grindings and liquor 3 and sediment 3 tested for agglutinin content against the untreated or control serum. In each case the titre of the liquor was markedly increased, while that of the sediment and the normal saline solution in which the sediment was suspended was considerably below that of the control serum.

General Conclusions.

The above observations seem to show that by submitting blood serum and other body fluids to a mechanical process, which includes friction combined with pressure, physical changes can be brought about in these fluids which throw some light on the condition in which haemagglutinins, bacterial agglutinins, complement, complement deviating substances, and antibodies exist in the blood serum. They suggest that the blood serum and the body fluids, the secretions and excretions, form a graded series with the blood serum at one end, and the excretions, such as the urine, at the other. The haemagglutinins seem to be present for the most part in a free state in the blood serum, and in a more or less combined form in the transudates and exudates, while in excretions, like the urine, the haemagglutinins when liberated and recovered in the free state are found to have lost their specific character. This is shown by testing the agglutinative capacity of the fractional series of liquors and sediments to the same varieties of washed red cells. Not only do the haemagglutinins show marked differences of composition in the different liquors and sediments, but they also vary according to the extent to which the fluid has been submitted to the mechanical fractional process. This is also true of the bacterial agglutinins contained in blood serum, and it has been found possible by these means to considerably increase the agglutinating titre of a blood serum to a given organism while retaining at the same time the specificity of the reaction. This suggests that it may be possible to raise the agglutinating capacity of a serum by a mechanical process *in vitro* for therapeutic purposes. These observations also show that the complement deviating factor in positive syphilitic serums passes over along with the haemagglutinins and bacterial agglutinins into the liquor, and is not thrown down with the sediment.

A word must be added about the relative leuco-toxicity of the liquors and sediments obtained by the fractional grinding treatment of blood serums and body fluids. In the British Medical Journal, December 8th, 1917, and January 11th, 1919, I drew attention to the fact that some blood serums are far more toxic to the leucocytes of some individuals than to those of other persons, my own (C. J. B.) leucocytes being taken as a standard. Thus, if a drop of the serum to be tested is incubated in a closed cell with a drop of whole (C. J. B.) blood, the effect of the foreign serum on the vitality of the leucocytes can be ascertained. Emigration from the clot, capacity to elaborate iodophil substances and phagocytic activity are taken as the standard of vitality. I find that out of 89 different blood serums from different individuals 13 were very toxic, 25 were slightly toxic, and 42 were non-toxic to my own leucocytes. In practically all cases the sediment is markedly toxic, while the liquor may or may not be toxic to the same leucocytes. In a few cases the liquor obtained by grinding a toxic serum has become non-toxic to the same cells. This problem of the leuco-toxicity of different blood serums is of considerable practical importance in regard to the operation of blood transfusion and vaccine and serum therapy. From some recent observations I am inclined to regard horse serum as markedly toxic to the leucocytes of certain individuals, and this fact may have some reference to the varying liability to serum sickness shown by different individuals.

Finally, while I am fully aware of the incomplete character of these observations, I think that they show the great importance of certain physical factors—for instance, friction and pressure—in relation to the antibody content of the blood serum and other body fluids. I am hopeful that the treatment of these fluids by a mechanical process which combines friction and pressure may open up a road for the further investigation of the biochemistry of the blood serum.

A FULLY equipped hospital, to be maintained by the French Government, has been opened at Athens by the French Minister.

A REPORT ON TWO CASES OF ENCEPHALITIS LETHARGICA.

BY

MAJOR C. W. J. BRASHER, R.A.M.C.(T.F.), CAPTAIN J. R. CALDWELL, R.A.M.C.(S.R.),

AND

CAPTAIN E. J. COOMBE, R.A.M.C.(S.R.).

THE disease which has been termed "encephalitis lethargica" appears to have been first observed in Vienna during the winter of 1916–17, and thirteen cases have been described by C. von Economo.[1] It does not appear that any connexion between these cases and an epidemic of influenza was observed, but the two cases described below are of interest on account of their occurrence during the epidemic of influenza in October, 1918, and also because the micro-organism found in the cerebro-spinal fluid in both cases was not the diplo-streptococcus found by von Eisner in an ape infected by material from some of these cases in the Vienna epidemic.

The micro-organism found by one of us (J. R. C.) appeared to be morphologically identical with that which was found in the blood, sputum, pleural fluid, and cerebro-spinal fluid in cases of influenza, trench fever, and nephritis among British troops in France during the autumn of 1917 and the spring and summer of 1918, described by Major-General Sir John Rose Bradford, A.M.S., Captain E. F. Bashford, R.A.M.C., and Captain J. A. Wilson, R.A.M.C., in their "preliminary report on a 'filter-passing' virus to the Director-General Medical Services, British Armies in France."[2] The filter-passing Gram-positive organism described by these observers as having been found in cases of encephalitis lethargica is regarded by them as allied to that which has been isolated in cases of polyneuritis, but it does not appear that this organism has been found in cases of typical influenza followed by encephalitis lethargica.

Both of the cases described below were admitted as influenza in which pneumonia supervened prior to the onset of cerebral symptoms.

Case I.

Pte. W. H. L., aged 22, was admitted to the Military Hospital, Fargo, Salisbury Plain, on October 19th, 1918, from Southern Command Malaria Centre, Larkhill, where he had been undergoing treatment for malaria contracted at Salonica.

He was very ill on admission, with severe headache, pains in limbs, and generalized bronchopneumonia; the temperature was 103°. He was given 5 c.cm. polyvalent vaccine (*B. influenzae*, *Streptococcus longus*, and *Micrococcus catarrhalis*). Some improvement was noted, and the vaccine was repeated at intervals of three or four days, but the headache persisted and the temperature oscillated between 100° and 103°. The spleen was not palpable, and blood films were examined for malarial parasites, as it was thought that the persistent fever might be due to malignant tertian malaria. No malarial parasites were found. The patient became very emaciated, he was somnolent, and lay curled up in bed with head retracted. When awake he complained of persistent severe headache, and it was thought that he might be suffering from acute tuberculosis with meningitis. The pupils were equal, dilated, and reacted sluggishly to light. The optic discs were normal, and no choroidal tubercles could be seen. A differential blood count showed no lymphocytosis, but, on the contrary, there was a distinct leucopenia. The relative proportion of white cells being normal—but the total number was only 12,000 per c.cm. on admission—this was regarded as pointing to chronic malaria, and quinine hydrochlor. gr. xx was given thrice daily, without benefit.

On October 29th the temperature rose to 104°, pulse rate 110, respiration rate 24; rigidity of neck and Kernig's sign were present. The latter symptoms persisted until November 6th, when lumbar puncture was performed, but the cerebro-spinal fluid was normal.

November 16th. The condition had improved since November 6th, but there was persistent pyrexia.

November 20th. Dullness left apex and upper lobe and apex of lower lobe, crepitations and tubular breathing. Curvature of spine in dorsal region.

November 26th. The tubercle bacillus was not found in the sputum, and *x*-ray examination revealed no sign of tuberculosis in the chest. Blood count:

Reds	4,000,000
Whites	5,000
Haemoglobin content	80 per cent.
Colour index	1
Mast cells	0.5 per cent.
Polymorphonuclears	79 ,,
Eosinophils	5 ,,
Small lymphocytes	5 ,,
Large lymphocytes	15 ,,
Transitionals	0.5 ,,

On January 2nd, 1919, Captain E. J. Coombe took over the case. The patient lay in a lethargic state, curled up; the head was retracted; very wasted. When awakened was fairly intelligent, but he fell asleep immediately he was left alone. No convulsions; no "cephalic cry." Intense pain on moving head, slight headache at times. Pupils widely dilated. Paralysis of lower limbs, incontinence of urine and faeces. Ophthalmoscopic examination (artificial dilatation of pupils not necessary): Optic disc pale; blood vessels engorged. Diagnosis: Encephalitis lethargica.

On January 3rd lumbar puncture was performed, and 20 to 30 c.cm. fluid withdrawn; it was under great pressure, milky, and somewhat opalescent. Ten grains of urotropin in 10 c.cm. of physiological salt solution were injected into the spinal canal. The patient improved somewhat after the lumbar puncture, and on January 5th was less lethargic.

January 6th. Report on cerebro-spinal fluid: Milky; 20 c.cm. centrifugalized gave a greenish deposit ½ in. in depth. Polynuclear leucocytosis of 1,000. Stained films (Gram and Leishman) showed a minute coccus Gram-positive, chiefly extracellular, but occurring occasionally intracellularly; usually diplococci and having apparently no capsule. Seen also in short chains of 3 to 5 cocci. All attempts at growth on agar, blood serum, Loeffler's serum, and haemoglobin agar failed. Anaërobic cultures could not be tried as the laboratory has not the equipment.

On January 9th it was noted that the patient slept continuously and was unable to speak when awakened. Lumbar puncture: fluid under pressure less than before; 15 to 20 c.cm. withdrawn and 10 c.cm. saline solution containing 10 grains urotropin in solution injected. The patient collapsed with respiratory failure. Ether was injected and artificial respiration performed for thirty minutes before respiration was restored. Urotropin gr. 10 was ordered thrice a day. The condition remained almost unchanged. On January 12th the cerebro-spinal fluid from lumbar puncture was almost clear; a minute deposit on centrifugalization. Stained films showed few pus cells present and no cocci.

On January 15th the lethargic condition was less pronounced; he was able to say "Yes," and recognized people when awake. The paralysis and incontinence had not improved. From this date the patient gradually sank, the bronchitis increased, and he died on January 29th, 1919. Permission for autopsy was refused.

CASE II.

Pte. J. M., aged 16 years, one month's service, was admitted to Fargo Military Hospital, Salisbury Plain, on October 27th, 1918. Temperature 103°, pulse 104, respirations 32. He complained of headache, pains in the abdomen and limbs, and frequent cough.

October 28th. Coarse râles at bases of both lungs. Symptoms of early consolidation at the right base. His condition on October 30th was unchanged, and 5 c.cm. polyvalent vaccine was given.

On November 10th he complained of pains in head and joints, and became very collapsed and pulseless. Hypodermic injection of strychnine (gr. $\frac{1}{30}$) given. Vomited brown fluid. Marked retraction of head and rigidity of neck (*tache cérébrale*). Kernig's sign present; 0.5 c.cm. vaccine given. Ice-bag to head. There was slight improvement on November 12th. He was conscious, had no headache, and no vomiting. Kernig's sign still present. Rigidity of neck persisted; complained of intense headache.

November 15th. Sputum purulent; cough loose; moist râles all over both lungs. Headache less severe.

November 18th. Headache improving. Answers questions intelligently. Moist râles all over both lungs.

November 19th. Kernig's sign still present. Dullness at right base and left upper and lower lobes. On November 21st 10 c.cm. antistreptococcic serum were given.

December 3rd. He has periodic attacks of severe occipital headache, with occasional attacks of vomiting. Has become very emaciated. The temperature varies between 101° and 104°.

December 5th. Vomiting of "cerebral type." Persistent severe headache. "Cephalic cry." Knee-jerks sluggish. No ankle clonus.

January 2nd, 1919. Temperature 101°, pulse 108, respirations 24. Patient emaciated. Pupils dilated, reacting sluggishly to light. Head retractions. Complains of frequent headache. Slightly drowsy, but intelligent. Intense pains on moving neck. Incontinence of urine and faeces. Occasional "cephalic cry." Ophthalmoscopic examination: Pale disc; engorged vessels; pupils dilated sufficiently for examination. Calomel gr. ½ thrice a day was ordered.

January 3rd. Lumbar puncture; fluid under pressure; 20 c.cm. withdrawn and 10 c.cm. saline solution containing 10 gr. urotropin injected. The cerebro-spinal fluid was colourless. The fluid was examined on January 6th. It was clear, and contained a few polynuclear leucocytes, but no lymphocytes. Stained Gram and Leishman. A few minute cocci were seen, Gram-positive, generally extracellular, sometimes intracellular; no capsule observed; usually diplococcus but sometimes in short chains, 3 to 5 cocci. The patient improved after lumbar puncture. Temperature 99°, pulse 104, respirations 24. Headaches less frequent. Paralysis and incontinence as before. Appetite good.

January 9th. Lumbar puncture; fluid under pressure and milky; 10 c.cm. saline solution containing 10 gr. urotropin injected. Urotropin gr. 10 thrice a day was ordered. On January 12th he was better, and wanted to get up, had no headaches and less pain on moving the head. Paralysis and incontinence remained. Stained films from the cerebro-spinal fluid showed many pus cells and no cocci. On January 16th the condition was unchanged; but on January 21st he was very lethargic, inarticulate, and very emaciated. Incontinence of urine and faeces persisted, and he had difficulty in swallowing fluids.

February 3rd. Died. Permission for autopsy was refused.

The symptoms in both patients exhibited a remarkable similarity.

The persistent headache and head retraction suggested tuberculous meningitis, but there was no paralysis of cranial nerves, and the differential blood counts showed no lymphocytosis. One common symptom was the widely dilated pupils, at first reacting sluggishly to light, but later there was no sign of contraction, even during examination of the fundi. The appearance of the fundi in both cases was remarkable; instead of the usual signs of the onset of optic neuritis the discs in both were somewhat pale, with clearly defined edges and marked congestion of the retinal veins. The patients, when not suffering from severe headache, were so lethargic that they hardly seemed conscious that the fundus was being examined, and on one occasion Pte. M. was found to be soundly asleep at the conclusion of the examination.

Pte. L. showed, in the earlier stages of the disease, more pronounced symptoms of cerebral irritation than Pte. M. He lay curled up on his left side with his head beneath the bedclothes, but in the later stages both lay on their backs, sleeping quietly. At no time was stertorous breathing observed in either case, nor did either patient suffer from convulsions. Paraplegia and incontinence of urine and faeces supervened at an early stage in both cases and persisted until death.

Lumbar puncture gave temporary relief from headache in both cases, but, as already noted, Pte. L. had respiratory failure on one occasion after removal of 15 to 20 c.cm. of fluid and injection of 10 c.cm. normal saline solution containing 10 grains urotropin. This treatment was tried as a last resort in the hope that it would destroy any infective organism. The fact that urotropin is inert in neutral or alkaline media makes it improbable that it would have any action on micro-organisms suspended in the cerebro-spinal fluid.

The onset of encephalitis lethargica in two typical cases of influenza suggests that the minute Gram-positive coccus isolated by Captain J. A. Wilson in cases of influenza and the apparently identical organism found by one of us (J. R. C.) in both of these cases, is the probable cause of encephalitis lethargica, as well as of the other diseases enumerated in the preliminary report. Subsequent lumbar punctures showed no trace of this coccus, or the cerebro-spinal fluid would have been sent to a larger laboratory for more detailed investigation.

It is recognized that in the absence of *post-mortem* observations and of any result from the attempts to obtain cultures of the coccus this report is incomplete, but the unusual clinical symptoms which appear to differentiate this disease from various forms of meningitis and from other types of encephalitis may assist in the diagnosis of other cases.

REFERENCES.

[1] Von Economo, C.: *Die Encephalitis Lethargica*. Leipzig: Franz Deuticke, 1918. [2] BRITISH MEDICAL JOURNAL, February 1st, 1919, p. 127.

HYPNOSIS, SUGGESTION, AND DISSOCIATION.

BY

WILLIAM BROWN, M.A., M.D.OXON., D.SC.LOND.,

LATE MAJOR R.A.M.C.,

READER IN PSYCHOLOGY IN THE UNIVERSITY OF LONDON, KING'S COLLEGE.

THERE is an overwhelming consensus of opinion at the present day that the one satisfactory method of treating the various forms of functional nervous disorder is that of mental analysis and re-education. The physician endeavours to unravel the tangled emotional skein of the patient's past life, as well as the emotional circumstances which ushered in the disease in its manifest form. He reveals mental conflicts and misunderstandings of the past, and mal-adaptations to the present, which he then helps the patient to correct and to solve. He demonstrates the causal connexion of these mental antecedents with the physical or mental symptoms from which the patient is suffering. He thus helps the patient to understand