

TWO NEW CESTODES FROM INDIAN COLUMBIDAE.

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An examination of the intestines of the domestic pigeon and the Red Turtle-Dove (*Oenopopelia tranquebarica* Herm.) revealed the presence of three Davaineid worms.

Domestic pigeons were found to be heavily infected with two species; one of them is apparently identical with *Cotugnia cuneata* var. *nervosa* Meggitt (5) and the other is an entirely new species of *Raillietina*, subgenus *Ransomia* Führmann. Both species were invariably found together in every one of the thirty to forty pigeons I examined.

***Cotugnia cuneata* var. *nervosa* Meggitt, 1924.**

My specimens are 32-43 mm. long and in no case did they reach the length of 60 mm. recorded by Meggitt; the maximum width varied from 2.7-4.5 mm. (Meggitt—3 mm.); scolex 0.77-0.79 mm. wide (Meggitt—0.26 mm.); rostellum 0.31-0.42 mm. wide (Meggitt—0.12 mm.); the cirrus-sac does not reach the longitudinal excretory vessel (Meggitt—cirrus-sac extending immediately internal to or as far as ventral excretory vessel).

They resemble *C. cuneata* var. *nervosa* Meggitt (5) in the number, arrangement, and size of rostellar hooks, in the musculature of the body, in all the proglottids being broader than long, and in the arrangement of the testes and the egg-capsules.

I do not consider that the differences mentioned above are of sufficient value to justify the creation of a new species and, therefore, I consider that my specimens are specifically identical with those described by Meggitt (5).

***Raillietina* (*Ransomia*) *nagpurensis*, sp. nov.**

The worm is 250-274 mm. in length with a maximum width of 1.9 mm. at the posterior extremity of the gravid segments. The strobilus consists of approximately 465-530 segments, all of which are broader than long. Proglottids with mature genital organs are 352-396 μ long and 968 μ -1.7 mm. wide. The gravid segments are 704-880 μ long and 1.34-1.9 mm. wide.

The scolex (fig. 1) is more or less rounded, 339 μ -382 μ in width. The rostellum is 216-241 μ in maximum width and in all the specimens I had was retracted; it is not possible, therefore, to state its length. It is armed with a double row of hammer-shaped hooks, approximately 220 in number. The hooks are of two sizes, 19 μ and 17 μ long, the larger

ones being set at a higher level and alternating with the shorter ones. The suckers are oval in shape, 142μ by 114μ , and armed with a single row of hooks at the margins; the length of the acetabular hooks is approximately 7μ .

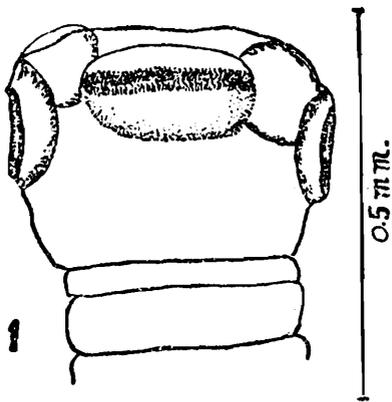


FIG. 1.—*Raillietina (Ransomia) nagpurensis*, sp. nov.
Scolex $\times 37$.

There is no neck, segmentation commencing immediately behind the scolex a short distance behind the level of the suckers.

The genital apertures are unilateral and are situated near the middle of the lateral margin of the proglottid; the position, however, varies slightly, being sometimes more anterior. There is a well-developed genital atrium.

The testes (fig. 2, *t.*), 19-22 in number, are all situated within the medullary region. They are lateral and posterior to the ovary: mostly aporal, two between the ovary and the vitelline gland and only two or three poral. The size of a well-developed testis is 78μ by 72μ . The

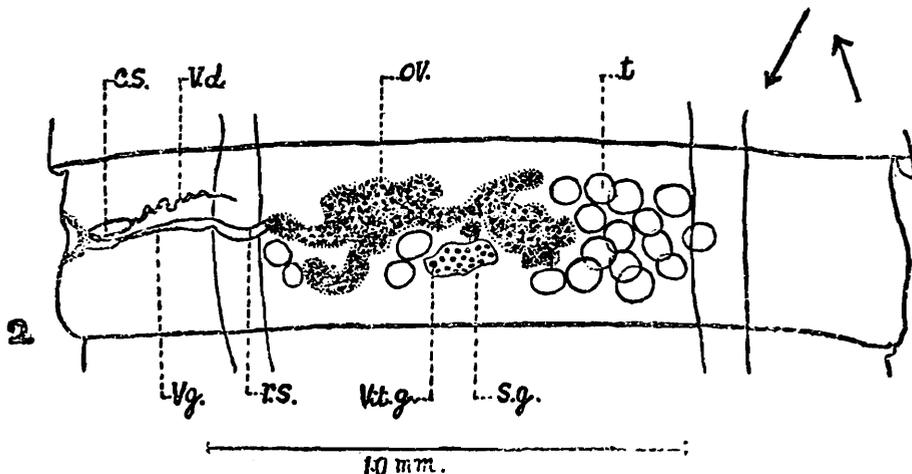


FIG. 2.—*Raillietina (Ransomia) nagpurensis*, sp. nov. A mature segment $\times 75$.
c.s., cirrus-sac; ov., ovary; r.s., receptaculum seminis; s.g., shell-gland;
t., testes; v.d., vas deferens; vit. g., vitelline gland; vg., vagina.

vas deferens (*v.d.*) is a small coiled tube. The cirrus-sac does not reach the longitudinal excretory vessel and is 90μ long and 30μ wide. It persists through the majority of the gravid segments, where it is longer and wider, being 111μ by $39-42\mu$.

The ovary (fig. 2, *ov.*) is a large irregularly lobed structure; its maximum transverse width is 645μ and it is situated slightly towards the poral side. The vagina (*vg.*) opens posteriorly to the cirrus-sac in the genital atrium and at the level of the longitudinal excretory vessel enlarges slightly into a receptaculum seminis (*r.s.*), which first curves downwards and then upwards. It is 190μ long and 28μ wide. The vitelline gland (*vit. g.*) is situated centrally in the segment posterior to the ovary and is of irregular shape, being approximately 200μ in transverse diameter. The shell-gland (*s.g.*) lies in the angular space between the ovary and the vitelline gland.

The egg-capsules (fig. 3) fill nearly the whole of the medullary space except a narrow strip at the anterior and posterior extremities of the

proglottid. They extend slightly beyond the wide longitudinal excretory vessels, being situated ventral to them. There are usually 50-75

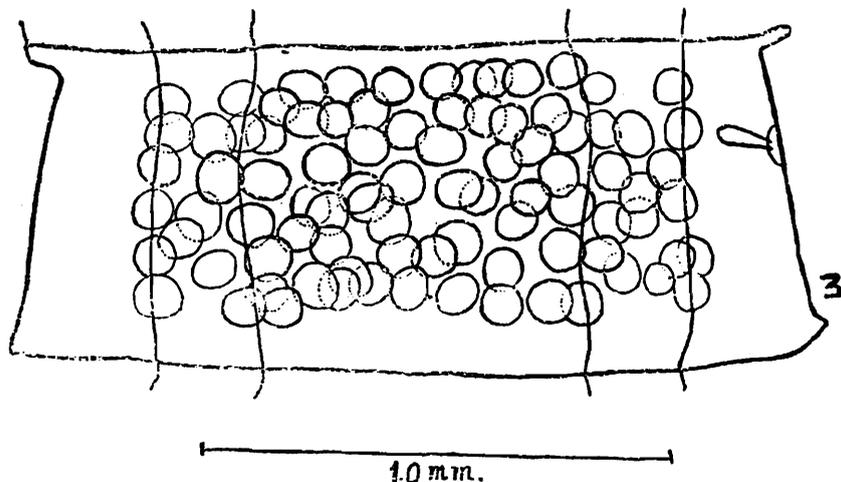


FIG. 3.—*Raillietina (Ransomia) nagpurensis*, sp. nov. A gravid segment $\times 75$.

and rarely 94 egg-capsules in each gravid segment. In specimens mounted in balsam, they are in different states of contraction and are approximately $100-119\mu$ by $87-100\mu$ (fig. 4). They usually contain 5-6 eggs, rarely 3-8. Eggs (in balsam) measure about 50μ by 43μ and the contained embryo (in balsam) approximately 17μ by 14μ .

The specific characterisation of this species is as follows:—

Length 250-274 mm., maximum width 1.9 mm.; all proglottids broader than long; width of scolex $339-382\mu$; rostellum $216-241\mu$ wide, armed with approximately 220 hooks in two rows 19μ and 17μ long, alternating; suckers 142μ by 114μ , armed with a single row of hooks 7μ long. Testes 19-22, mostly aporal, 78μ by 72μ ; cirrus-sac 90μ long and 30μ wide, not reaching the longitudinal excretory vessel. Ovary large, 645μ in transverse width; receptaculum seminis 190μ long and 28μ wide. Eggs (in balsam) approximately 50μ by 43μ ; onchosphere (in balsam) approximately 17μ by 14μ .

Habitat: Intestine of domestic pigeon; locality: Nagpur, C. P., India.

Raillietina (Ransomia) quadritesticulata, sp. nov.

I examined the intestines of two individuals of the Red Turtle-Dove (*Oenopopelia tranquebarica* Herm.) both of which contained this worm, five specimens being obtained from one bird and two from another. Some of the worms were flattened between glass slides and fixed in Mann's Fluid. The measurements of the entire worm and of the proglottids relate to the unflattened specimens, whereas the measurements of the organs were made on flattened specimens.

Length 62-137 mm.; maximum width $924\mu-1.23$ mm. at the posterior border of the gravid segments. All the proglottids are broader

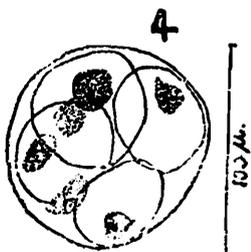


FIG. 4.—*Raillietina (Ransomia) nagpurensis*, sp. nov. A single egg-capsule (size approximately $\times 200$).

than long. Those containing mature genitalia are $352-505\mu$ long and $528-880\mu$ wide. Gravid segments are $880-906\mu$ long and $924\mu-1.23$ mm. wide. The last twenty-five segments, all of which are gravid, are easily detachable.

The scolex (fig. 5) is bluntly rounded and has a maximum width of 165μ at the level of the hooks on the retracted rostellum. The rostellum is 96μ wide and is armed with a double row of very small alternat-

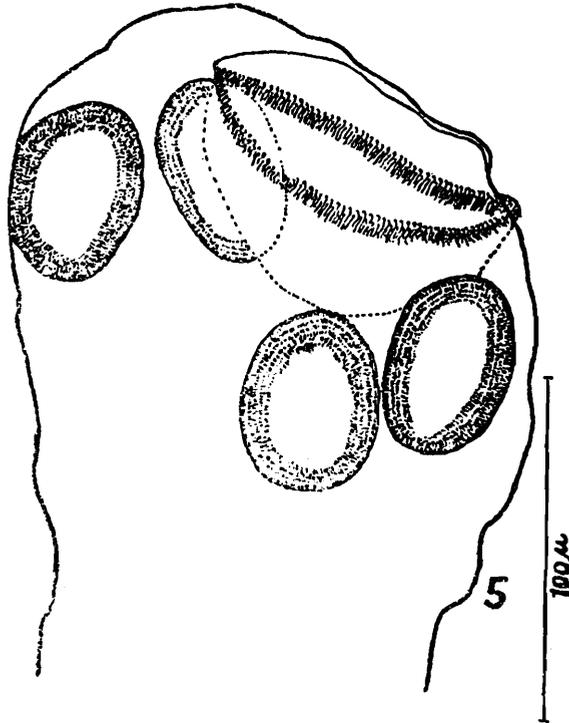


FIG. 5.—*Raillietina* (*Ransomia*) *quadritesticulata*, sp. nov. Scolex (from unflattened specimen) $\times 32$.

ing hooks, approximately 180 in number; the hooks of both rows are of the same size, about 6μ long. The suckers measure $52-54\mu$ by $35-40\mu$ and are armed with approximately 5 rows of hooks.

The unsegmented neck region, approximately 1 mm. in length, is not sharply demarcated from the scolex. There are approximately 188-196 segments. In one specimen with 196 segments, the first 24 recognisable segments contain no genital organs. The cirrus-sac appears first and after the 59th segment all the genital organs are clearly visible, though they attain their maximum development between the 90th and 118th segment. Segments from 147 to 196 are full of egg-capsules.

The genital apertures are unilateral and are situated in the middle of the lateral margin of the proglottid. There is a well developed genital atrium.

There are only four testes (fig. 6, *t.*): one posterior to the vitelline gland and three lateral to the ovary on its aporal side. The diameter of the testes is $68-75\mu$ by $75-77\mu$. The vas deferens (*v.d.*) is a loosely coiled tube. The cirrus-sac (*c.s.*) is muscular and conical, 138μ in length and 68μ in width. It does not reach the longitudinal excretory vessel and persists through all the gravid segments except the last eight.

The vagina (fig. 6, *vg.*) opens into the genital atrium posterior to the cirrus-sac and runs ventral to the excretory vessel. Between the large

excretory vessel and the poral side of the ovary it enlarges into an elongate receptaculum seminis (*r.s.*), 108μ long and 32μ wide. The lobu-

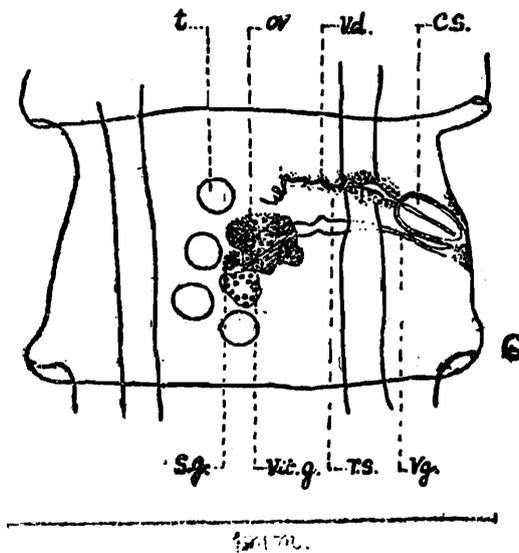


FIG. 6.—*Raillietina (Ransomia) quadritesticulata*, sp. nov. A mature segment (from a flattened specimen) $\times 47$.

c.s., cirrus-sac; *ov.*, ovary; *r.s.*, receptaculum seminis; *s.g.*, shell-gland; *t.*, testes; *v.d.*, vas deferens; *vit. g.*, vitelline gland; *v.g.*, vagina.

lated ovary (*ov.*) is situated near the centre of the proglottid and measures $138-176\mu$ in transverse diameter. The vitelline gland (*vit. g.*) is situated posterior to the aporal portion of the ovary. The shell-gland (*s.g.*) is lateral to the ovary on its aporal side and anterior to the vitelline gland.

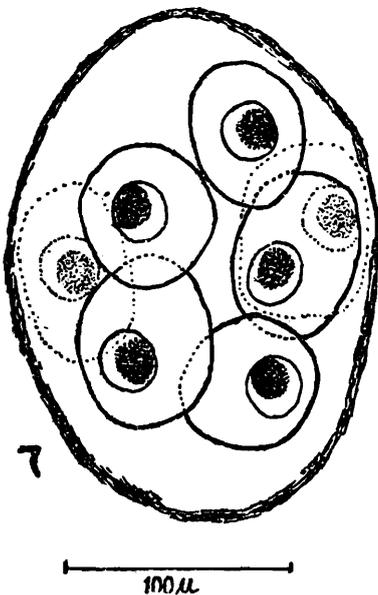


FIG. 7.—*Raillietina (Ransomia) quadritesticulata*, sp. nov. A single egg-capsule (from a flattened specimen). Size approximately $\times 200$.

There are forty to fifty egg-capsules in each segment, confined to the medullary region and not extending beyond the longitudinal excretory vessels. In specimens mounted in balsam, owing perhaps to the different state of contraction, all the egg-capsules are not of the same size; a fairly large-sized egg-capsule measures 228μ by 164μ . Each egg-capsule (fig. 7) contains 6 to 8 eggs, which measure, on an average (in balsam), 67μ by 54μ . The contained embryo (in balsam) measures approximately 18μ by 16μ and its outer envelope approximately $25-27\mu$ by $23-25\mu$.

The specific characterisation of this species is as follows:—

Length $62-132$ mm., maximum width $924\mu-1.23$ mm.; all proglottids broader than long; width of scolex 165μ ; rostellum 96μ wide, armed with a double row of small alternating hooks 6μ long; suckers $52-54\mu$ by $35-40\mu$, armed with approximately five rows of hooks. Testes four, posterior to the vitelline gland and lateral to the ovary on its aporal side, $67-75\mu$ by $75-77\mu$; cirrus-sac not reaching the longitudinal excretory vessel, 138μ

long and 68μ wide. Ovary lobulated, receptaculum seminis 108μ by 32μ . Egg-capsules not extending beyond the excretory vessels, 40-50 in each segment, approximately 228μ by 164μ , each containing six to eight eggs, approximately (in balsam) 67μ by 54μ , embryo (in balsam) approximately 18μ by 16μ .

Habitat :—Intestine of *Oenopopelia tranquebarica* Herm. ; locality : Nagpur, C. P., India.

The possession of hammer-shaped hooks on the rostellum, a single set of reproductive organs in each segment and the presence of egg-capsules place both these worms in the genus *Raillietina* Führmann, 1920, and the fact that the egg-capsules contain several eggs and that the genital pores are unilateral, in the sub-genus *Ransomia* Führmann, 1920. The hosts of both these worms belong to the family Columbidae. A complete list of cestodes occurring in birds of this family has recently been recorded by Joyeux (2) and also by Meggitt (5).

R. nagpurensis, sp. nov. is readily distinguished from *Ransomia goura* Führ. (1), *R. paucitesticulata* Führ. and *R. micracantha* Führ. by the fact that the suckers are unarmed ; *R. cryptacantha* Führ. is included by Meggitt (4) in the category of species having unarmed suckers, but according to Joyeux's key (2) the suckers are armed. This species, however, can be distinguished by the smaller size of the rostellar hooks (7μ) and the smaller number of testes (8-12) (Führmann, 1, p. 105).

Comparing the present species with other species of *Ransomia* recorded from Columbidae, it can readily be distinguished from *R. spiralis* Bacz., 1914, *R. clerici* Führ., 1920 (= *crassula* Clerc, 1906, nec Rud.), *R. gendrei* Joyeux, 1923, and *R. fuhrmanni* Southwell, 1922 by the size of the rostellar hooks ; from *R. spiralis* Bacz., *R. clerici* Führ., *R. weissii* Joyeux, 1923, *R. senaariensis* Weithofer, 1916, and *R. fuhrmanni* Southwell by the number of testes.

With reference to the key to the species of *Raillietina* given by Meggitt (4), in which the sub-genera are not recognised, my species falls in the group including *D. friedbergi* v. Linstow, *D. multicapsulata* Führmann, *D. cyrtus* Skrj., *D. ceylonica* Bacz., and *D. tetragona* (Molin). Of these species *D. cyrtus*, *D. ceylonica*, and *D. tetragona* are distinguished by the smaller size of their rostellar hooks, *D. multicapsulata* by the absence of a receptaculum seminis, and *D. friedbergi* by the number of eggs in the capsules.

Three other species, *D. allomyodes* Kotlán, 1921, *D. causurii* Kotlán, 1923, and *D. infrequens* Kotlán, 1923 described since the publication of Meggitt's key (4), are distinguished as follows : *D. allomyodes* by the smaller number of rostellar hooks and smaller number of egg-capsules (Southwell, 6, p. 142), *D. causurii* by the larger size of the rostellar hooks ($48-54\mu$ long) and larger number of testes (50-60), and *D. infrequens* by larger rostellar hooks ($27-34\mu$ long) and smaller number of testes (9-12) (Kotlán, 3, p. 49).

R. quadritesticulata, sp. nov. differs widely from all other species of *Raillietina* in the number of testes, excepting *D. oligorchidna* Führ., *R. spiralis* Bacz., and *R. micracantha* Führ. 1909, in which the number

of testes is 5-6, 6-7 and 6-7 respectively, but the uniform presence of four testes is sufficient to distinguish it from these. Furthermore, *R. micracantha* Führ. has unarmed suckers and *D. spiralis* Bacz. has much larger rostellar hooks. The description of *D. olichorchidna* is not accessible to me.

Type slides of both these species have been deposited in the collections of the Zoological Survey of India, Indian Museum, Calcutta.

In conclusion I desire to express my gratitude to Dr. Asa C. Chandler, in-charge Hookworm Research Laboratory, for very valuable guidance.

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