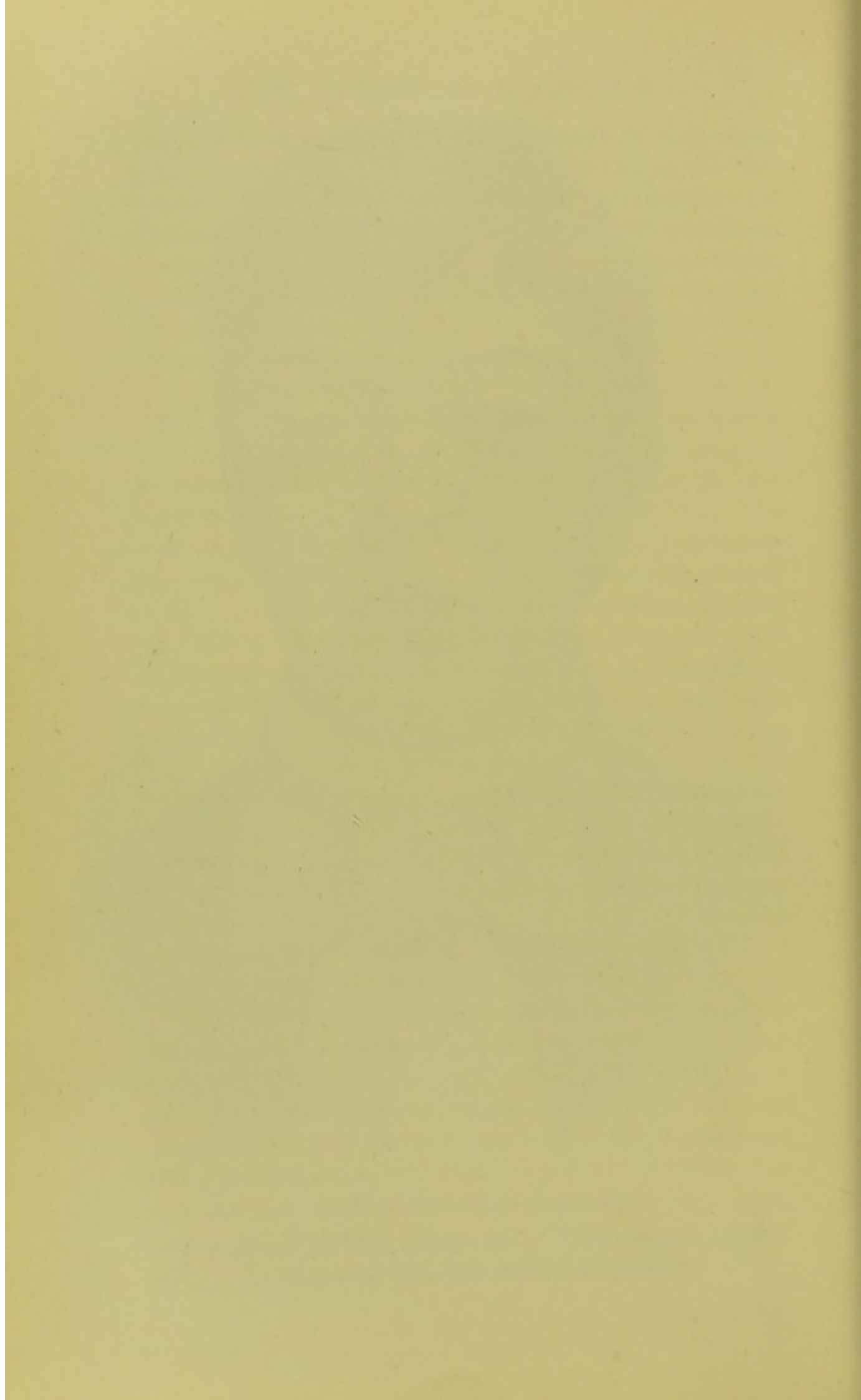
She had a slight fit when going under chloroform, and another when the wounds were being stitched up. The operation was over at 12.45 P.M. She then swallowed a little iced water, and slept from 1 till 1.20 P.M. She awoke crying. At 1.30 P.M., she took a little ice and milk. The pupil of the right eye was rather dilated, that of the left eye, contracted. Temperature, 2 P.M., right, 97.4° F.; left, 97.6° F. 2.20 P.M., had a slight fit, in which the left arm and side worked, and the eyes turned towards the left. She cried when coming out of the fit, and afterwards slept for ten minutes. Immediately after she had another fit. At 3.45 P.M., she vomited a little white frothy material, and at 5.10 P.M., vomited about a pint of this stuff. Temperature at 6 o'clock, 99.4°, under each arm. Slept at intervals from 6 to 9 P.M., when she vomited again.

25th. 2 A.M., temperature, left, 99.6°; right, 99.4°. 6 A.M., temperature, left, 99.4°; right, 99.2°. Slept nearly all night, and had a little ice and soda water occasionally, when she awoke for a moment. 9 A.M., rather restless, temperature, left, 99.2°; right, 99°. 11 A.M., had a fit which lasted a few minutes. 12 noon, passed urine. 12.10 P.M., had another fit, a rather strong one, lasting three minutes; eyes turned upwards. 12.15 P.M., had some milk; complained of a little difficulty in swallowing. 2 P.M., temperature, left, 99.4°; right, 99°. Urine, specific gravity, 1012; no sugar or albumen; left pupil still contracted. 6 P.M.,



FLORENCE OGDEN—CASE III.

Both ganglia removed. Staphyloma of right eye, the result of ophthalmia, caught long after operations.



temperature, left, 98.4°; right, 98°. 10 P.M., left, 98.4°; right, 98°. Wound dressed, looking well.

26th. 2 A.M., temperature, left, 98.4°; right, 98°. 6 A.M., left, 98.4°; right, 98°. Slept nearly all night. 10 A.M., left, 98°; right, 97.6°. Wound dressed. Pupil of left eye contracted; eyelid drooped, or, as the nurse remarked, appeared swollen. Patient said she was hungry. Took half a pint of beef tea with a little bread crumb in it. 2 P.M., temperature, left, 98.4°; right, 98°. 6 P.M., left, 99.4°; right, 99°. At 11.10 had a fit, very slight in its character; slept for some time after it.

27th. 2 A.M., temperature, left, 99°; right, 98.4°. 6 A.M., temperature, left, 99.4°; right, 99°. Passed a fair quantity of urine; specific gravity, 1012; no sugar. 12 A.M., wound dressed antiseptically. Had beef-tea and bread at 1 P.M. 2 P.M., temperature, left, 98.6°; right, 98.4°. 6 P.M., temperature, left, 98.8°; right, 98.6°.

28th. 2 A.M., temperature, 98.2° under each arm. At 2.30 A.M., had a slight fit. At 7.15 A.M., another slight fit; temperature normal, and equal under both arms at 9 A.M.

29th. Another slight fit.

30th. Had a fit at 3.30 P.M. Temperature under each arm, normal. Slept well during the night, and was comfortable. At 8.45 A.M., she had a very strong fit, in which the whole body was convulsed; the mouth was quite open, the eyes closed. She cried when coming out of the fit, which lasted fifteen minutes. At 10 A.M. she had another fit, lasting ten minutes. At 11.45 A.M. she had another strong one, lasting twelve minutes, in which the eyes twitched, the pupils were dilated, and the tongue was drawn to left side of mouth. She cried when coming out of it, and her whole body was "convulsed." At 1.30 P.M. she had another fit, lasting ten minutes. She cried all the time she was in it. At 3.30 P.M. she had another, which lasted three minutes. At 4.30 P.M., temperature, left, 98.8°; right, 98.6°; pupils dilated. At 5.45 P.M. she had a slight fit. 6 P.M., temperature, left, 98°; right, 97.6°. At 6.40 P.M. her bowels were moved. 10 P.M., temperature, 98° under both arms.

31st. Slept well all night. Her urine, after the fits, was of

specific gravity, 1012, contained no albumen or sugar. She had two fits during the afternoon of this day, one of which lasted about three minutes, the other was a very slight one. The temperature was normal and equal under both arms, on the four occasions on which it was taken to-day.

November 12th. No fits since the 31st ultimo. Sat up for six hours.

15th. Patient had a few slight fits every day, that were scarcely noticeable, and lasted only about a minute, leaving her quite well immediately afterwards.

20th. The attacks of petit m^âl still continued. Some days she had one, on other days three or four attacks. To-day she had a strong fit, lasting about ten minutes, in which all her body worked.

21st. I removed the whole of the right superior cervical ganglion. When she was returned to bed, she slept for ten minutes, and then awoke, crying. Pupils of average size, both eyelids alike. Temperature two hours after operation, right, 98°; left, 97.8°. At 4.35 P.M., she had a very slight fit, which lasted a minute, and in which her eyes twitched. She was restless and peevish in the evening. Five minims of laudanum made her quiet; a similar dose was again administered at bed-time. Just before getting the laudanum, she had a strong fit, lasting ten minutes; her whole body worked; she foamed at the mouth, and her pupils were dilated. It was stopped by the inhalation of m. xx chloroform administered by the nurse, as had been directed. At 7.50 P.M., her pulse was 100; respirations, 28; temperature, 98°, on both sides.

22nd. Temperature, 5 A.M., right, 98.2°; left, 98.6°; pulse, 104; respiration, 26. Temperature 8 A.M., right, 99°; left, 98°; pulse, 100; respiration, 24. Passed one pint of dark, strong-smelling urine during the night. 2 P.M., temperature, right, 100°; left, 99.6°; left pupil more dilated than right. One pint urine, specific gravity, 1032; no sugar or albumen present.

23rd. Patient slept well all night. At 5 A.M. temperature, right, 99°; left, 99°. At 10.30 A.M. temperature, right, 99.4°; left, 99°; eyes alike. 3.0 P.M. temperature, right, 99°; left,

98.6°. At 3.10 A.M. had a slight fit, lasting ten seconds—eyes twitched; urine, $\frac{1}{2}$ pint, specific gravity, 1030.

24th. Morning temperature, right, 98.2°; left, 98°; pulse, 90; respiration, 24. One slight fit, lasting about a minute.

25th. Wound dressed antiseptically, looking well; a slight fit; urine, specific gravity, 1024. Could not measure quantity accurately in this case, as the patient did not help nurse to collect it.

26th. Morning temperature, right, 97.8°; left, 97.6°; eyes alike. Patient looked very bright, and slept well.

27th. A slight fit in the evening—a general shake; pupils dilated during the attack.

December 1st. Temperature normal. Had one strong fit, in which she screamed, and foamed at the mouth; her eyes turned upwards, her body, generally, felt cold, this condition being especially marked in the extremities. She slept after the fit.

5th. No more fits till to-day. This morning she had three, the first lasting seven minutes, and in which every portion of her body twitched; she also foamed at the mouth. The second lasted three, and the third, five minutes. Urine, specific gravity, 1020; no sugar and no albumen present.

7th. She had a slight twitching, lasting a few seconds.

8th. Several twitchings.

9th. Eight fits resulting from a quantity of unmasticated meat that was vomited after the attacks.

14th. Had slight twitchings daily, but the patient's mind was much improved. To have light dumb-bell exercise, night and morning.

January 12th, no more fits. Sent to Maghull.

From this time, the fits were not regularly recorded, and we can only give the gross result. At the time of writing (September 1888), she has been, for nearly a year, free from fits of any kind. Before that, she had an interval of six months, and before that, an interval of at least three months. Lately, her stepfather died, and she has passed through a good deal of trouble without having had a fit. She had the "shakes," or attacks of petit m^al, long after the fits ceased, and, at last, these disappeared also. She has had no bromide for about three years.

CASE IV.

Cornelius Eustace, aged sixteen years, a rivet heater, came under my care on November 11th, 1882.

His parents were healthy, but he lived with an uncle who was subject to fits. About six years ago, patient had a fit, whilst reading with his mother, for which no cause could be assigned. At first they were very infrequent, but latterly they have increased so much as to hinder him from work. Mind clear.

On December 2nd, he had a slight fit, which was not specially observed.

12th. He had a severe fit, with complete loss of consciousness, lasting about fifteen minutes, and accompanied by foaming at the mouth. Percussion of spine ordered as treatment.

16th. Had five trembling fits, in which the patient shook all over. Each of the fits lasted about two minutes.

26th. Trembling fit. 28th. Five trembling fits.

31st. Eleven attacks of the petit m^âl.

January 4th. Four attacks.

21st. Seventeen attacks. 22nd. One attack of grand m^âl.

23rd. Four attacks of petit m^âl. 24th. Nine attacks.

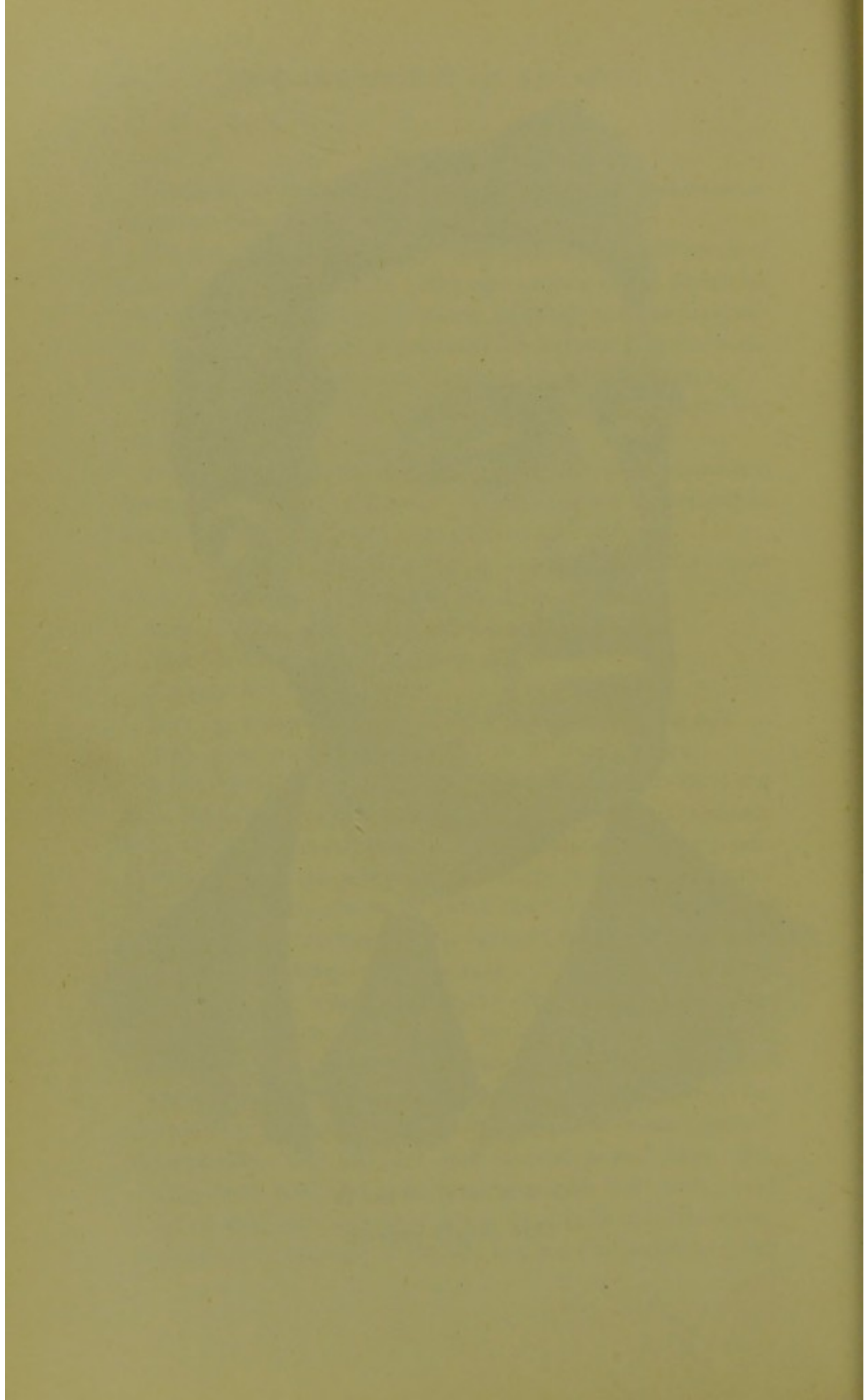
February 2nd. One petit m^âl. He was soon after taken out from hospital by his mother, and did not return until October 23rd, 1883. He stated that for some months after he went out, after having had the percussion treatment, he was free from the fits, as well as from what he called the "shakes." The latter affected his arms and legs, several times during the day, but more especially after rising in the morning. He was afraid to carry anything, lest he should let it fall. He himself would fall on the floor at the same time, but would pick himself up in a moment, "with all his wits about him."

On October 31st, his left superior cervical ganglion of the sympathetic was completely removed, and the wound dressed antiseptically. He was sick, and vomited several times after coming down from the operation room. He had small pieces of ice to suck, with occasional spoonfuls of milk and soda-water. An hour after the pupil of the left eye was contracted, and the



CORNELIUS E.—CASE IV.

Both ganglia removed.



eyelid drooping. Evening temperature, right, 98.6° ; left, 99.4° ; pulse, 88.

November 1st. Slept fairly well all night. Morning temperature, right, 98.8° ; left, 99° ; pulse, 98. Evening temperature, right, 99° ; left, 98° ; pulse, 78. Passed $1\frac{3}{4}$ pints urine; specific gravity, 1021. No sugar. There was a large excess of phosphates, but no sugar or albumen. The wound was dressed, as there was a little oozing from it. No fits or shakes.

2nd. Slept well all night. Appetite good. Morning temperature, right, 98.2° ; left, 97.8° ; pulse not recorded. Evening temperature, right, 97.6° ; left, 97.6° ; pulse, 62. Passed $2\frac{1}{2}$ pints urine; specific gravity, 1028; no sugar; phosphates less. Patient very quiet all day.

3rd. Slept well. Passed $2\frac{1}{2}$ pints urine; specific gravity, 1014; no sugar. Temperature, morning, right, 97.6° ; left, 97.2° . Evening, right, 97.6° ; left, 98° .

4th. Morning temperature, right, 97.4° ; left, 97.4° . Evening, 98.2° on both sides. Passed $3\frac{1}{2}$ pints of urine; specific gravity, 1012; phosphates still in excess. At 7.30 this morning he had a shake similar to the attacks of petit mál before the operation.

5th. Temperature normal and almost uniform. Morning, right, 97.8° ; left, 97.4° . Evening, right, 97.6° ; left, 97.8° . Passed $3\frac{1}{2}$ pints urine; specific gravity, 1013. Wound looking well. Some headache, and difficulty in swallowing, this afternoon.

6th. Did not sleep quite so well last night. Throat much better this morning. Passed 3 pints of urine; specific gravity, 1016; phosphates present; no sugar or albumen. Morning temperature, right, 97.8° ; left, 98.4° . Evening temperature, right, 98.4° ; left, 98.4° .

7th. Slept well. Temperature normal and uniform. Urine, $2\frac{1}{2}$ pints; specific gravity, 1028; phosphates. Wound looked well; throat better.

8th. Had a "trembling" at five o'clock this morning. Passed $2\frac{3}{4}$ pints of urine; phosphates present; specific gravity, 1018.

9th. Slept well. Passed $3\frac{1}{2}$ pints of urine; phosphates pre-

sent; specific gravity, 1009. Drainage tube removed. Wound almost healed. Temperature normal and uniform.

10th. Passed $2\frac{3}{4}$ pints urine; specific gravity, 1005; phosphates present. Had seven trembling fits this forenoon, all of them slight. Wounds healed.

11th. Bowels moved four times, the first since the operation. Temperature normal. Had a fit last night at twelve o'clock, the first since the operation. His face was convulsed. This morning he had four "tremblings." Passed 2 pints of urine.

12th. Diarrhœa. Urine only 1 pint; specific gravity, 1017. Temperature normal.

13th. Diarrhœa continued. Milk diet, and bismuth in combination with syrup of poppies prescribed. Half pint of urine passed; specific gravity, 1020.

14th. Much better. Passed 2 pints urine; specific gravity, 1030.

15th. Passed $3\frac{1}{4}$ pints urine; specific gravity, 1018.

16th. Was quite well. Had one trembling fit in the night. Passed $3\frac{1}{2}$ pints of urine; specific gravity, 1012.

17th. Had four trembling fits during the night. Passed $3\frac{1}{2}$ pints of urine; specific gravity, 1012. Complained of some pain in passing it. Diet changed to meat and potatoes.

18th. Had seven "tremblings" during the night. No urine passed during that time. Enema ordered this morning; bowels were opened. Passed $1\frac{1}{4}$ pints of urine during the day; specific gravity, 1018.

He had no more attacks, and the quantity of urine was about three pints daily until the

21st, when he was again taken to the operation room, and had the right upper ganglion of the sympathetic removed. He was sick, and vomited several times during the afternoon, sleeping at intervals. Passed $\frac{3}{4}$ pint of urine. Temperature, 99° , under both arms. Pupils of both eyes equal. He complained of some pain in the head and neck. Five minims of morphia were prescribed.

22nd. Temperature, 99° under each arm. He slept well all night. Vomited at 6 A.M. Was sick again this forenoon. At

5 P.M., he was again sick. Evening temperature, right, 99.4° ; left, 99.8° ; pulse, 84. Passed $\frac{3}{4}$ pint of urine; specific gravity, 1024; no sugar; phosphates present. Had four tremblings to-day.

23rd. Slept very well. Had some soda-water and milk, and some chicken broth. Wound dressed. There had been a little oozing from it; drainage renewed. He had some difficulty in swallowing. Passed $1\frac{3}{4}$ pints of urine; specific gravity, 1032; there was excess of phosphates, but no sugar or albumen. Temperature, right, 99.8° ; left, 99.8° ; pulse, 84.

24th. Slept well. No trembling fits. Temperature, right, 98.2° ; left, 98.4° . Passed $\frac{1}{2}$ pint of urine during the night; specific gravity, 1015; no sugar; no albumen.

25th. He did not sleep quite so well; complained of headache. Passed $3\frac{1}{4}$ pints of urine; specific gravity, 1014. Wound almost healed. Aperient mixture caused two movements of bowels. Temperature, 101.2° , under each arm; pulse, 104.

26th. Temperature, right, 100.4° ; left, 100° ; pulse, 98. Passed $2\frac{3}{4}$ pints of urine; specific gravity, 1014. Wound a little swollen. Linseed poultice applied, and drainage tube re-inserted.

27th. Temperature, 98.6° , on both sides. Passed 2 pints of urine; specific gravity, 1020. Pulse, 104.

28th. Passed $2\frac{1}{2}$ pints of urine. Temperature normal.

29th. Did not sleep so well; complained of pain in neck. Passed 2 pints of urine; specific gravity, 1030. Some pain in wound; less irritated, and discharging pus; washed out daily with boracic lotion.

30th. Passed 2 pints of urine. Specific gravity, 1013. One slight shake this morning. Temperature, 98.6° .

December 1st. Passed 3 pints of urine. Specific gravity, 1018. One momentary shake.

2nd. Passed 2 pints of urine. Had two shakes.

3rd. Passed $3\frac{3}{4}$ pints of urine; specific gravity, 1015. Patient got up to-day. Had a little headache.

4th. Passed $2\frac{1}{2}$ pints of urine; specific gravity, 1018. Was up five hours.

5th. As he had some pain in swallowing solid food, he was ordered to be fed on liquids. Urine not to be examined for a week.

8th. Had three slight tremblings this morning when getting up. Could swallow easily now. Temperature normal. Two "tremblings" in evening.

10th. Had one "trembling" in afternoon, and went down on knees, but arose immediately.

12th. One "trembling" before getting up, but was over in a moment.

13th. One "trembling."

15th. One "trembling." In none of these "tremblings" has he fallen, and the legs were not affected, except on one occasion. There was still some hyperæsthesia of fauces when eating rough food. Surface temperature of cheek before exercise, right, 97.2° ; left, 94.5° . After exercise with dumb-bells, right, 95.4° ; left, 95.2° . He was, soon after, discharged to town, and did not turn up again till January 7th, 1885, when he presented himself at hospital, suffering from a cheloid on the cicatrix of the left side of the neck. He had been working since operation, and during that time had had no fits. He came into hospital only on account of the constant pain on the left side of the neck. This pain was of a throbbing character, and prevented him eating or sleeping. After various futile attempts to relieve the pain, the cheloid was excised on January 22nd. It was about the size of a hazel nut, and presented the usual appearance of cicatricial cheloids. On the 24th, the patient had a slight fit. On February 1st he had a stronger one, and on March 3rd, two strong fits in the same night. On March 9th, he again went out to resume his work, with the neck healed, and no sign of any return of the cheloid.

Since that time, he was seen frequently, but no fits have been experienced. The only trouble he complained of was a dropping or staggering whenever he got out of bed in the morning, or when he put his hands into the cold water in order to wash himself. I have told him to persevere with his work, and that in time these troubles would probably disappear also. No medicines since operation.

CASE V.

Thomas B. (No. 5, in sheet of photographs), aged thirty-six years, single, was admitted to hospital under my care on September 13th, 1883. He was educated as a veterinary surgeon, but had not been able, owing to the state of his health, to follow his occupation. Habits temperate.

His father died from overwork, as an estate agent. Mother died from natural causes. He had four brothers and three sisters, all living and healthy. None of his relatives epileptic. When twenty years of age, and whilst going with his father to examine a cow, he fell down in an epileptic attack produced by self-abuse. He had two fits within twelve months. After that they came at longer or shorter intervals. Lately he had a number of them every fortnight. He could tell when they were coming on by the blood rushing to his head. He had headaches after the fits passed off. The fits were very severe, and he was afraid to be alone.

On October 31st, I attempted to remove the superior cervical ganglion of the sympathetic, on the left side. The region through which the ganglion was reached was full of lymphatic glands, and these had to be removed before the internal jugular vein could be seen. No ganglion could be discovered, although the pneumogastric and other cranial nerves were plainly visible. I searched cautiously, upwards, and downwards, and inwards, but could not see anything of the structure I was looking for. I therefore judged it wiser to close the wound, than to provoke suppuration or sloughing in such a dangerous region.

On visiting him after he recovered from the effects of the chloroform, I found the left pupil contracted, and the left eyelid drooping. Probably a portion of the ganglion came away with the adherent lymphatic glands. He passed half a pint of urine during the afternoon. Temperature, right, 99° ; left, 99.4° ; pulse, 64.

November 1st. Temperature, right, 99.8° ; left, 100.6° . The wound was dressed, and looked healthy. He passed one pint of urine, specific gravity, 1020, and contained no sugar or albumen. This afternoon he complained of a feeling of cold in his knees and

legs, the rest of his body being very hot. Evening temperature uniform, 100.6° ; pulse, 98.

2nd. Morning temperature, right, 100.1° ; left, 100.8° ; pulse, 98. Evening temperature, right, 100.6° ; left, 100.8° ; pulse, 110. Wound was dressed, and looked well; bowels opened. Complained of pain in head and left ear, and of some difficulty in swallowing. Passed two pints of urine, which contained no albumen or sugar.

3rd. Patient was very restless all night; slept at short intervals. Passed one pint of urine, which contained a considerable quantity of albumen. He still complained of pain in his neck and behind his ear. Temperature, morning, right, 101.2° ; left, 101.4° . Pulse, 98. Evening, right, 101.4° ; left, 101.4° . The wound was dressed; its edges were a little reddened.

4th. Patient had a good night. Passed two pints of urine; specific gravity, 1028; albumen less. Pains around wound less severe. Temperature, morning, right, 99.8° ; left, 100.4° . Evening, right, 101.4° ; left, 101.8° .

5th. Slept well. Passed $2\frac{1}{2}$ pints of urine; specific gravity, 1024; contained very little albumen. Head and throat better; could swallow better. Temperature, morning, right, 100° ; left, 100° . Evening, right, 100.4° ; left, 100.6° .

6th. Passed 4 pints of urine; specific gravity, 1012; contained no albumen or sugar. Pain continued in left ear and head. Temperature, morning, right, 99.6° ; left, 99.6° . Evening, right, 99.6° ; left, 100.2° .

7th. Patient had a good night. Passed $3\frac{3}{4}$ pints of urine; specific gravity, 1010; contained no albumen or sugar. Wound discharging pus freely through drainage tube. Rest of wound healed; had some bloody sputa. Temperature, morning, uniform, 99° ; evening, right 99° , left 99.4° .

8th. Patient slept well. Passed $3\frac{1}{2}$ pints of urine, of specific gravity, 1012; excess of phosphates present. It contained no sugar or albumen. He said last night he felt as if he was going to have a fit, but it passed off. No pain in head, and no blood in sputa. Temperature, right 98° , left 98.2° , morning; right 98.4° , left 98.4° , evening.

9th. Patient slept well. Passed 5 pints of urine; specific gravity, 1016, and contained phosphates. Wound discharging freely. Temperature, right 98.6°, left 99.2°, evening; right 98.2°, left 98.6°, morning.

10th. Passed 3 pints of urine; specific gravity, 1008, and contained phosphates. Temperature normal and uniform.

11th. Passed 2½ pints of urine; specific gravity, 1008.

12th. Passed 3 pints of urine; specific gravity, 1018.

13th. Passed 2½ pints of urine; specific gravity, 1020, and contained phosphates.

30th. Wound quite healed, head better. Had no fits since the operation.

December 6th. Had a fit at 1 A.M. this morning.

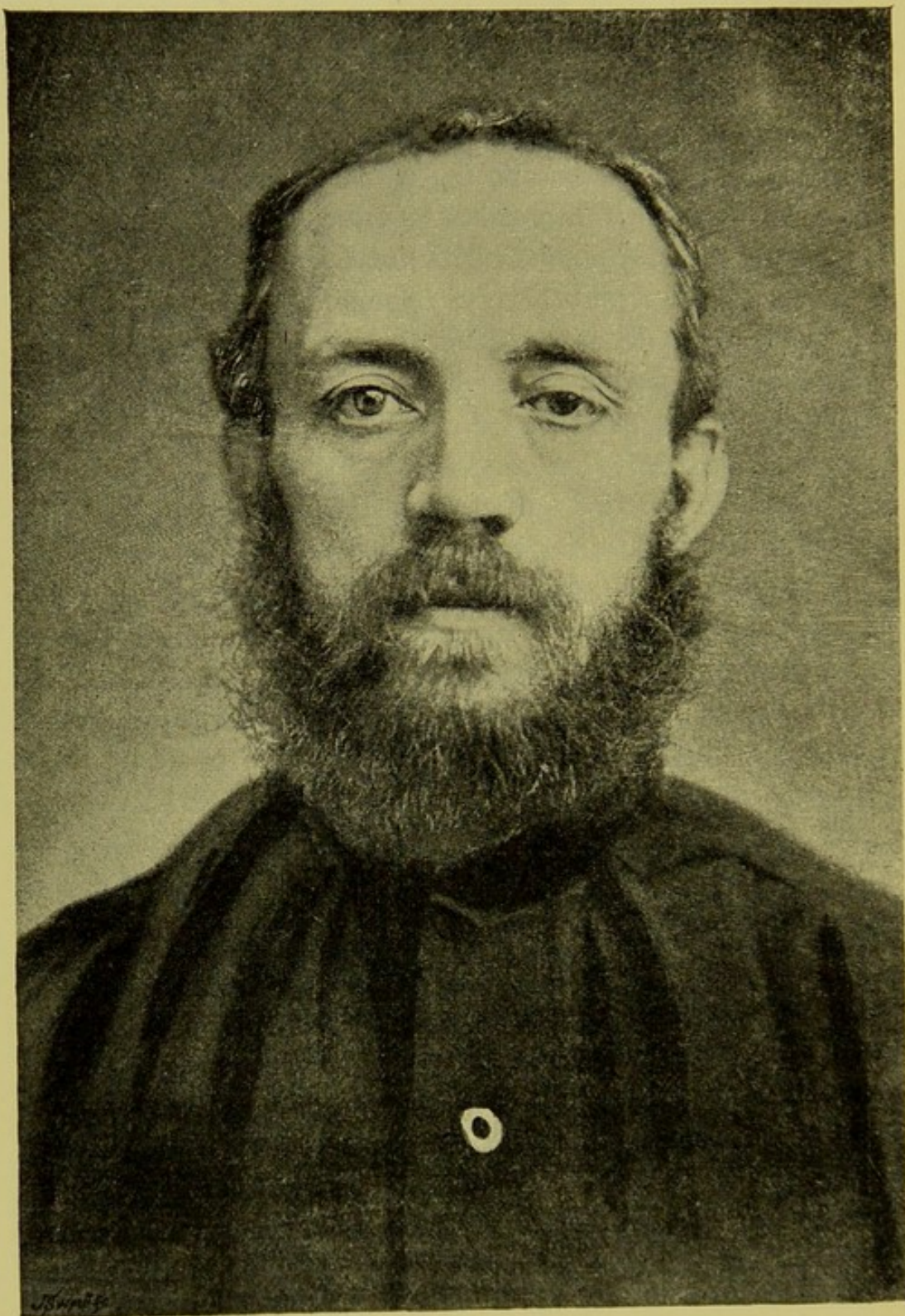
30th. Had a fit during the night, moved limbs about violently snored loudly after; the attack lasted about five minutes. The patient was then sent to Woolton, where he stayed a fortnight. He had two fits while he was there.

On March 19th, 1884, I removed the right superior cervical ganglion. The ganglion was very high up in the neck, and its removal was performed with some difficulty. He had a fit on the 23rd, 25th, 30th; April 3rd, 9th, 16th, 23rd, 29th; May 2nd, 11th, 31st; June 2nd, 21st; July 14th and 15th; 25th August, six fits; September, five fits; October, three fits; November, 22 fits; December, 1 fit.

During 1885 he had 16 fits; 1886, 21 fits; 1887, 19 fits; 1888, 13 fits.

He has much improved mentally, and during last year he never had more than one fit at a time. In the previous year he had four batches of three fits each. In 1886, he had five batches of three and four fits; in 1885, six similar attacks; and in 1884, he had twenty-two in four days. The attacks are slighter, and his mind is not nearly so much affected after them.

Only one ganglion was really removed in this case, and the disease was of sixteen years' duration. The improvement so far is very satisfactory, and as the patient has only had three fits in the last five months, we may look forward with much hope.



THOMAS B.—CASE V.

Left ganglion completely removed, right partially removed.

CASE VI.

Emma Press, (No. 9, in sheet of photographs), aged thirty-three years, married, came under my care on October 18th, 1883, to have an operation performed for the cure of epilepsy.

Her father died from phthisis about twenty years ago, and her mother died from heart disease. She had three sisters, and one brother, all of whom were healthy. She had been married ten years, and had five children, four of whom died from teething. None of them were epileptic.

The patient was quite healthy up to the age of fifteen years, when she began to menstruate. About the same time she was seized with epileptic convulsions. Before their onset she was afflicted with pains in her head, and "fulness of her temples." Since that time she had never been free for more than a fortnight. They had always been excessively severe at the monthly periods. She had no warning of the onset of an attack, and only suspected that she had one from the lassitude she experienced.

October 24th. She had a strong fit, which lasted about twenty minutes. "Her body all worked, she foamed at the mouth, and her eyes looked upwards. Her mouth was drawn a little to the right side. She fell asleep immediately afterwards."

29th. She had two fits during the night, in each of which she "worked" very much. Each lasted about twenty minutes.

30th. She had a strong fit, lasting half an hour. "Her whole body took part in the convulsions; her face became quite purple, and she foamed at the mouth. She was sitting on a chair at the time, her eyes were closed in the early part of the fit, and her pupils were contracted."

On November 7th, I removed both superior cervical ganglia at the same time. These structures were both large, and I removed them very completely, severing the carotid continuation of each ganglion by traction. The pulse, on the side operated on, became fuller, softer, and slower, at the time of removal of the ganglion by traction; she vomited after the operation. An hour afterwards, at 1.20 P.M., the temperature under each arm was 97.1° F.; she was rather restless, and the pupil of each eye was

contracted. At 3 P.M., the pulse was 84, respiration 18. At 4.30 P.M. she was sighing a good deal, and kicking her legs about. She complained of pain in her throat, but was able to swallow a little ice. At 6 P.M., the pulse was 78, respiration 18, temperature 99.4° , under each arm. At 7 P.M., she had some soda-water. At 8.10 P.M., she had a very loose motion. At 10 P.M., the pulse was 112, respiration 28, temperature 100.4° under each arm; the bowels were freely moved, and bladder emptied.

8th. At 4 A.M., the number of respirations was 24 in a minute, pulse 86, temperature of right arm 98.4° , of left 98.2° . The patient slept well during the night. At 10 A.M., the temperature was 99.6° F., under each arm, respiration 20, pulse 88. She had a very slight fit, in which the hands worked a little; the lips were quite blue, and the pupils very much contracted. She slept till nearly twelve o'clock, when the wounds were dressed under the spray, and were looking well. At 12.30 P.M., she took a half-pint of beef-tea. At 2 P.M., the temperature under the right arm was 99° F., under the left 98.4° F. At 6 P.M., the temperature under each arm was 100.2° , the pulse 90, and respiration 22. At 10 P.M., temperature, right, 99.4° ; left, 99.4° ; pulse, 80; respiration, 20. Midnight, temperature, right, 99.2° ; left, 99.2° ; pulse, 110; respiration, 20.

9th. 2 A.M., temperature, right, 99° ; left, 98.4° ; pulse, 102; respiration, 20. 6 A.M., temperature, right, 99.2° ; left, 99.2° ; pulse, 102; respiration, 20. She passed ten ounces of urine, which was very dark in colour, of specific gravity 1034; it contained neither sugar nor albumen, but a large quantity of phosphates and urates. At 10 A.M., the temperature of right arm was 97.8° ; of left, 97.6° ; pulse, 86; respiration, 20. The specific gravity of the urine was 1034, and contained neither albumen nor sugar. Her tongue was coated with white fur, and she complained of pain in her throat. She took half a pint of beef-tea. At 6 P.M., temperature, right, 99.6° ; left, 99° ; pulse, 86; respiration, 22. At 10 P.M., temperature, right, 99.8° ; left, 99.4° ; pulse, 110; respiration, 20.

10th. At 2 A.M., temperature, right, 99° ; left, 99° ; pulse, 84; respiration, 20. Passed four ounces of urine. At 6 A.M., tem-

perature, right, 98.4° ; left, 98.4° ; pulse, 84; respiration, 20. Passed one and a half pints of urine, of specific gravity 1030, which emitted a strong odour, but did not show any traces of either sugar or albumen. The wounds were dressed antiseptically. Left wound discharging healthy pus. At 6 P.M., temperature of right side, 98.6° ; that of left, 98.8° ; pulse, 80; respiration, 20.

11th. Patient slept all night. She passed one pint of urine to-day. It was still dark in colour, and emitted a strong odour. Temperature normal, and the same under each arm.

12th. The wounds were dressed antiseptically; both were suppurating a little. The temperature normal, and equal on both sides. She passed one pint of urine, of specific gravity 1032; it was much clearer.

14th. Patient's urine was of specific gravity, 1020. The wounds were looking well. She had one fit during the night, which lasted ten minutes. "All her body worked." She slept afterwards.

23rd. Patient had a fit during the night, in which "her whole body worked," and her eyes twitched. It lasted about ten minutes. The urine was of specific gravity 1020, and contained neither sugar nor albumen. One wound not yet quite healed.

25th. Patient had a fit similar to that of yesterday. Specific gravity of urine, 1020.

26th. She had two fits, each lasting about four minutes, and in which her body all worked, her eyes remained closed, her face was ghastly pale when going into them. She had one again in the evening, in which the pupils were dilated for the first time since the operation.

27th. She had a slight fit, and complained of headache.

28th. She still complained of headache, was very restless, and fancied "all kinds of things." Got out of bed. An aperient mixture and a chloral draught were ordered.

29th. Patient much more settled in mind.

December 2nd. Patient much better. Menses came on.

15th. Patient has done well since, and had no fits. The surface temperature of the right cheek, before exercise, was 94.6° , after 95.1° .

Soon after this she left the hospital.

I saw this patient in September 1887, and asked her husband about her condition. He said her attacks were about half as numerous as they had been before the operation, and that mentally she was a good deal better. She managed the house, and had no accidents since she came home, which speaks well for her condition. In this case I anticipate a gradual improvement.

CASE VII.

James Connor, a sensible, healthy-looking fellow, aged twenty-nine years, single, by occupation a sailor, was admitted 10th October 1883, suffering from fits, to which he had been subject for a long time. They were growing so much worse, that the patient came in to have anything done that could possibly relieve him. He had a strong fit during the night of admission. He complained of pain in his head and chest before the onset of the attacks.

December 4th. The specific gravity of the urine was 1020, and contained no sugar or albumen. He had several strong fits since admission, that were not noted except in general terms, and no descriptive details had been recorded.

5th. Both superior cervical ganglia were removed. The left superior cervical was closely attached to the pneumogastric nerve.

6th. Temperature, morning, 97.8° ; evening, 97.2° . Patient slept four and a half hours. He was sick four times, and complained of pains at the back of his head and chest. He passed $2\frac{3}{4}$ pints urine, of specific gravity 1032. The wounds were dressed, and were looking well.

7th. He had a bad cough this morning, and was found, on examination, to be suffering from acute capillary bronchitis. The patient in the next bed caught pneumonia during the same night. Both diseases were caused by over-ventilation in cold weather. Connor's chest was poulticed every four hours. Temperature, morning, 98.6° ; evening, 101.2° . He passed $2\frac{1}{2}$ pints of urine, of specific gravity 1026. The wounds looked healthy.

8th. Patient's breathing was very short and difficult. The dyspnœa gradually increased, and patient died at 2.15 A.M. on the 9th.

Post mortem on December 11th, 1883.—*Brain* was reddened all over its surface by a network of small vessels, very apparent in pia mater. *Veins* moderately full of blood. The brain substance was pale in centre, but otherwise normal; the cord was soft; heart normal. *Lungs*—The bronchial tubes were gorged with bronchitic effusion; the lungs were partly collapsed. There was some recent adhesive pleurisy; and perihepatitis was also found.

The *liver* and *kidney* were congested. *Superior cervical ganglia* all gone. The wounds were healthy; vagi nerves normal.

CASE VIII.

Mary M'Grath, aged eleven (No. 4, in sheet of photographs), re-admitted to hospital on June 26th, 1883, was one of my vertebral cases, as the following report from "Brain" for July 1882, shows:—

"Mary M'G., aged eleven, was admitted to hospital on March 7th, 1882. Her father died suddenly; her mother is living and strong. Has had a brother who died of scarlet fever, and has four sisters who are all living and well. Four years ago this child had a fit when she was at play. It lasted some time,—the mother says a quarter of an hour,—and she has had fits ever since. Her general health was good, her appetite normal, and her urine free from albumen.

"From February 11th until March 1st, when the right vertebral artery was tied, she had nineteen fits. Her temperature on the evening of operation went up to 103.8°; pulse, 116; respiration, 54. She suffered from headache, to relieve which evaporating lotions were applied to her forehead. On March 2nd her morning temperature was 98.8°. In the evening it was 99°. On March 9th her temperature again rose to 102°, and she had a fit. Next day the temperature was normal, and she had no more fits till the 13th. On that date she had one fit.

On March 15th the right side of her face was swollen, and her right eyelid pale and puffy. Her urine was examined. It

was of specific gravity 1011, and contained no albumen. On March 18th, as she had no more fits, she was sent to Maghull.

"Immediately she went out there the fits recommenced, and she had from three to four daily up to April 8th. From April 8th till April 15th, she had no more. On April 15th, she had one, and on April 18th, another, and from that date up to April 26th, she had seven. On April 26th, the left vertebral artery was tied. The highest temperature was registered on April 27th, and reached 101° . On May 7th, she had two fits. On May 9th, an ice bag was applied to her spine. Since that time up to the present, June 5th, she has had three fits. The mental condition of the patient has much improved."

The mother, soon after this, took the patient home, where she gradually relapsed into the old stupid way, and she was again brought back at the above mentioned date, to see if anything further could be done for her.

Soon after her admission, she had two fits, lasting, according to the nurse, three minutes each. "The child," according to the nurse, "seemed to be convulsed inwardly. She foamed at the mouth, and her eyelids were tightly closed. Between the fits, she seemed of a very sullen, melancholy disposition."

July 13th. We began to observe the patient, and the urine was carefully tested every day with the following results:—

13th. Specific gravity was 1014, and contained no albumen. July 14th. Urine, specific gravity, 1014. July 15th. Urine, specific gravity, 1020, and contained no albumen or sugar. She had a fit during the afternoon, in which she screamed loudly, and was much convulsed. July 16th. Specific gravity of urine was 1029, and contained no albumen. Patient had a fit during the afternoon; in it the pupils were very much contracted. It lasted about two minutes. After the fit, the urine was of specific gravity 1028, and contained no albumen.

17th. Patient had a fit during the afternoon. The specific gravity of the urine was 1015. There was no albumen.

18th. She had a fit during the night, in which she screamed loudly, and was unconscious for about two minutes. Specific gravity of urine, after the fit, was 1026; there was no al-

bumen. She had another fit during the evening, and worked very much.

19th. The urine was of specific gravity 1029, and contained no albumen.

20th, Specific gravity of urine was 1030. There was no albumen.

21st. Specific gravity of urine was 1030. There was no albumen or sugar.

22nd. Specific gravity of urine was 1028. There was no albumen.

23d. Specific gravity of urine was 1026. There was no albumen.

24th. The child was much more lively, less melancholy, and took an interest in things in which she did not take any interest since her readmission. The specific gravity of urine was 1026. For the next nine days the specific gravity of the urine was 1026, 1024, 1028, 1026, 1028, 1029, 1028, 1030, 1030. This concluded a period of fifteen days without any fits.

On August 5th, she had four strong fits, each lasting about three minutes. The specific gravity of the urine was 1030.

6th. Patient had one fit.

15th. A seton was inserted into the nape of her neck. The urine was of about the same specific gravity as usual.

19th. She had a fit, and relapsed into the previous stupid condition.

23rd. She was a little brighter, but never talked unless spoken to.

25th. She had two fits, in which both sides of the body were affected. She foamed at the mouth, and was unconscious for about the space of three minutes.

On August 27th patient had one fit; on the 29th, two fits; 30th, three fits; on September 3rd, one fit; 5th, one fit; 10th, one fit; 12th, two fits; 15th, three fits; 19th, four fits; 21st, two fits; 24th, one fit; on October 15th, one fit; 16th, three fits; 17th, six fits; 18th, two fits; 29th, one fit; on November 10th, three fits; 11th, four fits.

The record here fails until January 29th 1883, when I removed both superior cervical ganglia. She slept for about an hour after the operation, when she awoke and began to tear off

her bandages. Ten minims of chlorodyne soothed her to sleep again.

Her temperature, when she was brought from the operation room, was normal in each axilla. At seven o'clock, it was 99° , in the right axilla, 98.4° , in the left. At 10 P.M., it was 98.4° , in the right axilla, 98° , in the left.

January 10th. At 8 A.M. temperature was 98.4° right axilla, 98.2° , left axilla. Child was quiet; drank milk readily. The wounds were dressed under the spray. She had a fit at one o'clock. At 7 P.M. the temperature was 99° , in right axilla, 98.4° , in left axilla.

11th. Patient had a quiet night. The temperature at 8 A.M. was 98.4° , right axilla, 98° , left axilla; evening temperature, 99.2° , right axilla, 98.4° , left axilla. She was somewhat restless during the day. The dressings were disturbed by patient, and had to be changed.

12th. Temperature, 8 A.M., 98.4° , right axilla, 98.2° , left axilla; evening temperature, 99° , right axilla, 98.4° , left axilla. The child was rather restless in the evening; a small draught of chloral and bromide secured a good night.

13th. The temperature at 8 A.M., 99° , right axilla; 98.2° , left axilla. The child had a fit at 1.10 P.M., which lasted about two minutes, and another at 9.45 P.M., which lasted about a minute. The temperature at 7 P.M. was 100° , right axilla, 99.4° , left axilla.

14th The temperature at 8 A.M. was 98.4° , right axilla, 98° , left axilla. The stitches were removed. The temperature at 7 P.M., was normal under each arm. At 4.15 A.M., she had a slight fit, but the patient was quite herself a minute afterwards.

15th. The temperature at 8 A.M. was normal under each arm. Patient passed a quiet day.

16th. She had three fits to-day, one at 8.30 A.M. (the patient was very much exhausted after it); another at 1.10 P.M., lasting four minutes, in which she worked very much; and the third at 11.10 P.M., lasting three minutes.

17th. Patient had a fit at 4 A.M., lasting two minutes, and a very slight fit at 11 A.M. in which she did not "work" at all.

18th. She had a fit at 11.40 P.M., lasting two minutes.

19th. She had two fits, one at 3.45 A.M., lasting three minutes, and another at 10.20 A.M.

February 4th. She had three fits during the day.

5th. She had three severe fits. She was put on 18 grains of bromide of potassium three times a day, with small doses of iodide and bicarbonate of potash, and some belladonna.

19th. Patient seemed very much depressed, and very quiet. She slept well last night, and was able to be up to-day. She walked about the wards, only speaking when spoken to. She has some catarrhal ophthalmia of the left eye, and complained of her head and face feeling sore. Temperature, 98°; respiration, 20; pulse, 80; weak over left wrist, normal over right wrist. Boracic lotion was prescribed for the ophthalmia.

20th. Her eye was much better, the patient was brighter, and walked about very well. Did not speak, and sat picking at something when left alone. "Shivers all over" sometimes.

21st. Walked a little better, was able to go about the wards without help, and asked for what she wanted. Her appetite was good; she appeared to suffer from toothache, but did not say so.

22nd. She was a good deal brighter, and more talkative.

23rd. She had a very violent fit in the early morning, and another soon after. "She gathered herself into a sitting posture, with her chin upon her knees, and then stretched herself out at full length in strong convulsions, for a few seconds, having her feet turned back, her hands clenched, and her face drawn to the left side. She screamed two or three times loudly, before going into a fit."

24th. She had another fit. She was soon herself again after it, and walked about the ward.

25th. She fell out of bed in a fit during the night; she screamed, and was very violent afterwards. She had another fit this morning in bed, where she stayed during the greater part of the day, and a third in the afternoon.

26th. She had a fit last night, in which she rolled on to the floor, and two more fits during the day. In the afternoon she sat up, and became quite talkative.

27th. She had three fits during the night, in which she screamed loudly, and two fits in the afternoon, in which her face was drawn to the right.

28th. She had a strong fit this morning, in which her face was drawn to the left. She had another fit in the evening.

29th. She had one fit to-day, and none during the night.

March 1st. She was very well and bright.

2nd and 3rd. She was stupid and morose. She had no fits till the 11th, when she had a slight one, and none again till the 17th, when she had two severe fits.

18th. She had a fit in the night.

A few days after, her mother took her out of hospital, and she was not again heard of till September 1888, when I went to see her. I found her living with her mother in a Liverpool court. The child was alone in a garret, with only a night-dress upon her, and lay on a mattress upon the floor. There she seemed to stay all day alone. I could get no account of her fits from the mother, who seemed to be afraid that I would somehow deprive her of the half-crown per week, which she got from the parish authorities, and she was manifestly trying to answer me so as to save the half-crown. After a few attempts at conversation, the child brightened up a little, but no treatment could possibly have much effect under such adverse circumstances.

CASE IX.

Mary Elizabeth Lewthwaite, aged nineteen years, was admitted to hospital on January 4th, 1884. Her father, mother, brother, and sister were living. A brother died, at the age of five years, of "water on the brain." Her paternal grandmother had fits for seven years before her death.

When patient was a year old, she fell down a flight of stairs and hurt her head. Both temples were very much swollen for a time. She had very good health until she reached fourteen years of age, when she had scarlet fever. A year after this, when in a situation, she had her first fit, and, since then, she has had these attacks at intervals of a month, or even longer. She was, however, able to keep her situation till a month ago, when

they became much worse, and she was sent home. She had a severe fit a few days before admission to hospital. She was a sensible, quiet, well-nourished girl.

On January 9th, about 1 P.M., she began to complain of headache, went to bed, and slept all the afternoon. "At 9 P.M. she awoke suddenly, made a great plunge and a shiver: she dashed her head and arms about violently, her eyes were turned up, the left pupil being more dilated than the right, her teeth ground against each other, and her hands were clenched." The nurse, who thus described the attack, said she had ten of these fits in succession, each lasting a few minutes, but none was so severe as the first. She went to sleep at 9.30 P.M.; she had four fits, one about 10.10 P.M., one at 12.20 P.M., one at 7.15 A.M., and another at 7.35 A.M. The last two were more like shivering fits.

10th. Patient had fits at intervals through the day. She had ten in succession, from 3 to 4.30 P.M. The first attack, much the longest in duration, did not last more than two to three minutes. She was quite unconscious between the attacks, and slightly delirious after they were over. When conscious, she could not speak for some time. After 4.30 P.M., she had one or two fits every hour up till 9 o'clock, when she went to sleep, and slept all night without an attack.

11th. Patient had six fits through the day, very strong, but not lasting five minutes. "She did not scream when the attack began, but always made a kind of snoring noise, and gave two or three great sobs when the fit was over."

12th. Patient slept all night, and was free from fits, but during the day, had fits at intervals as before. Her hands were very cold.

13th. Patient passed a good night, and was much brighter this morning. She only complained of slight pains in the top of her head. At 5 P.M. she had two slight fits.

14th. She had no fits last night; slept well, and was very much better this morning. She was able to be up and about all day. Complained of pains in her eyes, which had rather a wild look, and the pupils were very much dilated.

15th. She slept well all night. This morning complained of great pain in her eyes, and dizziness in her head, and could not remain up all day. She had two slight fits about 9 P.M.

16th. She slept well all night; had no fits; was much better this morning, and able to be up all day.

17th. The patient passed a good night, and had no fits. The pupils of her eyes were normal, and the pain in eyes and head not so bad; her appetite was good. She slept for some hours in the middle of the day, and felt very drowsy.

18th. She had a good night and day till 8 P.M., when she had two strong fits.

19th. Patient had two strong fits at 9.45 A.M., and slept till about 3 P.M., when she awoke, but did not feel able to get up. She had two fits at 5 P.M.

20th. Patient slept well all night. Complained very much of her head and eyes this morning, but had no fits.

21st. Patient slept well, and was able to be up this morning. She was not, however, looking well. Her eyes had a wild, staring look; the pupil of the left eye was more dilated than that of the right. She was standing at the fire, between ten and eleven o'clock, when she was seized with a fit. "She became quite stiff, and fell flat on her back, and her head came in contact with the floor with a bang. She was not much convulsed, but her head, hands, and feet, beat against the floor, her eyes turned up, she ground her teeth, and her whole frame shivered." The fit lasted about a minute. She was helped to bed, and slept for some hours. She seemed better in the evening, but still complained of pain in the head. About 6 P.M., she had another very strong fit. It seemed to be coming on for half an hour, she screamed, and worked her arms, legs, and head, violently, for a minute or two. Then she lay quite unconscious for a little, and awoke in a delirious state, in which condition she remained for a quarter of an hour, after which she slept.

22nd. Patient slept well all night, and had no fits. The left pupil was much dilated, the right was normal. She was not able to get out of bed. At 1.45 P.M., she had a strong fit, after which she remained unconscious for nearly an hour. About a

quarter to four she had another fit, which ceased instantly when the carotid arteries were compressed.

23rd. Patient slept well, and seemed brighter this morning. At 1.40 P.M. she appeared as if a fit was coming on, as the hands twitched, and she ground her teeth. The carotids were compressed, and the phenomena ceased.

24th. Patient slept well, and had no fits.

25th. Patient got up this morning, but complained of her head. She went to bed at 9.30, and seemed very drowsy. She had a fit at 2.45 P.M., not very strong; there was much headache afterwards. About 5.15 P.M., as another fit seemed to be threatening, the carotids were compressed. She said it relieved her head very much; the fit did not occur, and she soon after went to sleep.

26th. She had pain and giddiness in her head this morning, and went to bed in the forenoon. She had three slight fits, which stopped when the carotids were compressed. Slept all the afternoon.

Patient had no fits from this date till January 30th, when both superior cervical ganglia were removed. Her temperature at 2 P.M. was 97.4° ; at 5.30 P.M., 98.8° . She complained of pain in her neck, when she swallowed. She slept from 6.30 to 7 P.M., her arms being folded over her head. At 5.30 her pulse was 94; respiration, 20.

January 31st. Patient could not sleep during the early part of the night. At 1 o'clock A.M., she had a hypodermic injection of morphia and atropine, after which she slept till 5 A.M. Her temperature, then was, 100.6° , in left axilla, 102° , in right axilla. At 8 A.M., her temperature was 100.6° , in right axilla, in left axilla, 100° ; pulse, 100; respiration, 18. Pulse tracing taken at this time did not show anything remarkable. Being thirsty, she was fed on soda-water and milk. The wounds were dressed antiseptically, and were looking well. At 2.30, temperature under each arm was 101.4° . About 7 P.M., patient complained greatly of pain in her neck; her face was very much flushed, and her eyes bloodshot; her temperature was 102.4° , in right axilla, 102.2° in left axilla; pulse, 120; respiration, 20. The wounds

were dressed antiseptically. On the left side, the wound was looking very clean; on the right side it was suppurating; the drainage tubes were removed and re-inserted.

February 1st. Patient slept badly. Her temperature at 12.25 A.M., was 101° under each arm. A hypodermic of morphia and atropine procured sleep till 6 A.M. Her temperature, then, was 100° , in right axilla, 99.8° , left axilla. At 8 A.M., her temperature was 99.8° ; pulse, 112; respiration, 16. At 12 o'clock the wounds were dressed, the drainage tubes being removed, and smaller ones inserted. At 7.15 P.M., her temperature was 101.6° , in right axilla, 101.4° , in left axilla. She complained of pain in the neck; the tubes were removed, and the wounds irrigated with boracic lotion. The wound on the left side was healing, that on right suppurating, and its edges were inflamed. At 10 o'clock her temperature was 100.8° ; pulse, 110; respiration, 20.

2nd. Her temperature in the morning was 100.8° ; pulse, 110; respiration, 18. The wounds were not dressed till 7 P.M. Before the dressing, her temperature was 101.4° right, 101.2° left. The tubes were removed, and the wounds irrigated with boracic acid in solution.

3rd. The morning temperature was 100° ; pulse, 110; respiration, 18. Patient was more comfortable; she had slept well by the aid of morphia and atropine. The evening temperature was 100.6° ; pulse, 118; respiration, 20.

4th. Patient complained of "jumping" pains in the right side of her neck. At 3.30 P.M., temperature, 99° ; pulse, 99; respiration, 20. This morning she was very fretful. There was a good deal of discharge from the right side of her neck; only a little from the left side. The wounds were dressed at one o'clock, and the drainage tubes re-inserted into the wound on the right side. At 7 P.M., the wounds were again dressed. Temperature, 102.2° right axilla, 101.8° left axilla.

5th. Patient could not sleep during the early part of the night. She had a hypodermic injection of morphia and atropine at 4 A.M. Temperature, 99° , right axilla, 98.6° , left axilla. At 8 A.M. her temperature was 99.8° ; pulse, 80; respiration, 16. The wounds were dressed at 9 A.M.; there was free discharge.

They were irrigated as usual, and the tube was cleaned and re-inserted. Her temperature at 6 P.M., was 101.4°, right axilla, 101.2°, left axilla. The wounds were dressed again and washed. At 9.30 P.M., her temperature was 100.8°, right axilla, 100°, left axilla. She had morphia at 11 P.M.

6th. At 7 A.M., temperature was normal. Her bowels were well moved, and the patient felt much better. The wounds were dressed, and drainage tube removed. The temperature from this date continued normal, and the wounds were healed by the 12th.

13th. Patient slept well last night, only started up in bed once as if dreaming. She looked very white in the face this morning, and her pulse was rather irregular. She sat up at the fire a little, and then went back to bed. Suddenly, she felt a choking sensation in her throat, and she sobbed once or twice; her hands twitched a little, and tears ran down her face. She recovered rapidly, without any convulsions, got up, and was very bright all day.

15th. Patient got up at 8 A.M. this morning, and, while sitting at the fire, felt very faint; when moved to the fresh air, she got all right. On the 21st, she had a slight threatening of an attack of fainting, but this passed off.

March 12th. Patient went to the convalescent home at Maghull.

April 10th. Returned from Maghull on account of some fits, which she had a few days before.

11th. Patient complained of headache this morning, and at 9.30 A.M., she had three slight fits. During the next few days, she had a series of slight fits, one or two each day, but they stopped on the 18th.

On May 11th, she had a slight fainting attack. On 20th, she had several slight fits. On 25th, she had two slight fits in the afternoon. On June 5th, she had two fits. On 6th, she had an attack at 10.30 P.M., and slept well all night afterwards. On 7th, she had two slight fits. On 24th, she was discharged from hospital, feeling very well.

I heard no more of this patient till August 14th, 1888, when

she came into hospital, with a baby fourteen months old. The fits gradually disappeared after she went out. Several months after, she got married, and had no attack now for nearly three years. She looked strong and intelligent.

CASE X.

Peter Burke, aged twenty-three years, single, a carter, was admitted to hospital on January 5th, 1884, suffering from epilepsy. His mother, five brothers, and five step-brothers were all living and healthy. His father died, when patient was about twelve months old. He suffered from "a bad chest." There was no history of fits in the family.

The first fit came on when patient was between seventeen and eighteen years of age. There was no apparent cause, no fall or previous sickness whatever. He was at his work as usual, when he suddenly fell in a fit, and from that time till he was twenty years of age, he had a fit every month or six weeks. For the last three years he had the attacks every week, and was unable to work in consequence. He did not know when they were coming on; he had always a feeling of great weight on the back of the head.

January 17th. Twelfth day from his last fit; he had not been so long without one for some time. At 10.30 A.M., he had a fit, in which he fell with a loud scream; for about three minutes he worked convulsively, his face being almost black, and his eyes half opened and turned up. He was put to bed, and slept till 11.15 A.M., when he got up and went about, apparently brighter and better than he had been for a long time. His bowels being confined, he had some *mist. aperiens.*

23rd. At 10.45 A.M. he had a fit, in which he fell with a loud scream, and worked violently for quite ten minutes. He remained blue in the face for a quarter of an hour afterwards; did not fall asleep, but lay quietly in a stupid state till 11.30 A.M., when he got up, feeling all right.

30th. At 7.15 A.M., patient fell in the wash-house in a fit, in which he struggled very much for fifteen minutes, then slept for ten minutes, when he got up quite well.

February 6th. Patient had a fit at 7 A.M., in which he fell across the fender, and cut his nose and forehead slightly. To-day he was taken to the operation room, and under chloroform had both superior cervical ganglia completely removed. He had a good deal of pain in the neck for some time after the operation, but in the evening he was very bright, and in good spirits.

7th. There was some oozing from the wounds, which were dressed antiseptically. The wounds were looking well; the temperature was normal.

8th. Temperature normal. He ate and slept well. Patient had not, since the operation, felt, as he had previously done, the sensation of weight on the back of the head.

12th. Wounds were dressed under the spray, and were looking well; the drainage tubes were changed for smaller ones. His eyes looked dull to-day, and as evening came on he felt great pain in his forehead and top of his head. Two pil. col. et hyos. were prescribed.

Patient went on well till February 20th, when he had a slight fit, at 9.30 A.M., which did not last more than two minutes. His left hand and arm twitched a little, the right remained stiff and rigid, his breathing was just a little heavier than usual. He slept, after the fit, for fifteen minutes, and then awoke quite bright, and unconscious that anything had happened.

23rd. Patient was up and going about; felt quite well.

March 1st. He had a fit, which was more severe than the last, but much lighter than before operation.

5th. Patient had a slight fit this evening.

12th. He had a short, but rather severe fit.

14th. He had a slight fit.

24th. He had two slight fits during the night.

30th. He had a slight fit, and screamed before going into it.

April 4th. Discharged to town at his own request.

Patient was readmitted to hospital on April 29th. He has had four fits since he went out. They were much slighter than before, and he feels them coming on.

May 4th. He had a slight fit.

12th. He had two slight fits during the night.

22nd. Patient had a fit lasting two minutes at 10.30 A.M., and while asleep.

26th. He had a severe fit during the night.

June 7th. He had a severe fit.

14th. Patient was discharged to town at his own request.

This patient was seen by me in September 1888. He described himself as much improved, thought he had not had a fit for a year, and had worked with a horse and cart. He might have had a fit at night without his knowledge, but he never had any reason to think so.

I have seen the mother since, but she did not give such a favourable report. Her son still had some fits, she said, but *he* did not know anything about them. He had not worked for some time, and had not, she thought, been much improved by operation. She could not give any clear opinion of the number, and only remembered two that he had, under striking circumstances.

CASE XI.

Sarah Ann Williams, (No. 14, in sheet of photographs), aged eighteen years, was admitted to hospital from workhouse, January 4th, 1884.

Her earliest recollections were of the parish school at Kirkdale, where she had been for ten years. She had a brother there who got a situation, and she had never heard of him since. She knew nothing of her parents or relations. She said she never had a fit, till three years ago, and thought she got the first fit from a fright. She remained at Kirkdale two years afterwards, during which time she continued to have fits, sometimes a great many, and sometimes she would be nearly six months without. She always knew when a fit was coming on, and sat down. Her mind was clear, and she was fairly intelligent.

She came into hospital in 1883, but not having had any fits for two or three weeks, she was sent out. From that time, the attacks became more frequent and severe. She always had two or three every month, and lately she had failed to anticipate their advent, and had fallen down. On January 4th, she fell

down suddenly in the wash-kitchen, and had four fits in succession. She was then sent under my care.

On February 22nd, she had two severe fits, with an interval of some hours between. She screamed very much when going into them, and worked very much. She had complained of great pain in her head and down her right side, for some days before.

27th. Patient had both ganglia removed. She complained, afterwards, of a good deal of sickness from the effects of chloroform. Two hours afterwards, her temperature was 96.2° ; four hours afterwards, her pulse was 66, and was weak; respiration, 28. She complained of a good deal of pain in the neck, and had for its relief five minims of morphia and atropine solution, hypodermically.

28th. Patient was sick this morning at 7 A.M., and again at 12.30 P.M. She complained of cramps in her stomach. Her temperature at 9 A.M. was 97.8° , right axilla, 98° , left axilla; pulse, 64; respiration, 14. She was sick several times during the afternoon; she had morphia again. In the evening her temperature was 99.4° , right and left axilla; pulse, 88; respiration, 28.

29th. The sickness had ceased since the previous night. The wounds were dressed antiseptically, and were looking quite well. Morning temperature, 98° , right axilla, 98.4° , left axilla; pulse, 62; respiration, 16. Evening temperature normal on both sides. As she was rather restless at night, morphia and atropine was administered.

March 1st. Patient was much better this morning; temperature normal all day.

2nd. The wounds were dressed antiseptically, and were looking well. Temperature normal.

On 6th, the stitches were removed, and drainage tubes shortened.

11th. The wounds were quite healed, and dressings removed. She complained of headache, which was relieved by a dose of bromide of potassium.

May 17th. Patient was sent to Maghull.

June 18th. Patient returned from Maghull, having had an attack there on this date. She worked about the wards till

July 28th, when she had another attack. She has been at work in the building ever since, where she had one or two slight attacks in the following year. She has taken no medicine since, and is going about quite well for the past two years. She has had no attacks that she knows about, or that her neighbours have seen.

CASE XII.

Mary Cavanagh was admitted to hospital, at the age of fourteen years, from the infirm division of the Liverpool Workhouse, on May 7th, 1881, suffering from fits.

Two years afterwards, on December 3rd, 1883, she came under my care in the surgical division.

Her father and mother were both living. Her mother was healthy. Her father had fits since he was a boy. She had two sisters, the younger of whom had fits like herself. Patient stated that she got a fright when she was three years of age, caused by a dog biting her leg. Her mother said that when the child was a year and eight months old she took a fit whilst sitting on the hearth-rug, and shortly after, when being vaccinated, she had another. A doctor said it was from teething. She had attacks since that gradually became more frequent.

Nurse said the attacks came on mostly in the mornings. She might have several every hour; sometimes only a few. They appeared like starts, in which the patient would jump up off her chair and fall, or if walking would fall down. Occasionally she had very strong attacks, and she suffered a good deal from headaches.

On December 4th, 5th, 6th, and 7th, patient had a great many fits—between twenty and thirty—every hour. On 8th, 9th, 10th, and 11th, she had only a few starts every hour.

12th. Patient had fits or starts every few minutes. She fell once when walking. She was ordered drill,—light dumb-bell exercise. Her urine was ordered to be tested and measured occasionally.

16th. Patient passed four pints of urine in twenty-four hours. It contained no sugar or albumen; specific gravity, 1022.

29th. She had attacks as usual. Her urine was the same in quantity and quality. She fell several times to-day.

January 12th. Patient was much the same as usual till to-day, when she was unable to get up. She tumbled down immediately she tried to stand, and anything she grasped fell out of her hand.

15th. Patient was very ill in the morning, but was better at noon. She went to chapel in the afternoon, and had not any attacks during that time.

16th. She has had two fairly good days. To-day she was much worse; just able to be up. She dropped a dish she was trying to wash.

18th. Patient had a very bad day.

Till February 5th, had fairly good days, when she was able to get up. This morning she had a terrible time with fits. Her eyes looked very dull, and her face was ghastly white. She improved during the evening, and went on in the old way till February 23rd, when, at 11.30 A.M., whilst at dinner, she had a fit, in which she turned quite rigid, her eyes became fixed and insensible, and saliva poured out of her mouth. She lay in a stupid state for nearly an hour, then slept, and was much better in the evening.

24th. She had another similar attack in the afternoon, but it was not quite so severe as the one of the day before.

27th. Both superior cervical ganglia were removed. There was some sickness after the chloroform, but otherwise nothing of importance occurred. Pulse, 96, weak; respiration, 12; temperature, 96.2°.

28th. Her temperature in the morning was 98.8°; pulse, 88; respiration, 18. She was very cheerful, and wished to get up. Both pupils were contracted. Evening temperature, 98.2°, right axilla, 98.8°, left axilla; pulse, 80; respiration, 16. Her pulse was much stronger.

29th. Patient slept well last night. Her temperature was 98.4°, in right axilla, 99°, in left axilla; pulse, 80; respiration, 18. The wounds were dressed under antiseptic precautions, and were looking well. The evening temperature was normal.

March 1st. Her temperature was normal. She had some pain in her neck. The wounds were dressed, and were healing by first intention.

6th. All the sutures were removed, and the drainage tubes were dispensed with.

10th. The wounds were quite healed. Patient had one or two "startings" in the morning for the past few days.

16th. She went to chapel twice to-day. She said her head



MARY CAVANAGH.

was much clearer and "freer" than before the operation. She had only one start when in chapel.

April 20th. She was always a little stupid in the morning; "started" very little; seemed to be getting more intelligent every day.

21st. Patient had one start. 22nd. One start. 23rd. One start.

May 1st. She had no starts since the 23rd ult. till this morning, when she felt some on getting up. She went back to bed, and remained there till eleven o'clock.

8th. Patient had one strong shake.

9th. She had a slight one. Her stomach was out of order.

17th. Patient was sent to Maghull.

I did not see this patient again for about nine months, she having been brought back from the Dingle to another department of the house. I saw her one day by accident, and found she had not had a fit for several months, and that without any medicine. Since that time I have not let her out of sight, and it is now fully three years since she has had an attack. She had some startings in the mornings, on getting out of bed or when washing the dishes. "She gives a jerk, and staggers, but is always able to recover herself before falling." A small dose of bromide (gr. x), every morning, has dissipated these startings, and she has not had any now for some months. Her mind is much improved, although she is still rather lazy. Lately she has gone to school, but she does not make much progress with her letters.

CASE XIII.

John Donnagan, (No. 11, in sheet of photographs), aged sixteen years, was admitted to hospital on December 6th, 1883. His mother was living, but he could not tell where she was. He could not remember ever having seen his father. Patient went to Kirkdale School at the age of five years. He stayed there till he was thirteen years old, and then ran about the streets for two and a half years. He was apprehended for stealing, and was sent to the "Clarence" training ship. He had his first fit when about two months on the training ship, and has had four or five fits at the end of every month since then. He took a fit on the 5th of December, and in consequence was sent into the workhouse. He looked very stupid on admission, temperature 97.4° , but seemed all right next morning, temperature 98° .

December 21st. Patient had one fit at 7 P.M.

22nd. He had a fit at 9 A.M., in which he fell on the floor, and struggled very hard. He did not know when the fit was coming on, and was always very sick after, and vomited a great deal.

January 17th. He had a very severe fit. On account of bad conduct he was sent to the infirm division, where no record was kept of his attacks.

On March 18th, he had a very severe attack, and was sent back to the surgical division.

27th. He had another severe attack, which lasted ten minutes. He vomited a great deal afterwards.

April 2nd. He was taken to operation room, where, under the influence of chloroform, he had both ganglia removed. He had a good afternoon. Temperature, evening, 99.8° .

3rd. His temperature in the morning was 99.4° , evening 99.4° , and he had a good day; dressings unstained.

4th. Patient had a very good night. Temperature normal this morning, in the evening 100° .

All went on well till the 8th, when the wounds were dressed antiseptically, under the spray, for the first time; they looked well; the drainage tubes were removed.

12th. Patient had a fit, without any convulsions; it was more like a choking fit. He became purple in the face, there was no vomiting after.

14th. He had one of his usual fits, with vomiting of some greenish fluid afterwards.

May 16th. Patient had a fit.

June 20th. While patient was making one of the children's beds he had a severe fit, in which he fell down suddenly, and worked violently for about ten minutes. In the afternoon of the same day he had three other fits.

July 6th. He had two fits.

18th. He had a bad fit.

August 1st. He had a slight attack.

8th. He had a severe fit. He says he can now tell when a fit is coming on by a feeling of sickness. In this case he left the schoolroom some time before the fit came, and went and lay down in the ward in preparation for it.

31st. Patient was sent to epileptic ward, as he was rather unmanageable in the surgical wards.

Since then he has been wandering about from the "epileptic ward" to town, and thence to building, when he again enters upon the same routine. He is very eager for work and education, and the want of these weighs much upon his mind. Without any medicine the attacks have lessened very much during the past year, and during the past five months he has only had eight. He is more sensible, and much more gentle in manner, and easier of control.

CASE XIV.

Emily Price (No. 17, in sheet of photographs), aged twelve years, was admitted to hospital on February 6th, 1884. Two days before confinement her mother fell down some steps, and the child was in a fit for nearly three hours after she was born. The doctor said he thought the fits were caused by the fall.

She has had fits ever since, and in them she falls quite suddenly, and always on the back of her head, which she once cut badly. She was then taken to the Stanley Hospital, and had six stitches put in it. Had a scar on the right side of her neck; this was caused by an abscess some years ago. She broke her collar bone, twice, each time from a fall occasioned by a fit. She was some time in the Stanley Hospital on account of epilepsy, for which she had some medicine, first, as an in-patient, and afterwards, as an out-patient. At first, her mother thought the medicine did her good, but lately, under its administration the fits seemed to have become more frequent and more severe. During a fit she did not scream, but her face became almost black; she foamed at the mouth, was inclined to bite her tongue, seemed quite convulsed, hands clenched, and raised over her face or head. The duration of the fits in hospital was a few minutes, but her father said they had lasted as long as thirty minutes.

She was able to go to school for three years, and sometimes had fits in school, but would get over them quickly. Can read and write, and is a most bright and intelligent child.

She had attacks almost daily till March 12th, when both

superior cervical ganglia were removed. There was no reaction, no sickness, nor disturbance after operation.

13th. The wounds were dressed, and looked clean. Her food was milk and soda-water, and a little beef-tea. Temperature normal. At 3.15 A.M., she started up in bed, tried to cough up some phlegm, and became black in the face. After struggling with her breath for half an hour, she became quite comfortable. Temperature, pulse, and respiration, normal.

14th. Temperature, 99.4°. She had a slight fit this morning, which lasted about a minute; she was quite conscious immediately afterwards. Temperature under each arm, immediately afterwards, was 100.2°; pulse, 100; respiration, 28. The wounds were dressed at mid-day, and looked clean; but the dressings were slightly stained with blood, and the left wound was a little swollen. The drainage tubes were washed out with concentrated boracic lotion, and shortened.

15th. She had a slight fit this morning, which lasted about thirty seconds. Pulse, 106; respiration, 24; temperature, 99.8°.

18th. She had no fits from the 15th; the wounds were healed. Patient was able to be up, and was very bright and cheerful.

25th. She had one slight fit whilst playing in the yard this morning.

April 9th. Patient was discharged to her parents. She had three to four attacks since the 25th of March. Up all day; never complained of anything, and was usually bright and cheerful.

I have searched diligently on two occasions for this patient, but could not find her.

CASE XV.

Catherine Hurley, aged seventeen years, was admitted to hospital, April 16th, 1885.

Her father and mother were both living, and healthy till twelve weeks ago, when the father took ill with bronchitis. Patient had three brothers and four sisters, all healthy, and was herself quite well until she was thirteen years of age. When five years old, she scalded herself on the thigh, and was

then in the Northern Hospital for a fortnight, on account of the injury.

Patient had never menstruated, and her fits, which came on at thirteen years of age, gradually became worse ever since.

April 17th. Patient had one fit at 3 P.M. She slept afterwards till 7.30 P.M. She had two fits in the night, and after each got out of bed, and tried to wander about the ward.

18th. Patient had four fits during the day. The nurse saw her in one which lasted about two minutes, and in which her limbs and features were very much convulsed, and her breathing rather stertorous. She seemed all right afterwards, but would not talk. She only laughed when spoken to, and fits come on worse after food.

19th. Patient had five fits; 20th, three fits; 21st, five fits. In one fit she passed water involuntarily. 22nd, four fits; 23rd, one fit; 24th, not any fits, but rambled a good deal; 26th, one fit. She was ordered a scruple of bromide three times a day. 27th, two fits; 28th, two fits; 29th, two fits; 30th, one fit; May 1st, two fits; 3rd, four fits; 4th, five fits; 5th, four fits; 6th, three fits; 7th, four fits; 8th, three fits; 9th, three fits; 10th, four fits; 11th, three fits; 12th, four fits; 13th, three fits.

May 13th. The left superior cervical ganglion was removed. After coming back from operation room, she slept for four hours. When she awoke, she tried to pull off her dressings. Evening temperature, right, 98.6° ; left, 98.6° .

May 14th. Morning temperature, 99.6° , in right axilla, 99.8° , left axilla; evening temperature, 100° right axilla, 100.2° left axilla. Surface temperature, in morning, was 96.4° , right cheek, 97.8° , left cheek. Patient had a good day.

15th. Morning temperature, 98.6° , right axilla, 98.4° , left axilla; evening temperature, 99° , right axilla, 98.8° , left axilla. Surface temperature, right, 96° ; left, 97° . Evening, right, 99° ; left, 98.8° . The wound was dressed antiseptically, and patient was going on well in every way.

16th. Morning temperature, right, 98.2° ; left, 97.6° . Evening, right, 98° ; left, 98° . Surface temperature, right, 96° ; left, 95° . Evening, both 98.4° .

17th. Morning temperature, right, 98° ; left, 98° . Evening,

right, 97.4°; left, 97.6°. Surface, right, 88°; left, 90°. Evening, right, 93.2°; left, 93.2°.

Patient had a slight fit this morning about 6.30 A.M. At 1.30 P.M., patient had another fit lasting about a minute. In it her face and limbs were convulsed; the right pupil was dilated.

18th. Morning temperature, right, 98.4°; left, 98.2° Evening, right, 97.4°; left, 97.6°. Surface, right, 69.4°; left, 89°. Evening, right, 93.2°; left, 93.2°. At 8.30 P.M., patient had a fit which lasted half a minute. At 11.45 she had another, and at 5 P.M. a slight one. The right pupil was dilated in all. The wound was dressed antiseptically. Bromide was prescribed.

19th. Patient had one fit to-day. Morning temperature, right, 98.4°; left, 98°. Evening, right, 99°; left, 99°. Surface, right, 85°; left, 90°. Evening, right, 89°; left, 90.4°.

20th. The temperature in axillæ was normal, and equal on both sides. Surface temperature in the morning was, right, 86.4°; left, 88°. Evening, right, 92°; left, 95°.

21st. Morning temperature, right axilla, 97.8°; left, 97°. Surface temperature, right, 85.2°; left, 89°. Evening, in axillæ, right, 97.8°; left, 97.8°. On surface, right, 90°; left, 91.2°.

22nd. Morning temperature, right, 98°; left, 98°. Axilla temperature, right, 84°; left, 85.4°. Evening, in axillæ, right, 99°; left, 98.2°. Surface, right, 93°; left, 94.2°.

Patient had one fit this morning. The wound was dressed with boracic lint and absorbent wool; it was looking well.

23rd. Morning, axilla temperature, right, 98°; left, 98.2°. Surface temperature, right, 88.2°; left, 90°. Evening, axilla temperature, right, 98°; left, 98.4°. Patient had one fit.

24th. Morning, axilla temperature, right, 98°; left, 97.4°; Surface temperature, right, 85°; left, 89°. Evening, temperature of axillæ, right, 98.2°; left, 98°. Surface temperature, right, 87°; left, 90°. Patient had three fits to-day.

25th. Morning, axilla temperature, right, 97.4°; left, 98.2°. Surface temperature, right, 88.2°; left, 88.4°. Evening, axilla temperature, right, 98°; left, 99°. Surface temperature, right, 95°; left, 95°. Patient had three fits to-day, and fell out of bed in one.

26th. Morning, axilla temperature, right, 97° ; left, 98° . Surface temperature, right, 87.4° ; left, 89° . Evening, axilla temperature, right, 98° ; left, 98° . Surface temperature, right, 90° ; left, 95° . The wound was quite healed. Patient had three fits to-day. The nurse described one, which was rather severe, "Face and limbs were convulsed; the right pupil was dilated; patient quite pale when she came out of it; duration about a minute."

27th. Right superior cervical ganglion was removed. Patient slept all the afternoon, and had a good night.

28th. Morning, axilla temperature, right, 100° ; left, 99.4° . Surface temperature, right, 98.8° ; left, 95.4° . Evening, axilla temperature, right, 100° ; left, 100° . Surface temperature, right, 90° ; left, 93.2° . Patient had two slight fits.

29th. Morning, axilla temperature, right, 98.2° ; left, 98° . Surface temperature, right, 96° ; left, 93.4° . Evening, axilla temperature, right, 99° ; left, 99.2° . Surface temperature, right, 94.2° ; left, 95° . Patient had a slight fit this morning. The wound was dressed antiseptically, and was looking well.

30th. Morning, axilla temperature, right, 97.4° ; left, 98° . Surface temperature, right, 89° ; left, 86.2 . Evening, axilla temperature, right, 98° ; left, 99° . Surface temperature, right, 96° ; left, 96.2° . Patient had three fits during the day, and four during the night. She was very restless at night, and pulled the dressings off.

31st. Morning, axilla temperature, right, 97.4° ; left, 99° . Surface temperature, right, 87.4° ; left, 86.2° . Evening, axilla temperature, right, 98° ; left, 99° . Surface temperature, right, 88° ; left, 86.4° . Patient had no fits to-day.

June 1st. Morning, axilla temperature, right, 97.4° ; left, 97° . Surface temperature, right, 91° ; left, 89° . Evening, axilla temperature, right, 98° ; left, 98.2° . Surface temperature, right, 94° ; left, 95° . Patient had two fits to-day,

2nd. Morning, axilla temperature, right, 99.6° ; left, 99.2° . Surface temperature, right, 90° ; left, 92° . Evening, axilla temperature, right, 99.4° ; left, 98.6° . Surface temperature, right, 93.2° ; left, 95.4° . Patient had two fits to-day.

3rd. Morning, axilla temperature, right, 98.2° ; left, 97° . Surface temperature, right, 92° ; left, 93° . Evening, axillæ temperature, right, 97.8° ; left, 98° . Surface temperature, right, 92.4° ; left, 92° . Patient had no fits to-day. The wound was dressed with absorbent wool, and was looking very well.

It is unnecessary to transcribe the comparative temperatures, (surface and axillary) further. They continued practically normal, and the variations followed no general law, but were probably due to accidental circumstances. The wounds were healed to-day, and for the future we will only record the number of fits. Medicine discontinued.

June 4th, one; 5th, one; 6th, one; 7th, three; 8th, one; 13th, three; 14th, six; 16th, two; 17th, one; 18th, one; 19th, two; 22nd, one; 23rd, one; 24th, one; 25th, one; 27th, one; 28th, one; 29th, three; July 4th, two; 5th, three; 6th, three; 7th, two; 8th, two; 9th, two; 10th, four; 12th, two; 13th, two; 14th, two; 15th, two; 16th, four; 17th, three; 18th, four; 19th, four; 20th, three; 21st, four; 22nd, two; 23rd, four; 24th, three; 25th, four; 26th, five; 27th, two. Bromide recommenced. 28th, two; 29th, three; 31st, one; August 1st, one; 2nd, one; 10th, one; 11th, one; 12th, one; 13th, one; 14th, three; 15th, three; 16th, one; 17th, two; 18th, one; 25th, one; 30th, one; 31st, one; September 1st, two; 6th, one; 14th, one; 15th, one; 16th, two; 17th, three; 18th, four; 19th, three; 20th, three; 21st, one; 23rd, one; 24th, one; 25th, one; 26th, one; 27th, one; 28th, one. During October she had thirteen fits, and during November she had twenty-five fits.

She was sent to another department, on account of bad conduct, and the record is wanting till May 15th, 1886. During the latter half of May, she had nine fits; in June, eleven fits; July, eighteen fits; August, nine fits; September, eleven fits; October, twelve fits; November, seven fits; December, thirteen fits. Patient had a slight attack of pleurisy, during the last week in October and the first fortnight in December. During this time the fits completely ceased for fourteen days.

January 1887. Patient was sent to the Dingle, an epileptic home. She came back on September 8th, 1887, much worse.

She gradually improved under treatment, and was discharged to Maghull Epileptic Home on January 22nd, 1889, having been, for three months, almost free from fits.

CASE XVI.

John O'Connor, (No. 15, in sheet of photographs), aged fourteen years, was admitted to hospital on June 3rd, 1884. His father and mother were both living, and healthy. His mother was excitable and nervous; a second cousin in the family, epileptic.

The parent stated that three years ago patient began to have fits, without any apparent cause. He was, up till then, at school, and was quick and intelligent, but the frequency of the attacks, two or three every day, obliged him to leave school, and to discontinue study entirely. Patient complained of headache, was in appearance rather heavy-looking, and spoke in a slow, deliberate manner.

He was for six weeks in the Northern Hospital, where the fits were at first thought to be hysterical. They came on more frequently when he was made jealous, or angry, or when he was annoyed in any way; but the mother said, that after careful examination the doctors of the Northern Hospital pronounced the disease epilepsy, and in a little while he was discharged as incurable. He was afterwards taken to the Children's Hospital, but during the fortnight that he remained there he had no fits. Since then he had been under many doctors without any benefit.

June 3rd. Two hours after admission he had a fit in bed. He did not fall or make any sound, his limbs and features became rigid, face flushed, eyes open, pupils dilated, and insensible to light or touch. After a few seconds his features relaxed, and he began to laugh and talk excitedly, trying to get out of bed. In a minute or two he lay down, and after laughing a little, fell soundly asleep.

4th. At 8 A.M., he had two similar fits, and again in the afternoon, when his mother came to see him, he had another.

6th. Patient had two very severe fits in the evening, and one at 10.30 P.M. The duration of the last one, according to the night-nurse, was about seven minutes.

7th. He complained of much headache to-day, especially on the left side of the head.

8th. At 9 P.M. he had a very severe fit, gave a piercing scream, his limbs were convulsed, his face was very pale, and his eyes squinting. The fit lasted three minutes. At 11 P.M. he had another fit, less violent.

9th. At 5 A.M. he had a slight attack, and "worked" very little in it; his limbs were very rigid; he laughed and talked excitedly. Patient has been very heavy and dull all the morning. At 3 P.M. and 9 P.M. he had attacks, in which he shrieked at the commencement of, and struggled during the fit. He fell always to the right, and perspired profusely afterwards. He did not foam at the mouth, or clench his teeth.

10th. Patient had a fit at 2 A.M., which was short and slight, and another at 11.30 P.M.

11th. At 3 A.M., he had a severe fit, in which his limbs worked very much; he remained unconscious for some time afterwards. At 3 P.M. he had a slight one, his limbs merely became rigid; he did not struggle at all, his eyes were sensitive to touch, he turned over in a minute, and fell asleep.

12th. He had three fits during the night; 13th, no fits; 14th, five fits; 15th, one fit; 16th, two fits; 17th, five fits; 18th, two fits; 19th, six fits; 20th, five fits; 21st, two fits; 22nd, four fits; 23rd, one fit; 24th, five fits.

25th. Both superior cervical ganglia of sympathetic were removed. The left was very difficult to remove entirely, being so firmly adherent to the vagus, consequently only a little more than the half of it was removed. Temperature in the evening 97.8°. He had five fits during the night, slight ones.

26th. Morning temperature normal, evening, 101°; pulse, 90; respiration, 30. He had three fits during the day, and thirteen slight attacks during the night. A dose of pulv. jalapæ co. was ordered.

27th. Morning temperature, right 99°, left 99.8°; evening temperature, left, 100.6°. The wounds were dressed, and were looking well. He had six slight fits during the day.

28th. Patient was ordered a dose of "House" mixture; bowels were well moved. He had one slight fit to-day.

29th. The patient passed a good night; had two fits. Temperature normal. The wounds, which were looking well, were dressed antiseptically.

30th. Patient had three fits during the night, all very slight ones. Had one at three o'clock in the afternoon. Morning temperature, 98.8°; evening temperature, 99°.

July 1st. The wounds were dressed, the stitches were removed, and the drainage tubes taken out; wounds were almost healed. Patient was much brighter, and took more notice of things than he did previously. He had no fits.

2nd. Patient had two slight fits during the night. Temperature normal.

3rd. He had three fits during the day, and three during the night.

4th. Patient had two bad fits during the night, foamed at the mouth, and bit his tongue.

5th. Wounds well healed. Temperature normal. He had three fits.

6th. Two fits; 7th, six fits; 8th, three fits; 10th, four fits; 11th, two fits; 12th, two fits; 14th, two fits; 15th, one fit; 16th, one fit; 17th, two fits; 25th, patient was free from fits for a week. This evening he had a series of them lasting from 6 to 7.30 P.M., and was almost in the *status epilepticus*. His father, who was sent for, said this was a comparatively frequent occurrence. Chloroform and bleeding revived him soon, and after a chloral and bromide enema, the patient slept soundly all night.

31st. Patient had a slight fit.

September 6th. He had no fits since July 31st; 9th, he had a slight fit; 11th, he had a fit; 15th, two slight fits; 16th, a fit; 18th, a slight fit; 21st, two fits during sleep; 23rd, one fit; 26th, a fit.

During October he had twenty-five, besides a series of fits on the 29th that were followed by stupor, for which he had bromide and chloral draughts.

During November, he had twenty-six fits; during December, twenty fits; during January 1885, he had sixteen fits; February, fourteen fits; March, twenty-one fits; April, seventeen fits;

May, six fits; June, twelve fits; July, ten fits; August, twelve fits; September, nine fits; October, twenty-two fits; November, twelve fits; December, twenty-three fits; January 1886, twenty-four fits.

From this till the end of the year, he had a slight fit almost daily, in which he would turn round, and sit down for half a minute, then get up, looking dazed, and immediately go to his work.

In February 1888, as it was no longer convenient to keep him in the surgical wards, he was sent to the epileptic wards, and the following table shows the number of attacks during the year. The diminution was very gratifying indeed, and showed to me that probably the case would be completely cured. Of course, this improvement was not the result of any medicine. But the most hopeful sign was the improvement in intelligence and in physical health. He had less of the downcast look, and had more vigour and independence.

On April 5th he looked very ill, and was sent to bed. Next day he had a number of fits, and signs of broncho-pneumonia set in. It developed gradually, and on April 13th he was sent to the wards, where every effort was made to restore his health, but he died with the usual symptoms of that disease on April 29th. No *post-mortem* examination was allowed.

CASE XVII.

John Pope, aged forty, a sailor, was admitted to hospital on September 5th, 1884, suffering from epilepsy.

Patient was not able to give much account of his previous history. His mother was living and healthy, but he did not know much about his father. Had several brothers and sisters alive and healthy. A brother, a heavy drinker, committed suicide some years ago. No member of his family had been subject to fits. Fourteen years ago he began to take fits in the night, but did not remember anything about them except that he had them more or less ever since.

When admitted, he seemed very bright and intelligent, but two days after, he had some fits. One morning he had as

JOHN O'CONNOR, Aged 17—*Epileptic*.

1887.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total.
February,*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	3
March, . . .	1	..	..	..	..	..	..	1	2	2	..	2	..	..	..	..	..	5	..	..	..	..	1	1	..	..	..	..	..	..	..	15
April, . . .	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	3
May, . . .	..	..	..	..	..	..	..	1	..	2	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..	1	..	1	1	1	..	10
June, . . .	..	1	..	1	..	..	1	..	2	..	1	..	..	..	..	..	..	..	..	..	..	2	1	..	..	..	1	..	..	..	..	10
July, . . .	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	6
August, . . .	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	3
September, .	1	2	1	..	..	..	..	1	..	1	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	11
October, . .	1	1	2	1	..	..	..	..	..	..	..	..	..	2	2	..	1	..	..	..	1	3	..	..	..	..	..	1	..	..	..	15
November, .	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	1	1	..	..	1	2	1	..	..	1	..	..	1	..	10
December, . .	..	..	..	..	..	..	..	..	..	4	1	..	1	..	..	..	..	..	..	..	2	1	2	1	..	..	..	..	..	2	..	14
1888.																																
January, . .	1	1	..	..	..	..	..	..	..	1	2	1	1	1	..	1	1	2	..	3	..	1	..	..	2	1	..	..	..	..	1	20
February, . .	1	2	1	1	..	..	..	..	..	2	1	2	1	..	..	..	2	..	..	..	1	..	..	..	..	..	1	..	..	..	..	15
March, . . .	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	3
April,† . . .	1	1	..	..	..†	1	6	..	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13

* Admitted on 19th.

† To Surgical Ward, 13th.

‡ Commencement of Broncho-pneumonia.

many as seven from 1 A.M. to 6.30 A.M. He was very much convulsed, and foamed at the mouth; he slept soundly after. He complained of headache, and was rather heavy looking after the attacks; sometimes delirious.

September 7th. Patient was very restless all day, had a fit in his sleep, and complained very much of his head. There was no pain or tenderness in any particular spot, no rigor, no localised symptoms; his eyes appeared normal.

Patient was very eager to have something done for his relief. Although his age made me disinclined to operate on him, yet, in the belief that I would do him no harm, I consented.

10th. Both ganglia were removed. Patient had a quiet afternoon. No sickness; temperature normal. In the beginning of the night he was restless, and tried to take the dressings off. Had a chloral and bromide draught, and slept from 2 A.M. to 5.30 A.M.

11th. The wounds were dressed under the spray, and looked very healthy. Patient looked rather wild at times during the day; tried to get the dressings off, and said he would do away with himself. His temperature was normal all day; he had a chloral and bromide draught at night,

12th. Temperature was normal. Patient quiet, but still talked incoherently. He complained of being hungry.

13th. Wounds were dressed, and were looking well. Chop diet prescribed.

Patient went on well till September 24th, when the wounds were quite healed.

25th. Patient had a fit, the first since operation.

26th. He had a slight fit at 12 P.M.

27th. He had a very bad night; had four fits at 9.15 P.M., 10.10 P.M., 11.30 P.M., 4 A.M., and was very stupid afterwards.

29th. He had a delirious night, and was quite insane.

October 3rd. Patient was discharged to asylum.

During the remainder of October he had eleven fits; November, eight fits; December, seven fits. He was sent to the medical wards on January 27th, 1885, suffering from general debility with loss of flesh, a state into which he had gradually fallen

lately without any physical signs to account for it. He gradually became comatose, and died on January 31st, 1885.

Post mortem, February 1st, 1885.—*Brain*—The membranes and calvarium were healthy. A fine vascular network in the pia mater extended over all the convolutions, which were abnormally large and deep. The ordinary vessels were normal in size. The central ganglia (corpus striatum and optic thalamus) of brain were slightly injected; the choroid plexus was moderately filled with blood, was, in fact, normal in appearance. The brain substance of cerebrum was healthy. The left lobe of the cerebellum was a large softened suppurating mass, no cause for the condition being found. The cord was softish from the fifth cervical vertebra to the mid lumbar region, but this was probably owing to *post mortem* change. The medulla and pons showed no gross lesion. The lungs were slightly congested posteriorly. All the other organs were healthy. The wounds on the neck were scarcely perceptible, and were soundly healed. The ganglia were absent.

CASE XVIII.

Sarah Ann Parry (No. 3, in sheet of photographs), aged thirteen years, single, an inmate of an epileptic establishment, was placed under my care on account of the severity of her fits. Every few days she passed into the *status epilepticus*, and chloroform had to be administered to bring her round. She was admitted on October 17th, 1884, and immediately put under the influence of the "bromide mixture." On the 18th she had three fits, and complained much of great pain in her chest and head. The bromide was stopped, and an aperient mixture prescribed. When her bowels were moved she was much brighter and better.

October 19th. She had three fits. 21st. She had three fits. 22nd. She had three fits. Patient appeared dull, and could neither speak nor sit up. I saw her, and ordered that her spine should be percussed twice daily with a mallet, the spinal muscles and bones being protected by an indiarubber pad. The percussion process was begun below, and gradually worked upwards towards the back of the neck.

24th. She had three fits; 25th, one fit; 26th, one fit; 27th, one very severe fit, lasting fifteen minutes. For an hour after there was much twitching in her neck, eyes, and hands, and she could not speak.

28th. She had one fit; 30th, one fit; November 11th, one fit; 26th, three fits; 30th, one fit; December 12th, one fit. Bromide mixture was again ordered, 28th, one fit (slight); January 5th, 1885, one fit (slight); 7th, one fit; February 4th, one fit (slight); 16th, one fit (slight, more like a faint); March 23rd, two fits; 28th, one fit (very slight); April 10th, one fit (very slight); 15th, one fit (very slight, like a faint); 21st, two fits (very slight); 26th, one fit, a violent one, in which the eyes were directed to the right, and the left leg was jerked forwards at the knee. Previous to this and the other fits, she complained of pain at the pit of her stomach, and of a feeling of much depression there.

May 2nd. She had one fit; 3rd, one fit (slight); 10th, one fit; 15th, one fit; 25th, one fit; 26th, one fit, after which she was very stupid and drowsy, and did not speak for five hours.

June 6th. She had one fit, and was unconscious for two and a half hours. 7th. One fit, from which she soon rallied. 19th. one fit; percussion stopped. July 1st. One fit, which lasted about one hour. 2nd. One fit, very severe; in it the eyelids twitched, and she foamed at the mouth. 3rd. One fit. 9th. One fit. 13th. One fit; specific gravity of urine, 1032; no sugar nor albumen. 14th. Two fits; 1010, 15th No fits; 1040. 16th. No fits; 1032. 17th. No fits; 1040. 18th. No fits; 1030. 19th. No fits; 1024. 20th. One slight fit; 1024. 21st. One slight fit; 1026. 22nd. No fits; 1020. 23rd. One fit; 1020. 24th. Two slight fits; 1024. 29th, One slight fit. 31st. One severe fit. August 4th. Two fits, 9th. One fit (slight). 14th. One fit (slight). 24th. One fit (slight). 25th. One fit (severe). 30th. One fit (slight). September 5th. One fit (slight). 9th. One fit. 13th. One fit. 20th. One fit. The specific gravity of the urine varied from 1020 to 1032 since last mentioned, and contained no sugar and no albumen.

October 3rd. I removed the left superior cervical sympathetic ganglion, the patient being under chloroform at the time of the

operation. The operation was finished at 12.30 P.M.; shortly after, she vomited half a pint of green-coloured matter. About 4 P.M., she vomited a little yellowish matter, and continued to do so at intervals all night. At 7.15 A.M., she was so restless that she had a subcutaneous injection of morphia. She slept only about an hour, but lay quiet, afterwards, except when she was sick.

4th, 7 A.M. Patient lay quiet, and seemed stupid. Her temperature was 97.6° . Vomiting occurred occasionally. The left pupil was contracted, and the eyelid drooping. At 7.5 P.M., the breathing suddenly became very rapid, the rate being about 50 per minute, each breath being quite short and spasmodic. The head was twitched aside at each breath; the eyes generally looked to the right side (the gas jet was on that side). Ten minims of ether and sixty of spt. ammoniæ aromaticus of the British Pharmacopœia were administered, with the result of quickly relieving the breathing, causing it to become slower and more natural. The face was now very much flushed. At 8 P.M., the temperature in the right axilla was 98.6° . Her face was much less flushed. At 10 P.M., her temperature was 99° .

5th. At 2 A.M., temperature was 99.4° ; 3 A.M., 99.2° ; 7 A.M., 98.4° . Patient slept well all night; passed a fair quantity of urine; had a short, ticklish cough. The wound was dressed at midday, and was looking well. At 3.45 P.M., she had a slight fit, which lasted about three minutes, and in which the right eye twitched greatly, but the left remained quite fixed; all the body shared in the convulsion. Patient had another fit at 5.45 P.M., which lasted till 6.30 P.M. In it the eyes were turned to the right, when going into the fit; the left arm and leg worked most. She foamed at the mouth, and was quite stupid afterwards, but not comatose. At 8.15 P.M., she had a quarter of a grain of morphia injected subcutaneously. Temperature, 98.2° .

6th. Patient had a very good night; was very quiet this morning, and looked well. Tongue moist, with white fur on the right side, the left side being shrunken, dry, and brown. At noon, temperature, left, 98.4° ; right, 98° . At 6 P.M. she had a slight fit, which

lasted three minutes. The eyes, at first, were quite fixed, afterwards, the eyelids twitched. At 7.45 P.M., temperature, left, 98.2°; right, 98°.

7th. At 1.45 A.M., patient had a fit, lasting three and a half minutes. At 4 A.M., temperature, left, 98.4°; right, 98.2°. At 8.15 A.M., left, 98.4°; right, 97.8°. The wound was dressed at noon to-day. At 2.30 P.M., she had a fit lasting about three minutes. Her eyes turned to the right, the left arm and leg "worked," and the right leg was very much drawn up. The tongue was now moist and clean on both sides, but the left side was still puckered and narrowed towards the tip. At seven o'clock, the temperature was uniform on both sides, 97.4°. At 7.10 P.M., she had a slight fit.

8th. Had a good night. At 1 P.M. temperature was, left, 98°; right, 97.6°. In the evening, the temperature was normal on both sides.

9th. The wound was dressed; temperature was uniform and normal.

10th. At 9 A.M. she had a fit lasting five minutes, in which the eyes were turned to the right, and the left side of the body, chiefly, was convulsed. Patient had another fit at 5.15 P.M., lasting eight minutes. Tongue was very much coated, and the breath was offensive.

11th. 7 A.M., temperature, left, 98.4°; right, 98°. Wounds looking well. Ol. ricini was administered. Evening temperature, left, 98.6°; right, 98.4°.

12th. At 8.30 A.M., she had a strong fit, lasting ten minutes. Temperature was normal to-day.

13th. Patient had a fit. Temperature at 8 P.M. was 99.2° on each side.

14th. At 10.40 A.M., she had a fit, lasting three minutes.

16th. At 10 A.M., she had a fit, lasting two minutes.

17th. She had no fits. Her urine was of specific gravity 1022, and contained no sugar nor albumen.

18th. She had a fit, lasting two minutes.

21st. She had a slight fit.

24th. She had one lasting ten minutes.

26th. The wound was quite healed.

30th. She had four very bad fits, one of which lasted thirty minutes, the others about ten minutes each. She cried out when going into, as well as when coming out of, the second one.

31st. She had another strong fit.

On November 7th, I removed the right superior cervical ganglion of the sympathetic. She came from the operation room at 12.30 P.M., and slept till four o'clock, when she vomited two ounces of white-coloured matter. The pupils of her eyes were now normal, and patient had lost the cunning (*louche*) appearance that the first operation gave her. The temperature under each arm was 97.4° . At this hour she had a very slight fit. The pupils were contracted, the eyes open, the convulsions scarcely perceptible. At 4.30 P.M., she vomited again. At 5.30 P.M., she had another fit, lasting about three minutes. The body all worked, the eyes twitched, and the pupils were contracted. At 5.35 P.M., the breathing suddenly became very rapid and spasmodic. Twenty minims of chloroform were ordered, to be inhaled, but before its administration the patient's breathing became regular. At 6 P.M., temperature was, right, 98.4° ; left, 98.2° ; at 11 P.M., 98.4° in each axilla. At midnight, she had a slight fit, which lasted a few minutes. Pulse, 72; respiration, 20.

8th. Patient had a good night after the fit. At 10 A.M., the temperature was uniform at 98.4° ; the specific gravity of the urine was 1036; well laden with phosphates, but without any traces of either sugar or albumen. The wound was dressed antiseptically, and was looking well. At 5.45 P.M., she had a slight fit. At six o'clock, temperature was, right, 98.4° ; left, 97.8° .

9th. Temperature was normal and uniform. Her urine was about normal in quantity; specific gravity, 1034; it contained no sugar or albumen.

10th. In the afternoon the temperature was, right, 99.4° ; left, 99.2° . In the evening, right, 97.8° ; left, 97.6° .

11th. Patient had a slight fit at 10 A.M. At 7.40 P.M., she had a very strong fit.

14th. She had a rather severe fit; otherwise progressing favourably. Temperature normal.

19th. She had a fit, lasting about seven minutes. All her

body "worked," her eyes twitched, and she foamed slightly at the mouth. She woke up immediately, and was quite bright after it.

23rd. Wound was almost healed. Her urine was of specific gravity 1010, and contained no sugar nor albumen.

25th. Patient had a slight fit, which lasted about four minutes.

26th. She had a rather strong fit, lasting five minutes. She screamed when she was going into it. Her body curved round in the bed, and was quite rigid. She slept after it.

December 8th. She had two very slight fits.

11th. She had an hysterical attack, which doctor witnessed. Her breathing was rapid and jerky, her eyes sensible, and she was looking about her.

13th. Patient had no more fits. The surface temperature of the right cheek before exercise was 92.1° ; after, 94° . She was ordered to have dumb-bell exercise daily.

Soon after this, patient went to the home at Maghull, where she remained nearly two years. She had no fits after the first six months, and she has now been three years without bromide or other medicine, and without having had a single fit. She is employed about the workhouse.

CASE XIX.

John Ashcroft, aged fifteen years, was admitted on September 8th, 1884, suffering from a burn on the hand, inflicted during an epileptic fit. His mother was dead, his father living, and healthy; he had three sisters alive and well.

About five years ago, some woman gave him a knock on the head, which stunned him; and while he was insensible, he was carried to the Northern Hospital. He did not know how long he was insensible, but he remained in hospital about six months, and was then sent to Kirkdale School, where he had the first fit soon after admission, and has had them ever since. Sometimes he would be a whole month without an attack, and might then have them three or four in a day. The nurse said that when he took a fit, if sitting or lying, he jumped right up and then fell down with a bang, if no one was there to support him.

No exact record was taken of the fits during September, owing to a change of nurses.

On October 2nd, the patient had one fit; October 4th, one fit; and October 8th, one fit.

The history of the injury made me examine this patient's head carefully, for any indication that it might be a case where trephining would prove useful, but no distinct or sunken cicatrices or painful spots were found. The onsets of the attacks were noticed as often as possible also, but no evidence of unilateral spasm was noticed at the beginning of the attacks.

As the case *appeared* to be one of essential epilepsy, I removed both superior cervical ganglia on October 8th. During the afternoon of the day of the operation, patient was very restless and fretful, slept at intervals, and vomited occasionally; temperature in evening, 97.6°.

9th. His neck was a little painful, but patient, on the whole, was comfortable. Temperature normal.

14th. Temperature had been normal and patient comfortable since last note. The wounds were dressed to-day for the first time, and were nearly healed. At 5.15 P.M. he had a fit—the first since the operation. “Worked” on both sides, and then lay in a very stupid state for half an hour, when he complained of hunger.

20th. Patient had a fit at 5.15; 21st, one fit; 23rd, one fit; 24th, one fit. 25th, the patient took his discharge to town.

After this time he came into and went out of the workhouse at different periods. Sometimes he was in jail, sometimes sleeping in empty houses. On June 27th, 1887, signs of phthisis were found to have developed, and he died on July 22nd, 1887. For some time before death the fits were few in number, but this frequently occurs in the presence of any grave disease. The *post-mortem* showed that trephining was the remedy, had we been able to have ascertained the place to plant the trephine.

Post-mortem examination, July 22nd, 1887.—His body was much emaciated, scalp closely adherent to calvarium; no fat; calvarium normal outside. On lifting up the calvarium, a hole was apparent, filled up externally by dense aponeurotic tissue, but

from the margins of the aperture, internally, spiculæ of bone projected at right angles to the plane of the aperture; these spiculæ were from a quarter to half an inch in length, and had produced softening, and partial destruction of the posterior end of the second left frontal, third left frontal, the lower end of the ascending frontal, and a small part of the ascending parietal convolutions.

The brain was otherwise large and well nourished, the vessels normal. The superior cervical ganglia were absent, and the cords, below, were atrophied as far as the lower ganglia, which seemed normal. No middle cervical ganglia were found.

The right lung contained numerous abscesses, full of pus of a yellowish green colour. The left lung was infiltrated with tubercle.

All the other organs of the body were healthy. The sketch of a section of one of the ganglia removed from this case, drawn for me by Mr Nairn, is given below.



CASE XX.

Mary Gill, aged fifteen years, was admitted to Surgical Wards. October 15th, 1884. She had been four years at the Dingle, where she, during all that time, had fits very frequently, and never could give any account of herself. Her parents were dead, and she had only two sisters, who were younger than herself.

About two months ago, patient got very outrageous, and could not be managed, and was consequently sent to the work-house to be operated on for epilepsy, or sent to a county asylum.

She was evidently a tough case, but as the operation was proved to be harmless, it was performed on October 15th, 1884. The left internal jugular vein was scratched, and had to be tied above and below. At 8 P.M., patient had a severe fit, which lasted about five minutes. The whole body was very much convulsed, the face drawn and pale at first, then became flushed. Evening temperature, 99° .

16th. Patient was restless all night, and had a fit at 4.30 A.M. She pulled off all the dressings afterwards; they were reapplied by the nurse. The wounds were dressed, and were looking well. Morning temperature, 98.4° ; evening temperature, 100.8° .

17th. Patient was very restless during the first part of the night, and tore the dressings off. She was quiet afterwards, and slept. The wounds were dressed again to-day. Morning temperature, 98.4° ; evening temperature, 100.4° .

18th. Patient was going on well; had three slight fits. Morning temperature, 100° ; evening, 100.4° .

19th. She had four fits, and several starts. Wounds were looking well. To be dressed with simple dressings.

21st. She had five fits to-day; wounds healing. Morning temperature, 99.2° ; evening temperature, 100.2° .

22nd. She had one fit. Morning temperature, 99.2° ; evening temperature, 100.4° .

23rd. She had three fits; the right wound was healed. Morning temperature, 99.4° ; evening temperature, 99.8° .

24th. She had four fits. Morning temperature, 99.4° ; evening temperature 99.2° .

25th. She had two fits, temperature normal; 26th, six fits; 27th, four fits; 28th, five slight fits; 29th, five fits; 30th, four fits; 31st, three fits.

November 1st. Patient had one fit; 2nd, five slight fits; 3rd, four slight fits; 4th, three fits; 5th, three fits; 6th, one fit; 7th, three fits; 8th, three slight fits; 9th, three fits; 10th, four fits; 11th, five fits; 12th, three fits; 13th, six fits, one severe; 14th, one slight fit; 16th, two slight fits; 17th, three fits; 18th, two severe fits; 19th, two fits; 20th, one severe fit; 21st, four slight, and one severe fit; 22nd, two fits; 23rd, two fits; 24th, one severe fit; 25th, two slight fits; 26th, one severe fit this morning, and two this evening; 27th, two fits; 28th, two fits; 29th, one fit; 30th, four slight fits.

December 1st, two fits; 2nd, one fit; 3rd, five fits, 4th, two fits; 5th, three fits; 6th, one fit; 7th, one fit; 8th, two fits; 9th, two fits; 10th, one fit; 11th, two fits; 12th, three fits; 13th, two fits; 14th, two fits; 15th, patient was sent back to Dingle, and afterwards to a lunatic asylum, unchanged in condition by operation.

CASE XXI.

Agnes Fraser (No. 12, in sheet of photographs), aged twenty-four, single, was admitted to hospital on October 16th, 1883.

Patient began to have fits three years ago. She thought they were caused by the courses stopping. She had scarlet fever ten years ago, and was always very healthy until she began to have the fits. Her parents both died when patient was very young. One brother died three months ago of consumption. She had one sister living and healthy.

Patient had very severe fits, took them without the slightest warning, and, whether standing or sitting, she fell down with great force. She did not scream; her face was drawn to one side, and was very pale at first, then became very flushed and red. The whole body was convulsed, the eyelids were quivering and half open, only showing the white of the eye, which rolled convulsively; frothy saliva came from the mouth. The fits lasted about five minutes, then patient fell into a deep, snoring

sleep, and was very stupid for a long time after she awoke. She had one or two fits a week.

On account of the alleged connection of the fits with the menstrual flux, the condition of the uterus was examined. It was found to be retroflexed and painful; the ovaries and tubes were normal.

On August 20th, 1884, she had both round ligaments shortened, and the uterus fixed in the usual way with stem pessary and Hodge. Evening temperature, 98.2° .

21st. Morning temperature, 98.4° ; evening temperature, 98.6° . The wounds were dressed antiseptically, and were looking well. Patient felt comfortable, and was doing well.

22nd. Morning temperature, 100.2° ; evening temperature, 101.2° . Patient restless. Urine to be drawn off by catheter.

23rd. She did not sleep so well last night. Morning temperature, 101° ; evening temperature, 100° .

24th. Morning temperature, 99.8° ; evening, 101° . The wounds were dressed, and were looking well, but suppurating a little.

25th. Morning temperature, 99.6° ; evening, 99° .

September 1st. Wounds healed. Had two fits, a strong one this morning and a slight one this evening.

5th. She had two slight fits this evening.

7th. She had two slight fits this evening.

8th. A slight fit.

10th. One fit; 24th, two fits; 29th, one fit; October 1st, two slight fits; 4th, one very slight fit; 5th, rather a strong fit; 6th, one slight fit; 8th, one fit; 9th, one fit; on 11th, 13th, 15th, 19th, 26th, 29th, one fit each day.

Patient went to Maghull on the 31st, and returned on December 24th. She had fits as usual while she was there. She had a fit on December 27th, 29th, 30th, and on January 10th, 12th, 16th (put on bromide), 29th, 30th, February 2nd, 6th, 7th, two fits; 8th, two fits; 10th, 16th, 17th, 18th, a fit.

At 11 A.M. on 18th, she was taken to the operation room, and had both superior cervical ganglia removed. On coming down from operation room, her pulse was 60; respiration, 18; temperature, 98.6° . She slept fairly all the afternoon. Evening temperature, 100.4° .

19th. Patient had a good night. Morning temperature, 100°; evening temperature, 99.8°. The wounds were dressed and the drainage tubes cleared. All went well.

21st. The wounds were dressed antiseptically. Temperature, morning and evening, 98.2°. Patient was hungry.

March 1st. Patient had a fit, lasting about five minutes.

5th. Two slight fits.

7th. A slight fit. Wounds were quite healed.

8th. One fit.

9th. One fit.

10th. Three slight fits during the night.

13th. One slight fit.

18th. Patient complained of a soreness or rawness inside her mouth when taking food.

23rd. A fit of three minutes' duration.

24th. A slight fit.

29th. One fit.

April 3rd. A slight fit.

6th. A slight fit. Patient complained still of soreness in the mouth.

17th. Two fits, the first, slight, the second, strong.

18th. A strong one; screamed loudly when going into it.

22nd. A slight fit.

26th. Two slight fits.

27th. A strong fit. Her mouth was very sore inside after the fits.

Fits on May 1st, 2nd, 3rd, 6th, 16th, 17th, 19th, 20th, three strong, remainder slight. Fits on June 5th, 8th, 9th, 19th, 24th, 25th, three of them strong. Fits on July 2nd, 3rd, 5th, 6th, 7th, 8th, 9th, 10th, 12th, 14th, 17th, 19th, 22nd, 24th, 25th, August 11th, 16th, 17th, 18th, 20th, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 30th.

Patient was sent to the sewing room on September 7th. All these fits, except two or three every month, were slight.

February 3rd, 1889. Has improved very much during the last three months, only three or four fits since September last. Hyperæsthesia of mouth continues.

CASE XXII.

Robert Baker (No. 13, in sheet of photographs), aged thirteen years, was admitted on January 25th, 1885, suffering from fits.

His father was asthmatic. His mother died of fever five months ago. He had four brothers and sisters, all strong and well, except that one sister was deaf and dumb. There was no history of fits in the family before. Father said the fits came on his child rather more than three years ago. Twelve months ago he was taken to the Royal Infirmary, where he remained for six months, but no relief was obtained. On January 25th, he was sent to the Fever Hospital, where he stayed till July 19th, suffering from some indefinite feverish symptoms, but we have no evidence of the kind of fever. On February 19th, he came under my care.

He had three or four fits every day, and was able to tell when a fit was coming on, by a severe pain in his left side and in his abdomen, about two minutes before the fit came on. When he felt the pain, he screamed, ran and caught hold of anything, which he grasped firmly, and then fell down. The muscles of the face were much contracted, the mouth was twisted to one side or the other, the eyes were turned upwards, and rolled from side to side, white foam came from the mouth, occasionally tinged with blood. He would remain in this state for two or three minutes, then would open his eyes, and look around him as if afraid of something; when spoken to, he would close his eyes and go to sleep.

This is the description by the nurse of her impression of the boy's condition before operation. The number of attacks was not recorded, owing to some forgetfulness or misunderstanding.

April 2nd. Both superior cervical ganglia were removed. Patient was sick and restless all the afternoon; he vomited two or three times; temperature was normal.

6th. The wounds were dressed to-day with antiseptic precautions. The temperature was normal. The left side of his neck was a little inflamed, superficially.

8th. The wounds were dressed, and were almost healed.

11th. Patient had two fits, all on the right side; the left side seemed quite dead whilst the fit was going on in the opposite side.

12th. He was up and dressed. The wounds were quite healed,

14th. He had one right unilateral fit as before.

25th. He had a right unilateral fit last night, and another at 5 P.M. to-day.

May 1st. He had a severe fit at 5.30.

19th. He had a slight one at 2 A.M.

25th. He had a slight one at 3.10.

During June he had four fits; July, eight fits; August, five fits; September, eight fits; October, eight fits; November, nine fits; December, five fits; January 1885, five fits. At the beginning of this month he had one fit, partially unilateral; at end of month, one fit bilateral. February, six fits; March, five fits; April, six fits; May, seven fits; June, fifteen fits; July, seven fits; August, seven fits; September, nine fits; October, eight fits; November, five fits; December, two fits up to 15th of the month.

This boy has now (November 16th, 1888) improved very much in intelligence and physique since operation. The fits have been gradually "scattering." Till the beginning of this year they have come in twos and threes. During this year they have mostly occurred singly, and during the past three months he has only had a few slight fits each month.

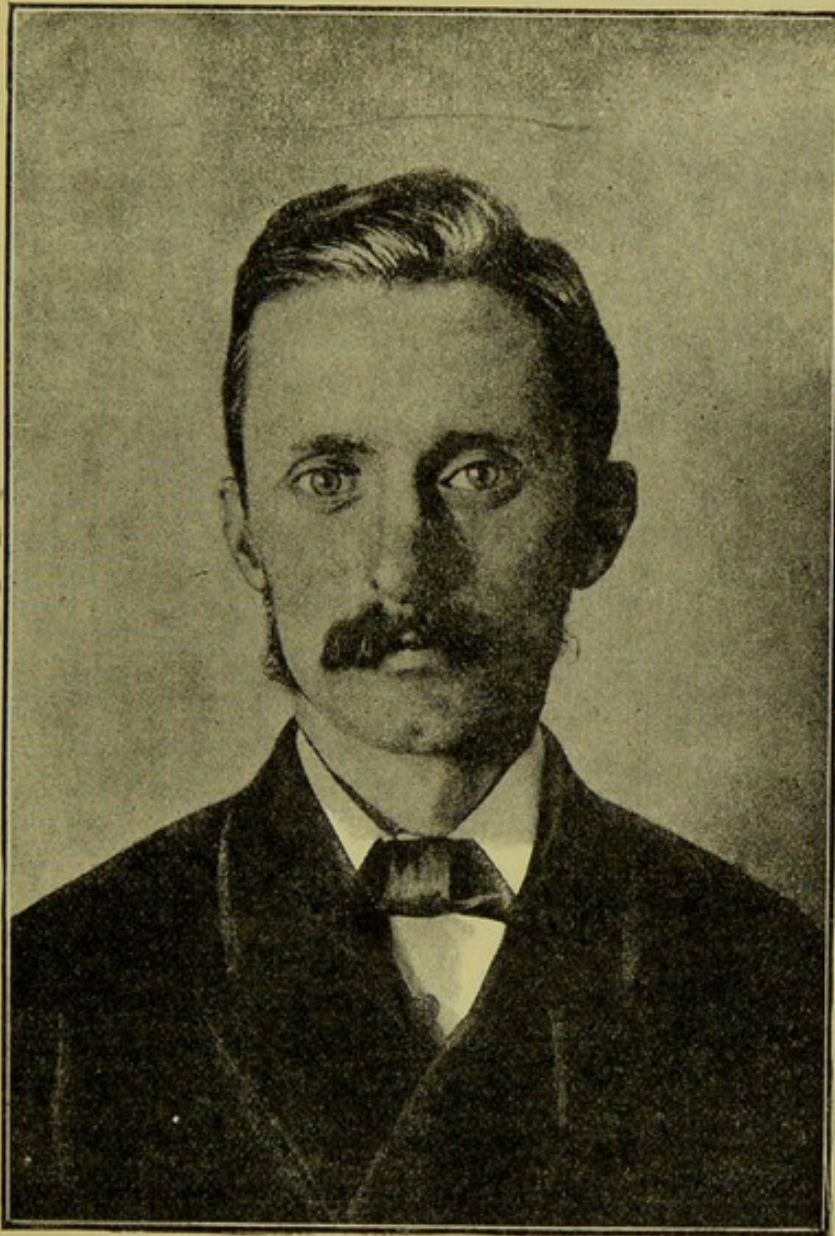
He goes to school every day, can read intelligently, and bids fair to go on to a cure, and all this without bromide. A very small quantity of bromide would no doubt keep him well, but would probably retard the cure.

CASE XXIII.

George H——, aged thirty years, single, of temperate habits, was admitted to hospital on May 19th, 1885.

He stated that he had been troubled with epileptic fits since infancy. His mother was living, and was strong and healthy. He had four brothers alive and well. His father was dead. He could give no account of any relative, except one uncle, who

was troubled with epilepsy. Could not say how frequently he had fits when a child, but when at school did not remember having had any, and had been as long as seven years without having had one.



GEORGE H——.

He is a draper by trade, but had not been able to keep a situation. Since September last, he has had on an average three fits a week, occasionally falling down in the street, and having to be carried to the nearest house until he recovered. After an attack, patient would feel comparatively well, with the excep-

tion of headache. He has been quite unfit for any business since September 1884. Although by education, habits, and profession, above the pauper class, yet, as his disease prevented him earning anything, he was allowed into hospital to have the operation performed.

May 20th. Both ganglia were removed. His temperature four hours after was 100.6° . There was slight oozing from the wounds.

21st. Patient had a good night. Temperature in the morning, 98.2° ; evening, 98.6° . He felt hungry.

22nd. He was dressed to-day; the tubes were removed; the wounds were healthy. Temperature, morning, 98.6° ; evening, 99.2° .

26th. Temperature normal since 22nd; no pain. He was ordered chop diet to-day.

28th. He had a fit at 11.25 this morning; worked both arms and feet a little, and frothed at mouth; he slept after.

29th. At 9.30 A.M., he had a very slight fit in his sleep, lasting about a minute; his limbs did not work, but there was slight frothing at mouth.

30th. Neck was quite healed; 31st, sitting up; June 1st, patient went home.

Seen about June 1888; much improved; able to work, and fits much less frequent.

CASE XXIV.

Eliza Ann Higgins, aged eighteen years, was admitted into hospital on May 27th, 1885, suffering from epilepsy.

Her mother stated that none of her relations, or her husband's, were ever troubled with fits. When patient was eight months old, she had fainting fits. When two years of age, she was knocked down by a cab, but did not seem to suffer from the effects. She had fits till she was five years of age, then they left her till she was ten years of age, when they recommenced, and have continued up to the present time. She had sometimes as many as five a day, and then she would not have any for a week or ten days.

June 16th. Patient was very stupid and silly, and laughed for hours together. She had five fits to-day, and was very stupid after.

June 25th. Three fits; July 1st, a strong fit; July 2nd, a strong fit, which lasted five minutes; she slept very soundly for some time afterwards.



ELIZA ANN HIGGENS.

July 3rd. She had a fit; all her body worked, her mouth was drawn to the left side, and her eyes were open. Before she fell down, nurse said, "she gave a dreadful scream."

4th. Patient had four strong fits to-day, each lasting about five minutes.

12th. She had a very severe fit, and was stupid after it.

13th. She had a severe fit; 14th, three severe fits; 24th, a severe fit; 25th, three fits to-day; 26th, one fit at 6 A.M., she worked very much in it.

August 3rd. She had a fit lasting a minute; the right half of her body worked; 4th, two fits; 5th, one fit. To-day both superior cervical ganglia were removed. She had a fit four hours afterwards.

6th. She had a fit at 3 A.M. Temperature, 99.4°.

14th. A severe fit at 9 P.M.

15th. She had a fit at 4 A.M., and a slight one at 7.15 A.M.

22nd. The wounds were healed.

24th. She had two fits.

29th. She had four fits.

31st. She had two fits.

September 7th, one severe fit; 10th, one severe fit; 11th, one fit; 15th, one severe fit; 17th, three fits; 18th, three fits; 26th, one fit; 27th, three fits.

October 1st, one fit; 6th, two fits; 10th, one fit; 12th, four fits; 13th, one fit; 22nd, five fits; 23rd, one fit. Future result unknown, probably not much benefited.

SUMMARY OF RESULTS OF THE OPERATION OF REMOVAL OF SUPERIOR CERVICAL SYMPATHETIC GANGLIA.

We shall now summarise these cases, so as to present their salient points to the mind of the reader in such a manner that they can be grasped as a whole. The ages are those on admission, and not the ages at the present time.

Case 1. Aged nine years. The fits commenced when patient was a year and a half old, gradually increasing in frequency and severity. *Mind*—The patient is sharp only in repartee, but generally stupid, and at times insane. Ganglia only half removed; temporary improvement. Died long after from *status epilepticus*. Trephining failed to relieve. Hypertrophy of white substance of brain. Not any small vessels over convolutions; ventricles small.

Case 2. Aged eighteen. Fits since age of thirteen; increasing

in frequency. Mind good between attacks. Some improvement, but patient has disappeared from observation.

Case 3. Aged thirteen years. Had fits since nine or ten years of age; increasing. Child at time of operation was quite prostrate; gradual improvement set in after operation. No fits for eighteen months. No medicine.

Case 4. Aged sixteen years. Had fits since ten or eleven years of age; numerous and increasing. Mind clear. No fits for about two years. Slight shakes in the mornings. No medicine.

Case 5. Aged thirty-six years. Had fits since twenty years of age; increasing; a number every fortnight. Mind clear, but sometimes suffers from post-epileptic mania. Improved after operation; one ganglion, only, fully removed.

Case 6. Aged thirty-three years. Had fits since fifteen years of age; increasing. Mind failing. Fits reduced to half since operation; mind better.

Case 7. Aged twenty-nine years. Had fits many years; growing much worse. Died of bronchitis, through exposure on a cold night.

Case 8. Aged eleven years. Had fits since seven years; stupid; fits increasing. Improved after operation; got worse since going home; bad surroundings.

Case 9. Aged nineteen years. Hereditary epilepsy; had fits about fifteen years; stupid and dull. No fits for a year and a half or nearly two years. Married and has a child since leaving hospital. Mind clear, and looks a healthy woman.

Case 10. Aged twenty-three years. Had fits at seventeen; stupid, with loss of memory; insane occasionally. Improved slightly after operation. His mother says he is not improved now.

Case 11. Aged eighteen years. Had fits at fourteen. Mind fair; stupid at times. Probably had no fits for about two years. No medicine; working.

Case 12. Aged fourteen years. Father and two sisters epileptic. First fit when eighteen months old. Stupid. No fits for two years. Fits consisted of shakes, without loss of con-

sciousness, and occurred chiefly in the morning. Cunning and lazy still, but slowly improving mentally.

Case 13. Aged sixteen years. Had fits for about a year probably. Stupid and dull. Improved mentally and physically. Fits lighter, but about as frequent as ever.

Case 14. Had fits since birth. Mind clear. Improved much when last seen. Not heard of for some years; inquiries failed to find her.

Case 15. Had fits since thirteen years of age. Very bad case; stupid, sullen. Fits reduced in number to about half. Lazy, but brighter mentally, and much improved last three months.

Case 16. Had fits since thirteen years. Dull; hanging lower lip. Was improving very much; longer intervals between fits; and mind was clearer and physique better. Died of pneumonia.

Case 17. Aged forty years. Had fits probably since twenty-six years of age; insane at times. Improved slightly at first after operation, then mind got weaker. He died nearly five months after operation, and an abscess was found in the left lobe of the cerebellum.

Case 18. Aged fourteen years. Had fits since five or six years of age at least. Very bad case; stupid, dull. Now bright and active, and has had no fits for from two to three years.

Case 19. Aged fifteen years. Five years' duration. Knock on head; no scar or depression; stupid, kleptomaniac. Relieved by operation. A spicule of bone was found penetrating convolutions when he died of phthisis, long after.

Case 20. Aged fifteen years. An imbecile epileptic, with daily attacks, probably since birth. No benefit from operation.

Case 21. Aged twenty-four years. Had fits of three years' duration. No benefit from operation, till lately, when a great improvement has taken place.

Case 22. Aged thirteen years. Had epilepsy of three years' duration. Mind stupid. Improved very much since operation. Now at school and can read.

Case 23. Aged thirty years. Had fits since infancy. Mind clear. Improved.

Case 24. Aged eighteen years. Had fits in infancy; from five

years of age till ten, free; from ten to eighteen years of age, a confirmed epileptic. Mind much impaired; no improvement in her condition.

Out of the twenty-four cases, six, I think, may be considered cured; ten improved, especially in mental condition; five remain unimproved; none have been made perceptibly worse through the operation; two died soon after operation, but not from its direct effects; and concerning one, we have not been able to obtain any information. The cures amount to 25 per cent. of the total number of cases. Several of these were very discouraging ones, and most of the cases were, according to Gowers, patients not likely to be cured.

He says—"The prospect of arrest is slightly better in males than females." Five of my cases were females.

"Better if the disease begins *after* twenty than before." Most of my successful cases were *under* twenty years of age.

"The prospect of arrest is greatest in those cases where the disease has existed for *less* than a year." In all my cases, the disease had existed for *many* years.

"An arrest is extremely rare, if the fits occur daily." In cases 3, 4, 11, 14, and 20, the fits occurred daily, and in all there were several.

"The prognosis is better, if the fits occur only during the sleeping or waking state, than if they occur in both." I think in all my cases the fits occurred at all times.

"It is better if there is no considerable mental change." Cases 3, 6, 11, 18, 16, 12, of the arrested cases showed a considerable mental change.

"It is better if the attacks are all of the severe variety than if there are minor seizures." Cases 3, 11, 4, had all numerous minor seizures.

"It is better if the attacks are preceded by an aura than if they occur without warning." In nearly all my good cases no aura existed.

In fact, after operation, I would be inclined to transpose Dr Gower's prognostic signs; what should have been the worst cases, being, with me, the best.

Of the cases where no improvement has resulted, those numbered 17 and 19 were incurable from gross disease of the brain.

In the one case, a spicule of bone, and in the other, a cerebellar abscess, being the cause of the convulsions.

Those numbered 17, 18, and 22, suffered from great impairment of the brain; and No. 1 had hypertrophy of the brain.

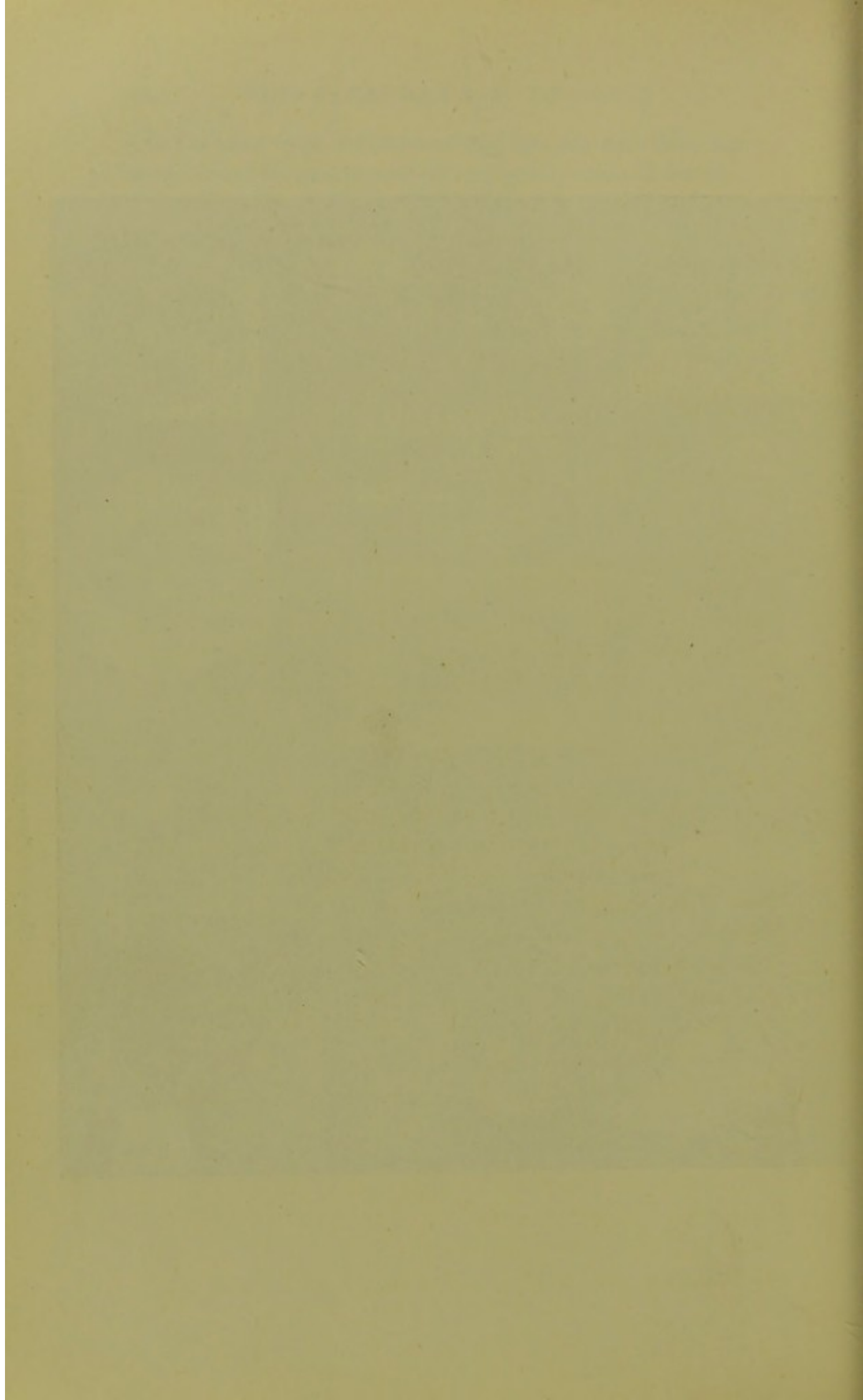
Of those improved, Nos. 5 and 6 were too old in years, as well as in disease, to promise a cure, yet the number of their fits have been reduced by half; whilst 15 and 21 have got much better during the past month.

In a future chapter (X.) I shall show that the operation, which has at least arrested the disease in 25 per cent. of my cases, in contradistinction to 7 per cent. arrested by medicinal treatment, is only a small part of what I consider to be the rational treatment of epilepsy.

The "cures" include only those cases where the disease has been arrested for two years or more, and where no medicine has been taken during that time. In a few more years the number of "cured" cases will increase, as several of the "improved" are rapidly qualifying for "cure."



Sheet of Photographs referred to in Reports of Cases.



CHAPTER V.

PHYSIOLOGICAL EFFECTS PRODUCED BY REMOVAL OF THE SUPERIOR CERVICAL GANGLIA OF THE SYMPATHETIC IN THE LOWER ANIMALS AND IN MAN.

THE physiological functions of the sympathetic ganglia in the lower animals, and especially in man, have hitherto been largely matters for conjecture. Many and varied functions have been ascribed to them by physiologists, and it will here be interesting to compare the alleged results of the division of the sympathetic in animals, with the actual results obtained in my cases, where the sympathetic was divided by removal of the superior cervical ganglia.

I shall, in the first place, enumerate, under paragraphs alphabetically arranged, the phenomena said to have occurred after division of the sympathetic in animals, giving in each case the name of the authority or experimenter. It is only fair to acknowledge, at the outset, that the occurrence in man of many of these phenomena has long been doubted by physiologists, and Eulenburg and Guttmann, at page 49 of their work on the Sympathetic, thus write:—

“There are, especially, almost no recorded cases in which we can assume with confidence, the existence of a direct, uncomplicated injury, confined to the cervical part of the trunk of the sympathetic.”

The cases about to be described by me will now, for the first time, supply such injuries, where the lesion of a part of the cervical sympathetic was as definite as it could possibly be, the whole of the superior cervical ganglion having been in each case removed.

RESULTS OF DIVISION OF THE SYMPATHETIC IN ANIMALS.

Drs Brown-Séguard and Schiff, according to the *Medico-Chirurgical Review* for 1856, page 235, report that the section of the cervical sympathetic in the neck produces:—

- A, Retraction of eyeball.
- B, Contracted pupil.
- C, Increased secretion of lachrymal gland.
- D, Mucous discharges from eyelids.
- E, Diminished brightness; or,
- F, Ulceration of cornea.
- G, Change of colour of iris.
- H, Inflamed conjunctivæ.

Eulenburg and Guttmann, in their work on the Sympathetic, give the following information at the pages of their book prefixed to each item. The authority mentioned by them I have attached to each statement:—

I, page 3. Flattening of cornea (Petit).

J, p. 3. Drawing inwards of eye (Petit).

K, p. 5. Elevation of temperature over ears, of from four to six degrees (Bernard); of nine degrees (Schiff), or of eleven degrees (Eulenburg and Guttmann).

L, p. 17. Diminution of ocular pressure, amounting to from 4 to 8 mm. (Wegner); or diminution of intra-ocular pressure in cats, of from 1 to 2 mm., followed by a rise of from 2 to 4 mm.

M, p. 19. Extirpation of ganglia suprema, alone, produces an increase of ocular tension (Hippel and Grünhagen).

N, p. 22. Has some influence on the lachrymal gland (Wolferz, Demtschenko).

O, p. 22. Produces atrophy of eye (Valentin, Reid, Volkmann).

P, p. 23. Produces greater resistance of cornea to foreign bodies (Sinitzin).

Q, p. 23. Produces atrophy of brain (Brown-Séguard, Vulpian).

R, p. 25. Produces increased rapidity of heart (Bernard, V. Bezold, M. and E. Cyon, and Schmiedeberg).

S, p. 30. Altered perspirations on face.

T, p. 6. Altered temperature during exercise.

U, pp. 19 and 30. Alterations of retinal vessels, when at rest, and during exercise.

V, p. 37. The production of diabetes (Pavy and Eckard).

W, p. 78. The production of progressive muscular atrophy (Sir Charles Bell, Schneevogt, Jaccoud).

X, p. 46. Dilatation of temporal artery (Ogle). Elevated temperature in mouth and nose.

Y, p. 49. Myopia (Weir Mitchell, Morehouse, and Keen). Pain and flashes of light in eye (*ibid.*).

Z, p. 50. Reddening of conjunctiva, and flow of tears, dependent on functional derangement of the vasomotor nerve fibres, which pass from the sympathetic to the first branch of the trigeminus.

a, p. 50. "Altered refractive power of eye, due either to the persistent paralytic myosis, or to the presumed direct influence of the sympathetic, on the muscles of accommodation."

b, p. 51. Emaciation of cheek.

c, p. 55. Progressive facial hemiatrophy. Case of a Jewish lady, aged twenty-seven, an epileptic, the subject also of dyspnoea, palpitation, premature grey hair on head and eyelashes, wide lachrymal fissure, dilated pupils, and tenderness over ganglion supremum on affected side (Brunner).

d, p. 86. In exophthalmic goitre we have palpitation of the heart, with or without atrophy of that organ, goitre and exophthalmus, generally in the order mentioned (Basedow).

Eulenburg and Guttmann (p. 87), compare these symptoms with division of the cervical sympathetic in animals. Division produces dilatation of vessels, elevation of temperature on the affected side of the head, and, in Basedow's disease, we have the strongly pulsating and frequently tortuous little arteries, in the region supplied by the carotid, and in the swollen thyroid. The increased heat found in Basedow's disease, is not local, as in division of the sympathetic, but is equal in both axillæ, and in both auditory meati.

The exophthalmus is due to an irritation of the sympathetic, and not to a paralysis, as after division.

The increased action of the heart may be interpreted as due to a variety of paralysis in the cervical and cardiac sympathetic (Eulenburg and Guttmann, p. 93).

In cases where the sympathetic was divided in animals during life, there were found, after death, by various observers, "increase of connective tissue, and atrophy of nerve cells in lower ganglia; hypertrophy of middle and lower ganglia, with increased size of inferior thyroid, and vertebral arteries; lower ganglion fatty; thinning of sympathetic and its ganglion; atrophy of sympathetic; interstitial thickening and hypertrophy of sympathetic; a fatty capsule round too deeply pigmented, but otherwise normal ganglia; and differences of size in lower ganglia." In some cases no lesion was observed.

PHYSIOLOGICAL EFFECTS OF REMOVAL OF THE SUPERIOR CERVICAL GANGLIA IN MAN.

Having given a summary of the phenomena said to have resulted from division of the cervical sympathetic in animals, I will now compare these with the results obtained in the course of my operations on epilepsy. It will be at once seen, even after the most cursory glance, that phenomena connected with the eye figure most largely in the enumeration I have just given.

On July 27th, 1886, Mr Edgar A. Browne, senior surgeon to the Liverpool Eye and Ear Infirmary, examined the eyes of the following patients for me at various intervals after operation, the particulars of which will be found in the following report written by that experienced observer:—

Name.	Visual acuteness in Metres.	Pupils.	
1. Bird,			
Distant, {	R., 5/10	2 mm. 4½	Left eyelid droops a little towards outer canthus; no retraction. O. D. physiological pit; both arteries slightly tortuous; fundus normal.
	L. 1/10	2 mm. 2½	
Near, {	R., No. 1, at 30 cm.	Act both to light and accommodation.	
	L., No. 1, at 30 cm.		
Photo Sheet, No. 5.		Dilated under atropine.	
2. Donelly,			
Distant, {	R., 5/5	3½ mm.	Old choroiditis in left; left eyelid droops slightly; fundus normal.
	L., 5/10	Dilated slowly under atropine.	
Near, {	R., No. 1	3 mm.	
	L., No. 6	Act to L. and A.	
Photo Sheet, No. 7.			

Name.	Visual Acuteness in Metres.	Pupils.	
3. Parry. Distant, { Near, { Photo Sheet, No. 3.	R., 5/5 L., 5/5 R., No. 1, at 17 cm. L., No. 1, at 17 cm.	2½ mm. 2½ mm.	Right pupil sluggish to direct light; acts vigorously when the left is uncovered. Eyelids normal. Left pupil vigorous to direct light; sluggish to opposite eye. Fundus healthy.
4. Ogden. Distant, { Near, { (Before oph- thalmia set in.) Photo Sheet, No. 6.	R., 5/0 L., 5/0 R., No. 1, at 15 cm. L., No. 1, at 15 cm.	4 mm. 4 mm. Act to L. and A.	Fundus normal.
5. Piers. Distant, { Near, { Photo Sheet, No. 9.	R., 5/10 L., 5/10 R., No. 1, at 17 cm. L., No. 1, at 17 cm.	1⅔ mm. 1⅔ mm. Act to L. and A.	Fundus normal.
6. Connor.	R., 5/5 L., 5/5		Had a fit just before examination; Oph. retinal veins large and pulsating; no notable change in tint of O. D.
7. Williams. Photo Sheet, No. 14.	R., 3/10 L., 4/10	2 mm. Act beautifully both to L. and A. 2 mm.	Right globe slightly retracted, and drooping of lid; fundus normal.
8. Paddy? Photo Sheet, No. 10.	R., 2/10 L., 2/10	Act to L. and A.	Old kerato-iritis; amblyopic; fundus not clearly seen.
10. Baker.	R., 5/5 L., 5/5	2 mm, 2 mm. Act to L. and A.	Slight drooping right lid; fundus normal.

Name.	Visual Acuteness in Metres.	Pupils.	
9. Dunnagan. Photo Sheet, No. 11.	R., 4/10 L., 4/10	Act to L. and A.	Hypermetropia + 5 D. on fourth day after exam. Pupils, R., $6\frac{1}{2}$ m.; L., $6\frac{1}{2}$ m.—not acting. No drooping; fundus normal.
10. O'Connor. Photo Sheet, No. 15.	R., 2/10 L., 2/10	Act to L. and A.	Myopia, 4 D. on fourth day after operation, Pupils, R., 8 m.; L., 5 m.—not acting. Eyes naturally deep set; no drooping; fundus normal.

Conclusions :—No type larger than 10 available. The examinations were made in a bright room, lighted from both sides, so that pupils were fully contracted. No abnormal contraction present in any case. In all cases, except 3, 6, and 8, dilatation and contraction quite normal. Atropine acted in about the usual time. Pupils became fully dilated, except 8. Recovery from atropine not more rapid than usual. Movement of the eyes not affected in any case. In three cases slight drooping of upper eyelid was noted. It did not affect the movement of the lid, and was so slight that it would have easily escaped notice. No external vascularity nor change in fundus was noticed in any case. E. A. B.

Practically, therefore, it will be seen that the removal of both superior cervical ganglia produces no prominent phenomena in regard to the eyes.

Where one ganglion only is removed, we have contracted pupil and drooping eyelid. When the opposite side is also operated upon, the inequalities disappear, and it is impossible to say that the cases have been operated on at all. I have sometimes thought, and the photographs seem to corroborate my thought, that the pupils were perhaps smaller than natural, and the eyelids more languishing, but it is so slight that my impression may be due more to the result of my knowledge of what had been done, than to my observation. Mr Browne, looking at the cases from an outsider's standpoint, did not notice any droop, except in cases where one ganglion was removed.

Retraction of eyeball is only mentioned in one case, that of Williams. Both ganglia were removed, but, strange to say, the droop has never disappeared, and the inequality exists to this day. The course of the nerve fibres must have been different in

her case, as it is the only case where the inequalities did not disappear when both sides were operated upon.

In Bird's case, the ganglion was not removed from the right side, the connecting cord only being cut. When the ganglion was removed from the opposite side, the inequality became reversed, and has remained permanent, showing how much more powerful is the influence exerted by removal of the ganglion, than by simple division of the cervical sympathetic. In Donnelly's case, where only the sympathetic in the neck was cut, all inequality has now disappeared, whereas in Bird's case the inequality is still permanent.

The influence of light, accommodation, atropine, &c., on the dilatation and contractions of the pupils of these cases, differed in no respect from what occurs in the normal eyes, so that the action of the sympathetic upon the pupil must be modified from what is usually taught in our physiologies.

The dilator fibres of the iris are said to be supplied by the sympathetic, from the superior cervical ganglion. Removal of one ganglion causes the pupil of that side to remain permanently smaller than the opposite one, removal of both renders the pupils equal, mobile to the same extent as before, and to the same toxic and reflex influences. In other words, the muscular fibres are not paralysed, as they ought to be, if the sympathetic system alone supplied them with the motor filaments.

No increased secretion of the lachrymal glands has been observed in any of my cases, no mucous discharges from the eyelids, no diminished brightness or ulceration of cornea, or change of colour of iris, and neither an increased nor diminished susceptibility to the influence of inflammation.

Connor caught purulent conjunctivitis from another child, some time after operation, and the disease ran a simple course, was amenable to the usual remedies, and passed away without leaving any trace behind.

Ogden also caught ophthalmia in the right eye, to which, by great care we were able to limit the disease; ulceration of the cornea resulted in spite of treatment, and leucoma and staphyloma permanently disfigure her.

Flattening of cornea has not been noticed, nor any change in ocular tension of any kind. No atrophic changes in the eye have yet appeared, nor any unusual phenomena of the retinal vessels, either during rest or exercise. No myopia has yet appeared (beyond the unilateral kind after removal of one ganglion), and no pains or flashes of light in the eyes have been complained of. Mr Browne did not discover any alteration of the refractive power of the eye.

Or to compare my results alphabetically with those of operations upon animals:—

Observations marked *A* and *B* are corroborated in man, but the explanation is found to be totally different.

C, D, E, F, G, I, have not been corroborated to any appreciable extent as yet.

H, or inflammation of the conjunctiva, has already been dwelt upon.

K, or elevation of temperature, is slight, compared with what has been found in animals. It seems to vary a good deal, and indeed, in some cases, seems to be lower on the affected side.

L, M, N, O, P, Q, R, and *S*, have not been corroborated by observations upon my patients as yet.

T. There does seem to be an increase of urine in some of the cases, but in no case has any sugar been observed.

U. No atrophy has as yet appeared. The time is, however, rather short to enable me to say that it does not occur.

V. No dilatation of temporal artery has been observed, nor increased heat of mouth or nose.

W. Not corroborated to any extent. Ogden was probably always myopic.

X. Not observed.

Y. Not corroborated.

a. No alteration of refractive power.

b. No emaciation of cheek. There has been, however, a peculiar and intermittent hyperæsthesia of the cheek and neck, and interior of the mouth, in the case of Jones and Fraser only. It hurts these patients to eat rough food, and rubbing the hand over the cicatrix of the wounds, or over the cheeks, is disliked by these

two, and even gentle rubbing gives them pain. The hyperæsthesia seems also to pass some distance down the throat, as it pains them to swallow when the hyperæsthesia is severe.

c. No signs of any atrophic changes on hair, &c., as yet.

There are no cardiac symptoms, or anything yet visible that would point to any tendency to Basedow's disease.

The urine of epileptics has been the subject of many discordant opinions. Dr Saundby, in the *Medical Times and Gazette*, 1882, vol. ii., page 469, says, " Drs Max Hubert and Otto found albumen in twenty-two out of sixty-one epileptics, and they ascribe it to general vascular disturbance. Dr Allen Sturge is said to have found albumen, immediately after the attack, in three out of twenty-five cases, while in forty epileptics at the Salpêtrière, Dr Bourneville reports that not a single one had albumen. Mabilde found albumen in one case in thirty-eight, Gowers one in forty-two, Kleudgen in thirty-seven cases could find albumen generally four hours after the attack. He thinks it is physiological, and due to semen.

Dr Saundby examined twenty epileptics on five occasions; no albumen out of twenty-seven examinations, and when present, generally only traces. In five cases, after a fit, two were free, three showed traces of albumen. He thinks albuminuria not more common in epileptics than in other individuals, and this agrees with my experience, which I need not detail. The attention bestowed on the urine has arisen, no doubt, from the frequency with which puerperal eclampsia and albuminuria occur together. I am inclined to look upon puerperal eclampsia as epilepsy arising from a peripheral irritation, whilst the albuminuria often occurs at the end of pregnancy, without any eclampsia. In other words, the albumen in the urine does not produce the eclampsia, but is another result of a common cause.

In the case of Parry, whose ganglia were removed, the urine before operation, taken from June 30th to July 24th, was of a mean specific gravity of 1024 or 1025. The quantity was about normal, although it was not put down in the notes. It never contained either sugar or albumen during that time. Since the operation, the quantity has, I think, increased, although this was

from the statement of the nurse. On December 16th, the quantity was four pints, and on December 21st, four pints. Specific gravity, 1020 and 1022. It contained no sugar or albumen. She has never complained of any urinary troubles, and is now, five years since the operation, in every respect a healthy, plump, well-nourished girl.

In Bird's case, some albumen appeared, on one occasion, soon after the first operation, on November 1st, 1883. It never appeared again. In none of the other cases was any albumen or sugar found. The daily quantity passed varied, and was often considerable after operation, but this, I think, was due to the liquid nourishment, when the patients imbibed large quantities of milk, mineral waters, or plain water.

It may be concluded that removal of the superior cervical ganglia has no effect upon the renal secretion, either immediate or remote.

TEMPERATURE AFTER REMOVAL OF THE SUPERIOR CERVICAL GANGLIA OF THE SYMPATHETIC.

Flushing of the face, reddening of the ears, and increase of temperature on that side of the face, are phenomena not observable to any permanent or even temporary extent in the human individual. It is true, an increase of temperature was observable, during the healing of the wound, in the axilla of the side operated on, and sometimes the face seemed warmer to touch. It was just as often, however, cooler to touch, and much more frequently no difference between the two sides of the body could be observed.

In several of the cases, I tested the temperature of the cheeks with a surface thermometer, before and after exercise.

In the case of Mrs Piers, the right cheek showed, after the application of the thermometer, for two minutes, a temperature of 94.6° . After exercise, it rose in the same time to 95° .

In Ogden's case, the temperature under the same circumstances was 94° and 95.9° .

In Parry's case, 92.1° and 94° .

In Bird's case, on December 13th, a long time after the ganglion was removed from the left side, I took the temperature

with two surface thermometers. The right side was 97.6° , the left side, 98.6° . However, there was some doubt as to the equality of the thermometers. It will be seen that in this case, as in nearly all the cases, the temperature of the side operated on was slightly raised above that of the opposite side, and as the temperature became elevated, where any fever occurred, the difference in the temperature of the two sides became greater. In O'Connor's case, and occasionally in some of the other cases, the temperature of the affected side was lower. The temperature was generally taken by the nurses.

THE PULSE AFTER EXTIRPATION OF THE SUPERIOR CERVICAL GANGLION.

At the time of operation, several observers thought that the pulse at the wrist became fuller and slower immediately the ganglion was removed, but others, of course in different cases, could detect no effect upon the pulse. Certainly, when I was so disengaged as to examine for myself, I could not detect any decided difference.

In Bird's case, where only one ganglion was fully removed, the pulse tracing, several months afterwards, showed a difference on the two sides, the tracing, taken from the side where the ganglion was fully removed, having a rounded top, that on the opposite side a pointed top. On some occasions both tracings had a rounded apex, but both never showed a pointed apex.

In other cases where tracings were taken, and where both ganglia were removed simultaneously, the tracings did not differ essentially from the usual tracings taken from healthy persons.

INCREASE OF VESSELS IN THE PIA MATER.

The only influence upon the brain, that removal of the superior cervical ganglia seems to have, is an increase in the number of vessels in the pia mater, and probably an increased volume and depth of convolutions. This was well marked in all the cases that died.

In the first case, that of Connor, who died some years after operation, there was distinct hypertrophy of the brain. This, I

think, was congenital. The vessels of the pia mater were not in excess in this case, but the operation of trephining may have interfered with their natural condition.

In the case of James Connor, aged twenty-nine, the reddening of the pia mater, through the numerous vessels it contained, was distinctly marked.

In Pope's case, nearly five months after operation, the vascular network was well marked.

In Ashcroft's case, three years after operation, the vessels were normal, but the brain was large, and well nourished.

The operation probably, therefore, acts by improving the nutrition of the brain, and increasing its growth. This effect is the opposite of that observed by Brown-Séquard.

CHAPTER VI.

THE INFLUENCE OF REPRODUCTION ON EPILEPSY.

It is wonderful how many effects are ascribed by medical men to disturbances of the sexual functions, especially in regard to the production of obscure diseases, such as epilepsy, locomotor ataxy, hysteria, &c. In males, masturbation, in females, dysmenorrhea, are the conditions chiefly seized upon as causes.

My experience leads me to join issue with the common belief. The sexual organs have a powerful effect upon the body, and at critical periods in both sexes great general disturbances take place. These great critical disturbances sometimes shake the nervous system to its foundation, and, where that is weak in the special manner required for the production of epilepsy, epilepsy may take place, and only at those times, not because the sexual organs are diseased, but because the irritation from these organs has found out the way to excite the epileptic attacks. It is not uncommon for hystero-epileptics to develop into ordinary epileptics, other excitements besides sexual ones being soon able to reach the epileptic area, and to stimulate it in the required manner.

In males, masturbation is most commonly a result of epilepsy. I have, moreover, never known masturbation to clearly produce epilepsy, though I have had considerable experience of masturbators. Masturbation frequently *accompanies* epilepsy, first, because, from the *effects* of the disease, the mind loses its healthy tone; second, because epileptics have nothing to do, and like all indolent people, are more prone to commit sensual excesses; third, because their life is restrained and uninteresting, and, like caged monkeys, they amuse themselves in the only plea-

sures open to them, eating excessively where they can get food, and abusing themselves, since healthy sexual intercourse is impossible to most of them. Not only is a mistaken pathology of the disease, in this direction, mischievous in putting practitioners off the true scent, but the means of stopping it, usually adopted, degrade the patient still further. Their keepers and friends watch them, interfere with their privacy, and let them see that their filthy habit is known. The self-respect of the patients is thus lost, and no barrier exists to prevent them sinking into hopeless dependence, moral, physical, and mental.

Castration has been performed in many cases of epilepsy with varying success, especially in those where the disease first occurred at puberty. It will be found, however, in most of these cases of epilepsy, that infantile convulsions existed, or an occasional "weakness" marked the period of boyhood. If we wish to cure such cases by castration, the operation ought to have been performed, as a preventive, before epilepsy sets in. By that means we may hope to prevent the disease. But who would propose it in such cases, or, if a surgeon were bold enough to propose it, what parents would allow the proposal to be carried out? When the epilepsy has manifested itself, and become chronic and incurable by other means, then both surgeon and patient are willing to have the operation performed. Except that the operation will prevent the continuation of epilepsy in the family, by abolishing the race as far as the epileptic individuals operated on are concerned, I am afraid no result will be obtained that is at all uniform or to be relied on.

In four cases, with the consent of the adults, I caused atrophy of both testicles by severing the spermatic cord just outside the external abdominal ring, and so arranging it that the vas deferens was never after pervious. In none of the cases did any benefit result, although the testicles gradually atrophied.

Dr L. Rooker records (*Cincinnati Lancet and Observer*, May 1861) a case of epilepsy in a man, aged thirty-five years, resulting from self-abuse, to desist from which was impossible. His expression was idiotic, and he avoided society, particularly that of females, for which last he had an abhorrence. On January

21st, 1861, Dr Rooker performed double castration, and on April 20th, 1861, the patient is said to be rapidly improving, and has had no fits since the operation.

The time is too short to be sufficient, but I would say that it is probable the cure may be permanent in such a case.

The moral effect of an operation, and the attention after it, may produce such an improvement of the nervous system, that no more fits may occur. It is quite as probable, although the fits may have been set up, in the first instance, by sexual irritation, that afterwards the fits may occur independently of sexual irritation, and that in such a case the fits will recur. Castration is not, as a general rule, of any utility in epilepsy.

In women, the menstrual functions are credited with great potency in producing epilepsy. I have never performed oophorectomy for epilepsy, but Mr Lawson Tait has operated on several cases, and speaks of them rather favourably in his book on "Diseases of the Ovaries." Some time afterwards, in conversation with me, he expressed his disappointment at the ultimate results, the disease recurring after a longer or shorter time in the great majority of cases. In one case, I removed the ovaries for severe abdominal neuralgia, supposed to be ovarian in its seat. For two months the disease was "cured," and the woman went about in a state of bliss, compared with her previous miserable condition. At the end of that time, the pain returned as bad as ever, and the last report I had of her was, that the operation had not been of permanent benefit.

For reasons to be more fully discussed in a future chapter, these operations, to be useful, should be performed at once, when epilepsy occurs; but the disease is of so uncertain a character, that it would only be in very rare cases that either surgeon or patient would submit to an operation that would, in the female, be attended with some amount of risk, and that in both sexes would deprive them of what every one prizes so much, the capability of procreation.

The following cases are especially interesting in this connection, as showing the effects of *flexions* of the *uterus* upon epilepsy. The first case I quote from *Brain* for July 1882, where it was

published in connection with "Ligature of the Vertebral Arteries for Epilepsy."

Mary S. B., aged twenty-four, a married woman, whose husband and only child are alive and well, came into the Liverpool Workhouse, on November 26th, 1881, with the object of getting rid of her fits, and for the treatment of a severe burn which she had received in her last fit. About twelve months ago, the menses stopped, and soon after, the fits began. She had had a good deal of medicine from her medical attendant, but no benefit seemed to result from it. Sometimes she had as many as four or five fits in a day, some of which were slight, and others more severe and prolonged. Previous to December 20th, her fits were not recorded. On that date, I saw her in a severe one, and told the nurse to obtain a record of her previous history, and to report, daily, the number of fits. During the next four days she had twelve fits, and altogether, from December 20th to January 18th, she had *thirty-one*. On the last mentioned date, the right vertebral artery was tied. The wound healed without anything occurring worthy of notice, but the fits still continued, though fewer in number and less severe. Fourteen occurred from January 18th to February 2nd. On that date, the left vertebral artery was also tied. This artery was of large size, but the right was small, which may account for the slight effect of ligature on the previous occasion. On February 8th, she had a very slight fit, and on the 12th, she had a severe one, followed by two minor ones on the same day. During the severe one, she hurt her right bursa patellæ, which became acutely inflamed and suppurated. On February 18th, she had a slight fit, and on the 20th, another. From that up to March 16th she had seven fits.

As the result of ligature of the vertebrales was not satisfactory, and as there was evidently some external irritation, I determined to find out what this was. The connection of the onset of the fits with menstrual derangement caused me to examine the uterine organs. She had not complained of any uterine or ovarian symptoms, yet an examination discovered a distinct retroversion of the uterus. The instrumental treatment by pessaries would probably have increased the irritation, and could

not have been tolerated. Fortunately my operation for retroversion, namely, shortening of the round ligaments,* was especially applicable to this case. This operation was performed on March 16th, and was perfectly successful in bringing the uterus into the normal position, and keeping it there. No inconvenience was suffered during the healing of the wound, and the temperature of the patient never rose above 98.4°. On April 10th, she was discharged from hospital, having had five very slight fits since the operation. She had improved so much, both physically and mentally, that I had no hesitation in telling her that her fits would gradually diminish. I saw her on June 25th; she called to tell me that she feels perfectly well, and has had no fits since she left hospital. The uterus is in the position in which I placed it, and her menstruation is now regular and comfortable. She has had two children since operation, the uterus still maintains its position, and her fits have not recurred since leaving hospital six years ago.

Mary Charlton, aged twenty-six, admitted to Royal Southern Hospital, Liverpool, July 11th, 1888; single; no occupation.

She had epileptic fits for about eight years, that began originally without any known cause, and now set in without any warning. She had a fit every two or three weeks, but sometimes an interval of two months occurred.

Her periods had been regular since she was fifteen years of age, and till she was twenty-one, she never felt any pelvic troubles.

Five years ago, she began to complain of pain in her left side, and she went to Shaw Street Hospital some time after, and had abdominal section performed. The scar of the operation was visible. No hernia.

Since operation, the pelvic pains have become much worse, and on admission here, she complained of a sharp, stabbing pain on her left side, passing round the loins, and down her left leg. She had also pains across the front of the head, occasionally. She applied for admission on account of the *pelvic* trouble, which was rendering her life miserable.

The patient was very well nourished, but rather anæmic-look-

* See *Medical Times and Gazette* of April 1st, 1882.

ing, excitable, and nervous; vision perfect, memory defective, urine normal, menstruation ceased for a year after operation, then became again regular, and the last two periods have been excessive, lasting nine days. Bowels irregular, appetite fair.

A physical examination revealed an acute retroflexion of the uterus, the fundus being the part first touched by the examining finger, and the touch giving pain. The appendages could not be felt, and the pelvis was otherwise healthy.

The fits were of the regular epileptic character. "She falls suddenly with a scream, works for nearly five minutes, and appears stupid for some time after."

July 17th. Both round ligaments drawn out and shortened, a galvanic stem and Hodge having been introduced in the usual way; no trouble about operation.

Had two fits on the evening of the operation, and next day two more. On the 19th, another fit, and no more are recorded whilst in hospital. Her temperature, throughout convalescence, was normal. The stem pessary was removed at the end of the third week, and the Hodge a week afterwards. The uterus was then in excellent position. An attack of acute catarrhal otorrhœa sent the patient back into bed. This ran a simple course. The patient left the hospital on October 1st, feeling much improved in every way.

I saw her on February 4th, 1889. The fundus uteri is in good position, and the pelvic troubles have disappeared. This shows that flexions can produce inconveniences where the appendages have been removed. The epileptic attacks still continue, but the patient seems stupefied with bromide, and we could not rely upon her answers. I intend taking her into hospital, to secure rest, good food, and general tonic treatment.

CHAPTER VII.

TREPHINING FOR EPILEPSY.

TREPHINING has been many times successfully performed for the cure of epilepsy, and is a well-recognised operation in traumatic cases. Ligature of the vertebral arteries proved very successful in the two traumatic cases on which I performed the operation, but I would not be inclined to recommend it now, when we are quite certain that trephining over the seat of injury is always the proper thing to be done, even as an exploratory operation.

Dr Billings, in Ranking's "Abstract of the Medical Sciences," vol. xxxiv., p. 58, gives the results of this operation in seventy-two cases. Sixteen of these proved fatal, forty-two are reported as cured, four unchanged, and the remainder (twelve) improved, but not entirely relieved. Many cases have been reported in the journals, with more or less permanent benefit from the same operation, and with much diminished mortality, owing to improved surgical knowledge and skill. The data, however, do not exist to allow any one to give a complete view of the results of the operation. Any *résumé* gathered from the journals would be far too favourable. A striking proof of the unfavourableness of remote results is the fact, that only one good case each has been reported by many surgeons in full practice, almost a positive proof that other cases have been less fortunate, or that the first case has relapsed. Those surgeons who have reported subsequent cases do not show such a favourable result.

In analysing the table of those who published more than one case, and who are therefore most likely to have published all

their cases, we find thirteen cured, nine fatal, five improved, and four unchanged. This is much less favourable than the aggregate, and is probably still more favourable than the reality.

Dr Briggs (in vol. ii., "Transactions of the American Surgical Association," p. 121) gives still further statistics.

Ninety-two American operations, of which sixty-three were cured, thirteen ameliorated, two not changed, fourteen died.

He quotes Walsham in St Bartholomew's Hospital Reports, where 130 cases are summarised. Of these, seventy-five cases were completely cured, eighteen improved, seven unimproved or worse, and thirty died.

Finally, Dr Briggs gives his own statistics of thirty cases: twenty-five cured, three ameliorated, one unchanged, and one died.

Unless the element of time is allowed sufficient scope to verify the cure, statistics of operations for epilepsy are quite valueless. On the other hand, the removal of a penetrating spicule of the calvarium from the convolutions into which it has penetrated, or the evacuation of a cerebral abscess, produces generally most brilliant and permanent results.

DULL INTELLECT, AMOUNTING TO SEMI-COMA; PARESIS OF ALL THE
MUSCLES OF THE LIMBS, WITH OCCASIONAL EPILEPTIC FITS;
RELIEVED BY TREPHINING.

George Potter, aged eighteen years, admitted to hospital May 19th, 1881, under my care, after having what was called "black fever." His father was a prisoner, and died in prison, and his mother abandoned him. He earned a livelihood partly by begging, and partly by working as a farm labourer.

At the age of fourteen years, through excessive drinking, he was sent to an asylum, where he remained for four years.

When I saw him, he had lost all power of the left side, but could pull his right leg up in bed, feebly, and could move the right arm in a similar manner. Two months ago, he fell and hurt his head, and has been in this stupid, paralytic condition ever since.

On the right side of the head, over the parietal region, were numerous scars upon the scalp, but no evidence of any depressed bone.

The paralysis in this case was paresis, rather than paralysis, and a multitude of *post-mortem* examinations of such cases have shown me, that what we find in them is not a distinctive lesion, but atrophy of the convolution in the motor area, and a great quantity of serum beneath the pia mater over those atrophied convolutions. At the moment of writing, I have just finished the *post-mortem* of a man who died from epileptic convulsions, that by their repetition, ended in coma and death, about twelve hours after the *status epilepticus* began. He had had occasional epileptic fits during life. In this case an enormous amount of serum (about a pint) lay between the pia mater and the convolutions. The latter were atrophied. No other nervous lesions were found except congestion of various viscera. The blood vessels were wonderfully sound for the age of the individual.

Now, it is usually argued, that the atrophy of the convolutions leads to serous collections in the space thus left between the brain substance and the bones of the skull, and that the atrophy of the brain is a senile change with which we have nothing to do, because we can do nothing. In the first place, probably, this is so, but the œdema being once produced, may not its presence produce atrophy of the neighbouring convolutions, and thus, in turn, allow the œdema to increase until stupidity and paresis set in?

Such a condition cannot easily be recovered from, on account of the bony case having a fixed and unalterable capacity. Could the brain case shrink in old people with the atrophy of the brain, which is either the consequence of natural decay, or the result of some distinct disease, I have long believed that the accompanying hebetude and paresis would be longer deferred than under present circumstances.

But as the brain case does not shrink, I have often thought that we might produce a lessening of its capacity, by the pressure of the atmosphere upon an aperture produced by the tre-

phine. I have never had the courage to face the opposition that such a proceeding would infallibly raise amongst the profession, lest an accidental fatal result should occur, and it is scarcely worth while in old people. In the case I have just narrated, the conditions had arisen in a young man with scars on the scalp, on the side opposite to that on which the greatest amount of paresis was found.

My house surgeons suggested an operation, on the chance of finding a fracture of the inner table, and a depressed spicule of bone irritating the underlying convolutions. I willingly agreed with their suggestion, because, even if we did not find any spicule as suggested, on my theory of such cases, which I have just referred to, benefit might arise, and the sequel will show we were not disappointed.

On September 26th, 1883, I trephined the right parietal bone, about its centre, with a trephine nearly an inch in diameter. The external table was quite level. The skull was thick and hard, and I felt my way very cautiously. The piece of bone was removed, perfect, although it was grooved by a vein that ran over the surface of the dura mater. The dura mater was, as I anticipated, perfectly healthy, and was not opened. The wound was dressed antiseptically, and healed without trouble. The evening of the operation, his temperature was normal, and he slept well all night.

27th. This morning felt some pain in the wound, but was able to move both arms much more freely than before operation. Morning temperature, 99° ; evening temperature, 98.4° F.

29th. Wound dressed under spray with boracic lint, and absorbent cotton wool. Morning temperature, 98.8° ; evening temperature, 101.2° F.

October 1st. (No note of yesterday recorded.) Had a good night. Said this morning that he could speak much better than before operation. Morning temperature, 98° ; evening temperature, 100.4° .

2nd. Wound dressed; some sweet discharge from it. Morning temperature, 97° ; evening temperature, 98° .

3rd. Slept well all night. Wanted more food than the milk

diet with which he is fed. A mutton chop ordered. Temperature normal, both morning and evening.

4th. Thinks he could walk if he had a pair of crutches. Morning temperature, 97.4° ; evening temperature, 99.4° .

5th. Morning temperature, 97.4° ; evening temperature, 98° .

6th. Morning temperature, 97.4° ; evening temperature, not recorded.

11th. Some headache. Wound dressed; nearly healed; position depressed.

14th. Wound quite healed; cicatrix much depressed.

16th. Was up all day, and walked about everywhere with a pair of crutches. He appeared to have less power now in his right leg than in the left. He was also able to walk about a little without crutches.

29th. Was walking about lately without crutches. He used a stick generally, but could walk steadily down the ward without any support. His under lip, which was drooping, and over which saliva dribbled, was much more natural, and the expression of his face was a great deal more intelligent and vivacious than before operation. To-day, on his way to wash himself, he fell and injured his wrist. It was only bruised, however, and in a few days he was walking about again.

He is now (December 11th) able to walk about, is quite intelligent compared with his previous condition.

The cicatrix made by the operation is quite depressed. I should add, that, at the operation, retraction of the dura mater occurred when the piece of bone was removed, the opposite of what occurs in trephining for other purposes.

He lived three years after this, and then died from chest disease, and a return of his old brain symptoms.

TREPHINING FOR SUPPOSED TRAUMATIC EPILEPSY.

Case 1. *Old depressed fracture, trephining, relief.*—David Y——, aged fifty-six, an old soldier, came into the Liverpool Workhouse on October 18th, 1883. He was employed as a messenger about the hospital, until the night of January 4th,

1884, when he had several severe epileptic fits, and, in consequence, became a patient under my care.

He was wounded on the right side of the head in the Crimean War about twenty-nine years ago. An irregular cicatrix could still be seen at the seat of the wound. After the war, he was sent to India, and there he began to be subject to occasional mild epileptic fits. He took little notice of them, blaming them on the climate, and believing they would cease when he returned to England.

He came back to England, and got married. The fits increased, and he was treated for them in a hospital in Edinburgh for some time. He appeared to have improved, for he was able to go to Alexandria afterwards, and, since that, he has had cholera. He believed that the wound on his head was the cause of the epilepsy, and has always complained of pain and tenderness at the spot.

On January 16th, the skull was trephined beneath the cicatrix. The external surface of the skull was irregular, as it seemed to me, from periostitis. The inner surface of the trephine circle of bone was smooth and normal, and the dura mater beneath was sound. A large vein grooved the bone internally, but it was untouched by the operation.

The temperature never rose, and the patient was quite well by the end of the month. He had three fits on February 27th, and one on March 15th. On March 22nd, he was transferred to the workhouse, where he stayed till June 10th, without having had any fits. He then went to town, and I have been unable to trace him since.

Case 2. *Depressed fracture, epilepsy, trephining.*—Wm. W., aged thirty-five, carter, married, eight children, three living, of temperate habits, was sent to me from the medical ward, to be trephined for epilepsy, in consequence of a cicatrix and an irregularity of the skull over the region of the left parietal-occipital suture, near the inner end. It is difficult to say how or when the injury was received, and whether it produced the fits, or was produced by a fall when in a fit. His mother

does not know anything of the injury to his head, and says he took the fits after being unconscious, for two days, through fright at the death of a brother from small-pox.

At any rate, since that time he has had peculiar attacks of shouting and twitching, always passing urine during the fits. Sometimes, when sitting quietly in the house, he will seize a chair, and march out and down the street with it. It is difficult to stop him until he comes out of the "turn," when he will return quietly to the house, quite unaware of what he has been doing. A premonitory giddiness in the head warns him, sometimes of the approach of a fit. If, then, somebody taps him on the shoulder and says, "Billy," he is all right at once.

He was admitted to the surgical ward on December 11th, after being in the medical ward for sixteen days, under bromide treatment. He had five fits during that time. On December 14th, at twelve o'clock noon, "he had a fit while sitting reading at the fire. His face became livid, his mouth twitched, the pupils did not seem to be quite insensible to touch and light. He shouted a name, indistinctly, during the onset of the attack, fell over to the right side, and passed urine during the attack. The fit lasted fifteen minutes, and the limbs did not work." Such is the description as written by a nurse.

On December 19th, a circle of bone, an inch in diameter, was removed by the trephine. The inner surface was a little unequal. The dura mater was normal. His temperature continued normal, and the wound healed, with the exception of a small sinus that remained. He had fits on the 21st, 26th, 28th, and 30th December, January 1st, 5th, 11th, 16th, 19th, 23rd. During this month an abscess formed on the opposite side of the skull, and was opened. Fits occurred on March 1st, 3rd, 7th, 18th, 19th. On the last date the abscess was again opened, and a piece of dead bone removed from the margin of the trephine hole. Another fit on March 23rd; then on April 7th, 8th, 21st, 24th, 28th, 30th, May 2nd, 10th, 20th, 22nd, 23rd, 24th, 25th. As a profuse discharge still came from the sinus, it was reopened, and a large mass of the inner table of the skull, three inches by two and a half, came away. The surrounding

bones were quite healthy, and the sequestrum had become loosened by natural processes. Fit on 29th, June 3rd, 6th, 10th, 14th, 20th. Wound almost healed. July 3rd, 6th, 7th, 8th, 9th, 10th, 11th, 18th, 19th, 21st, 27th, August 1st, 4th, 9th. Discharged to town to-day at own request, with scalp quite firmly healed at seat of wound. Not heard of since.

Case 3. *Depressed fracture of the skull—trephining—temporary relief—death from an abscess of the brain.*—Robert M., aged forty-six, a fireman, single, of intemperate habits, was admitted to hospital on January 5th, 1884. About a month before admission, he injured his head by a fall. He evidently had some brain symptoms, for he was treated in another hospital, for a fortnight, where he had some epileptiform convulsions. He remained at home with his friends for another fortnight, and then came to the workhouse hospital, with what appeared to be a simple granulating wound of scalp just below the left frontal eminence. He was up every day till the 17th, and no special notice was taken of his case. On this day he became stupid, refused food, and could not answer when addressed. On the 19th, as he was still very stupid, I opened up the wound, and found a depressed fracture. Next day I trephined, and raised a spicule of the inner table that was pressing upon the dura mater. The dura mater was thickened, but not ruptured or perforated, as far as could be seen. His temperature before the operation was 102° , and he was then almost comatose, and breathing heavily.

21st. Had a very good night, took nourishment well, and looks much brighter this morning. Spoke several times. Temperature, 99° ; pulse, 120; respiration, 38.

22nd. At 2.30 this morning, lost the power of right arm, and face became quite pale; breathing more laboured. Temperature in evening, 101° ; pulse, 140; respiration, 40 to 60.

Next day the coma became more profound, the temperature fell to 100.4° , the pulse remained at 140, while the respiration rose to 70. Paralysis in right side complete.

24th. The temperature fell this morning to 97.4° ; pulse,

120; respiration, 60. Nurse thought he tried to speak. The breathing gradually became more and more rapid, and he died in the afternoon.

Autopsy on the 27th. Dura mater granulating at the bottom of the trephine hole; adherent at one spot to the brain beneath. A large abscess cavity, containing about two ounces of pus, occupied the centre of the left frontal lobe, and came close to the surface opposite the middle of the sulcus between the first and second frontal convolutions. The pus was light green. The whole anterior lobe of the brain was white and soft, as far back as the fissure of Rolando. The sulci over that area were obliterated. Both lungs collapsed, and just floated beneath the surface of the water. Atheroma in great vessels. The other organs were normal.

I would have operated again in this case, but was prevented by the friends, who did not think it was any use to have anything more done. This case occurred before the rules of treatment were so clear as they are now, and I could not press the matter so strongly as I could do now. The large frontal abscess had been forming for some time, only lately it had pressed upon the motor area, and produced the symptoms.

Case 4. *Fatty fibrous tumour of forehead—epilepsy—trephining—relief—condition twenty months afterwards.*—Thomas A. Boote, aged thirty-one, admitted to hospital January 14th, 1887, suffering from epilepsy, and from a tumor of the scalp. A steward on board ship for ten years, then in a telegraph and other offices.

Father died, aged sixty-one, of fever. Mother died, aged fifty-eight, cause of death unknown. Has three brothers alive, and twelve dead; cause of death unknown. Two sisters alive, one dead of scarlet fever. No hereditary disease, and the patient has never been ill before, with the exception of having measles, until his present complaint began to annoy him.

About seven years ago, a small lump came on forehead, just over the left frontal eminence. It never was painful or tender to touch, varied in size, and gave him little concern until, soon after its appearance, he began to suffer from fits. These fits

have grown more frequent and more severe, and he has lost many good situations through them.

He is in good health otherwise. Urine, 1018, acid, no albumen.

On February 9th, the tumour, which was a flat cake of fibrofatty tissue intimately adhering to the pericranium, was removed. The bare bone left after its removal was trephined. The ring of bone was unusually thick, but on its removal the dura mater beneath seemed healthy. The wound healed without anything calling for remark.

On March 4th, he had a slight fit.

5th. Another fit, more severe than the previous one, tossed wildly about, eyeballs quite unconscious to touch. Slept afterwards for forty minutes.

8th. A decided fit, lasting four and a half minutes.

9th. Another fit.

21st. Sat up. In the evening had a fit, passed urine and motions unconsciously, tossed wildly about. Slept afterwards for five hours.

29th. A slight fit.

April 5th, a slight fit; 10th, a slight fit; 18th, a slight fit.

24th. A slight fit when warming his hands at the grate.

26th. A slight fit.

28th. A fit on getting out of bed.

May 9th. No fits since. Went to town at own request. Says he has not been so well for many years, and since the attacks have become so slight, he can remember things much better.

January 1st, 1889. Improvement still apparent. Fits lighter and patient more intelligent. Has improved lately under treatment by borax. Sent to his own parish soon after this date.

CHAPTER VIII.

MEDICINAL AND DIETETIC TREATMENT OF EPILEPSY.

THE medicinal treatment of epilepsy now consists, chiefly, in the administration of bromide of potassium in varying doses. Some combine it with tincture of belladonna, and some add to the bromide a small quantity of iodide of potassium, digitalis, bicarbonate of potash, arsenic, or other supposed adjuvants.

The bromide was recommended, in 1857, by Sir Charles Locock for hysterical epilepsy, that is, epilepsy associated with the menstrual periods. This use of the drug arose from the experiments of a German, who became impotent from taking too much bromide, and who recovered after leaving it off. Sir Charles thought bromide was of no use, where menstrual derangements do not cause the convulsions (*Medical Times and Gazette*, London, May 23rd, 1857).

In many treatises on epilepsy, the effect of the bromide is so represented, that it would seem as if no necessity existed for any other treatment. This arises from the decided controlling influence it exercises upon the disease for a time. In the simpler cases, it is probably curative. The epileptogenic areas seem to be restored to their normal condition, and the tendency to the disease ceases. In other cases, the tendency to a fit is only kept under restraint by bromide of potassium: the individual believes himself cured, and ceases to consult, or is dismissed by his medical attendant. The relapse, when it occurs, is probably severe in proportion to the duration of the quiescent state, and when once the epileptic tendency has broken through the restraint imposed by the drug, the moral effect of the bro-

mide, and, to a less extent, the medicinal effect, are at an end for that time. The patient comes to the conclusion, that no benefit can be again derived from consulting that medical man, and goes to another. The former, no doubt, oftentimes retains the happy delusion that he has cured the patient, when the latter is roaming from medical man to medical man seeking relief, and finding none of a satisfactory and permanent kind.

For these reasons, most statistics of the effects of treatment by bromide are useless. It is only when the patients are in hospital, or under observation for years, that the true action of the drug can be ascertained. We do not often hear of asylums and workhouses publishing very favourable results of the treatment of epileptics there. The temporary improvements that would be called *cures*, outside, soon issue in relapse, and the *real cures* of chronic epilepsy, by bromide treatment, are few and far between.

The continued and excessive use of bromides is, I am convinced, more detrimental to the constitution and health of the patient, in many cases, than the epilepsy itself is, and is especially detrimental to the prospects of a cure. The action of the remedy and of the disease on the brain are similar, as both produce dull intellect, stupidity, or imbecility. An epileptic attack, in many cases, arrests epilepsy for a time, just as bromide would, were it given in sufficient quantity before the attack. After an epileptic attack, the brain resumes its functions, the mind clears, and the patient is better than he was for some time previous to the attack, and so he is after a dose of bromide. Should the epileptic attacks succeed each other too rapidly, there is no time for recovery of the mental vigour, and dulness, stupidity, incoherence, or coma mark his condition.

In such cases, a limited amount of bromide clears the mind, and gives tone to the intellectual faculties, cerebral disturbances cease, and the brain cells renew their energies. A continuation of the bromide, beyond what is necessary, clogs the energies of the brain cells, dulls the intellect, interferes with the general economy of the body, and produces the same condition that the limited amount of bromide rescued the patient from.

The pitiful subjects that have come to me, suffering more from treatment than from disease, have convinced me that the usual way of administering bromide is wrong and hurtful. I remember one of my patients, who came to me after being placed under what is known as Gowers' treatment, that is, gradually increasing doses until complete saturation with the drug takes place. Even this was not considered sufficient in the case, and when the drug had lost its influence, not only was it continued, but daily subcutaneous injections of morphia administered. The patient was a miserable wreck, stupid, lean, stooping, and feeble. I sent him to the country, used the percussion and galvanisation of the spine treatment, had his back well douched every day with salt water, and the utmost freedom allowed to his movements.

During the three months he remained under my care, the improvement, mentally and physically, was most marked, and the fits were only about two per month greater than when under the influence of large doses of bromide.

He had one slight maniacal attack, but of much less severity than one that he had had previously, when under the excessive bromide treatment.

My practice in a case like this, is to continue the percussion and electricity to spine treatment, until his system is entirely free from bromide, and the tonicity of the vascular and nervous system is restored. Then, whenever the fits become excessively frequent, I prescribe a mild bromide treatment, continuing the bromide with chloral, for a few days in cases where mania shows itself. As soon as the maniacal crisis is past, I first lessen, and soon stop the bromide, continuing the hygienic and special spinal treatment. When a succession of fits again threatens, the bromide should be resumed. By this means, epilepsy may be kept within bounds, and opportunity afforded to improve the nervous system by general treatment. Whilst bromide is the best palliative known, I am inclined to think it generally retards the cure of the disease. A patient came to me lately from Asia Minor to have the ganglia removed for epilepsy. For three years he had taken, without fail, several grammes of bro-

mide daily, with the result that he does not know that he ever had any attack of grand mál during that time, but he has had frequent *threatenings* and *many attacks* of petit mál. Before operation, I asked him to stop taking bromide. He remained well for three days only, when he had a terrible attack, followed by mild mental disturbance. Here the bromide restrained the attacks very effectually, but did not produce any tendency whatever to cure, or surely in his case he would have gone longer than three days without an attack, after three years' constant use of the drug.

A fortnight after operation, the patient went home, and I have heard a good account of him since, but the time is too short to decide anything. I only mention it to show the uselessness of bromide, as a curative agent, in some cases, even when persisted in for three years. The epileptic wards of every institution prove the same thing. Restraint of the disease by bromide for years, cure in only a few, say seven per cent. of the more recent cases, in almost none of the inveterate cases.

This retarding influence of over-drugging with bromide is well illustrated in another patient of mine, named Barker, whom I have had under my care for years. When I commenced to take an interest in his case, he had taken bromide three times a day for eighteen months, the number of fits being each month, 2, 4, 1, 3, 6, 4, 7, 6, 2, 6, 9, 5, 3, 6, 3, 6, 3, 6. He was then reduced to bromide once a day, and the fits numbered monthly, 4, 3, 2, 5, 7, 7, 5, 4, 4, 3, 9, 7. He was now so much improved mentally, that treatment was stopped, and he went to school. At the beginning of 1887, he had eight attacks one month, and eight the next, then 0, 0, 3, 0, 0, 1, 3, 5, 0, without any medicine whatever. The improvement arose from encouragement and education, and both would have been less effectual through the use of bromides in sufficient quantity to stop the attacks. He has now been several months at school, quite well, without any treatment at all.

I believe, from my own experience, that belladonna assists the action of the bromide, but cannot be relied upon alone. The bromides of sodium and ammonium do not seem to me so

effectual as the bromide of potassium. Bicarbonate of potash and arsenic are useful when combined with the bromides.

I have had some little experience of other *drugs*, but I may here be allowed to refer to some observations of others, and then to give the results of my experience.

The nitrite of sodium treatment has been tried by Dr Law, F.R.C.S. (*Practitioner*, London, June 1887) on an imbecile epileptic. He gives the comparative results in a tabular form:—

Weeks	Season.	Day.	Night.	Total.	Drugs Used.
14½	Summer	...	28	28	Bromide of potassium and sodium.
4½	Winter	2	7	9	Borax.
23	Winter and Spring	11	15	26	Bromide with aloes and iron.
22	Summer	3	12	15	Bromide with belladonna.
14	Winter	2	1	3	Nitrite of sodium, 20 grains.

It afterwards turned out the nitrite was impure, and that twenty grains of the pure drug could not be given with impunity.

In the *Dublin Medical Journal* for June, 1882, Seguin recommends hyoscyamine for shortening the epileptic fits, whilst in the same journal Dr Allan McLane Hamilton recommends tribasic phosphate of silver for diminishing inveterate epileptic attacks.

In *Brain*, London, November 11th, 1882, Dr Saundby, in a paper on the treatment of epilepsy, insisted on the following points in the treatment of epilepsy:—First, the value of combining the bromides of potassium, sodium, and ammonium in prescriptions. Second, The advantage of adding tinct. digitalis to these medicines, to counteract their depressing effect. Third, the utility of zinc as an adjuvant. Fourth, the successful use of borax in some cases of obstinate epilepsy. Fifth, the value of theine or caffeine in epileptic vertigo. It will be seen that the bromides occupy the foremost place in Dr Saundby's treatment.

Kunze treated thirty-five patients suffering from epilepsy with curare, and cured nine. Some of the successful cases were very severe, where the disease had existed for years, and where the intellectual faculties had become affected.

Professor Edlefsen prescribes for epilepsy, curare, 0.5 grammes; aq. dist., 5.0 grammes; ac. mur. dil. gr. i; digere per xxiv horis deni filtra.

One-third of this, every five days, by subcutaneous injection. If no result after fourth or fifth injection, there is no use in persevering further.

In fourteen cases, two of hystero-epilepsy were not improved; six of true epilepsy were unaffected, three cases were cured, and three improved.

Dr G. Ferrand tried bromide of sodium in eighty-nine cases; thirteen were greatly benefited, fifty-seven benefited, eighteen slightly benefited, twelve not benefited. The minimum dose was 5.6 grains, the maximum, 6.8 grains. He gives arsenic and coffee as antidotes to the depressing effects of these drugs. Three extracts are from *Practitioner*, London, June 1882.

Curare had been tried in 1861 by M. Thierceln, in doses varying from half a grain to a grain daily, with the effect of producing temporary relief.—Ranking's "Abstract" (London), vol. xxxiii. p. 57, 1861.

Dr Anstie, in Vol. xxxv., p. 52, of the same work, cured six cases out of twelve by cod liver oil, phosphorus, quinine, and sedatives, as opium, hyoscyamus, belladonna, and sulphate of aniline; chiefly general treatment.

Foxglove was used in Ireland for many years as a cure for epilepsy, but the mode of its administration produced such violent effects, that medical men were afraid to give it.

The country formula was as follows:—Take $\mathfrak{z}\text{iv}$. of fresh leaves of digitalis, beat them into a pulp, and pour over them a pint of boiling water. Infuse for an hour, and strain with pressure. Of this 4 oz. were to be taken every third day, with 15 grs. of the dried root of polypodium. In another case, the above infusion was to be given every hour till vomiting was produced. Sir P. Crompton, of Dublin, had tried it in four cases; three were said to be successful after the first dose.

In 1831, Dr Sharkey first drew the attention of the profession to digitalis in the *Dublin Hospital Gazette* for May 1845. The first dose of the above infusion, according to him, produced

vomiting, soreness of the epigastrium, cold extremities, cramps, and great depression, irregularity of pulse, continuing for several days.

I might add many extracts to the above, which are taken at random from the journals. I have taken these, because I have tried all the remedies mentioned, and intend now to give my experience of them. But I must preface my statement of results with the warning, that no remedy for epilepsy is of any value that has not been tried for years, and on a sufficient number of cases. Epileptics have been cured by all methods and without any methods, and probably more have been cured without drugs than with them. Drugs sometimes obtain the credit of having cured when they don't deserve it, and are as often thrown aside when doing good, through impatience at the slowness of results, or the desire to try a new remedy.

The successful medicinal treatment of epilepsy is a *work*, not an *act*, and each case of this disease is a special study. The primary object should not be the arrest of the fits; that can nearly always be procured by bromide in large enough doses; but we have shown that the bromide rarely cures except in slight cases. The primary object should be the physical improvement of the brain, the education of the mind, and the awakening a healthy interest in life. All these we shall consider in detail in the tenth chapter, under the head of general management of epilepsy. But in the mean time what drugs are we to give, as a matter of routine? None. Routine is the curse of this disease, and routine generally means bromide. I have analysed a dozen prescriptions given to an epileptic who had time and means to obtain them from the best authorities. Bromide, bromide, nothing much except bromide. When any patient *asked* for something else, as "bromide was useless," then arsenic or zinc was generally prescribed. The immediate result of the "something else" was that the patient became worse, partly from the cessation of the effects of the bromide upon the system, and partly from the irritation of the new drug. Disappointment resulted, because the patient did not expect to be made worse by treatment, or to feel less comfortable than he

was before, and he generally gave up the something else soon, and recommenced bromide. In all cases we should seek to obtain the confidence of the friends of the patient, and especially of the patient, if the latter is capable either of being confided in by the doctor or of having confidence in the doctor. This confidence can only be obtained by pointing out the *rationale* of the treatment to be adopted, and then obtaining the assent to its trial for a sufficient time.

The fits will certainly be more frequent under any treatment than under bromide, and the increase must be endured if not ignored. This enduring and ignoring are just what we mostly cannot obtain. We may sometimes manage for a few weeks, then the contest is given up, and the disease once more *concealed* by bromide. Hence I reiterate what I said before, that as far as a cure is concerned, bromide is, as it is generally administered, the curse of epilepsy.

I will now give my experience with the other drugs mentioned.

Nitrite of sodium failed to have any appreciable effects upon the disease. Probably the drug I employed was impure also, as 20 grs. could be taken with impunity.

Borax, an old remedy again and again revived, seems to have proved useful in some cases.

One, an epileptic youth, ill for several years, and whose spine has been regularly percussed for a long time with benefit, ceased to have attacks soon after adopting the borax treatment, and I believe they have not recurred since, now eight months ago.

The father of this boy was led to adopt the treatment from having heard of another case where borax arrested the disease.

I had given borax many years ago, but had been disappointed with it. On hearing this fresh evidence of its apparent efficacy, I have tried it again on a case of inveterate epilepsy, whom I had been giving bromide to three times a day. He had no fits in November 1886, one in December, two in January 1887, and none in February, March, April, May, or June, two in July, and three August. The bromide was reduced to once a day, with the result that during the next nine months the monthly attacks

numbered 1, 8, 5, 20, 4, 14, 9, 4, 12. The patient, however, felt and looked better than when under the effectual doses of bromide.

In the beginning of June 1888, he was placed on 20 grs. borax three times a day. In June he had ten fits: July, fourteen; August, ten; September, six; October, three.

Another old epileptic was admitted in the beginning of July. During the month of July, he had thirteen fits without medicine. During August, with borax treatment, he had eight fits; September, five; October, seven.

A third private case, aged forty, epileptic for sixteen years, was placed on borax for two months, without any good effect so far. I could not persevere with the treatment in this case, because the patient was at business, and it was very awkward for him to have many attacks. As mild doses of bromide and belladonna kept this patient well, I felt constrained to use these medicines instead of the borax, until a more convenient time should come.

Digitalis I have prescribed frequently in combination with bromide, and occasionally by itself. I never could be certain that it had any special effect on the disease. It is, no doubt, useful, where a cardiac tonic is indicated.

I have never ventured to try it in the very large doses previously referred to, as I believe, from what I have seen of the use of large doses in delirium tremens, that these large doses are dangerous.

I tried curare once, but it did not seem to affect the disease in any way. I was doubtful whether the drug was pure.

Of the two old remedies, arsenic and zinc, I have most faith in arsenic. I always prescribed small doses of Fowler's solution (M. iii.-v.), well diluted, after meals, leaving it off if the attacks became more frequent, and substituting a dose or two of bromide for it, occasionally. Sometimes zinc succeeds where arsenic fails, and indeed the experience of many doctors seems different from mine, as zinc is extolled in preference to arsenic. Gowers does not even mention arsenic. Arsenic, I think, is most useful in those cases where attacks of petit m^{al} predominate.

Picrotoxine I have tried without much, if any, benefit. One-

sixtieth of a grain, three times a day, was given in one case for five months. The average attacks were ten per month when uninfluenced by any medicine; under picrotoxine, the monthly attacks numbered thirteen, eleven, ten, eight, eight. On leaving it off and giving bromide once a day, the monthly attacks numbered seven, twenty-one, fifteen, ten, fifteen, seventeen.

Antipyrin was then substituted for the picrotoxine, and the monthly attacks up to the time of writing were, six, three, six, seven, seven, seven, four, four, two; a great improvement being manifested in every way, besides the reduction of fits.

Antipyrin was also used by me in the private case referred to before, where borax had to be given up. It was prescribed after the borax apparently failed, and it also failed to arrest the attacks during the month of its administration. The time available was too short to test, thoroughly, either drug.

In a case under my care at the present time, *antipyrin* is acting well, the fits being reduced to one-half during the two months of its administration, and the patient being much improved in every other way. It must, however, be said that the patient's general and mental condition, was much improved by arsenic at the time of commencing *antipyrin*.

Herein lies the chief difficulty in deciding upon the influence of a remedy in epilepsy.

We cannot sometimes tell by the number of fits whether a medicine is doing good or not. After removal of the ganglia in the cases where the disease is now arrested, the attacks went on much as usual for a time, and then stopped suddenly and altogether in some cases; for an interval in others, to finally cease in these also. Had I been impatient in these cases, and tried remedy after remedy, I would have been led astray as to the cause of the arrest, or might by drugs have interfered with the cure of the disease. In a sense epilepsy seems to follow the laws of an epidemic. At one stage, no remedy is of any benefit; at another stage, certain drugs are useful; whilst at another, all drugs arrest the disease. Hence the difficulty of apportioning credit where it is due.

I have tried, spasmodically, many other drugs, but I can form

no definite opinion of their merits, as they did not apparently influence the disease in any decided way during their administration. General nervine tonics, cod liver oil, &c., are useful in appropriate cases.

The treatment by drugs, can only be beneficial when carried out in connection with general treatment, and this general treatment deserves a chapter to itself, instead of the paragraph that is usually devoted to it in works on epilepsy.

As far as the drugs are concerned, my practice is as follows:—

To watch the case first for a time uninfluenced by drugs, noting the character of the disease, the time of day, the frequency of onset, and all the phenomena connected therewith. The influence of the passions, emotions, state of health, and habits of the patient, upon the disease, is to be specially noted. Then evidence of congenital defects, gross brain disease, insanity, or general paralysis, is to be anxiously looked for, since if one of these diseases is present, the prospect of cure by drugs is nil.

Being satisfied that none of these exist, that the case is one of essential epilepsy, and the fits not very frequent, no drugs are used beyond general tonics, arsenic, zinc, and aperients. Reliance is placed upon the means to be mentioned in the tenth chapter.

If the attacks interfere with work, or exhaust the patient, then five, ten, fifteen, or twenty grains of bromide per diem are prescribed, at times most suited to the periods of attack, that is, some time before the usual attacks set in.

With this mild bromide treatment, arsenic, zinc, &c., may also be administered.

The bromide is stopped every week, to see if the patient keeps fairly well without it, and is not resumed till it becomes necessary. If, after a time, the bromide still seems necessary, then borax and antipyrin deserve a trial.

All changes and results of treatment should be daily recorded. The diminution in number of the attacks should not be considered the test of benefit so much as the scattering of the attacks into single ones instead of batches, the lessening of the effects of the disease on the constitution and mind, the shortening of each

attack, especially the shortening of the period of unconsciousness and the avowal of a feeling by the patient that he is getting better.

In the *status epilepticus*, chloroform is *the* remedy *par excellence*. Local blood-letting comes next in value, and is extremely useful in suitable cases. In some cases, the patient is too weak to stand blood-letting. In either case, a chloral and bromide mixture should be given by mouth or rectum, according to the ability of the patient to swallow or not. The bowels should in all cases be moved by calomel, croton oil, or enemata. I have tried nitro-glycerine and amyl nitrite without any marked or permanent benefit.

The diet of epileptic patients should be simple, nutritious, and *sufficient* for their *mode of life*, whatever that may be. Some think the grand desideratum for epilepsy is a vegetarian diet; others recommend a low diet; whilst others again keep their patients on ordinary diet. The diet requires to be regulated for each case. If the patient leads an indolent, aimless life, lounging about all day, or if he is engaged in sedentary indoor pursuits, is dyspeptic, with a delicate palate, he must be dieted accordingly. I do not think I ever knew a fat epileptic to improve mentally, whilst on the other hand, the fits are aggravated in dyspeptics by an attack of dyspepsia. Case 15 came to me from the Dingle, breathless with fat, lazy, bad tempered, and suffering from numerous and severe fits. By persuasion, promises, threats, and perseverance, we induced her to work off some of the fat, and the ordinary workhouse diet did not tend to keep up the supply; a little bromide relieved her of the attacks, and a secluded part of the house kept her from quarrelling. She is now a respectable member of society in her part of the workhouse, and her attendant told me, the last time I saw her, that she was quite satisfactory in every way—worked hard, was good tempered, and has had no fits. She looks much more intelligent and active.

No. 19, an opposite kind of case, came from the same institution, looking as if she was far advanced in phthisis, unable to get out of bed, or, indeed, to walk, all her limbs nearly powerless, and her mind quite incoherent. She did not care about food, had evidently no appetite for it, and passed from fit to fit, becoming

gradually more drivelling and helpless, and even unable to attend to the wants of nature. Full doses of bromide were given, but at the same time whisky, eggs, milk, and beef tea were regularly administered. She is now, four months after, quite rational, walks about and works a little, is gaining flesh, and has not had a fit since the adoption of the treatment. She is now on the ordinary healthy hospital diet. On low or vegetarian diet, she would now have been in her grave.

The diet for each patient should be such as can be thoroughly digested and used up in the processes of the body. In most young epileptics, the digestion is as good as that of any other boy of the same age, and he should no more overeat than any other boy should; for if he does so overeat, he will become ill just as other boys will, and probably have fits in addition to the ordinary gastric troubles. But there is no reason why he should not have the regular healthy full meals of other boys, provided he is also allowed the same outdoor active life, to work off the pabulum stored up in the blood. As an epileptic is never allowed to have quite the same wild, energetic life of a healthy boy, the diet should always be somewhat, but not much, restricted, and at the same time the activity of his life should be permitted full range up to the limit of safety. The more nearly we can approximate the activity of an epileptic child to that of a healthy child, the more nearly can we approximate the diet.

Sweets, pastry, nuts, green fruits, should be kept far away from epileptics. Ordinary boys get these things, and they do them no *permanent* harm. They do a great deal of temporary harm even to ordinary boys, as all family doctors can testify; but nature soon repairs the injury, and we laugh at the pale faces of our children after a party, or accidental feast. In epileptics, the injury is not so easily repaired, and as far as the epilepsy is concerned an attack of *indigestion* may destroy the work of months of patient treatment.

Diet for Epileptic Children.—Bread and milk or porridge for breakfast; soup, broth, bread, potatoes, and simple vegetables, and a small piece of meat or fish, farinaceous pudding, and some fruit for dinner; bread and milk in the evening; and porridge,

bread and milk, or gruel, for supper. A supplementary piece of bread and butter, at stated times, during the day may be allowed to some children, who cannot take sufficient at their ordinary meals.

A slight modification is required for adults. Weak tea, coffee, or cocoa, a little bacon, one egg, or white fish, bread and butter, for breakfast. An early dinner, with sufficient food to satisfy, and of the same kind as in the children's dinner, except that the supply of meat may be more liberal; tea in the evening instead of milk, or milk if desired; and the supper the same as for the children.

Stimulants are always better avoided, and when necessary should be prescribed as medicine, and administered as such. No advantage ever accrues to epileptics from taking stimulants as an ordinary article of diet.

Epileptic youths should never learn to smoke. The habit can never do any good to the disease. To those who have become habituated to tobacco, smoking should be limited to, say, an ounce of tobacco per week, and the evening time is the best for the indulgence of the habit. It then tends to soothe the nervous system, and prepares the body for the sleep that is designed for the resuscitation of the body, and before morning the enervating influence of the nicotine will have quite passed off.

The diet of epileptics should be taken at regular hours, and punctual to the minute. The desire for the meal will thus be more uniform, the quantity taken more uniform, and such as the digestive and vascular systems are accustomed to operate upon and dispose of. The variety in diet need not be great, if the amount taken is sufficient and the hours regular. Water, tea, coffee, cocoa, milk, bread, butter, flour, oatmeal, rice, sago, arrow-root, beef, mutton, chicken, bacon, fish, cabbage, cauliflower, lettuce, turnips, carrots, parsnips, sugar, apples, oranges, grapes, jams, all include the substances that are necessary for the wants and luxuries of any sensible individual, and all these should be cooked in the simplest manner possible. Whoever lives healthily on simple dishes made of these things, and works sufficiently hard, does not require any greater variety to tickle his palate, and epileptics should always come to their meals with that oldest of all sauces, hunger.

CHAPTER IX.

PERCUSSION AND GALVANISATION OF THE SPINE.

In "Clinical Observations on Nervous Disorders," p. 98, Dr Handfield Jones states that Frank attributed certain epileptic phenomena to congestion and distension of the vertebral sinuses and veins; that Portal explained convulsive and paralytic affections of the extremities, occurring in various inflammatory diseases, by congestion of the spinal vessels; and, that Abercrombie felt considerable doubt as to how far spinal hyperæmia (neurosis) is ever a cause of failure of the functional powers of the cord. He thought *post-mortem* examinations were not to be relied on, as the blood distribution varies considerably through accidental occurrences after death.

Seeing the effect of ligature of the vertebral arteries upon epilepsy, and its unreliability as a certain cure of any particular case, I was led to adopt percussion of the spine as a substitute that would offer some hope of relief, which would be free from the objection that patients have to operative treatment, as well as free from the risks of ligature of the vertebrae.

The spinal cord is surrounded by a network of venous sinuses, that communicate freely with the intermuscular veins of the muscles of the spinal column, and with the *venæ azygæ* of the abdomen.

It struck me that the muscular mass is fullest where the laminae of the vertebrae overlap least, viz., in the cervical and lumbar regions. In these regions, the pressure of the muscles when undergoing contraction would inevitably act upon the venous sinuses, and assist, in this way, in promoting the circulation of the cerebro-spinal nervous system, especially the spinal

part of it. As most epileptics are, or soon become, indolent and apathetic in their movements, I argued that the state may arise from the altered nutrition of the nervous system, through abnormal stagnation of blood in these venous sinuses, and that, although this stagnation is rarely, if ever, a primary cause of epilepsy, it may be a secondary cause, preventing the resumption of the normal state, and producing a blunting of nervous energy.

My *post-mortem* examinations on epilepsy had shown me the large quantities of blood that had collected, in many cases, amongst these muscles, and in the spinal sinuses, a quantity sufficient to extinguish life, if it were capable of pressing on the cord.

The effect of spinal ice-bags on epilepsy, although popularly over-rated, seemed to me to favour my theory, and hence I tried them in many cases without any permanent effect. On these grounds, I originated what I called the percussion treatment, which was carried out in the following manner.

The instruments required are, a wooden mallet, similar to that used by the carpenter, and a solid indiarubber pad, sufficient to render dull the force of the blows. The mallet head ought to be about four inches in length, and two inches in diameter at the ends, and have a handle about ten inches long, so as to hit a diffused banging blow. The indiarubber pad is about four inches square, and an inch thick.

The pad is applied to the muscles in the lumbar region, and moved gradually up towards the nape of the neck, being vigorously hammered by the mallet as it is moved upwards. Care should be taken not to percuss the spinous processes too much, and thus set up inflammation on their summits. The pressure of the blow is intended to act rather on the erector spinæ muscles. About three courses are sufficient for one sitting, and two such sittings in the day: one in the morning, before dressing, and the other at night, just before getting into bed, are most convenient, and as often as necessary.

In some cases I have supplemented the percussion with galvanism, but the percussion seems as efficacious alone.

The effect of it is always to scatter the fits, and, for a time

to diminish them. The general improvement is uniform and considerable.

In Case 18 this effect was most marked. The girl had been previously quite stupefied, at intervals, by a succession of fits. By percussion alone they were reduced to one at a time, and, for a time, to a very few per month. On stopping the percussion, they recurred.

I have tried it on about ten cases, with the same result as above. A complete arrest of the disease has not yet been made in any case by this treatment, and the performance became tiresome, and ultimately was given up. In the case so far cured by borax, percussion was performed regularly, and the father of the patient himself noticed the regularity of the attacks after he had commenced to use percussion. In institutions, however, the percussion is mostly done in a perfunctory and careless manner, after the first enthusiasm has worn off, and the apparently slow progress of the case still further dispels any lingering zeal. I have percussed several cases at home, for some months, with decided benefit, and one youth, whose fits went on in spite of the most extreme bromism, and frequent morphia injections, improved wonderfully, for a time, under the combined percussion and galvanisation of spinal muscles. In these cases, an attendant was engaged to do the work, and even then it was difficult to manage the matter, so as to have it done properly.

Besides, although this treatment is good for the epileptics, I have no grounds for recommending it as a cure. It evidently controls the fits, but a treatment that will only do this, does not relieve either the patients or their friends from the burden epilepsy imposes on them, and so would soon be discarded by both.

I hope soon to be in a position for carrying it out carefully and regularly. It is very likely, with ignorant people, to degenerate into a mode of punishment, or a light routine tapping, that is supposed by the operator to act as a charm, rather than mechanically.

Sundry small operations have been performed for epilepsy. Messrs Solly and Wells have found congenital phymosis in eleven out of twenty-five epileptics. This, they say, leads to

masturbation, and the evils consequent upon that habit. Operation on cases had no good effect, even in their hands.

In the first place, congenital phymosis, or what is so called, is common before puberty, because the glans penis is not then fully developed. The same cause was alleged for hip disease (*morbus coxarius*), and I examined one hundred children unaffected by that disease, and found the proportion of phymosis to be as great in them as in the alleged hip cases. I expect it is the same in epilepsy. The relation of masturbation to epilepsy I have already alluded to.

Tracheotomy, as recommended by Dr Marshall Hall, has died a natural death, and only requires mention.

Blood-letting has been practised for epilepsy from a very early period. It is rarely performed now. I performed it on one occasion on an old epileptic with marked effect. He was deeply comatose, and suffering from repeated attacks of one-sided convulsions. I drew off sixteen ounces of blood, the patient rapidly became conscious, and the fits ceased, and did not return for three years after. Then Dr Forbes of Bootle bled him, and he remained free for two years, and after a third bleeding he has kept well up to the present time.

My colleague, Dr Robertson, has relieved many epileptics for several months by bleeding, and thinks very highly of it. Another patient of mine was bled many years ago for epilepsy, and she never felt so well as she did for three years after. I bled her again, lately, with some benefit, but it was not very marked. She had become so stout, that I was afraid to remove much blood. In puerperal convulsions bleeding is a favourite remedy, and should be employed before coma sets in, when chloral and chloroform have failed. In some of my cases, mentioned in the chapter on morbid anatomy, it was performed too late, and failed to benefit them.

I believe blood-letting may be used as an occasional remedy, when the relaxation of the affected part of the vascular system has gone beyond recall, and when chloral and chloroform have no effect.

A rapid bleeding to a fair amount will drain the dilated area,

and allow the blood vessels to recover their tone. Epileptics will bear bleeding just as well as the average of human beings. At the onset of epilepsy they are not, as a class, more anæmic or plethoric than other people. Bleeding, however, can only be recommended at the exceptional times just mentioned. When epilepsy becomes confirmed, it is of no use, and the caged, restrained life so impairs the nutrition of the body, that most epileptics bear bleeding badly. The small lungs and chests of epileptics who have been "caged" for years, have especially attracted my attention, and made me especially anxious that their treatment should be altered. In these atrophied, stunted, anæmic creatures, blood-letting should only be employed to rescue them from death.

The introduction of a seton into the nape of the neck is an old and useful remedy. It is most useful in the early stages. Like many other similar remedies, the disease returns as soon as the presence of the seton becomes familiar to the patient. An acute joint disease will ward off epilepsy for an indefinite period, and may cure it, if recent. Similarly Brown-Séquard thought intermittent fever would have a curative influence. I agree with him so far, that during the presence of the fever the patients would probably not suffer from epilepsy, but in confirmed epilepsy there would be small chance of a radical cure.

Nerve stretching has recently been tried on epilepsy without much permanent benefit. In Case 2 of the series of ligatures of the vertebral arteries, the aura was confined to the ulnar nerve, and that nerve was stretched without producing any effect upon the disease.

Operations undertaken, and medicines administered, to remove peripheral sources of irritation, that may cause epilepsy, are so various, that we need not refer to them here, except to say that both are of great importance, and their necessity should be considered in every case. The administration of vermicides, and the removal of painful neuromata (two cases), are the only instances where I have tried to remove peripheral causes of epilepsy. To indicate the directions in which we should look for

these peripheral irritations. I will here mention a few cases from well known authors.

The twelve following cases are quoted from Romberg, (vol. ii., page 210, *et seq.*).

In one case, a neuroma, the size of a pea, was found in the calf of the leg.

In two cases, neuromatous tumours were found on the phrenic nerves, and the optic thalami were atrophied.

In two cases, neuromata were found on the crural and vagus nerves. Epilepsy occurred in all these cases.

In two cases, cicatrices on the sole of the foot seemed to produce epilepsy.

In one case, injury to the internal cutaneous nerve produced epilepsy.

In another case, the presence of a piece of glass lying in the palm of the hand, pressing upon a nerve there, was followed by epilepsy.

An injury to the knee was followed by epilepsy, preceded by an aura affecting the internal saphenous nerve.

Two cases are given, where looking at the sun for several minutes has produced epilepsy.

In another case, narrated by Sir James Paget,* a girl had run a splinter of wood the distance of an inch underneath her left thumb nail. Much pain and irritation ensued, and at the end of a week she had an epileptic fit. She had four more fits at irregular intervals in the next four months. The wound remained open, and painful on pressure. The fits were preceded by a numbness in the thumb, rapidly extending up to the shoulder. They were complete epileptic fits: the tongue was usually bitten, and she fell asleep after them. She had not suffered from convulsions whilst teething, and was not subject to hysteria. Dr Greenhow ordered the thumb to be poulticed, and for medicine gave solution of perchloride of mercury, and tincture of cinchona, of each one drachm and a half, thrice daily. Nine days after, a sixth fit occurred. The wound was now healing, and soon after healed. The sixth fit was the last.

* *Lancet*, April 18th, 1868.

Four months afterwards the patient remained well.

Sir James Paget also quotes, at the same place, a case from Portal, where a man was wounded on the upper part of the chest and forepart of the neck with small shot, discharged from a pistol. Portions of shot remained in the neck, that seemed to have caused epilepsy for many years, as the disease was finally cured through the concealed shot being discharged from an abscess.

In two other cases from Portal, small shot in the thigh, and the point of a sword concealed in the corner of the eye, produced convulsions, cured by the removal of the exciting cause.

On p. 491 of the *Lancet*, for April 18th, 1868, Sir James Paget relates several remarkable instances where the irritation arose in the stomach. Such cases he designated gastric epilepsy, and showed how much good may be done by regulated diet, and the avoidance of gastric irritation.

Dr Sadowsky, in the *Medez Oberziene*, of May 1882, p. 717, records a case where epilepsy was supposed to result from exposure to cold. A strong, healthy woman, aged twenty years, was much exposed to cold, and caught a severe chill. On the first day after, she had twelve paroxysms of epilepsy, each lasting ten to fifteen minutes, and preceded by an aura of epigastric pain, accompanied by slight fever, tenderness, enlarged spleen, loss of appetite, and sleeplessness. Quinine failed to do any good. She had ten fits for about eight days. Then a mixture containing chloral hydrate, bromide of potassium, tincture of convallaria mag. was prescribed, and the fits ceased.

Bluch is said to have reported another case in the *Centralblatt für Nervenheilkunde*, for 1882, p. 504.

For other cases of local lesions, accompanied by epilepsy, in which the lesion was supposed to be the cause of the convulsions, it will be sufficient to refer the reader to the writings of Brown-Séquard, and others, on epilepsy.

In connection with local causes of the disease, such as are mentioned above, it may be appropriate here to call attention to those "*zona epileptica*" that are sometimes found in man, irritation of which is found to bring on an epileptic attack.

Brown-Séquard gives cases * where zona were found by observers. A touch over the region of the right temporal bone, or on the upper part of the head, exposure of the ears to cold, simple pressure on the left hypochondrium, pressure on the left mamma, galvanisation of the bend of the elbow, or of a portion of the skin of the neck and face, pressure on the inflamed cervical glands, and, lastly, irritation of the glans penis in masturbation, have brought on attacks. The smell of hemp, any odour, the colour red, the bark of a dog, an idea, remembrance, or a scolding, quoted by the same author at p. 48, may be put into the same class of phenomena as the zona above mentioned. I have tested many epileptics to find out zona, but have never yet succeeded.

* "Researches on Epilepsy," p. 31, 1857.

CHAPTER X.

THE GENERAL MANAGEMENT OF EPILEPTICS.

THE difficulties that meet us, at every step, in the ordinary conditions under which we have to treat epilepsy in this country, are so great as to minimise very materially the chances of recovery.

Let us consider these difficulties, first, as they beset us in the treatment of children; second, as they hinder us in the treatment of adults.

The period of childhood extends from the time when the infant takes a lively interest in the world around it, and cares for other things than the breast and the cradle, up to the time when the youth or maiden begins to entertain hopes of an independent existence, and to strive to earn a livelihood or to learn a profession. We will here consider the boys only, but the same remarks will apply to the girls, though perhaps to a less degree.

An infant epileptic is the greatest tyrant in existence, and the male is generally worse in this respect than the female. The dread that he may have a fit completely enslaves the parents. Every wish is gratified immediately, if possible, and if impossible, the desired thing is promised, or other things offered instead. The child grows according to the bent of its uncontrolled propensities, and the original cerebral disturbance, that produced the epileptic convulsions, becomes perpetuated and aggravated by the want of control over the emotions and sensations, where great control is specially necessary, and should by all means be developed.

It is sometimes pitiful to see the distress manifested in the mother's countenance, when her afflicted child shows signs of

dissatisfaction. How the healthy children of the family are sacrificed, and all their rights trodden under foot according to the imperial will of their epileptic brother or sister! In any nursery contest, the influence of the parent is nearly always on the side of the epileptic, and the toy coveted by all, is invariably given to the defective child, and sometimes he is allowed to gather all the toys "under his wing," and to revel in delight whilst the other children are weeping for their share.

As regards the healthy children, the principle of self-sacrifice and of self-obliteration in favour of a sick relative, may result in the production of a non-intrusive disposition, and a character that is very highly to be admired. But this partiality of the parents for the epileptic child as often fails to produce a voluntary self-obliteration and self-sacrifice on the part of the other children of the family; feelings of jealousy, of being treated with injustice, and of dislike to their brother, often fill their breasts instead, and most people who have tried it know the difficulty of rearing an epileptic with other children, and how harmful the attempt is to the other members of the family, and especially to the sick. For the epileptic is spoiled by the almost inevitable partiality of the parents; the mind, already debased, more or less, by the disease, becomes still worse regulated by indulgence. Tyranny becomes sweet by practice, the usual parental discipline that moulds the civilised child is wanting, or fitful in its exercise, and the epileptic consequently tends to become a young savage, with all the delight of a savage in cruelty and oppression. The mind runs riot with its evil tendencies, and the disease has a poor chance of being eradicated. Idiocy and mania are more likely to set in, and I have no doubt do often set in, where early training would have prevented them.

Should judicious parental control, a good constitution and disposition, have brought the epileptic child safely to the age when school life usually begins, then, probably for the first time, will the *patient* feel how dreadfully he is handicapped in the race of life. Except the case is a very mild one, he is not permitted to attend school. All work, and especially all play of a kind which a boy would call "decent play," is forbidden to him. He is

avoided by his fellows, mourned over and pitied by his relatives. No preparations are made for his entry into life; no hopeful discussions are raised as to his profession, except to consider whether *any* occupation can be found for him. The tyranny of the nursery has now given place to the despondency produced by being left irretrievably behind by his playmates. A dull, dreamy, idle boyhood, saturated with a feeling of inferiority and of being an encumbrance, and even a nuisance, produces a very pernicious mental effect, quite antagonistic to what should be aimed at—the strengthening of the power of self-control, and the improvement of the nutrition of the brain.

But the troubles of infancy and boyhood are small, compared with those which the epileptic youth or man experiences.

The future does not trouble the boy much. The irksomeness of being forbidden to accompany his young companions to the river side, to the cricket or the football field, to the mountain top, or to the gymnasium, is generally compensated for by indulgences in other ways, and a dulness of mind mercifully makes the patient fail to see, in all its hideousness, the effects of epilepsy on his future life.

When the time of youth finds a patient still an epileptic, it is only by special favour that he can get anything to do. Some people promise to give him a trial, and generally this trial continues until a fit takes place in public. The struggle for existence is so intense, and the number of applicants for every vacancy so great, that it is not likely an epileptic will be taken when several other healthy individuals can be had. Pity, favour, cheapness, or some other influence has to be called into action to open any door at all to him. Other infirmities do not act so disastrously. A youth, or man, with one eye, one leg, or one arm, can be depended on as far as what is left of him goes, but an epileptic, no matter how bright, intellectual, well formed, and healthy he may look when well, may, any moment, be to all intents and purposes a dead man, lying, without feeling, upon the fire, drowning, without protest, in the shallowest water, or falling, without resistance or alarm, from the giddiest height. The epileptic paroxysm is so unpleasant to witness, the patient

is so helpless during it, and the danger of fatal consequences, although comparatively rare, seems so obvious, that no one likes to have epileptics in their business, or about their households. It is very painful to witness the struggles epileptics have to undergo in order to procure a situation; their joy when they obtain work, and the fits have been arrested, or slight for a time; the deep disappointment when a series of fits again sets in, aggravated by the subsequent notice from the employer, "I am very sorry, but I think some quieter place would be more suitable; I would like to take you back, but some one objects to work with you, to have you about the place," &c., &c. The epileptic is turned once more into the wide world, and is it any wonder that despair makes him worse?

Where is he to go? If a child is an idiot or insane, efforts will be made to educate and improve him; if an epileptic idiot, though less an idiot, no such efforts will be made except in a lunatic asylum, but he *can* be admitted there. If an epileptic, pure and simple, every door is shut in his face. Hospitals fight shy of such cases; schools will not admit them on any terms. A few private homes will take them in, but only to afford them an *asylum* while they can pay, or while some one can pay for them. Those epileptics who have means are managed somehow or other at home. Either, friends are found to look after them, or, paid attendants are engaged. Many are placed in the country, lodging with more or less suitable caretakers. Country clergymen and country doctors look after other cases. In most of these places the boyhood is wasted, the youth is unsettled and aimless, and the manhood is unprofitable. Money makes the affliction less painful both to the patient and his friends, but does not redeem the life. With the lower middle class, where the means are just sufficient to support the household respectably, and where each member has to earn a livelihood at the earliest convenient age, an epileptic child requiring constant looking after is a sore trial. To only a few, like myself, are opportunities given to appreciate the struggles and the sacrifices endured by parents and relatives to hide the infirmity, or failing that, to keep the patient from the workhouse, the only home at

present available to this class. I have made many endeavours, but always in vain, to procure the admission of epileptic children to schools, of epileptic youths to workshops, or of epileptic men to suitable employment.

I have long been convinced, that, as society is at present constituted, except in very mild cases, the epileptic cannot be educated, cannot be taught a trade, and cannot be employed, in company with ordinary healthy boys, youths, or men. The workhouse is the only place where they are received; but, if we follow those epileptics who go into the workhouse, we will find that no organised effort is there made to teach, instruct, or employ. One or two of the least afflicted assist the attendants, in washing, carrying, bed making, &c., but the majority dream away their existence, become fat, and lazy, enliven the passing hours by quarrelling with each other, by acquiring bad habits from each other, or by contriving how more food can be obtained.

I have tried the usual employment given in such places, but it is entirely unsuitable: picking oakum, peeling potatoes, sweeping passages, all penal occupations, tending to deteriorate, rather than to elevate the mind. Even when the epileptic prefers these dreary occupations to idleness, he cannot, sometimes, be allowed to follow them. The usual fright ensues when a fit takes place. The patient is brought back to the epileptic ward by the attendant, who says that he is afraid of the responsibility, that the patient is not a case for that department, &c. &c., until the medical officer generally has to yield to repeated remonstrances, in the fear lest some fatality might happen, and the objectors then seem to have been in the right as to the proper location of the case. And so he has to return to dreary walking through the ward, varied by quarrels, fits, and meal time, until imbecility, consumption, or some other disease, carries him off.

What we want for epileptics, is not an institution, for that generally implies, nowadays, the massing of people together in large buildings, where they live and grow up collectively. Cleanliness, order, simultaneous performance of duties, and strict observance of rule, are the cardinal virtues there. The inmates are addressed by their superiors in the aggregate, visitors come into

contact with a squad, and when we see before us a multitude of eager faces, we may even imagine they are all thinking the regulation thoughts laid down for the moment, and the imagination is, probably, sometimes not far from the reality.

Now, a certain amount of rule is necessary for every place where, at least, two human beings are to live together. But the rules should never usurp the chief place, nor become the *life* of the household, and that they do in many institutions.

We want for epileptics a home, or a colony, where each individual lives with a limited number of others similarly afflicted, so that the rules need not be complex, where the one helps the other during the attacks, and the community of suffering prevents the mental depression arising from the feeling of inferiority to others. We want judicious teachers, attendants, visitors, who will help the individual members of the home, or colony, who will find out the hopes, aspirations, and fears of each person, and make him feel that he has a sympathising friend, to whom he can tell his joys, griefs, or wrongs.

The course of study entered upon by each individual, should be adapted to each case. In some cases it must be very elementary, and in all it should be made easy and pleasant, never irksome; but it should always be persevered with, no matter what disappointments. It is wonderful how quickly some epileptics will learn, when "they take a notion" of a subject; how it gives them an interest in life, and makes them feel that they may yet shake off the incubus that has weighed them down.

I sometimes meet my epileptic friends pacing the streets, gazing listlessly into the shop windows, loafing about the parks, or walking about the hospital yards, apparently contented and resigned. I have often imagined, that, because they are quiet and retiring, they are resigned, and I have tried to ascertain if it were so.

In every one, no matter how young, there is a feeling of rebellion against their condition. Many a pitiful appeal have I listened to from comparatively young children, to be allowed to go to school, or to learn to read, or to go to work, and the transformation was wonderful when they could obtain their end, and were encouraged to persevere. Since Baker (No. 13 in the sheet

of photographs) was able to go to school, he has a different look, and the pride with which he read out of his lesson book to me some days ago, was a pleasure to witness.

The greatest calamity that afflicts the epileptics is, that work, the most beneficent of all blessings, is usually denied them. Now, work is of two kinds: healthy, voluntary, interesting *work*; or unhealthy, involuntary *drudgery*. The first is the kind *required* for epileptics, the second is the kind *usually set apart* for them, or available for them. It does not depend altogether, nor even very much, however, on the nature of the work, as to which of these categories any specific employment will fall into. It all depends on how the worker looks at it. For instance, scouring a floor is not very interesting work, but a great deal of interest may be infused into it by a superior, who praises the perfect way in which it was done, or the short time it took to do it efficiently, and so on. The feeling must be engendered, that a good scourer is a person of some value, and so with other occupations. I have wonderfully improved the physical and mental condition of two epileptics, by employing them as scourers. The more menial the occupation, the more attention must be bestowed on the workers, and the more sentiment and emulation put into the work. Occupations that are more attractive require less care on the part of the attendants, but here great discrimination is necessary in selecting the occupation, as some patients would like work that they are quite unsuited for. Great wisdom, tact, patience, and perseverance are necessary in teaching a suitable occupation to most cases, and indeed, all four are necessary in dealing, generally, with epileptics. In other words, epileptics, until cured, must be taught, must work, must play, under special conditions.

In the early part of the year (1888), I was consulted as to the desirability of establishing a hospital for epilepsy in Liverpool, by a philanthropic gentleman, who saw the great difficulties in the treatment of the disease, that both doctors and patients laboured under.

I immediately objected to a *hospital* for such cases, in the ordinary sense of the term, but proposed a home in the country, where work, treatment, education, and all good influences could be

brought to bear upon them, under healthy conditions of life, for a sufficiently long period of time, to give a chance of cure.

After a little inquiry, we found that several large institutions of the kind proposed by me, existed in Germany, and, in company with Messrs Grisewood and Hanewinkel, I visited one of the largest of these, situated at Bielefeld, on June 24th and 25th of the year 1888. The colony is managed by its enterprising founder, the Rev. Von Bodelschwingh, and long may it remain under his care.

The colony consists of several substantially built houses, varying in size, scattered over a hilly district of country, at a short distance from the quiet, country town of Bielefeld. There are no distinct walls marking the precincts of the colony; public roads intersect the grounds; whilst gardens, fields, and workshops are so intermingled, that a stranger would find it impossible to say, by any external landmarks, when he had entered the grounds of the colony. Except that some of the buildings are too large for ordinary dwelling-houses, there is an entire absence of the "institution look" about it. No high boundary wall, with single portal, iron grating, and gruff porter in uniform, who wants to know all about you, before the great iron gate is opened. Here, you can walk along the public roads through the grounds, and are as much at liberty as in walking through any country district.

The 868 inmates are located in the various houses, under the charge of a married couple, called the house father and house mother. Here, family life is maintained, as far as possible, the number in each family being moderate. For instance, the joiners and carpenters have a house to themselves. We saw about two dozens of them at dinner in a small, plain, comfortable dining-room, adjoining the workshop and kitchen, whilst upstairs were their bedrooms. These formed a family group; all looked intelligent, happy, and at home, and one youth was pointed out to me, who had been in the colony since childhood.

We visited in turn, a tailor's shop, a printing establishment, a smithy, a dispensary, (where bromide of potassium is dispensed far and wide), and many other similar places.

Peace and contentment seemed to reign supreme over the whole hillside, and we saw none of that imbecile, dazed look, that is stamped on the face of inmates of similar institutions in this country.

An imbecile epileptic was brought up to the Pastor, on the morning of our visit. He had wandered away a few days before, and had lost himself in the country, some distance from home. He looked weather-beaten and very forlorn, and was received by the second in command much as a father receives a lost child, and the poor fellow seemed unutterably contented to be received again into the fold. When dismissed to his house, he still stood waiting until his superiors were again disengaged, when he went up and offered his hand to them to shake. This they did very warmly, and the patient then retired quite satisfied.

The house fathers and house mothers live as do the family. They partake of the same food as the patients, sleep under exactly the same conditions of bedroom, wear the same style of dress, and are in all respects on a social level with the patients. This system contrasts very favourably indeed when compared with the petty aristocracy of officialism, that is the bane of all institutions in this country, where the *inmates* are regarded as a lower class, over whom the *officials* must domineer, and where the head carpenter, head gardener, down to the head scullery-maid, in virtue of their position, no longer wear a work-a-day-dress, no longer consider their work honourable, but a thing to be avoided as a degradation.

Flitting about the place are superior officers, both gentlemen and ladies, refined, intelligent, and oftentimes, evidently, of gentle birth. We could not quite ascertain their special functions, but this much we did ascertain, that most of them were *devoting their lives* to their work, whatever it was, and that they considered that work as their special *mission*, performed for the sake of their Heavenly Master, and not for any earthly gain.

Here we reach the essential feature of the colony, the religious element. The patients are taught to bear their sufferings patiently, because these sufferings are permitted for some good purpose by their Father above, who *only* can cure them. They are

taught to look to the next world rather than to this world for permanent relief; and that, whilst here, occupation and divine communion best relieve the tedium of life. As a great religious institution for ameliorating *the condition of epileptics*, that at Bielefeld is a *grand success*. In regard to the medical treatment, proper, carried on at Bielefeld, we cannot speak in such high terms. It begins and ends with bromide of potassium, which is given very freely indeed. We here insert the official instructions as to its use, in their entirety.

“INSTRUCTIONS FOR THE TREATMENT OF EPILEPSY, AS CARRIED OUT
AT THE ‘BETHEL’ COLONY FOR EPILEPTICS, IN BIELEFELD
(WESTPHALIA), GERMANY.

“Patients suffering from Epilepsy have to be very careful in their diet, which must be very plain; they have to avoid taking food that is very rich or acid, and must abstain from all exciting beverages, especially from spirits. Coffee or tea has to be taken very weak, mixed with much milk. Milk diet (milk and milk puddings) is preferable to a diet consisting chiefly of meat and strong broth. Supper must be taken early, and has to be light. Smoking also, is only allowed in moderation.

“The patient’s time must be well occupied, in order to prevent him from brooding and getting low-spirited. Exciting amusements and great mental exertions have also to be avoided. Exercise in the fresh air, and cold sponging, or better still, cold shower baths, gradually prolonged, act beneficially.

“A remedy from which a *certain* cure might be expected, as frequently advertised in newspapers, does not exist. Thousands of unfortunate patients, who have tried all those ‘celebrated’ secret remedies, acknowledge this fact, which is also confirmed by our own extensive experience. Whenever, after the use of such a remedy, the epileptic attacks ceased, it was *not* the *remedy*, which improved the patient, *but* the plain diet, as recommended by us.

“The most effectual remedy for the cure of epilepsy, which we know, is ‘Bromide of Potassium.’ It has a most soothing

effect upon the nervous system, and can be taken by most patients for years without deranging their stomachs. Our experience with this remedy is not sufficiently long to enable us to maintain that it effects a complete cure; but so much is certain, that by causing the attacks to be less frequent, it not only prevents the patients from becoming imbecile, but very often strengthens their mental faculties, especially their memory.

"A certain number of cases, which have not been of long duration, will probably even be cured completely, provided the remedy be taken regularly, without any interruption. In 250 cases, which have been under our observation, the attacks have not returned for several years. The success of the treatment greatly depends upon the quantity of the remedy required, which the medical attendant has to find out for each individual case. We therefore advise every patient to consult a doctor, and to show him our prescription, as very often, especially in women, epilepsy is complicated with some other disease.

This treatment often fails, because it is not strictly and perseveringly carried out, as in most cases the remedy must be taken continually for at least six months, if it has to be effectual. But many patients cannot afford the expense, as the drug is very dear if it has to be bought 'in retail' of a druggist.

"In order to enable even poor patients to use this remedy, we offer to procure it for them at the lowest wholesale price, such as we obtain it for our own institution.

"Patients who have no regular occupation, and cannot lead an equal, healthy life at their own home, can only be successfully treated in an establishment specially adapted for the disease.

"Prescription for the use of Bromide of Potassium.

"Dissolve 20 grammes (5 drachms) of bromide of potassium in 200 grammes (6 ounces) of pure water.

"Take of this mixture:—

"*The first week:* three times a-day, 1 tablespoonful, half an hour before each meal (morning, noon, and night).

"*The second week*: four times a-day, 1 tablespoonful, at equal intervals, but never directly before or after a meal.

"*The third week*: 5 tablespoonfuls a-day, and so on, every week 1 tablespoonful more, up to 8 tablespoonfuls daily, so that 21 tablespoonfuls are taken the first week, 28 tablespoonfuls the second week, 35 tablespoonfuls the third week. More than 8 tablespoonfuls a-day are not to be taken, and so many as 8 tablespoonfuls must not be continued too long. As soon as the patient gets drowsy and heavy (which sometimes occurs when only 6 or 7 tablespoonfuls daily are taken), the number of tablespoonfuls has to be decreased again. Should the attacks cease, when, for instance, the patient is taking only 3 tablespoonfuls daily, he must not increase the dose, but continue to take only 3 tablespoonfuls. But as soon as the attack returns, or symptoms appear indicating its approach, the patient has to take, daily, an additional tablespoonful, up to 4, 5, 6, 7, or 8 tablespoonfuls daily, until he has reached the quantity which causes the attack to disappear.

"When the attacks have not returned for three months, the number of tablespoonfuls, daily taken, is gradually to be decreased at the same rate as it had been increased before. When having reached again the number of 3 tablespoonfuls daily, the patient, for precaution's sake, has to continue this amount for two to three months. After this period he may take 2 tablespoonfuls daily for two to three months longer, and then cease.

"Should the attacks return again, the same treatment must be renewed.

"In many cases the patients cannot do without the bromide of potassium; they have to take for years, 2, 3, or 4 tablespoonfuls daily, as the attacks return with increased vigour whenever they give over taking the medicine.

"If eruptions and ulcers appear on the legs, or on other parts of the body, the medicine has to be discontinued until the skin is healed.

"Children, between ten to sixteen years of age, begin with 3 tablespoonfuls, but must not take more than 6. Children under ten years have to begin with 2 tablespoonfuls, and to go as high

as 4 to 5 daily. Very young children have even to take still less. Bromide of potassium has to be kept in a dry place, and carefully closed up. Very much depends upon the purity of the drug. The bromide of potassium, as it is generally sold, contains 5 to 6 per cent. of chlorate of potash, in addition to some other ingredients. But the bromide of potassium, which is prepared by our chemist, only contains 0.5 to 0.7 per cent. of chlorate of potash, if so much. A purer article cannot be prepared. As we use an exceedingly large quantity, our supply is systematically arranged, and we can always reckon upon an article good and pure. In case you intend to get the bromide of potassium through us, we beg to inform you that we have made an arrangement with our chemist to supply the drug at the price of 12s. per two pounds, or 50 powders, free of postage.

“Any one, who cannot claim parish relief, and who can prove by the certificate of a clergyman or magistrate, that he is unable to pay, may, on application, and on payment of the carriage only, obtain the bromide of potassium gratis from our institution. The cure is therefore within the reach of every one, and a trial of all sorts of useless, dangerous, and often very expensive secret remedies can be dispensed with.

“Lastly, we beg to call your attention to the fact, that our chemist supplies the bromide of potassium at self-cost price; any over-payment, or voluntary gift, will be for the benefit of a great number of poor amongst our epileptics, who are attended in our institution, erected in the year 1867.

“THE ADMINISTRATION OF THE COLONY
FOR EPILEPTICS ‘BETHEL.’”

As we walked through the establishment, we could trace on many a face the marks of the bromide, marks that proved to my mind that the patients were over-dosed with it.

We could not ascertain that any systematic scientific medical observations, calculated to elucidate the nature of this mysterious disease, or to define the cause of the epilepsy in particular cases, were carried on in this splendid field. Focal lesions had not apparently penetrated to the heart of Westphalia, and perhaps

there are, at Bielefeld, many cases that a trephine would relieve more effectually than any amount of bromide. Indeed, the pathology of the disease expressed to us by one gentleman connected in some way with the place was, that the disease was a visitation of the evil one. He admitted that all the authorities there did not go so far in this direction as he did. The establishment is, however, a *religious* and not a *medical* one, and apparently the medical element is present only because it is considered a necessary appendage. It seemed to us, however, to be very much in abeyance.

We here insert the medical report, as translated by Mr Hanewinkel. Its character as a medical report reflects the nature of the place, and affords so much information on so many points, that I have determined to print it.

“MEDICAL REPORT OF THE COLONY ‘BETHEL’ FOR EPILEPTICS,
FOR THE YEAR ENDING JULY 1ST, 1887.

“Gentlemen,—Before entering upon the annual report of the Colony ‘Bethel,’ I should like to remind you that exactly twenty years have gone by since the Institution for Epileptics was established, for, on 15th October 1867, the first four inmates were received.

“In reviewing the past twenty years, which after all is but a short time, one cannot help wondering that, notwithstanding the great difficulties before and since the establishment, the institution has grown to such gigantic dimensions.

“The growth of an institution like ours, which has grown to a colony, stands, no doubt, singly in the history of humanity and of nursing, and therefore we cannot thank our Heavenly Father sufficiently for his protecting hand, and the blessings which he has bestowed on our work of charity.

“Since the establishment of the institution, *i.e.*, up to July 1st this year, 2271 epileptics have been nursed and treated. This is a large number when it is borne in mind that the *majority of these invalids remain here for years, and others even for life*. During the past twenty years, not only have the institutions been in-

creased, but the patients also. On July 1st, 1886, the number of epileptics in the colony was 858; during the year, 188 new cases were admitted; total, 1046; and 178 were discharged; so that on June 30th, 1887, the remainder numbers 868, an increase of 10 on the year 1886. Of the 868 patients, 530 were males, and 338 females. Of the 178 discharged,

only 6 could be classed as cured.

93 „ „ improved.

36 left unimproved.

43 died.

178

“Exceptionally small is the number discharged as ‘cured,’ which number is decreasing year by year. This is traceable to the fact that we can hope to cure *new* cases only.

“Some one may put the question, ‘How long does it take to cure an epileptic patient?’ With positive surety this can be stated only after ten years’ treatment, but we take an average of one to two years. If any one has been free from attack during such a period, we withdraw gradually the medicine, and pronounce them as cured. Were we to act as other institutions do, which pronounce a patient as cured after the attacks have ceased six months, we might give more satisfactory statistics; but in such cases the patients themselves, as well as their relations, would in most cases be deceived.

“The 36 who left the institution unhealed is a proof that there is no hope for chronic cases. The number of deaths (43) may also appear rather large, but this proportion will astonish no one who has paid a visit to our various institutions.

“The causes of death were mostly chronic diseases of the brain and skin, chronic derangement of the respiratory organs, consumption of the lungs. Not seldom, sudden death occurs, which puts an end to the poor sufferer. Sometimes the death is not found out until the following morning by the nurse or the patient in the next bed, when it turns out that the poor creature has had an attack, and has been choked, or has died of weak

action of the heart This is easily explained, as many sufferers have their attacks without the least noise or cry. During the year, 14 patients had to re-enter the colony.

"As a proof that our colony has, so to say, an international character, it may be mentioned that we have at present in the institution 3 Russians, 1 Austrian, 5 Dutchmen, 2 Belgians, 1 Frenchman, 2 Swiss, 2 Danes, and 2 Americans.

"The total *nursing days* were 275,785; the average, 264 days for each patient.

"The sick have been nursed by 61 *brothers* and 63 *sisters*, the average being 7 *patients for each nurse*.

"The general health has been good during the past year. Epidemics have not taken place. But it may here be again mentioned, that our disinfection department is too small.

"In the medical departments an alteration has also been made, by which Dr Huchzermeier, a third medical officer, has been appointed and dwells in the institution since April 1st this year. By this arrangement, the complaints have been put aside that no doctor is at hand when many accidents may happen; it has also removed from our shoulders a burden of responsibility. Since this appointment, we have divided amongst ourselves the duties of the whole institution.

"It is self-evident that if an institution is to prove successful, special, fixed, and wholesome regulations must be introduced. Of these regulations, there stand out at the head, work and employment for all patients. Even the bodily and mentally sick have to do work suitable for them. Unfortunately, the ability to do work of many of them has been reduced to almost nil, hence it is difficult to find that kind of employment which will give them pleasure and satisfaction. Employment is found for children also.

"With most patients there is no lack of will to work; but with the bodily and mentally sick, great patience and consideration must be practised. Inasmuch as our patients are ever subject to attacks, no private employer will take such people in his service.

"In consequence of their malady, they have to leave their workshops, factory, &c.; it is difficult to gauge the harm it

causes to their minds to be thus put aside. This should be sufficient reason, why we should make it our first duty to find employment, especially for our adult able-bodied epileptics. A great blessing, therefore, is conferred by our various employments, such as *gardening, seed trade, baking, bookbinding, text painting, joinering, locksmith work, painting, saddlery, shoemaking and tailoring*, where the sick work for the sick, and by this means all assist in keeping down expenses.

"*Cooking and washing, kitchen work, sewing, ironing, potato-peeling, cleaning the dining-rooms, sickrooms, and bedrooms, as well as serving at table*, afford sufficient employment for our female patients.

"A practical regulation regarding style of living has a special influence upon the epileptics, as much of the well-being of the patients depends upon it. Hence the diet regulations must be strictly observed, and *resting and working* must be taken in turn. Light employment, free from the noise of the great world, temperance in taking food, avoidance of every excitement, and the enjoyment of fresh air, such are the principal factors of a wholesome life for our invalids.

"Great caution, therefore, must be observed in regard to the nourishment of our patients. Heavy meals and excess in drinking are as disadvantageous as insufficient food. The diet table as introduced twelve years ago, is practically the same now. It is simple, nutritious, and easily digested, the food consisting principally of vegetables.

"It has been contended, that vegetable nourishment acts more favourably on the epileptic sick, and that from experiments made, it had been proved that the sick who receive this diet had attacks much more seldom than those who take animal food.

"My own view is, that the medium as practised by us is the best, since our patients feel well, are of contented mind, and look healthy.

"About the latter there has been one voice, viz., that our sick are on the whole well nourished, and most of those admitted very soon look better and healthier, which is the best proof that the nourishment is suitable.

" *Alcoholic drinks* are strictly forbidden, and are granted only at the doctor's request. Tobacco smoking is allowed to the adults in a mild form.

"To this good nourishment, nursing, and watching may be traced the contentment of the patients, on the whole, and that they, in their own family groups, feel themselves thoroughly at home. Our aim is, that family life shall be restored to them, to the best of our ability, through our institution, and the pressure which has borne so heavily upon so many sick is gradually removed here, through coming into contact and associating with suffering colleagues.

"The institution is, therefore, a blessing for the epileptics, inasmuch as it restores to them what they lost long ago. Courage, joy, company, and work, schools, church, and workshops—all sources are open for them. Suitable employment in the garden, field, and forest, which satisfies their drooping spirits. Hands are ever stretched forth to catch the falling sick, and carry them away on the resting bed which is attached to every station.

"These works, and the institution's life, have an influence upon the character, brighten the dreary and downcast, remove sulking and selfishness, and recall many, who have lost moral strength, to decent social life.

"I have already mentioned that the majority of our epileptics exhibit symptoms of mental disturbance. The first symptom of mental disturbance in chronic epilepsy, is shown by a falling off of memory, and that more so in matters of the immediate past than of long ago. Then steps in weakness of comprehension and judgment. The onset of these defects depends entirely upon the severity and number of attacks, and they may proceed to complete imbecility, in which state there is left the outward form of man only.

"Even in this state of ruined humanity, epilepsy rages with unabated severity, and calls forth daily the most dreadful attacks.

"Through these repeated attacks, the epileptic maniac becomes the most dangerous of lunatics, commits with giant strength the most violent acts, and is more fitted for a lunatic asylum than a healing and nursing institution for epileptics.

" All these different forms of mental disturbances we find represented in our institution. We have even been compelled, after our special and extended treatment, to hand some of the most dangerous cases over to the lunatic asylum. Happily there is a large number of exceptions.

" Referring to the treatment of our epileptics, *bromide of potassium* has been, and remains, our principal remedy, and takes to this day, amongst other remedies, the sovereign place.

" If this remedy is to succeed, it must be taken for years with iron consistency, like the daily bread, and must never during that time be put aside wholly. If the attacks do not diminish, the doses must be stronger, and increasing (for children up to eight grammes, for adults, up to fourteen grammes per day), and a steady reduction in the doses must be observed, if the attacks diminish.

" A withdrawal of the medicine should be resorted to only when disagreeable symptoms appear, such as stomach or bowel catarrh, drowsiness, eruptions and boils, or great general weakness. Much depends on the most suitable method of using this remedy. It is not sufficient that the patient should take bromide, or take it for a long time, but he must also take it in the correct manner. It is further necessary that a good, unadulterated preparation, free from other mixtures, should be used. After my many years' experience, I have come more and more to the conclusion, that bromide of potassium, after being used for a long time, and in large doses, does certainly not cure all cases of epilepsy, but that in a large number of cases it puts aside the attacks for prolonged periods, and that advanced mental derangement is, by its proper use, relieved, and the mental balance restored.

" Like other medicines, the bromide of potassium has this evil, that it ceases to act after being used continually, as the patients get used to it. To this we must attribute the fact, that we had to register, during the last year, no less than 90,000 light and severe attacks. This fact is the more distressing to our patients, as well as to ourselves, inasmuch as we have no proper substitute for our bromide of potassium. During the last few years we have given stronger doses. Whilst formerly we gave 1 : 10

water, to-day we give $1\frac{1}{2}$: 10 water, or $1.6\frac{2}{3}$ water, to all male patients. Further increase, however, for extended periods, is certainly not desirable, as the medicine acts unfavourably both mentally and bodily. We hailed with joy, therefore, the news a few years ago, that other bromine salts (alkalis), viz., bromide of sodium and bromide of ammonium, had been recommended as substitutes for the bromide of potassium.

"We made various experiments with these bromine salts, by mixing them with bromide of potassium, as well as trying them by themselves, and at first it appeared as if they would be able to drive the bromide of potassium out of the field. But we regret to say, we soon observed that each of these salts was far behind the bromide of potassium in its action, and was also detrimental to the digestive organs. We have therefore limited the use of these salts, and use them only in combination with the potash salt. In this respect we have found, that the potash and soda salt, or all three together, act exceedingly well with many patients, and especially with those upon whom the bromide of potassium has ceased to act.

"As proof that, in our institution, the use of bromide of potassium by far exceeds the other two bromine salts, I may state, that during last year we used 1287 kilos bromide of potassium, 221 kilos bromide of sodium, 150 grammes bromide of ammonium.

"If given according to the above details, we find, as the result of the treatment, that the action of the bromide does not, in many cases, come up to our wishes; and if part of the epileptics remain unhealed, or go as incurables to destruction, even so, this circumstance will not shorten the glory of the bromide of potassium. Under the existing means for curing this severe malady, it takes at present the first rank.

"It is to be hoped that science will, some day, discover a powerful healing remedy. Until then, the epileptic must prize the bromide of potassium as his highest treasure, as a safe retreat from physical collapse, from imbecility and loss of mind, from penal servitude, or a madhouse.

"DR A. BERTELSMANN,
"Institution Doctor."

The finances of this large establishment do not interest us much, living as we do in a country where the conditions of life are so different from what they are in Germany. The income is obtained from fees paid by patients, which amount to £14,058, or about one-third of the total receipts. The rest is made up by grants from German States and municipalities, and contributions obtained from charitable individuals everywhere. A regular system of issuing letters, soliciting help, is carried on, and gives employment to some of the inmates.

Then, none of the officers, brothers, sisters, and attendants are, as far as we could learn, in receipt of salaries, and salaries necessarily figure rather largely in all English institutions. Scientifically and financially, therefore, we did not get much light from our visit to Bielefeld, but we did get a great deal of information as to the way we could maintain a *home-life* away from the *homes* of the patients, as well as how to occupy their minds and bodies, and make them contented; and we obtained ocular demonstration of the benefit that we believed would arise by such methods of managing epileptics in England.

The whole establishment reflects the greatest credit on the energy, wisdom, devotion, and enthusiasm of its worthy patron, and he and his colleagues have placed us all under a deep obligation for the kind way we were received, and for the great pains taken to show us everything we desired to see, both at Bielefeld and Williamsdorf, a colony for unemployed men, also founded by Pastor von Bodelschwingh, and under his management.

When we returned to England, the scheme of establishing a home near Liverpool was prosecuted by us with greater ardour than before; and, after much searching and inquiry, we at last found a suitable place at Manor House, Maghull, which was at the same time available for the purpose.

We wanted a fertile, quiet country place, easily reached from town, with a good house, and sufficient grounds and gardens to occupy some of the epileptics in horticulture and agriculture, and with extensive outhouses for workshops and recreation purposes. All these we have at Manor House, and a more suitable place we could not have found in the north of England.

Our aim is to bring under treatment cases where there is a reasonable prospect of cure or amelioration.

Before admission, the following form of application must be accurately filled up, to be afterwards preserved in the case book of each patient:—

“HOME FOR EPILEPTICS, MANOR HOUSE, MAGHULL, NEAR
LIVERPOOL.

“Particulars of the patient for whom application for admission is being made.

“To be signed by parent or other relative of patient.

“1. Name and address of patient.

“2. Age and occupation of patient.

“3. Ages and state of health of parents, brothers and sisters who are alive.

“4. Ages and causes of death of parents, brothers and sisters who are deceased.

“5. What evidence is there of epilepsy, insanity, chorea, hysteria, apoplexy, paralysis, or other nervous diseases amongst immediate or remote relations?

“6. What evidence is there of consumption, cancer, rheumatism, or gout, in family history?

“7. What diseases or injuries has patient ever suffered from? Give dates and duration.

“8. Date and circumstances of first epileptic attack.

“9. Supposed cause of epilepsy.

“10. Frequency of attack, and if increasing or diminishing in frequency.

“11. What warning is given of an attack, either to the patient or his friends?

“12. Describe as fully as possible any attack that has been observed.

“13. In what part of the body do the convulsions first appear?

“14. What bad or dirty habits has the patient acquired?

“15. Can he attend to his own wants?

- "16. Has he ever shown signs of being dangerous to himself or others?
- "17. What is his mental condition?
- "18. What previous treatment has he received?

Name, _____

Address, _____

"I certify that I have attended the above patient, and believe the above statement to be correct, and that the patient is suitable for admission to the Home for Epileptics, Maghull.

Name, _____

Address, _____

Medical Attendant.

"*N.B.*—This sheet to be filled up as accurately and as carefully as possible, and sent to Dr Alexander, 100 Bedford Street South, Liverpool, who will, from it, form a conclusion of the suitability of the case for admission, and also, if admitted, of the course of treatment required. Any serious omission or incorrect statement may render more difficult the due treatment of the case, and even necessitate the patient being sent home as unsuitable."

When the patient presents himself, further particulars as to his condition and habits will be ascertained, another sheet will be filled up by the examining officer, in which the condition of every organ in the body, and the general physique will be noted, as far as our means of doing so, by all methods available at the present time.

The patient will then be closely watched, and the nature, duration, accompaniment, sequelæ or complications of the fits recorded, and from these an opinion of the necessity and kind of medical treatment will be formed.

The inclination, habits, mental disposition and power, of the patient being at the same time observed, some clue will be obtained as to the probability of teaching or employing him, and in what way.

Under whatever treatment the patient is placed, the effects, not only upon the disease, but upon the mind and body of the patient, will be determined in every possible way.

The whole life history of every epileptic whilst in the home will be written as minutely as possible, and an earnest endeavour will be made to ascertain the at present unknown laws under which the fits cease under treatment in some cases, and why in other cases the same treatment fails to have any effect. We intend that here medical science will do its very best for the elucidation and cure of the disease.

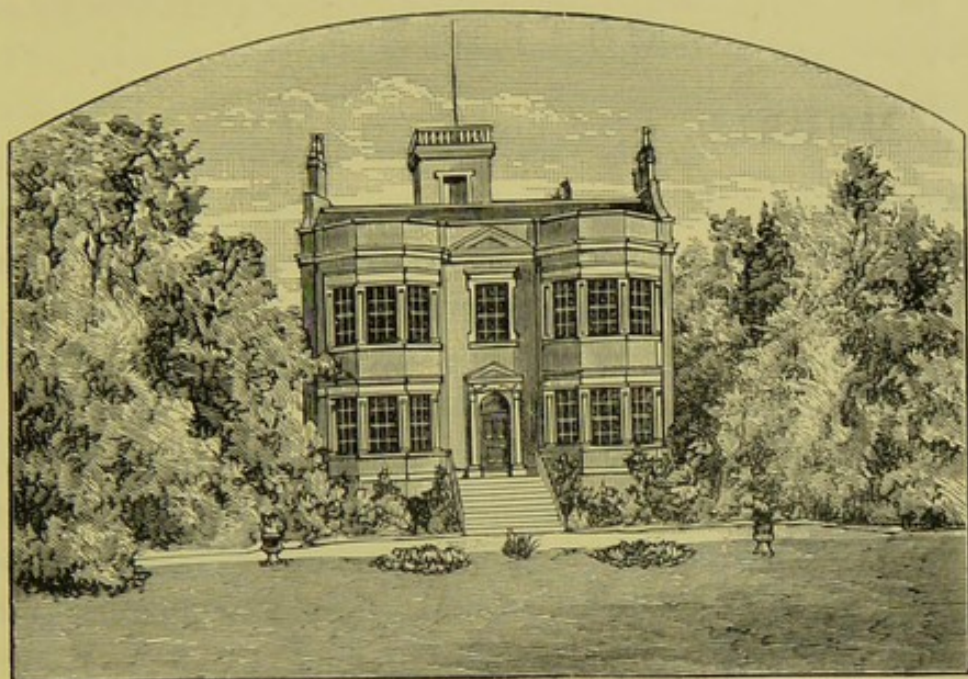
Then, after all the various operations that I have described, time and care are needed to produce their full effect. These cases can be sent here during their period of probation, until the cure is considered sound and lasting, or its failure is manifest. By this means fewer cases will in all probability fail.

The home will be made as far as possible self-supporting, and the different classes of epileptics will have accommodation according to their means. The occupations will vary according to the class, but all must be employed in some way or other. No lounging, idleness, slovenliness, or luxuries will be permitted. The patient will have simple, nourishing, and abundant food, warm clothing, regular hours of sleep, work, and recreation. The live stock of a farm will interest some, the garden will occupy the attention of others, simple mechanical trades will be preferred by a third class, and so on.

The religious education and wants of the patients will be attended to, and we hope, by the aid of philanthropic friends or of intelligent patients and officers, that a simple education, together with a knowledge of the arts and sciences, will be imparted where these are necessary, possible, or likely to be beneficial. Lunatics and hopeless idiots will not be admitted, and any patients becoming so after admission will be sent home.

The cases most desired by us are recent ones, or young people, and those who can be kept at the home long enough to allow sufficient time to do good—a few weeks or months will rarely do any permanent good; one, two, or more years will be required in most cases.

At the end of every year we hope to publish a full report of the medical details of every case in the Home during the preceding twelve months, so that the medical profession will know exactly how the work is progressing, and what practical results in increased knowledge, either of the disease or of the application of successful remedies, have been discovered.



HOME FOR EPILEPTICS, MANOR HOUSE, MAGHULL,
NEAR LIVERPOOL.

CHAPTER XI.

MORBID ANATOMY OF EPILEPSY.

SINCE I commenced practice, I have always made special endeavours to procure a *post-mortem* examination on any of my patients who died of epilepsy, or of epileptic convulsions of any kind. What I observed in these cases will now be placed as shortly as possible before the reader.

Case 1. John S., aged nine years, became the subject of epilepsy soon after birth. Lately the fits averaged about three daily, and were rather severe. His left leg and arm were contracted, as in post-epileptic hemiplegia, and the muscles of the affected arm were much wasted.

There was found, on *post-mortem* examination, great distension of the right lateral ventricle, to such an extent that the peripheral convolutions were much atrophied, and the central ganglia were flattened. The ependyma of the ventricles almost came in contact with the dura mater covering the fissure of Rolando, at, and for some distance behind, that sulcus.

The patient died from the exhaustion produced by diarrhœa.

Case 2. An adult, who had suffered for many years from epilepsy and right hemiplegia at an epileptic institution; became suddenly comatose and died.

Both an old and a recent clot were found lying just outside the corpus striatum and optic thalamus, on the left side. The cord seemed softened at the upper part, and on microscopic examination some sclerosis of the neuroglia and plugging of the small vessels were supposed to be found.

Case 3. A discharged soldier, aged thirty-three years, who had been under my care and that of others in the epileptic wards for

several years, was found dead one morning by the attendant, with his face buried in the pillow.

His body was well nourished, stout, and healthy-looking. Intense congestion was found beneath the skin of the neck and on the scalp; in the liver, kidney, and spleen; on the surface of the brain; along the erector spinæ muscles; and on the surface of the spinal cord, especially in the dorsal region.

The anterior half of the right hemisphere of the brain was much larger than that of the left. The substance of this enlarged part was homogeneous in texture, white and glistening in appearance, like blanc mange, but was much denser, softer, and quite opaque. It was so soft that, when cut into, the section would not keep "an edge," and blood vessels were almost completely absent from it.

Case 4. Elizabeth P., aged sixteen years, had been an epileptic from birth. A short time previous to admission, she became an imbecile. She had a brother who was also an epileptic. There was no history of syphilis. Her disposition was cheerful, and memory good. She died of phthisis, developed without any physical signs whatever, such as pain, cough, or expectoration. The epileptic fits in her case were of daily occurrence, and continued up to the time of her death.

Although a small girl, the brain struck us as being especially small, even for one of her size. There was some congestion on the surface, but the substance appeared to be quite healthy. The cord seemed to be softer than usual at the cervical enlargement, and throughout all the dorsal region. The subarachnoid fluid was plentiful in all the cerebro-spinal system.

Case 5. John G., aged sixty-nine years, an epileptic, but for many years the fits had not been very severe, and occurred at long intervals, hence he was able to attend to light duties. One evening he complained of slight pain in his side, and on the following morning, when getting out of bed, he suddenly expired.

On *post-mortem* examination, a rupture was found in the aortic arch, behind the left subclavian artery, and the left pleural cavity was quite filled with blood. The ependyma of all the ventricles

was studded with small miliary tubercles, the result of chronic inflammation of that structure.

A small clear cyst dropped out of the posterior part of the right lateral ventricle. A small extravasation existed at the posterior and outer part of the left corpus striatum. The brain, generally, was softened and pale. The vessels were healthy.

Case 6. Catherine Eustace, aged sixty-two years, an epileptic since the earliest date from which we have any information regarding her, was for some time previous to her death an imbecile.

The limbs were much deformed; the left leg was contracted at the knee; and the left hand, especially, was twisted into the extraordinary position so common in epileptics.

A tumour, fibrous in character, was found partly buried in and encroaching upon all the left frontal convolutions. It was firm and fibrous in the centre. The brain immediately surrounding the tumour was softened. The remainder of the brain presented no unusual appearance. The arteries were atheromatous. The other organs of the body showed no disease beyond some senile degenerations.

Case 7. Agnes F., aged twenty-five years, a chronic epileptic, who gradually passed into a condition of continuous stupor, and died. No history could be obtained further than that she had had epileptic fits since childhood. The fits were sometimes frequent; at other times longer intervals occurred. Lately they had become very frequent, and during the twenty-four hours previous to death they were almost continuous.

A considerable amount of congestion was found in the brain and cord, but no coarse lesions could be detected. The cord *appeared* to be softened at the cervical enlargement.

Case 8. A young girl, aged twenty years, died of phthisis in an epileptic institution. She had suffered from essential epilepsy for many years. Her body was extremely small and delicate for one of her age. The heart, and, in fact, all the organs, were extremely small in proportion to her age. The aorta was small, and showed commencing fatty degeneration of its inner coat. Both lungs were infiltrated with tubercle. The cerebro-spinal axis did not exhibit any gross lesion.

Case 9. Girl, aged thirty years, an epileptic since childhood, came under my care from an epileptic institution. She was almost an imbecile, and was inclined to wander about for the first three weeks that she was under my charge. She then became stupid, finally comatose, and died.

The brain showed general softening, but the membranes were quite healthy. A small abscess was found beneath the posterior common ligament behind the body of the second dorsal vertebræ. This had not produced any symptoms of pressure upon the anterior columns of the cord; but all the membranes of the cord were thickened in that region, and the cord seemed softer there than elsewhere. The latter could not be examined microscopically, as it broke down during the hardening process.

Case 10. Elizabeth Dunn, aged thirty years, an epileptic from birth, was admitted under my care suffering from burns of hands, arms, and chest, inflicted by a fall into the fire during an epileptic fit.

During the time that intervened between her admission and her death, she was often attacked by paroxysms of weeping and screaming, and showed many other signs of insanity.

Her body was found to be much emaciated, and did not weigh more than seventy pounds. Numerous bed sores were found all over her back. Her legs were flexed at the knees, and her wrists were deformed by reason of cicatrices.

Both lateral ventricles of the brain were found enormously dilated, and full of clear fluid. The ependyma was much thickened, and grooved like a reefed sail at the lower part of the enlarged cavities. The corpus callosum was separated from the fornix. The basal ganglia were healthy. The fourth ventricle was dilated, and so, to a less extent, was the third.

The lungs were extensively infiltrated with tubercle, and large cavities were found in the right lung.

The heart was very small. The mesenteric glands were much enlarged. The other organs were healthy. The cord was rather soft.

Case 11. Richard R., aged fifty-four years, an epileptic for years, but exact history unknown, died from coma. A tumour

was found in the right frontal convolutions. This tumour was soft and pale around the outside, but in the centre it was described to be red and cancerous looking.

There was also considerable oedema of the membranes of the brain, and the ventricles contained more than the usual amount of fluid. A large mass of scrofulous (?) glands was found beneath the left ear.

Case 12. Mary D., aged thirty years, had a great many fits for the last nine years. She died of phthisis.

Nothing unusual, except some congestion, was found in the brain and spinal cord. This congestion was so slight, that it could not be considered peculiar to any disease. The fourth ventricle seemed a little dilated, but not markedly so.

Case 13. Lardner, aged fifty-six years, came under my care in rather a delirious state. On the day after admission, he had several unilateral epileptic fits, in which he was unconscious. Inquiry elicited the information, that he had been an epileptic for twelve years.

He had several fits before his death, in which it was observed that the right side of the body, and the left side of the face only, were convulsed.

On *post-mortem* examination, a depression, into which the tip of the little finger could be inserted, was found in the occipital bone, its situation being a little above, and to the left of the external occipital protuberance. There was no irregularity of the skull on the inside, corresponding to the external depression.

The cerebellum was considerably softened opposite the depression, and this condition existed, but to a slighter extent, all over the left hemisphere of the brain.

Two small *apoplectic abscesses* were found in the left corpus striatum: one in the centre of the intra-ventricular nucleus, the other at the outer and posterior part of the tail of that nucleus. There was also a small cyst in the optic thalamus of that side.

The left tarsal bones were almost completely ankylosed, as a result of old standing inflammatory disease. No history of the disease of the foot, or of the depression in the skull, could be obtained.

Case 14. Patrick M., aged fifty years, was admitted under the care of Dr Irvine, suffering from epileptic attacks, that rapidly passed into coma, without an opportunity being afforded of obtaining any history.

Except œdema of the membranes, and a slight enlargement of the ventricles, especially the fourth, no evidence of disease could be found. The kidneys were cirrhotic, and the tissues were œdematous. The pericardial and pleural cavities were full of clear fluid.

Case 15. Wignall, aged twenty-four years, had been an epileptic since he was six years of age. He died, when at dinner, through a piece of meat becoming entangled in his larynx.

The brain was intensely congested all over the surface, but especially behind. Blood had transuded in several places from the engorged vessels. The brain itself was apparently healthy. When the head was thrown back, after the brain had been removed, about a quarter of a pint of blood flowed from the spinal canal, and when that canal was opened, the surface of the cord was still much congested.

The cord was much softened in the mid-dorsal region. The cervical and lumbar enlargements were both firm and healthy.

The heart had evidently stopped in systole, or just after, as only a little blood was found in the left ventricle, which was contracted. The lungs were collapsed, and not much congested.

The body was well nourished, and covered with fat.

Case 16. Ellen M., aged thirty-five years, was admitted, suffering from right-sided epileptic fits, and unconsciousness. As far as could be ascertained, the *status epilepticus* was not accompanied by any hemiplegia.

There was some softening of the left corpus striatum, and to a less extent of the left optic thalamus. The arteries of the brain were markedly atheromatous, and both posterior communicating branches of the internal carotid artery had become impervious, and were changed into mere fibrous cords.

The kidneys were slightly granular.

The other organs of the body seemed healthy.

Case 17. Maria M'Donald, aged forty-six years, was transferred

from the epileptic institution to the hospital, under my care, a few days before her death. She had had numerous fits for a long time. Several days before I saw her, she had passed into the *status epilepticus*, and had fallen out of bed. She never recovered, but died, her face being very much congested at the time of death.

The left half of the brain weighed a quarter of a pound more than the right half. The corpus striatum and optic thalamus of the left side were twice the size of those on the opposite side. The enlargement evidently consisted of an increase of the white substance of the brain.

The anterior lobe, the temporal lobes, and the insula of that side, were also enlarged. The olfactory lobe was covered over by, and occupied a *canal in*, the convolutions, instead of a *groove between* them, as is usually the case.

The cerebellum, pons, and medulla, were unaffected.

Case 18. Annie O., aged nineteen years, died at a neighbouring institution for epileptics.

She had been an epileptic from birth. Her twin sister was alive and healthy.

This patient died from the exhaustion and coma produced by a constant succession of severe fits. Permission was given to examine the brain only.

The body was well nourished. The surface of the brain was fawn coloured, and some of the usual inflammatory or congestive tubercles were found along the marginal convolutions, where the veins enter the superior longitudinal sinus. The brain tissue seemed more leathery to the feel than usual, and both corpora striata and optic thalami seemed enlarged, in proportion to the amount of cerebral substance above them. The medulla and pons were paler than usual, but firm.

Case 19. Michael M'Donough, aged twenty-one years, had been in our epileptic wards since 1875. He died on September 26th, 1883, from phthisis.

He had had very few fits previous to death, and suffered more from imbecility than epilepsy.

The vessels of the brain were normal, and no lesions were

perceptible over the parietal convolutions of either hemisphere of the brain.

The brain substance seemed healthy, and although, at first, we were inclined to think it was tough and leathery in feel, comparison with another brain, just removed from a woman, who died from purpura, quickly convinced us that this conception was an illusion. The medulla and cord appeared normal. The calvarium was much encroached upon by the brain, and the bones of the cranial vault were very thin all over.

The superior cervical ganglion was very soft, and seemed large: no middle cervical ganglion could be found. The inferior cervical ganglion on the right side was large and distinct. The left lung was so adherent, and matted at the apex, that the inferior ganglion of that side was not examined.

Both lungs were much infiltrated with tubercle, and extensively broken down in all directions.

The heart was small and pale, but healthy. All the blood vessels seemed healthy.

The *liver* was normal, or slightly amyloid. *Spleen*, normal. *Kidneys*, amyloid. *Intestine*, normal. *Mesentery*, infiltrated with tubercular glands. *Bladder*, small and contracted. *Testicles*, small.

The spinal cord was soft in the dorsal region, firm in the cervical and lumbar enlargements. Limbs normal. Body much emaciated.

Case 20. Janet Kean, aged seventeen years, was an epileptic since she was eight years old. She had been robust up to that time, when she met with an accident, and has had fits, of gradually increasing frequency and severity, ever since.

Her calvarium was very thick, and some granulated lymph was found along the marginal convolutions posteriorly. The medulla was *slightly* congested, but the remaining parts of the brain seemed normal. The cord was healthy. The other organs of the body were healthy. The heart and uterus were, however, very small.

Case 21. Henry Howarth, aged forty-seven years, a labourer, widower, admitted to hospital on May 18th.

He had been somewhat imbecile for some time previous to admission, and had suffered from occasional epileptic fits. Had a great number of fits, then passed into a state of coma, and died.

Several tumours (gliomata) were found in different parts of the brain. A pretty large one in lower portion of the anterior frontal regions, a small one in the upper part of the pons, and several throughout the white substance of the brain. None pressed upon the cortex. A large one was situated just outside the left optic thalamus. There was hæmorrhage into the left lateral ventricle, and extensive softening of the brain substance surrounding it.

The cord was softish, but not diseased.

The right lung contained an enormous mass of cancer. The posterior mediastinal glands were much enlarged. The left lung was normal. The heart was flabby, otherwise normal. There were three cancerous nodules in the liver. In the *kidneys* several small nodules were found. Pancreas and mesenteric glands were cancerous.

Case 22. Maggie O. D., aged twenty years, a confirmed epileptic, of stout build, who suffered from pneumonia, and frequent epileptic attacks. She gradually became comatose, and died, in spite of bleeding, chloroform inhalation, &c., on August 20th, 1882.

The *body* was very well nourished. The *brain* was firm and healthy, but a considerable quantity of nodular lymph was found along the superior longitudinal convolution. There was no deposit of tubercle. The veins that entered the superior longitudinal sinus were much engorged.

There was pneumonia of posterior two-thirds of the left lung.

Case 23. John Newton, aged sixteen years, an intelligent child, but deaf and dumb, who has been in the workhouse since childhood. When he attained the proper age, he was sent to the school for the deaf and dumb, where, I believe, he got on well for some years. He came back to the workhouse on June 18th, 1886, suffering from epilepsy, and was sent to the epileptic ward on August 14th, 1886; he was transferred to the infirm ward, as he

was suffering from incontinence of urine. Symptoms of phthisis then set in, and he died on July 5th, 1887.

His body was like that of a boy of nine or ten years of age, and presented no signs of commencing manhood.

The *calvarium* was normal, except that the occipital bone stood out very prominently from the surrounding bones.

Brain.—A layer of coagulated blood extended over all the surface of the cerebrum, beneath the pia mater. This layer dipped down into all the sulci, and was adherent to the brain substance in the occipital and temporal regions, and at the lower end of the fissure of Rolando.

The *brain* was small, and the convolutions small, and poorly developed. There was less white substance than usual, in proportion to grey. The frontal regions were well developed, the occipital regions badly; the development of the parietal regions occupied the intermediate place.

The *cord* was not examined.

Lungs.—There was a deposit of tubercle at the apices, and congestion below.

The *ears* were quite healthy.

Case 24. Thomas Burke, aged seventy-three years, who stated that he had been subject to fits for thirty years, was admitted to the epileptic wards in December 1883. On the 30th of that month he had seven fits, and on the 31st, one fit.

During 1884, he had in January no fits; February, 4; March, 4; April, 3; May, 4; June, 3; July, 5; August, 7; September, 9; October, 2; November, 8; December, 3.

During 1885, he had in January, 4; February, 4; March, 8; April, 5; May, 7; June, 8; July, 2; August, 3; September, 6; October, 9; November, 3; December, 3.

During 1886, he had in January, 3; February, 3; March, 8; April, 2; May, 6; June, 6; July, 2; August, 6; September, 4; October, 4; November, 0; December, 2.

During 1887, he had in January, 6; February, 5; March, 3; April, 0; May, 5; June, 6. He was then sent to the infirm wards, as he was suffering from passive congestion of the lungs, of a chronic kind. His pulse was 56 in the minute, intermittent;

respirations, 28. There was no cardiac murmur; crepitation was heard over the bases of both lungs. He was ordered a mixture containing ammonia and senega, and lin. camph. co., to be applied to his chest.

On July 18th, he had a very severe fit, in which he fell on his face, and his nose bled profusely. His chest was much improved.

September 9th. He had retention of urine, necessitating the use of the catheter; soon after he became a crib case, the urine dribbling away constantly. A typhoid condition, with low muttering delirium, supervened.

23rd. His general health had improved considerably, but he was quite childish.

30th. His legs were blue and cold; senile gangrene began to set in.

October 14th. Patient had two very severe fits; the first about five o'clock, and the second about eight o'clock p.m., after which he was very weak. He gradually became more exhausted and more imbecile, and died in a typhoid condition on October 23rd.

Post mortem, October 26th, 1887.—The calvarium was thick; the brain was atrophied, but otherwise healthy upon the surface, its substance was firm and pale, and there was a small focus of softening in each optic thalamus, just above the internal capsule. The vessels at the base were large and patent.

Lungs.—Both were adherent to the wall of the chest; the bronchial tubes were dilated and filled with secretion; there was œdema of lungs, and clear fluid in left pleural space.

Pericardium.—There was some recent pericarditis, with effusion of bloody serum.

Heart.—There was hypertrophy of the wall of the left ventricle; the valves were healthy; there was a small blood cyst on the surface of the liver.

Spleen.—The capsule was thick and pearly.

Kidneys.—Were cystic and atrophied; there were purulent collections in the right.

Bladder.—Was full of pale semipurulent urine; there was a small tumour on the trigone.

Case 25. Catherine M., aged eleven years, had been an epileptic from birth, and died of pleuro-pneumonia.

The brain was pale, but otherwise healthy; and the spinal cord was quite normal, if we exclude slight congestion.

Case 26. Sarah A., aged twelve years, had been an epileptic since she was seven years of age. For the first two years, the attacks were intermittent in character. Two years previous to admission, she had scarlet fever, and after that the fits increased in frequency, so that she would sometimes have as many as fourteen in one night. Until the three months previous to admission, she could tell when an attack was coming on, but after that period they had come without any warning, and, except for the feeling of prostration, she did not know she had had an attack. Her memory was failing, her speech was limited to monosyllables, her countenance was stupid-looking and "puffy." The urine was normal.

She had the right vertebral artery ligatured on March 1st, 1882, and the left on March 30th. She had twenty-seven fits from February 22nd, 1882, till April 30th, that is, during the time in which she was in hospital before operation. After the second operation, she improved very much, and the improvement continued till the last week in July, when the attacks increased in number and severity, to such an extent that coma, unrelieved by bleeding or chloroform, set in, and she died on August 2nd.

Post-mortem, August 3rd.—There was intense congestion of the brain, both outside and inside. Its weight was 3 lbs. 1 oz. Both ventricles were very much enlarged and dilated. The brain substance was deep and hypertrophied, but there was no lesion apparent to the naked eye. *Heart* was normal in size. The blood was dark. *Lungs* were congested. There were adhesions between the lungs and ribs. *Kidneys* were normal, though congested. *Liver* was covered with old adhesions; its substance was normal. *Bladder* was full of urine. Body was well nourished.

Case 27. Maria Hughes, aged thirty years, was admitted to hospital on July 17th, 1885. She went about the workhouse as a cripple, with partial paralysis of right arm and leg.

On March 14th, 1887, she was admitted to the medical wards, suffering from bronchitis, phthisis, and occasional attacks of diarrhœa. She had several fits before her death, which occurred on September 18th, 1887.

The right arm was in the position usual in post-epileptic paralysis; leg straight. The position of the arm was due to a diseased elbow joint.

Widow of William, a fitter. She is the mother of a child, now at Kirkdale, aged seven years.

Brain was of medium size; membranes healthy. There was a little tubercular white nodule, of the size of a pea, embedded in the posterior extremity of the third left frontal convolution, and pressing upon the adjacent end of the ascending frontal convolution. The pia mater was adherent to the nodule. A small cluster of similar nodules was found at the posterior extremity of the second left frontal convolution, and a single small nodule at the posterior extremity of the first left frontal convolution. A small nodule was also found in the superior vermiform process of the cerebellum. The vessels were healthy. The spinal cord was not examined. The apices of both lungs were riddled with abscess cavities, which were empty, and gave the lungs a pale, honeycombed appearance. *Heart* was small. The *Liver* contained one small nodule, but was otherwise healthy. *Spleen* was healthy. *Peritoneum* was covered with tubercles, especially numerous over the liver and pylorus, and all down the left side of abdomen. *Peritoneum* was of a dark hue. *Uterus* was small, and bathed in pus. There was pus in the tubes, and this could be easily squeezed out. *Bladder* was healthy. There was caseous degeneration of the right elbow.

Case 28. James Carmichael, aged 62 years, who was admitted to the epileptic wards on June 30th, 1887, was sent to the medical wards on May 14th, 1888, suffering from pneumonia. He died on the same day.

Brain.—The meninges were adherent to the surface of the brain, this condition being the result of old standing inflammation. There was some effusion of lymph all over the convolutions. A considerable amount of fluid was found in the

ventricles. The substance of the brain, generally, was soft, but there were no distinct lesions. *Lungs*.—The right lung was pneumonic; the left congested; and there was some fluid in the left pleural cavity, and old pleuritic adhesions bound both lungs to the chest wall. *Heart*.—The mitral valves were thickened, but no atheroma of the heart or large blood vessels existed. *Liver* was enlarged and cirrhotic. *Kidneys*.—Both were very large and cirrhotic; the capsules were adherent.

Case 29. John M., aged twenty-five years, was admitted to the workhouse on December 4th, 1887, suffering from the effects of a fit. He had been in the surgical wards, suffering from caries of the right angle of the lower jaw, and consequent glandular enlargements in the neck, from August 18th, 1885, till June of the same year. He then went to the workhouse proper, and was either there or in the medical wards, till his re-admission to the surgical wards on the above date.

He had been in the army four years. In April 1883, when at Aldershot, a gum-boil formed. At the end of a month, he was sent to King's College Hospital, where he remained a week. Whilst at Aldershot, some pieces of bone came away from the jaw.

On August 26th, some pieces of dead bone were removed from the jaw; and we may dismiss this part of his case with the statement, that his jaw was quite healed in June.

On our first examination of this case, Dr Pinkerton directed my attention to some peculiar transverse stripes all over his body. He thought he had these stripes ever since he was eleven years of age, and could not in any way account for their presence.

He was, and always had been, very stout. The skin, generally, was of a ruddy flesh colour; the striped portions were smooth, silky, and of a dark pink or purplish colour. The stripes were all transverse, and resembled those produced on the abdomen of women after pregnancy; but these were not so white as, and were more vascular than, the scars of post-parturient women. He had no fits during his primary stay in hospital, and none after the attack that gained him readmission. He was kept

under observation for a month, and was about to be discharged as a malingerer, when he died suddenly.

On the *post-mortem* table, the very stout body, and comparatively thin legs, attracted the attention very forcibly. The calvarium was soft and fatty. The *brain* was small, and appeared normal. The *spinal cord* was softish, but apparently normal. The *lungs* were small, deeply congested, and somewhat bronchitic. The *heart* was fatty; the left side dilated, and the walls thin; valves normal. The *liver* was fatty. The other organs were normal.

Case 30. John E., aged seventy, a widower, was an old epileptic, who had been known to me for many years, and who had been occasionally brought into hospital suffering from fits, but after a few days' rest he was able to resume his work, which was that of a labourer.

Three days before his death, he was brought to hospital, and had three epileptic fits; next day, he was quiet and sleepy. During the evening of that day, he had a succession of fits, passed into the *status epilepticus*, and became comatose. He died on the following day.

The body was well nourished. The *brain* was covered with a thick white layer of œdema beneath the pia mater. The convolutions, beneath, were atrophied, and of a pale blue colour; they seemed bathed in fluid. The brain substance presented no gross lesions, and its vessels were healthy. The cord was not examined. The *lungs* were deeply congested posteriorly, in some parts being almost solid. The *heart* was the subject of fatty degeneration. The *liver* was congested. The *kidneys* were healthy. The inferior cervical ganglion was healthy, large, and easily got at. The *joints* were healthy.

Case 31. Thomas Gordon, aged thirty years, a plumber, was admitted on the 24th June, 1886, to the epileptic ward. He was transferred from the epileptic ward to the infirm on the 18th of November, 1887, and died December 4th, 1887, of broncho-pneumonia.

He had a few fits after admission, but for six months he had no fits until a week before his death. The specific gravity of his urine was 1023, and contained no albumen.

When admitted, his mind was fairly clear; afterwards, when in the infirm ward, his mental faculties became impaired, and symptoms of general paralysis set in, as indicated by incontinence of urine, thickness of speech, exalted ideas, shuffling walk, &c. The pupils reacted, however, to light, and the accommodation to distances was normal. He complained, occasionally, of tingling in his feet and legs. He had some bronchitis and pneumonia.

On November 28th, about 9.30 P.M., he had a fit. Ice was ordered to be applied to his head, and mustard to the calves of his legs and to the nape of his neck. Patient remained unconscious till the 30th, when he was able to speak, and seemed more intelligent. On December 2nd, patient complained very much of his head. December 3rd, had another fit, after which he remained in a state of coma until his death, next day.

Post-mortem on December 5th, 1887. — *Brain*. — There was œdema on its surface, and some patches of lymph were observed along the superior longitudinal sinus. The vessels were healthy. The convolutions were atrophied, but no gross lesion was apparent. *Lungs*. — The *right* showed evidence of purulent bronchitis and pneumonia. The *left* was deeply congested, and there was pleuropneumonia at its base. All the other organs were examined, but presented no lesion worthy of note.

Case 32. John P., aged twenty-two years, a labourer, single, was admitted to hospital on February 8th, 1888, suffering from a scald of his foot inflicted during a fit. An epileptic from birth. He had both vertebral arteries tied on May 31st, 1882. He had been very well indeed for over two years, but a short time previous to admission, the attacks had become more frequent and more severe.

When admitted, he was partially comatose, and continued to have a succession of fits. Bleeding and bromide relieved him so much, that he was able to sit up and look about him, although in a dazed manner, for a week or two before his death.

Towards the end of April (I quote from memory, not being able to find any notes of the case), he had another succession of fits, and died suddenly on March 1st, having previously relapsed into a condition of profound coma.

Post-mortem, March 1st.—The brain was small and round, filling the cavity of the skull, well. The membranes were healthy. There was some ecchymosis over the occipital convolutions. The vessels at the base were normal; the basilar and vertebral arteries at their junction were normal in size. The vessels were impervious at the seat of ligature. *Brain substance*.—The convolutions were very deep, and there was a greater quantity of white substance in the brain than usual. The central ganglia were normal. The cerebellum was healthy. The spinal cord was not examined. The *lungs* were deeply congested, but not pneumonic. The *heart* was normal, and the valves healthy. All the other organs were healthy. The body was well nourished.

Case 33. James Crawford, aged thirty-four years, a labourer, and a healthy-looking and well nourished man, was carried into hospital at 9 P.M. of April 26th, 1882, in an unconscious state, and with clonic spasms of all the muscles of the body, those of the face being most affected. A bloody froth was oozing from his mouth, his right pupil was much dilated, his pulse was full and bounding, his skin was warm and perspiring. The house surgeon, Dr Crewe, took twenty-three ounces of blood from his left jugular vein. Soon after, the volume of the pulse was much reduced, and consciousness returned. Twenty grains of the bromide were prescribed to be administered every four hours. At 12.30 P.M. on the 27th, he had an epileptic fit, and during the next two and a half hours, he had thirteen epileptic attacks. During the succeeding two hours, he slept a great deal, but at 7 P.M. he had several fits. Next morning a "black draught" was given, followed by an enema of salt and water, and a Chapman's ice bag was applied to the spine.

April 28th. Fits still recurred at frequent intervals. The following mixture—R. Ext. Ergotæ Liq., $\bar{3}$ ii; Sp. Eth. Nitrosi, $\bar{3}$ ss.; Aq. Camph. ad $\bar{3}$ x. $\bar{3}$ i. every four hours was prescribed. In the evening, the fits had again returned. Dr Brannagan opened a vein in the arm, and fourteen ounces of blood were taken away.

29th. During the night, the patient had five fits. The pupils were still irregular, and he had not spoken.

30th. Patient was much better, but very weak. A stimulating

mixture was prescribed, as well as a chloral and bromide draught. During the evening, the retention of urine occurred, necessitating the use of the catheter.

May 1st. Patient was very violent this morning again, and had not slept during the night. A subcutaneous injection of morphia and atropine was prescribed. Slept an hour; afterwards very restless and noisy.

2nd. He was still a complete maniac. He had a chloral draught in the afternoon, which caused him to sleep two hours.

3rd. He was still very delirious. He had, in the afternoon, 3ss. of bimeconate of morphia, and slept well shortly afterwards.

4th. Patient had slept all night; was quiet, but rather stupid, in the morning. He complained of headache, which disappeared as the day advanced.

19th. He had one fit in the night, which lasted about five minutes, but he knew nothing about it next morning.

25th. Patient had one fit this morning at 6.15.

29th. He had two severe fits.

July 8th. He had one fit.

July 12th. What was thought to be the left sympathetic cord in the neck was cut through, but there was some doubt regarding its identity. The wound gave very little trouble.

On the 18th of July he had one strong fit. On the 26th of July, he had a strong fit.

He underwent a second operation, in which the right cord of the sympathetic was cut through in the neck. Shortly afterwards, the right side of the face seemed warmer than the left, the right eyelid drooped, and the right pupil was contracted.

July 27th. Patient had one fit.

August 5th. He had one fit. The wound had healed. He was discharged from hospital on this date, and went about his usual business for two months. At the end of that time, he was brought into hospital in a state of profound coma, from which bleeding failed to arouse him, and he died on October 28th.

The *post-mortem* showed that the right sympathetic nerve was not cut. The opposite one was atrophied, and the end seemed to blend with the aponeurosis of the neck. There existed con-

gestion of all the organs, and old standing pleuritic adhesions in connection with both lungs. The *brain* was healthy-looking, and seemed well nourished. There was some abnormal adhesion of membranes to the medulla, and to the upper part of the spinal cord, with consequent matting of the nerve roots in those regions. The body was well nourished. The other organs were healthy.

Case 34. Ellen M., aged forty, an epileptic, who had been an inmate of the Dingle Epileptic Institution for several years, was admitted to the Liverpool Workhouse on January 7th, 1885. She was then a harmless imbecile, and rarely suffered from epilepsy. There is no evidence of any attacks from the time of her admission to the workhouse in 1885, till her death in 1888.

On July 11th, she complained of some pelvic symptoms, and was sent to the surgical ward, where she was found to be suffering from advanced cancer of the uterus, that had extended beyond the reach of relief. She died on November 5th, 1888.

A *post-mortem* examination was made, next day, with the following results:—*Brain*, firm; ventricles normal. There was no gross lesion apparent. *Lungs*, congested posteriorly. *Liver*, healthy. *Kidneys*, cirrhotic. *Uterus*—Fundus free and normal in size; the cervix and body had disappeared, and the circumference of the fundus was eaten away, and its margin attached to the neighbouring structures. *Ovaries*, atrophied. *Bladder*, empty. *Bladder* and *rectum*, slightly infiltrated. No glandular enlargements.

Case 35. Richard Longley, aged forty, was admitted to the epileptic ward of the Liverpool Workhouse on February 7th, 1880. In February, he had one fit: March, four fits; April, 21; and May, 19 attacks. Some of these attacks very severe and prolonged, and followed by mania. The convulsions were general, and began without warning. He then took his own discharge, and returned to the epileptic ward on September 5th, 1882.

During September, he had sixteen fits; October, thirteen; November, eleven; and December, one. In 1883, the monthly attacks were nineteen, one, eleven, none, and fifteen. He then became a crib case, and was transferred to the infirm ward, from

which he returned on November 10th. Up to the end of 1883, he had only three attacks under bromide treatment.

In 1884, his monthly attacks numbered five, three, two, fourteen, seven, four. In July, he again went to town, returning again in November. During December, he had twelve fits.

In January 1885, he had twelve fits, and becoming somewhat comatose, he was sent to the medical ward, where he stayed ten days. He had no attacks in February; March, thirteen; April, seven; May, eighteen; June, two; July, fifteen; August, five; September, none; October, two; and in the first week of November, three. He was then put on twenty grains bromide, three times a day, and during December he had no attacks. This treatment was continued for seventeen months, and the monthly attacks numbered two, five, six, one, none, one, none, none, one, none, eleven, three, none, none, one, none, none, a great reduction, but the patient had to retire once more to the crib wards, where he stayed till July 25th, 1887. He was then placed on bromide twice a day. The monthly attacks numbered seven, two, ten, three, five, two, six, five, four, four, nine, fifteen.

He was then operated on for hernia, and after the operation he had broncho-pneumonia, which nearly carried him off.

He recovered, but his cough spoiled the radical cure of the hernia. On November 1st, the radical cure of the hernia was again attempted, and progressed favourably. The anæsthetic chloroform, seemed to have relighted the broncho-pneumonia, and of this he died on November 14th, 1888.

Autopsy, November 16th, 1888.—The dura mater was firmly adherent to the calvarium. The cranial cavity contained a considerable amount of reddish looking cerebro-spinal fluid. The superficial vessels of the brain were engorged with blood, and a fine layer of lymph, of old standing, covered the convolutions. The blood vessels of the brain were healthy. The brain substance was *fibrous*, contained a fair number of puncta cruenta, but showed no gross lesion. The ventricles contained a small quantity of reddish fluid, and the choroid plexuses were much congested. The lungs afforded abundant evidence of the cor-

rectness of the diagnosis. Old pleural adhesions and collapse of some regions were found, as the result of the previous inflammations. The heart was large, flabby; both ventricles dilated. Aortic valves, sound; mitral, a little thickened. The *liver*, *kidneys*, and *spleen* were congested. The abdomen was otherwise normal. The hernial wound, healing and superficial.

Case 36. Mary W., aged twenty-one years, admitted to work-house September 9th, 1887, was sent to infirm division on January 28th, 1888, on account of a fit. Her mental condition was below par, or as a nurse said, she was "queer." She was always quiet. Latterly she became a complete crib case, was noisy and maniacal at times, and died from exhaustion on October 28th, 1888. Not more than two or three fits were observed during this time, and none of the nurses can give any clear account of their nature.

Autopsy, October 30th, 1888.—*Brain*—Some traces of meningitis, of old standing, over convolutions; ventricles dilated, and contained some fluid. Brain substance atrophied, softish, but otherwise healthy, except that there was a small yellowish mass in the region of the pons. *Lungs*, small and shrunken; somewhat congested. Two or three tubercular nodules in left apex. Old and strong pleuritic adhesion on the left side. *Liver*, *spleen*, and *kidneys*, small, healthy. *Uterus*, normal. *Ovaries*, small.

In the following cases, the epilepsy was only an accompaniment to some gross lesion, quite apparent to the observer, and which claimed his special attention, the epilepsy being only a *symptom*, and not the disease.

Case 1. A male child, named Bamber, aged twenty-eight months, who died suddenly in the night, after an epileptiform attack. He had been under treatment for some time, on account of a supposed syphilitic rash.

There was increased vascularity of the corpus striatum and optic thalamus, and an increase of fluid in the pericardium, and in the ventricles of the brain.

Case 2. A man named Albrick, aged fifty-six years, who had had epileptiform convulsions for nine months. He only came

under my care three days before his death, and was so affected with aphasia that, when asked a question, he answered by repeating the last few words of the question.

Numerous firm, hard, Pacchionian bodies were found over the cerebral surface of the dura mater, and these pressed, to some extent, upon the convolutions of the left temporal lobe. The brain, generally, seemed softer than usual, the aorta was extensively affected with atheroma, and the kidneys were congested and cirrhotic.

Case 3. James O'Hara, aged forty-eight years, a labourer, who came under my care, suffering from "erysipelas" of the face, and subsequent sloughing of the nose. A plastic operation had been successfully performed, and when the flap from the forehead had almost healed, the sloughing suddenly returned, affecting only the seat and surroundings of the flap, but not the flap itself. He almost died on this occasion through septicæmia from ozæna, but to the surprise of all, from a moribund condition, he rallied, and got quite strong. The original flap again became united to the surrounding parts. Six months from the date of the last sloughing, he was observed to have a fit in the night. Next day, the sloughing had returned, followed by coma, which soon ended in death.

On *post-mortem* examination, there was found grey softening of the marginal convolution, near the upper extremity of the ascending parietal convolution.

Case 4. Elizabeth Williams, aged twenty-four years, was confined of a healthy child, after an easy and unassisted labour, in which she was attended by a midwife. Her legs, at the time of delivery, were very œdematous, but no other part of the body was "puffy." Ten hours after labour, she became feverish, and was attacked with epileptic convulsions, which continued without interruption, until death closed the scene twelve hours after the onset of the convulsions.

On *post-mortem* examination, twenty-four hours after death, the legs were found to be very œdematous and mottled. A frothy fluid exuded from the mouth, and a considerable amount of clear serum was found in the cavities of the pleuræ, pericardium, and

peritoneum. The lungs were healthy. The heart was small, but healthy. The liver was fatty.

The pyramids of the kidneys were much congested, the inter-tubular substances being very pale, almost white, and the capsules were adherent to the cortical substance. The spleen was normal. The uterus was healthy: it contained no clots, nor were there any lesions observable at the seat of the placenta. The ovaries were small and soft. The brain contained a considerable quantity of clear fluid in the subarachnoid space, and in the ventricles. The brain substance was, generally, very pale, and fewer blood points, than usual, were seen.

Case 5. A female child, aged two years, who died under the care of a colleague of mine. She suffered from unilateral convulsions, and towards the end, from partial paralysis of the convulsed side.

Nothing could be found to account for the disease, on *post-mortem* examination, except general pallor of the nerve centres, and congestion of the viscera, and of the surface of the brain.

Case 6, showed softening of the central ganglia of the brain, viz., the corpus striatum and optic thalamus, on the same side as that affected by the alleged unilateral convulsions. The case was that of a young child, and my notes do not say on which side either the brain lesions or the convulsions occurred.

Case 7. Louisa C., aged twenty-two years, who died from post-partum epileptic convulsions, which had supervened after labour, without any apparent cause. The brain was anæmic. The cord was softish in the dorsal region. The lungs were congested. The heart was contracted. The liver was broken down in patches, forming gangrenous *areas, that varied from the size of a pea, to that of a cherry*. The kidneys were healthy. The spleen was congested. The breasts were healthy, and contained milk. The uterus was contracted, and lay in the pelvis; only a few clots were found in its interior.

Case 8. James Owen, aged fifty-six years, became ill on March 22nd, 1881, with convulsions, which were not preceded by any illness or prodromata. The convulsions were right-sided, and the face turned to the convulsed side. The face and arm

twitched more than the leg or foot. Aphasia was well marked, as, during his illness, he uttered only one unmeaning monosyllable to his attendants. He was, however, frequently conscious. The pupils were normal. He died on March 28th, from exhaustion, and congestion of the lungs.

There were some small cicatrices over the scalp, in the region usually affected by syphilis: with these exceptions, his skin was sound. The dura mater was thickened along each side of the superior longitudinal sinus, and more so on the left side, than on the right. A patch of œdematous and thickened pia mater covered an area, two inches in diameter, of the surface of the convolutions, that coincided with the lower extremity of the ascending frontal convolution, the anterior part of the Sylvian fissure, and the posterior part of the third left frontal convolution. The convolutions named were completely atrophied, and the lining membrane of the lateral ventricle came into contact with the centre of the piece of thickened pia mater. The central ganglia, medulla, and pons were healthy. The heart was fatty, and the mitral cusps were nodulated with lymph. The lungs were much congested. The capsule of the liver was somewhat thickened. The kidneys were somewhat cirrhotic. The right testicle was attached to the tunica vaginalis by a layer of cheesy material: the substance of this testicle was very pale and bloodless, and its spermatic cord was much thickened and indurated. The left testicle was healthy. There were no scars on the penis, and no glandular enlargements.

Case 9. Clara W., aged twenty-three years, a prostitute, was confined in the workhouse, on May 17th, 1881. When admitted, labour had not yet commenced, and she was put to bed in a ward with other women. During the night she fell out of bed, and, when picked up, was found to be dead.

On inquiring as to her history, I found that she had been a "heavy drinker," and had been under the care of a friend of mine some months ago, on account of fits, supposed to have been induced by drink.

The scalp was œdematous, and was easily stripped from the calvarium, which was considerably thickened. The dura mater

was loosely attached to the calvarium; on the right side, a dense well-organised membrane, nearly a quarter of an inch thick, covered the greater part of the anterior and middle lobes of the brain, as far back as the ascending parietal convolution, and extended as low as the Sylvian fissure. On both hemispheres, the convolutions of the anterior and middle lobes of the brain were covered with an œdematous, thick, jelly-like substance.

Case 10. Sarah Owens, aged twenty-eight years, came under my care on March 7th, 1882. She was in labour, which terminated naturally, without any assistance. A few hours afterwards, epileptic convulsions set in, slight at first, but gradually increasing in severity. Bromide of potassium and chloral hydrate were administered without effect. The inhalation of chloroform was ordered, but, as the patient's breathing became stertorous, it was not considered advisable to carry out the order.

Next day, I found her comatose. I bled her to fourteen ounces, without producing any good effect, and death ensued two hours afterwards. The vessels, along the spinal cord, and in the great muscles of the back, were engorged with dark blood. The scalp was quite "wet." The brain substance, everywhere, was pale, with the exception of the pons, where a few small puncta were found; some small vessels were also seen at the intraventricular line of junction of the corpus striatum and optic thalamus. The spinal cord was healthy looking, but its substance was paler than usual. The posterior spinal arteries were full of blood. The uterus weighed $20\frac{3}{4}$ ounces, and contained a few clots in its interior. The heart weighed 13 ounces: its right side was full of dark blood, while its left side was empty and contracted. The lungs were œdematous, and fairly vascular. The liver was congested and fatty. The kidneys were much enlarged. When boiled, the urine became solid, with a thick, yellowish albumen.

Case 11. A young man, aged about thirty years, whom I had never seen during life, but who was under the care of a friend of mine. This friend informed me, that he had been called to him on account of epileptic fits, which were so frequent and

severe, that in about four days he died from exhaustion and suffocation.

The *post-mortem* showed signs of tuberculosis in the following places, viz., along the marginal convolutions and the superior vermiform process, in both lungs and pleura, and over the pericardium and peritoneum. There was considerable thickening of the sheaths of the cranial nerves, and of the fibrous tissues at the base of the brain.

Two tubercular masses were found in the cerebellum, viz., a large one in the right amygdala, and a smaller one in the flocculus.

The dura mater was adherent to the upper half of the spinal cord posteriorly, and to the back of the medulla.

The testicles, bladder, kidneys, liver, spleen, and heart, were normal.

The body was plump, and well nourished.

Case 12. A drunkard, aged fifty-three years, who fell in the street, and was brought into hospital in an unconscious state. He had, occasionally, unilateral convulsions during the week that preceded his death. At the autopsy, a fissured fracture of the skull was found, that involved the outer part of the left great wing of the sphenoid, and small parts of the adjacent frontal and parietal bones. There was a small clot between the dura mater and the bone, and some effusion of blood existed over the convolutions beneath the dura mater of the same side.

Case 13. Arthur D., was born on August 7th, 1883, and died on August 17th, 1883. He was the illegitimate son of Elizabeth, a hawker.

On the 8th of August, he was attacked with epileptiform convulsions, in which his body "worked" vigorously. The convulsions began, first of all, on the left side. On the 8th, when I saw the child, its face was much congested, and it had just recovered from a fit. I gave it chloroform, during the administration of which it had an abortive attack. The fits never recurred afterwards. It gradually wasted, in spite of the utmost care, and died on the 17th.

Brain was congested on the surface; its substance was pale

and soft, otherwise it showed nothing in particular. The *cord* was not examined. The *lungs* were congested, but floated in water. The *liver* and *spleen* were also congested. The *left kidney* contained the usual uric acid crystals, the right kidney also contained these crystals, and was about four times its usual size. The cortical part was of a dark, mahogany colour, the pyramids of a bright red colour. The enlargement seemed the result of congestion and inflammation. Skin of body much shrunk and puckered. The eyes were sunken.

Case 14. Whelan, a baby, a few days old, died of convulsions, which began in the right side of the face. The hands were in the epileptic position after death.

The *brain* was very pale, its vessels few, and the brain substance gelatiniform, as is usual at this age. The *lungs* were congested posteriorly. The *liver* was intensely congested. The *kidneys*, *spleen*, and *adrenals* were normal. The *body* was well nourished. The *eyes* were sunken. The *ovaries* and *uterus* were normal.

Case 15. Devlin, a very small female child, who died, aged five days, from diarrhœa and convulsions. The brain and cord were intensely congested, not only on the surface, but throughout their substance. When the brain was cut into, numerous bloody points appeared. The *lungs*, *liver*, and *kidneys* were pale. The contrast between this case and the one previously described was very marked. The hands were in the epileptic position. There was no intussusception in either of these cases.

Case 16. A woman, aged fifty years, who, for nearly a year previous to admission, had been confined to bed, and during that time she had suffered at intervals from *shocks*, like "*electric shocks*." She was sent into a hospital, and died shortly after her admission. During the few days she was in hospital, she lay in bed in a semi-comatose condition, and no shocks, twitchings, or convulsions were observed during that period.

I made the *post-mortem* examination on November 9th. The brain, at first sight, appeared quite healthy. On the upper and inner corner of the left cerebellar fossa, the dura mater was rough and calcareous to touch, over an area half-an-inch in

diameter. This single spot projected and encroached upon the opposite cerebellar convolutions, producing a cortical lesion of that part of the cerebellum. The brain tissue was here softened and dark. The calvarium outside the roughened spot was quite healthy. There were signs of old standing pelvic cellulitis on left side of the pelvis, that had produced adhesion of the uterus to that side. The uterus was smaller than usual. The other organs of the body were healthy.

Case 17. Morris, a fine, plump, healthy infant, ten days old, who died from convulsions, without any cause for their production being known.

The *brain* was not more congested, either on surface or in the interior, than that of another premature child dying of debility, that was examined at the same time. The cervical enlargement of the spinal cord was surrounded by a considerable quantity of blood. The lower part of the cord was soft. The lungs were very dark, and much congested; they *just* floated in water. *Heart*, duct and foramen closing. The *liver* was somewhat congested. The *kidneys* were normal. The *spleen* was dark in colour. *Bladder*.—The mucous membrane congested at two spots.

Case 18. Mary Ann Riley, aged forty-two years, a hawker, single, was admitted on December 14th, 1884, suffering from a recto vaginal fistula, which was successfully closed by operation. She was very much scarred by syphilis. She went about the workhouse, doing odd jobs, until December 1885, dying on the 16th of that month from epileptiform convulsions, that began two days before with twitchings on left side of face, and gradually became general. These attacks rapidly succeeded each other, and complete coma soon set in.

December 15th, I trephined over the right motor area expecting to find a gumma. The dura mater, however, seemed normal, and was not opened. The patient appeared to waken up a little afterwards, but it was only a flicker, and the fits continued until death, on the 16th, *i.e.*, next day.

Post-mortem, December 18th, 1885.—The dura mater was healthy. There was a softened patch beneath the posterior extremities of the second and third right frontal convolutions.

The convolutions were thin, and separated from each other in consequence of their atrophy. Some watery flocculent material lay beneath them. The brain substance in the immediate neighbourhood was softened. There was no other noticeable lesion. The trephine opening was just over the spot, and had I opened the dura mater, the lesion would have been discovered and might have been relieved.

Case 19. *Proptosis—Pulsating tumour of orbit—Loss of sight—Epileptiform attacks—Ligature of common carotid—Relief—Death several months after—Post-mortem examination.*—Catherine M., aged twenty-four, a housemaid and waitress, single. Her father and mother were alive, and her brothers and sisters healthy. She had enjoyed good health till two years previous to admission, when she became ill with scarlet fever. After that time she suffered from defective vision of the left eye. In five months more, she found that she had completely lost the sight of that eye. She had some fainting fits, but these were not regarded as epileptiform till afterwards.

The left eye protruded very much; the globe seemed healthy externally. Internally there was a considerable amount of atrophy of the disc. A pulsating tumour could be felt beneath the upper eyelid, its pulsation being synchronous with the beats of the heart. Pressure on the left carotid stopped the pulsations in the tumour, and caused it to recede under the finger. The opposite eye seemed to protrude a little, but the patient said, "she was always full-eyed." There was some optic neuritis, but vision was good in the right eye.

On May 24th, 1882, I ligatured the left common carotid artery, the patient being under chloroform. The operation was quite successful. The wound healed readily, the temperature never exceeding 100.8° F. during the period of convalescence.

The pulsation ceased from the time when the ligature was applied, and the eye receded somewhat. In place of the soft pulsating mass, the finger could now detect a hard, irregular ridge. We were inclined to regard this ridge as a coagulum of blood, but its extreme hardness and irregularities were puzzling phenomena.

On May 30th, she complained of soreness in both eyes. A little discharge issued from the left conjunctiva.

On June 7th, the patient said that the sight of the left eye had become a very little clearer. She could now tell when the day was bright and clear, or dark and gloomy, a distinction which she could not make before.

On June 15th, at 11.30 p.m., the patient had a fit, and from that time till 8.30 next morning, she had eighteen attacks. Convulsions were general, but the small muscles of the face and eyes were most affected by them. The pupils of both eyes were very much dilated.

On June 16th, the patient's temperature was 103° ; the fits had ceased, but she was still unconscious. An enema was ordered; fits ceased; evening temperature, 98.6°

17th. Patient's temperature was normal.

27th. Her temperature was normal; patient became noisy and excited, and attempted to strangle herself twice with a bandage.

29th. Excitement still continued, but no suicidal tendencies observed.

July 4th. She again attempted to strangle herself. Bromide of potassium and chloral hydrate were prescribed.

From this date I have no regular notes of the case, as the patient passed from under my care. The medical attendant, however, informed me that the right eye gradually became protruded, and vision completely disappeared. Pulsation never returned in the left eye after operation. Coma gradually set in, and the patient died on June 12th, 1883. She had occasional epileptic fits.

A *post-mortem* examination was made on June 14th. The calvarium was very thin all over, and in some places it was so reduced in thickness as to be transparent. A considerable portion of the frontal bone, including its supra-orbital processes, was completely absorbed, only a thin membrane being found in lieu of bone. The eye muscles were visible when the brain was removed. This was so on both sides. The cribriform plate was also absorbed. The contents of the orbit were healthy, except that the left optic nerve was much thinned and stretched.

A large mass of greyish, congested, soft, cancerous tissue was found in the region usually occupied by the left anterior lobe of the brain. The tumour extended across the middle anteriorly, and pressed upon the right hemisphere of the brain. It was this part of the mass which had produced absorption of the supra-orbital and cribriform plates. The disease also encroached upon or infiltrated the outer part of the left corpus striatum, and the anterior part of the corpus callosum. The right corpus striatum, and both optic thalami, were unaffected. The lateral ventricles anteriorly were occupied by a portion of the growth that projected into them. The vessels of the brain were healthy. The carotid artery was impervious below the seat of the ligature. It was pervious above.

The diseased mass evidently originated amongst the frontal convolutions, at the lower part of the left anterior lobe of the brain, and pressed, first, upon the left orbital plate, which was soon absorbed. The pulsation and pressure effects seen during life arose from this absorption. It is interesting to note that, although the collateral circulation was speedily established after operation, the pulsation never returned. What we felt after the operation, and considered to be coagula or aneurism, were really pieces of the depressed and partially absorbed frontal bones. The improvement resulting from the operation was marked; and for a time justified the diagnosis of aneurism, and the operation performed in order to cure it. The true disease being a malignant growth could not be ultimately restrained by such an operation. What the epileptiform convulsions arose from, it would be impossible to say where so many causes for their production existed.

It may have been from pressure on the convolutions of the brain, for the calvarium showed that pressure capable of producing absorption was exercised over every part of the inner surface of the cranium, as well as upon the part directly in contact with the cancerous masses.

REMARKS ON THE MORBID ANATOMY OF EPILEPSY.

It will be evident, from a perusal of the cases just described, that the morbid anatomy of epilepsy is by no means a "constant

quantity." Fluid distension of the right lateral ventricle, dilated lateral ventricles (three cases), dilated fourth ventricle (?), inflamed ependyma of ventricles accompanied with cysts, an old apoplexy, jelly-like enlargement of the anterior half of the right hemisphere, a small brain, a fibrous tumour in the left frontal convolutions, abscess beneath the anterior common ligament of the second dorsal vertebra, a tumour amongst the frontal convolutions, an apoplectic cyst of cerebellum, softening of corpus striatum and optic thalamus (?), enlargement of the left side of the brain, gliomata, hæmorrhage over the surface of the brain, atrophied brain with apoplectic focus above internal capsule, several tumours in various parts of the brain, meningeal inflammation, supra-cerebral œdema with atrophied convolutions (two cases), and medullary meningitis. In twelve cases no gross lesion could be observed.

Amongst the second series of *post-mortems*, where the epileptiform convulsions were diagnosed as an accident due to some other disease, the following lesions were found:—An excess of fluid that pressed on the brain; an enlarged Pacchionian body; grey softening of the marginal convolutions; a malignant tumour of the brain, which produced pulsation of orbit; softening and atrophy of the motor area of the brain, at the upper extremity of the ascending frontal convolution; parturition (two cases); softening of central ganglia; atrophy of the lower extremity of the ascending frontal convolution; general pallor of nerve centres (two cases); thickening of the arachnoid to the extent of a quarter of an inch over the parietal convolution of one hemisphere; tubercular masses in the flocculus and amygdalæ, and over the superior longitudinal convolution; a fracture of the base, and effusion of blood over the convolutions; congestion of the right kidney, that produced considerable hypertrophy of that organ, intense congestion of the nerve centres, softening of a portion of one lobe of the cerebellum, congestion of the upper part of the spinal cord, and abscess in theca spinalis.

I am very doubtful of the value of a feeling of hardness or softness of the spinal cord. This part of the nervous system is very easily softened artificially during its extraction. The

slightest laceration of the pia mater at any point will suffice to cause softening of long distances above and below the laceration. If removed from the body without such laceration, the same cord would, no doubt, appear quite hard. My *post-mortem* examinations of the spinal cords of some thousands of people have convinced me, that the hardness or softness that is not accompanied by decisive abnormal signs in other respects as well as in feel, cannot be depended on. The abscess in the theca spinalis is interesting in view of Dr Brown-Séquard's experiments. It is the only case in which a lesion of the spinal cord was observed.

Out of the thirty-six *post-mortems* on cases of so-called essential epilepsy, in twelve no gross lesion could be discovered, and if we place the questionably dilated fourth ventricle, the small brain, in the same class, we have fourteen where no distinct lesion could be found after death, a proportion of a little more than one-third.

Most of these *post-mortems* were made before it was considered so safe to open up the dura mater as Macewen, Horsley, and others have shown it to be. Let us see how many of these might have been relieved by exploratory operations. Case 6, where a fibrous tumour was found in the left frontal convolutions of the old lady of sixty-two, could hardly be considered a fair case for operation. Case 11 was brought in comatose, and there was no time or indication for operation, but no doubt an operation would have relieved *him*. These are the only cases out of the thirty-six where an operation would have promised relief. In the second class of cases, there are absolutely none where the indications for operation were clear, and where the *post-mortem* showed that life would probably have been saved by exploration. The enlarged Pacchionian body, and the grey softening of the marginal convolution, would have been difficult to find. It is not yet clear whether softened and atrophied motor areas could be removed advantageously, and whether I would have done good by going through the dura mater in the last case recorded. I believe it would have been good surgery to have removed the soft flocculent material. Even granting these cases to be legitimate subjects for "brain surgery," their proportion to the whole number of cases is very insignificant.

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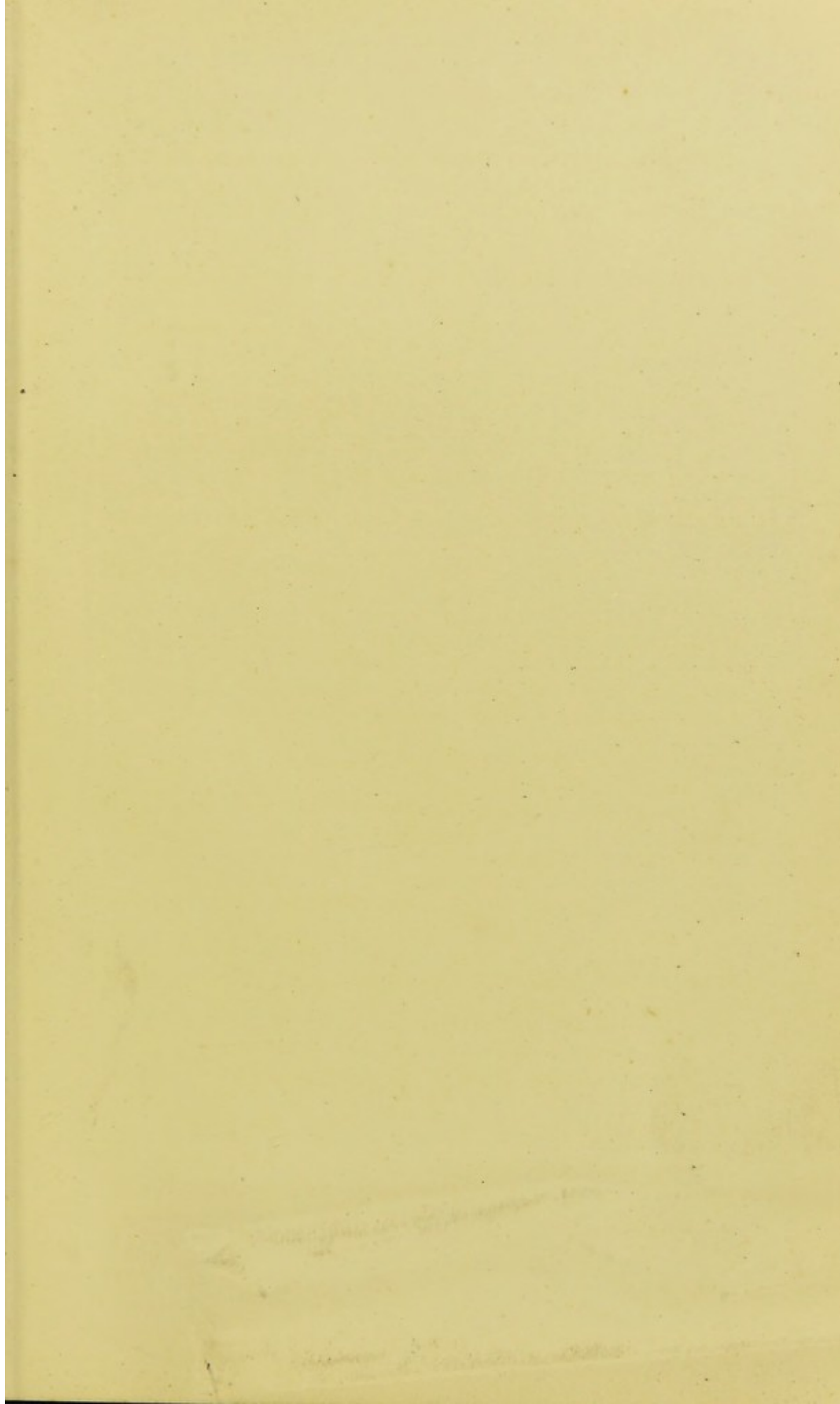
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