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Sporadic Bovine Encephalomyelitis

Coccus-like bodies associated with this disease

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The infectious agent of sporadic bovine encephalomyelitis has now been propagated for nearly three years in developing chick embryos. This has afforded a convenient method of propagation while studying the causal agent. It is interesting that during all of this time in chick embryos, which represents more than 135 passages in series, there has been no apparent variation in the character of the infectious agent. It is as pathogenic for guinea pigs and cattle as when first isolated. Failure to recognize anything in the tissues of affected animals that would indicate the exact nature of the entity which causes the disease, led to an extension of the histological study to infected chick embryos, especially their membranes and yolk sacs.

The materials for this study were embryos that had died three to four days following yolk sac injection and like embryos that had not yet died. Control material was taken from a variety of sources. Normal live embryos of the same age as the above, as well as normal embryos that had been killed by chilling, were employed. Embryos, both alive and dead, that had received a yolk sac injection of western equine encephalomyelitis virus and embryos that had died following a like injection of Aujeszky's disease virus were also used as control material. Nothing significant was recognized in the tissues of the chicks or the chorioallantoic membranes. However, very marked difference was noted between the experimental and control yolk sac.

As would be expected, the yolk sacs of normal embryos showed a very clear distinct layer of epithelial cells lining them. The yolk sacs of embryos infected with equine encephalomyelitis virus or Aujeszky's disease virus showed a similar picture with the exception that the epithelial cells were not nearly so distinct as in the normal embryos and were sometimes misshapen or loosened. Other than this, no abnormal changes were recognized in the control material. In the yolk sacs of embryos infected with sporadic bovine encephalomyelitis significant changes were confined to the large epithelial cells lining the yolk sacs. The cells of most of these yolk sacs showed small dark stain-
ing granules or coccus-like bodies either just within or on the free ends of the cells. These coccus-like bodies varied in number from a few in or on some cells to great numbers associated with other cells. On microscopic examination these bodies seemed to be on the free ends of the cells and also to extend down among the cells making it appear that they were often within the cells. The bodies are slightly less than 1 micron in diameter. They stain a dark blue with Giemsa. They are often so numerous as to form a “cap” over the ends of the cells. A normal yolk sac is shown in Figure 1 while the “cap-like” mass of granules in a bovine encephalitis infected yolk sac is shown in Figure 2. The granules are shown at a higher magnification in Figure 3. The granules are usually distinctly spherical and appear like cocci, which they may be. Occasionally one encounters a similar mass of material in association with the epithelial cells in which there are no distinct coccus-like bodies. Such masses stain amorphously. They are usually made up of small circular masses several microns in diameter.

Because the infectious agent is in high concentration in the yolk material of such infected chick embryos, attempts were made to find the coccus-like bodies in smears from the yolk as well as in smears from washed infected yolk sacs. These attempts met with failure, perhaps because these materials contain so many granules normally that it would be impossible to recognize similar granules which were abnormal. Since the bodies appeared to be cocci, attempts were again made to grow them on a number of special culture media not containing living tissues. This again met with failure, possibly because the proper medium was not employed.

Since the bodies were found only in the bovine encephalitis infected embryos and were not found in normal embryos or in embryos infected with two other active agents, it would appear likely that the bodies are in some way related to the causal agent of the encephalitis or they are the actual agent. Because they are small and inconspicuous it would be impossible to recognize them in tissues or smears from exudates unless they could

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differences become apparent in the gonads. No evidence was obtained to indicate that sex hormone is produced during the incubation period.

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be found congregated in or about cells as in the yolk sac cells. The bodies appear like cocci to some extent, resembling the pleuropneumonia organisms. They do not resemble their protozoa, and their shape, size, and especially location, indicate that they are not Rickettsia. (The authors are indebted to Dr. Alfred M. Lucas, Zoology Department, Iowa State College, and Dr. Cornelius B. Philip, U. S. Public Health Service, Hamilton, Montana, for examination of slides.)

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We must be our own teachers. We must be willing to do our own thinking (our veterinary education should cultivate that tendency in us). We should look about us with intelligent curiosity. We should examine the issues of the day from all angles. We should try to gain more information and understanding all the time, and avoid sinking into narrow prejudices. If we are to prepare for the veterinarian of tomorrow, we must be able to meet Tyndall's challenge, "Is he a man of information and good sense?" When we can do that, we will find, with him, that "knowledge once gained casts a light beyond its own immediate boundaries."