an enormous quantity of fresh young fibroblasts and the entire absence of fibrin.

We are conscious of the fact that, in common with all observations on the human subject, these notes lack a wide scientific basis, being without the necessary control. None the less, in the cases studied two constant phenomena were observed—namely, the very early and striking appearance of large firm granulations (often in six hours), and the early bleeding of the surface of the wound.

This latter point led us to introduce a slight modification in cases now under treatment, which has served to shed some light on the part played by ether in the healing of the wounds. The wounds are firmly swabbed when dressed, especially those with cavities or deficient drainage. This procedure, while removing the pus, is undoubtedly instrumental in hastening healing by encouraging further oozing of blood from the granulation tissue.

In this connexion it is interesting to note that in Case v, where the healing process was comparatively slow, the granulation tissue did not bleed readily, and is in striking contrast to the other freely oozing and rapidly healing wounds cited. The induction of bleeding by scarification of the wound surface in this case immediately resulted in a quicker and firmer growth of new tissue. Indeed, without undervaluing the bactericidal power of young, fresh tissue, we are forced to think also of the bactericidal action of the blood in these cases, the function of the ether being to stimulate the growth of the tissues without clotting the fibrin, and providing thus the newly-formed tissue with free and constant lavage with blood. This we consider a logical conclusion from the foregoing observations, despite its conflict with current opinion in this matter.

Moreover, the ether method has given definite curative results where other methods had been disappointing—as, for example, in Cases iv and v. It has proved also its ability to quicken the healing of wounds to a striking degree, and the treatment of a case is completed in about half the time taken before its introduction into our practice.

It can, therefore, be fairly deduced that the discharge of patients from hospital is materially accelerated by the use of the ether method, on account of its comparatively rapid healing power.

REFERENCES.

¹ *Rivista critica di Clinica Medica*, 1900, No. 12. ² *Lancet*, October 30th, 1915.

THE RELATION OF THE TYPE OF COCCUS TO THE TYPE OF DISEASE IN MENINGOCOCCAL MENINGITIS.

BY

ALEX. MILLS KENNEDY, M.D. GLASG.,

TEMPORARY CAPTAIN R.A.M.C.,

BACTERIOLOGIST TO THE ROYAL HERBERT HOSPITAL, WOOLWICH;

AND

C. C. WORSTER-DROUGHT, M.B. CANTAB.,

TEMPORARY CAPTAIN R.A.M.C.,

OFFICER-IN-CHARGE CEREBRO-SPINAL FEVER WARD, ROYAL HERBERT HOSPITAL.

For some time evidence has been accumulating that in the species of organisms known as the meningococcus there are a number of races which can be differentiated by their immunological reactions.

By the method of "absorption of agglutinins" Gordon, working in the Central Cerebro-spinal Laboratory, has been able to differentiate the meningococcus into four strains based upon their immunological characters. Using the four strains isolated, he has prepared four immune serums from young rabbits, which can be used for the differential diagnosis of the type of meningococcus by macroscopic agglutination methods. For over a year we have been using such serums, kindly supplied to us by Colonel Gordon, for the differentiation and diagnosis of meningococci isolated from cases of cerebro-spinal fever or "carriers."

It occurred to us that there might be some difference in the virulence or pathogenic reactions of the four types of the coccus in so far as the resulting disease is concerned,

and the present paper is an endeavour to correlate the type of coccus to the type of disease.

Our observations are based upon a study of twenty-three cases of cerebro-spinal fever. In all except four the organism was cultivated from the cerebro-spinal fluid; in three of these the coccus was seen on direct examination of the fluid, although it failed to grow on culture; in each, however, a culture of the meningococcus was obtained from nasopharyngeal swabs and the type of the organism so determined; in the fourth, an abortive case, the organism was obtained from the nasopharynx, but the cerebro-spinal fluid was clear and no organisms were found on direct examination or culture.

Type I Coccus.

This type of meningococcus was found in eight cases. Without exception all were extremely severe, six proving fatal. Of these, one was fulminating, and the patient died within thirty-six hours of the onset of illness. Two were of a progressively purulent nature—that is, the meningeal exudate became daily thicker and more purulent, and both died on the ninth day of the disease. Two were acute types, and died, apparently of toxæmia, on the fourth and eighth day respectively. The last fatal case was a man, aged 60, who did not come under treatment until the third day. Although severely ill, he progressed favourably as regards the meningitis, when, on the eighth day, pneumonia of the right lower lobe unfortunately supervened. Notwithstanding the fact that by this time no meningococci could be found in the slightly turbid cerebro-spinal fluid, the lung condition apparently permitted an exacerbation of the meningitis, for organisms reappeared in the fluid on the eleventh day. The patient died on the fourteenth day of the disease, although the pneumonic condition had practically disappeared.

Of the two cases which recovered, both were severe, but came under treatment on the second day of illness. One of these ran a prolonged course of thirty-eight days before final recovery; the other was acutely ill, but ran a course of ten days only.

All the cases in this group were admitted to hospital in a delirious or unconscious condition. In five the onset was sudden and abrupt; two had had a "cold" and "sore throat" for about a week, but the actual onset of meningeal symptoms was sudden. In the remaining case the onset was more gradual.

Type II Coccus.

Eight cases were found infected with this type of meningococcus. All recovered. None were fulminating, three were severe, four moderate, and one abortive. Of the severe cases one ran a course of eighty days, another of twenty-eight days, and a third of twenty-four days. The moderate cases had all a course of seven to ten days only. The abortive case was that of a man who was found to be carrying this type of meningococcus in his nasopharynx on April 23rd, 1916. On May 4th severe headache set in, pain in the back of the neck developed, and he vomited. The patient had pyrexia and slight cervical rigidity, but there was only a tendency to Kernig's sign. Lumbar puncture gave a clear fluid under slight pressure. Within four days of the onset the temperature had returned to normal, and the patient was fairly well.

Type III Coccus.

Six cases due to this type occurred; they fall into two distinct divisions. The first includes two occurring early in 1916, the second division four appearing at the end of the year.

The two in the first division were both very severe and proved fatal after prolonged courses, in one case thirty-one days and in the other fifty-four days; towards the end of the course in each case gradually diminishing quantities of fluid were obtained on lumbar puncture and occasionally none. Coincident with this, signs of hydrocephalus appeared—progressive emaciation, continuous headache, tremulousness, and mental torpor.

The four in the second division were of moderate severity only, all excepting one recovering. The fatal case did not come under our care until the fourth day of the disease, the nature of the case not being recognized till then. The symptoms at first were subacute, as in the other three, and it was only when he became unconscious

that the true condition was suspected and he was transferred to us for treatment. He died on the seventh day of the disease. The remaining three, coming under treatment on the second day, ran comparatively short courses of seven to fourteen days.

Type IV Coccus.

No case in which this type of coccus was obtained was met with. One case occurring early in the year, before an agglutinating serum for Type IV coccus was obtained, was found to be due to a meningococcus inagglutinable by any of the first three type serums. The patient recovered after a moderate course of thirty-two days, in spite of pneumonia complicating the disease.

In all the above cases allowance must be made for the influence of treatment. Early treatment is of paramount importance. In the only two cases of Type I which recovered, treatment was in each case commenced on the second day. The only recent case of Type III which proved fatal was not treated until the fourth day of the disease. The treatment adopted in the majority of the cases consisted of repeated lumbar puncture, with daily intrathecal administration of serum in the earlier stages, and continued vaccine, as described elsewhere.¹

Lister Institute serum was employed throughout.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, November 18th, 1916.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

PREVENTION OF CEREBRO-SPINAL FEVER.

In view of the prevalence of cerebro-spinal fever on transports from overseas, and also in large military camps, it may be of practical interest to explain the measures which have been successfully employed to check the disease amongst New Zealand reinforcements.

For a period of fifteen months prior to October 1st, 1916, the disease was prevalent in military camps in New Zealand, and cases frequently occurred on the transports, some of a rapid and fulminating type. As the measures adopted in New Zealand failed to control the disease, I had a consultation at the Central Cerebro-spinal Fever Laboratory, London, with Colonels Gordon and Reece, and it was decided to communicate by cablegram the following measures, which were adopted, and are still in force.

All troops before embarkation have the nasopharynx swabbed and examined bacteriologically, only negative cases being allowed to proceed. The rejects and contacts are treated by a steam apparatus similar to that described in a recent article in the BRITISH MEDICAL JOURNAL by Colonel Gordon and Captain Flack. By this method a disinfectant solution is sprayed into the air of a room of 700 cub. ft. capacity, the steam atomizing from a vessel containing 1 per cent. solution of zinc sulphate, of which 1 litre suffices for twenty minutes. Eight carriers are treated for five minutes in the prone position, inhaling the misty air freely through the nose; this temporarily destroys the meningococcus in the nasopharynx. The inhalations are repeated daily for three, four, or five days until the results of the swab examinations are negative. Inhalation rooms are fitted up at the military camps, and also on all transports proceeding to England.

This method has now been employed for six months with most gratifying results. During that period not a single case of cerebro-spinal fever has developed on a transport, and I am notified that the disease is now under control in New Zealand. The success, no doubt, depends upon the thoroughness of the measures adopted, but it seems sufficiently encouraging to justify a wider application of the method, both on transports and in large camps.

London, W.C.

W. H. PARKES, Colonel,
D.D.M.S., N.Z. Expeditionary Force.

CEREBRO-SPINAL FEVER.

The cases admitted, including 14 military, to the Alexandra Cerebro-spinal Fever Hospital, Wigmere, Kent, from July, 1915, to December, 1916, numbered 51 (14 female and

37 male). Of these, 3 were moribund, and died within a few hours. Excluding these, the deaths numbered 14, giving a death-rate of 28 per cent.

	Cases.	Death-rate.
1-5 years ...	8 ...	25 per cent.
5-10 " ...	6 ...	50 "
10-15 " ...	9 ...	12 "
15-20 " ...	8 ...	37 "
20-25 " ...	5 ...	Nil.
Over 25 years ...	15 ...	35 per cent.

The oldest patient was 64 years old.

The average day of disease on admission was the sixth.

Twenty-two cases showed no rash; 29 showed one or more types of rashes, as follows:

Herpes...	...	...	...	10
Petechia	...	...	...	15
Purpura	...	...	...	6
Erythema	...	...	...	3
Macules	...	...	...	1

Pressure erythema was always present. The number of lumbar punctures made was 234, and 189 doses of Mulford or Lister Institute serum were given intraspinally. During the last three months a small dose of serum was also given subcutaneously on admission. A serum rash developed in 77 per cent. of cases which survived the tenth day. The average date of its appearance was on the tenth day after the first dose of serum.

The following complications were seen:

- Many cases of bronchitis and bronchopneumonia.
- 1 case of temporary insanity.
- 6 cases of arthritis.
- 4 cases of chronic hydrocephalus.
- 1 case of severe neuritis.
- 1 case of complete paralysis of the eye.
- 1 case of parotitis.
- 1 psoas abscess.

Polyuria was a very common early symptom.

RICHARD C. C. CLAY, M.R.C.S., L.R.C.P.
Fovant, near Salisbury.

SUBCUTANEOUS EMPHYSEMA DURING LABOUR.

The following case, similar to that recorded by Dr. Murray (January 6th, p. 14), and the only one I have so far seen, occurred at the Mission of Hope Maternity Hospital in May, 1915.

B. F., a primipara, aged 22, was examined after admission on April 21st. She was a normal healthy woman, showing no signs of disease of heart or lungs. She had good pelvic measurements. There was some oedema of the ankles, but her urine was normal. Labour commenced on May 6th, and lasted seventeen hours, of which the first stage occupied fourteen. About an hour before the baby (male) was born she felt something go "pop," and swelling of the right eyelids was noticed.

I saw her after the birth; she complained of slight substernal uneasiness, but otherwise felt quite well. The typical crackling was felt all over the face except the forehead and chin, and over the neck and anterior chest wall down to the level of the breasts, over the whole of the back on the right side as low as the margins of the ribs, and on the left side down to the angle of the scapula. On percussion no superficial cardiac dullness was present, and the note at the right apex was "boxy" in character. The breath sounds were quite normal. The baby weighed 9½ lb.

From the physical signs it appeared that the seat of rupture was in the neighbourhood of the right apex with the pleura adherent. The temperature fell from 100.4° F. to normal within twelve hours, and the subcutaneous crackling had disappeared in five days. It is not unusual to get a short rise of temperature after a moderately stiff confinement, as this was, though the emphysema may have been a contributory cause in this instance.

London, S.W.

GEORGE MILNE, M.D., D.P.H.

THE executive of the German Medical Association has adopted a resolution demanding that after the war students prematurely qualified to practise medicine should be given an opportunity to continue their studies. A three months' course should be given at large centres and universities where adequate facilities for teaching exist. The teachers should be paid, but the instruction should be free to the pupils, as it is to the interest of the public that these imperfectly qualified practitioners should take advantage of this opportunity to supplement their studies. It is suggested that scholarships should be offered, and that those attending the course should not be allowed to practise medicine during its continuance.