rather tiresome complication. The trephine opening itself should not be behind the frontal plane through the anterior end of the zygomatic arch. A safe distance must be kept from the superior longitudinal sinus in the middle line. The skull itself is insensitive. I have found it an advantage to give ¼ gr. morphia hypodermically about half an hour before the operation. The wound is sutured whilst the patient is sitting up; the trephine aperture in the skull is left open for subsequent injections. These are performed by puncturing through the skin, pushing the needle in slowly till the cerebrospinal fluid trickles out (the patient lying with his head low); then the patient is raised to the sitting position, and the injection is carried out.

I have to thank Dr. T. E. K. Stansfield for permission to use the *post-mortem* material, and Dr. E. Faulks for valuable advice during my work.

(1) *Norsk Magasin for Lægevidenskaben*, Christiania, 1914, No. 5.—(2) I may add that for injections *post mortem* I have preferably selected cases of dementia paralytica, in order to obviate the objection that the adhesions in this disease might possibly prevent the access of the fluid to the different parts of the subarachnoid space.

Clinical Notes and Cases.

Notes on Juvenile General Paralysis, with the Clinical Description of a Case.

By C. H. G. GOSTWYCK, M.B.Edin., F.R.C.P.E., Senior Assistant Physician, Stirling District Asylum, Larbert.

JUVENILE general paralysis is of interest as illustrating one of the many ways in which syphilis may produce its detrimental effect on the human race. The disease may commence at a very early age; according to Thomson, progressive symptoms may be evident in children as young as three years. Males and females are victims in practically equal proportions. The symptoms are very similar to those of the adult form, progressive dementia being very marked; such variations as are present are due to the more undeveloped mental state of youth, and on the whole it corresponds to the demented or confused type of the adult. Periods of acute excitement, or of mental

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depression, are met with, and epileptiform seizures, which may be present at any stage, are often observed. Delusions of persecution are not uncommon, and grandiose delusions occur; hallucinations are also evident occasionally at some time during the course. In the younger patients a type of advancing spastic diplegia is most common, and even in older cases spastic symptoms are more prominent than in the adult form. The pathological appearances in the nervous system have the same characteristics as those seen in cases of mature age. The duration is usually from two to four years, although sometimes it may be more protracted.

Juvenile general paralytics fall somewhat naturally into two classes, namely, those who have been mentally deficient from birth, and those who, during the years previous to the onset of the disease, are stated to have been bright and intelligent, developing the characteristic symptoms later. A large proportion show traces of congenital syphilis, or have a history of parental syphilis, and in those cases where external evidence of syphilis is wanting the absence may be explained by the spirochæte being in a resting or latent stage, taking on activity later in life, and attacking the body in its most vulnerable spot, namely, the neurones, or that the resistance of the nervous system is being slowly undermined by toxines produced by the spirochæte.

The following is a description of the only case I have seen during twelve years' asylum experience:

A. B—, æt. 17, the child of a small farmer, was the eldest of six, the other children being from all accounts normal. No history of miscarriages or stillborn children was acknowledged, nor of any hereditary tendencies to insanity. He had always been considered somewhat "simple," and was a rather backward child, learning slowly, being unable to profit by his attendance at school in an average degree. At fourteen years of age he began to work on a farm, doing odd jobs for eighteen months; at the end of which time he complained of pains in both feet, and as these were attributed to flat-foot he was made to do tip-toe exercises, which seemed to relieve the condition. But shortly after this his parents noticed that his mental condition was altering, that he was becoming dull and stupid, talking less than formerly. Two months before admission to the asylum he lost a letter entrusted to him for the post, and received a severe scolding. This was the starting-point of a more decided change of character, for he then became stubborn, would not do as he was told, and would not answer; he cried like a frightened child when spoken to, and appeared unaccountably nervous. His habits rapidly altered, he lost all sense of decency, he

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became dirty and required attention as would an infant. During this later period his parents observed that his legs were becoming stiff, and he walked very badly. Eventually he was confined to bed owing to muscular weakness. There was no history of fits or convulsions.

When admitted to Stirling District Asylum on October 7th, 1913, his general condition was very poor. He was quite unable to walk, and could not stand without assistance. His legs were spastic, and movements of hands and fingers inco-ordinate. His speech was indistinct and inarticulate, the sounds he uttered were unintelligible, the only word which could even be guessed at being "mother." Sphincter control was quite lost, fæces and urine being voided involuntarily. Sensation, as tested with a pin-prick, was markedly diminished all over. The knee-jerks were much exaggerated, and the plantar reflexes normal. His pupils were equal, much dilated, but reacted sluggishly to light. He gave no sign that sounds were audible, and did not seem to understand what he saw. His teeth were typically of Hutchinson type, notched and peg-shaped, and there were old syphilitic scars around the angles of his mouth. His heart's action was irregular, but there was no alteration in the character of the sounds. Pulse, 120. Temperature, 100·2° F. His mental condition was one of dementia, with some temporary agitation at first which passed off within an hour or two after admission. He was quite unable to understand what was said to him, or to give any indication as to his condition, nor could he look after himself in any way. He required to be fed and tended after the fashion of a general paralytic patient in the third stage. One month after admission his sphincter control had improved, but he was as helpless as ever. His expression was one of quiet imbecile pleasure. He smiled when spoken to, and to everything responded with a word that sounded like "fine." Occasionally he was mildly restless, turning about in bed, but never attempting to get up. Lumbar puncture gave a result positive for general paralysis; the pressure was increased, the fluid clear and alkaline, markedly turbid on boiling, and the Nissl-Nonne test was positive and well marked; the cells were greatly increased, averaging twenty per field, lymphocytes plentiful with plasma cells, some Gitter cells, and a few polymorphonuclear leucocytes. During the following months his condition grew slowly worse, until, at the beginning of the fifth month of his residence, he was very thin and emaciated; he made no sound, his only movement was to turn his head from side to side, and his legs and arms had become very contracted. He died six months after admission, a pulmonary congestion setting in two days prior to his death. There were no convulsions or seizures during the course of his illness.

The *post-mortem* appearance of the brain was typical of general paralysis—the dura was thickened, no pachymeningitis hæmorrhagica was present. The arachnoid was thickened and opalescent, especially along the line of the vessels, and adherent to the tips of the convolutions, causing small erosions when stripped off. The convolutions were wasted, and separated from each other, especially on the anterior half of the cerebrum. The lateral ventricles were much enlarged, and thickly covered with granulations, as was the floor of the fourth ventricle. There was excess of cerebro-spinal fluid, and the blood-vessels at the

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base of the brain were thickened. The brain weighed 43 oz. The microscopic appearances confirmed the diagnosis, as the characteristic group of lesions were very definite. The vessels showed marked periarteritis with plasma-cells, there was much proliferation of neuroglia, and the nerve-cells were degenerated. The central canal of the spinal cord was entirely closed throughout its whole length by proliferated endothelial cells.

Whilst this lad was a patient, his mother, æt. 40, was admitted suffering from acute melancholia, and died after the attack had lasted three months. Unfortunately, no *post-mortem* was permitted, but her symptoms did not suggest general paralysis.

In this case, a congenital syphilitic, mentally deficient boy, the onset appeared at the age of fifteen in a slow but definite progressive mental deterioration, followed by a more rapid mental change after a scolding, which may have provided an accessory factor of mental stress. The neuronic degeneration seems to have been somewhat swift, as it was well marked within two months after its commencement. The emotional state changed quickly, for he passed through a phase which had a melancholic colouring within the same period; and appearing later was a condition of euphoria, as judged by his expression of happiness, and the inane smile he assumed when addressed. He exhibited no delusions or hallucinations at any time, and no seizures or "faint turns" were noticed prior to admission, and certainly none after. The duration of the disease from onset to death was only eight months.

It was thirty-seven years ago, when general paralysis of the insane was believed to be a disease confined to adult life, that Sir Thomas Clouston recorded the first case of juvenile general paralysis in a boy, æt. 16, and since then many other cases have been recognised, until it is no longer considered to be so very uncommon. Fennell looks on the disease as one which is by no means the rarest form of breakdown in children, and places the number among imbecile children at 5 *per cent.*; and Dr. Clarkson tells me that there are nearly always one or two among his patients at the Institution for Imbecile Children at Larbert.

The cause of general paralysis in the adult is now recognised to be syphilis, and has been proved by the researches of Noguchi and others, by the finding of the *Spirochæta pallida* in the brains of those dying from the disease, and we have the same factor acting as a congenital infection, and causing the same

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paretic symptoms in young persons. Syphilis is also a factor in the causation of imbecility, but there is a considerable discrepancy between the percentages obtained by various observers. Tredgold quotes the results of eight observers in different countries, of which three find positive Wassermann reactions which vary from 1·5 *per cent.* to 4·8 *per cent.*, and five give positive reactions varying from 15 *per cent.* to 30 *per cent.* Chislett obtained a positive reaction in eight of fourteen cases of imbecility.

Fraser and Watson placed the percentage at the high figure of over 50 *per cent.* of the mentally defective children they examined, and only a very small percentage of their cases giving a positive Wassermann reaction showed external evidence of congenital syphilis.

It is impossible in early life to say whether any given imbecile child will prove later to be a general paralytic, and only after the progressive symptoms have shown themselves can the case be declared as one of dementia paralytica. A systematic performance of lumbar puncture of young imbeciles, especially when combined with the Wassermann test, might prove to be of interest and productive of valuable results from the point of prognosis, at the same time throwing some more light on the incidence of progressive paralysis among such patients. By no means every child which is the subject of congenital syphilis develops into a general paralytic, and this seems to lend some colour to the idea that there may be some special form of spirochæte which causes the symptoms of general paralysis, especially when we consider those cases in which husband and wife have both suffered from the disease, the one having infected the other, and where one person has infected several others, who, later on, develop general paralysis, and also the more unusual cases where both parents and child have all been general paralytics. Although this form of spirochæte has not yet been isolated, there are some grounds, in the slowly accumulating evidence, for belief in its existence, and possibly the present view that in general paralysis the central nervous system is especially vulnerable to the toxic effects of the *Spirochæte pallida*, or that this organism is assisted by the *Bacillus paralyticans*, will require to be modified.

Bolton has put forward an interesting theory with supporting evidence with regard to general paralysis. He holds

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that subjects of this form of mental disease would, had they not been syphilised, have suffered from one or other types of primarily neuronic dementia, and he is of the opinion that an attack of syphilis is a necessary antecedent to dementia paralytica, supporting his argument by the appearances presented by the brains of general paralytics and those of progressive senile dementia, which do not differ in their essential pathological features. With regard to juvenile general paralytics he expresses the opinion that had these children not been syphilitic they would have become ordinary examples of stationary premature dementia. But, in consequence of this infection, paretic symptoms show themselves at a time when the neuronic activity is becoming most evident, and this activity replaces the ordinary stress and strain of adults, with the result that degeneration of the neuronic elements follows as a natural sequence. This last view has something to recommend it when we consider that there can be no stress of life affecting those imbeciles who develop general paralysis; and in those young persons who are not, or are only mildly, mentally defective the stresses of life can only affect them to a slight degree, for their age is often somewhat young to expect them to react to these in a manner which can compare with the more developed brain of an adult, and the other usual factors, such as alcohol and sexual excess, can be excluded.

The treatment of juvenile general paralysis must be on the general lines as for the adult form, and, although the benefit of salvarsan is still undecided yet, there are sufficient instances of amelioration on record to justify its use even in those who have been imbecile from birth; and more especially in those cases which are seen during the earlier stages. The treatment devised by Dr. G. M. Robertson of intra-venous injection of salvarsan, together with intra-spinal injection of antisyphilitic serum, combined with the administration of urotropine and calomel, gave definite evidence of a promise of satisfactory results, three out of twelve cases so treated recovering sufficiently to be discharged from institution care. And he was inclined to believe that the negative results were due to a want of vigour in pushing remedies in a combination and system which was at the time tentative.

In support of the fact that salvarsan undoubtedly does good in actual imbecility arising from syphilis, Finlay has published

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some very striking results, and leaves the impression that the same remedy might be administered in most cases of imbecility with advantage. And perhaps a similar amelioration might be expected in those cases of imbecility which, on showing some progressive mental and physical symptoms, might well prove themselves to be cases of juvenile general paralysis.

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The Clinical Simulation of General Paralysis of the Insane.

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IT happens not unfrequently that a provisional diagnosis of general paralysis is made in the insane, which the subsequent course of the case fails to confirm. In the three cases on which this paper is based a diagnosis of general paralysis was made, in one of them quite confidently, and in the two others only as a last resort, because the course of the disease presented so many unusual clinical features. These three cases are specially interesting because a *post-mortem* examination was made on each of them, and so permitted of a confirmation or otherwise of the diagnosis, and also on account of the very interesting pathological findings.

A. B—, female, æt. 62, admitted November, 1911, died May, 1912; duration on admission said to be one week only. On admission she was very dull and confused, had a weak, unsteady gait, and general tremors; knee-jerks were dull but equal; pupils equal, and reacted both to light and accommodation; pulse 76. When I saw her on February 15th, 1912, she was weak, very unsteady on her legs, tremors of tongue

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