negative. This, considering the well-known fact that Klebs-Loeffler bacilli are occasionally to be found in the throats of healthy persons, is eminently satisfactory.

The most disappointing feature about our series is that on 25 occasions we failed to find Klebs-Loeffler bacillus on the swab or culture taken from cases which were clinically diphtheria. Some of these cases were very typical, several of them dying of cardiac failure; others, however, were less distinctive. The fallacies of a negative examination are obvious.

First, our inability to find the bacilli on the coverslip does not necessarily prove their absence from the culture in which they may not be very numerous.

Secondly, insemination of the culture media may have failed.

Thirdly, the bacilli may not have been transferred from the throat to the swab. In purely laryngeal cases it is quite possible that the bacilli may be present in the throat in very small numbers, or be absent. In pharyngeal cases—and especially in those cases where other bacteria are present in large numbers—only a very few Klebs-Loeffler bacilli may be transferred to the swab.

Fourthly, though the bacilli may be transferred to the swab, they may be incapable of growth, as when a swab is taken directly after the throat has been treated with an antiseptic.

Lastly, there is the general fallacy attaching to a single negative result. For this reason it cannot be too strongly urged that where there are definite clinical symptoms pointing to a diagnosis of diphtheria the value of a single negative bacteriological examination is practically nil; it is not until several negative results have been obtained that one is justified in believing that the disease is not diphtheria. The importance of this can hardly be too strongly insisted on.

Concurrently with the examination of this series, two of us have been examining a second series consisting of about 40 cases, in which we have examined preparations from the cultures after staining by methylene blue as well as by Neisser's method. On two occasions Neisser's stain enabled us to arrive at a positive diagnosis with ease when there was some difficulty with the methylene-blue specimens; but in both cases we were satisfied, after careful examination, that the Klebs-Loeffler bacillus was present in the methylene-blue preparations. One of the two cases was undoubtedly diphtheria clinically. In no case did we find that Neisser's stain showed bacilli having the staining reaction of the Klebs-Loeffler bacillus, when at the same time the methylene-blue specimens failed to shew Klebs-Loeffler bacilli.

One of the most satisfactory features about our series is that out of the 48 cases in which the bacillus of diphtheria was found in the culture we were able to diagnose 18 by the microscopical examination of the coverslips made directly from the swab.

We feel convinced that if coverslip preparations were made directly from the throat without the loss of any time, this number of positive results would be increased. On many occasions it is highly desirable to make a diagnosis as early as possible, and our observations show that a positive diagnosis was possible from the examination of the swab in 18 per cent. of all the cases, and in 37.5 per cent. of the cases of proved diphtheria. If more care were expended in the taking of the swab, so that a really good coverslip preparation could be made from it, we think that a higher percentage of cases would yield an indisputable result. Of course, a negative result would be of little or no value, and it is always well to confirm the result, even if positive, by subsequent examination of the culture.

As a result of our observations, we feel that Neisser's stain is a valuable one in several ways:—

First, a positive diagnosis is rendered more certain for those who cannot be considered as experts, since it is often easier to diagnose the Klebs-Loeffler bacillus after staining by Neisser than after staining by ordinary methylene blue, as we think that for the inexperienced the bacilli after staining by Neisser's method, are much more characteristic than after staining by methylene blue.

Secondly, a trustworthy positive result may be obtained from the microscopical examination of a preparation made

direct from the swab, and this method is, we think, not only more reliable when Neisser's stain is used than when the ordinary methylene blue is employed alone, but is more obvious.

Thirdly, the use of Neisser's stain does not appear to introduce any fallacy not found in the application of other methods.

TWO SUCCESSFUL CASES OF OPERATION FOR PERFORATED GASTRIC ULCER.

By E. COLLINGWOOD ANDREWS, M.A., M.D., B.Sc.,
Surgeon to the Hampstead Hospital.

It appears to me that it is still desirable to publish the details of successful operations for gastric perforation, even if the only purpose served is to impress once again the necessity for prompt diagnosis and early treatment.

I cannot doubt that both the patients whose cases are here recorded largely owe their lives to the immediate and accurate judgment of the medical men who first saw them. In the search for the perforation, minute flakes of recent lymph are most suggestive indications as to the locality of the lesion, and should be carefully looked for. In both cases a considerable quantity of food was present in the stomach, and in neither was it possible to empty the organ through the pyloric opening. The constant welling-up of semi-digested food through the perforation was a considerable impediment to the introduction of the first few sutures. Another difficulty was the fixation of the stomach by old and firm adhesions.

It will be observed that in the first case irrigation with saline solution was employed. It is my practice, in dealing with the perforation of a viscus, to irrigate if the food is widely diffused, but to content myself with careful sponging if the escape is confined to a limited area. I must also express a decided preference for Halsted's suture, at any rate for the second layer of stitches.

For the notes of the first case I am indebted to Mr. Geoffrey Hobbs, the resident medical officer at the Hampstead Hospital.

CASE I.—C. D., aged 23, a housemaid, had suffered from "indigestion" for some months, but had never vomited blood. For a fortnight the indigestion had been worse, and on the day of admission (February 7th) to the Hampstead Hospital, after a substantial lunch of cold mutton and suet pudding, the patient was carrying up the tea-things, when she suddenly felt intense pain in the stomach, and fell down collapsed. Dr. William Boulting saw her soon after, diagnosed the condition as gastric perforation, and ordered her removal to the hospital. Dr. Andrews saw the case soon after admission, and found the abdomen motionless, board-like, and exquisitely tender, especially in the region of the stomach. There was marked diminution of the liver dulness, a feeble pulse of 120, and all the symptoms of general collapse. Immediate operation was considered necessary, and at 6 P.M. Dr. Andrews made an incision 4 inches long in the middle line between the costal angle and the umbilicus. On opening the peritoneum gas escaped, and the anterior surface of the stomach presented in the wound. To examine the surface it was necessary to separate extensive adhesions, and towards the cardiac end a collection of recent lymph and particles of semi-digested food were noticed. Continuing the search in this direction the perforated ulcer was found near the cardiac orifice on the lesser curvature, the aperture being rather smaller than a threepenny-piece. The peritoneum round the perforation was united by two layers of Lembert sutures, the area around carefully sponged, [and the whole of the peritoneal cavity well flushed with saline solution. A gauze drain was inserted into the upper portion of the wound, and a large drainage tube in the lower angle.]

February 8th. Patient has vomited since the operation, but has had some sleep. She is fed by rectal injections of peptonised milk and beef-tea every four hours. Pulse 120, temperature normal.

February 9th. Patient has been sick once at 10 A.M., but had a good night. Wound was dressed and gauze drain removed. There is only a slight serous discharge, and the abdomen is less distended. Complaints of pain under left shoulder blade. Temperature normal. Pulse 100.

February 10th. Has passed a good night. Discharge still serous. Abdomen less distended and moving with respiration. Drain tube removed. Pulse 100.

February 12th. Had a free action of the bowels after oil injection. Milk given by mouth. Pulse 90.

February 16th. Progress continued and stitches taken out. Patient commenced farinaceous food. Henceforward recovery was uneventful.

CASE II.—M. C., a gentleman aged 30, was seized with violent abdominal pain while riding on an omnibus, and on reaching home fell down in his dining room. The last meal of pork, potatoes, etc., had been taken some three hours earlier. Dr. McLelland was called to the patient, and diagnosed a perforated gastric ulcer. On seeing the patient some two hours later I found the pulse 124, and almost imperceptible, the face pale and sunken, and skin cold and clammy. There was a history of chronic dyspepsia, chiefly occurring before meals. The abdomen was rigid and distended, and no liver dulness could be elicited. Dr. Hale White and my father (Dr. James Andrews) concurring in the diagnosis, I decided to operate forthwith. A median incision was made in the epigastric region

4½ inches in length, and on opening the peritoneum there was a rush of gas. The stomach was distended with fluid food, and the gastric vessels much engorged. The anterior surface and cardiac end of the stomach were examined without result. To complete the examination it was necessary to make a transverse incision 3 inches in length, and close to the pylorus a few small flakes of recent lymph were observed. Close to these, just on the lower border, three-quarters of an inch from the pyloric orifice, I found the perforation. It was one-third of an inch in diameter, and surrounded by an area of hard and dense cicatricial tissue with the diameter of an inch. A single row of Lembert sutures were first inserted with silk, and then over these another series of Halsted sutures. Partially digested food was present in considerable quantity beneath the liver, but none could be detected in any other part of the abdomen. The infected area was well cleansed by sponging, and irrigation was not employed. A large rubber drainage tube was inserted reaching to the back of the abdomen, and packed round with gauze. The difficulties of the operation consisted in the fixity of the pylorus, which necessitated working at a great depth, and the constant retching caused by the manipulation of the stomach. The patient stood the operation well, and the pulse and general condition were better after it than before I began. He was fed *per rectum* for seven days, the gauze being removed on the second day and the tube on the sixth. On removing the gauze a considerable mass of omentum which adhered to it issued from the wound. Two ligatures were placed around the base of this, and it was excised, the patient experiencing hardly any pain. With the exception of a sharp attack of phlebitis in the right leg recovery was uninterrupted.

SIXTY-NINTH ANNUAL MEETING

OF THE

British Medical Association.

Held at Cheltenham, July 30th, 31st, August 1st, and 2nd, 1901.

PROCEEDINGS OF SECTIONS.

SECTION OF PATHOLOGY AND BACTERIOLOGY.

J. W. WASHBOURN, C.M.G., M.D., F.R.C.P., President.

DISCUSSION ON THE PATHOLOGY OF PNEUMOCOCCUS INFECTION.

I.—ALEXANDER G. R. FOULERTON, F.R.C.S.,

Bacteriologist and Lecturer on Bacteriology, Middlesex Hospital.

MR. FOULERTON said that the pathology of pneumococcus infection was concerned with many cases of disease which in their clinical aspect might have little in common, and in their morbid anatomy might vary as widely. The specific organism of this infection, the pneumococcus, *micrococcus pneumoniae*, or *diplococcus lanceolatus*, belonged to the class of strict parasites, so far as our present knowledge went. Further, it occurred as infecting man alone and had not yet been found as a parasite of the lower animals. It had been but rarely met with outside the human body, but Emmerich had succeeded in isolating it from the dust of the floor of a ward in which there were patients with pneumonia, and Uffelmann claimed to have isolated it from the air of a cellar. From what was known of its biology it was improbable that the pneumococcus as it was found as a parasite of man could maintain a separate existence as a saprophyte and away from a living host for any length of time. *Micrococcus pneumoniae* was a fairly common parasite of the mucous membrane in man, and not necessarily under pathogenic conditions. It was first discovered accidentally by Pasteur, Chamberland, and Roux on inoculating rabbits with the saliva of a child who had died from hydrophobia, and at about the same time by Sternberg on inoculating some of his own healthy saliva into rabbits as a control to some other experiments, and both accounts of the organism were published almost simultaneously in 1881. Subsequent investigations had shown the frequency with which the organism existed as a parasite on the mucous membranes of perfectly healthy individuals; infesting more especially the mouth, where Sternberg found it in 20 per cent. of all cases examined, and Netter in about 15 per cent. It was also found in the anterior nares; von Besser isolating it from the nasal secretion of 14 out of 57 individuals

examined. Arnold Lawson when investigating the bacteriology of the conjunctival sac in 200 healthy individuals, found *micrococcus pneumoniae* present in two, and in each in pure culture. The parasite also occurred in the vagina, but it was probably rarely present there, since Doyen was the only one of the large number of those who had worked at the bacteriology of this canal who had isolated it from the healthy vaginal secretion, and he only in a single case.

THE VIRULENCE OF THE PARASITE FROM HEALTHY INDIVIDUALS AND WHEN EXISTING UNDER PATHOGENIC CONDITIONS.

The first point that had to be considered in studying the pathology of pneumococcus infection was whether the organism as it existed as a parasite of healthy individuals was possessed of the same degree of virulence as it exhibited when found as an actively pathogenic agent. Evidence on this point could be obtained only by animal experiment. *Micrococcus pneumoniae*, although not found occurring naturally in the lower animals, was actively pathogenic for many of them—the rabbit, wild and tame mice, wild and tame rats, the guinea-pig, the sheep, and the dog being all more or less susceptible to infection. This susceptibility was most marked in the rabbit, least in the dog, and in the other species according to their position on the list. Pigeons and poultry were, according to Washbourn, immune against this infection. And in testing the organism as obtained from healthy saliva, its virulence for the rabbit would usually be found quite as well marked as the virulence of a strain isolated from, for instance, a case of pneumonia. When, therefore, the parasite became pathogenic for its human host, there was no reason to suppose that infection had happened because of any sudden access of virulence to a previously harmless parasite; but rather it was probable that the condition of the host had afforded opportunity which was usually wanting, under the conditions of ordinary good health, for the exercise of a natural pathogenic power. In connection with this, Netter had noticed one very interesting fact when investigating the virulence of the coccus in the sputum of cases of pneumonia. He found that during the two weeks immediately succeeding defervescence the pneumococcus lost its virulence for the rabbit, but regained it at the end of that time. Testing the virulence of cultures immediately after isolation from cases of recent infection in man, he himself had found that its degree was remarkably constant in a series of experiments on rabbits with the organisms isolated from 11 cases of empyema in children, 2 cases of empyema in adults, 3 cases of lobar pneumonia, 2 cases of meningitis, 1 case of cellulitis, and 1 case of circumscribed abscess of the finger. So far, then, as man, its natural host, was concerned, *micrococcus pneumoniae* in its character as a normal, and only occasionally pathogenic, parasite resembled in some degree *bacillus coli communis*. The latter organism, although a universal and, according to Bientock, a useful parasite of the intestinal tract, became, nevertheless, like the pneumococcus actively pathogenic when it found the opportunity of penetrating below the mucous membrane.

THE PATHOGENIC ACTION OF MICROCOCCUS PNEUMONIAE IN MAN.

The pathology of pneumococcus infection might conveniently be considered with special regard to the following points: (1) The general results of blood infection and those of the toxæmia produced by the absorption and circulation of toxins formed at the local foci of infection in the tissues, or produced by bacteria which had infected the circulating blood itself; (2) the direct action of the parasite on the various tissues in which it becomes located in the course of an infection; and (3) what might be termed the secondary results of the infection, that is to say, those results due not to the direct action of the infecting organisms, but arising out of the new morbid conditions brought about by the infection.

In the case of pneumococcus infection these last secondary results were often of much consequence; in lobar pneumonia there was the effect on the right heart of the obstruction to the passage of blood through the infected area of lung, and the effect of a sudden diminution of the surface available for the proper oxygenation of the blood; in other cases the effect of the embolism of arteries and thrombosis of veins which