developed. Both sciatics were stretched, and he was completely cured.

CASE XV. Langenbuch (*loc. cit.*). A man aged 45, with ataxy for seven years. The atactic movements were extreme and grotesque, affecting both upper and lower extremities. Both sciatic and the right median nerves were stretched. In two months, mere traces only of the ataxy remained.

CASE XVI. Langenbuch (*loc. cit.*). A man aged 31, with moderate ataxy for one year. The right sciatic and left anterior crural nerves were stretched, followed by very great improvement in motion and sensation, most marked on the left side.

CASES XVII and XVIII. Benedikt (*Wien. Med. Presse*, No. 30, 1881). No separate details of these cases are given, the paper being preliminary only. It is said that the pains, which were present in both patients almost continuously, disappeared after one sciatic operation, not only in both lower extremities, but over the whole body. Constrictive pains also subsided, and anæsthesia was improved. In one patient, who had long suffered from paralysis of the bladder, strangury and phosphatic urine, these symptoms disappeared. The ataxy was markedly improved, especially by a double operation; one patient who could only walk with two sticks, being afterwards able to walk without any support, and to turn round easily. One of the patients showed improvement in the contracted pupils, but the tendon reflexes were uninfluenced in either.

It is much to be regretted that some of these cases have not been reported in more detail, but it appears to be established that the operation was markedly beneficial, or even curative so far as the pains were concerned, this being the case in seventeen out of nineteen. The result, however, seems to have been by no means the same in all. In the greater number, all pains were removed, or at least greatly alleviated by one operation; but in three cases they subsided only in the territory of the operated nerve, while in one they disappeared from the part operated on, but increased elsewhere. The improvement seems to have been permanent in the majority, but on this point it is impossible to speak with confidence in the absence of further details. In Dr. Johnston's and in my own case, the pains reappeared, though less severely; and we should bear in mind that spontaneous remission of the pains in ataxy often occurs for considerable periods. The ataxy itself is said to have been cured in four cases only, three of Langenbuch's, and Esmarch's. Langenbuch's first case proved to be not affected with posterior sclerosis, and must be excluded from consideration, unless we admit the existence of a purely functional ataxy. Benedikt, however, goes so far as to say that the absence of posterior sclerosis *post mortem* does not prove the absence of this condition *intra vitam*, and that its disappearance may have been brought about by nutritive changes set up in the cord by the operations. With our present knowledge, it is difficult to share this somewhat enthusiastic view. Langenbuch himself considers it a case of genuine ataxy, in so early a stage that the peripheral nerves only were affected, and believes that the affection always commences in this manner, the posterior sclerosis coming on later. Esmarch's case was only shortly communicated in the course of a discussion, and is so wanting in details, that it must be received with caution. In eight cases, the ataxy was diminished; strikingly in three of Langenbuch's, the first two of Debove and Gillette, and in Benedikt's; only very slightly in Bastian's first case. In four, there was no improvement—Erlenmeyer's, Bastian's second case, Johnston's, and my own; while in the remainder the result is not stated. I think we may probably class them as failures in this respect, as it is not likely that any improvement would have been overlooked. It appears probable, therefore, that benefit is to be always expected from the operation so far as the pains are concerned, but that the prospect of improvement in the ataxy is much less certain. Langenbuch, however, takes a much more hopeful view, and Benedikt concludes that the operation can convert a severe case of ataxy into a mild one, and, so to speak, an advanced case into an early one. I am inclined to think that the operation is applicable especially to early cases, and where pain is a prominent symptom; but I should not hesitate to employ it in later ones also, as it has not been followed by any injurious results beyond temporary paralysis, and this very rarely: the rupture of a vein in one of Gillette's cases, and the venous thrombosis and erysipelas in Socin's and Erlenmeyer's, are merely surgical accidents. The wound itself is sometimes very slow to heal, a sluggishness which does not appear to be connected with the duration of the disease; as in my own case, in which the ataxy had been manifested only three years and a half, the wound was unhealed after six weeks, while in Debove and Gillette's second case, in which symptoms had existed for fifteen years, it healed by first intention.

It is most desirable that surgeons should come to some agreement as to the best mode of operating, and especially as to the force to be em-

ployed. The cases show considerable variety in these respects, as to point of exposure of nerve, direction of traction, etc.; and the words "strongly," "violently," and so on, used in describing the operation, afford us no means of judging of the strength of the extension. As Dr. Bastian justly remarks: "It is quite possible that too weak a pull may produce little or no effect; but, on the other hand, too strong a pull may yield either no good results, or results which are positively harmful." The impression I have derived is that, in the foreign cases, which have been followed by greater benefit than the English ones, a greater force was used, and that it was often applied more suddenly than in this country; [this point deserves attention, as the same force used with a jerk, or applied in gradual extension, would probably give different results. Langenbuch appears now to prefer gradually increasing extension, and uses as a test for the force to be employed, the effect produced on the pulse and breathing; these are sometimes even doubled in frequency, while in other cases the opposite occurs, and they may be as much diminished. He continues to drag on the central end of the nerve with increasing strength until a distinct effect is produced on the pulse, which is counted aloud by an assistant; he then stops, and finds that the pulse and respiration return almost at once to their normal rate. I believe this is probably the best mode of operating. M. Gillette has devised an instrument, which he calls a "nerve-stretcher". (*Bull. de la Soc. de Chirurgie*, 1881, page 533.) It consists essentially of a somewhat flattened blunt hook, which is inserted under the nerve, traction being made at right angles to its course, while the limb is held down by an assistant; a dynamometer is so connected with the instrument that the force employed is exactly indicated on a dial. The only objections to this apparatus are, that the extension must affect the central and peripheral portions of the nerve equally, and that the pressure of the hard hook against the part of the nerve to which it is applied must give rise to more extensive local crushing and bruising than would be the case with the finger and thumb. The introduction of the dynamometer, however, is a genuine improvement.

It would occupy too much time to inquire as to the mode of action of the operation, especially as the subject is still under investigation by experimenters; but, so far as we know, a forcible extension of a nerve, when not excessive, is followed by temporary paralysis only; and, further, the operation seems to act on the spinal cord as well as on the nerve itself.

CASE OF INJURY TO THE CERVICAL PORTION OF THE SYMPATHETIC NERVE, IN REMOVING A SARCOMA.*

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EULENBERG and GUTTMANN, in their work upon the *Physiology and Pathology of the Sympathetic System of Nerves*, state that there are no recorded cases in which a direct injury, confined to the cervical part of the trunk of the sympathetic, can be asserted with confidence. The following case would, therefore, seem to be of interest—not only surgically, but also physiologically.

K. T., aged 6, a pale delicate-looking girl, came to the out-patient room at the General Hospital, early in August 1880, to receive treatment for a tumour lying under the horizontal ramus of the jaw, in the position of the right submaxillary gland. According to the statement of the mother, a small lump, of the size of a hazel-nut, was noticed in the position named at the time of birth. The increase in size was slow, and in accordance with surgical advice, not much attention was paid to the abnormality until three months before coming to the hospital, when a visibly increasing enlargement was perceived. The following is the description of the tumour when seen in August 1880. Its situation was at the upper portion of the right anterior triangle of the neck, just below the horizontal ramus of the inferior maxilla. Its size was that of a Tangerine orange; it was firm to the feel, movable, and, as far as could be ascertained, not connected with the surrounding textures; it was painless.

August 18th, 1880. I made an incision over the tumour, parallel to the ramus of the jaw. It was then found that the tumour had no connection with the submaxillary gland, but was encapsuled, and dipped down deeply into the neck. Quite superficially, lying over the front of the capsule and adherent to it throughout, a large nerve was observed, the precise nature of which was doubtful until it was gently seized by a pair of forceps, preparatory to dissecting it away from its adhesions. The breathing of the patient was immediately much impaired, becoming jerky; and the child, although fully under the influence of chloro-

* Read before the Birmingham and Midland Counties Branch.

form, made efforts to vomit. The nerve was the pneumogastric. The peculiar breathing continued until the nerve had been quite released from the tumour and the grasp of the forceps. On the inner side, the tumour had adhering to it the upper part of the common carotid and the first portion of the external carotid arteries, for about two inches. Posteriorly, it was necessary to dissect away the trunk of the sympathetic nerve, as the tumour rested upon the transverse processes of the vertebrae. The whole of the growth was removed in one piece; the internal jugular vein was not found in any way attached to the same. At the conclusion of the operation, the pupil of the right eye was seen to be contracted to the size of a pin's head.

August 19th. The patient had been very restless, and had made continuous efforts to vomit. She complained merely of slight pain in the neck.

August 20th. The child was weaker, and made incessant efforts to vomit. I ordered an half-ounce enema of brandy and milk, to be given thrice in twenty-four hours.

August 21st. The child was brighter, and only vomited once. The pupil of the right eye was irregularly contracted, as at the conclusion of the operation, but acted a little under the stimulus of a strong light. There was also drooping of the upper lid, and well-marked diminution in the size of the palpebral fissure. The sight of the eye was unimpaired.

August 22nd. All vomiting had ceased. The lungs were examined, and nothing abnormal detected. Teaspoonful doses of beef-tea were given. With regard to the further progress of the wound, there was nothing of note. By the 10th of September, healing was complete. A microscopic examination showed the tumour to be a mixed sarcoma, in which spindle-cells preponderated.

August 29th. A drop of atropine was placed in the affected eye, and the pupil very slowly dilated under its action. In a few days it contracted to the same size as before. At this date, also, a slight exudation of pus was perceived immediately over the occipital protuberance. Subsequently, a piece of the scalp, of the size of half-a-crown, separated as a slough, leaving the occipital bone at that point quite bare. From its median position, I believe this sloughing was due to pressure from continuously lying on the back, and not to any trophic influence.

October 18th. (Two months after the operation). An examination of the eyes was kindly made for me by Mr. Eales, at the Eye Hospital; the following is his report: "Pupil of right eye contracted irregularly, but responds slowly to alterations in the intensity of light. Accommodation good, as in the other eye. Vision normal ($V = \frac{15}{25}$). With the ophthalmoscope, no appreciable difference can be detected in the size of the vessels of the retina."

December 18th (two months later). The narrowing of the palpebral fissure was hardly perceptible; ptosis was slight. The pupil was larger than it had been, but was not equal in size to its fellow. There was no emaciation of the cheek, and no flushings or redness of the conjunctiva on the affected side had been noticed. The child's general health was good.

It was not possible, after the operation, to compare the temperatures of the auditory meatus, in consequence of the continuous vomiting, restlessness, and general signs of fear exhibited when the patient was approached.

To what may be attributed the condition of the right eye? Petit observed in 1727, and Boffi in 1746, that the cervical sympathetic nerve exercised a certain influence over the movement of the pupil, producing on division contraction of the same, and a drawing inwards of the eye. Claude Bernard subsequently pointed out that this contracted state of the pupil was accompanied by retraction of the globe of the eye, flattening of the cornea, and decrease in size of the palpebral fissure. In the case under notice, the chief points of interest, after removal of the tumour, were irregular myosis, narrowing of the palpebral fissure, and slight ptosis. It is generally accepted that the dilating fibres of the iris receive their nerve-supply through the cervical sympathetic. Remak refers the decrease in size of the palpebral fissure and the ptosis, when the cervical sympathetic is paralysed, to an alteration in the muscular actions of the levator palpebrae, orbicularis palpebrarum, and the retractor plicae semilunaris; and thinks that these muscles are under the control of a tonic power communicated through this nerve trunk. The dissection necessary to remove the sarcoma had to be carefully performed; and, the bleeding being only slight, every cut with the knife was readily seen, and, as far as could be ascertained, no nerves were divided; but, at the same time, it is quite possible that some very minute communicating branches may unknowingly have been cut. The trunk of the cervical sympathetic was grasped and held for some time in a pair of forceps, while it was freed from an adhering tumour: hence a pinching of the nerve-elements

and consequent interference with the functions of the nerve. That a similar pressure caused some perverted action of the vagus, the continuous and uncontrollable efforts to vomit seem to indicate; that the injury inflicted may not have been so severe, as to the sympathetic, is possibly due to the fundamental differences in the fibres which compose the nerve trunk. That there was no division of the larger fibres of the sympathetic, may be inferred from the absence of any signs of flushing of the face and reddening of the conjunctiva, indicating vaso-motor derangement; and also from the fact that emaciation of the face, and constant increase in temperature of the affected side, have been noted in cases where such an injury has occurred from gun-shot wounds. (*Vide* Cases by Seeligmüller and Bernhardt, *Berliner Klin. Wochenschrift*, 1872. Nos. 4, 47, 48.)

Will the eye ever recover? Eulenberg and Guttman, experimenting upon animals, found that, in dogs, there was contraction of the pupil four months after the trunks of the sympathetic and vagus nerves had been divided on the left side of the neck. Kampf brought a case before the Society of Physicians in Vienna, in which existed a permanently contracted state of the right pupil, following a stab on the edge of the sterno-mastoid muscle, which was unaffected even by electricity. In my patient, six months after removal of the tumour, all the oculo-pupillary symptoms had much improved; but, since that time, they have remained *in statu quo*. Fifteen months having now elapsed, it seems doubtful if the normal condition will ever be regained.

THE CURABILITY OF PHTHISIS AT HIGH ALTITUDES.

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IN the BRITISH MEDICAL JOURNAL, of October 1st, is a note on the above title, the writer of which, while admitting the possibility of expansion of the bases of the lungs from compensatory hypertrophy, hardly allows the existence of a similar process taking place at the apices. He also protests against the too sanguine views put forward about the arrest of phthisis through this alveolar dilatation; and he states "that the experience of every physician will supply him with cases of phthisis, in which, after a longer or shorter period of quiescence", under high altitude conditions, "a further extension of the disease has occurred with extreme rapidity".

As the writer appears to allude to certain views put forward by me, in a paper read before the International Medical Congress, in August, "On the Treatment of Phthisis by Residence at High Altitudes", I take the opportunity of correcting some inaccuracies which have crept into his statements, and which mar the logic of my conclusions; and I do this because some time may yet elapse before the *Transactions* of the International Congress appear, which will include the paper, with all its facts and reasonings.

My data as to the increase in the size of the chest, after a residence at high altitudes, were based, not on spirometrical observations, as the writer of the article assumes, but on measurements of the chest-wall at different levels, made either with Hare's tapes or with the cyrtometer; and these, carried out in a large number of cases, led me to the following conclusions.

1. A greater dilatation of the chest-wall takes place than can be accounted for by any accumulation of fat or muscle, and this even occurs in bed-ridden patients, who may be also losing weight.

2. While it may occur in any part of the thorax, it is more common in the upper regions, and most frequent of all at the level of the third rib.

3. It is oftener found in women than in men; and its amount depends, to some extent, on the yielding or non-yielding condition of the thoracic wall. The changes in the lung-tissue which give rise to these modifications in the form of the thorax, as far as I can ascertain them by percussion and auscultation, are: (1) partial absorption of the pneumonic consolidations; (2) shrinking and cicatrization of the tuberculous masses, and development of emphysema in this neighbourhood, similar to that found in *post mortem* examinations of arrested phthisis; (3) hypertrophy of the healthy lung-tissue. The existence of this last I deduce from the physical signs, and it may also be inferred from the improved breathing powers of the patients, as shown by their daily ascents, which previously would have been impossible of accomplishment.

I have not used the spirometer in these cases, and am quite as alive as the writer of the note to "the many difficulties surrounding the application of spirometry to practice", though most of these are over-