fication of a disease-producing microphryte is the faculty of living and multiplying in the living tissue, the researches of recent years have taught us that its poisonloseness is even more essential than its adaptedness to a living nutritive medium; so much so that the damage which it thereby inflicts on its living environment is a means by which it spreads knowledge that environment to its own advantage. We have further seen that the contest which takes place in the organism between invading microphrytes and the living elements of the invaded territory is not a hand to hand fight between tissue elements at some points, but one in which both act (so to speak) at a certain distance. For in which the weapons are poisons and counter-poisons, toxines and anti-toxines—words which imply that the pathological endowments of these bodies are antagonistic.

The question of infection, therefore, has become—as many clear-sighted pathologists forewarned that it necessarily would—more and more chemical, less morphological. But in saying this, we must carefully guard against its being implied that any progress in the discovery of the chemical agencies by which diseases are produced and prevented can be made without the bacteriological method, or that it is in the least less necessary than before that all who intend to be pathologists should perfect themselves in the technique which Dr. Koch created. If, therefore, the questions which at this moment concern us appear to the chiefly chemical, it means only that we have got from the form to the substance, from the agent to the action. Pathologists were already physiologists, and are not now chemists. We care for microphrytes not as botanical species, but as makers of toxines; and for toxines not as chemical compounds but as producers of disease. For, although as not being organised, we must call them chemical, our chemical knowledge respecting them is so inconsiderable, so vague, that the chemist would scarcely recognise their existence. They possess certain pathogenic or axetalex properties which appear to adapt themselves to proteids; but of their chemical nature, the pathologist is able to say even less than the physiologist can of the so-called enzymes.

I must not end without saying a word as to the future of pathology in this country, and particularly in this great metropolitan school of medicine. Unfortunately it must be admitted, whether we like it or not, that hitherto we have been too much contented to let other men labour and complacently enter into their labours. I have in the course of these lectures been only too conscious, and it must have been equally apparent to those who have listened to me, that of the names I have had occasion to refer to as of men who have achieved the progress which it has been my business to record, few, far too few, have been names of our own countrymen. Happily the promise of the future is more encouraging than the record. We have now, if we have not, a considerable body of men who know their business and how to do it—men young enough not to have lost those exact habits of observation acquired by previous studies in physics and chemistry, and in physiology, yet old enough to take a living interest in medicine—men with a very definite understanding of what pathology means and how it must be advanced, namely, by that same method which Harvey commended so emphatically to us over two hundred years ago—the searching out of the secrets of Nature by way of experiment.

In the part it has taken in the building and establishment of a laboratory for researches in pathology and pharmacology this College has given substantial proof of its readiness to follow Harvey’s counsel. It could not have raised a better monument to his memory. The success of the College is already assured. Small as it is, it has already become a centre of pathologico—work—such whence a salutary influence in the direction of real progress is spreading in every direction. Nor can it be doubted that when the advance of the next ten years has to be chronicled its establishment will be looked back to as the beginning of a new era.

By decree of the Prefect of the Seine, a Committee, which includes Professor Brouardel and Dr. Motet among its members, has been formed for the purpose of studying the questions connected with the creation of a medico-legal institute in Paris, and drawing up a scheme for its organisation.

REMARKS
ON
THE VARIOUS SURGICAL PROCEDURES
DEvised FOR THE RELIEF OR CURE
OF TRIGEMINAL NEURALGIA
(TIC DOULOUREUX).

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NEURALGIA is a term of somewhat vague import, merely implying the existence of pain as a result of some morbid condition of the nerves. The special form of neuralgia with which this paper is concerned is what is known as facial or trigeminal neuralgia, the nerve affected in this case being the fifth or trigeminal. The pain may be situated in any part of its region of distribution, and may depend upon an affection of any branch of one of its three main divisions; but the pain present in this condition is peculiar in several respects. It is intense and paroxysmal, with frequent intervals of freedom, which may extend over days or hours, or may be limited to only a few seconds, so that it becomes practically continuous. It is often confined to a particular branch of one of the divisions, but it not uncommonly extends from one into another, and in an extreme case all three divisions of the nerve may be involved. But it usually starts at some point, and is frequently corresponding with the exit of a nerve twig from a bony canal, and it may be excited by the least change in external conditions. A slight breath of wind or the slightest touch may evoke a paroxysm, and moderate pressure never fails to excite it. This is this paroxysmal character which has earned for it the synonym of epileptiform neuralgia or tic douloureux.

These tender spots or foci were first pointed out by Valleeix, and they are as follows:—In the distribution of the first division are the supraorbital notch, the junction of the nasal bone and cartilage, and the inner angle of the orbit, where the trochlear branch becomes superficial. Other points which are less frequently the seats of pain are the upper eyelid and the eyeball itself, but in the last position the pain is said by the sufferers to be of a particularly distressing character.

In the distribution of the second division the most common foci are the infraorbital foramen, where the nerve of the same name emerges, and the malar foramen in the malar bone. Pain may also be experienced, but more rarely, along the upper gums or in the upper lip, and there may be a focus in the palate, a somewhat unusual one, but when it does exist it is the seat of intolerable pain.

In the territory of the third division, the inferior dental nerve and the lingual are the most common seats of severe pain, but it is also sometimes experienced in the auriculo-temporal region just in front of the ear, and more rarely in the lower lip. Anstie, in his work on neuralgia, states that another very common seat of severe pain is situated just above the parietal eminence but this is probably neuroasthenic and secondary.

Besides the pain which the unfortunate patient suffers, certain objective changes are not uncommonly manifest in the parts where it is experienced. Frequently the skin has a glazed and hyperemic appearance, due to the frantic energy with which the patient rubs the painful part; sometimes it has a moist, sweaty look, due to the accumulation of secretions which the sufferer, in dread of setting up a paroxysm, allows to remain undisturbed, and in some cases there is no doubt a true vasomotor or secretory disturbance leading to in-
creased vascularity or sweating over the part. In cases in which the lingual branch is affected there is frequently a unilateral furring of the tongue on the affected side, and this is present also in cases in which there is some degree of nerve-stretching, and records several cases in which various branches of the fifth nerve were affected. In all there was relief, which in one lasted for at least three years without recurrence, when he heard of one year after operation, then continued free; a third was lost three months after operation, and had until then remained without any attack.

Walsham strongly advocates nerve-stretching, and records several cases in which various branches of the fifth nerve have been operated on with success. In the three cases without recurrence, which he records, the relief was very marked. In one the infra-orbital was stretched; there was no return a year after. In the other the inferior dental was stretched from the mouth (Paravincini’s incision), and in that case there was no recurrence of pain in three years. Müller says that Albinus and Galen suggested section of the nerve, and this was actually carried out by Mesaresch, body-surgeon to Louis XIV. The motor nerves—for example, the facial—were supposed to be at fault. The operation consequently fell into disrepute because of the want of success, and the general belief became established that the affection was central. Schuh, Patrunb, and others revived it, exciting portions of sensory nerves.

With regard to nerve-stretching it need only be said that the procedure as regards the fifth nerve differs in various ways from that pursued with regard to the other nerves. The branch in which the pain starts is exposed at its point of exit, a blunt hook is passed under it, and over this it is stretched. The result is in many cases good, but, unfortunately, not lasting, and in the hope of more permanent benefit galvanism was tried with previous stretching, was practised; but as it was found that there was a recurrence of pain in the region of the nerve which had been divided, this being due to reunion of the divided ends, a means of avoiding this was sought in the excision of a part of the root of the nerve proximally, as a part of the operation of neurotomy.

Besides operations on nerves, it should be mentioned here that the most serious operation of ligaturing the common carotid has also been proposed and practised for the relief of facial neuralgia. It was first recommended by Walsham, and a series of cases has been recorded by Patrunb, in some of which relief was obtained, while in others the operation had little or no beneficial effect. The success obtained was certainly not such as to justify its employment as a routine method of treatment, and it may now be said to have practically dropped out of use as a means of treatment for facial neuralgia.

I shall now proceed to consider in detail the various branches of the fifth nerve on which operations are carried out, and to describe the operations themselves, and the various modifications which they have undergone, and the results which may be hoped for from them.

First Division of the Fifth Nerve.—With regard to the branches of the first division on which operation is carried out, the supraorbital is the first which demands attention. The superior orbital fissure is an opening in the floor of the orbit, which may be divided into the region of the forehead, and the supraorbital. The nerve may be stretched subcutaneously or by exposure, the usual way, a blunt hook being used to catch it up. Division also may be carried out subcutaneously, but the most satisfactory method of dealing with the nerve will be found to be by excision. This is carried out as follows. An incision is made parallel to and just below the supraorbital margin. The incision is to be an inch in length. After incising the orbicularis oculi muscle, search must be made in the notch or foramen for the nerve and accompanying artery. These can be easily recognised and separated in strong light (electric), and each made for every branch of the nerves. The divided end is now pulled forward, and the terminal filaments dissected out and divided. At the same time the supraorbicular may also be dealt with in a similar way, as it is easy, as a rule, to follow back the supraorbital to the point where it is given off as one of the terminal branches of the nerve, the other terminal branch being the supraorbicular.

But the supraorbicular may be dealt with by itself.

1 Trophische Störungen des Nervenareals.
2 Practitioner, 1884.
Its position is indicated by a line drawn from the outer angle of the mouth through the inner canthus to the orbital margin. At this point of the orbital margin it is found to be either one of several fine filaments running from the orbit just above the pulley of the superior oblique. It lies deeply on the periorbita, and is best exposed by making a curved incision about half an inch long crossing its tract.

If strict ascetic be observed the small wound exposing these nerves should be completely united with horseradish sutures, and a light cyaniac dressing applied firmly with a bandage.

Second Division of the Fifth Nerve.—Of this division the following anatomic points may be noted:—It passes through the foramen rotundum into the infra-maxillary fossa, thence through the infraorbital canal to the infraorbital foramen. Before it approaches the face it gives off the following branches—temporal-malar, sphenopalatine, two or three dental branches. The infraorbital foramen corresponds with the junction of the inner and middle thirds of the orbital margin, and lies about a quarter of an inch below it.

Langenbeck recommended neurotomy by passing a tenotome in at the outer angle of the eye. Billroth formerly made neurotomy subcutaneously, always dividing the nerve in several places with the intent of 2 centimetres which it is employed a T-shaped incision for the infraorbital. He cut through the nerve and did not open up the canal. A. Wagner recommended Malgaigne first resected the infraorbital almost subcutaneously.

Petrunahl was the first in Germany, and Schuh was the next to carry this out. Malgaigne recommended exposing the nerve by a small incision, 1 centimetre below the orbital margin, passing a long strong tenotome along the floor of the orbit and cutting across the canal and nerve as far back as possible, and then drawing the tenotome through the canal. Agnew recommended varying the extent of the operation in the case of the second division according to the extent of the pain. Thus if the posterior dental nerves were not affected he would only remove the front of the nerve. But perhaps the method of dealing with the lower orbital nerve, which he employed, is that recommended by Wagner: Hildenbrand suggested a similar procedure, as follows: An incision is made parallel to the orbital margin and the skin reflected. The periorbit is raised from the floor of the orbit, and the nerve is cut through as it enters the infraorbital canal, and then drawn through from the foramen in front. Wagner recommended that the canal in the orbit should be laid freely by means of a chisel, the eyeball being held out of the way by a retractor, and the nerve can then be separated from the artery, raised and divided as far back as possible.

Sometimes the dental nerves are undoubtedly the source of infraorbital neuralgia, and in such cases Roux (de Toulon), so long ago as 1852, recommended, in the Proprie Médical, that the upper lip should be raised, the buccal mucous membrane divided, the antrum trephined and its lining membrane stripped off, and then that the segment of the maxillary tuberosity containing the superior and posterior dental nerves should be removed.

In spite of this very free treatment of the nerve, it was found that there was not infrequently a return of pain, and at length Carnochan recommended that the trunk of the nerve should be resected beyond Meckel's ganglion. The key of the operation he believed to be the removal of the ganglion. It was carried out as follows: An incision was made commencing near the internal angle of the eye on the infant edge of the orbit opposite the anterior lip of the lacrimal groove. The incision was carried downwards and outwards for about an inch to a point opposite the foramen on the lower part of the ala of the nose. Another incision was made, also terminating at this point, and commencing half an inch below the external angle of the eye, opposite the edge of the orbit, thus forming a V-shaped flap in the area of which was situated the infraorbital foramen. The flap was thrown up, and the branches being found severed, a tenotome, as to divide entirely the tissues of the cheek and upper lip along a line passing midway between the ala of the nose and the commissure of the lips. The two flaps were then dissected from the bone and turned, one out and the other in. The whole anterior wall of the antrum was not exposed. A trephine was next applied to it with the infraorbital foramen at the upper margin and the cavity of the antrum exposed. The nerve was seen and carefully separated as far as the posterior wall of the antrum, bone forceps or chisel being used if necessary. The posterior wall of the antrum was now attacked with a chisel and broken down, and the sphenomaxillary fossa thus exposed. The trunk of the nerve was now isolated in the fossa, and the posterior dental nerve and the branches to Meckel's ganglion divided, and the trunk itself cut with curved scissors close to the foramen rotundum, and the exposed part removed.

In the three cases which Carnochan himself reported at the time when he published his paper, the operation was successful, but in two at least the interval which had elapsed between the date of the operation and the time when the cases were recorded was less than a year.

Gröber reported three cases, in which, on account of the limited space and the bad light available in Carnochan's operation, he performed temporary excision of the upper jaw, but as in one suppurating occurred and in another part of the tract was united, the procedure is not one which is likely to commend itself.

Chavasse also reported two cases in which he carried out an operation similar to Carnochan's, and nine months after it there was no return of pain in either. The points in which Carnochan's procedure were that instead of Carnochan's V-shaped incision with the subsequent cut downwards from its apex, he made his first incision along the lower orbital margin, and his second from this down to the angle of the mouth without opening into it. Instead, also, of breaking through the posterior wall of the antrum with a chisel he used a small trephine, but the way in which the nerve was treated was essentially the same as the older operation. Clutton similarly obtained excellent results.

Fowler operated in the same way as Chavasse, and so did Rockwell.

Such an operation as that just described, although possessing the undoubted advantage of enabling one to reach the second division of the nerve as far back as it can be reached without going inside the skull, possesses the great drawback—namely, temporary excision of the zygomatic arch. He made an incision 1 centimetre behind the external angle of the eye in the anterior and lower corner of the temporal fossa, and carried it downwards and forwards into the region of the third upper molar tooth. Here a sharp punch can be felt—the commencement of the zygomatic arch. The soft parts are separated, and the zygomatic process of the malar is laid bare. This is sawn through, the saw being directed inwards, so that the surface may be used as to furnish a good support when the bone is replaced.

The zygoma is then fractured posteriorly, with the attached fascia turned upwards and the sphenomaxillary fossa opened into. The nerve is then followed from the hinder end of the infraorbital canal to the foramen rotundum, and this piece of the operation is sometimes deformity and the result apparently of the division of the masseter, and a modification of it with the object of preventing this deformity.
I should then prefer to carry out the modified Pancoast's operation, of which a description will be given later.

Third Division of the Fifth Nerve.—Although the lingual or gustatory branch of this division is occasionally affected with the paroxysmal neuralgia peculiar to the fifth nerve, and more rarely the buccal and auriculo-temporal branches, by far the commonest of all is the marginal branch of the buccal nerve, which is the inferior dental and its continuation, the mental.

The lingual or gustatory branch of the inferior division of the fifth nerve passes down under cover of the external pterygoid muscle, lying internal to and in front of the inferior dental. It then passes between the internal pterygoid and the lower jaw, and is inclined obliquely inwards to the side of the tongue. It crosses the duct of the submaxillary gland, and is continued to the apex of the tongue.

Operations on the nerve may be carried out from the mouth or from the outside, in the manner to be described in connection with the inferior dental nerve, and it has also been suggested that it might be operated on in the digastric triangle.

The buccal nerve and the auriculo-temporal are easily exposed, the former from the mouth by dividing the mucous membrane opposite the middle of the anterior margin of the ascending ramus of the jaw, and the latter as it crossed the zygoma between the temporal artery and the pinna of the ear. The former operation is very disadvantageous (vid. infra.).

The nerve is now in its full length, and it can be divided into (1) those in which the nerve itself is attacked from the mouth, (2) those in which it is attacked from the outside, either as it enters the canal or as it is in it, and (3) those in which the third division of the maxilla is sought at the base of the skull. The last operation, of course, is available not only for cases in which the pain is in the distribution of the inferior dental, but when it occurs anywhere in the region of the third division.

The operation which is done from the mouth is what is known as Paravicini's operation. It is carried out as follows: the jaws are widely opened, the angle of the mouth on the side on which the operation is to be is drawn down and out, and the mucous membrane is incised for an inch along the anterior border of the ascending ramus of the lower jaw. The incision is carried down to the bone, and the periosteum with the soft parts detached until the dental foramen is exposed. The nerve can now be seized and separated, and about an inch of it, if desired, can be excised. The lingual nerve crosses the lower extremity of the wound, and it too, if desired, can be dealt with. The dissection on to such an operation is the certainty of the wound becoming septic, and the consequent inconvenience and danger to the patient, not only from the danger of local necrosis, but of general infection. It may now be said to be very rarely practised.

The operation of Paravicini's is the oldest. He proceeded by displaying and chiselling away the surface of the under jaw above the angle until the nerve was exposed. In the similar method of Kühne and Brun a piece of the lower jaw above the angle was sacrificed. In Sonnenburg's and Lücke's method recourse was had to position particularly. The nerve was sought with the head hanging down. An incision was made round the angle of the jaw corresponding with the insertion of the masseter, the soft parts were raised from the inside of the bone with the anterior border of the canal, and in front of it the lingual, could be felt with the finger. A hook was then passed round the nerve as it entered the canal, and part removed.

Various methods of exposing the nerve in the canal have been used. Arnow24 makes a horsehoe flap over the ramus of the jaw and masseter with the convexity downwards. It was 1 inch vertically and 1½ inch transversely. The external wall of the ramus was trephined ½ inch above the angle, and ½ inch behind the last molar. Garretson25 makes his incision 1 inch behind the molar and exposes it for 2 inches. Two longitudinal cuts are made ½ inch apart, under the outer wall, and the canal exposed with chisel and hammer. An exactly similar procedure to that of Gar-
retson is recommended by Hildenbrand.27 Beau,28 of Toulon, used a semilunar flap in the cheek from a little behind the anterior border of the masseter to the chin, turned it up, and trephined over the entrance of the inferior dental nerve and divided it. He then exposed the mental nerve at its foramen of exit, thoroughly freed it, and pulled it from above through, the mental branches having been dissected out and divided.

In Warren's method an incision was made from the sigmoid notch to the lower border of the jaw. The fibres of the masseter were cut, and a trephine of 20 to 25 millimetres applied below the notch, exposing the nerve and vessels. The nerve was drawn down and 11 millimetres excised. Velpeau's modification of this consisted in raising a V-shaped flap with the convexity downwards, avoiding injury to the parotid. Galignani29 recommended an incision along the lower border of the jaw, and behind the ramus, as high as the lobe of the ear. The periosteum was raised until the tendinous insertion of the internal pterygoid was reached. This was divided and the periosteum elevated until the dental foramen was reached. The nerve was drawn down with a hook and 5½ millimetres excised. Weir Mitchell30 trephined at the angle of the jaw and excised part of the nerve. He also suggested blocking up the end of the canal to prevent re-union.

These are some of the numerous operations proposed and actually carried out for the relief of neuralgia of the inferior dental nerve. Further, the body of the jaw or the ascending ramus has been perforated by the dentist's drill (Tomes) so as to completely destroy the nerve, that is, cut it across. All these operations have the disadvantage that the nerve is not sufficiently removed between the foramen ovale and the upper end of the inferior dental canal. It was to provide a means of doing this without injuring important parts that I suggested and have frequently carried out the operation which I shall now describe. In devising this operation the objects which I had in view, besides that alluded to, were: (1) To secure separation of the lingual and inferior dental nerves from their continuation with the main trunk just outside the foramen ovale. (2) To effect this without notable scar and without injury to such important structures as the facial nerve, parotid gland and the articulation of the lower jaw. (3) To see clearly every step in the operation and to have the nerve in view, not only where it is first exposed, but where it is divided. (4) To obtain immediate union of the wound.

EMARKS ON THE USE OF ELECTRICITY IN GYNECOLOGY.

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Having worked at this subject for now four years, we are induced to put before the readers of the BRITISH MEDICAL JOURNAL our experience of it after giving it a fair trial. We shall not enter into the details of apparatus, etc.; this can be learnt from Apostoli's published works. We shall simply state what we consider to be the value of the continuous current and of the interrupted current in the treatment of certain diseases peculiar to women.

We may state that the amount of knowledge of electricity that is required to carry out this treatment can be very easily acquired by anyone who is willing to devote a little time to obtain it from books and from conversation with electricians, but we consider that something more than a mere smattering of knowledge of diseases of women is necessary to avoid mistakes, which even with the most experienced will sometimes creep in. We have used the galvanic current over 500 times in 100 separate cases without any ill result, and in most of them with benefit.

Myoma Uteri.

The first set of cases we will take will be that of myoma uteri. We have used fibroids without bleeding, and for the same class of tumours with bleeding, for stationary tumours accompanied by bleeding, and for the same kind of tumours without bleeding but accompanied by pain. The results have been as follows: There has not been any great reduction in the size of the tumours, but rapidly growing tumours have been checked in their growth in all cases except one. The bleeding has been lessened in a very marked degree by the intrauterine use of the positive pole. The pain has been lessened and in some cases removed entirely. The general health has been much improved, the feeling of weight has been removed to a great extent, and this out of all proportion to the diminution of the size of the tumour.

In a short paper like this we cannot quote details of cases. We simply give our opinion after working at the subject. We do not regard electricity as a means of cure or even of relief in all cases of myoma uteri; we regard it as a very valuable addition to our means of treating a very troublesome set of cases. Fibroids of the uterus have been often classified according to their position in the walls of the uterus; this to what extent is useful, but we are sure what is often of as much importance is the fact of their being accompanied or not by any other diseased pelvis condition, especially disease of the uterine appendages. An ordinary uterus will bleed most profusely in some cases when there is disease of the appendixes; how much weight it can lose depends what complicated with a similar disease? These cases we regard as least amenable to the electric treatment, and in all probability they require removal of the diseased appendages with the double result of removing diseased organs and bringing about the most rapid cure.

The removal of the appendages does not always check the uterine hemorrhage. We have had placed under our care for electric treatment a patient from whom a very able surgeon removed both appendages; this young woman has had protracted hemorrhage by the operation. We diluted the uterus and found a myoma situated in the anterior wall and bulging well into the uterine cavity. She has had two applications of electricity and the uterus is already much smaller, and the hemorrhage has lessened although it has not yet ceased entirely. We have followed the rules laid down by Apostoli, and can to a great extent verify his statements.

Subinvolution.

In ordinary cases of subinvolution of the uterus the intrauterine use of the negative pole with a current of 50 milliamperes given once a week for three or four times has a very good effect, the uterus very rapidly undergoing involution. The cases do best where the enlargement of the uterus is the principal lesion; those cases complicated with endometritis are best treated by ordinary intrauterine medication and curettage.

Dysmenorrhoea.

In cases of dysmenorrhoea, due to a narrow condition of the cervix uteri, the intrauterine use of the negative pole causes an immediate diminution of the canal, which remains permanent, and removes the pain which was due to the stenosis. We know of no treatment so effectual for the relief of pain in these cases if the cause is simply a narrow canal.

Often these cases are complicated with tubal or ovarian disease; if so, after dilating the canal with the galvanic current, the faradic current should be used for the relief of the other pain.

Caustic Action.

Destruction of diseased tissue is most easily effected by the negative pole either by puncturing or simply by touching. It is most useful in urethral cases, and in chronic inflammatory deposits in the pelvis, in order to assist absorption or to drain away pus, etc.

The Faradic Current.

Although relief of pain is very marked by the use of the galvanic negative pole within the uterus, yet the best agent for this purpose is the faradic current. To relieve pain by the faradic current it is necessary to attend to a few brief directions.

In a very large class of cases, all that need be done is to
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(Continued from p. 14.)

All previous operations for trephining the jaw fall under the disadvantage of not complying with all the above operative considerations or of not removing the nerve before its entrance into the bony canal—in my opinion a sine quod non for a successful result. The operation known as Paravicini's had the further disadvantage that the wound of necessity became septic. The operation which I advise and have performed since 1886 is carried out as follows:

The skin having been first shaved and washed with soap and water, is covered for twenty-four hours with a dressing of lint soaked in 1 in 30 carbolic solution. Just before the operation it is finally sponged with warm leon, and the external auditory meatus, after being thoroughly cleaned out, is rendered more antiseptic by the insufflation of powdered boracic acid, or is packed with antiseptic wool or soft gauze. The patient is anaesthetised, preferably with chloroform, so as to diminish facial congestion, although ether has frequently been given for me in this operation without much inconvenience. An incision is then made, (See Fig. 1.) beginning above the upper border of the root of the zygoma and carried through the skin and superficial layer of fat only, straight down the front of the tragus and following the contour of the jaw behind the angle forward just below the border of the body as far as the facial artery. The triangular flap thus marked out is then raised, the knife cutting the layer of fat and superficial fascia which lies immediately over the deep masseteric fascia. In this latter ramify the branches of the facial nerve. The flap is in both directions upwards with available traction until the anterior border of the masseter is reached, and the edge of the parotid and the lower border of Stenson's duct are clearly defined. The degree to which the parotid gland covers the masseter muscle varies, of course, in different individuals, but this is of no consequence. What does matter is that sometimes collecting tubules of the lower lobules run upwards towards Stenson's duct just within the anterior border of the gland, covered only by a thin layer of the parotid fascia. Unless care be taken in defining the edge of the parotid or the fascia left injured in the next step of the operation, one or other of these may be divided or torn, and subsequent annoyance may be caused for some days by a flow of saliva through the track of the drainage tube.

The next step is to divide the fascia, muscle, etc., between Stenson's duct and the highest branch of the facial nerve. The nerve branch and duct being obvious, the masseteric fascia is split horizontally between them over the whole breadth of the muscle. (See Fig. 1.) In doing this the branches of the transverse facial artery will probably be wounded; if they are tied at once they will give no further trouble. The fascia is then seized with a hemostat, and the whole masseteric fascia, with the back of a knife or some blunt instrument. It has been recognised for some time that if a nerve in its continuity be pulled by a small blunt hook, the point of traction being so narrow many nerve fibres may be seriously damaged, giving rise to subsequent paralysis. It seemed to me that this could be avoided by employing retractors which should have a convex outline towards the structures they were separating, so that the nerve they are drawing aside should slip round them as on a pulley. A similar retractor was suggested by Mr. Morris for pushing aside fat, etc., in operations on the parotid. The concave retractor acts like a reflector, carrying the light to the bottom of the wound. With such retractors, and with the aid of a blunt instrument, the hole in the masseteric fascia can be steadily widened until it is about 3 centimetres in diameter. The parotid gland should now be retracted towards the ear, so that the finger can freely detect the posterior border of the jaw. The masseter muscle is then to be divided, preferably with scissors, on the jaw for the posterior two-thirds of its extent. The rapid edging from the branches of the masseteric artery can be cut once by the application of a small sponge with some very hot lotion, though the arrest of the bleeding is especially provided for by the pressure of the retractors. The periorbitum of the jaw is then peeled off, together with the superjacent muscle, until the finger and the electric light (which is absolutely essential for the success of the operation and should be worn on the forehead) have made perfectly evident the sigmoid notch, the posterior border of the coronoïd process and the neck of the jaw.

The small wound in the muscle should then be plunged with a piece of hot dry sponge for a moment while operations are made for dividing the bone. Now, this division consists practically in extending the sigmoid notch down as low as the upper orifice of the dental foramen. The dental foramen is situated about opposite to the point where the masseteric ridge—which is really, of course, a continuation of the inner border of the neck of the jaw—reaches the middle of the vertical ramus. Although arbitrary measurements are dangerously untrustworthy, it may, perhaps, be better to mention that this point in the adult is usually from 12 to 15 millimetres (measured in the line of the ramus) from the bottom of the sigmoid notch. To prevent possible fracture of the jaw and to avoid subsequent division of the same with bone forceps I think it best to cut out the U-shaped section by first marking with the drill the presumptive position of the dental foramen, then carrying up on each side the proper distance a row of holes, made with a drill, completely but only penetrating the bone. (See Fig. 2.) These holes are best drilled with the central pin of Farabœuf's trephine, and then a small centimetre disc of the jaw should be taken out opposite the foramen. If this be done just at the opening of the foramen the periosteum on the inner side of the flap appears, and on its division the inferior dental artery comes into view, while lying behind and posterior to it is the inferior dental nerve. If the nerve is not seen at once it is probably just under the posterior border of the trephine opening, and may be reached by raising the periosteum with a hook, and advantage be looped round it at this stage. The rest of the bone marked out by the drill holes should next be removed lope artis. Curved bone forceps of patterns made for me by Mr. Hawsley, of Oxford Street, I find useful for this purpose.

The internal maxillary artery giving off the inferior dental branch is now seen, and if it is large and the walls degenerated so that it will not stand much traction it had better be divided between two fine ligatures, and the ends pushed out of the way. (See Fig. 2.) A quantity of loose yellow, acting as a filling the bottom of the wound and if it interferes with the next step some large lobules of it may be quickly extracted with the dissecting forceps. The inferior dental nerve, secured by the ligature previously passed round it, should now be divided at its raised point, or the fat, etc., is pushed away from around it with a conveniently stiff and narrow retractor. In doing this it is traced upwards to the point where it is coming from beneath the external pterygoid muscle. This latter is also to be levered upwards with the retractors, and by means of a sharp needle or the dental foramen, consequently search must be made for fully this depth if it should not have been found before. A large
length of it is then removed in the same way as from the inferior dental. The wound is then sponged out with warm sublimate solution, all bleeding points, including the smallest, ligatured with fine catgut, the whole thoroughly dried and the smallest drainage tube laid from the bottom of the hole to just above the lower angle of the jaw and the skin edges carefully pulled together with horsehair stitches at intervals of a centimetre. A light dressing of soft gauze and alembroth wool is then fixed on with soft muslin bandages. The patient usually is fed with spoon diet and custard pudding, etc., for five or six days, and is then given pounded chicken and fish and liberal mincemeat; provided the wound runs it proper course it is very remarkable to see how extremely little disturbance is caused to the eating.

A feature common to all neuralgic cases and of practical importance is the furred condition of the mouth, which, with the impracticability of cleansing it during the period of pain. Immediately after the operation, as it gives immediate and complete relief from pain, can be at once carried out by judiciously wiping out the mouth with a slender stick around one end of which some cotton wool has been twisted and wetted with warm boracic lotion. The drainage tube should be removed in twenty-four hours and an exclusive cotton wool dressing applied, which need not be taken off, unless uncomfortable, until the stitches are removed, seven or nine days after the operation. In one or two cases where the patients have been nervous and not given the jaw free play, which can be allowed after the first fortnight, they way, in this is not seen to, experience some stiffness, and in one case, when I only saw the patient three times, I had to give a little laughing gas, six weeks after the operation, and gently open the jaws to their full extent with a gag, which of course was easily done. After everything is perfectly healed, partly from a little accretion of exudation in the wound in the tissues of the cheek, the cheek of the operated side appears fuller than the other, but this is no disadvantage, as was shown long ago by Mr. Adams, such exudation (if not inflammatory, that is, suppurrative) doing good service in preventing any falling in from loss of substance, etc.

Believing strongly in the common origin of this evil in cold, I think it is a wise precaution to advise the patient to wear a slight protection over the seat of operation, in the shape of a silk covered guard if a male, and padded bonnet strings if a female. As these patients are usually reduced before operation and on account of their general state, loss of sleep, and the depression produced by the dreadful pain, they should always, if possible, be sent away afterwards to a warm seaside place, sheltered from the north and east such as Bournemouth etc.

The fact of cases having been seen in which the pain recurred after peripheral operation on the inferior division, suggested the adoption of a method which provides for the removal of this division at the foramen ovale itself. The first apparently to reduce this to a method was the elder Pan-

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30 Philadelphia Medical Times, 1872.
31 Verhandlung der deutschen Gesellschaft für Chirurg., XX Congress, 1880
32 Zeitschrift für Chirurg., 1884, XX, p. 84.
fascia, temporal muscle and the periosfeme at both roots of the zygoiia. Then the spot at which the zygomatic process of the temporal bone was cut from the tuberculum mandibulare is freed and sawn through. To be able to turn down the soft parts attached to the zygoma it is necessary to detach the temporal muscle from the skull at its insertion. Then work along the base of the skull with a blunt instrument to avoid cutting the joint and break the bone. The nerve cannot be missed if the corner bounded above by the base of the skull and below by the articulation of the jaw be adhered to. Electric light is necessary, and all the different parts of the nerve can be seen. The mouth should be kept slightly opened so as to keep the coronoid out of the way, and the nerve is divided by pressing a tenotomy along the artery and nerve to the foramen ovale.

An operation has been described, independently, by Mikulicz and Obalinski, with the view of exposing the third division, but as the method proposed by them involves the division of the jaw and does not permit of such easy access to the second division, it is not to be compared for utility to the valuable operation of Salter.

In three cases, as described below, where I have observed recurrence of the neuralgia after removal of a considerable portion of the inferior dental nerve through the enlarged sigmoid notch, as described above, I have found that the Pancoast-Salter operation with slight modification, afforded a very useful means of obtaining access to the second and third divisions of the fifth nerve, not merely at the base, but actually within the skull itself. In each case I have made a convex flap, the incision being carried upwards from the root of the pinna across the middle of the temporal muscle, and then joining the ridge and following that down beyond the external angular process and margin of the orbit to terminate just below the middle of the malar bone. This incision is carried down to the bone throughout, except at the fore part of the temporal fossa. The flap is then turned downwards, including skin and superficial fascia and fat only, as low as the centre of the zygoma. The deep fascia covering the temporal muscle is then best divided by an incision running parallel to the margin of the orbit and upper border of the zygoma, and at about 1 centimetre from these. The upper part of it is then turned up and the temporal muscle exposed. The next step is to divide the malar bone above the root of the zygoma, so as to turn that process downwards with the zygomatic attachment, the process being done by sawing vertically through the malar bone in a line with the posterior margin of the orbit with an Adams's saw, which can be pushed underneath the skin and periosfeme if the latter be separated a little. The posterior extremity of the zygoma should also be sawn through immediately in front of the capsule of the joint. The complete division of the bone is then best effected in each case with sharp forceps. The zygoma being now forced downwards, carrying with it Stenson’s duct and the branches of the facial nerve uninjured, the coronoid process of the jaw appears with the temporal muscle attached. The upper portion of the coronoid process should be cut off with strong forceps, and may be conveniently removed, together with the lower portion of the temporal muscle, since this has become degenerate after the removal of the branches of the inferior division. The oozing in this operation is usually very free, but is easily controlled by irrigation with very hot aseptic solutions and by firm sponge pressure.

The external pterygoid muscle is now divided from the sphenoid with an elevator and pushed down until the foramen ovale is completely laid bare, with the branch issuing from it. In two cases I have proceeded with a suitable long hand-died trephine to remove the bottom of the middle fossa of the skull between the foramen ovale and the foramen ovale, and have severed the branches of the fifth nerve within the skull and removed them freely outside. In a third case I did not open the skull, but contented myself with removing the nerve from the foramen ovale, which was found to be remarkably enlarged. (See Case II.) After all bleeding has been stopped and the wound has been thoroughly disinfected, a horizontal drain is placed at the bottom and brought out close to the pinna, and the rest of the wound carefully sutured with horsehair sutures and cyanide dressings applied. In two cases the wounds have healed by first intention, but in the third case some necrosis occurred, which also happened to Pancoast and others. I was at first inclined to blame the very free manipulation which is necessary for this effect, but I afterwards examined my books, and found that it was really due to the failure of the aseptic precautions, although in these cases they were very extensive. The operation is certainly a very useful one, and as it is not followed by any notable shock it does not appear to endanger life, and I recommend it to be tried as the next measure after the simple procedure of enlarging the sigmoid notch has been carried out according to the method described above.

(to be continued.)

General Practitioners’ Alliance.—A meeting of the Council of this Society was held on November 17th, 1898; 29 duly registered general practitioners were elected members of the Alliance. The following gentlemen were elected District Secretaries:—Dr. R. H. Barkwell (Wandsworth), Dr. Edridge-Green (Willesden), Dr. R. W. Jones (Westminster), Dr. Walter Moore (Stourport), and Dr. W. W. Stocko (Bromley).
there is a period during which naked-eye diagnosis is possible before anything definite is discovered by the microscope, is, I think, well proved by the following fact. In at least three cases in which different microscopists, who examined the specimen after its removal, reported that there was nothing definite, the disease yet recurred in the glands. I, therefore, always trust to other signs for the diagnosis. A careful microscopic examination ought always to be made, but it should follow and not precede a liberal excision. In one of the few cases in which I have known the disease return in the tongue itself, most valuable time had been lost before I saw the patient in the vain hope of establishing a diagnosis by the microscope.

If it be asked whether the doctrine of a precancerous stage and the habit of trusting to the aspect, etc., of the sore for diagnosis, do not occasionally lead to errors and to premature operations, I must answer candidly, yes. A gentleman to whom I had, after consultation with an eminent surgeon, advised excision of part of his tongue, was quite cured by a liberal use of the acid nitrate of mercury as a caustic, and several under similar conditions have been cured by the actual cautery. One very obstinate patient who refused my urgent recommendation that he should have the whole tongue removed because there were several separate places which looked very suspicious, lived for at least three years without any malignant development. He visited many of my surgical friends and always expressed his satisfaction, that by disregarding my recommendation he had saved his tongue. His fate found him, however, at last. He never consulted me again, but one morning a medical friend acquainted with the facts drew my attention to a newspaper notice of his death, and I found on inquiry that he had died after an operation on one of the tongues. He would have been a gainer by what some might deem a premature operation for (let alone the final result), his tongue had been a trouble to him during the whole interval.

REMARKS
ON
THE VARIOUS SURGICAL PROCEDURES
DEVISED FOR THE RELIEF OR CURE
OF TRIGEMINAL NEURALGIA
(TIC Douloureux).

By VICTOR HORSLEY, F.R.S., F.R.C.S., Surgeon to the National Hospital for the Paralysed and Epileptic; Assistant-Surgeon to the Middlesex Hospital, etc;

ASSISTED BY

JAMES TAYLOR, M.D., Pathologist to the National Hospital for the Paralysed and Epileptic;

AND

WALTER S. COLMAN, M.B.

(Concluded from page 1189.)

Operation for Removal of the Gasserian Ganglion and the Division of the Fifth Nerve behind the Latter.—In considering the possibility of relieving cases of invertebrate neuralgia where recurrence of the pain had taken place, I thought one might be able to remove the Gasserian ganglion or divide the fifth nerve behind it, and I made, the following preliminary experiments to see how far the Gasserian ganglion could be separated from the cavernous sinus. On first exposing the ganglion from the petrygoid fossa and opening the middle fossa of the skull freely following up the inferior division of the fifth nerve, I found that the one could raise the inferior division and so the lower half of the ganglion from its bed in the dura mater without damage to the carotid artery in the canal or to the cavernous sinus, but that when one attempted to strip up the upper half of the ganglion from the cavernous sinus, it invariably tore the wall of that cavity. For this reason I believe that the operation of complete removal of the Gasserian ganglion is not possible, but that in the operation which Mr. Rose has subsequently described only a portion of it can be taken away.

To the case, I then considered the possibility of dividing the fifth nerve behind the ganglion. It is well known that the fifth nerve enters the dura mater just beneath the edge of the tentorium, and that it runs afterwards in a small but roomy canal in the dura mater, joining the anterior ethmoidal arteries by a fibrous vascular sheath. In children it passes with a similar cleft on the upper surface of the petrous bone and on the roof of the carotid canal. Some experiments on the monkey to expose the crura had shown me that it was possible to expose the temporo-sphenoidal lobe, and then, by raising the brain care-
Table showing the Results of Removal of the Branches of the Fifth Nerve.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Duration</th>
<th>Presumed Exciting Cause</th>
<th>Nerve Distribution Affected</th>
<th>Trophic Changes</th>
<th>Previous Treatment</th>
<th>Operative Treatment</th>
<th>Mode of Healing</th>
<th>Notes</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.</td>
<td>60</td>
<td>7 yrs.</td>
<td>Worry</td>
<td>Left 2nd division; pain also in supra-orbital region</td>
<td>None</td>
<td>Extraction of all teeth; usual drugs, and opium in large doses</td>
<td>Mar. 21, 1888. Removal of 2nd division through antrum</td>
<td>First intention</td>
<td>—</td>
<td>Pain in upper gum remained.</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td>Left upper gum</td>
<td>Abnormal</td>
<td>None</td>
<td>Extraction of all teeth; ordinary drugs</td>
<td>July, 1887. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 7 months.</td>
</tr>
<tr>
<td>2</td>
<td>M.</td>
<td>65</td>
<td>7 yrs.</td>
<td>Exposure to cold</td>
<td>Left 2nd division</td>
<td>None</td>
<td>All usual drugs</td>
<td>Nov. 9, 1886. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief.</td>
</tr>
<tr>
<td>b</td>
<td>F.</td>
<td>50</td>
<td>12 yrs.</td>
<td>Worry</td>
<td>Right inferior dental</td>
<td>None</td>
<td>Teeth extracted</td>
<td>Aug. 12, 1887. Excision of 1 in. of 3rd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 3 weeks after operation.</td>
</tr>
<tr>
<td>c</td>
<td>F.</td>
<td>66</td>
<td>8 yrs.</td>
<td>Cold &amp; cleaning teeth</td>
<td>Right 2nd and 3rd divisions</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Aug. 21, 1887. Excision of 1 in. of 3rd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td>Cold</td>
<td>Right 2nd division</td>
<td>None</td>
<td>Extraction of all teeth; usual drugs</td>
<td>Aug. 21, 1887. Excision of 1 in. of 3rd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>b</td>
<td>F.</td>
<td>65</td>
<td>7 yrs.</td>
<td>Exposure to cold</td>
<td>Right inferior dental</td>
<td>None</td>
<td>Various drugs</td>
<td>Aug. 9, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>7</td>
<td>M.</td>
<td>39</td>
<td>6 yrs.</td>
<td>Movement exerts pain</td>
<td>Right inferior dental &amp; lingual; pain over vertex</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 5, 1888. Excision of part of injured nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>8</td>
<td>F.</td>
<td>58</td>
<td>9 yrs.</td>
<td>Exposure to cold</td>
<td>Right inferior dental &amp; lingual; pain over vertex</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 7, 1888. Excision of 1 in. of 3rd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>9</td>
<td>M.</td>
<td>60</td>
<td>7 yrs.</td>
<td>Movement excites pain</td>
<td>Left 2nd and 3rd divisions</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 21, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td>Left 2nd division</td>
<td>Abnormal</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 21, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td>Left 2nd division</td>
<td>Abnormal</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 21, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>10</td>
<td>M.</td>
<td>60</td>
<td>6 yrs.</td>
<td>Exposure to cold</td>
<td>Right inferior dental &amp; lingual; pain in upper jaw</td>
<td>None</td>
<td>All teeth on affected side extracted</td>
<td>Aug. 21, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>11</td>
<td>F.</td>
<td>68</td>
<td>15 yrs.</td>
<td>Getting wet</td>
<td>Right 2nd division; pain in supra-orbital region; pain in 2nd division</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Nov. 22, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td>Right 2nd division</td>
<td>Abnormal</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Nov. 22, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td>Right 2nd division</td>
<td>Abnormal</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Nov. 22, 1888. Removal of 2nd division of infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>12</td>
<td>F.</td>
<td>54</td>
<td>5 yrs.</td>
<td>Right 2nd division</td>
<td>Right 2nd division</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Jan. 15, 1889. Excision of part of right infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>13</td>
<td>M.</td>
<td>60</td>
<td>12 yrs.</td>
<td>Pressure or movement excites pain</td>
<td>Left infra-orbital; pain in supra-orbital region</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>Jan. 15, 1889. Excision of part of right infra-orbital nerve</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>14</td>
<td>F.</td>
<td>53</td>
<td>6 yrs.</td>
<td>Left infra-orbital; occasionally supra-orbital</td>
<td>Left infra-orbital</td>
<td>None</td>
<td>Swelling of right cheek and lower lip</td>
<td>May 8, 1889. Removal of 2nd division of infra-orbital nerve at foramen rotundum; antrum opened</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
<tr>
<td>15</td>
<td>M.</td>
<td>62</td>
<td>2 yrs.</td>
<td>Exposure to cold</td>
<td>Left 2nd division</td>
<td>None</td>
<td>Various drugs</td>
<td>May 15, 1889. Removal of 2nd division of infra-orbital nerve at foramen rotundum; antrum opened</td>
<td>First intention</td>
<td>—</td>
<td>Complete relief for 2 years.</td>
</tr>
</tbody>
</table>

* The letters a, b, and c signify second, third, and fourth operations respectively.
even any noteworthy oozing. The wound was closed in the usual way. Unfortunately the patient never rallied from the operation, and died seven hours afterwards, obviously from cerebral shock. At the post-mortem examination—which I obtained with some difficulty, and further details of which will be given in a paper on the pathology of the disease shortly to be published—I found that there was no cause of death except that already mentioned. There had been a slight amount of oozing into the subarachnoid space, but nothing to produce any compression at all, and of course of that there were no symptoms during life. At the moment when the fifth nerve was separated from the pons, although the patient was well under the anaesthetic, there was arrest of the respiration and the pulse could not be felt. This lasted for probably not more than three to four seconds, and then the respiratory movements and the pulse became normal. On reviewing the result of this operation I am satisfied that the unfavourable termination was due to the special circumstances of the case, and the considerable series of experiments on the lower animals which have been made involving the division of the fifth nerve show clearly that the mere exposure and section of the nerve is not of itself dangerous to life.

It has been suggested, Mr. Rose, to remove the Gasserian ganglion by removing a ring of bone around the foramen rotundum. I have already shown that the ganglion cannot be wholly removed from its bed, but only a small portion. This operation therefore resolves itself practically into removal of the lower two divisions of the nerve, if not of the lower wall of the skull. In Mr. Rose's first operation the foramen rotundum was reached by resecting the upper jaw. It is quite easy, however, to reach the parts by the Pancoast-Salzer method without resorting to this procedure, and, moreover, in Mr. Rose's case it was not a grave consequence, which is avoided by the method I carried out in 1888 of trephining the middle fossa through the pterygoid region. It may now be asked, do the results of the operation in those cases of intractable facial neuralgia justify the procedure? This question presupposes a previous one, namely, what is the condition for which the operation is undertaken? In other words, how is the operation supposed to act? Bell long ago suggested that section of the nerve in these cases produces an alternative and tonic effect on the nervous system. Erb agrees with Bell in thinking that the "strong peripheral stimulation is the cause of the disappearance of the neuralgia." Tripler regards facial neuralgia as probably due to some central change, and that a temporary inhibition is caused by the operation. Some cases, he thinks, may be permanent, and may disappear if the irritant is removed. Wagner also believed that the mischief is central. Caroehan attaches great importance to Meckel's ganglion in the production of neuralgia, and an essential in his operation was the removal of this. And even with this idea as to the origin of the pain and the consequently less radical operations undertaken for its relief, the success has been so marked as to convince many surgeons of the usefulness of operative procedures. But I hold very strongly the opinion that epiléptiform neuralgia is a purely peripheral malady, affecting principally the small subcutaneous branches of the nerve, or possibly the nerve endings, as well as the trunks of the fifth nerve, as they run in the bony canals of the facial bones, and that complete removal of the pain in any given division of the nerve may be obtained by ablation of the nerve from the base of the skull, unless the stump of the nerve become the seat of neuritis. (Vide Case 1 in the accompanying table.)

All other measures, for example, stretching, simple division, destruction of the nerve in a bony canal by the drill or trephining, may and undoubtedly do, give relief for a varying period. But the disease is extremely likely to recur in the stump or trunk as soon as the paralyzing effects of the operation have passed off. I do not believe there is such a thing as reflection of pain along other branches, and certainly no proof of its existence is to hand, although it is freely spoken of as occurring. If pain is felt in two branches, for example, infra-orbital and inferior dental, that means, I believe, disease of both those nerves. It is true that after operation on the nerve most affected, drugs such as salicylic acid and cocaine, etc., may so reduce the irritation in the other nerve as to render life tolerable and efficient, but in the end the remaining nerve, so far as I have seen, usually has to be extracted before permanent relief is obtained.

In this opinion I am supported by several authorities, and the evidence which they offer I shall discuss in a subsequent paper in the Practitioner on the pathology of this condition, in which I also hope to advance fresh evidence from cases of my own. Holding then as I do this opinion, I believe that operative procedure in those cases is an imperative duty. All medical measures of relief have failed. It is true that in many cases operation is not followed by that permanent relief which is aimed at, and this no doubt arises from several causes. One of these I believe to be the
excision of too short a piece, permitting reunion of the cut ends. It is stated by Hütter that experiments show that not less than 5 mm. added to the length of the nerve is required to prevent recurrence with certainty. Although I am inclined to think that this is an excessive length, there seems to be little doubt that a considerable gap between the divided ends can be bridged over, but I am convinced that in many of the cases in which a return of pain after nerve section, or blinding of the eye, was observed the result is in reality due to the occurrence of neurtis in the stump of the nerve, chiefly because the wound was not treated antiseptically. Another reason for a want of permanent relief after neurctomy is, I believe, because the nerve is not fully freed in the canal. If the procedure, and particularly those as such as carnot, be rendered unsuitable for the elaboration of the pigment, while still affording a rich nutriment for the microbe. Thus, if 1 per cent. of cresote be added to bouillon the medium soon becomes cloudy after inoculation with the microbe, but no pigment appears; the cloudiness deepens into milky opacity in time, the fluid teems with well developed microbes, but the pigment is not present even in the faintest degree. These are merely temporary aberrations in its physiological activity, nor has it yet been possible, though many attempts have been made, to obtain the organism disassociated permanently from its chromogenic attribute. As soon as the organism has been placed in proper surroundings the pigment-forming power reasserts itself. The proper surroundings consist, then, in a suitable nutrient medium, such as bouillon, with the presence of free oxygen, and in the absence of such restraining influences as antiseptics. Given these conditions the microbe, matter through which many generations its power of pigment formation has lain dormant, at once rises to its old activity and produces the pigment.

In the accompanying lists A and B are to be found the media which are best suited for the elaboration of the pigment, and also those which do not offer such an occasion. It is understood, in both cases, that abundance of free oxygen has been supplied.

A. Pigment Former.—On agar-agar (neutral), on agar-agar plus 0.75 per cent. of sodium carbonate, on agar-agar plus 0.75 per cent. of agar serum, on Koch's gelatine, on Koch's gelatine (alkaline), on bouillon, on blood serum, on milk, on coconunt water, on codfish water and blood, on rabbit's blood, on tubing, on fish broth. On Wasserrug's fluid, on Wasserrug's fluid plus 1 per cent. of milk sugar (very good), on Beyerinch's medium.

B. No Pigment Former.—On agar-agar plus 0.75 per cent. of sodium carbonate, on Koch's gelatine (very acid), on potato (both acid and alkaline), on beetroot, on turnip, on carrot, on parsley, on coconunt, on urin.

Pathology.—The microbe occurs either as a rod or thread form. The threads are either in true or pseudo-filaments, that is either as long solid filaments or as strepto-bacteria. The filaments are mostly solid, without septa; they are always very long, with a tendency to twist upon themselves, curving in various directions, and are flexible. Neither coccii nor spiralis have as yet been seen, although attempts have been made to obtain such forms artificially after the manner of Charrin, with bacillus pyocyaneus. Bacterial spores do not occur, but by influencing the growth of the bacillus by means of antiseptic or other poisonous substances, cylinders filled with spore-like bodies have been obtained. Dumb-bell and drumstick forms have also been found in great quantity, the drumstick forms being similar to those of the bacillus of tetanus. The fact of the above being true spores is perhaps not beyond doubt. It may be mentioned that no green-producing organism hitherto described has been observed to form spores, the only exception being the bacillus pyocyaneus, in which Professor Ferrari, of Turin, has, contrary to many observers, described their formation.

The Pigment.—I have not been able to separate this in a pure form as yet. It is, as seen in solution of melted gelatine, dichroic, green by reflected, and straw yellow by transmitted light. It is difficult to see it by gas light. When several weeks old it changes colour, gradually becoming like burnt sienna, and ultimately assuming a crimson tint in addition to the sienna colour. Both mineral and organic acids decompose it without destroying it; on neutralising with an alkaline the green colour reappears, or has little effect upon it. Liquor ammonie intensifies the normal green colour; and in media which do not appear to contain the pigment it...