sclerosis in the lateral columns of the spinal cord, disseminated sclerosis, etc.), but that it is just possible that in some rare cases of organic nervous disease (for instance, some cases of early disseminated sclerosis) the organic changes may give rise to the phenomena of increased tendon reflexes, etc., merely by inducing the above-mentioned (hypothetical) functional cerebral change.

To illustrate my meaning further, I shall now allude to the analogous question of the nature of functional nervous vomiting. In an article contributed to *Brain* in 1904¹ I endeavoured to show that functional nervous vomiting, like the hemianaesthesia, palsies, and spasms of hysteria, must be regarded as due to an abnormal state of the brain (cerebral cortex), and is just as much a symptom of functional brain disease as the vomiting in cases of cerebral tumour is of organic brain disease. We know that violent vomiting is frequently a result of organic disease (tumours, etc.) and injuries (involving concussion) of the brain, and that vomiting of cerebral origin often occurs in the absence of any gross change in the brain (for instance, in simple concussion and in ordinary sea-sickness, and from toxic causes acting on the cerebral cortex, such as uraemia, and from the inhalation of chloroform and ether), and may even be due to purely psychical causes—such as ideas connected with disagreeable smells and sights, the view of blood and surgical operations, and various mental emotions. Now, patients with functional nervous vomiting mostly exhibit characteristic signs of hysteria, and it is generally recognized, I believe, that the main symptoms of hysteria, such as hysterical hemianaesthesia, hysterical monoplegias, and hysterical spasms, owing to their characteristic distributions, etc., are of cerebral cortical origin, just as much so as the mental symptoms of hysteria are. I believe, therefore, that in vomiting of functional nervous origin the main site of the disturbance in the nervous system is most probably likewise in the brain (cerebral cortex), and, practically speaking, I regard the vomiting of organic brain disease as an imitation of that due to functional brain disease (hysteria). The vomiting due to functional disease may in rare cases—true faecal vomiting of functional nervous origin—be more violent than any vomiting caused by organic disease. With regard to the violence of the symptoms in such exceptional cases, I wrote in the paper above referred to:

"Why the vomiting in functional brain disease should be sometimes actually more violent and severe (faecal vomiting) than it is in organic cerebral disease (faecal vomiting practically never occurs in organic brain disease) I cannot understand, unless it be that disturbance of function can show itself in a more pronounced form in a brain without any gross organic disease than it can in a brain the finer mechanism of which has already been impaired by severe organic disease, such as cerebral tumour. In connexion with such a supposition one may remember that a delusion is apt to be less stable (and not so well organized) in a general paralytic, whose brain is the site of grave organic disease, than in a patient with chronic paranoia, whose brain, could it be examined, would probably show no obvious organic changes."

In conclusion, I maintain that in functional nervous vomiting we probably have to deal with a peculiar functional change in the brain (cortex), analogous to the cerebral condition that produces the exaggerated tendon reflexes and "trepidation" of functional nervous origin, and which, like it, may be excited or modified by emotional factors, and is analogous to certain states induced by toxæmias—such as uraemia. The symptoms produced by these abnormal functional states may equal or even exceed those produced by organic disease.

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THE *Deutsche medizinische Wochenschrift* announces, on the authority of the German Ambassador at Tokyo, that foreign doctors who wish to obtain the right to practise their profession in Japan may pass the necessary examination in English, French, or German, or may employ the services of an interpreter. Moreover, the interval which in the case of Japanese candidates must elapse between the two parts of the medical examination may be dispensed with in the case of foreigners holding a medical diploma.

TYPHOID CARRIERS.

BY

ALEX. LEDINGHAM, and J. C. G. LEDINGHAM,
M.D., M.A., D.P.H., M.B., B.Sc., M.A.,
MEDICAL OFFICER OF HEALTH ASSISTANT BACTERIOLOGIST,
OF COUNTY OF BANFF. LISTER INSTITUTE, LONDON.

DURING the past two years the important question of "chronic typhoid carriers" has received a large amount of attention at the hands of German hygienists and bacteriologists.

Hitherto the importance of the subject from the point of view of public health has been insufficiently realized in this country. Recently an American worker has recorded one very interesting case to which reference will be made later. It is not proposed here to discuss in detail the various published cases, which after all present so many points of similarity. It will suffice to refer briefly to the more important articles, after which we shall record our own experiences in this matter.

German Experiences.

For a large part of our knowledge of the subject we are indebted to hygienists in Strassburg. The now classical case of the Strassburg female baker was described by Kayser in 1906. The facts of the case were briefly these: It was observed that practically every new employee in the bakery became sooner or later seriously ill with intestinal typhoid-like symptoms. In two persons the disease proved fatal. The faeces of the woman who owned the bakery and who had had typhoid fever ten years previously, were found to contain typhoid bacilli in large numbers. Her serum also agglutinated the *Bacillus typhosus* up to 1 in 100. Kayser (1906) was also able to isolate another carrier in the person of a female engaged in the milk trade. She was apparently responsible for a small typhoid epidemic due to infected milk, in which 17 cases were involved, with two fatalities.

Further, several epidemics in a household were traced to a female who had had typhoid fever complicated with jaundice thirty years previously. In all, twelve carriers were found (9 female and 3 male). The ratio (3 to 1) probably also expresses the incidence of gall-stone disease in the female and male respectively. Klinger (1906), in an examination of the stools of 482 cases of typhoid fever, found that 27, or 13.1 per cent., harboured the bacilli; of these 27, however, 8 only continued to harbour the bacilli longer than six weeks after the temperature had become normal, so that altogether 1.7 per cent. became chronic carriers. These cases were followed up for varying periods up to eleven months. Klinger places in a separate group a series of 11 cases (6 male and 5 female), who were found to pass typhoid bacilli in the stools for a short time only. These people had not had typhoid fever, but had been closely associated with typhoid patients. These temporary harbourers of the bacillus, or "acute typhoid carriers," he does not consider to be relatively so dangerous as the chronic or persistent carriers. It seems unjustifiable to dogmatize on this point, as the passage of bacilli in the stools probably takes place intermittently, and repeated examination at intervals would be required to settle this question.

Lunatic asylums appear to yield a considerable number of the cases recorded; and, as our experience has been obtained with material from this source, it may be well to summarize the chief evidence.

In the course of an investigation into the causes leading to a succession of typhoid epidemics which had occurred in an asylum containing 250 patients, Nietzer and Liefmann (1906) were able to isolate seven typhoid carriers. They had commenced with an examination of the stools of patients who had recovered from typhoid fever, but none of these were found to harbour the typhoid bacillus. A certain patient, however, happened to be suffering from dysentery, and in her stools typhoid bacilli were found, along with dysentery bacilli of type "Flexner." In the faeces of another patient who had the characteristic symptoms of dysentery, typhoid bacilli were found, but no dysentery bacilli. After death typhoid bacilli were found, not only in the intestine, but also in the bile. The blood of this patient also agglutinated *B. typhosus* up to

1 in 50, and the *B. dysenteriae* (Flexner) up to 1 in 100. Old typhoid cicatrices were found in the small intestine, while the large intestine showed chronic catarrh.

Probably the infection of these dysentery cases with the *Bacillus typhosus* was due to the fact that, owing to lack of room, the typhoid and dysentery cases were not isolated in separate buildings. The transference of infection from one patient to another is readily conceivable when the filthy habits of many of these cases are remembered.

Further notes on the conditions prevailing in this asylum were recently recorded by Nieter (1907). The asylum contained altogether about 900 females, and the previous 7 cases had been discovered in one building containing 250 female inmates. In addition to these 7 cases, 4 others were found, and it was hoped that with the isolation of these no more outbreaks would arise. However, during the course of December, 1906, and January, 1907, 3 cases of typhoid fever occurred among female attendants. In the room in which these attendants had served was found another carrier. This female harboured the paratyphoid bacillus (type B) in addition to the *Bacillus typhosus*.

Four or five months later an outbreak occurred in another department. This led to the discovery of yet another chronic carrier who had had typhoid fever two years previously. Altogether in this asylum 13 cases were brought to light.

The experience of Friedel (1907) is especially interesting, as the outbreaks occurring in a similar institution were clearly traced by him to an imbecile patient who did work in the kitchen department. This person had never suffered from typhoid fever. It is important to note that her work in the kitchen consisted chiefly in the preparation of various salads.

In an asylum at Hördt as described by Klinger, two carriers were found and isolated. It happened that in the typhoid-infected building there was a washerwoman who had suffered from typhoid fever one year previously. Her stools were examined three times, and found to be free of typhoid bacilli (February and March, 1905). However, in September, 1905, other cases broke out in her department, and she was now found to be a carrier. Her serum agglutinated the *Bacillus typhosus* up to 1 in 1,000.

Other carrier cases isolated in asylums at Saargemünd and Klingemünster are mentioned by Nieter. The American case described recently by Soper (1907) of New York concerned a female cook, in apparently perfect health, who, so far as her history could be traced, had in the course of five years been responsible for the occurrence of typhoid epidemics in seven different households. Her stools were found to contain typhoid bacilli in large numbers, and her serum gave a positive Widal reaction.

CAUSE OF THE PRESENT INVESTIGATION.

A certain lunatic asylum in Scotland, containing at the present time 92 male and 53 female patients, 8 male and 6 female attendants, and 4 female servants, has since 1893 been visited by a succession of small outbreaks of typhoid fever. Similar outbreaks have occurred during the same time in a smaller detached institution situated about five minutes' walk from the main building. Female patients only, to the number of 32, occupy at present this smaller asylum. Prior to the adoption of the Notification Act in 1891 no authentic records of typhoid fever in this institution are available.

Thirty-one cases in all have occurred, and 24 of these have been females. Nine cases have proved fatal, giving a fatality rate of 29 per cent. Included in the accompanying table are 4 cases among the attendant staff (3 female and 1 male). It will be observed from the table that the cases occurred at no special time of the year, but that in any one year the notified cases followed each other as a rule very closely. During 1894, 1898, 1902, and 1905, no cases were notified.

As might be expected, the mysterious cropping up of typhoid cases has been a source of great anxiety to the authorities, who have done everything in their power to make the sanitary arrangements of the institution as complete as possible. Repeated analyses of the water supply, both chemically and bacteriologically, have thrown no light on the etiology of the outbreaks. The sewage is conveyed direct to the sea. The dairy arrangements are in excellent order. The same water supply is enjoyed by

Table Showing the Incidence of Typhoid Fever in Successive Years since 1893, when the First Case was Notified.

Year.	Total Number of Cases.	Month of Notification.	Main Asylum.	Small Asylum.
1893	2	March, July	2	0
1894	0	—	0	0
1895	6	July (2), August (3), December (1)	1	5
1896	2	April, May	2	0
1897	1	November	0	1
1898	0	—	0	0
1899	4	August (1), November (3)	4	0
1900	3	January, June, August	1	2
1901	2	February, May	2	0
1902	0	—	0	0
1903	4	February, March, April, October	4	0
1904	3	June, July, August	3	0
1905	0	—	0	0
1906	1	April	1	0
1907	3	February, April, October	2	1

several families residing on a farm near the source of the supply, but at no time have cases of typhoid occurred among them. These and other considerations suggested that the source of the infection was possibly to be found among the patients themselves, and in the light on recent German work on the occurrence of typhoid carriers, one of us (A. L.) proceeded to investigate the whole question from this point of view. As three-fourths of the cases had occurred among the female inmates, his attention was confined solely to these. In February of this year a start was made by testing the Widal reaction in a group of 43 female patients. The serum of 6 cases, 2 of whom had had typhoid fever previously (in 1903 and 1904 respectively) gave a well-marked reaction. In the course of this investigation, however, A. L. himself contracted an attack of typhoid fever, and nothing further was done in the matter till September, when it was determined to make an exhaustive bacteriological examination of the stools of all the female patients in the asylum. The samples were forwarded to one of us (J. C. G. L.) at the Lister Institute, London.

Bacteriological Investigation.

The samples were received in sterile bottles, great care being taken to avoid any admixture of urine, as the latter markedly inhibits the growth of intestinal organisms on the plates. From each sample two separate loops were taken and emulsified in two broth tubes. Two plates of bile salt lactose-neutral-red agar (MacConkey's medium) were spread with a loopful from each broth tube, four plates in all being prepared from each sample of faeces.

On the following day the colourless colonies were picked off and inoculated in mannite-peptone water. If gas production occurred (as in the great majority of the cases), no further consideration was necessary. Where acid production only occurred, a further series of sugar tubes were inoculated (glucose, lactose, cane sugar, and dulcitol), also litmus, milk, and gelatine. Indol was tested for by Ehrlich's method on the third day. Agglutination tests were made with an antityphoid horse serum, also with serum from positive cases of typhoid fever.

From the main asylum fifty-seven samples of faeces from female patients were examined. One patient, G., was found to be passing typhoid bacilli in enormous numbers in the faeces. In fact, the plates contained typhoid colonies to the almost complete exclusion of *B. coli* and other lactose fermenters. This patient, G., has been in the asylum since 1896. She is 35 years of age, suffers from dementia, and there is no record of her having had typhoid fever. Her personal habits are exceedingly filthy, and she has never been employed in the laundry or kitchen. Her serum agglutinated the *Bacillus typhosus* up to 1 in 200. (Time, 1½ hours at room temperature.)

For this test the laboratory strain was employed. Curiously enough, her own strain was agglutinated very slowly by G.'s serum, but was agglutinated by anti-typhoid horse serum in dilution of 1 in 8,000. The G. strain had also considerable virulence for the guinea-pig; 2 c.cm. of a twelve-hour bouillon culture inoculated intraperitoneally caused death within twenty-four hours.

The patient G. was isolated on September 24th and treated with intestinal antiseptics. On October 12th samples of faeces and urine of G. were received. Typhoid bacilli were not found in either. On October 21st the *B. typhosus* was readily isolated from the faeces, and a fourth sample received on November 29th was also positive. The urine remained negative.

With the isolation of G., it was hoped that no more cases of typhoid fever would recur, but this did not prove to be the case. Towards the end of October a case of typhoid fever occurred in the small asylum, and accordingly we proceeded to examine the faeces of all the female patients systematically (34 in number). Another carrier was thus brought to light. This patient, M.C., is about 60 years old. She had an attack of typhoid fever in 1895, and has been continuously in the small asylum since that time. She is able to walk about and do a little work, but she has never been employed in the kitchen. Her habits are cleanly, and she has occasionally assisted in the laundry. It has to be noted that though there are two separate blocks, they are really one, from the extent of communication that goes on between them. The dinners are cooked at the main asylum and brought over to the smaller block. The clothes are washed also at the main asylum, but patients from the small asylum would occasionally assist. As in G.'s case, the plates of M.C. showed almost pure typhoid to the exclusion of lactose fermenters.

The strain obtained from M.C. was agglutinated by antityphoid serum in dilution of 1 in 7,000. The serum agglutinated the laboratory strain, her own strain, and the G. strain up to 1 in 200. The M.C. strain had also the same degree of virulence for the guinea-pig as the G. strain. On November 29th, the *Bacillus typhosus* was again isolated from the stools of M.C. but not from the urine.

So far the blood has not been examined for typhoid bacilli in either G. or M.C.

All the females in both buildings had now been gone over, but it was felt advisable to repeat the examination in some of them, especially those who had suffered from typhoid fever in recent years.

A third carrier negative on the previous occasion was thus revealed.

This patient, C., is about 30 years old and had typhoid fever in 1904. She is not of dirty habits, and has never been employed in kitchen or laundry. The plates prepared from C. showed very few colonies, and in this respect differed from those of G. and M.C. The serum gives a marked Widal reaction, and the strain obtained from the stools is agglutinated by antityphoid serum in dilution of 1 in 7,000.

Up to the present time, therefore, we have succeeded in isolating three typhoid carriers out of a total of ninety females examined. The male patients have so far not been investigated, but we are at present considering this step.

Prophylactic Measures.

We shall conclude with some observations as to the treatment adopted in these cases. In addition to isolation and disinfection of excreta, so-called intestinal and urinary antiseptics have been employed in our cases, but it is not at all likely that they will do the slightest good. Other workers have recorded quite negative results with milk diet, chloroform, hepatic cholagogues, salol, etc.

It seems probable that in these cases the bacilli vegetate in the gall bladder, from which they are intermittently ejected into the intestine. An interesting case, showing the importance of the gall bladder as the seat of vegetation of the *Bacillus typhosus*, is recorded by Levy and Kayser (1907). A female asylum patient who had been isolated as a typhoid carrier on October 17th, 1905, died on October 18th, 1906, after a short illness, in which fever, pulmonary trouble, and stupor were marked symptoms. At the necropsy, hypostatic pneumonia was found, the spleen was slightly enlarged, and a gall stone was present in the fundus of the gall bladder. Typhoid bacilli were isolated from the liver, spleen, bile, gall bladder wall, and interior

of gall stone. In view of the general distribution of the typhoid bacillus in this case, the authors conclude that death was due to an autoinfection from the gall bladder, where the bacillus had so far led a saprophytic existence.

Dehler (1907) has actually performed cholecystostomy and drainage of the gall bladder in two asylum carrier cases, though in neither were there symptoms pointing to gall-bladder disease.

Numerous examinations of the stools were made after the operations, and it was found that in a few months the typhoid bacilli ceased to appear in the faeces, and the patient's serum failed to agglutinate the typhoid bacillus.

It cannot, however, be expected that this form of treatment will become popular, at least where otherwise healthy carriers are concerned.

The appropriate treatment of these cases presents many difficulties, but one conclusion is clear—that a person who is found to be a typhoid carrier should be kept constantly under bacteriological supervision. Perhaps also many typhoid epidemics would be avoided if the excreta of recovered typhoid cases (especially female cases) were examined systematically (say once a month) up to six months after recovery.

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THE CONTENTS OF IRREDUCIBLE INGUINAL HERNIAE IN FEMALE SUBJECTS, AND TRUE HERMAPHRODITISM.

By EDRED M. CORNER, M.C.CANTAB., F.R.C.S. ENG.,
SURGEON IN CHARGE OF OUT-PATIENTS TO ST. THOMAS'S
HOSPITAL AND TO THE CHILDREN'S HOSPITAL,
GREAT ORMOND STREET, ETC.

THERE is a condition of inguinal hernia found in females which deserves much more attention than has hitherto been given to it. It is concerned with the irreducibility of the hernia, and differs in a most marked manner when found in adults from that when found in children. This condition is the presence of some of the female internal genitalia in the hernia sac. In order to arrive at extensive information on the subject, I asked Mr. S. G. Allen, F.R.C.S., of the Children's Hospital, Great Ormond Street, to obtain for me some figures of the irreducible herniae in female patients admitted at that institution. He looked through 11,800 cases, and amongst them found 103; 90 were reducible, 4 were irreducible, and 9 were strangulated. Of the latter 13, the contents of the hernia were recorded, every one containing some of the internal genitalia of the female. The uniformity of the condition in them is most striking.

To contrast with this, Mr. L. E. C. Norbury, F.R.C.S., Surgical Registrar to St. Thomas's Hospital, made for me a list of the irreducible inguinal herniae of female patients admitted to the hospital. Since 1878, 52 such cases have been admitted and operated upon. Of these 52, 3 were children, and have been added to the 13 of Great Ormond Street, bringing the total up to 16. These two groups of hospital cases, children and adults, possess distinctive features as regards the age of the subject and the contents of the hernia.

Age.

Class 1.—All were infants, the youngest being 9 weeks and the oldest 13 months.

Class 2.—All were adults, the youngest being 15 and the oldest 19. The generality of the patients were between 40 and 50.