

W. M., aged 29, had severe influenza in 1901, appendicitis in 1903, and appendicectomy in 1907, followed by prolonged insomnia and mental depression. He returned to work, but in 1911, after a mild attack of influenza, headaches, and depression with suicidal impulses, culminating in delusional insanity, he was again unable to work. He was found to have staphylococcal infection involving all his nasal sinuses. The sinuses were radically operated on to eliminate all the focal sepsis, and after some months he

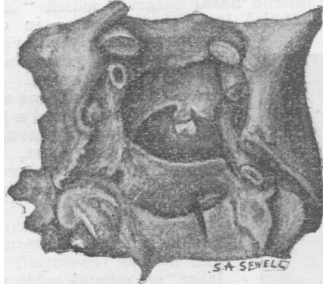


FIG. 8.—Sphenoidal sinus (M. L.), showing perforation of pituitary fossa from sphenoidal sinus. Note especially the bony ridge within the fossa indicative of long-standing infection.

lost his delusions, regained his mental balance, and returned to work. He remained in uninterrupted health, and has occupied the position of bank manager for sixteen years.

These three cases, after a long history of nasal infection with ever-recurring complications—extending over several years, and including arthritis, appendicitis, pneumonia, neurasthenia, and insanity—completely recovered, and the oft-recurring infections abruptly ceased with the removal of what certainly would appear to have been the common causal factor of all their illnesses, nasal, pulmonary, and abdominal. The appendicitis cannot be regarded as mere coincidence, and each case in its entirety is a clinical picture representing the long-drawn-out history of a chronic low-grade focal infection.

Now, if these naso-oral focal infections do cause such serious complications, their early recognition and prompt

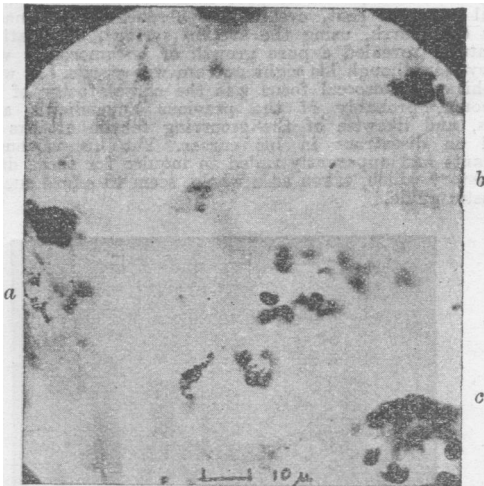


FIG. 9.—Pituitary stalk (M. L.), showing diplococci at a, b, and c. This suggests a new path of infection of the hypothalamic region of the brain from a sphenoidal sinusitis.

removal may prevent these subinfections of the pulmonary and gastro-intestinal tracts, for a latent focal infection is truly "a wolf in sheep's clothing." How much serious illness could be prevented by regarding chronic septic infections more seriously without waiting for dangerous complications to point the moral!

If I have wandered into the domain of the physician and surgeon my purpose has been to show how even the rhinologist, ploughing his lonely furrow, is by his work so interlinked with his colleagues that no territory can be regarded as lonely, and that in medicine there is but one field, which ever calls for team work.

#### REFERENCES.

- <sup>1</sup> *Practitioner*, April, 1921. <sup>2</sup> *Ibid.*, July, 1900. <sup>3</sup> *British Medical Journal*, November 26th, 1927, p. 988. <sup>4</sup> *Ibid.*, March 24th, 1928, p. 482. <sup>5</sup> *Ibid.*, February 4th, 1928, p. 168. <sup>6</sup> *Ibid.*, April 14th, 1928, p. 619. <sup>7</sup> *Proc. Roy. Soc. Med.*, xxi, No. 5, 1928. <sup>8</sup> *British Medical Journal*, December 26th, 1925, p. 1212.

## AN OUTBREAK OF PARATYPHOID B FEVER PRESENTING NOVEL FEATURES.

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With Notes on the Bacteriological Aspects

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THE subject of the present study was a limited outbreak of paratyphoid fever which occurred in May, 1925, in a preparatory school, and which, in certain aspects, presented novel features. The boys, numbering sixty, re-assembled for the summer term on May 5th; some ten days later cases of fever began to occur, and continued to do so till May 29th, when the epidemic ceased. In all, twenty-three cases were notified, while none of those attacked was dangerously ill. The incubation period of this particular epidemic could be accurately ascertained as being from ten to twenty-four days.

The early symptoms were not of a serious nature; for the most part they consisted of a transient headache and a high temperature (102° to 104° F.), coupled with an extraordinary appearance of well-being. At first the headache, the high temperature, and the relatively slow pulse suggested influenza. By the fifth day from the commencement of the epidemic "rose spots" were already visible. At this time, too, a positive agglutination to *B. paratyphosus* B was obtained, and a blood culture performed gave a positive growth of this organism. The diagnosis was therefore clinched.

#### CLINICAL SYMPTOMS.

In contradistinction to other zymotic diseases the absence of any distressing features at the commencement of the illness was a point to be noted. Save for a few days at the end of the first week appetites and spirits appeared to be unaffected. In the early stages this very absence of symptoms may be misleading and cause delay in diagnosis. The pulse-temperature ratio was typical of the enteric group. In one boy with a temperature of 105° F. the pulse rate registered 100, in another with 101° F. it was 80, and in a third with 104° F. it was 96. In one-fifth of the cases transitory dizziness was complained of, and in 15 per cent. there was vomiting. In one only was there a rigor, and, with the exception of headaches, no other complaints. The onset of the paratyphoid fever was sudden; there were no prodromal symptoms. Constipation was the rule, and the motions did not in the least betray the nature of the illness. The tongue was coated with a thick white central fur. In only one case, a boy with a temperature of 105° F., was mild delirium noted.

*The Exanthem.*—The first spots appeared at the end of the fifth day; after that 75 per cent. of the cases developed a roseolar rash confined to the chest, abdomen, back, and flanks. In one case the rash was so generalized that the body was covered, with the exception of the soles of the feet, the hands, face, and neck. In 25 per cent. no rash whatever developed, and in a few instances its appearance was delayed till the fourteenth day.

*Pyrexia.*—In typical cases the fever was of a remittent type for fourteen days; in some cases for seventeen or eighteen days; in the milder forms it lasted from seven to ten days. Defervescence took place by lysis. Palpable enlargement of the spleen was noted in every case from the fifth day onwards. In some the splenomegaly was obvious, and extended four fingerbreadths below the costal margin. In a third of the cases epistaxis was noted. No complications were observed save a severe general myalgia and cardiac dilatation in one boy who had previously suffered from an enlarged heart. Bronchitis and pulmonary complications were completely absent.

## TREATMENT ADOPTED.

Treatment was based on general lines. The diet was not excessively rigid; it consisted of three pints of milk, reinforced with plasmon, biscuits and rusks, bread-and-butter, custards, raw eggs, milk puddings, and a tablespoonful of glucose. Lemonade was freely given.

*Drugs.*—A 2½ minim capsule of oil of cinnamon was given every two hours, and 5 grains of urotropine three times daily. In order to counteract the constipation an ounce of petrolagar was given twice daily. At the termination of the illness the faeces and urine of each boy were examined bacteriologically three times, and in only one case was a positive culture of *B. paratyphosus B* obtained.

## PREDISPOSING CAUSE.

The limited nature of the outbreak, its occurrence amongst a proportion of the schoolboys, the absence of any other ascertainable source of infection, the probability that all twenty-three cases were infected from the same source, at the same time, rendered it almost certain that some article of food was responsible for the outbreak. After eliminating other possible articles of food, suspicion fell on one particular Italian cream cheese, which was eaten on the day of assembly, May 5th. A very careful search for a possible carrier was undertaken, but proved useless.

Two previous outbreaks of fever due to eating cheese have been recorded. Foard and Walker<sup>1</sup> record an epidemic of paratyphoid fever in Missouri; it consisted of forty-four cases and extended over twenty-eight days. Macaulay,<sup>2</sup> in the Dover epidemic of July, 1922, which affected 126 individuals in forty-three families, expresses the opinion that the infection was due to Gaertner toxins contained in cheese.

## LABORATORY INVESTIGATIONS.

*Blood Culture.*—Blood culture was performed in five instances, and was successful on the fifth and eighth days of the illness.

*Serum Agglutination Tests.*—The first batch of cases consisted of seven boys who had been ill for eleven days; the second consisted of four boys, two of whom had been ill for five days and two for three days. The serums of all the above strongly agglutinated emulsions of *B. paratyphosus B* when tested out on "Garrow's agglutinator" in dilutions of 1 in 10 upwards. The clinical appearances of the sick boys coincided with the results of the agglutination tests. Following upon the outbreak, the blood of the remaining boys, together with that of the masters, domestic staff, and outside attendants (eighty-four persons in all), was tested, with a negative result; but in two apparently healthy boys, who at the time were playing in the fields, the serum was found to agglutinate *B. paratyphosus B* in a dilution of 1 in 10, while the spleens of both were definitely enlarged. Both of these boys, who, as a result of the test, were regarded with suspicion, developed paratyphoid B fever within the next five days. On the other hand, in the case of eight other boys who developed paratyphoid fever during the ensuing five days no agglutination was obtained; but, after a further lapse of a fortnight, when again tested, a positive agglutination in dilutions of 1 in 80 to 1 in 160 was obtained. In one instance a positive agglutination against typhoid, paratyphoid A, and paratyphoid B was obtained, and it was satisfactory to ascertain on inquiry that this boy had received a triple inoculation some two months previously in Egypt.

The object of setting forth an account of this epidemic in detail is to show that, with the technique employed, the investigation of such an outbreak can be concluded within the comparatively short period of forty-eight hours. It is doubtful whether by any other technique results of such importance could be obtained with like certainty and speed. The main points elicited were: (1) The trustworthiness of this method of macroscopic agglutination when applied on a large scale. (2) The fact that in two instances the blood serum gave a positive agglutination to *B. paratyphosus B* at a considerable period before the symptoms of the disease developed, and that it was in one instance accompanied by a palpable enlargement of the spleen in the incubation period of the disease.

## Method of Determining the Serological Reactions of Patients and Contacts in the Epidemic of Paratyphoid B Fever.

Agglutination tests were performed on Garrow's agglutinator, a method we have practised with satisfaction since the perfection of the apparatus in 1916, and subsequently we employed it as a means of diagnosis throughout the great war. The simplicity of the instrument, and the ease with which all the necessary material for performing agglutination tests can be carried about, rendered it invaluable for use under conditions of active service. Garrow's agglutinator<sup>3</sup> is to some extent based on Broughton-Alcock's<sup>4</sup> slide method. This method of "agglutination forcée" alone makes possible the performance of a large number of tests in a minimum of time. The reaction is macroscopic and easily visible to the naked eye. When controlled by the tube method of agglutination it has shown itself to be equally specific, though it must be admitted that the "end-point" never reaches so high a titre as in the former method. False or "pseudo-reactions" are apt to occur only when very low dilutions of the serum—that is, under 1 in 10—are employed.

The formalized bacillary emulsions used were prepared from type cultures supplied from the National Collection of Type Cultures at the Lister Institute, and were adequately tested, as regards their agglutinability, before the investigation was commenced.

The object of testing the entire school population for agglutinins of paratyphoid B fever was based upon the supposition that such a reaction will normally occur in a carrier of the infection. It is quite true that if a person has suffered from a mild attack of paratyphoid B fever, and continues to excrete the organisms, his serum will probably agglutinate the paratyphoid B bacillus, but this does not necessarily take place in the "symptomless carrier," who, though not showing any clinical signs of infection, nevertheless harbours the organisms, so that the agglutination test does not always provide a sure means of detecting such a "carrier."

The serum of eighty-four individuals was submitted to the test, and the method of applying it on such a large scale was as follows: The blood required was obtained by pricking the pulp of the finger with a sterilized "hare-tip" needle. By gentle massage along the length of the finger sufficient blood was obtained to fill an ordinary capillary tube with a bulbous enlargement in its middle.

The sick boys were visited in their rooms in order to collect the sample of blood. The remainder of the school-boys, masters, and domestic staff were paraded. As each individual came forward the finger was pricked and the blood collected in the capillary tube. The tube ends were then carefully sealed with sealing wax, and finally each tube was labelled with the respective individual's name. In this manner samples of blood from the entire school were rapidly obtained. The next step consisted in centrifugalizing the blood in order to obtain clear serum. The capillary tubes containing the blood were placed in both buckets of the centrifuge, so that the process of centrifugalizing the whole of the specimens was thus rapidly carried through. It may be pointed out here that the amount of clear serum required for the test, when using the Garrow agglutinator, is very small, two drops being ample.

After obtaining the serum, dilutions were made with normal saline; one drop of the diluted serum of each individual was placed in each of three adjoining divisions on the Garrow's slab, and to these were added respectively one drop of typhoid bacillary emulsion, one drop of paratyphoid A emulsion, and one drop of paratyphoid B emulsion. Since the slab is divided into thirty separate divisions it was possible to put up the serums of ten individuals against the typhoid and paratyphoid A and B emulsions at one and the same time. The slab was then transferred to the box and rotated for three minutes by means of a special mechanism, thus bringing the serum into intimate contact with the bacillary emulsion. As a rule the results are sharp and clear. In the case of a positive reaction the mingled drops of bacillary emulsion and serum are seen to contain innumerable whitish particles

consisting of agglutinated masses of the germs. In the case of a negative reaction, the emulsion is smooth and free from particles. In this manner the whole of the eighty-four serums were quickly tested and those giving a positive reaction carefully noted.

## REFERENCES.

- <sup>1</sup> Foard and Walker: *U.S. Public Health Reports*, 1921, vol. 36, No. 35, p. 2095.  
<sup>2</sup> Macaulay, H. M. C.: *Lancet*, 1922, vol. cciii, p. 1012.  
<sup>3</sup> Garrow, R. P.: *Lancet*, 1917, vol. i., p. 262, and *Journ. Roy. Army Med. Corps*, 1917, vol. 28, p. 566.  
<sup>4</sup> Broughton-Alcock, W.: *Journ. Roy. Army Med. Corps*, 1918, vol. xxx, p. 424.

## NOTES ON THE TREATMENT OF ORAL AND RECTAL CANCER BY RADIUM.

BY

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By the courtesy of my colleagues at the General Hospital, Birmingham, and with the help of the Birmingham Branch of the British Empire Cancer Campaign, I have been enabled to treat a number of cases of advanced oral and rectal carcinoma with radium. The radium has been loaned to the hospital by the Medical Research Council, and I am indebted to this body for permission to publish these notes, which embody much that has been previously communicated to the Council in the last report from the department. The figures deal with cases treated over a period of two years (1926-27), but include a few cases treated before this date which have been kept under continued observation and treatment during the period stated.

### CANCER OF THE MOUTH.

The number of cases admitted to the department was 39. Of these, 2 have been treated too recently to be included in these notes, 1 proved to be a simple naevoid tumour of the tongue and was easily cured by radium, 7 were unsuitable or refused treatment; 29 cases are thus left available for consideration.

*Age and Sex Incidence.*—The average age of the patients was 59 years; the youngest was 46 and the oldest 70; all except two had passed the age of 50. Males greatly preponderated, there being 27 to 2 females. It is difficult to account for this, because dental sepsis appears to be equally common in both sexes in hospital practice.

*Predisposing Factors.*—Dental sepsis is undoubtedly a predisposing factor. Severe dental sepsis was present in 20 cases (69 per cent.), and in 9 of these there was a direct history of prolonged irritation at the site of the ulcer by a jagged tooth; moderate dental sepsis was present in 7 cases (24 per cent.); there was no history or sign of dental sepsis in 2 cases (7 per cent.). It would thus appear that dental sepsis is a powerful factor in the causation of epithelioma of the mouth. There can be no doubt that mouth cancer is more frequent among patients of the hospital class, who rarely, if ever, use a toothbrush and who seek no advice for dental caries. The importance of syphilis as a factor in the production of the disease was not brought out in this series of cases. In only 5 of the 38 cases of new growth admitted was the Wassermann reaction positive, and in only one of these five was a syphilitic lesion of any type found; this was marked lingual leucoplakia, a carcinoma developing on a thickened patch in the centre of the tongue.

*Microscopical Verification.*—A section was obtained in 27 out of the 29 cases considered; all were squamous epitheliomata. The two cases not submitted to section were clinically unmistakable cases of cancer, and have proved fatal. It is essential in an investigation of this kind that no doubt should exist as to the nature of the disease; the reason for omission in the two cases was the inaccessibility of the growth and the danger of continued bleeding after the section had been taken.

### TREATMENT.

All the cases treated were advanced and inoperable, and many were in poor general condition. In the present state of our knowledge it does not seem fair to submit early cases to this method of treatment.

### Treatment of the Primary Growth.

A complete dental toilet was first carried out. Of the 29 cases, 5 had some preliminary treatment to the growth; in 2 a partial excision to remove sloughing tissue was performed. This in no sense of the term approximated to a surgical excision, but was rather of the nature of a wound toilet. It was later found that treatment of the ulcer by pure formalin gave a better result, the formalin acting as a caustic and leaving a clean ulcer after the sloughs had separated. This preliminary treatment was carried out in the remaining three cases.

In the majority of cases the radium needles were inserted under general anaesthesia administered by a catheter through the nose. In a few cases local anaesthesia or infiltration of the lingual nerves was employed, but this fails to give sufficient anaesthesia to allow of ease of manipulation of the tongue, jaw, and soft parts generally. The needles used were 5 mg. tubes screened with 0.5 mm. of platinum, but it is probable that tubes of smaller power would be preferable and less likely to cause radio-necrosis.

Some idea of the "mass" of the growth was first obtained by palpation, and the number of needles inserted varied with this. The needles, threaded with the strongest vaselined silk obtainable, were inserted deeply into the tissues at least 1 cm. from the growing edge. If the ulcer was very extensive two or three needles were placed beneath the floor of the ulcer parallel with its surface and at a depth of 2 or 3 cm. Special care must be taken to place the needles as far away from bone as possible. It is difficult to protect the bone sufficiently in cases where the floor of the mouth is involved, and in two cases some necrosis of the mandible followed treatment. Adequate protection of the alveolus by moulded lead sheeting has proved difficult owing to the close proximity of the ulcer to the bony alveolus in most cases of epithelioma of the floor of the mouth.

The needles were kept in position for forty-eight hours in most cases, but in a few they were left in for seventy-two hours. The number of tubes inserted varied with the size of the growth, but as these were large in most cases eight tubes was the average number used in the mouth. This represents an average dose of 1,920 mg. hours for the primary growth. In many cases a second and even a third dose was given.

Some degree of local reaction followed in most cases; this consisted in local swelling, superficial necrosis of the epithelium at the site of the needle punctures, and general reddening of the tissues around the irradiated zone. A very considerable degree of reaction occurred in 9 cases where a very extensive growth was treated, and probably the dose given was excessive. Radio-necrosis is a most troublesome complication, especially if bone is involved, and must be avoided by careful screening, guarding against overdose, and care in the position of the needles. In the early cases especially too massive doses have been administered.

### Treatment of the Glandular Fields.

Where the glands were enlarged but operable a block dissection of the neck was undertaken on one or both sides, depending on the site of the ulcer and the nature of the glandular enlargement. Radium needles were implanted in the wound, especial care being taken to place the tubes at such intervals that the whole field was irradiated. This procedure was employed in 9 cases. In the remaining 20 cases the glands were badly infected and quite inoperable in 18, and not infected so far as could be ascertained in 2. These 20 cases were treated by irradiation alone, needles being embedded in the tissues of the neck through a trocar. Ten to fifteen needles were used over a period of forty-eight to fifty-six hours. Most cases had two applications to the glands at intervals of three months, while a few had three or more. Where possible the irradiation of the primary growth and the neck was carried out concurrently.

### RESULTS AND REMARKS.

Of the 29 patients treated and kept under observation for two to three years, 10 (34.5 per cent.) died, 11 (38 per cent.) showed no improvement, and 8 (27.5 per cent.) had improved. Three of the deaths were due to intercurrent disease—cardiac failure, acute appendicitis, and perforated duodenal ulcer. In 9 of the 21 patients comprising those