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Developmental Morphology of Human and Avian Tubercle Bacilli on Bordet-Gengou Medium.

ELEANOR G. ALEXANDER. (Introduced by William H. Park.)

From New York University.

These observations on the developmental morphology of human and avian tubercle bacilli are in agreement with those made by Kahn[1] with H37 and a more recently isolated human strain, on Long's medium. Bordet-Gengou medium was chosen for this study, as it differs from Long's medium in not being synthetic, and is more highly enriched.

Smears were made at daily and weekly intervals from growth on Bordet-Gengou slants which were first tested for sterility by incubation at 37°C. for 24 hours. They were then seeded with a light inoculum. Prior to planting, smears were made of the inoculums. The slides were stained by a modified Ziehl-Neelsen method[2] which had been found excellent for demonstrating non-acid-fast forms of the tubercle bacillus. Each slide prior to staining was covered by a clean strip of filter paper to protect the smears as much as possible from particles of precipitated stain which might lead to inaccurate observations. The slides used were clean and free from grease. The strains employed were 2 recently isolated human strains H3 (Mishulow) and Arilotta (Alexander), and R and S strains of a dissociated avian strain obtained through Dr. Florence Sabin.

During the first week of incubation at 37°C. no growth was visible, but smears made during the first few days revealed segmenting acid-fast bacilli, acid-fast cocci and diplococci, and some non-acid-fast cocci and diplococci. Transitional diplococci were noted which appeared to consist of one acid-fast coccus and one smaller non-acid-fast coccus. After about 5 days only non-acid-fast cocci and diplococci appeared on the smears. No acid-fast bacilli were observed.

A week or 10 days after incubation, very delicately staining non-acid-fast rods appeared on the smears. Each bacillus contained one or more deeply staining non-acid-fast bodies. Some of the bacilli stained more homogeneously than others. Many were very

[1] Kahn, M. C., *Amer. Rev. Tuberc.*, 1929, **22**, 150.

[2] Alexander, E. G., *Science*, 1932, **75**, 197.

small, and suggested non-acid-fast cocci surrounded by a mere wisp of cytoplasm.

Smears taken from 2½-to-4½-weeks-old cultures showed few granule forms, many non-acid-fast bacilli and acid-fast bacilli as well. Many were rather light red in color, and in some instances contained one or more deeply stained acid-fast bodies. Occasional forms were noted which appeared to be transitional between the non-acid-fast and acid-fast stage. These transitional bacilli contained one acid-fast body and one or more non-acid-fast bodies lying within the same bacillus. Both of the transitional forms described above indicate that the granules or bodies of the tubercle bacillus are the last portions of the organism to lose acid-fastness, and the first portions to regain or reacquire acid-fast properties.

Each of the 4 strains, including both R and S forms, followed the same course of development.

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Hemorrhages in Skin Lesions After Intravenous Injection of Starch.

JULES FREUND AND WILSON F. SMITH, JR.

From the Department of Pathology, Cornell University Medical College.

When rabbits are injected intravenously with cholera vibrios and on the following day the same material, or *B. coli* or proteus bacilli, is again injected intravenously, hemorrhages occur in the intestines at the site of the localization of cholera vibrios. This hemorrhagic phenomenon was discovered by Sanarelli.[1] Shwartzman[2] and Hanger[3] have shown that when certain species of bacteria or their products (*B. typhosus, B. lepisepticum, B. coli,* meningococci) are introduced into the skin of rabbits and one day later the same material injected intravenously, hemorrhagic necrosis occurs in the skin at the site of the first injection. The nature of this hemorrhagic reaction is still obscure. It seems reasonable to hope that the discovery of new substances capable of producing the reaction may throw light on the nature of the phenomenon. Sickles[4] observed that bacterial filtrates, of the second injection, can be

1 Sanarelli, G., *Ann. Inst. Pasteur,* 1924, **38**, 11.

2 Shwartzman, G., PROC. SOC. EXP. BIOL. AND MED., 1928, **25**, 560.

3 Hanger, F., PROC. SOC. EXP. BIOL. AND MED., 1928, **25**, 775.

4 Sickles, G., *J. Immunol.,* 1931, **20**, 169.