Active treatment was now temporarily suspended. The patient was fed on fluids, of which he managed to take large quantities without resort to tube feeding being necessary. His condition gradually improved, but the inability to open the mouth persisted until November 15th. A little previous to this it had been noted that the spasm relaxed slightly during sleep. On November 16th the patient took solid food for the first time. On November 17th he was given a further 15,000 units of anti-toxin, 4,500 being administered spinally, 10,500 subcutaneously.

It should be noted that on each occasion when serum was given the patient's condition became temporarily much worse, there being marked increase in rapidity of the pulse and considerable rise of temperature. During the last spinal injection it is interesting to note that the patient experienced painful numbness and tingling in the amputation stump which by this time was practically healed.

Gradually the patient resumed the normal state of health—there was no return of muscular spasm, and we were able to transfer him to a convalescent hospital very shortly; there, according to later reports, he made an excellent recovery.

The points to which I would draw particular attention are:

1. Recovery in spite of well-marked symptoms and a short incubation period (nine days).
2. The large doses of serum administered, 46,500 units in all.
3. The very slow and gradual relaxation of spasm.

I am indebted to Captain E. D. Telford, F.R.C.S., R.A.M.C.(T.), in whose wards the patient was treated, and to whom I was acting as house-surgeon at the time, for permission to publish these notes.

SEROLOGICAL TESTS IN DYSENTERY CONVALESCENTS.

BY

J. C. G. LEDINGHAM, M.B., D.Sc.,

AND

W. J. PENFOLD, M.B., D.P.H.,

BACTERIOLOGISTS TO THE KING GEORGE HOSPITAL.

In a previous paper¹ we have explained that the subacute cases of dysentery which have been admitted here have all been due to infection by *B. dysenteriae* Shiga, this organism having been recovered from the dysenteric dejecta. Since that paper was published three further subacute cases have been found to be due to *B. dysenteriae* Shiga and two to *B. dysenteriae* Flexner. Only in one case so far has *E. histolytica* been present in the active form. As already mentioned, a large number of convalescent cases were admitted from whose faeces (for the most part not of dysenteric type) no organisms of the typhoid-dysentery group were recovered. There were probably 150 to 200 of these. In a certain proportion of these flagellates were found to be present in the stools, but owing to pressure of work it was impossible to analyse these cases more exhaustively. Recently, however, a fresh batch of these convalescents arrived, and the opportunity was taken to ascertain by agglutination tests with the serums of the cases what proportion of them had suffered from bacillary dysentery. The necessity for this investigation was rendered the more urgent as conflicting evidence had reached us with regard to the relative proportion of bacillary and amoebic dysentery in the Near East. The history given by these convalescents did not point invariably to dysentery, but might have been construed in some cases as typhoid infections. We have now examined the serums of over 100 of these cases, the stools in all (except one) being negative as to *B. dysenteriae*, *E. histolytica*, and typhoid organisms. The technique was that described in the previous paper. Time limit twenty-four hours.

Determination of the Upper Limit of Agglutination of *B. dysenteriae* Shiga by the Serum of Normal Persons.

It has been generally held that agglutination of *B. dysenteriae* Shiga in a dilution of 1 in 50 is significant of infection, and the statement is probably in the main true, but such statements are unfortunately not accompanied by specifications of the time limit, the method employed, and the degree of agglutination at this dilution. We therefore decided to obtain the upper normal limit in a series of serums of normal persons (generally orderlies) who had never been out of the country, and had never

suffered from dysentery. Twenty-three such have been examined under the prescribed conditions, with the following result:

- 14 gave no agglutination whatever at 1 in 50.
- 3 gave a trace of agglutination at 1 in 50.
- 3 gave agglutination amounting only to one + at 1 in 50, but no agglutination at 1 in 100.
- 3 gave agglutination amounting to one + at 1 in 50, and a mere trace of agglutination at 1 in 100.

In no case was complete agglutination at 1 in 50 with normal serum obtained.

It was decided therefore to treat all reactions above "50 (+) 100 (trace)" as significant.

Results in 103 Convalescents, the Great Majority of whom gave a History of Dysentery.

- 24 gave no agglutination in 1 in 50.
- 12 gave a trace of agglutination in 1 in 50.
- 11 gave agglutination (+) in 1 in 50, but no agglutination at 1 in 100.
- 7 gave agglutination (+) in 1 in 50, and a trace of agglutination at 1 in 100.

The above (54) fell within normal limits. Of the remaining 49 cases—

- 15 gave agglutination with end point between 100 and 200. (Illustrative reaction, 50 (+++) 100 (+) 200 (0).)
- 19 gave agglutination with end point between 200 and 400. (Illustrative reaction, 50 (++++) 100 (+++) 200 (+++) 400 (0).)
- 15 gave agglutination with end point beyond 400. (Illustrative reaction, 50 (++++) 100 (++++) 200 (++++) 400 (+++), 800 (+).)

We conclude, therefore, that 49 or 47.5 of the convalescents have suffered from bacillary dysentery (type Shiga).

Dr. Woodcock, parasitologist to the hospital, found 41 per cent. of these cases showed in the faeces either one or more of the following protozoa—namely, *Lamblia intestinalis*, *Trichomonas*, or *Entamoeba coli*. The positive Shiga agglutination cases were not found to be more liable to harbour the above protozoa than the negative Shiga cases.

REFERENCE.

¹ Ledingham, Penfold, and Woodcock, Recent Bacteriological Experiences with Typhoid Disease and Dysentery, *BRITISH MEDICAL JOURNAL*, November 13th, 1915.

METASTATIC ENDOPHTHALMITIS IN A CASE OF CEREBRO-SPINAL MENINGITIS.

BY

LIEUTENANT A. LEONARD WEAKLEY, R.A.M.C.,

OPHTHALMIC SURGEON TO A GENERAL HOSPITAL, ALEXANDRIA, EGYPT.

I THINK the following case worthy of record for two reasons—(1) the way the threatened panophthalmitis was aborted, and the quick resolution of the inflammation, possibly due to the antimeningococcus serum; (2) the cultivation of a pure growth of meningococcus from the interior of the eye.

Private H., aged 19, had pneumonia on the transport during the voyage from Australia. He arrived in Egypt on September 28th, and was sent to a convalescent hospital.

He was well until October 9th, when he had severe headache, diarrhoea, and vomiting, with rise of temperature. On October 10th the headache was worse, he became unconscious, and was admitted to hospital. He then had all the signs of meningitis: head retracted, vomiting frequently, restless, and groaning; temperature 103°. Extensor response present, and also Kernig's sign. The eyes were apparently normal, except that the right pupil was noticed larger than the left; both pupils acted to light; there was no deviation.

On October 11th, lumbar puncture showed cerebro-spinal fluid under pressure, turbid, and clotting rapidly.

Bacteriological Report.—"Fluid frankly purulent, stained films show preponderance of polymorpho-neutrophils with numerous endothelial cells and a small intracellular Gram-negative diplococcus. Culture on Buchanan's medium shows a pure culture of a Gram-negative diplococcus, morphologically indistinguishable from the meningococcus of Weichselbaum."

October 12th. The left eye was noticed to be inflamed, and when I saw the case the same morning the lids were slightly swollen, there was slight ptosis, general injection of conjunctiva, episcleral oedema, cornea hazy. Descemet's membrane covered with thin yellowish film; anterior chamber deep, turbid, and iris covered with thick grey-yellow exudate; pupil contracted, inactive to light, and completely filled with exudate; no fundus reflex obtained; globe tender; tension slightly subnormal; vision bare perception of light. There was no proptosis, and ocular movements were full in all directions. There was no discharge from the conjunctiva, and no dacryocystitis. There was partial left-sided facial paralysis.

I diagnosed metastatic infection, and, deciding that there was

no urgent need for operation, ordered atropine 1 per cent. with cocaine 2 per cent. to be instilled and hot fomentations to be applied every three hours. The right eye was quiet; pupil active to light; fundus normal; vision good.

October 13th. The pupil was still firmly adherent and tension had become raised a little. Under cocaine and adrenalin anaesthesia I washed out the conjunctival sac with sterile mercury perchloride solution 1 in 5,000 and performed a paracentesis of the anterior chamber, removing some of the pus to a culture tube of Buchanan's medium. Treatment was continued as before.

Bacteriological Report.—"Culture on Buchanan's medium shows a pure growth of an organism morphologically identical with the meningococcus."

The next day the pupil started to dilate, and on October 15th had given for three-quarters of the circumference. On October 16th it was quite free and the anterior chamber was clearing; a thick ring of yellow exudate was left on the anterior capsule of the lens. The tension was about normal and vision perception of light. The facial paralysis had practically recovered.

The eye continued to clear under local and general treatment, and on October 20th the pupil was well dilated, episcleral swelling subsided; tension was about equal in both eyes, and both subnormal. Vision—hand movement. No fundus details could be made out, and only a yellow-green reflex obtained. On convergence the left eye already diverged. The local treatment was now dionine 0.0005 gram, atropine 1 per cent. every six hours, and fomentations as before. A culture taken from the conjunctival sac showed a growth of *Staphylococcus albus* and no meningococci.

On October 27th the eye was quieter; the pupil was dilated, with one small adhesion at ten o'clock. The anterior chamber was clear, the lens capsule nearly clear, the vitreous clearing; only greenish-grey reflex and gross floating opacities were made out. Vision was perception of light, and becoming worse. Atropine and dionine now only bare dilatation.

On November 1st the eye was quiet, the iris showed several snail-track-like grey eroded patches scattered around, the anterior chamber was clear and of medium depth, anterior part of vitreous fluid and clear, and a large yellow-green mass was seen floating in upper quadrant; neither vessels nor disc could be seen. The tension was -1 and the vision perception of light, and the eye was apparently beginning to shrink. The general treatment has been to draw off 15 to 20 c.cm. of cerebro-spinal fluid from the lumbar region and replace with an equal amount of antineurococcus serum about every two days, according to symptoms. The patient has steadily improved in general health, and is apparently now on the road to recovery.

THE DOMICILIARY TREATMENT OF PULMONARY TUBERCULOSIS.

BY

G. H. DART, M.D., M.R.C.P. EDIN., D.P.H. CANTAB.,

TUBERCULOSIS OFFICER AND ACTING MEDICAL OFFICER OF
HEALTH, METROPOLITAN BOROUGH OF GREENWICH.

IN view of the fact that at the present time there is very little, if any, institutional means in most of the London boroughs for dealing with advanced cases of pulmonary tuberculosis—apart, that is, from the general hospital or infirmary—the question of how to deal with advanced cases in their homes is of the greatest importance.

London boroughs vary very much both in administrative schemes and in the character and variety of local agencies dealing with tuberculosis, but in a few respects at least the facts with regard to Greenwich may have some value for every borough.

It appears from a comparison between the number of deaths and the number of cases nursed in Greenwich that many more than half the patients who died at home did not receive skilled nursing attention.

The deaths from pulmonary tuberculosis numbered 129 during 1914 in Greenwich. Of these deaths, 50 occurred in Poor Law and similar institutions, 17 in hospital, and 62 at home. The number of cases nursed during 1914 was 46, and 24 of these cases died during the year. There are three district nursing associations in the borough, employing in all 12 nurses.

At first sight this return, as far as regards the places where death occurred, appears satisfactory, as more than 50 per cent. of the deaths have taken place in institutions. Also, although there were 62 deaths at home, 46 cases had nursing supervision, with its attendant prevention of the spread of infection. It appears, however, that many of the cases nursed were not among the deaths. Satisfaction with the return is also modified by the fact that many of the patients shown as having died in an institution in reality required nursing—many of them before entering

and many after leaving or before re-entering the institutions.

The leaving notifications (hospital and infirmary) during 1914 numbered 48. There were 24 deaths among these patients. Of these deaths 5 occurred at home, and 3 of the home deaths had the benefit of nursing. The remaining 19 deaths took place in institutions, and 2 of these patients during the period between their discharge and return were nursed.

These 19 returned patients are, of course, included in the 67 patients who died in institutions, and who, therefore, at the first glance, might be considered as not having needed nursing.

A patient who "takes his discharge" from an infirmary or hospital and becomes so rapidly worse that he dies within the year, in all probability requires home nursing, whether he dies at home or enters the infirmary to die. The large majority of institutional deaths take place in the infirmary.

These patients prefer, as a rule, to stay at home until desperately ill and leave the infirmary on the slightest pretext.

The result of this is placed on record in the Final Report of the Departmental Committee on Tuberculosis: "Infection is frequently disseminated by persons suffering from advanced pulmonary tuberculosis who are in the habit of entering and leaving Poor Law institutions, having regard merely to their own convenience, and not to the interests of their family or of the community in which they live."

Considering the advanced character of the disease in most cases treated in these institutions, it would probably, therefore, be nearer the mark if one considered all such cases in need of nursing after discharge. Certainly, if, as in Greenwich in 1914, 50 per cent. of these cases die during the same year, it is probable that the majority of the survivors have been during the year in need of attention.

If the 48 leaving notifications, minus the 5 patients that died at home, are added to the total 62 deaths at home, 81 per cent. of the total deaths will be found to have required nursing during 1914.

The greatest number of visits paid to a patient was 60. The average, obtained from the total numbers of patients and visits, worked out at 20 visits a patient.

The work cannot be carried out by dispensary nurses unless the number attached to the dispensaries is greatly increased. If for the purpose of estimating the number of visits required one takes, not the 81 per cent. mentioned above, but only 66 per cent., or, say, two-thirds of the deaths, at an average rate of 20 visits to each patient, the estimated number of visits would in many instances approach the number of visits actually paid by the nursing staff. As an illustration:

	Deaths.				N.	Visits.	
	Total.	P. L. I.	H.	D.		C. F.	A.
Paddington ...	156	42	35	79	664	2,925	2,080
St. Marylebone ...	149	87	15	47	526	2,219	1,986
Stepney ...	447	198	55	194	2,038	10,016	5,960

Total = Total deaths 1913. P. L. I. = Deaths in Poor Law institutions. H. = Deaths in hospital. D. = Deaths at home. N. = Primary pulmonary notifications. C. F. = Central Fund report visits paid. A. = Estimated visits to advanced cases.

To attempt the nursing from the dispensary of those who died at home, even if such a small number of visits as to average 20 per patient were paid, would in itself be sufficient to cripple the work in connexion with other than advanced cases.

The Greenwich Dispensary had not completed a full year in 1913. Throughout 1914 the nurses did not attempt any home nursing, even of bed-ridden patients who had formerly been dispensary patients.

Greenwich, 1914.

Deaths ...	129
Primary pulmonary notifications ...	308
Visits paid ...	3,676
Visits estimated to two-thirds of the deaths at above rate ...	1,720

The deaths alone, moreover, give no indication of the