RELATION OF PFIEFFER'S BACILLUS TO INFLUENZA.

By STANLEY WYARD, M.D., M.R.C.P.,
PHYSICIAN TO THE BELGRAVIA HOSPITAL, AND ASSISTANT PHYSICIAN TO THE VICTORIA HOSPITAL FOR CHILDREN.

The following report is based upon a number of cases examined during the 1918 epidemic. Attempts to obtain cultures from blood were made in all cases, and from the heart's blood post mortem in two. Of the former, two were sterile and one yielded streptococci; of the latter, one was sterile and one gave streptococci. In an attempt to discover the bacilli, and swabs taken from the nasopharynx, none showed this organism. Cultures were made from the sputum in seventy-three cases, the specimen in all cases being purulent or muco-purulent in character. The Bacillus influenzae was recovered seventeen times (24 per cent.).

The earliest cultures were made on agar smeared with fresh human blood, but the results with this medium were not equal to those with the media afterwards used, and the percentage of positive results was smaller. The later media were Levihn's and Fleming's. Both were prepared freshly for each plate (within twelve hours).

Levihn's was prepared by melting some nutrient agar, cooling to 150° C., and adding 5 per cent. cultured human blood. The whole was then just brought to the boil, cooled 10° to 15° C., and raised a second time to 47° C.; it was finally passed through a sterile gauze and cotton-wool filter and poured immediately in plates.

Fleming's was prepared as follows: Stock flasks containing 150 c.c.m. nutrients agar were prepared and kept ready for use. Human blood was obtained and added to five times its quantity of tap water and an equal quantity of NaCl. The mixture was well stirred and preserved in a sterile stoppered bottle in the ice compartment for seven days. The broth was then found necessary to ensure sterility. Tubes put up with blood newly treated were contaminated with B. staphylii, from 25 to 30 per cent. Immediately 2.5 c.c.m. of the agar were taken and 2.5 c.c.m. of normal NaOH added; mixed thoroughly and the reaction adjusted to just blue to litmus. The whole amount was then added to 160 c.c.m. of melted agar and plated.

Both these media proved highly satisfactory but rapidly lost the power of giving good growths. The primary culture and first and second subcultures must be made on the freshly prepared medium. Subsequently the organism became immobilized and will grow only on older media.

Pfeiffer's bacillus grows on them as minute, round, colorless colonies, which generally require thirty-six hours' incubation before they can be picked off for subculture. Here, as on other media, they show a marked tendency to congregate round colonies of staphylococci. An organism was accepted as a true B. influenzae if it was a minute Gram-negative coco-bacillus with slightly tapering ends, non-motoile, growing best on blood media, and maintaining slowly with ordinary saline dextrose.

For further investigation three strains were chosen, numbered 14, 16, and 43, after very numerous replications to ensure absolute purity.

Pathogenicity.—None of the strains produced any symptoms when injected intraperitoneally into rats or intravenously into rabbits.

Immunity.—A suspension of strain 14 was put up against the serum of a rabbit by Dreyer's technique. No agglutination occurred. The rabbit received on the following day, December 5th, 1918:

At 10.55 a.m. an intravenous injection of one agar slope of strain 14 suspended in physiological saline to which had been added 0.2 per cent. phbc, the whole having been heated to 60° C. for thirty minutes.

At 11.55 a.m. a second slope culture of the same strain similarly prepared was injected intravenously and a third slope was injected intraperitoneally. The animal remained perfectly well.

On December 12th, 1918, two slopes of strain 14 were given into the ear vein. This time the organisms were living. Again no ill effects ensued.

On December 15th, 1918, a few c.c.m. of blood were drawn off and the serum put up against all the strains of the bacillus, with the following results (in Dreyer's nomenclature):

<table>
<thead>
<tr>
<th>Dilution of Serum</th>
<th>Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>1,250</td>
</tr>
<tr>
<td>14</td>
<td>T</td>
</tr>
<tr>
<td>16</td>
<td>T</td>
</tr>
<tr>
<td>43</td>
<td>T</td>
</tr>
</tbody>
</table>

On December 20th, 1918, the rabbit was bled to the amount of 20 c.c.m., the serum removed and further agglutination tests performed. It consistently gave a clear agglutination of all three strains in a dilution of 1 in 1,250.

Having demonstrated the antigenic properties of these serums, the serums of patients suffering from influenza were put up against them with unvarying negative results.

Bronchopneumonia Present | Bronchopneumonia Absent

<table>
<thead>
<tr>
<th>Week of Disease</th>
<th>No. of Serums Examined</th>
<th>Week of Disease</th>
<th>No. of Serums Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1-7 days)</td>
<td>3</td>
<td>1 (1-4 days)</td>
<td>12</td>
</tr>
<tr>
<td>2 (7-14 days)</td>
<td>8</td>
<td>2 (1-4 days)</td>
<td>11</td>
</tr>
<tr>
<td>3 (15-21 days)</td>
<td>4</td>
<td>3 (15-21 days)</td>
<td>10</td>
</tr>
<tr>
<td>4 (22-28 days)</td>
<td>6</td>
<td>4 (23-28 days)</td>
<td>1</td>
</tr>
<tr>
<td>5 (29-35 days)</td>
<td>3</td>
<td>5 (29-35 days)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>Total</td>
<td>36</td>
</tr>
</tbody>
</table>

From this table it is seen that no agglutination of either of three typical strains of Pfeiffer's bacillus was obtained with serums removed from 59 cases of influenza, whether those cases were or were not complicated by bronchopneumonia, and whether the strain was in the first, second, third, fourth, or fifth week of the disease.

When it was found that agglutination tests failed to reveal the presence of antibodies in the blood of influenza patients, attempts were made to discover them by means of complement fixation tests; but here a difficulty arose in the preparation of the antigen. At first a suspension of the bacilli in 0.85 per cent. saline was employed. The growth on several agar slopes was washed off in saline and washed several times. Unfortunately great difficulty was experienced in obtaining the use of a centrifuge, so that the washing was not as thorough as could be wished. Possibly more perfect washing would have altered the result. As it was, every suspension that it was possible to obtain was so strongly anticomplementary of itself that no complement fixation tests in the presence of a possible antibody could be carried out.

In order to overcome this, further cultures were washed off the medium with normal NaOH, a little of the latter being used for much growth of the bacilli. The suspension was kept on ice for a few days, and then neutralized exactly with normal HCl. Finally it was diluted with distilled water to give a NaCl content of 0.9 per cent., and further diluted with saline to give the requisite strength of antigen. This was determined empirically for each strain. Eight serums were put up against all three antigens, and in no case was the complement fixed.

*I have been unable to discover any references to bacteriological literature to either of these media. In both cases the details of the preparation were communicated to me personally by a fellow worker. I have been unable to find any similar method has been devised by Hambgs, Deut. med. Woch., 1918, 45, 181, quoted by the Medical Supplement to the Daily Review of the Foreign Press, vol. 1, No. 15, December, 1918, p. 456.
One patient had broncho-pneumonia, and two bronchitis, probably broncho-pneumonia; and the day of the disease was 8, 25, 14, 14, 25, 6, 15, and 17 respectively. At the time of this experiment no control with a known agglutinating serum was possible.

Conclusions.

From the above observations it appears that influenza is not produced by Pfeiffer’s bacillus, but by some other virus at present unknown, since—

1. The B. anginosus is found in only a proportion of the cases.

Other workers have, however, recovered it in more than 90 per cent., and streptococci can be found in quite as many.

2. In certain epidemics of influenza it has been found extremely rarely, while in others it has been entirely absent. It is found in cases other than influenza.

4. No specific immunity has been demonstrated to follow infection with this organism. Here again, however, others have arrived at a different result, and have found agglutinins to the bacillus in certain cases of influenza, but their presence has been found by no means constant, and they appear more frequently in the first week of the disease than in the later stages. The observation that the bacillus is pathogenic to animals after intracerebral injections is no proof of an etiological relation with influenza, since in the human disease infection can never be effected by that path; while equally invalid in this respect is the fact that it has been recovered from pleural, artithritic, and meningitic exudates.

It is well established that certain organisms—e.g., B. coli communis—though normally harmless saprophytes, may in certain circumstances become pathogenic; and it is probable, or even certain, that the B. influenzae Pfeiffer is one of these. What are the factors producing such a change have not yet been determined.

Reference.


PREGNANCY COMPLICATED BY VOLVULUS OF THE PELVIC COLON.

BY VICTOR BONNEY, M.S., M.D., B.S.CLOND., F.R.C.S.,
ASSISTANT OBSTETRICAL SURGEON, MIDDLESEX HOSPITAL; SURGEON TO THE CHELSEA HOSPITAL FOR WOMEN; AND E. CHITTENDEN BRIDGES, M.D.DURM.,
CONSULTING PHYSICIAN, MARGARET STREET HOSPITAL FOR DISEASES OF THE CHEST; VISITING MEDICAL OFFICER, ST. DUNSTAN’S HOME.

The publication in the British Medical Journal of December 13th last of Mr. M. Donaldson’s interesting case of pregnancy complicated by volvulus, prompts us to place on record another case of the same kind presenting several remarkable features.

In February, 1918, one of us (E. C. B.) was called to see a lady five months pregnant who had symptoms of acute intestinal obstruction. She was very ill, in great pain, and the abdomen was exceedingly distended.

First Operation.

The abdomen was opened in the middle line and an enormous volvulus of the pelvic colon was found, so large that when untwisted the loop of intestine was long enough to reach from the wound to the floor of the room and back again. There was not only greatly distended, but greatly hypertrophied as well. There was an anatomical abnormality whereby the descending colon was continued sessile over the brim of the pelvis and down its side wall to within an inch of the point where the body wall of the pelvic mesocolon, therefore, had only this length of base from which it spread fanwise to its attachment to the enormous loop of movable pelvic colon, so that from the description of the bowel, pedunculated, and was at the point of the peduncle that the twist had occurred. At the junction of the colon and the rectum the bowel wall was much thickened and its lumen narrowed, so that a diagnosis of chronic intestinal obstruction must have existed for some time before the acute attack took place, and there was, in fact, a history of symptoms for two years. Having untwisted the volvulus, the bowel was incised and emptied of a great quantity of gas and faeculent fluid; but even in its collapsed state it was so large that it was impossible to return it into the abdomen, and it was necessary to detach it at the upper end of the wound, the segment left outside the abdomen being thence the size of a man’s fist. The pregnancy was not interfered with, as the patient’s state did not permit of a prolongation of the operation.

Second Operation.

There was a good deal of suppuration round the colostomy, and it was decided to wash the bowel out before the exposed portion of the bowel shrank to a reasonable size. The next problem was to deal with the pregnancy, for the position of the anchored bowel would not permit of the uterus being brought over a size much over five weeks after the first operation vaginal Caesarean section was performed and a dead, and a half months child was expelled, the fetal head having been performed first. The patient again made a good recovery except for a slight attack of endocarditis three weeks after the operation.

Third Operation.

Finally, in June, the colostomy being healthy and the uterus inviolate, the abdomen was reopened, the anchored bowel freed, the whole loop of still hypertrophied pelvic colon pulled, and finally the end of the descending colon was joined to the rectum. Once again the patient did well, and at the present time is in very good health.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

DEATH DUE TO SWALLOWING A DENTAL PLATE.

A woman, aged 40 years, was admitted into Chelsea Infirmary on October 9th, at 4.15 p.m., with the following history:

She had been healthy until three weeks before admission. On September 8th, in the afternoon, whilst eating a potato, she swallowed a dental plate. She drank a cup of tea to wash it down, and then tried to vomit, but could not do so. She felt pain and heaviness in the pit of the stomach, and pain in the back of the chest. She then took about 8 oz. of castor oil in two doses, but could not say whether she passed the plate. She was quite comfortable, took her food fairly well until October 8th, at 5.30 p.m., when she fell down a few stairs; she was picked up by her daughter in a fainting condition, and recovered after taking a drink of water. About half an hour later she complained of feeling faint, and vomited blood (about 10 oz.). She slept well the night, but at 6 a.m. on October 9th she again complained of faintness, with a sensation of choking, and then vomited a pint of blood. She was seen by a doctor at her house, who ordered her removal to the infirmary, where she was admitted at 4.15 p.m. of the same day.

On admission the patient looked very pale, anaemic, was rather restless, respirations were rapid, her pulse being almost imperceptible at the wrist. She was given 1 c.c.m. of pilocarpine extract (intramuscularly) and one pint of saline per rectum. She returned most of the saline mixed with blood. She then stated she felt faint, and had an attack of haematemesis, vomiting about 10 oz. of blood.

Abdominal examination showed nothing except dilated stomach, with tenderness in the pyloric region. A haematemesis might be heard all over the heart region, and the lungs showed evidence of emphysema and chronic bronchitis.

The patient rapidly became worse, and died at 5.15 p.m., complaining of choking sensation and the desire, but inability, to vomit.

A post-mortem examination was performed by order of the coroner on October 11th, and the following was found: A gas-forming bacterial growth was found in the colon.

There was no evidence of violence except a slight discoloration of the skin of the left tibia. The mouth was normal; opening the oesophagus a small plaster splint was found from the back of the pharynx, at the level of the arch of the aorta where the plate divides. An attachment of the plate had pierced the left antero-lateral surface of the aortic arch and made its way into the aorta, just below the origin of the left common carotid artery. There was a bean-shaped ulcer (1 in. by ½ in.) on each side of the oesophagus, about 2 in. from the pharynx, and this ulcer was deeply incised and had rubbed against the mucous membrane. There was also dilatation of the oesophagus. There was a large clot, easily detachable from the posterior wall of the aorta. The heart was fairly normal in size, and did not show any signs of aneurysm.