Summary.

Three cases of frontal lobe tumour are described, in two of which the growths were bilateral.

The only observed clinical signs which were common to all three cases were mental changes and tremor.

In two cases severe generalized convulsive attacks constituted the first definite symptom.

Attention is drawn to a peculiar exaggeration of the plantar reflexes encountered in two of the cases.

TUMOUR OF THE BRAIN SIMULATING ENCEPHALITIS LETHARGICA.

BY

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THE rarity of a cerebral tumour giving rise to the clinical picture of encephalitis lethargica in its early and penultimate stages is so marked that the following case deserves attention.

A man, aged 57, had a mild attack of influenza in April, 1926, and was reported as completely well in the third week of the following month. Four weeks later an insidious onset of drowsiness and lethargy began, and was followed in a few days by dimness of vision for near objects. The drowsiness gradually deepened for four weeks, and the patient complained of double vision; the temperature during the same period oscillated between 98° and 100° F. The period of stupor reached its height at the end of July, and was followed by marked improvement in the patient's condition, as shown by his taking an increasing interest in his surroundings and in the disappearance of diplopia. Except for spasmodic twitching of his legs he had almost regained his normal health in September. In October and December, 1926, and April, 1927, he had relapses which were followed with marked improvement, although it was noticed that each successive improvement left the patient a little more stuporous. In June, 1927, he became markedly lethargic, and on July 13th he was admitted to hospital for treatment, his condition having been definitely diagnosed by a neurologist as encephalitis lethargica. On admission his temperature was 98° F., and his pulse 74. He continued in a stuporous condition, but when awakened his mental condition appeared quite clear and he was able to answer questions in a rational manner. The face was smoothed out and expressionless, the eyelids were in a condition of ptosis, his voice was monotonous, but not indistinct, his right eye showed an internal strabismus, and on being questioned he said he saw two fingers instead of one which I held before him. There was dimness of vision for near objects, the pupillary reflex to light was absent on the right side and sluggish on the left; reaction to accommodation was normal. The tendon, abdominal, and plantar reflexes remained unaffected.

Although signs of improvement were occasionally manifested the stupor gradually deepened, and the vision of the right eye diminished so rapidly that a more detailed ophthalmological examination was made. The ocular reflexes had not altered since the previous examination; there was paresis of the external rectus on the right side, associated with well-marked papilloedema of the right optic disc, and the retinal veins of the left fundus appeared slightly swollen. These findings pointed to the probability of a neoplasm localized to the right frontal region of the brain, producing pressure on the right second and sixth cranial nerves and causing the papilloedema.

A cerebral gumma being suspected as the cause of the mischief a Wassermann test of the blood was performed; the reaction was positive. Antisyphilitic treatment, in the form of potassium iodide and liquor hydrarg. perchlor. internally, and neosalvarsan intramuscularly, was started at once, but there was no response, and the patient died on November 30th, 1927, eight weeks after the commencement of the treatment.

The autopsy revealed a spherical tumour, two inches in diameter and gelatinous in consistency, lying in a smooth walled cavity of the right frontal lobe of the cerebrum; posteriorly between the tumour and the wall of the cavity was a clot of blood an inch long and a quarter of an inch broad.

The points of interest in the case are:

1. The earlier symptoms—namely, gradually progressing drowsiness, dimness of vision, diplopia, ptosis of eyelids, and occasional slight rises of temperature—were identical with the clinical manifestations in a large group of cases of encephalitis lethargica.

2. Complete absence of headache and vomiting, which are almost invariably present in the later stages of cerebral tumour.

3. The importance of ophthalmoscopic examination of the eyes in every case pointing to a lesion of the central nervous system.

It is very much regretted that there was no histological examination of the tumour; perhaps an expert in neuropathology would venture an opinion as to the nature of the neoplasm.

ISOLATION OF *B. TYPHOSUS* FROM SEWAGE AND SHELLFISH.

BY

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THE danger of consumption of sewage-contaminated water, shellfish, watercress, etc., is a cardinal article of the hygienist's faith, but hitherto it has not been possible to find objective evidence by the cultivation of the typhoid bacillus from the sewage. By the use of a new technique I can now demonstrate on an average the presence of one typhoid bacillus in each cubic centimetre of Belfast sewage.

Sir Alexander Houston¹ in 1913 and 1914 examined 23,353 non-lactose fermenting colonies developing on plates inoculated mainly with samples of London (Barking) or Hendon sewage, and also with individual samples from Dublin, Belfast, Edinburgh, and Aberdeen. He was unsuccessful in isolating a single *B. typhosus*, and concluded that the typhoid bacillus is not uniformly present in 0.00066 c.cm. of crude sewage, and that this amount of sewage contains 704 excretal bacteria per cubic centimetre. Dealing with the difficulties of the task Houston writes:

"Sewage contains such an enormous number of bacteria that it is quite impracticable to examine more than a very small amount of this material. For example, to examine one cubic centimetre of crude sewage for typhoid bacilli by the direct plating method would mean making at least 1,000 special plate cultures and at least 20,000 primary subcultures, not to speak of the secondary and other cultures for the purpose of differentiation. It is, however, quite practicable to work with as much as 0.01 c.cm. of sewage spread over from 10 to 20 special plates, and therefore to make 200 to 400 primary cultures."

Non-lactose fermenting organisms are so common in sewage that many thousands or hundreds of thousands of such colonies would require to be examined in order to isolate a single typhoid bacillus. For example, in Belfast sewage I find that on an average 400,000 to 500,000 organisms develop from 1 c.cm. on MacConkey lactose bile salt agar plates, and that of these more than one-half are non-lactose fermenters. In such sewage I have found about one typhoid bacillus in each cubic centimetre, so that, using the MacConkey medium, there would have been a chance of isolating the bacillus if 250,000 non-lactose fermenting colonies had been tested. In all probability, even after such a Herculean effort, failure would have resulted, as the chances are that the typhoid bacillus would not have had a clear space on the plate to develop, and its growth would have been obscured and inhibited by the coliform colonies. The addition of brilliant green to the medium would doubtless render the isolation of *B. typhosus* from sewage not quite so difficult, but even so the chances against a non-lactose fermenting colony being composed of typhoid bacilli would be many thousands to one. In the examination of sewage for the presence of *B. typhosus* I therefore made use of the glucose-sulphite-iron-bismuth-brilliant green medium of Wilson and Blair,² the efficiency of which depends on two original observations of mine: (1) *B. typhosus* in the presence of a fermentable carbohydrate is able to reduce a sulphite to a sulphide, and so to form a black colony in the presence of an iron salt. (2) Bismuth sulphite in the presence of a certain excess of sodium sulphite suppresses the growth of most coliform bacilli; in the presence of brilliant green the selective action is intensified. This medium has in my hands rendered the isolation of *B. typhosus* from enteric stools one of the easiest procedures in applied bacteriology, and recently by means of it B. A. Adams³ has isolated the same bacillus from the excreta of seagulls.

When 0.5 to 1 c.cm. of sewage is poured over the surface of a plate of the medium and allowed to dry, and is then incubated for twenty-four hours at 37° C., black colonies with a metallic halo are developed, and also light green colonies of *B. proteus*. It is among the black colonies that *B. typhosus* is to be sought. All the black colonies, if subcultured on MacConkey or Endo medium, will be found to consist of non-lactose fermenters, so that these media are not very helpful in distinguishing between colonies of *B. typhosus* and those of other reducing bacteria. It was found that a very large proportion of the black

colonies simulating those of *B. typhosus* were saccharose fermenters, so that the use of saccharose in a modified Endo medium enabled me to distinguish rapidly between them and those of *B. typhosus*. The principal organism forming these black colonies on the bismuth sulphite medium is present in most specimens of sewage, but has not so far been found by me in faeces. The chief characters of this organism, to which I have given the name of *B. effluviei*, are as follows: A Gram-negative actively motile bacillus with growth on agar resembling *B. coli*; in liquefying gelatin and in being negative to methyl red and giving a positive reaction to the Voges-Proskauer test, it resembles *B. cloacae*, from which it differs in its reduction of sulphites and in being a non-lactose fermenter. It grows in Koser's citrate solution. It ferments glucose, maltose, mannite, saccharose, and starch, with the production of acid and gas, and has no action on lactose, dulcitol, and salicin. It forms indol and digests inspissated serum.

The *B. effluviei* is probably related to the *B. proteus* group, although it ferments mannite and does not decompose urea.

Material Employed.

Crude fresh-screened sewage was taken from the combined sewage of the upper and lower level sewers of Belfast on its way to the sedimentation tanks. On three occasions the samples were taken at 10 a.m., on the fourth at 2 p.m. The sewage was flowing along and was taken up in a sterile bottle, and may be regarded as representative of the ordinary dry weather sewage of Belfast. One sample taken on February 25th, 1928, gave the following figures on chemical analysis:

	Parts per 100,000.
Free and saline ammonia	1.4
Albuminoid ammonia	0.8
Oxygen absorbed, two hours, at 80° F.	4.0
Chlorine	25.0

On bacteriological examination it showed 480,000 colonies per cubic centimetre on a MacConkey plate, and of these 218,000 were lactose fermenters and 262,000 non-lactose fermenters. It also contained 200 spores of *B. welchii* per cubic centimetre.

The chief details in connexion with the isolation of the typhoid bacillus may be summarized as follows:

TABLE I.

Sewage.	Date.	Amount of sewage Planted Out.	No. of Black Colonies Examined	No. of Saccharose Fermenters.	No. of Non-saccharose Fermenters.	No. of Typhoid Colonies Found.
Belfast	1928. Feb. 16	4 c.cm.	31	27	4	4
Belfast	Feb. 25	11 c.cm.	67	60	7	2
Belfast	Mar. 8	10 c.cm.	64	50	14	7
Belfast	Mar. 12	5 c.cm.	71	56	15	8

The examination of 30 c.cm. of sewage resulted in the isolation of twenty-one strains of *B. typhosus*. The bacilli were not uniformly distributed in the sewage, some of the plates yielding none and others several. Probably more bacilli were present than were isolated, and I am of opinion that at least one typhoid bacillus is present in each cubic centimetre of the ordinary crude screened sewage of Belfast.

Whether the sewage of other cities and towns would yield similar results requires investigation. I may state that Belfast, although at present comparatively free from typhoid fever, was at one time one of the most typhoid-infested cities of Europe, and consequently would be expected to have many typhoid "carriers." From the annual report of the superintendent medical officer of health for Belfast for 1926 I may take the following figures.

Year.	Population.	Deaths from typhoid fever.	Annual enteric mortality rate per 10,000.
1897	310,000	354	11.4
1898	340,000	640	18.8
1901	350,862	341	9.7
1905	360,000	128	3.0
1911	386,449	15	0.4
1920	413,000	34	0.8
1926	416,000	6	0.1

During 1926 there were 84 cases of enteric fever notified in Belfast. It would seem, therefore, that in a town that has been exposed to outbreaks of typhoid fever the ordinary sewage contains the typhoid bacillus, and that the sanitary policy which aimed at the formation of a clean environment—pure water, pure soil, and the rapid removal of excretal matter from premises—was sound. In such a town our results show that the specific infective agent is liable to be present in ordinary sewage. Nearly all the cases of typhoid fever notified are treated in an isolation hospital, the sewage of which, before discharge into the city sewers, is sterilized by steam; of the 84 patients with enteric fever in Belfast in 1926, 82 were treated in hospital. The source of the bacilli in the sewage is therefore probably mainly "carriers." While the bacilli remain in the sewage as such there is little danger of infection, but there is the possibility of the return of the typhoid bacillus to man again by contamination of the soil, by leaking drains and sewers, by contaminated water supplies, and by the consumption of shellfish living on sewage-polluted foreshores.

Shellfish.

The facts relating to the isolation of *B. typhosus* from shellfish collected from Belfast Lough foreshore at Green-castle are as follows. On March 6th seven cockles were opened; the liquor was collected on a sterile Petri dish and was then transferred to nine plates of the special bismuth medium. Nine black colonies were studied, seven being saccharose fermenters and two non-saccharose fermenters; of the latter one proved to be *B. typhosus*.

The bacilli which I regard as being typhoid bacilli were actively motile and Gram-negative; they formed acid but no gas in glucose, maltose, and mannite agar shake cultures. No fermentation of lactose, saccharose, dulcitol, and salicin occurred; indol was not formed, and gelatin was not liquefied.

The bacilli were agglutinated to full titre by four different antityphoid serums, and were not agglutinated by normal serums in dilutions of 1 in 20. That the organisms were typhoid bacilli was established by means of absorption tests. It was found that those recovered from the sewage and the cockles removed from several antityphoid serums the agglutinins acting on them and on genuine typhoid bacilli.

REFERENCES.

¹ Houston, A. C. (1914): Tenth Report on Research Work to Metropolitan Water Board. ² Wilson, W. J., and Blair, E. M. McV. (1927): *Journ. of Hygiene*, 26, 374. ³ Adams, B. A. (1928): *The Medical Officer*, 39, 185.

A CASE OF PROGRESSIVE MUSCULAR ATROPHY OF THE PERONEAL TYPE;

TWENTY-ONE OF THE PATIENT'S RELATIVES BEING ALSO AFFECTED.

BY

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THIS syndrome was recognized as a distinct type, first by Charcot and Marie in 1886, and independently by Sir Howard Tooth in a thesis the same year. Several cases which were perhaps similar had been recorded previously, such as Osler's Star family in New York, and Meryon's patient in 1852. Herringham, in 1887, published an account of a family where eighteen members were all affected, Symonds brought forward one where nine suffered, Collier one with eight, while Beevor, Bryant, Ormerod, and Schultz have each reported families with three cases.

The disease is transmitted both in the male and in the female line; and there is not the great preponderance of males affected that we get in pseudo-hypertrophic paralysis. As Williams has remarked, however, there are instances where no relatives are affected, and others where several brothers and sisters develop the disease simultaneously for the first time in a family. It has several times appeared after a febrile disease, such as measles. It may commence in childhood, more often in the second or third decade. Generally the first wasting is seen in the feet or peronei on both sides, but occasionally it shows itself first in the hands