

THE BACTERIOLOGICAL INTERPRETATION OF VAGINAL SMEARS

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(With Plate 8)

The examination over a number of years of routine vaginal smears has revealed to the author the frequent presence of vibrio-like micro-organisms, and also, of gram-negative cocci other than gonococci.

The presence of vibrios in the vagina has been casually mentioned by Cruickshank & Baird (1930), and Cruickshank & Sharman (1934), but the author has been unable to find any reference to the cultivation of these; nor has any reference been found to the identity of vaginal commensal Gram-negative cocci.

MATERIAL EXAMINED AND METHODS

Material was obtained during the course of an investigation of the bacterial flora of a group of thirty-nine women attending a Fertility Clinic. Freshly prepared smears were used and cultures were made without delay, using a wide range of media under aerobic, anaerobic and micro-aerophilic conditions of cultivation.

OBSERVATIONS

Direct smears

Usually there was no difficulty in recognizing the vaginal bacillus described by Döderlein; occasionally, however, pleomorphism and the failure to retain Gram's stain made its identity less obvious. The commonest organisms encountered were Corynebacteria. These showed a wide variation in morphology and Gram-negative forms were frequent. Branched forms were seen in two cases, and forms with exaggerated curvature were very common (Pl. 8, figs. 1, 2). Some of these forms stained Gram-positively, but others stained Gram-negatively, even in the same microscopic field. At first the Gram-negative forms were thought to be vibrios and a number of media specially selected to favour the growth of vibrios was used. In no case, however, were vibrios isolated in culture.

As a rule cocci were not abundant in direct smears, and sometimes none were found; but, not infrequently, both Gram-negative and Gram-positive forms were seen.

In smears from two cases an unusual organism was encountered. This appeared as very slender, Gram-negative curved and winding filaments, sometimes

with variation of the intensity of staining along the length of the filaments. No branching was apparent (Pl. 8, fig. 3).

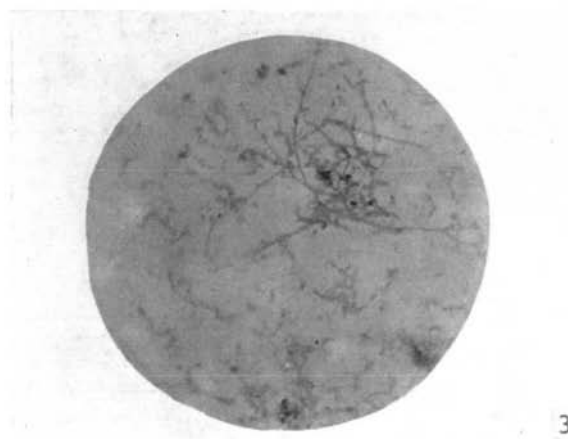
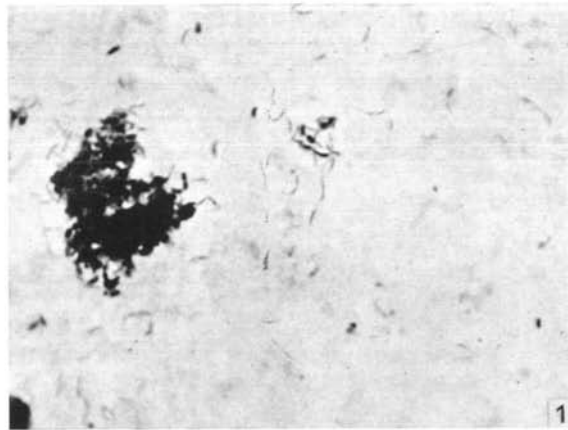
Cultural findings

Of the thirty-nine women, twenty-one (53.8%) showed the presence of Döderlein's bacillus. Corynebacteria were isolated from thirty-three (86.3%) cases, two or more strains being obtained in a few instances. Staphylococci were present in twenty-nine (74.3%). From ten (25.6%) individuals, a coccus which morphologically was a staphylococcus, was cultivated, but culturally it resembled a member of the genus *Neisseria*. Most of the cocci failed to retain Gram's stain, and, in some cases, all the cocci stained Gram-negatively. This organism was identified as *Diplococcus crassus*. Other organisms obtained comprised faecal strains of streptococci, anaerobic streptococci, various types of coliform bacilli and one obligate anaerobic bacillus of the *Bacteroides fragilis* type.

COMMENT

The findings show the Corynebacteria to be most frequent in the vagina, and I would suggest that it is very probable that curved forms of these bacilli have been identified erroneously as vibrios. The observations which Pijper (1946) made upon bacterial motility may have some bearing on this matter, because, during the course of this work, he demonstrated that bacilli, normally described as straight or slightly curved, took on a spiral shape when fixed in the viscid solution of methyl cellulose in water. Although the vaginal Corynebacteria are non-motile, they too, when fixed under the conditions imposed by a viscous medium, such as that of the vaginal and cervical secretions, might behave in a similar manner. Also lending support to this suggestion is a personal communication from Dr K. A. Bisset who states that he has frequently observed that a high proportion of the bacteria in concentrated preparations of animal faeces appear as spirilla. He has not succeeded, however, in cultivating these as such, and, if the same material is diluted, these forms are much less frequent.

The importance of the presence, not infrequently, of commensal Gram-negative cocci in the vagina lies



Direct vaginal smears

Figs. 1 and 2. Curved forms of *Corynebacteria*. $\times 800$.

Fig. 3. Slender filamentous organisms. $\times 800$.

in their possible confusion with gonococci in direct smears, particularly in material from suspected cases of subacute or chronic gonorrhoea.

The identity of the slender filamentous organism described above is in doubt. In appearance it resembled *Streptobacillus (Haverhillia) moniliformis*, an organism which Dienes (1939) has suggested is a possible form of an L organism belonging to the pleuropneumonia group. L organisms have been isolated from both male and female genital tracts by several workers, namely, Dienes & Smith (1942), Klieneberger-Nobel (1945), and Salaman and his collaborators (1946). Brown & Hayes (1942) have isolated them from stock cultures of gonococci in which they were living as symbionts.

The suggestion that the organisms seen were in fact *Str. moniliformis* is, of course, presumptive as

the cultural examination requisite for the isolation of this organism was not carried out.

SUMMARY

1. The genus *Corynebacterium* is common in the vagina. In direct smears forms with exaggerated curvature and staining Gram-negatively may easily be mistaken for vibrios.

2. Attention is drawn to the not infrequent presence of Gram-negative cocci in direct vaginal smears. From these cases *Diplococcus crassus*, a commensal member of the genus *Neisseria*, has been isolated. These cocci could be mistaken for gonococci.

3. An unusual organism seen in two direct smears from the vagina is described, and the suggestion is made that it may be *Streptobacillus moniliformis*.

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