plete paralysis of both arms, with weakness of some of the neck muscles. Indeed, in some cases where the final paralysis is limited to two or three muscles, the original paralysis was almost universal, affecting all the limbs and many of the neck and trunk muscles.

This want of correspondence in the distribution of motor weakness at different stages of the disease is one of the striking features of infantile paralysis. A consideration of the complete return of motor power in parts that were profoundly paralysed would lead one to assume that in some cases the wave of recovery would spread to every part that was initially affected, yet as a matter of fact this rarely occurs. In nearly every case of acute anterior poliomyelitis some muscles are left permanently, even if only slightly, weak.

As an apparent exception to this rule, the following case is worthy of record:

A girl, aged 9 years, was admitted under my care at the Manchester Royal Infirmary on January 20th this year. Her mother told me that on January 13th the child was "shaky and cold," that on the 15th she was shivering, and her skin was very hot. On the 16th it was noticed that her legs seemed to fail her. On the 17th she was unable to get out of bed; at breakfast time she could use her hands, but a few hours later she was unable to move them. On the 19th she was very feverish, and on the 20th, the day of admission, her temperature was 103° F. On this day I saw her for the first time. She was lying in bed, unable to move any part of her body except the head; this she could raise from the pillow, and move from side to side. She was unable to raise either side of her body from the bed, nor could she move any part of her arms or legs; her limbs were completely and universally paralysed. She had no pain, and no alteration in cutaneous sensibility could be detected. None of the cranial nerves were affected. The knee-jerks were absent, and no wrist-jerk could be obtained. The action of the bladder seemed to be normal.

The possibility of diphtheria being the cause of the paralysis was considered, but there was no history of sore throat, nor were any cases of infectious disease known to exist in the neighbourhood of the child's home. The fauces had a healthy appearance, and the urine was free from albumen.

On the 21st, the day after admission to hospital, the temperature was normal and the child could feebly draw up her legs in bed and could feebly move her arms; she could also very slightly raise her body from the bed. The improvement progressed rapidly, so that on the 27th, a week after admission, the paralysis of the arms had almost entirely disappeared; the legs, too, were much stronger, and when her body was supported the patient could walk a few steps. She was also just able to sit up in bed. A few days later she could walk without assistance, the flexors of the ankles being, however, still weak. She left the hospital on February 9th quite recovered from the paralysis, and the knee-jerks, which were feebly obtained a few days previously, were quite normal.

As to the site of the lesion in this case, the flaccid paralysis and the loss of the deep reflexes point to an affection of the lower neurons for the limbs and trunk. The absence of sensory and of all other symptoms than paralysis indicates that the motor path was alone at fault. Which part of the lower neuron was affected? Was it the nerve cell or its axon? Was the case one of anterior poliomyelitis or one of peripheral neuritis? It is certain that instances of purely motor peripheral neuritis do occur, and in the present case the complete recovery speaks more for a peripheral than a central disorder. Still such great rapidity in the disappearance of symptoms as occurred in this case is probably as rare in neuritis as in poliomyelitis. Then again multiple neuritis in the child, apart from diphtheria, is rare, whereas anterior poliomyelitis is common. In favour of the latter condition, too, may be mentioned the completeness of the palsy.

Just as difficult to settle as the site of the lesion, if not more so, is its nature. Obviously there was a profound, if only a transitory, disturbance of the functions of the parts attacked. The action of some poison seems to be the simplest explanation. Yet such speedy destruction or elimination of the poison as must have occurred in the case related is very remarkable.

Evidence is accumulating that many disorders of the central as well as of the peripheral nervous system are initiated by the presence of a toxin, the product of micro-organisms, which

circulates in the blood and, according to its nature, selects for its attack certain definite parts of the nervous system.

Suggestive in this respect are the characters and the distribution of the early lesions in infantile paralysis, together with the etiology of the disease and its occasional occurrence in large epidemics. Moreover, in a few instances micro-organisms have been found. Thus, Schultze detected the Jäger-Weichselbaum's diplococcus in the cerebro-spinal fluid obtained by lumbar puncture in an early case of infantile paralysis. Chapin, too, in a case which terminated fatally, found diplococci in the anterior horn which presented the characteristic histological changes of acute anterior poliomyelitis. Dercum has also recorded a case of infantile paralysis in which the fluid obtained by lumbar puncture showed diplococci which stained with gentian violet, and also by Gram's method. They resembled, both as regards their structure and their affinity to certain stains, the diplococci of Sternberg.

Experiments on animals have shown that various forms of myelitis can be produced by the injection of bacteria or their toxins into the blood. Thus Marinesco has produced poliomyelitis in animals by injecting micro-organisms into the blood vessels which directly supply the spinal cord. He has also set up changes like those of acute anterior poliomyelitis by the injection of streptococci and of the influenza bacillus within the spinal dura mater. Other investigators, too, have produced in animals spinal lesions resembling those of acute poliomyelitis by the injection of various bacteria; of these may be mentioned the typhoid, influenza, and diphtheria bacilli, also the streptococci of erysipelas, and the bacterium coli.

Hence, it is not unlikely that infantile paralysis may be set up by the action of a toxin which is produced by micro-organisms, and which circulates in the blood. The infective agent may find its way into the system through the gastrointestinal tract, or possibly by the nasal mucous membrane, or even, as suggested by Schultze, through the middle ear.

In the case which I have related no facts were obtained which threw any light either on the nature or on the mode of entry of a supposed infectious agent. If we assume that a toxin did attack the lower neurons of the parts paralysed, the rapid disappearance of the paralysis would suggest that the toxin was speedily destroyed or rendered innocuous, or quickly eliminated from the system.

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CASE OF SPORADIC CRETINISM, IN WHICH A RELAPSE OCCURRED OWING TO OMISSION OF THYROID EXTRACT.*

By ARTHUR HALL, M.A., M.B., M.R.C.P.,

Physician, Sheffield Royal Hospital; Professor of Pathology and Joint Lecturer on Clinical Medicine, University College, Sheffield.

THE following case emphasizes the fact that relapses may and do occur in cases of sporadic cretinism, if the treatment by thyroid gland substance be omitted, and that it is of absolute importance that cretins should be kept carefully under observation if the results of treatment are not to be spoiled:

History.—A. R., a boy, aged 15 months, was sent up to me at the Sheffield Royal Hospital in February, 1896, by Dr. J. H. Wilson, of Hillsborough. At birth he was not noticeably different from other children, but when a few months old he was found to have a "goitre." This was treated—how I do not know—and it disappeared when he was six months old. The parents date the change in his condition from that time.

State on Examination.—He was continually crying with a harsh cry, moving his head restlessly, and always pulling faces. Skin dry, with fine branny desquamation on the forehead and eyebrows. Circumference of head 18 in.; hair dark and scanty; complexion pasty; anterior fontanelle widely open, posterior slightly; eyelids purple and oedematous; opening of eyes narrow; pupils large; slight internal strabismus; nose broad, depressed bridge; nostrils wide, snuffles; mouth large, two lower incisors depressed appearing; arms flabby, thick; hands very broad and thick, skin loose and flabby and in folds; abdomen not very prominent; large umbilical hernia; scrotum pendulous; legs very thick, skin loose, and thrown into very loose folds; feet thick and broad; height 26½ in.; weight 18 lb. 10 oz.; temperature 97°.

* Read at the meeting of the Yorkshire Branch of the British Medical Association.

Treatment.—The child had only just been weaned, and was put on to thyroid at once. A liquid extract of thyroid was first given, but this did not seem to agree, so it was altered to the solid extract in the form of powdered tabloids. Unfortunately, I have lost the record of the amount then given.

Progress.—On March 14th, 1896, that is, one month later, there was a general improvement, especially less puffiness and swelling of the skin, and a brighter mental condition. The child could not sit up or in any way support itself. The parents now took it home, and it continued to take thyroid tabloids daily to the extent of about $7\frac{1}{2}$ gr.

Fig. 1.—February, 1896; before treatment.

In July, 1896, the improvement was very great, the hair had grown luxuriantly, the face had become quite intelligent, but the child was still very weak and could not stand at all.

In October, 1896, I saw the child again and have made the following note: He is now a bright merry boy, always laughing and playing, and is able to stand when holding on to a chair for support.

Fig. 2.—November, 1896; after treatment.

I showed the case to the Sheffield Medico-Chirurgical Society at that time, and raised the question as to whether it would be necessary to continue the treatment all through the child's life, or if possibly the thyroid might later show signs of acting.

Relapse.—Two years later, June, 1898, I have the following note: The parents left off the treatment in January, 1898, and the child has steadily gone backwards. In April of the same year I advised them to recommence the thyroid, which they did, giving two tabloids per day. It began to improve at once, and about the end of May walked for the first time: it also tried to speak more.

From June, 1898, I lost sight of the child altogether until February of this year, in fact, I had forgotten all about the case, until, on looking up

my old case-books, I came across a reference to it, and wrote to the parents asking them to let me see it again. I was greatly disappointed to find that they had given up giving the thyroid in 1900, as they thought it was making the child weaker, and instead of coming to the hospital to see me, had given up the treatment entirely. There was every probability that the child was getting too much thyroid after the symptoms had gone and that, as the parents said, it really did make it weak.

Present State.—The child is now (March 17th, 1902) seven years old; it weighs 53 lbs. Height 38 in. The weight is in excess of the average weight of a child of seven, as given by Roch, namely, 48.9 lbs. The general measurements of the head, body, and limbs, are also abnormally large, and the general appearance of the child is gross. The hair is dark, scanty, and coarse. The face large, heavy and dull, very pasty and swollen. Lips thick. The teeth short, and are imperfectly developed. The skin is very rough and dry. The external auditory meatus runs in the wrong direction. The breathing is noisy, and there is some snuffling. The limbs are gross and coarse with considerable thickening of the sub-

Fig. 3.—March, 1902; after leaving off treatment for two years.

cutaneous tissues. The hands are particularly striking, their breadth and size almost suggesting acromegaly. The knee-jerks are well marked on both sides. There are pads above each clavicle, and I think I can feel the very slight remains of a thyroid. His mental condition is dull and slow, he is very affectionate and manageable, speaks but little and more often makes strange grunting noises. He occasionally breaks into a broad smile, which comes rather late after the event causing it, and remains for some time. His movements are all very slow, he can walk, but is soon tired and easily trips over any obstacle. He eats and sleeps well, and passes everything under him.

Measurements.—Head: circumference, 21 in.; transverse, 11½ in.; posterior, 13 in. Circumference of arm, 8 in.; of forearm, 8½ in.; of calf, 10 in.; of chest, 24½; of neck, 14 in.

The case very well illustrates the fact that if we are to succeed in this condition it is necessary that the patients should be closely watched for a very long period. Even in a case like this where the relatives of the patient are intelligent people, and where the importance of continued treatment is impressed on them over and over again, there is the danger of valuable time being lost and the child gradually getting back into its former condition, without the parents who see it day by day noticing the change. I am particularly sorry that this occurred in the present instance, as the case was a most promising one, and as there seemed every reason to hope that the child would gain an amount of mental improvement greater than has usually been the case where the cretin has got into years before the treatment was begun. The child is now less the cretin with its ill-developed frame, and more of the child with myxoedema, and I have considerable hopes that with judicious treatment and careful watching it will yet develop into a fairly useful member of society.

As regards the amount of thyroid to be administered, one can only judge by trying carefully whilst the child is under

observation in the hospital, but as soon as the immediate symptoms have subsided it will be probably only necessary to give very small quantities two or three times a week; and as the drug is cheap and easily obtainable, it is not a great matter if he has to continue it all his life. In the early days of thyroid administration a mistake was made on the side of giving too much rather than too little. It seemed such a harmless thing to give, but, as we know now, it is by no means the innocuous preparation one then imagined. I suppose we have all seen cases in which it has produced distinctly unpleasant symptoms, certainly I have on more than one occasion, and I always give strict injunctions to patients when ordering it for them.

But besides myxoedema in adults and infants, there are certain other conditions in which the administration of thyroid is more or less beneficial. So far as my own experience goes, they may be divided into four: (1) Psoriasis, (2) ichthyosis, (3) obesity, (4) goitre. As regards psoriasis, I happened to be visiting Edinburgh at the time that Dr. Byrom Bramwell was treating his case of psoriasis, on the strength of which he suggested the use of thyroid in these cases. Since then I have systematically tried it in every case that I have seen at the Skin Department of the Sheffield Royal Hospital and in private. Of these a certain very small percentage benefited markedly, and in one case the patient was rapidly cured of four attacks during the last few years by thyroid alone, without any other treatment, local or general. Seeing the great convenience of such a treatment, if successful, I make it a rule in every case to try thyroid extract alone for a short time if the patient consents, and if the result is negative at the end of that time, I give it up entirely and commence local treatment. It was a curious accident that one of the first cases on which it was tried should have been one of the very few that did respond. I am not aware that there is any means by which one can tell which cases will and which will not be benefited. In ichthyosis, thyroid is distinctly of use, but in my experience the effect soon wears off if it is discontinued. As regards its use in obesity, one must remember that this may arise from widely different causes, not all of which are likely to be amenable to any one form of treatment, but I can certainly recall three cases in which the diminution in weight on thyroid alone, without any dieting, was very marked. One man was so stout that he was unable to work, and could hardly get about in comfort, and in a few weeks he got down to quite a reasonable weight, which he has maintained ever since. As regards the value of thyroid in goitre, my experience is very limited, as such cases do not come under the physician in hospital practice. I happened to be treating a patient for psoriasis who had a large goitre, and after she had been taking thyroid for about a fortnight, I asked her how she was, and she said her rash was no better, but that her neck was getting smaller, and that she was able to fasten the collar of her dress, which she had not been able to do for years. I measured the neck regularly during the next few weeks, and it certainly decreased in diameter, but I unfortunately lost sight of her.

NOTE.—April 4th, 1902. The child is now in hospital, and taking thyroid extract. He is daily becoming brighter and less swollen.

MYXOEDEMA IN MOTHER AND CHILD.

By S. W. MACILWAINE, L.R.C.P., M.R.C.S.,
Redhill.

THE occurrence of myxoedema in mother and daughter may be a coincidence, but it seems to me very possibly to show an inherited susceptibility of the thyroid to toxic influences. Mrs. G. had till 1895 practically never known a day's illness; she was then seized with a very severe and persistent attack, of which diarrhoea and vomiting were at first the prominent symptoms and later phlebitis. Removal from Ealing to Malvern led to improvement, but a return to Ealing brought on recurrence of the symptoms. The impression was that the severe toxic condition which undoubtedly existed arose from some sanitary defect in the house at Ealing, and so it was finally given up and the patient removed to Croydon. Before removal tachycardia and palpitation had become established as the leading troubles; the thyroid was noticed to

be much enlarged, indeed its immediate removal was at one time urged. In Croydon, however, the symptoms slowly improved under palliative treatment; the diagnosis was then Graves's disease. The whole illness, till comparative health was restored, lasted about three years—1895-98—but ever since then severe palpitation has given much trouble. The thyroid is hard and enlarged on one side, the hair has fallen out to a considerable extent and has quite changed its texture; the skin has never been moist with perspiration except just at the nape of the neck, and has become harsh, especially in the palms of the hands, where it has often been so severely cracked as to lead to bleeding. Since taking small doses of thyroid for three months, all these symptoms have so rapidly improved as to leave no doubt that the case was one of myxoedema.

In 1899 Mrs. G.'s first child, a girl, was born. Up to a year old the child was perfectly healthy; she was exceptionally forward in walking and talking. When just a year old, and on a visit to London, she was seized with "dysenteric diarrhoea," large quantities of blood being passed. The attack began with drowsiness and feverishness, several other children in the neighbourhood suffered similarly at the same time, and as influenza was epidemic it was suggested as a probable cause. The child wasted with startling rapidity, and nearly died of exhaustion. It was removed to Malvern as a last resource, and immediately began to improve; but for three months there were recurrent attacks of jaundice, and the child was so weak as to be unable to sit up. From this time flesh was put on again, but there was a palpable alteration in the child, she was unable to speak or walk, and the whole appearance was strange. From a bright, nice-looking child she became a typical cretin, as the patient was pronounced to be by Mr. Charters Symonds in January, 1902.

The change since then on thyroid is just such a dramatic occurrence as Osler describes. In six weeks from the commencement of treatment the child was reduced to not much more than half its previous bulk, walking was resumed after two years' interval, but the reawakening of intelligence, with a corresponding change of expression, and the resumption of speech, were the most striking and the most gratifying features of the recovery.

Nine or ten years ago I recorded two cases of myxoedema in adults, the one in a man in whom the establishment of the myxoedematous state was subsequent to and apparently a direct consequence of a severe influenza. In the other, severe and continued haemorrhage at and after confinement established a profound state of anaemia, and the symptoms of myxoedema were gradually grafted on to those of anaemia; the cirrhosis of the thyroid apparently resulting from the toxic state of the blood associated with the anaemia.

In all these four cases the myxoedematous state was clearly secondary to some pre-existing toxic condition: it was an incidental symptom-group, not a primary disease. They emphasize the fact that both scientifically and practically it is inadvisable to attempt to localize diseases instead of tracing them to their causes. In the case of Mrs. G., for instance, although looking back all her ailments have been due to an original toxæmia, the diagnosis has passed through "dysenteric diarrhoea," "phlebitis," "Graves's disease," and "myxoedema." Early recognition and, at least in some cases, prevention—as, for instance, in the anaemic case above-mentioned—would be more probable in cases of myxoedema if we recognized that the detection of "symptom-groups" is not any more the making of a diagnosis, properly so-called, than the now generally discredited method of naming symptoms apart from their causes.

THE DIAZO-REACTION AS A METHOD OF DIAGNOSIS IN CLINICAL MEDICINE.

By H. W. SYERS, M.A., M.D. CANTAB.,
Physician to Out-patients, Great Northern Central Hospital.

THE actual value of a clinical test depends upon its applicability to every-day work. Should it prove to be a method which can be easily employed in routine practice, and if it be granted that the results obtained are reliable, then can there be no doubt that the test has come to stay.