WOUND FLORA IN RELATION TO SECONDARY SUTURE.

BY

CAPTAIN A. R. MUNROE, M.D.McGILL, C.A.M.C.,
SURGEON TO No. — CANADIAN GENERAL HOSPITAL;CAPTAIN A. G. FLEMING, AND CAPTAIN R. M. JANES,
M.B., D.P.H.Tor., C.A.M.C., M.B.Tor., C.A.M.C.,
PATHOLOGISTS TO No. — CANADIAN GENERAL HOSPITAL.

I.

THE sterilization of septic wounds followed by secondary suture or closure, having for its objects the shortening of the patient's stay in hospital and the lessening of impairment of function, is the ambition of most army hospitals to-day.

Many brilliant successes have been recorded by those following the various methods in vogue. Several, on account of a few failures, have become sceptical about the results claimed by others, and have drifted back to pre-war methods.

An analysis of failures often teaches us much. The flora of all septic wounds consists of a conglomerate variety of bacteria—staphylococcus, streptococcus, *pyocyaneus*, *welchii* group, and bacilli with end or central spores, etc. On analysing fifty cases of secondary closure it has been noted that in all failures the anaërobic culture showed we had previously had to deal with a very active infection, which digested the meat medium rapidly and gave off abundance of gas with rotten-egg odour. The cultures obtained showed in some cases infection by an active streptococcus, in others by a spore-forming bacillus. In both cases, even when the bacterial count was low, the wounds so infected broke down on secondary suture. On the other hand, where the cultures obtained showed an absence of these particular groups of bacteria, and the meat medium was unchanged, wounds were closed successfully, even when affording a comparatively high bacterial count (20 to 30 per microscopic field).

Sufficient data are not yet before us to state definitely that all infected wounds might be classified clinically according to the findings of the anaërobic culture, but we have gone far enough to be of opinion that where the anaërobic culture shows a virulent infection, and where the culture obtained shows spore-forming bacilli, it would be advisable not to attempt secondary suture until the wound is absolutely sterile.

II.

After making many bacterial counts as a routine procedure in wounds, especially those which were being treated by the Carrel-Dakin method, it appeared that although the factor of the bacterial count was not an absolute guide it was of very considerable help, and a fair indication as to the progress of the combat between the tissues and the infection. Nevertheless, it seemed that other factors came into play, and it occurred to us that possibly the most important of these was the particular bacteria present in a particular wound. Accordingly it was decided to make cultures from a series of wounds with a view to determining the total bacterial flora of each, both aerobic and anaërobic.

A swab is taken from the wound either the day following or, in cases where the wound is very dirty, within two or three days after the patient arrives in hospital from France. This is planted in nutrient bouillon and in the meat medium recommended by the Tetanus Committee for the growth of anaërobics.

It seems advisable either not to inactivate the meat medium after inoculation with a view to eliminating all but spore-forming organism, or, if this be done, to run two cultures, one of which has been inactivated and one not, as the action of the facultative anaërobics on the medium appears to afford a clue to the virulence of the infection.

The broth culture is examined at the end of twenty-four hours and the findings recorded. The anaërobic culture is examined daily as to the bacteria present, colour, gas formation, digestion and odour, and the findings recorded. These examinations are carried out until it is apparent that nothing more is to be gained. A culture which has at any time shown *B. welchii* or bacilli of the malignant

oedema group is usually carried on for two or three weeks unless bacilli of the end-sporing group appear before this time.

In attempting to judge of the virulence of the streptococci attention has been paid to the effect on the meat medium, the length of the chains formed, and the extent to which the streptococcus dominates the culture. Certain forms of streptococci rapidly digest and darken meat, produce gas, and even a disagreeable odour. These are considered virulent. Others, although a good growth is obtained, leave the medium unchanged. These have been regarded as the less virulent. Along with streptococcus, the *B. welchii* is found almost constantly, and in doing bacterial counts this organism in many instances accounts for a large percentage of the bacteria counted, although it would not appear to be an important factor in the healing of the wound. Streptococcus is the most persistent of all organisms we have found.

The malignant oedema group of organisms has been active on the meat culture, rapidly digesting it, forming gas, darkening it to brownish-black or even black, and producing an extremely disagreeable odour like that of rotten eggs. These have been regarded as a dangerous infection, even in the presence of a low bacterial count. The fact that the bacillus of malignant oedema may, in a non-inactivated culture, occasionally be mistaken for one of the *B. welchii* group, does not seem to be of great practical importance, as the identity of the malignant oedema group is later shown by the formation of the typical spores and the effect on the medium. Further, there is undoubtedly such a relationship between the occurrence of the two groups that where *B. welchii* is found one would hesitate in saying the other group is absent.

End-sporing bacilli, oval and round, have been found in a small percentage of cases. Among these may be mentioned a stump which repeatedly broke down, and a replating of femur for malposition, which broke down although the original wound had been completely healed for a period of six months.

It is within the power of many if not most of the laboratories now attached to our general hospitals in England to make cultures from almost if not all wounds in the hospitals where a secondary suture is likely to be undertaken. It is in the cases which early show a low bacterial count that the kind of organism present is of prime importance. At the end of a week or ten days the culture will have shown whether or not there is an extensive or virulent infection present, which it is probably not going to be advisable to close in by secondary suture.

THE VALUE OF A MIXTURE OF CYLLIN, IODOFORM, AND OLIVE OIL IN INTRATHORACIC SEPSIS.

BY

W. GORDON, M.D.CANTAB., F.R.C.P.LOND.,

AND

M. E. GATES, M.D., B.S.LOND.,

MEDICAL OFFICERS, No. 1 SECTION, EXETER WAR HOSPITALS.

A CASE of pulmonary gangrene, apparently cured by post-operative injection into the lung tissue of the following mixture, was published by one of us (W. G.) in 1912:—

R. Iodoform	...	...	...	gr. v
Cyllin	...	...	...	℥ v
Ol. olivæ	...	...	...	3ss

We now desire to report two cases of intrathoracic sepsis in which the same mixture has proved of undoubted service.

CASE I.

Cpl. R. L. was admitted from overseas on September 14th, 1917; he had been seized with pains in the left side of the chest on July 25th, and on August 14th a fetid empyema had been opened and drained. On admission his temperature was 102° and the next day 103°. The discharge from the wound was copious and most horribly offensive. The wound was packed with gauze soaked in the above mixture. Chart 1 shows the result on the temperature. The offensiveness of the discharge ceased immediately; there was no bad smell next day or afterwards. The dressing with the mixture was continued until his

transfer to a convalescent home in excellent condition with his wound nearly healed. The drainage, however, having been

CHART 1.—Cpl. R. L. C = Cyllin, iodoform, and olive oil begun.

imperfect, on November 15th a larger piece of rib had to be removed, by Mr. Ellis Pearson, surgeon to the section, after which progress was uneventful.

CASE II.

Pte. W. W., admitted March 11th, 1917. Twelve years previously he had a left-sided empyema, which was drained. About a month before admission he had an attack of pleurisy in the left side, and the old wound reopened and discharged. On admission the temperature was irregular, and there was dullness at the left lung base, so on March 25th the wound was enlarged by Mr. Pearson, and better drainage established. On March 31st severe haemorrhage occurred from the wound and

CHART 2.—Pte. W. W. O = Operation. H = Severe haemorrhage. C = Cyllin, iodoform, and olive oil begun.

continued to a considerable extent. The temperature, which had fallen after the operation, rose again to 102° on April 2nd. As the condition was obviously one of intrathoracic sepsis, injection of the cyllin and iodoform mixture was begun and continued, with the result shown on Chart 2. The haemorrhage ceased, and there was no further rise of temperature until April 14th, when the patient had a slight rise of temperature accompanied by slight haemorrhage lasting about two days, after which recovery was uneventful. The patient is now very stout and well.

We have since seen a third case of intrathoracic sepsis following a gunshot wound, in which the use of this mixture has been of great value.

REFERENCE.

¹ *Practitioner*, April, 1912.

MUTTON BIRD OIL.

BY

LIEUT.-COLONEL J. S. PURDY, D.S.O., M.D., C.M.ABERD.

D.P.H.CAMB., F.R.S.E., A.A.M.C.,

FELLOW ROY. SAN. INST., METROPOLITAN M.O.H., SYDNEY.

As cod-liver oil is difficult to obtain in sufficient quantities it may be of interest to know that the oil extracted from the sooty petrel is not only an excellent substitute, but, in the opinion of some, more effective in the treatment of bronchitic conditions and phthisis.

The sooty petrel, which is known in New Zealand and Australia as the mutton bird, spends nine months of the year in the Antarctic, and, consequently, must be so constituted as to stand extreme degrees of cold. The birds arrive in enormous numbers at their breeding places on Stewart Island, to the south of New Zealand, and on the islands in Bass Straits. The chief islands on which they breed are Chapple Island, Hummocky Island, Tin Kettle Island, and the other small islands near Flinders Island and Cape Barren Island. These birds arrive on the same day every year, and depart in flocks at the end of their period of migration.

The female lays only one egg, which is hatched by the parents sitting in turn. The young birds are fed by the parents with marine life collected from far at sea. When about six weeks old, the young, which are found in burrows similar to rabbit holes, are taken by the residents and half castes who visit these islands for the mutton bird season. The young bird is lined with fat, which is expressed as oil. The birds are then gutted, salted, and smoked, and used to be sold in Tasmania and New Zealand at a retail cost of 1½d. to 2d. each, and in Sydney at 6d. each. Recently a certain number have been tinned for export; some have reached the western front, and have been much appreciated as an article of diet.

In 1900, whilst in practice in The Hutt, New Zealand, I found at Porirua and Otaki, in the Maori Pahs, that natives suffering from consumption in some cases put on flesh during a tangi, which is something akin to an Irish wake. At these times the natives consumed large quantities of mutton birds.

At Tawa Flat, where some Norwegians had settled, I induced two of the settlers, who were suffering from phthisis and did not object to the fishy taste of the mutton bird, to eat one mutton bird a day, and found after some months that there was a considerable increase in weight. I published a paper in 1900 in the *Australasian Medical Gazette* advocating the feeding of cases of phthisis with mutton birds. In 1910, on going to Tasmania as chief health officer, I found on the west coast of Tasmania

a chemist at Zeelian who was putting up an emulsion of mutton bird oil and almond oil, which had earned a considerable repute for the treatment of bronchitis and phthisis.

On visiting the islands in Bass Straits with the then Governor of Tasmania, Sir Harry Barron, Sir Elliott Lewis, the Premier, and other members of the Ministry and Government officials, I found that the mutton bird was one of the principal articles of diet among residents of the islands. Later, in 1913, I was marooned on these

islands for six weeks, whilst investigating an epidemic of what I diagnosed as atypical measles simulating scarlet fever, but what Dr. Wetter of the Mawson Expedition diagnosed as atypical scarlet fever simulating measles; my chief article of diet, as of the others, was mutton birds, and I found a progressive increase in weight.

On behalf of the Tasmanian Government, the Commissioner of Police, Colonel J. E. C. Lord, D.S.O., made a special report on the mutton bird industry. As a result, I understand that improved conditions have been introduced into the islands and that these birds are sufficiently protected to prevent any serious diminution in their numbers.

The supply of oil from this source is considerable and would be a valuable addition to the medicinal oils at the present time.

Another point of interest about this industry is that, until a German agent intervened, the feathers, owing to their oily state, were found to be a nuisance, but previous to the war were actually exported to Germany, where they were treated and used in the making of cushions and pillows.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

PERICARDIAL KNOCK.

A FEW days before the appearance of Colonel S. Maynard Smith's article in the *JOURNAL* of January 19th, p. 78, I was called to see a boy who had been accidentally shot in the head and left side of the chest when rabbiting.

About an hour before he died a loud cardiac "click" developed which was synchronous with the heart systole and could be heard distinctly six or eight feet away. It bore no relation to the respiratory movements, as the respiration was Cheyne-Stokes in character and the sound persisted during the period of apnoea. The simile of the click in the ear-piece of a telephone when the lever is