

the soil more easily than the smooth type of grain.

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DELAWARE AGRICULTURAL EXP. STATION

A MEANS OF TRANSMITTING THE FOWL
NEMATODE, *HETERAKIS PAPILLOSA*
BLOCH¹

A RECENT experiment demonstrated that the fowl nematode, *Heterakis papillosa* Bloch² may be transmitted to chickens by the feeding of a dung earthworm, *Helodrilus gieseleri hempeli* Smith.³ The thirteen fowls (three of them controls) used in the experiment were hatched in an incubator, reared in a worm-proof field cage,⁴ and given food free from animal tissues, while the dung earthworms were taken from a poultry yard in which the fowls were heavily infected with *H. papillosa*. When these chicks were about five weeks old, they were given dung earthworms every few days until each chick had ingested approximately forty worms. Of ten chicks so fed, four became infected with *H. papillosa*, the results of these examinations being as follows:

Chick 104, examined sixty-four days after first feeding, nine nematodes in the cæca.

Chick 117, examined one hundred thirty-seven days after first feeding, one nematode in the right cæcum.

Chick 128A, examined twenty-nine days after feeding, two nematodes in the cæca.

Chick 130A, examined twenty-seven days after feeding, two nematodes in the cæca. The six remaining chicks and the three controls were free from nematodes.

As is well known, these small nematodes commonly occur in the cæca of fowls, although

they are not infrequently found in the large intestine. Of three hundred ninety-five chickens taken locally and examined in this laboratory during the last three years, two hundred ninety-three (74.1 per cent.) were infected with *H. papillosa*. The average infection was 34.4 nematodes, but a single infection of one hundred nematodes is not uncommon, and in one instance a fowl contained three hundred twenty-six of these parasites.

The means by which chickens become infected with *H. papillosa* is not wholly understood. Evidently, in some cases, a dung earthworm transmits these nematodes, but whether the relation between the two worms is one of parasitism or merely that of an association has not been fully determined. The presence of certain nematodes both free in the nephridia and imbedded in the muscles of earthworms furnishes a suggestive hypothesis. Dung earthworms are of common occurrence in the local poultry yards, and it might be possible to account for the rather heavy nematode infection of fowls from this source alone. But Leuckart long ago pointed out that *H. papillosa* may develop directly, according to Railliet and Lucet,⁵ who, by feeding to a fowl eggs removed from the uterus of *H. papillosa*, secured a direct infection of fifteen of these nematodes. The writer, likewise, has obtained direct infections by giving eggs of this nematode to fowls reared under controlled conditions. These data indicate that the relation of the nematode to the earthworm is that of an association, in which case the eggs of the former might be carried on the slimy surface of the earthworm or in its engulfed food. However, the evidence is not such as to preclude the possibility that this earthworm, *H. gieseleri hempeli*, may, in some way, serve as an intermediate host of *H. papillosa*, and it is hoped that experiments now under way will reveal the nature of this relation.

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² The identification of this nematode has been verified by Dr. B. H. Ransom, Zoologist, B. A. I., U. S. Dept. Agr., Washington, D. C.

³ The earthworms were identified by Professor Frank Smith, University of Illinois.

⁴ The field cage with its floor and eighteen-inch walls of cement is so constructed as to be practically insect-proof also. Examinations of control chickens every few weeks for three years have not yielded a single parasitic worm.

⁵ Railliet, A., et Lucet, A., "Observations et expériences sur quelques helminths du genre *Heterakis* Dujardin," *Bull. Soc. Zool. France*, Par., 17: 117-120, 1892.