

were both old men and one of them died in the following year from acute diarrhoea, the other two years later from senility. In the physician's case the serum had no apparent effect, nor had it in three other cases in which it was subsequently used. During June anti-streptococcic serum was used, five cubic centimetres being given every two or three days at first and later 10 cubic centimetres; in all 125 cubic centimetres were used. During this time the temperature varied from 99.2° to 100.6° F. Some time after beginning the use of serum, after each injection a free secretion of saliva occurred which was sometimes blood-stained. No apparent benefit followed the use of the serum. The patient spent the summer of 1900 under most favourable conditions, living out of doors all day and sleeping in a tent at night. During the remissions the appetite was good and his diet was highly nutritious. By September he was considerably better but still his blood only contained about 3,500,000 red corpuscles per cubic millimetre. In October, on my advice, he tried spermin (Poehl), 10 cubic centimetres being given in divided doses extending over 10 days. He soon began to improve and during November his blood contained 4,500,000 corpuscles per cubic millimetre and the hæmoglobin rose to 85 (Fleischl). He looked quite well and said he felt as well as ever; the corpuscles, however, showed considerable inequality in size and a few nucleated ones could be found. He resumed his practice in a quiet way, but soon found himself unequal to the work. He became depressed; his mental condition which had been affected early in his illness and was not completely restored even at his periods of greatest improvement, now became so much disturbed that he became difficult to nurse. He was confined to bed although the blood showed only moderate deterioration, and in January, 1901, he grew suddenly worse and died comatose.

In more recent cases I have advised moderate purgation, with the object of removing infective material from the bowel. At the same time intestinal antiseptics have been given, and such general remedies as strychnine, arsenic, iron, bone-marrow, and the like. The results, however, have been no less disappointing than former experiences. Notwithstanding all the good work that has been done the cause and pathology of the disease are as yet quite unknown, and as to its effective treatment we are equally in the dark. No plan of management or treatment so far devised avails to cure the disease or even, in most cases at least, to alter its erratic course. Before the recovery can be considered complete the blood on histological examination must be found quite normal. A restoration of even the full complement of 5,000,000 red corpuscles per cubic millimetre is not sufficient, as that may occur in a prolonged and marked remission. Not a few of the cures reported have doubtless been remissions of this kind.

Toronto.

FRIEDREICH'S ATAXIA.¹

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FRIEDREICH'S ataxia is a sufficiently rare disease to make a group of cases such as the following worthy of detailed record. The patients are three sisters, aged respectively 20 years, 18 years, and 11 years, who belong to a family of four, the remaining member being a boy, aged 16 years, whose general health is reported to be excellent, but who is afflicted with stammering of a pronounced degree. The only point of importance in connexion with the family history is that the parents are first cousins. So far as can be ascertained there is no reason to suspect alcoholism or syphilis in either father or mother.

CASE 1.—The eldest of these three girls (Fig. 1) came to the out-patient room at the Royal Hospital for Children and Women some time ago complaining of gradually increasing loss of power in her legs, on account of which she had latterly found it a matter of considerable difficulty to get upstairs. She had always been perfectly well in her general health, but at the age of 12 years she first observed

that her legs were becoming feeble. There was no wasting of the limbs, no history of previous acute illness, and no sensory disturbance. She had several chronic sores on her feet to which she attributed her difficulty in locomotion and the feeling of weariness in her legs. This history led to an examination of the patient's feet, and their appearance at once suggested the nature of her malady and prompted inquiries as to the health of other members of her family. Both feet presented the characteristic deformity of Friedreich's disease, being foreshortened with abnormally high instep arch and acute extension of the phalanges on the metatarsal bones (Fig. 2). The sores she complained of were numerous; a few superficial, others deep, and with some of the features of perforating ulcer. The soles were tender to the touch, and partly because of this tenderness—wholly, as the patient thought—and partly also, no doubt, from the deformity and muscular debility, she was unable to walk across the floor on bare feet. The girl then explained that she required to wear specially made boots to enable her to get about at all, but that with them she could manage pretty well so long as she was not required to do much in the way of going upstairs. This point, which to the girl is one of the striking features of her case, is noteworthy as prominently emphasising the fact that the flexor muscles of the leg are those which become specially impaired in the early stages of the disease. Her gait is more reeling than ataxic in character. This is brought out if she is asked to turn sharply round, when it will be observed that her efforts at movement are attended by a certain amount of shakiness. She walks with her toes turned inwards and with her legs widely apart. Romberg's symptom is well marked and she complains of attacks of vertigo which are always liable to be induced by closing her eyes when she is in the erect position. Her knee-jerks are absent and the plantar reflexes, though not abolished, are feeble. There is loss of motor power in both legs, but especially in the left, which she is quite unable to raise from the ground against the opposition of the most moderate pressure. Her arms are slightly ataxic, but not yet to such an extent as to interfere with her daily duties. There is no nystagmus and her eye-movements are normal. The optic discs are healthy and the pupils are equal and react freely both to light and to accommodation. Her speech is unimpaired and she is mentally bright and active. A fine tremor is to be noted throughout her muscles whenever they are put into use, and this is specially observable in the face, where sustained muscular tension, such as that required by the upper lip when called upon to uncover the teeth and gums, brings about, not only tremor, but after a few moments clonic contractions of the levator labii superioris, orbicularis oris, and other small circum-oral muscles. There is nothing abnormal about any internal organ, but her menstruation is somewhat irregular as to periodicity and is scanty. She suffers from pronounced ichthyosis, so that the congenital imperfection is not limited to the spinal cord, but implicates the skin as well.

The facts of the case leave little doubt as to the diagnosis, but full confirmation is afforded by the condition of the patient's two sisters.

CASE 2.—The elder of the two, aged 18 years, at once attracts attention on entering the room by her apathetic and almost vacant expression. Her gait is more shuffling but less ataxic than her sister's, and her speech is slurring, deliberate, and produced by a voice almost wholly wanting in both animation and inflection. She, too, enjoyed perfect health till the age of 12 years and her first abnormal sign was (precisely like her sister's) a difficulty in getting upstairs from feebleness of her leg-muscles. On examination she is found to possess the same foot-deformity (Fig. 4) but without any plantar sores, the same absence of knee-jerks, and, in fact, a replica of the sister's symptoms, but with the important addition of a marked curvature of the upper part of her spine (Fig. 3). The loss of power in her legs is not yet so far advanced as in her sister's case, but, on the other hand, on extreme conjugate deviation the eyes manifest oscillating movements which are not sufficiently sustained to be dignified with the name of nystagmus, but are still nystagmoid in character and in all probability represent the early stage of that condition. In her case tremor on movement is a well-marked feature and on watching her attentively for a little while one observes occasional choreiform twitchings which seem to be confined to the right arm and face. Her skin is normal and there is no impairment of her general health or evidence of disease in any thoracic or abdominal organ.

¹ A clinical demonstration at the Medical Graduates' College and Polyclinic on July 2nd, 1901.

CASE 3.—The patient in this case—the youngest of the three girls—is 11 years of age and is supposed to be perfectly well, but on examination she presents three very suggestive

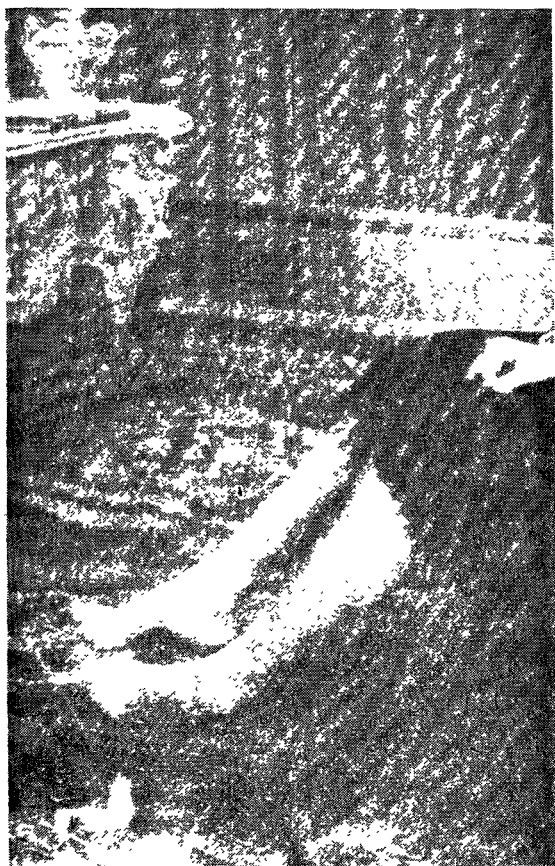
so feeble that they can only be mildly elicited on reinforcement; and the small muscles of the face are distinctly tremulous when they are called upon to exert their full

FIG. 1.



Showing condition of the back (no curvature) in Case 1.

FIG. 2.



Showing condition of the feet in Case 1.

symptoms. The great toe on each foot is hyper-extended and the extensor proprius pollicis stands out with undue prominence (Fig. 6); the knee-jerks, though not wholly absent, are

FIG. 3.



Showing condition of the back (spinal curvature) in Case 2.

FIG. 4.



Showing condition of the feet in Case 2.

vigour. The girl is robust and energetic, she has experienced no muscular weakness, vertigo, or ataxia, and is, so far as she knows and to all superficial appearance, in the enjoyment

of perfect health. It is of special importance to note that she has not yet reached the age at which both her elder sisters first began to droop, because it has become one of the

FIG. 5.



Showing condition of the back in Case 3.

FIG. 6.



Showing condition of the feet in Case 3.

absence of symptoms after the age of incidence has been passed.

Though the disease has not reached its full development in either of these girls the three cases taken together portray in unmistakeable colours the picture first painted by Friedreich. The absence of certain phenomena, such as well-marked nystagmus, pronounced ataxia of the upper arms, emotional instability, &c., is to be explained by the comparatively short time during which the disease has been in progress. It is, of all nerve disorders, one of the slowest. Many important symptoms, therefore, remain to declare themselves in process of time, and already in these present cases a certain amount of evidence is forthcoming that the advent of some of them will not be long delayed.

The photographs in the accompanying illustrations have not succeeded in bringing out as well as they might have done the deformities of the feet and back, but they illustrate clearly enough some abnormal features and have been taken with a view to future comparison. The attitude and shape of the feet are, in all three cases, already striking. There is no marked curvature of the spine to be seen when the back of the patient in Case 1 is examined, but the photograph fails altogether to portray the bend which is strikingly in evidence in Case 2, and only imperfectly reproduces the slighter, but still undoubted, curvature which the youngest girl (Case 3) presents.

Friedreich's ataxia is essentially a family, as distinguished from a hereditary disease; it attacks several members of the same family or generation, isolated cases being comparatively rare. Obviously it can seldom be a directly hereditary disease, because in the vast majority of cases it is so far advanced before the marriageable age is reached that a matrimonial alliance is out of the question, not necessarily from actual sexual incapacity, but on account of the helplessness and crippling which have been already by that time produced. There is nothing definitely known as to the etiology of the disease beyond its dependence upon congenital conditions of the spinal cord. It has been variously ascribed to alcoholic excess in one or both parents, to syphilis, to parental consanguinity, and to preceding acute febrile disorders—such as measles or scarlet fever. It has also been said to occur with greatest frequency in families of unusual numerical strength. None of these causes are adequately sufficient to explain its occurrence. As regards syphilis, for instance, it is now accepted that it may be definitely excluded as a direct cause, though it may coincidentally exist. The speech defect by which the only son of this family is afflicted goes to confirm the supposition of an unstable inheritance so far as nerve tissues are concerned, and the ichthyotic skin of the eldest daughter (Case 1) further proves a congenital tendency to imperfect development. But no more can be said in favour of consanguinity as a cause than that weaknesses of tissue inheritance are more likely to be intensified in the children of parents who come of the same stock than in those whose ancestry is derived from parents born of entirely different strains.

Pathologically Friedreich's ataxia depends upon a sclerosis of the spinal cord which invades the posterior, lateral, and often, also, the anterior columns. In many cases the cord is smaller than normal, and this deficiency in size may involve the medulla and pons as well as the cord. Cases are recorded in which the cerebellum also has been found atrophied. The sclerosis of the posterior columns is usually complete throughout the whole length of the cord, and that of the lateral columns extends outwards and forwards so as to involve the direct cerebellar and the anterior pyramidal tracts. The cord lesion is thus much more extensive than in ordinary tabes which in many respects the disease so closely resembles. According to some authorities the sclerosis of Friedreich differs intrinsically from all other forms of sclerotic lesion in being purely neuroglial in character.

The two diseases with which Friedreich's ataxia is most liable to be confounded are locomotor ataxia and disseminated sclerosis. It may be distinguished from locomotor ataxia by the age of the patient, the existence of the disease in other members of the family, the altered speech, characteristic foot deformity, tendency to spinal curvature, muscular tremors, and choreiform twitchings, and by the absence of visceral crises, Argyll-Robertson pupils, lightning pains, and other sensory phenomena. If carefully observed the gait also will be found to differ in the two diseases; in tabes it is purely ataxic, whereas in Friedreich's ataxia it partakes of the cerebellar character as well, and thus

recognised tendencies of the disease to manifest itself at the same age in members of the same family—so much so that one of the most favourable of all prognostic facts is the

becomes a mixture of stamping and reeling. The resemblance to disseminated sclerosis is at first sight considerable. In both affections there are nystagmus, a difficulty in speech, muscular tremor, and an abnormal gait, but on closer investigation it will be found that the nystagmus is more marked and developed at an earlier period of the disease in disseminated sclerosis than in Friedreich's ataxia; that the speech, though slurred and deliberate, is not so syllabic; that the muscular tremor is not rhythmical nor of the unmistakable intentional type; and that the gait possesses none of the spastic element which characterises the disseminated case. Further and more distinctive points of differentiation are to be found in the facts that disseminated sclerosis is not a family disease; that it very rarely develops in persons under 20 years of age; that it is subject to periods of remission and exacerbation unknown in Friedreich's ataxia; and that the spinal reflexes are exaggerated and the optic discs frequently atrophied. The foot deformity and spinal curvature of Friedreich's disease are not present in disseminated sclerosis.

The prognosis of the disease is, so far as now understood, hopeless. Its progress is usually slow, often lasting over a long period of years, but it is gradually a downhill one, and there is such eventual crippling that the patient is unable to do anything for himself—a helpless condition which sometimes is accentuated by the fact that the speech has become so slurred as to be wholly unintelligible. No remedies have any apparent effect in arresting its course; it goes on steadily, however slowly, from bad to worse in spite of treatment. The most that can be done is to maintain the general health as thoroughly as possible, and this should be accomplished by means of good and abundant food, fresh air, suitable exercise, cod-liver oil, and general tonics. The constant current applied down the length of the spine may be of temporary value, and the use of a well-fitting rigid jacket will help to prevent the excessive development of spinal curvature.

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REPORT AND COMMENTARY ON SCHOOL SANITATION AND HYGIENE

AS PROVIDED FOR IN THE FOLLOWING FIVE EUROPEAN
COUNTRIES—VIZ., FRANCE REPRESENTED BY PARIS,
ITALY BY MILAN AND FLORENCE, BELGIUM BY
BRUSSELS, GERMANY BY STUTTGART, AND
SWITZERLAND BY ZÜRICH.

BY STUART ALEXANDER TIDEY, M.D. LOND.

THE following report, drawn up during a rapid tour of inspection, represents the crystallisation in specific form of one element—viz., school hygiene, from a solution of general knowledge of continental methods of elementary education, acquired during 16 years' residence on the continent at intervals extending over a period of 30 years. To facilitate ready reference and comparison the reports are drawn up in tabular form and this was done in each case immediately after the visit of inspection was made. Thus confusion was avoided and the relative merits and defects were brought into strong relief.

The object of the reports is to afford an accurate appreciation of the work being done at various continental centres towards providing for the physical well-being of school-children educated at free elementary national or municipal schools. No consideration other than that of accuracy has been allowed to influence the compilation of results recorded. Reports on the same subject as treated in various countries must lead to comparisons, and should the comparisons drawn as a necessary part of this review come by any chance to the ken of those in charge of the institutions reviewed it is hoped that they will accept the conclusions as the result of sincere conviction based on a definite scheme of inspection. The selection of towns visited was made with a view to seeing a good, if possible the best, representative centre in each country. Whether this result has been accomplished or not it is impossible to say; possibly Berlin would have been a better representative centre than Stuttgart, and Le Havre

than Paris; but accepting the centres visited as representative, the order of relative merit in which they stand in point of provision for elementary free education admits of no uncertain verdict except as to the claims of Belgium and Switzerland for the honour of first place. Together or separately, they excel all rivals in superlative excellence—Switzerland, represented by the town of Zürich, with its palatial school buildings arranged to meet every hygienic requirement, and Belgium, represented by Brussels, with its established structural excellence and highly-organised administrative programme; both marshalled by an energetic and progressive *personnel*, neither content with excellence but seeking perfection; Switzerland, more lavish in structural outlay; Belgium, if possible, more perfect in administrative organisation. Is there in either a determining element of superlative excellence or of essential defect to turn the scale? Yes; and reference to the respective reports will furnish the answer.

Under the head "Ventilation" will be found mentioned in the Swiss report opposite windows facing the lighting windows and opening into the corridor and extraction openings *near the floor* functioning in and out of class hours. In the Belgian report is no mention of opposite windows, and the extraction opening is *near the ceiling*. In relation to this structural difference there is no perceptible vitiation of the air at the end of the Swiss class, but at the end of the Belgian class there is perceptible vitiation of air. The Swiss engineer has provided a double extraction, and that for special function in winter near the floor. He argues thus. In winter the outside air passing over the radiator is heated and rises at once; descending as it cools, it reaches its destination at the level of the heads of the pupils, is not sufficiently heated by respiration to rise again, but finds its way to the extraction shaft by the low opening. In summer the entering air diffuses equally throughout the room, is warmed by respiration, and passes into the corridor or into the open air by the high opposite windows. The Belgian architect says: "The intake air is warmed by passage over the radiator, is breathed by the pupils, and then rises and finds its way by the high aperture to the extraction shaft." One of his premisses is false, by omission, and the conclusion falls to the ground. On this ground, involving as it does the most important hygienic principal—viz., that of proper aeration of the classrooms—the palm of superiority must be awarded to the Swiss elementary school.

Next, and following close on the heels of the leaders, comes Italy, represented by Milan and glowing with the enthusiasm of the Risorgimento. Here, again, are fine elementary school buildings, well-designed to fulfil the demands of modern science and generously installed. Here also the *personnel* is proud of its schools and still striving to excel. Florence, too, far behind Milan in point of school buildings, has all the potential energy and will to convert her antiquated schools into educational palaces. To quote words recently used by Professor Del Greco: "Questi stabilimenti infelici sono destinati a sparire—a morto." ("These infelicitous buildings are destined to disappear—to death.") But while the Florentine bemoans the destitute circumstances of his seats of learning, he, nevertheless, makes the best use of them. One of the most infelicitous of the schools—viz., that of Salvino del Armato degli Armati—is a pattern of order and cleanliness. Every attempt is made to do good work with bad material. What better warrant of future success? Then the institution for backward children, near Florence, is a model of excellence in point of administration and instruction, though housed in an ancient building.

But to proceed, Germany, as represented by Stuttgart, comes next in order of merit. Here we see established scholastic success enjoying the dignity of recognised merit as the educational school of Europe, the buildings being of substantial structure and simple decorative design and fulfilling the established hygienic rubric. No indication is there of a keen progressive movement, but all is in order and everything established on a solid basis.

Next on the list under review comes France, represented by Paris. Many of the school buildings are of recent construction, but the best are not built to meet modern requirements of school hygiene. There is deficient width of corridors and staircases, the drill-halls have to subserve a variety of purposes, the basement and roof-space are not utilised, the ventilation is defective, and the system of heating is bad, the pupils are adapted to the desks instead