od when applied to human hearts obtained within three or four hours post mortem has given complete injection of the capillaries in certain areas of the heart. There is approximately one capillary per muscle fiber in the human heart, except in the auricle where the number is not constant and the supply less abundant.

By the methods described above it has also been possible to obtain good injections of the vessels of the heart valves and of the capillaries in the wall of the aorta. In one instance the vessels in a papillary muscle were seen to anastamose with those coming down from the base of the valve cusp.

Further studies upon the quantitative distribution of capillaries in the heart and upon the function of the Thebesian vessels are now in progress.

3129

Heterakis vesicularis Frölich 1791: A vector of an infectious disease.

ERNEST EDWARD TYZZER.

[*From the Department of Comparative Pathology, Medical School of Harvard University, Boston, Mass.*]

Several parasites, a flagellate of the genus *Giardia* and also microsporidia have been reported in intestinal round worms, but up to the present time the latter have not been shown to be concerned in the transmission of disease.

Blackhead, an infectious disease of turkeys and other poultry, is caused by a flagellate, *Histomonas meleagridis*. It is transmitted experimentally and to some extent in nature by the direct ingestion of material contaminated with freshly passed discharges containing the protozoon. It appears, however, to be much more frequently transmitted indirectly by some phase distributed on the soil, evidently in association with the eggs of the caecal worm, *H. vesicularis*.

The presence of the protozoon in the egg of *Heterakis* is indicated by experimental evidence of various sorts.

1. *Heterakis* eggs kept in 1.5 per cent nitric acid until embryonated produce blackhead when fed to young birds isolated from all other sources of infection, although this treatment renders the material bacteriologically sterile.

2. That there occurs no resistant phase of the blackhead protozoon apart from the worm egg, capable of resisting the 1.5 per cent acid, is shown by the invariably negative results obtained by the repeated feeding of susceptible birds with the discharges of blackhead carriers, after treatment in 1.5 per cent acid. Furthermore, no resistant form has been demonstrated microscopically.

3. *Heterakis* material will only produce blackhead after the ova have become embryonated and capable of hatching. Samples of the same material fed before the eggs are ripe invariably furnish negative results.

4. The feeding of male *Heterakis* also furnishes only negative results although ova-containing females of the same lot produce blackhead.

The disease usually follows the feeding of large numbers of *Heterakis,* especially when the latter are pooled from several different birds. However, it is occasionally possible to feed large numbers from a single bird without producing blackhead. *H. vesicularis* obtained from pheasants has also furnished only negative results, as well as that obtained from the goose.

Morphological evidence of the presence of the blackhead flagellate in the ovum of *Heterakis* has not yet been obtained, although large numbers of eggs have been examined. However, the invasion of the tissue of the worm by the protozoon has been demonstrated in a number of instances, thus far in half-grown worms from cases of blackhead. It is not yet known whether the acute disease or the carrier state is the most favorable for the infection of the worm.