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Rôle of Hog Cholera Virus in Production of Inclusions in the Conjunctival Epithelium.

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The occurrence of inclusions in the conjunctival epithelial cells during trachoma has been recognized and reported universally by a number of workers.[1-4, 7, 10] Whether the inclusions, however, comprise the etiological agent, as claimed in numerous publications,[5-8] or whether they are merely an incidental concomitant of the disease remains to be determined. One of the main causes of confusion regarding the rôle of the inclusion body in trachoma has been the presence of identical epithelial inclusions in other ocular infections; as inclusion blennorrhea, swimming bath conjunctivitis, vernal catarrh, etc., and even in the genito-urinary tract of man.

In accord with most investigators who have studied experimental trachoma, reports from this laboratory indicate that the inclusion does not occur in monkeys experimentally infected with the disease.[9, 11] The question arises, therefore, whether it is possible to stimulate epithelial inclusions of the conjunctiva in animals. Uhlenhuth and Boeing[12] reported that inclusions similar to those found in trachoma are present in the conjunctival epithelial cells of hogs suffering from hog-cholera. Halberstädter, who with Prowaczek was co-discoverer of the trachoma inclusion, examined Uhlenhuth's preparations and agreed to their resemblance to trachoma inclusions.[13] Since such a high percentage of animals with hog cholera has been reported to have inclusions in the conjunctival epithelium (Uhlen-

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1 Halberstädter, L., and Prowaczek, S. von, *Deutsch. med. Woch.*, 1907, **33**, 1285.

2 Axenfeld, T., *Die Aetiologie des Trachoms*, Gustav Fischer, Jena, 1914.

3 Taborisky, J., *Arch. f. Ophth.*, 1930, **124**, 455.

4 Lumbroso, V., *Arch. Inst. Past. de Tunis*, 1924, **13**, 203.

5 Lindner, K., *Arch. f. Ophth.*, 1911, **78**, 345.

6 Rötth, *Arch. f. Ophth.*, 1932, **128**, 381.

7 Thygeson, P., *Arch. Ophth.*, 1934, **12**, 307.

8 Thygeson, P., *Am. J. Ophth.*, 1933, **17**, 1019.

9 Stewart, F. H., *Eighth Annual Report of the Giza Memorial Ophthalmic Laboratory*, Cairo, 1933, p. 113.

10 Julianelle, L. A., and Harrison, R. W., *Am. J. Ophth.*, 1934, **17**, 1035.

11 Julianelle, L. A., and Harrison, R. W., *Am. J. Ophth.*, 1935, **18**, 10.

12 Uhlenhuth and Boeing, *Berl. Klin. Wch.*, 1910, **47**, 1514.

13 Halberstädter, L., *Berl. Klin. Wch.*, 1910, **47**, 1515.

huth, *et al.*, 88-100%,[12, 14] Himmelberger 95%[15]), it seemed possible to study the nature of the inclusion body by means of the hog-cholera virus.

For this reason, hog-cholera virus obtained through the courtesy of Dr. O. S. Crisler of the University of Missouri was inoculated into hogs by various routes: subconjunctival, subcutaneous, intraperitoneal, as well as by intravenous injection, and conjunctival swabbing. All of the animals inoculated exhibited the typical symptoms of the disease including conjunctivitis. Eventually the animals died or were sacrificed, when *in extremis*. While conjunctivitis is one of the commonly reported symptoms of hog-cholera, the presence of numerous bacteria in the conjunctiva of the animals infected experimentally made it doubtful whether the eye infection was due to hog-cholera virus or merely to secondary bacterial invaders. Scrapings of the conjunctiva were made daily for a period of about 2 weeks, stained by Giemsa, and examined for inclusions. In none of the animals were inclusions found. Both before and after inoculation of virus, one hog showed numerous epithelial cells containing bodies, which were quite large, round masses, apparently comprised of tiny rod-like elements, although sometimes appearing quite homogeneous. They were usually stained a deep blue by Giemsa but were often a paler blue or a deep pink. Frequently large numbers were massed into one epithelial cell and they were never observed extracellularly. It has not been possible to identify these bodies, but it may be reasonably assumed that they are unrelated to hog-cholera since they were present before infection. The important point is that, in any case, they did not resemble the inclusions of trachoma.

Guinea pigs, rabbits, and monkeys were inoculated in the conjunctiva by swabbing and by subconjunctival injection of the virus. Scrapings of the conjunctiva were made daily for one to 2 weeks. No signs of infection occurred and no inclusions were found.

In the experiments reported here, then, no trachoma-like inclusions were found in scrapings of the conjunctiva of hogs, guinea pigs, rabbits, or monkeys inoculated with active hog-cholera virus. If such an inclusion body occurs at all in hogs suffering from hog-cholera, it appears to be present only rarely, thus limiting its diagnostic importance. As a means of studying the nature of the trachoma inclusion, however, infection of animals with hog-cholera virus is inadequate.

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[14] Uhlenhuth, Haendel, Gildemeister, *Schern. Arb. aus. dem. Kais. Gesundheitsamte*, **1914**, **47**, 145.

[15] Himmelberger, L. R., *Am. Vet. Med. Ass. J.*, 1916, **1**, 450.