

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.

FC  
17



U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF ANIMAL INDUSTRY—Circular No. 47.

D. E. SALMON, D. V. M., Chief of Bureau.

**A NEW PARASITE (*Strongylus quadriradiatus* n. sp.) FOUND IN THE  
PIGEON.<sup>1</sup>**

(Preliminary report.)

A certain malady of unknown character recently destroyed the greater portion of a flock of fancy pigeons (*Columba livia domestica*) in Washington, D. C. Some of the birds were examined for parasites at the zoological laboratory of this Bureau, and a small nematode was found in considerable numbers in the intestines. The filiform coiled body suggested its identity with the trichosomes. A closer examination, however, showed it to be a *Strongylus*<sup>2</sup> possessing some very peculiar anatomical structures.

So far as it has been possible to trace the parasites of pigeons in the card catalogue of the zoological laboratory and the veterinary and zoological literature at hand, no reference has been found to a *Strongylus* parasitic in this bird. The check list of animal parasites of pigeons, compiled and published by Hassall (1896), includes, beside protozoa, cestoda, arachnida, and insecta, a number of roundworms belonging to the genera *Ascaris*, *Calodium*, *Filaria*, *Heterakis*, and *Trichosoma*, but no mention is made of a *Strongylus*. Likewise among the parasites of chickens, ducks, and geese, no species was traced with which this new worm can be classed.

Cobbold (1873) described a small nematode (*Strongylus pergracilis*) which he found in the grouse on the Scottish moors, but certain anatomical differences mark this parasite of the pigeon as another species.

The anatomical differences between this new parasite and some closely-allied forms are best shown in a table of comparison:

*Strongylus* n. sp.: Male, 9-12 mm. long; female, 18-24 mm. long. Cuticula enveloping cephalic end inflated to form a vesicular enlargement. Mouth simple, unarmed, no papillæ. Vulva in posterior fourth of body. Bursa bilobed, six rays in each lobe; the two ventral rays close together and curved forward. Two

<sup>1</sup>In the helminthological collection of the United States National Museum an unidentified parasite of the pigeon was found listed under number 6280. This specimen was collected in 1892 at Washington, D. C., by Hassall and is identical with the species discussed in this paper.

<sup>2</sup>The generic name *Strongylus* is properly limited to the sclerostomes, as Stiles (1902) has recently pointed out. It has, however, been retained temporarily in the present connection, since it does not seem possible to locate the parasite under discussion in its proper position until there has been an extensive revision of the group of nematodes now generally referred to as *Strongylus*.

three-pointed spicules joined by a membrane to form a tube; a star-shaped chitinous piece with four rays, the two lateral rays curved forward around the spicules when they are protruded. Eggs, 70–75 microns long, 38–40 microns broad.

*Strongylus pergracilis* COBBOLD, 1873: Body filiform, diminishing in front.

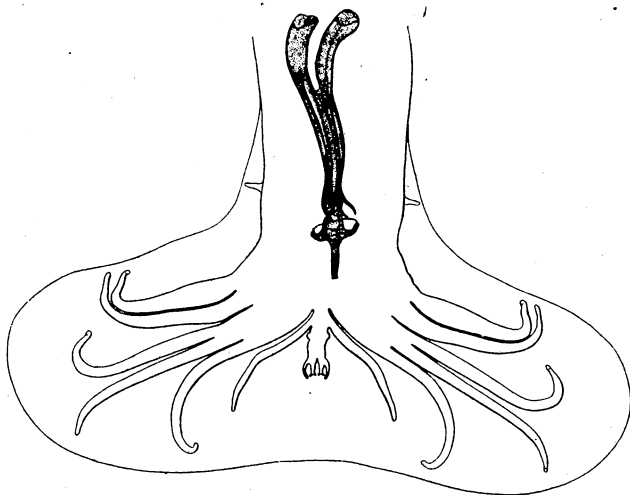


FIG. 1.—Caudal bursa of male. Spicules retracted. X 470.

Male, 8–12 mm. long; female, 12–16 mm. long. Head blunt, mouth simple. Vulva in posterior sixth of body. Bursa bilobed, four rays in each lobe. Two spicules slightly divergent. Eggs, 100 microns long, 50 microns broad.

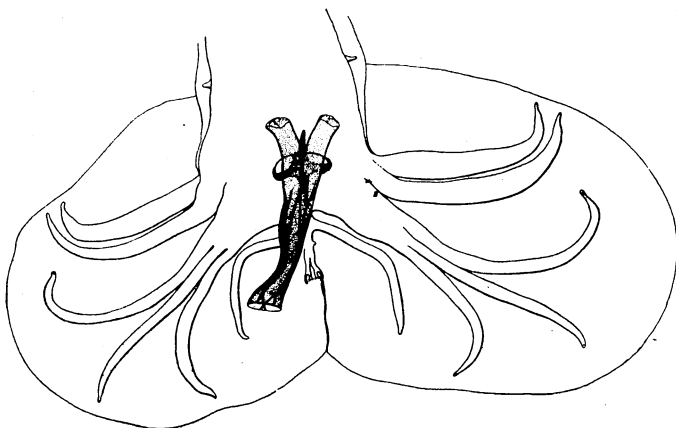


FIG. 2.—Caudal bursa of male. Spicules protruded, showing the membranous tube with the spicules supporting its wall; also the position of the chitinous piece supporting the spicules. X 470.

*Strongylus nodularis* RUD., 1809: Body slender, attenuated anteriorly. Male, 10–16 mm. long; female, 12–22 mm. long. Cephalic extremity slightly enlarged and provided with papillæ. Mouth round, with a short buccal capsule at the base of which are conical projections. Bursa trilobed, six rays in each lateral lobe. Dorsal ray with two branches in its lower third bifurcated at their extrem-

ities. Two spicules bifurcated and pointed at their extremities; one accessory piece. Vulva in posterior sixth of body, covered by a projecting appendage. Eggs, 115-120 microns long, 62-68 microns broad.

*Strongylus tenuis* (MEHLIS) EBERTH, 1861: Male, 5-5.6 mm. long; female, 7.3-7.8 mm. long. Body filiform, attenuated anteriorly. Buccal extremity with three distinct papillæ. Bursa with two lobes united by a small median lobe. Dorsal ray with two branches in its lower third split at their extremities. Two short spicules, one accessory piece. Vulva in posterior seventh of body. Eggs, 66-75 microns long, 35-42 microns broad.

The following anatomical structure of this new strongyle was determined from fresh material. In preserved material the vesicular swelling of the cuticle enveloping the cephalic end is often nearly obliterated by shrinkage.

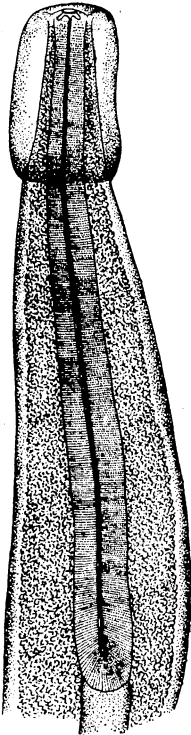


FIG. 5.—Anterior end of worm showing the esophagus and buccal capsule. X 470.

#### DIAGNOSIS.

Cephalic end blunt, enveloped by a vesicular swelling of the cuticula 95 microns long and 55 microns broad. Mouth simple, unarmed, no papillæ. Body filiform, having a reddish color when first collected alive, due

to the intestine being filled with blood that the parasite has sucked from its host. Esophagus 450 microns in length; intestine a simple straight tube extending the entire length of the body; skin with longitudinal markings.

Male, 9-12 mm. long; bursa bilobed, 0.5 mm. broad, six rays in each lobe. The two ventral rays are close together with points curved forward. The ventro-lateral and two lateral rays arise from a common stem but diverge toward the outer ends. The dorso-lateral ray is shorter than the other rays.

The dorsal ray is short with four terminal branches, the inner two branches being notched in the ends. On either side of the dorsal ray near its base is a short, blunt projection. On each side of the body at

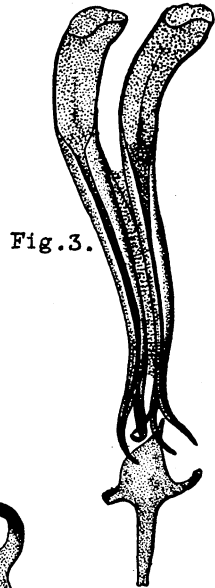


Fig. 3.



Fig. 4.

FIG. 3.—The spicules and the star-shaped chitinous support. X 470.

FIG. 4.—Much enlarged drawing of the chitinous piece supporting the spicules. X 750.

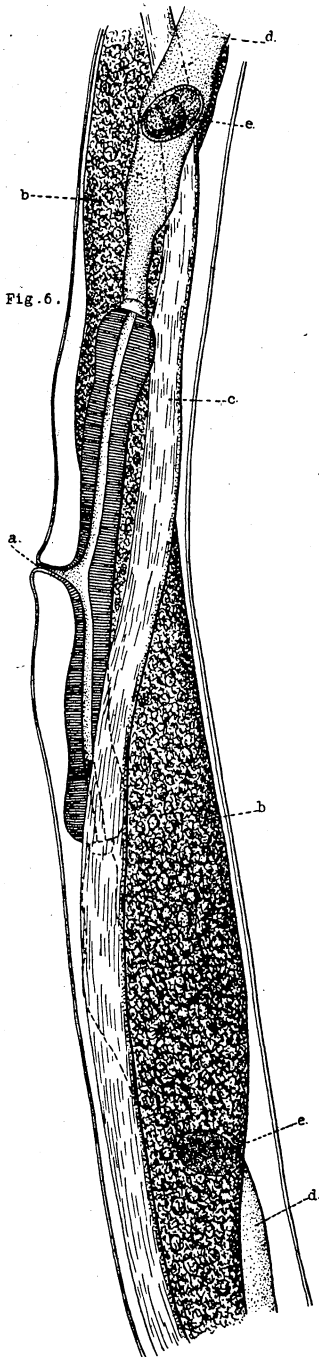


Fig. 6.

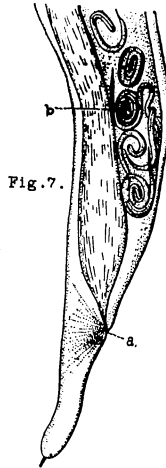


Fig. 7.

FIG. 6.—A section of the female showing the vulva and internal organs. *a*, Vulva; *b*, ovary; *c*, intestine; *d*, uterus; *e*, egg. X 470.

FIG. 7.—Tail of female. *a*, Anus; *b*, embryos in the uterus. X 470.

the base of the bursa is a supporting ray. There are two spicules 150–160 microns long, each spicule having three terminal branches. The spicules are joined by a membrane to form a protrusible tube, the end of which is supported by the terminal branches of the spicules. The dorsal terminal branch of one spicule is joined to the same branch of the other spicule. The chitinous support to the spicules is fixed at the distal end in the dorsal side of the canal containing the spicules and is of a most characteristic form. It is star-shaped with four rays, the two lateral rays curved forward to form a partial ring, through which the spicules are protruded. The length of the chitinous piece supporting the spicules is 65–70 microns.

Female, 18–24 mm. long, anterior half of body filiform; vulva naked, no papillæ, located 5 mm. from end of tail. The tail tapers to a narrow blunt end bearing a short spine; anus 140 microns from end of tail. Double uterus, two ovaries; body slightly broadened at the vulva. Eggs 70–75 microns long, 38–40 microns broad. Embryo, 0.5 mm. long.

#### ANATOMICAL CHARACTERISTIC.

The most striking anatomical characteristic of this worm is the singular

form of what was at first taken to be the so-called accessory piece to the spicules that occurs in some forms. Close examination, however, showed this chitinous piece to be firmly fixed in its position at the mouth of the canal containing the spicules, acting as a supporting ring, through which the spicules are protruded. While examining one of the males under the microscope, it was seen to eject its spicules and discharge a fluid through the tube formed by the membrane uniting them. From this specimen figure 2 was drawn.

#### LIFE HISTORY.

The life history of the worm was not determined, as no opportunity for experiment was afforded, on account of the scarcity of material. However, a number of female worms gravid with eggs were kept in normal salt solution for a week, during which time the eggs in the uterus hatched, leaving a mass of wriggling embryos in their place. The embryos and adult worms soon died. It is most likely that, as with some other nematode worms of birds, such as *Heterakis maculosa*, the life history includes a free living larval stage that forms the source of new infection through the water and food of the host.

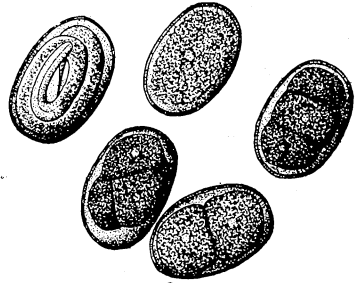


FIG. 8.—Four eggs in different stages of development. X 470.

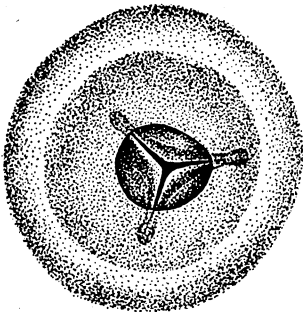


FIG. 9.—Anterior view of head showing the simple, unarmed, circular mouth opening, and the folded esophagus. X 1300.

animal parasites, a few small nematode worms, such as the one described, apparently cause no bad results to the host. When, however, the worms number hundreds and even thousands, the loss of blood to the host is considerable, though in all probability the greatest injury is caused by the worms burrowing into the mucous layer of the intestine, leaving open channels for fatal infection with bacteria, and producing an inflamed catarrhal condition of the intestine, resulting in a debilitating diarrhea and general disorder of the nutritive functions.

Cobbold (1873) regarded the widespread destruction of grouse on the Scottish moors that year as caused principally by the presence of large numbers of the small nematode *Strongylus pergracilis* in the intestines of the birds. The circumstance that both healthy and sick

#### PATHOLOGY.



FIG. 10.—Embryo. X 230.

birds harbored the parasite in great numbers is explained by the statement that the measure of feebleness of disease corresponds, not exclusively to the degree of parasitism, but arises out of the constitutional vigor of the host. Young birds succumb to an infection that older, stronger birds can withstand.

Neumann (1888) describes the fatal effects of large numbers of the nematode *Heterakis maculosa* Rud., 1809, in the pigeon. Torpidity, loss of appetite, and periodic mucous diarrhea is followed by marked wasting, particularly of the pectoral muscles, and, finally, death from exhaustion.

With reference to the distinctive peculiar shape of the chitinous support to the spicules, I have named this nematode *Strongylus quadri-radiatus*.

#### LITERATURE.<sup>1</sup>

COBBOLD, THOMAS SPENCER.

1873 d.—The grouse disease. A statement of facts tending to prove the parasitic origin of the epidemic. 27 pp., 2 figs. 8°. London. [W<sup>a</sup>.]

1873 e.—Contributions to our knowledge of the grouse disease, including the description of a new species of entozoon, with remarks on a case of rot in the hare <Veterinarian, Lond. (543), v. 46, 4. s. (219), v. 19, Mar., pp. 163-172, figs. a-h. [W<sup>a</sup>.]

HASSALL, ALBERT.

1896.—Check list of the animal parasites of pigeons <Circular No. 15, Bureau Animal Indust., U. S. Dept. Agric., Wash., 4 pp. [W<sup>a</sup>.]

NEUMANN, LOUIS GEORG.

1888.—Traité des maladies parasitaires non microbiennes des animaux domestiques xvi + 673 pp., 306 figs. 8°. Paris. [W<sup>a</sup>.]

1892.—Idem., 2 éd., xvi + 767 pp., 364 figs. 8°. Paris. [W<sup>a</sup>.]

1892.—A treatise on the parasites and parasitic diseases of the domesticated animals, translated and edited by George Fleming. xxiii + 800 pp., 364 figs. 8°. London. [W<sup>a</sup>.]

EARLE C. STEVENSON, B. SC., M. A.,  
*Of the Zoological Laboratory.*

Approved:

JAMES WILSON,  
*Secretary of Agriculture.*

WASHINGTON, D. C., *June 30, 1904.*

<sup>1</sup>[W<sup>a</sup>] at the end of each reference indicates that the publication is found in the Library of the U. S. Department of Agriculture, Washington, D. C.