to a superadded cornual lesion. The actual findings in the recorded necropsies agree in degeneration of the nerves, the muscles, and the posterior columns of the cord; these three may be said to be constant as far as present knowledge goes. Among other lesions not constantly present or recorded are those of the posterior horns (recorded by Gombault and Mallet,¹⁵ and Marinesco), the anterior horns (by Friedreich, Gombault, Déjerine and Marinesco, and Sainton), sclerosis of the pyramidal tracts (by Sainton and Dubreuilh), and atrophy of the cells of Clarke's column by Sainton; while Déjerine,¹⁶ Gombault, and Marinesco have described some hypertrophy of the interstitial substance of the nerves leading to manifest thickening.

DIFFERENTIAL DIAGNOSIS.

The differential diagnosis offers little, if any, difficulty. Oppenheim and Cassirer¹⁷ have recorded a case which showed all or most of the distribution characters of a myopathy; but the reaction of degeneration (a degree of which is present often in the muscles not obviously wasted), the pains and anaesthesia if present and the distribution of the wasting are sufficient to differentiate the peroneal from the myopathic type. The similarity with progressive muscular atrophy is not close enough to occasion perplexity; the absence of the knee-jerks and the sensory phenomena are sufficient to obviate that. There is much greater difficulty in eliminating the possibility of multiple neuritis. Some of its characteristic symptoms developing after a toxic fever are suggestive, but the progressive and prolonged course of the peroneal atrophy are definitely distinctive, and the occurrence of electrical changes before and in excess of the atrophy are characteristic of the peroneal type alone.

In respect of treatment there is unfortunately but little to be hoped for. In the very early stages the administration of thyroid gland substance seems worthy of trial, on the theory that it might counteract the hereditary vulnerability of the central nervous system. Carefully adapted tenotomies and orthopaedic methods may certainly add many years of active existence to the patient's life, and the significance of this is especially important in view of the protracted course of the disease. For example, a case is referred to by Sainton who at 81 could still walk about although the disease began in adolescence.

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CASE OF CHRONIC INFANTILE PARALYSIS OF TEN YEARS' STANDING: TREATMENT: RESULT.

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CASES of chronic infantile palsy may be roughly divided into three classes: (1) Those of great severity, in which there is much wasting, extensive deformity, and, it may be, complete loss of the power of locomotion. Here it is obvious that surgery offers the only hope of betterment. (2) Cases in which the wasting is slight, and deformity absent; but where there is pain and aching after using the affected limb. Such are liable to be confounded with morbus coxae, but once their true nature is recognized, it is evident that no operation can be of benefit. (3) A group midway between these extremes—a lower limb, for example, is shortened, more or less wasted, and to some extent misshapen.

Cases falling into this third category are of fairly frequent occurrence in general practice. The diagnosis presents no difficulties, and the lesion is not so severe as to negative home treatment. Minor surgical measures may seem to be indicated, but in many instances the parents will not consent to anything of the kind. The question arises, what can be done?

The following case, occurring in my own practice, I venture to hope may prove not without interest:

N. H., a girl, aged 14, had infantile paralysis of ten years' standing, affecting chiefly the left lower extremity.

History.

At the age of 4 the patient, after exposure to a hot sun, was seized with an acute attack of vomiting and diarrhoea, with febrile symptoms. This lasted two days. On the child recovering from the gastro-intestinal disturbance the left leg was found to be almost completely paralysed. The left arm and back muscles of the same side were also slightly affected. There was nocturnal incontinence of urine, with which the child had not previously been troubled. The paralysis followed the usual course in such cases. That is to say, there was gradual spontaneous recovery up to a certain point, and after a few months the patient was able to get about again. The limb, however, remained generally feeble. So far as I could gather, there was not at this time complete paralysis of any group of muscles, but the movements of dorsiflexion and eversion of the foot were relatively the most impaired.

The parents, who were reasonably well-to-do, took the child to more than one neurologist, and received in every case practically the same opinion—that the disease was infantile paralysis; that the growth of the limb would be more or less checked; and that nothing could be done except to massage the affected muscles. Electrical treatment apparently was not mentioned; at any rate, it was not impressed on the parents as a vital necessity, nor does it seem that any warning was given as to the likelihood of deformities supervening unless suitable supporting apparatus were employed.

In accordance with medical advice the limb was rubbed systematically by the child's mother, and an attempt was made to carry out graduated exercises. Some improvement resulted from these measures, but in the course of a few months it was evident that the limit of improvement had been reached and the parents made up their minds that nothing further could be done. As the years went by, relative shortening increased, contractures of the calf muscles occurred, and from a state of paresis the peronei passed gradually into a condition of almost complete paralysis.

Physical Examination.

When I saw the patient, ten years after the original lesion, the left lower limb was much shrunken and wasted; there was $3\frac{1}{2}$ in. of actual shortening, as measured from the anterior superior spine to the inner malleolus. The buttock muscles were flattened and the gluteal fold lost. The foot could not be bent to a smaller angle than about 120 degrees with the leg. There was complete absence of voluntary power in the peronei, but no contractures of their opponents; the foot assumed the varus position on an attempt being made to place a weight on it. The limb was clammy to the touch and of lower temperature than its fellow.

The boot worn had no stiffening of any sort, and but 2 in. of sole extension.

Walking was possible only by the aid of a stick (Fig. 3), and the patient was liable to severe falls. As a consequence of the uncorrected shortening plus the paralytic varus, there existed marked downward (compensatory) tilting of the pelvis to the affected side, together with lateral spinal curvature and general faulty carriage.

Electrical Reactions.—Response to the faradic current was fair throughout the limb, except in the case of the muscles before specified. Even here, however, although all voluntary power was lost, a faint reaction indicated some remaining vitality.

Treatment.

Tenotomy of the tendo Achillis, together with shortening of the overstretched peronei was an obvious preliminary measure;

Fig. 1.—Illustrates shortening and talipes equinus. The patient was supported by a person not visible in the photograph.

Fig. 2.—Paralysed leg, showing foot drop and equino-varus.

Fig. 3.—Showing patient standing in original boot, steadying herself by the aid of a stick.

but the parents absolutely refused to permit anything in the nature of an operation. I had therefore to do the best I could under the limitations imposed. A three months' course (five days a week) of massage, interrupted current, and mechanical vibration (*sismothérapie mécanique* of French writers) produced very fair results as regards the thigh and hip, despite the long standing of the disease. The buttock muscles were increased to such an extent that the difference between the two sides, previously marked, was no longer noticeable when the clothes were on. At the same time, the thigh gained two inches in circumference.

As to that part of the limb below the knee-joint, however, a very short experience convinced me that little could be done by electricity, etc., without previous surgical correction. In this case, then, the only possibility of benefit lay in the provision of suitable apparatus. The usual cumbersome and unsightly "leg-irons" had been previously suggested; but the patient—a somewhat spoiled and self-willed child—had refused them. To anyone acquainted with these instruments her objection will appear not altogether unreasonable, especially when it is remembered that she could manage to get about after a fashion without any such aid. I therefore set myself to devise a boot which should support the ankle, correct the talipes equinus, so far as possible, and at the same time be neither unduly heavy nor recognizable as a surgical appliance.

Fig. 4.—Patient in new surgical boot, standing firmly on both feet.

The boot shown in photographs 4 and 5 was made to my design by a firm of instrument makers in Newcastle. Its construction is very simple. There is a cork extension having a thickness of $3\frac{1}{2}$ in. at the heel, tapering to 2½ in. at the toe; of this rather more than a third is concealed within the upper. Two light steel side supports are fitted between the leather and the lining; these are furnished with flat joints at the ankle, and their lower ends are firmly attached to the sole. To correct the foot drop—that is, in so far as the retraction of the calf muscles will admit of it—finely tempered steel springs are fitted to the joints on both sides. As can be seen from the photographs, the whole boot is neatly finished, and, except for the thick sole, scarcely to be distinguished from an ordinary piece of foot gear.

The patient now walks considerable distances, still limping, of course, to some extent. Her figure and general carriage are greatly improved. She has learnt to ride a bicycle without special difficulty, and has so far met with no accident.

During the course of the treatment the nocturnal incontinence gradually disappeared. This result was not specially aimed at, but it often happens that in the course of treating a paralysed limb we get beneficial effects not originally expected, or even thought of. Remarkable improvement in the general health, both of body and mind, is not uncommon.

Fig. 5.—Side view of new boot. The outlines of steel side supports and internal cork sole are just visible.

The lessons to be derived from a consideration of the above case seem to me to be as follows:

1. Chronic infantile paralysis of medium severity occurring in persons not yet of full growth should never be regarded as incapable of improvement, even when the condition is of many years' standing.

2. Because the parents will not permit us to perform a simple and, to our minds, obviously necessary operation, we should not therefore throw up the case. It is our duty to do what we can for the patient by other means, thereby conserving the limb, and leaving the way open for surgical measures at some future date.

3. As regards paralytic deformity below the knee, leg-irons and coil-springs are not the last word in supporting apparatus. Provided expense is not a first consideration, special boots can generally be devised to suit individual cases—boots which need not be a source of constant embarrassment to the sensitive girl-patient approaching young womanhood.

4. Lastly, the fact that the patient has well-to-do and intelligent parents, desirous of giving their child every chance, is no guarantee that everything possible has been done. Each case, no matter what the history, should be considered with an open mind.

A SPECIAL clinic for the treatment of internal diseases by phototherapy has been established in the Finsen Light Institute, Copenhagen. The director of the new clinic is Dr. Rubow.

ON THE DETERMINATION OF THE TUBERCLE BACILLUS IN THE BLOOD OF PERSONS SUFFERING FROM PHTHISIS.

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It has usually been maintained, in relation to localized pulmonary tuberculosis, that tubercle bacilli do not occur in the blood stream. The access of the bacilli to the blood stream has been supposed to constitute the commencement of a generalized tuberculosis. Certain recent observations have raised doubts regarding the validity of this view. Thus, Rosenberger¹ has published the results of the examination of the blood of 50 cases of phthisis in various stages of the disease. In every case examined he reports having found tubercle bacilli with ease. In a later paper² he states that he has demonstrated the bacillus in 312 out of 312 cases examined. Later, Forsyth³ reports having examined the blood in 12 cases of phthisis and having found tubercle bacilli in 10 of these cases.

These results, if correct, being evidently of much importance, it was suggested to us by Dr. Philip that we should undertake a further series of observations at the Royal Victoria Hospital for Consumption, Edinburgh.

METHOD.

The method adopted by Rosenberger was, shortly, as follows:

He withdrew from a vein in the arm of the patient 5 c.cm. of blood by means of a sterile syringe, previously boiled in a solution of caustic soda. This blood was at once mixed with an equal quantity of a 2 per cent. solution of sodium citrate in normal saline, well shaken to avoid clot formation, and then allowed to stand in a refrigerator for twenty-four hours. He then, with a sterile pipette, removed a small quantity of the precipitate with which he made a thick film on a clean glass slide, dried on a copper plate at moderate heat, laked in sterile distilled water, and finally stained "by the usual technique" for tubercle bacilli. From each lot of blood he made three films. He maintains that each film should be examined for thirty minutes before giving a negative verdict. Care must, of course, be taken throughout the processes to avoid contamination.

Forsyth's method is similar to that of Rosenberger, with the exception that he centrifuges the mixture of blood and sodium citrate solution "in a fast-running centrifuge for twenty minutes," instead of allowing it to precipitate in a refrigerator.

Out of 22 blood examinations done by us, 13 were performed according to Rosenberger's method and 9 by Forsyth's. As regards staining, our method was as follows:

Slides were first stained with hot carbol fuchsin for five minutes, then decolorized in 5 per cent. sulphuric acid, and finally counter-stained with a watery solution of methylene blue.

As Rosenberger indicated that tubercle bacilli could be demonstrated in the blood even before they were to be found in the sputum, we commenced by examining the blood of two patients with well-marked physical signs of consolidation at both apices, in whose sputa it had been impossible to demonstrate tubercle bacilli. Prolonged examination of four slides in each case failed to reveal tubercle bacilli.

We next examined the blood of an advanced case with double cavity formation, in whose sputum numerous tubercle bacilli were present. Again the result of blood examination was negative, notwithstanding searching examination of four slides for more than an hour each. In confirmation we again removed 5 c.cm. of this patient's blood and treated it by centrifugalization (the former sample having been allowed to stand in the refrigerator). Again the result of examination of four slides was negative.

We then resolved to extend our examination to the blood of 20 cases, varying in type from early consolidation to advanced lung condition, and in some cases accompanied