downward direction, and more to the left than to the right. When the right auricle is dilated there is usually engorge-
ment of the veins of the neck and other signs of cardiac failure.

To map out accurately on the chest wall the right border of
the heart is difficult, if not impossible, even in the hands
of experts. It is better to rely on signs of venous engorge-
ment, which all can recognize as indicating dilata-
tion of the right auricle. It is certainly wrong to consider
increase in the size of the heart to the right as a sign of
enlargement of the right ventricle. Epigastric pulsation
is commonly present in mitral stenosis, and too frequent
observed in patients with normal hearts to be of service
as a sign of right ventricular hypertrophy. It is generally
safe when there is a sign of enlargement of the heart to
the left that the heart itself is increased in size. It is true
that in mitral stenosis the hypertrophy that predominates is usually a right ventricular one, but it is
equally true that both ventricles are usually hypertrophied.
Observations which Lewis and I made have shown this.

We weighed separately the ventricles of a large number of
hearts with mitral stenosis, and found the hypertrophy
to be general, but with a relative increase in the weight of
the right ventricle. Such pathological findings, together
with electro-cardiographic records, do not support the
hypothesis that the diaphragmatic defect is the only cause
of the production of hypertrophy in mitral stenosis. Some
other cause must be found to explain the increase in
weight of the muscle in b.vth ventricles.

The importance of the history of mitral stenosis. By
the symptoms alone as I have described them one may gauge
the man's present capacity for work. The exercise
tolerance, as determined by a simple exercise test, gives
useful information concerning his present disability. As
a measure of physical endurance the reaction to exercise is
of prognostic value. As a test to be employed in predicting
the duration of life it is not to be relied upon. Good
exercise tolerance is never observed when there are signs of
heart failure. Poor exercise tolerance is not necessarily
associated with clinical breakdown. It is true that there
are symptoms which so incapacitate that total disability
is at once recognized, and the duration of life may be
evaluated with a fair degree of accuracy. I refer to such
symptoms as breathlessness, associated with cyanosis and
pulmonary congestion, and the pain of angina pectoris;
such symptoms are associated with definite signs of heart
failure. The disease is no longer in its earlier stages; our
problem is an easy one, total disability is obvious, and
progress of clinical breakdown is certain. The physiologist
becomes a more difficult one when we are required to
foretell, in the patient with early heart disease, the number of
years remaining before the final stage of total disability
has been reached. When will the patient with mitral stenosis
have no symptoms due to incomplete heart failure? With
symptoms after effort when may we expect signs of venous engorge-
ment? These questions cannot be answered unless we understand the symptoms and the relation
they bear to the signs. Until we know what symptoms arise from loss of cardiac reserve through myo-
cardial disease, and can recognize the early symptoms of
heart failure, and identify symptoms due to other causes,
it will not be possible to prognosticate with any degree of
certainty in early mitral stenosis.

We know from experience that the course of the disease is
a progressive one; the disability increasing one year, and
heart failure the end of most patients with mitral stenosis.
The duration of life may be shortened by repeated attacks
of pneumonia, fever, or other infections, or prolongation
of the mode of living and proper care. A single attack of
rheumatic fever many years back, with good health since,
provided the heart is not enlarged, or only slightly
involved, may be an indication that the disease is
stationary. With the heart much enlarged the onset of
heart failure in most cases is not far off.

REFERENCE.

RELATION OF PFEIFFER'S BACILLUS TO INFLUENZA.

BY

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The following report is based upon a number of cases examined during the 1918 epidemic. Attempts to obtain cultures from blood were made on 29 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 no case did Pfeiffer’s bacillus and staphylococci be swabs taken from the nasopharynx show this organism. Cultures were made from the sputum in seventy-three cases, the specimens 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 Levinthal’s and Fleming’s. Both were prepared freshly for each plate (within twelve hours).

Levinthal’s was prepared by melting some nutrient agar, cooling to 75°C, and adding 5 per cent. strained human blood. The whole was then just brought to the boil, cooled 10° to 15°C, and raised a second time to ebullition; 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-box for seven days. This was found necessary to ensure sterility. Tubes put up with blood newly treated were contaminated with St. subtilis in from 25 to 50 per cent. Immediately 0.5 c.c.m. of the agar were taken and 2 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 becomes oligomorphed 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 accepted as a true B. influenzae if it was a minute Gram-negative coco-bacillus with slightly tapering ends, non-motile, growing best on blood media, and remaining slowly with ordinary saline dyes.

For further investigation three strains were chosen, numbered 14, 16, and 43, after very numerous repetitions 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 0.5 per cent. phenol, the whole having been heated to 60°C for thirty minutes.

At 11.55 a.m. a second slope culture of the same strain previously prepared was injected intravenously at 12.56 p.m. a third slope. The animal remained perfectly well.

On December 12th, 1918, two slopes of strain 14 were given into the ear vein. This time the organism 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):

Dilution of Serum.

<table>
<thead>
<tr>
<th>Strain</th>
<th>125</th>
<th>250</th>
<th>625</th>
<th>1,250</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>T</td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>T</td>
<td>T</td>
<td>S+</td>
<td>S</td>
</tr>
<tr>
<td>43</td>
<td>T</td>
<td>T</td>
<td>S+</td>
<td>S</td>
</tr>
</tbody>
</table>

On December 20th, 1918, the rabbit was bled to the amount of 20 c.c.m., the serum removed and used as a control for further experiments. 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 strains, the sera of patients suffering from influenza were put up against them with unvarying negative results.

Bacteriological Examinations of the Sputum.

Pneumonia 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 (1-7 days)</td>
<td>12</td>
</tr>
<tr>
<td>2 (8-14 days)</td>
<td>8</td>
<td>2 (8-14 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 (22-28 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>
</tbody>
</table>

Total 23 36

From this table it is seen that no agglutination of either of three typical strains of Pfeiffer’s bacillus was obtained with sera removed from 59 cases of influenza, whether these cases were or were not complicated by bronchopneumonia, and whether the strain were 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 0.5 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 sera were put up against all three antigens, and in no case was the complement fixed.

I have been unable to discover any references in 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 believe that no medium has yet been put forward, but a very similar method has been devised by Høibergen, Deut. med. Woch., 1918, 44, 1981, quoted by the Medical Supplement to the Daily Review of the Foreign Press, vol. 1, No. 15, December, 1918, p. 456.©