ON
PARTIAL PARALYSIS.

By JOHN SHAW, Esq.

LECTURER ON ANATOMY, GREAT WINDMILL STREET.

Read April 30, 1822.

IT is, probably, well known to many members of this Society, that, during the last two years, very important discoveries have been made on the functions of certain nerves. A general view of these discoveries will be found in a paper in the last volume of the Transactions of the Royal Society*.

In that communication Mr. Charles Bell has shewn, by researches into comparative anatomy, and by experiments, this most important fact, that the “*nerves of all creatures may be divided into two parts or systems; the one simple and uniform, the other irregular and complex, in proportion to the complexity of the organization.*” The first he has called *symmetrical* or *original*; the other, the *super-added* or *irregular* nerves. He has also shewn,

* On the Nerves, giving an account of some experiments on their structure and functions, which lead to a new arrangement of the system, by Charles Bell, Esq.

that "no organ which possesses only one property or endowment, has more than one nerve, however exquisite the sense or action may be; but if two nerves coming from different sources are directed to one part, this is the sign of a double function performed by it; and if a part or organ have many distinct nerves, we may be certain, that instead of having a mere accumulation of nervous power, it possesses distinct powers, or enters into different combinations, in proportion to the number of its nerves." It is, however, to be recollected, that the nerve called sympathetic, is not included in this arrangement.

As I assisted Mr. Bell in his researches into the comparative anatomy of the nervous system, and in the performance of the experiments by which his opinions have been substantiated, I was naturally induced to take much interest in the investigation. The results of experiments upon the two systems of nerves being very different, it appeared to me probable that, by an examination into the phenomena consequent upon paralysis, it would be found that the symptoms accorded with the system of nerves affected. To this enquiry I have, of late, particularly directed my attention.

The facts which I have already observed, though not yet so numerous as to permit us to come to any absolute conclusions, are still sufficient to shew, that *when one system of nerves is affected, the symp-*

toms are different from those following a disease of the other, and that the two systems are seldom affected at the same time.

To establish these facts, I have published two papers in the Quarterly Journal of Science. In the first communication, in January 1822, I have entered particularly into the description of the comparative anatomy of the nerves of the face, by which the conclusions previously drawn by Mr. Bell are further proved, viz. that if there be muscles on the face of an animal, corresponding in action with the respiratory muscles of the chest, they will be supplied with nerves not only from the original or symmetrical system, through the fifth or trigeminus, but also from the superadded system, through the nerve commonly called portio dura of the seventh*.

* To this nerve we have given the name of respiratory of the face. This change in the nomenclature has been made for several reasons; first, in consequence of its being proved by comparative anatomy, that the nerve, at its origin, is not connected with the portio mollis, or auditory nerve; secondly, that if, as has been already stated, there be muscles on the face, which accord in action with the respiratory muscles of the chest, they will receive branches from this nerve; and, lastly, if these branches be cut, the muscles will immediately be deprived of the power of co-operating in the act of respiration; the same muscles will, however, retain certain powers, which, by various experiments, are proved to be derived from the fifth pair.

In giving this description of the nerves it is scarcely necessary to state, that the face is, like all other parts of the body, supplied with twigs from the sympathetic.

In the same paper the result of experiments upon both sets of nerves is also given.

In my second communication I have shewn, that in the common cases of hemiplegia, or palsy after apoplexy, the muscles are paralysed only in those voluntary actions, the perfection of which depends on the nerves of the original or symmetrical class; while in the case of partial paralysis of the face, in consequence of an affection of a nerve of the superadded system, the muscles are deprived only of the power over those actions which are to a certain degree involuntary, or to perform which, it is necessary there should be a combination with the organs of respiration. It is also in the same communication proved, that if, in a case of hemiplegia, those actions of the muscles (and those of the face particularly) which are regulated by nerves of the superadded system, be excited, the symptoms produced by the paralysis of the original system of nerves will disappear for the time; it is moreover shewn, that if, in a case of paralysis of a nerve of the superadded system, the actions controlled by the nerves of the original system be excited, analogous results will be obtained.

As these observations were confined to questions of anatomy and physiology, I did not presume to offer them to the consideration of the members of the Medico-Chirurgical Society; but a fact, much

more important to the physician or surgeon, remains to be shewn, viz. that the two kinds of paralysis seldom or never depend on the same cause, and that, consequently, the plan of treatment must be widely different in each case.

Cases of partial paralysis, similar to those which I shall now lay before the Society, are probably familiar to every member; but the fact, that such cases have been only cursorily mentioned by writers on palsy, without any attempt to account for the phenomena presented in them, will perhaps be a sufficient excuse to a learned body, for my entering into details, which of themselves may be uninteresting.

When we recollect the numerous nerves which supply the head and neck, and many of which differ in function from each other, we cannot be surprised that some of them should be affected, while the functions of the others continue unimpaired. Indeed the most common cases of partial paralysis which have been recorded by writers on palsy, are of certain actions of the muscles of the neck and throat. But, at present, I shall confine my observations principally to those cases, where the respiratory functions, and the powers of expression in the muscles of the face, were affected.

The first series of cases will prove that the most

common instance of partial paralysis of the face is seldom caused by an affection of the brain, as has been hitherto supposed, but that it generally depends on some injury or disease of the superadded nerve, commonly called portio dura, of the seventh pair, and to which we have given the name of respiratory nerve of the face.

FIRST SERIES OF CASES,

To shew the Symptoms and Effects of Partial Paralysis of the Face, in consequence of Inflammation of the Portio Dura.

J. Richardson, October, 1820.—On first looking at this man, there does not appear to be any thing unusual in the state of his face; but the moment he speaks or smiles, the mouth is drawn to the left side. When he laughs, the distortion is increased; and when he sneezes, the difference between the two sides is quite extraordinary.

On holding ammonia to his nose, it was observed that he could not inspire with the right nostril; and, on examining the state of the muscles, when the act of sneezing was excited by the ammonia snuffed up by the left nostril, it was found, that not only those of the right side of the nose and mouth, but also of the eye-lids, were passive, while all the

muscles of the left side were in full action. When he blew, or attempted to whistle, the air escaped by the right angle of the mouth, the right buccinator not at all corresponding in action with the muscle of the left side, nor with that of the muscles of the chest and neck, by which the air was expelled.

On exciting those actions which, by experiments on animals, we had proved to depend on the fifth pair of nerves, they were all found perfect; *i. e.* the patient could bring the orbicularis oris into such action as to hold a pencil with it; he could throw a piece of bread from the right to the left side of his mouth by the action of the buccinator*, and he could close his jaws with equal force on both sides. The sensibility of the paralysed cheek was equal to that of the other side.

I need not here particularly describe the phenomena which are observable on the face of a person who is paralytic, after an attack of apoplexy; but merely state, what I think will be found cor-

* We cannot divide the actions of the muscles of the face simply into voluntary and involuntary. Whistling is a voluntary act, but to perform it, all the muscles of the face connected with respiration must be perfect in their actions; so it is also in snuffing. The action of the buccinator in mastication, is quite independent of the respiratory organs, and this, we may presume, is the reason, why this function of the muscle is not deranged when the portio dura is cut.

rect in the greater number of instances;* that those actions which I have just enumerated as perfect, in this case, and which are produced through the influence of the fifth pair, will be found deficient; while those, which are influenced by the respiratory nerve, will be perfect. I may further state, that if, in such a case, the actions regulated by the latter nerve be excited, both cheeks will not only be drawn up to an equal degree, but the eye-lids and eyebrows will act so similarly on both sides, that the distortion and heavy expression, which are so remarkable in a paralytic patient, will disappear for the time.

-- The history of the first part of the case just related, according to the account given by the patient's friends, was the following.—He was seized with a severe pain under the ear, and in a short time became so delirious, and his face so distorted, that the people in whose house he lodged, supposing him to be mad from brain fever, carried him to the parish work-house. There he lay until his friends discovered him and brought him into the hospital. It was then found, that the phrensy which had led the people of the lodging-house to suppose that he was mad, was only a high state of delirium, in consequence of a severe attack of cynanche parotidea; indeed, the inflammation had run so high, that an abscess formed and burst under the ear.

* A particular account of the phenomena consequent upon hemiplegia, is contained in my paper in the Quarterly Journal of Science, for April, 1822.

When the swelling subsided, the degree of paralysis was more easily noted.

The delirium and the paralysis of the face naturally led the gentlemen, who first saw this patient, to suppose that the symptoms were caused by an affection of the brain. Luckily, the treatment generally adopted in cases of phrenitis, was best adapted for the particular affection which had caused both the delirium and the paralysis.

The following instance will shew to what a degree of needless severity a patient with such an affection may be subjected. During the course of last winter, a surgeon, in town, was much distressed by receiving intelligence that one of his relations in the country was attacked with symptoms of paralysis of the face ; but in the course of a short time he was not less surprised than pleased, to hear that his friend had been suddenly relieved of all the symptoms, by the bursting of an abscess in his ear. The progress of this case puzzled my friend not a little, until he read the account of the enquiries in which we had been engaged in Windmill Street. He then related the case to me as a good example of the importance of the discoveries to the medical practitioner ; for his relation, in consequence of the paralytic attack having been supposed to proceed from an affection of the brain, had not only gone through all the severe discipline of bleeding, purging, and starving, but had also his head shaved

and blistered. Had this been a solitary instance, it might have been supposed that the means employed had effected the cure; but the next case will prove that even the severest general treatment will not of itself, be sufficient to remedy this particular kind of paralysis. The history, will, at the same time, shew the difficulty which has hitherto existed, of determining upon the proper course of treatment in such cases.

About two years ago, a gentleman, in consequence of a consultation with an English surgeon in Rome, came over to London, to request Mr. Bell to perform an operation upon his face, by which he hoped that a very unseemly distortion would be remedied. But as this happened before Mr. Bell had made those discoveries, by which we have been able to comprehend the nature and cause of the particular kind of paralysis, which produced the distortion, he was then unable to propose any plan of relief. The case, however, naturally made an impression on Mr. Bell's mind, and when he found that I was investigating the nature of the different paralytic affections, he described it to me, as one which would probably be of use in my enquiry.

A short time after this, I met with a gentleman, the state of whose face so exactly corresponded with the description I had received, that I immediately supposed he must be the same person who

had formerly consulted Mr. Bell. On asking him the question, he replied "no, but I know the gentleman you mean, I met him in France a few months ago, and the state of his face is so similar to mine, that I am not surprised, you should have made the mistake; there is, however," he continued, "some difference in the original cause of the distortion in our faces, for on comparing notes with the gentleman you supposed me to be, I found that the distortion of his face, was in consequence of a blow on the head, while in mine, it was caused by a paralytic affection."

According to this gentleman's own statement, the disease commenced with a violent pain below the ear, and in a short time, one side of his face became paralysed. For this paralytic affection, he consulted many eminent men. The first plan of treatment was bleeding, blistering, and starving, the disease being supposed to have its origin in the brain; but as he got rather worse than better, under this treatment, he was put upon a course of mercury, which was carried to such an extent, that he lost several of his teeth. After he recovered from the bad effects of the mercury, he was recommended to attend only to the state of his digestive organs. But the blue pill had no effect upon the distortion. The last advice which this gentleman received, was to wear an issue in his neck; with this, however, he has not complied, as he feared it

would, like some of the other remedies, have only the effect of rendering him more uncomfortable.

As the symptoms in this gentleman's case so exactly corresponded with those described in the first example, and with the results of experiments made upon animals, there can be little doubt of their being in consequence of an affection of the portio dura ; and, as he has been deaf in the corresponding ear, ever since the first moment of the attack, it is probable that the trunk of the nerve, as it passes through the temporal bone, is the portion affected. The consequences of the paralysis in this case are now so distressing, that they prove the importance of such a knowledge, as will enable us to ascertain the cause of the symptoms at their commencement. The deformity produced by the distortion of the face, and the wasting of the muscles of the paralysed side, are sufficiently vexatious ; but the greatest distress is from the loss of power over the eye-lids of the same side, for the eye, being thus deprived of its natural coverings during night, as well as day, has been almost destroyed by repeated attacks of inflammation.

This last consequence is particularly observable in a porter of the name of Garrity, who may be often seen about auction rooms, in the West end of London. This poor man, about 19 years ago, was attacked by a severe pain, accompanied with

discharge from the right ear. After a paroxysm severer than usual, he found, on getting up one morning, that the right side of his face was paralytic. His present condition, and the description which he gives of the progress of the symptoms, prove that the same results followed this paralysis, as in the case of Richardson already related. But what this poor fellow particularly laments, is, that since the day he was first attacked, he has not been able to close his right eye ; and well he may, for the constant exposure of the eye to the light and dust, has been the cause of so many attacks of inflammation, and consequently of the opacity of the cornea, that the eye is now completely destroyed ; and this, I fear, will often occur in similar cases, for I have observed, that the eye has always become inflamed in those animals, in which the portio dura has been cut. It is worthy of remark, that the inflammation has been more severe in the dog and in the ass, than in the monkey. One great source of the increase of the inflammation, is the purulent secretion from the conjunctiva ; this the monkey wiped away with his hand ; but it lodged between the eye-lids of the dog and of the ass, so as to form an additional source of irritation.

The cause of the blindness in Garrity is quite obvious. But here I shall make a short digression from my present subject into the question of another kind of blindness, which, though not directly connected with the subject, of the paper, will per-

haps have the effect of exciting the attention of those who make the diseases of the eye a particular study.

It must be well known to every member of this Society, that the common opinion of the pupil being always immoveable in amaurosis, is founded in error. I had lately a good opportunity of proving this in the eye of a little girl with partial paralysis of the face, and whose case I have detailed in the Journal of Science for April 1822. The only *apparent* defect which this girl had, was paralysis of those actions which are controlled by the right portio dura; but the vision of the right eye was completely lost, although the eye appeared to be in every respect perfect; *i. e.* whether the other eye was open or shut, the pupil of the blind eye contracted and dilated with perfect regularity. When the eye was directed towards the sun, the sound one being closed, the pupil contracted, and when the hand was put before the eye, it dilated; yet, notwithstanding this apparent sensibility of the eye to light, the power of vision was so completely lost, that although a lighted candle was brought close to the child's face, she was not sensible of it until she felt the heat of the flame. To prove that there was no deception practised upon me, which, however, I had not the slightest reason to suspect, I closed the left, and brought my finger so close to the right eye, as almost to touch the cornea; the girl did not appear to be in the

slightest degree conscious of the proximity of my finger, but the moment I touched the eye she started back.

No explanation has as yet been given why the pupil should in some cases of amaurosis remain fixed and unaltered by the exposure of the eye to the different degrees of light, while in others it is as sensible to the stimulus of light, as a perfect eye. It will be very difficult to obtain any conclusive evidence on this question ; but circumstances seem to prove thus far, that the motions of the iris depend upon other causes, than merely the state of the retina. They are perhaps, in a great measure, controlled by the fifth nerve. In support of this opinion, which, however, I offer as a mere speculation, I may adduce the common occurrence of a slight paralysis of the levator palpebræ, and of the iris, without the retina being at the same time affected. We know that the fifth pair supplies the levator palpebræ, and that the ciliary nerves which go to the iris, are connected with it.

A good example of complete paralysis of the levator palpebræ, and of loss of power in the pupil, without any affection of the retina, occurred last winter ; and I was fortunate enough to have an opportunity of examining the body after death. A young woman had a fungous tumour under the jaw ; the cheek of the same side was paralytic : the upper eyelid of the same side had fallen ; but

when the eyelid was raised, the patient could see distinctly, although the pupil was fully dilated and immovable. Upon dissection, it was found that the tumour had extended into the lateral part of the orbit; the fourth nerve ran over the tumour, the third was in the substance of it, but the ophthalmic division of the fifth pair was the nerve most destroyed; the sixth was partially affected. The tumour did not reach as far as the optic nerve. Since all the nerves of the orbit, except the optic, were included in the disease, we cannot draw any further conclusion from this case, than that the motions of the iris do not altogether depend upon the state of the optic nerve. The voluntary power which some individuals possess over the motions of the iris, will perhaps be considered as in some degree supporting the view which I have taken. The members of the Society are, no doubt, aware, that one of their most distinguished associates has this voluntary power over the motion of his iris. Upon an occasion in which the gentleman I allude to, was so kind as to shew me, to what an extent he could exercise this power, I thought I could perceive that the exertion which attended the attempt, had some effect upon the motions of the upper eyelid. At one time, I imagined that there was some correspondence between the internal parts of the eye and the portio dura. This I deduced from observing that some patients who had paralysis of the portio dura, were at the same time affected with symptoms of amaurosis. I had also observed

that a loss of vision was apparently the consequence of cutting the nerve in a dog. However, further experience has induced me to suspect that the cases which I had seen of amaurosis combined with partial paralysis of the face, were merely accidental coincidences.

Trusting that the Society will excuse this digression, I shall now return to my proper subject.

A most remarkable appearance in the face of Garrity is the wasting of all those muscles of the face, which are subservient to respiration and expression. His cheek is so thin, that when he speaks, it flaps about as if it were only skin, and the corrugator supercilii and occipito-frontalis, which are principally muscles of expression, are so wasted, that we might at first sight, suppose they had been removed by operation, and that now the bones were only covered by skin. There can be little doubt that the wasting of these muscles is in consequence of their not having been called into action for many years; since the masseter and temporalis muscles of the same side are not at all diminished in size, being as large as those of the opposite side. A curious example of the effect produced on the growth of the muscles of respiration and expression, by an injury of the portio dura, was afforded in an experiment made upon a young dog. After the nerve was cut, he was taught to snarl whenever a stick was held out to him; this being often repeated, the muscles of the

side upon which the nerve was entire, became very strong, while those on the paralysed side rather diminished than increased as the dog grew older. In a few months, the one side of the face was much larger than the other. We may, every day, see similar results following palsy of the limbs.

In the greater number of the cases which I have seen of this partial paralysis of the face, the eye has been more or less affected ; but it does not always suffer. There is a broker in the New Road whose appearance is exactly the same as Garrity's, excepting in the state of the eye ; for that of the paralysed side is more useful than the other, although the affection has lasted for thirty-five years. I suspect, however, that in this case the superior branches of the nerve are not much affected. An instance, proving that there are just grounds for such an opinion, will be given presently. I may here add, that on inquiring into the history of this man's disease, I found he had gone through the ordinary severe treatment for paralysis, under the care of the late Dr. Pitcairn ; the symptoms having been supposed to indicate an affection of the brain. On asking Garrity, what kind of treatment he had undergone for the paralysis of his face when it first appeared, he said that as it was of no inconvenience to him as a porter, he was unwilling to give up his time or money in endeavouring to get rid of what he considered only a deformity ; and therefore nothing was ever tried. It is not very unreasonable

to suppose, that if he had applied for relief, he would have been treated as if the paralysis had been produced by an affection of the brain.

The only other instance I shall at present offer of a patient having been severely treated for a slight paralytic affection, is that of a friend, who is now an eminent surgeon, and attached to one of the first provincial hospitals in England. While my fellow-student, he was attacked with partial paralysis of the face ; for this, we treated him as if it had been caused by an affection of the brain. Under this treatment the paralytic symptoms gradually disappeared, but they would probably have subsided without any such severe measures ; for it seemed to have been an instance of that partial paralysis from sudden exposure to cold, which generally disappears even without any local treatment. But so convinced was this gentleman that the paralysis depended on the state of his brain, that up to the present day, he is alarmed by the slightest headache, fearing that it is only the precursor of a more serious attack than that which he suffered while a student. I hope the cases here related will set my old friend's mind at ease upon the subject.

Partial Paralysis, connected with a Diseased State of the Brain.

Cases which will be presently detailed, will further shew that we may be mistaken in supposing

that the symptoms of paralysis depend always upon an affection of the brain. But I must now state, that there are certain cases of this kind of paralysis which are intimately connected with the condition of the brain, or I should rather say that the same cause which has produced the local paralysis, may gradually affect the brain. Of this, the following is a common example.

Nov. 30th, *Mary Cummings*, 30 years of age.—About a month ago, this woman was attacked with pain in the right ear, which was followed by a discharge from the tube, and a short time afterwards, she discovered that her face was distorted. Ten days ago, the discharge from the ear stopped. Previous to this, the patient had no pain in the head; but since the discharge ceased, she has suffered much in the temple and occiput; she is giddy and stupefied, and her expression is of that anxious kind, which is so remarkable in those patients, who have a commencing suppuration on the membranes of the brain. The symptoms were relieved by active local and general treatment. Upon this case, I may remark, that a knowledge of the fact, that paralysis of the muscles of respiration of the face is often caused by an affection of the portio dura in its course through the temporal bone, should, in instances where the paralysis is accompanied with pain in the head, lead us to examine the state of the ear, even though we should not be directed to it, by the circumstance of a discharge from the tube.

I have no doubt that the symptoms in this case are familiar to every surgeon ; a child suffering in a similar manner, was sent to me about two years ago, from Greenwich. At the time, I could not account for the peculiar paralytic symptoms which were evident when the child cried ; but now, I have no doubt that it was from the nerve being affected in its course through the diseased temporal bone. This child died some time after I saw it, in consequence of the disease spreading to the cerebellum*.

* After this paper was read before the Society, I was requested by Dr. Gregory to see a case of paralysis in which there were some unusual symptoms.

On examining the girl, who was the subject of the disease, I was forced to confess, that if the case had occurred to me earlier in the enquiry, it would probably have induced me to give up the investigation ; for there was not only double or total paralysis of the left side of the face ; but there was also paralysis of the leg and arm of the same side.

The mother of the child could not give me a very clear account of the origin of the disease. Upon observing that the respiratory nerve of the face, as well as the other nerves, was affected, I suspected that the child was deaf. I found, however, that she was not so ; but upon inquiring whether there had ever been any thing the matter with the left ear, the mother immediately replied, " O yes, Sir, this ear, at one time, was swelled as large as my fist, and then it broke and discharged a great deal of bad humor from the inside." She then told me that it was some time after the discharge had ceased, that the child, while sitting eating oranges, was seized with a fit and fell down.

The

These two last examples are common ; but I believe we shall occasionally meet with instances of this paralytic affection of the face, and a disease of the brain co-existent, but unconnected with each other, although the same cause may have produced both. The following I offer as an example. A gentleman's groom was, six years ago, thrown from his horse ; he was so much hurt about the head, that it was supposed his skull was fractured, particularly

The state in which the ear had been is sufficient to account for the derangement of those actions which are regulated by the portio dura ; but there is much difficulty in deciding whether the paralysis of the other set of nerves arose from a certain degree of irritation on the brain, in consequence of the disease in the temporal bone, or from some other cause, as in the common cases of hemiplegia, preceded by apoplexy. The circumstance of the paralysis being on the same side of the body, is certainly an objection to the opinion that it was caused by the spreading of that local irritation which affected the portio dura. I cannot at present enter farther into the discussion of this question ; but I must observe, that independently of the combination of the two kinds of paralysis, the history of the symptoms, and the appearance of the child, induced me to suspect that this instance was more like a case of epilepsy than of common paralysis.

I have been often asked, during the prosecution of this enquiry, what practical benefit could accrue from this distinction of cases ? In the body of the paper, I trust that many examples will be found which prove its utility ; and even in this obscure case, the symptoms of affection of the portio dura, led me to discover an important circumstance in the history of the disease, and enabled me to point out the part of the head to which we should particularly direct our attention, if we pursue any plan of local treatment.

as his face was paralytic on one side. However, in about three months, though his face continued distorted, he so far recovered as to be able to go to work. He continued well for three years, the paralysis of the face remaining in the same state; about that time, when walking in the streets, he was seized with an epileptic fit, but from this he so quickly recovered, that he was able to do his duty in the stable, the following day. Since that time, he has had about twelve fits, from each of which he has as quickly recovered; but no change has ever been produced in the degree of paralysis, and the appearance of his face is now very similar to that of Richardson. He has been deaf in the paralysed side ever since he fell from his horse, which, to me, is sufficient proof of the paralysis having been produced by an injury to the portio dura, in its passage through the temporal bone. The histories of epilepsy, and the dissections which I have made of persons who have died of that disease, induce me to believe, that in this case, the epilepsy is not owing to the injury of the temporal bone, but to some disease in the substance of the brain, which had probably its origin in the shock, that the brain in general suffered, when the man fell. Several examples of partial paralysis in consequence of injuries of the head will be given presently.

Partial Paralysis in consequence of Exposure to Cold.

There seems to be one cause of paralysis of the respiratory muscles of the face, which is not productive of such serious consequences, as those I have already described; I mean the sudden exposure to cold; indeed, such cases are so common, that the attack is vulgarly called *a blight*. Three instances of this are given by Dr. Powell, in the fifth volume of the Transactions of the College of Physicians. They are described as cases of complete paralysis of the face, but this we now know to be an erroneous description, since there is only a loss of power over one set of actions. The same kind of cases, I am told, are very common in India, during the prevalence of the cold winds, and it may sometimes be observed in those unfortunate females who walk the streets during the night. In most of the cases, where the paralysis arises in consequence of exposure to cold, it gradually disappears, while in those patients in whom the affection commences by inflammation and suppuration, it seems to be very difficult to cure.

Example of the Paralysis being confined to a part of the side of the Face, in consequence of only certain branches of the Portio Dura being affected.

Before suggesting any plan of treatment, I may state the necessity of our knowing the course of the nerves upon the face, and the sources from

which the several muscles receive their branches ; for without this knowledge we cannot apply local remedies with proper effect. The importance of it, in enquiring into the cause of paralytic symptoms, was exemplified in the case of a young lady about whom I was consulted last spring. This lady had for some years, suffered from a nervous affection of the side of her mouth ; but she had been lately attacked with what her friends supposed to be a similar disease of the eye-lids. On observing the action of the muscles while the lady was eating, I did not perceive any power deficient, but the moment she smiled or laughed, there was distinct paralysis. It was, however, new to me, to see the muscles of the mouth affected at one time, and those of the eye at another, for I had found in all the experiments where the portio dura was cut, and in the cases where the paralysis had been produced by inflammation of the ear, that the muscles of the eye and mouth were affected at the same moment.

On enquiring minutely into the origin of the complaint, the cause of the difference in this case was explained. The inflammation, which was the original source of injury to the nerve, had been confined to a spot above the molar teeth, so that the branches of the nerve which go to the muscles round the eye, were not included in the disease. The affection of the eye-lid was quite different from that of the muscles of the mouth ; for instead

of being paralysed, it was spasmodically affected. It was, however, only that slight twitching which is common in hysterical cases, and would scarcely have been noticed, had it not been supposed to have some connection with the state of the mouth. It is worthy of remark, that this young lady found it exceedingly difficult to regulate the muscles of the mouth, when she made her entry into a room, or was obliged to accost strangers.

As she had been partaking of all the gaiety of a London winter, I recommended her to go into the country, and to attend to the general state of her health. After she had been a short time at the sea-side, the twitchings of the eye-lids ceased, but there was no change produced in the paralysis of the muscles, which had been caused by the previous inflammation of the branches of the portio dura.

Proposal of a Mode of Treatment in Cases of Partial Paralysis of the Face.

The degree of paralysis in the last case though at present slight, is still sufficient to destroy the contour of a very pretty face, and is consequently a subject of much regret to the young lady's friends. But the history of the preceding cases shews more forcibly, the importance of an early cure of this paralysis, for we have seen that the eye generally

suffers, and if the case even be such, that the nerves going to the eye are not affected, we know that the distortion will increase in proportion to the time the affection exists, since the muscles of the paralysed side will diminish in size, while those on the opposite side will probably increase in a proportionate degree. That this result generally follows disease of the portio dura, may be proved any day, for it is almost impossible to walk from Piccadilly to St. Paul's, without meeting several examples of this disease in old men, and in some of whom, one side of the face may be observed to be wasted.

In cases of long standing we can scarcely expect to do much good by any plan of treatment; but in the early stages we may perhaps be able, by active local treatment, to restore the nerve to a power of performing its functions. I cannot as yet offer any examples of the effect of remedies upon the injuries of the portio dura, because the cases which have occurred to me since the discovery of the cause of the paralysis, have existed too long to expect that any benefit would result from the most active treatment.

But we have instances of the cure of the same kind of partial paralysis in other parts of the body; and I think there can be little doubt, that, by following the same plan of treatment in those of the face, we may be successful. At present, I am watching the progress of a case of partial paralysis

which appears to have arisen from a cause analogous to that of several which I have already described. M. C. dislocated his shoulder ; after the bone was reduced, and which was easily done, he could move his fingers in the same degree with other patients who have suffered a similar accident ; a bandage was put round the arm, but probably too tightly, since the arm swelled, inflamed, and at last suppurated over the middle of the triceps muscle. Ever since the commencement of the inflammation, he has lost the use of the extensor-muscles of the fingers and thumb. The description which the man gives of the parts affected, and the manner in which he traces out the insensible parts of the skin with the point of his finger, clearly demonstrate that neither the median nor the ulnar nerve are affected, but that it is solely the muscular spiral nerve which has suffered. He cannot open his hand ; but, by pulling up the fingers with the other hand, he is enabled to get them over the handle of his spade, and then, he says, he can work as well as his comrades ; thus shewing that all the flexor muscles are entire in their actions.

The nerve must have been injured either at the time of the dislocation, or by the inflammation which followed the application of the bandage. The latter cause is, I think, the most probable, for such an affection is rarely if ever produced by dislocation ; at least, the effect upon the nerves produced by the pressure of the bone generally

subsides when the dislocation is reduced. The man is very positive that he could extend his fingers previous to the inflammation of the arm.

It is now nearly three months since the attack; but we hope, that by active measures, the power of the nerve may be restored, for already, within a week, a smart blister, laid in the course of the inflamed part of the nerve, appears to have produced some effect.

If blistering, and the occasional application of leeches, restore the power of the nerve in this man, we may presume that a treatment somewhat similar will be beneficial in cases of paralysis of the portio dura.

Paralysis of the Face in consequence of Injuries of the Head.

Instances of partial paralysis of the face must have been frequently observed by those, who have had the opportunity of seeing many injuries of the head. The case of the groom, which I have already described, affords an example of it. One of the most unequivocal cases is that of the gentleman to whom I have alluded, as having come from Rome to have an operation performed upon his face. He had been knocked down in a scuffle; when he recovered his senses in the morning, he found that

he had lost a large quantity of blood from the ear ; since that time his face has been distorted.

While accompanying M. Cloquet, one of the most ingenious and learned surgeons in Paris, in his morning visit to the Hospital St. Louis, he drew my attention to the case of a woman who had some unusual symptoms, produced apparently by a fracture of the clavicle. On examining her, I discovered all the appearances of paralysis of the portio dura ; and on farther inquiry, I found, that at the time the clavicle was broken, she had received a blow on the temporal bone of the same side.

I ought here, in justice to the frankness and liberality of M. Cloquet, to state that he immediately and cordially congratulated me on having an opportunity of giving ocular proof of the correctness with which I had described the consequence of an injury to the portio dura, and which he at the same time acknowledged was quite new to him.

In the Journal of Science for April 1822, I have particularly described the symptoms in a case of double or total paralysis of one side of the face, in consequence of an accidental injury of the portio dura, and of the fifth pair of nerves on the same side.

As the case is an example of an affection by no

means common, and as the symptoms might have been mistaken for those of injury of the brain, I shall perhaps be permitted to introduce a slight sketch of it here, particularly as the details given in the Journal of Science were offered merely for the purpose of contrasting the phenomena consequent upon injury of both systems, with those following the affection of one or other of the systems of nerves.

A bricklayer fell from a scaffold thirty feet high; his right clavicle was broken, his right loin and hip were much bruised, and he received a severe contusion on the head, the marks of which were particularly observable in a puffiness behind the right ear, and in bleeding from the same ear and from the nose.

He was in a state of stupor when brought into the hospital; but from this he soon recovered. For the two or three first days, he appeared to suffer only from the effects of *concussion*, never having any of those symptoms which are generally attributed to *compression*. On the fourth day, it was observed that the angle of the mouth was drawn a little to one side, and there was also a degree of irregularity in the contraction of the pupils. On the sixth day, it was remarked, that while he was asleep, the right eye was more than half open, while the left was closed.

The notes of the case were very fully taken, up

to the twenty-fourth day after the accident, and shew that the patient had, during the interval, gone through the common series of symptoms which attend a slight inflammation of the brain which is often the consequence of concussion.

The general appearance of this man's face, about six weeks after the accident, was that of a person who had suffered paralysis from apoplexy*; but when he spoke or laughed, the distortion was increased, the mouth being pulled much more to one side than is usual in those cases.

On examination into the cause of such an unusual degree of distortion, it was evident that both the portio dura and the fifth pair of the same side had been affected. The phenomena by which this is proved are particularly detailed in the Journal of Science: the description of them I need not repeat here, but merely state that they differed from those presented in the common cases of partial paralysis, not only in the face being distorted while the muscles were at rest, but also in the power of the

* In consequence of the clavicle of the same-side having been broken, and the loin much injured by the fall, this patient had so much the appearance of a paralytic in walking, that when the degree of loss of power over the limbs was coupled with the distinct marks of paralysis of the face, it led many to believe that every symptom was caused by the injury to the brain. That this opinion was incorrect, was proved when the broken clavicle united, for then, though the paralysis of the face was as distinct as ever, the power over the arm and leg was completely restored.

muscles being deficient during the act of eating. The sensibility of the skin of the same side was also in a great measure destroyed.

The symptoms differed from those in a case of hemiplegia in several important circumstances: first, in the paralysis being confined to the face; secondly, in its being on the same side with that on which the head was affected; and, thirdly, in the palsy being more evident when the patient was made to sneeze or laugh.

The paralytic symptoms were, I think, to be ascribed, not to any affection of the brain generally, but to an injury or inflammation of the portio dura, and a great part of the fifth nerve, either near their origins, or in their passage through the bones of the head.

My reasons for forming this opinion are, that the state of the actions regulated by the portio dura was similar to what is found in cases and experiments where the nerve has been cut. The bleeding from the ear, and the consequent deafness, may be given as proofs that the petrous portion of the temporal bone through which the nerve passes had been injured.

The evidences that we had of the fifth having been injured in its transit through the bones, were, first, in the paralysis being on the same side of the

head as that struck in the fall ; secondly, in the hemorrhage from the nose ; thirdly, in the sensations, both of common feeling and of taste, being destroyed on one side, which is not *always* the consequence of apoplexy, but which must happen if the *trunk* of the third division of the fifth be injured ; and, lastly, in the phenomena according with those which are observed when the branches of the fifth are cut.

The symptoms of general affection of the brain, appeared to have been caused by that inflammatory state, which is often a consequence of concussion, but which almost always subsides without leaving any degree of partial paralysis.

Paralysis of the Face in consequence of operations upon it.

The last examples of this kind of paralysis, which I shall at present offer, are those which have followed certain operations on the face.

I recollect that some years ago, in the removal of a tumor from before the ear, the moment the branches of the portio dura were cut, the girl called out, " O, I cannot shut my eye." The cause of this, though obscure at the time, must now be evident.

A coachman had a tumor removed from his face ; on returning some time after, he complained that although the operation had freed him of the tumor, it had deprived him of the power of whistling to his horses. The degree of paralysis consequent upon this operation, and the effects produced on the face of a lady by a similar operation, induced me, before I would consent to cut out a small harmless tumor from the face of a gentleman, to put the question to him, whether he would run the risk of being disfigured, by having one side of his mouth paralysed, when laughing or smiling, or retain the small tumor, which might be almost concealed by his whisker. He chose to submit to the disfigurement caused by the tumor, as probably the lesser of the two.*

* An important question connected with this subject remains undecided: whether the portio dura, when cut, is ever reunited so as to be capable of again performing its peculiar functions. In two experiments of cutting the portio dura, which I have already made on a dog and a monkey, the power over the muscles of the face, was, in the course of a few months much restored, while, in another dog, the paralysis of the respiratory muscles was as complete at the end of four months, as on the day after the operation. But as none of these experiments were made with a view to determine the question of the re-union of nerves, I was not particular in the manner of dividing the nerve. M. Magendie, in his Journal for January 1822, makes the following remarks upon the result of these experiments. “ Cette différence dans les deux résultats porte à croire que dans la première opération, la section des nerfs n’a pas été complète: j’ai chez moi maintenant un chien sur lequel j’ai pratiqué cette double section, il y a plus des six semaines, les effets sont encore à peu près ce qu’ils étaient le jour même de l’expérience.”

The consideration of the effects of cutting the branches of the seventh nerve, will induce us to make our incision in these operations parallel to the branches of this nerve, and not across them. It will make us careful to save nerves, which, heretofore, were considered of little moment.

The general question of the restoration of the functions of nerves, which have been divided, will probably be more satisfactorily decided by experiments upon the portio dura, than upon any other nerve, since its functions are now distinctly ascertained, both by comparative anatomy, and by experiments.

Upon the deductions which have been drawn from experiments on the par vagum, I shall, at present, only remark, that since many animals which have no par vagum, have stomachs of powerful digestion; the only inferences that can be drawn from the phenomena presented upon cutting the par vagum in the rabbit, &c., are, that in consequence of this bond of connection between the stomach, and the organs of respiration, and circulation being destroyed, the functions of the stomach will be more or less disturbed.

With reference to those experiments by which it is attempted to be shewn, that the nervous influence passes from the one portion of a nerve to the other, when the cut surfaces are brought into contact, I may state, that after having divided the portio dura of a dog, I placed the two ends of the nerve nicely together, and then stimulated the nostrils, but no effect was produced on the muscles regulated by the nerve. I varied the experiment, by stimulating the portion of the nerve next the brain, with galvanic forceps, (the cut surfaces being still in contact); there was then a convulsive action in the muscles of the nostril, but it was the same kind of convulsion as that produced by touching the muscles themselves, and was entirely different from that very peculiar action which is displayed if the stimulus be applied to the nerve when entire, or even to the lower portion of it when it is divided.

It is almost needless to state, that there are often certain tumors before the ear, the extirpation of which is so necessary, that in such cases the paralysis must be considered of minor importance. However, if we have an accurate knowledge of the small nerves which pass from before the ear to the mouth and nostril, we may, in extirpating tumors from the cheek, preserve these twigs, and thus avoid substituting distortion for the slight deformity caused by the tumor which we wished to remove; a result which has hitherto frequently followed operations on the face, in consequence of our proceeding on the old idea, that although the parts might be deprived of the supply of nerves from the portio dura, they would still receive sufficient nervous influence from those of the fifth pair.

I may be allowed to suggest that the discovery which has been made of the difference in the functions of the two sets of nerves upon the face, will, perhaps, alter the question of the pathology, and of the operations for the disease called tic douloureux.

PART II.

Enquiry into the State of the Superadded Nerves in Cases of Palsy following Apoplexy.

The examples already given, will probably be considered sufficient evidence in support of the opinions which have been advanced, as far as they relate to affections of the face.

The greater complexity of the nervous system of the viscera, and of the parts combined with them, and the obscurity of the symptoms consequent upon paralysis of the internal parts, make it more difficult to prove that the same order holds in their paralytic affections ; but still, the facts already discovered, entitle us to expect that a clue will eventually be found, by which we shall be able to trace the symptoms of palsy of other parts to their source as easily as we already can those of the face.

In making some observations upon this question, I must crave the indulgence of the Society for entering a little into speculation ; my excuse must rest on the hope that it may excite others to enquire into the causes of those symptoms of palsy which are of common occurrence.

It is well known that the muscles of the pharynx and oesophagus, the muscles of speech and the sphincter muscles, all of which are supplied with nerves from the superadded system, are occasionally paralysed, without there being, at the same time, any symptom of palsy in the limbs. It is also as well established, that the muscles just enumerated, and those carrying on the *vital functions*, viz. those of respiration, circulation, &c. are seldom impaired in the common cases of hemiplegia. Indeed we have daily opportunities of observing, that respiration and circulation are seldom affected in the common cases of palsy, and that although a patient may have entirely lost the use of the limbs of

one side, that still his sphincter muscles are unimpaired. It is needless for me to state, that when the functions of this latter class of muscles are affected in apoplexy, the prognosis is very unfavourable.

In the work of one of the most learned writers on apoplexy, (Dr. Cheyne of Dublin) there is a very extraordinary example given of the functions of an important organ continuing perfect, while one half of the body was paralysed. A woman was attacked with apoplexy, and lay hemiplegic for two days ; at the end of that time she was delivered of a living child, the uterus acting in the most perfect manner, so as to expel the foetus and the secundines, and then contracting regularly, so that the flooding which might have been anticipated, did not take place.

Since partial paralysis is commonly owing to some local affection, it is often possible to discover the cause by dissection ; but where there is palsy of one side of the body, or where the internal organs are affected, there is generally so much disturbance to the whole structure of the brain, as will probably prevent us from ever being able to trace each class of symptoms, to the affection of a particular part. In the present state of the enquiry, it will be impossible to offer more than a general surmise, as to what parts of the brain are affected, when there is common hemiplegia, or when there is paralysis of some of the internal organs.

According to the accounts given of dissections of cases, where the patients have recovered from the immediate attack of apoplexy, and have lived for some years, with a palsied state of one side of the body, the marks of injury to the brain have been commonly found in the centre or upper part. Here, I may add, that a patient, whom I occasionally see, with complete paralysis of the original class of nerves of one side of the body, without any perceptible affection of the superadded system, being in fact, in a state similar to that of common hemiplegia from apoplexy, became so, in consequence of the destruction of a portion of the upper part of the brain, after fracture of the skull. There are very few histories of the dissection of cases, where an affection of the respiratory organ was the principal symptom preceding death; in the work of Dr. Cheyne, there is a very interesting case of apoplexy detailed, in which the chief symptoms were those of irritation of the stomach, and difficulty of respiration, "about an hour and a half after the attack, his breathing was extremely irregular and laborious. Inspiration would cease for nearly a quarter of a minute, and then go on with tolerable regularity for a little; his pulse was slow and irregular, sometimes intermitting; he died about midnight, two hours and a half after his breathing became affected." On examination of the body, a cavity containing a quantity of blood was found in the pons varolii. Perhaps it will be allowed that in this case, the particular class or symptoms arose in consequence of injury to a part of the brain,

near to that from which the par vagum and other respiratory nerves arise.

It is a happy circumstance for this inquiry, that the case has been recorded by a gentleman so well known for minuteness and correctness of observation, since the coagulum, which is supposed to be the cause of the symptoms in apoplexy, is seldom found confined to one particular spot, but extended through a considerable part of the substance of the brain; and therefore, although from the rupture of a vessel near the origin of the respiratory nerves, the first symptoms of apoplexy may occasionally be those of disturbance to the respiratory organs, still, in consequence of the effusion of blood increasing, the other parts of the body will, in a short time, become affected. This is, perhaps, the reason why there is generally *total* paralysis before the patient expires.

In the work of M. Serres several cases of total paralysis are given. He describes the patients as dying with symptoms of asphyxia, or in a manner similar to animals in which the par vagum of both sides has been divided.

In the account of the dissection of these cases, it is observed that the effusion seemed to have taken place near the pons Varolii. One of them is very similar to that related by Dr. Cheyne, the

coagulum having been found in the same part. Upon this case M. Serres makes the following remarks : “ C’ était la première fois, depuis que mon attention était fixée sur les apoplexies cérébrales, que je trouvais les lobes sains, sur un cadavre qui avait offert pendant la vie une paralysie bien constatée.” In the description of the examination of the chest, he says, “ Un phénomène singulier et que nous ne devons pas passer sous silence c’est que les poumons étaient emphysémateux, les cellules pulmonaires étaient boursoufflées et remplies d’air, j’ attribue cet effet à la paralysie des deux nerfs pneumogastriques.”

Upon this question I shall not at present offer any further observations, as a paper directly connected with the enquiry, and containing facts which will form a secure basis for reasoning upon the symptoms observable in disordered respiration and circulation, has been lately presented to the Royal Society by Mr. Charles Bell.

I shall, however, take the liberty of trespassing still more upon the time of the Society, by making a few remarks upon a very curious question, which has particularly excited the attention of physicians in all ages since the time of Galen :—

Why sensation should remain entire in a limb when all voluntary power over the action of its mus-

cles is lost, or why muscular power should remain when feeling is gone?

The attention of Galen was particularly directed to this question, in consequence of his having been called upon, by some of his contemporaries, to account for the manner in which he had cured a partial paralysis of the finger by applications made to the spine.

In answer, Galen told them, that two sets of nerves went to every part; one to endow the skin with sensibility, the other to give the muscles the power of voluntary action. This opinion was probably founded on a mere theory; but the facts lately discovered, and the observations which have been noted in attending to the phenomena of disease, though they do not afford absolute proofs of the correctness of Galen's supposition, still they go far to establish the fact, that every part of the body which is endowed with two or more powers, is provided with a distinct nerve for each function.

The *form* of the nerves, which at the same time endow the skin with sensibility and the muscles with the power of voluntary motion, is such that they appear to be single cords; but if we examine the origin of any of those nerves, we shall find that it is composed of two packets of fibres which arise from distinct parts of the spinal marrow. These origins are soon enveloped in the same sheath, so

as to appear, to a superficial observer, to form a single nerve.

It is not too much to suppose that either of these origins may be affected while the other remains entire. To prove this by ocular demonstration will perhaps be impossible, and therefore the question will probably remain undecided. But we have already seen examples of the consequence of injury to a nerve that has a single root, viz. the portio dura: for if we cut it, there will be only one set of actions paralysed, while by dividing a nerve which has a double origin, viz. the fifth, we shall destroy two powers, viz. voluntary motion and sensibility. We know also, that when we cut through the trunk of a nerve going to the hand, we destroy both sensibility and the power of motion.

In reference to this subject, I shall state the result of certain experiments which were made about thirteen years ago, by Mr. Charles Bell. The two sets of filaments by which each spinal nerve is connected to the spinal marrow were exposed: on irritating one set, convulsion of the muscles upon which the nerve was distributed, ensued; but when the other was excited, no perceptible effect was produced. These experiments we have often repeated, and always with the same results; but from the violence necessarily used in making them, it has been difficult to ascertain which of the filaments

bestows sensibility on the part. It was easily shewn, that if only the posterior set was destroyed, the voluntary power over the muscles continued unimpaired ; but the pain necessarily attendant upon the performance of the experiment, prevented us from judging of the degree of sensibility remaining in the part.

It was, I believe, the result of these experiments, which induced Mr. Bell to give an opinion nearly similar to that of Galen, in a short essay on the Anatomy of the Brain, which was printed and distributed among his friends in 1809. An opinion somewhat similar has been lately offered by Dr. W. Phillip, in answer to a query of Dr. Cooke's.

If the view which I have here taken of this question be correct, it may lead to this rule of practice. If only one set of functions of a spinal nerve be deficient, we should apply our remedies to that part of the system from which the nerve arises ; but if both functions are impaired, we must then direct our inquiries to the state of the nerve in the whole course, from its origin to its distribution, as the loss of power is probably owing to some affection of a part of the nerve, after the two sets of filaments by which it arises, are united together.

I trust it will not be presuming too much, to expect that the detail of the cases in this communication, will excite the members of our profession

to inquire into the discoveries which have of late been made on the anatomy and functions of certain nerves.

The effect which these discoveries have already had on the minds of students, I have had ample opportunities of observing. The young anatomist, now, instead of considering the study of the nervous system as a labyrinth into which he dares not venture, enters upon the investigation with the conviction that it will prove more satisfactory and more interesting, than that of any other department of the science of anatomy. By examining the nervous system in animals less complicated in their structure than man, he is at once able to comprehend the grand arrangements, and, from the nomenclature of the principal nerves corresponding with their functions, he can, in a very short time, make himself master of that, which, to students of former years, was matter of the utmost labour.

Those members of the Society, who, while students, spent hours and days in attempting to shew all the nerves on the side of the neck and chest, will be able to appreciate the advantages gained by the discovery, that those nerves are in number and intricacy, in proportion to the complex nature of the respiratory organs. I may, perhaps, be permitted to suggest to those who are anxious to investigate the anatomy and physiology of the res.

piratory nerves, that they will find the inquiry very much facilitated by the dissection of some of the lower animals.

In the greater number of the mammalia, the nervous system within the thorax, is nearly the same as in man. In the abdomen, it has relation to the intricacy of the intestinal canal ; hence, it is more complex in the ruminating, than in man, or the truly carnivorous animal. In the neck and face, it bears the same relation to the parts. If an animal has little or no power over the voice, and breathes only by the nostril, as the horse or ass, the arrangement of the respiratory nerves is particularly simple ; and if we compare the nerves on the neck of the ass, with those of the dog, which breathes principally by the mouth, we shall be able to understand the complication of the nerves in the neck of man, who breathes not only by the nose and mouth, but has more power over the organs of respiration as vocal instruments, than any other animal.