ON SOME NEMATODES OF BIRDS FROM INDIA
PART 1. FILARIIDAE AND DIPETALONEMATIDAE

Durdana S. JairaJPuri and Ather H. Siddiqi

(Section of Parasitology, Department of Zoology, Aligarh Muslim University, Aligarh, U. P., India)

ABSTRACT: A new genus and new species, Farooqijilaria pecta belonging to the family Filariidae is reported from the heart of Anser indicus (Latham). It resembles Tetracheilonema in having 4 lips, undivided esophagus and a functional anus, but differs in the absence of a chitinous ring and a buccal capsule and in having a short muscular esophagus, annulated cuticle, straight tail and vulva just behind the nerve ring. Two new genera, Francolinema and Francojilaria from Francolinus pondicerius (Gmelin) and a new species, Aproctoides crassum from Sturnus contra L., are reported under the family Dipetalonematidae. Francolinema n. gen., is close to Lendana but differs in having striated cuticle, long spirally coiled tail with indistinct papillae, in the shape and size of spicules and in the absence of cervical papillae. Aproctoides crassum n. sp., resembles A. lissum but differs by its smaller body size, tail and spicule ratio. Francojilaria n. gen., resembles Cardiojilaria but differs in the absence of a cuticular thickening at base of stoma, number and arrangement of cephalic papillae, esophagus divided into muscular and glandular portions and the absence of cloacal papillae.

FILARIIDAE (Cobbold, 1864)
Claus, 1885
Tetracheilonematinae Wehr, 1936

Molin (1858) described Filaria quadrilabiata from the body cavity and subcutaneous tissues of two birds, Rhynchotus rufescens (= Tinamus rufescens) and Nothura maculosa (= T. maculosa) respectively. Diesing (1861) proposed a new genus Tetracheilonema for the above species. Mazza and Fiora (1932) described another species, Filaria hoffmanni from the body cavity of Nothura maculosa. Vaz (1934) collected a large number of worms from Rhynchotus rufescens and found them to fit well under both Tetracheilonema quadrilabiata and Filaria hoffmanni and thus regarded the latter as a synonym of the former. Yamaguti (1961) did not consider the above differences as of generic rank and synonymised the genus Labiatofilaria with Tetracheilonema. Although the type and only species, L. tringae has been insufficiently described as far as various body measurements, number and position of the cloacal papillae and the shape and size of the spicules are concerned. However, on the basis of the differences mentioned above, Labiatofilaria is considered here to be a valid genus.

During the course of this study 3 worms were recovered from the heart muscles of Anser indicus. On examination they were found to resemble Tetracheilonema in having four lips, an undivided esophagus, and a short muscular esophagus with annulated cuticle. The descriptions of Tetracheilonema quadrilabiata as given by Molin (1858) and Mazza and Fiora (1932) were inadequate and Vaz (1934) provided a redescription of it. Adams (1933) erected the genus Labiatofilaria for L. tringae collected from the body cavity of a 'knot'. This genus resembles Tetracheilonema very closely but differs in the absence of a chitinous ring near the anterior extremity; in having only two lateral lips which are deeply cleft, giving an appearance of four prominent lips, and in having the esophagus divided into muscular and glandular portions. Yamaguti (1961) did not consider the above differences as of generic rank and synonymised the genus Labiatofilaria with Tetracheilonema. Although the type and only species, L. tringae has been insufficiently described as far as various body measurements, number and position of the cloacal papillae and the shape and size of the spicules are concerned. However, on the basis of the differences mentioned above, Labiatofilaria is considered here to be a valid genus.

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All measurements are in millimeters unless otherwise stated.
gus and a functional anus. The worms, however, differ from the above genus in the absence of a chitinous ring, and a buccal capsule and in having a short muscular esophagus, prominently and coarsely annulated cuticle, straight tail and vulva just behind the nerve ring. A new genus, *Farooqifilaria* is therefore proposed for the present material.

**Farooqifilaria n. gen.**

**Diagnosis:** Tetracheilonematinae. Head rounded and blunt. Cuticle prominently and coarsely striated. Mouth with four sublateral lips. Chitinous ring and buccal capsule absent. Esophagus entirely muscular, undivided. 

**Male:** Tail straight, caudal alae absent, caudal papillae sessile. Spicules similar and subequal. 

**Female:** Vulva in esophageal region. Viviparous. Microfilariae sheathed. Parasites of birds.

Type and only species: *Farooqifilaria pecta* n. gen., n. sp.

**Farooqifilaria pecta n. gen., n. sp.**

**Plate I. Figure 1–6**

**Description:** (Based on a single male and two females). Worms cylindrical, straight, thick, rounded at both ends, broader in anterior region and narrow towards posterior region. Head round; mouth bounded by four semilunar lips; buccal capsule absent. Cuticle prominently annulated, annules closer together in anterior and posterior region, but wider apart elsewhere, occasionally anastomosing. Esophagus not divided into muscular and glandular portions. Rectum club-shaped. Anus functional.

**Male:** Body length 11.32, width 0.36. Nerve ring located at 0.13 from anterior end. Esophagus 0.32 long, broader anteriorly, narrowing in the middle and then again expanding posteriorly. Tail 0.05 long, straight, blunt and rounded. Cloacal papillae sessile; three pairs of precloaca, one pair of adanal and three pairs of postcloacal papillae present. Testis single, extending up to esophagus. Spicules subequal, similar, delicate, thin and slightly broad proximally; left one 0.08, right one 0.088 long. Spicule ratio 1:1.

**Female:** Body length 24.5–29.03, width 0.57–0.77. Nerve ring located at 0.122–0.16 from anterior end. Esophagus 0.36–0.43 long. Tail 0.04–0.05 long, straight, blunt and rounded. Vulva a transverse slit, just below nerve ring at 0.23–0.24 from anterior end. Vagina a simple muscular tube directed posteriorly. Gonads didelphic, opisthodelphic and reflexed. Uteri voluminous, filled with numerous embryonated eggs and microfilariae. Eggs 59–63 x 37–38 μ. Microfilariae sheathed, 0.39–0.41 long.

**Host:** Anser indicus (LATHAM)

**Site:** Heart

**Locality:** Laharpur, Sitapur, U. P.

**DIPETALONEMATIDAE WEHR, 1935**

**Oncocercinae LEIPER, 1911**

On several occasions a large number of worms were collected from the lungs, heart and air sacs of the Grey Partridge, *Francolinus pondicerianus*. Upon examination they were found to have a rough resemblance to *Lemdana Seurat, 1919* in having a divided esophagus and unsheathed microfilariae and in the absence of lateral flanges and lips. The genus *Lemdana* has eleven species, but *L. skrjabini* Kasimov, 1952 from *Francolinus orientalis caucasica* differs markedly from the other ten species in the following characters: The cuticle is transversely striated, the long tail is provided with two indistinct postcloacal papillae and the vulva is located far behind the esophagus. It also differs in the absence of cervical papillae and has spicules which are not broad and thick. It appears that *L. skrjabini* is not a member of the genus *Lemdana*. The present material resembles *L. skrjabini* much more closely than it does other species of *Lemdana* in having a striated...

* *Named in memory of Dr. A. MOBIN FAROOQI, father of the first author.*
cuticle, long tail with indistinct papillae, spirally coiled tail, in the shape and size of the spicules and in the absence of cervical papillae. It is therefore considered appropriate that a new genus *Francolinema* be proposed to accommodate these two closely related species.

**Francolinema** n. gen.

*Diagnosis:* Oncocercinae. Body long, cylindrical, slightly tapering towards both ends. Cephalic papillae present. Esophagus distinctly divided into muscular and glandular portions. *Male:* Tail long, spirally coiled, provided with two indistinct postcloacal papillae. Spicules unequal, dissimilar, broad proximally and provided with alae which appear to be serrate. Right spicule with a rounded tip, left one lancet-shaped with wing-like processes in middle. *Female:* Vulva post-esophageal, far behind base of esophagus, but situated in anterior half of body. Microfilariae unsheathed. Parasites of lungs, heart, air sacs and caecum of birds.

Type species: *Francolinema francolina* n. gen., n. sp.

Other species: *F. skrjabini* (KASIMOV, 1952) n. comb.

Syn. *Lemdana skrjabini* KASIMOV, 1952

*Francolinema francolina* n. gen., n. sp.

Plate 1. Figures 7-13

*Description:* (Based on four males and five females). Body cylindrical, slightly tapering towards both ends, reddish yellow in colour. Cuticle thick with faint striations. Head blunt, rounded, lips absent. Mouth terminal, oval, surrounded by eight cephalic papillae in two circles and a pair of amphids. Buccal capsule reduced. Excretory pore obscure. Nerve ring surrounding the esophagus slightly above junction of muscular and glandular portions at 0.108-0.118 in males and 0.108-0.126 in females from anterior end. Esophagus distinctly divided into a short, muscular and a long glandular portion. Rectum a simple capillary tube, anus functional, large number of rectal glands present.

*Male:* Body length 21.23-22.08, width 0.261-0.294. Muscular and glandular portions of esophagus 0.165-0.18 and 1.012-1.058 respectively, total length 1.177-1.238. Tail 0.125-0.144, spirally coiled, with two indistinct, sessile postcloacal papillae. Testis single, extending up to base of esophagus. Spicules two, unequal, dissimilar, broad proximally, provided with serrate alae. Left spicule 0.265-0.326, lancet-shaped with wing-like processes and pointed tip; right spicule 0.142-0.17 long, broad and stout with a rounded tip. Spicule ratio 1:1.8.

*Female:* Body length 42-47, width 0.412-0.495. Muscular and glandular portions of esophagus 0.23-0.261 and 1.429-1.497 respectively, total length 1.659-1.758. Tail 0.126-0.133 long, blunt, rounded without any papillae. Vulva a transverse slit at 3.169-3.365 from anterior end. Vagina a very long tube, first directed posteriorly and then anteriorly. Uteri voluminous, filled with numerous, colourless eggs. Microfilariae unsheathed, 151-165 x 5 μ.

*Host:* *Francolinus pondicerianus* (GMELIN)

*Sites:* Lungs, heart and air sacs

*Locality:* Agra, U. P.

*Relationship:* The present material differs from *Francolinema skrjabini* in having eight cephalic papillae, spicules with serrate alae and in the absence of a papilla at the tip of the female tail.

**Splendidofilariinae** CHABAUD and CHOQUET, 1953

The Splendidofilariinae include a large number of genera parasitizing avian hosts. Of these, the following genera are known to occur in Indian birds: *Le-rousinema* SINGH, 1949; *Eufilaria* SEURAT, 1921; *Splendidofilaria* SKRJABIN, 1923; *Aproctoides* CHANDLER, 1929; *Paramcipsella* CHOW, 1939 and *Paraprocta* MAPLESTONE,
1931. In the present study a new species of the genus *Aproctoides* and a new genus and species, *Francofilaria basiri* have been described.

*Aproctoides crassum* n. sp.

Plate II. Figures 1-5

Description: (Based on one male and two females, of which one was slightly damaged). Body stout, cylindrical with tail end spirally coiled. Head end narrow, round and provided with three indistinct lips. Esophagus distinctly divided into muscular and glandular portions. Nerve ring located at 0.126-0.148 from anterior end.

Male: Body length 9.741, width 0.32. Muscular and glandular portions of esophagus measure 0.15 and 0.573 respectively; total length 0.723. Tail 0.1 long, coiled, blunt and obtuse. Testis single, coiled, extending up to middle of esophagus. Spicules unequal, similar, slender, delicate, having notched distal ends and slightly broadened proximal ends; left one 0.265, right one 0.193. Spicule ratio 1:1.3. Cloacal papillae absent.

Female: Body length 16.961, width 0.472-0.499. Muscular and glandular portions of esophagus 0.081-0.108 and 0.637-0.745 respectively; total average length 0.813. Tail 0.328 long, straight and broad. Vulva a transverse slit, located at 0.297-0.472 from anterior end. Vagina a muscular tube descending posteriorly. Uteri voluminous, filled with embryonated eggs. Eggs measure 45-49×28 μ.

Host: *Sturnus contra* L.

Site: Orbital cavity

Locality: Aligarh. U. P.

Relationships: The genus *Aproctoides* Chandler, 1929 at present includes following three species: the type species, *A. lissum* Chandler, 1929; *A. papillatus* Ali, 1956 and *A. alii* Sultana, 1961. All these species have been described from India. The new species differs from *A. papillatus* and *A. alii* in having no cloacal papillae and in the intermediate position of its vulva (position of vulva in relation to esophagus is 88% in *A. papillatus*, 33% in *A. alii* while 48% in the new species). It resembles *A. lissum* very closely but can be differentiated by its smaller body size, tail and smaller spicule ratio (spicule ratio in *A. lissum* is 1:2.3 compared with 1:1.3 in the new species).

Key to species of *Aproctoides*

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<tr>
<th>1. Cloacal papillae present</th>
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<th>Cloacal papillae absent</th>
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<tr>
<td>2. Spicules very small, left one 0.97, right 0.062</td>
<td><em>alii</em></td>
<td>Spicules large, left one 0.301-0.313, right 0.145</td>
<td><em>papillatus</em></td>
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<td>3. Spicule ratio 1:1.3</td>
<td><em>crassum</em></td>
<td>Spicule ratio 1:2.3</td>
<td><em>lissum</em></td>
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A number of nematodes were collected from the Grey Partridge, *Francolinus pondicerianus*. Microscopic examination revealed that the worms resemble *Cardiofilaria* Shtrom, 1937 in their general appearance, in having a smooth cuticle, female posterior end with a digitiform appendage, a post-esophageal vulva and in the absence of lips and an anal aperture. In spite of these similarities, there are some differences which separate the new found worms from the genus *Cardiofilaria*. The differences consist of the absence of a cuticular thickening at the base of the stoma, the number and arrangement of the cephalic papillae, the division of esophagus into muscular and glandular portions and the absence of cloacal papillae. Keeping in view the above differences it is felt necessary to erect a new genus and new species, for which the name *Francofilaria basiri* n. gen., n. sp., is proposed.

*Francofilaria* n. gen.

Diagnosis: Splendidofilariniae. Body cylindrical, tapering to blunt ends, head without appendages. Mouth round, with-

* Named after late Professor M. A. Basir

Type and only species: *Francofilaria basiri* n. gen., n. sp.

*Francofilaria basiri* n. gen., n. sp.

**Description**: (Based on one male and three females). Body cylindrical, tapering to blunt ends. Male tail spirally coiled. Head round and bare. Mouth round, surrounded by thin cuticle, eight cephalic papillae arranged in two circles; the inner ones arranged in pairs and situated laterally, outer one arranged singly, sublateral in position. Cuticle thick and smooth with no trace of longitudinal or transverse striae. Esophagus short, distinctly divided into muscular and glandular portions, narrower towards anterior end, broader posteriorly. Intestine swollen, rectum atrophied, anus absent. Nerve ring 0.154–0.178 from anterior end. Excretory pore not observed.

**Male**: Body length 7.356, width 0.171. Muscular and glandular portions of esophagus 0.053 and 0.279 long respectively; total length 0.332. Tail 0.08 long, spirally coiled with a blunt and rounded end without cloacal papillae. Testis single, extending through 2/3 rds of body. Spicules small, subequal, dissimilar, delicate, thin and slightly cuticularized. Right spicule 0.075 long, narrow with a pointed tip; left one 0.82 long, broader with rounded tip and slightly cephalated at proximal end. Spicule ratio 1:1.1.

**Female**: Body length 12.804–13.856, width 0.343–0.364. Muscular and glandular portions of esophagus 0.073–0.084 and 0.276–0.31 long respectively; total length 0.349–0.394. Posterior extremity conoid to a subdigitate terminus. Vulva circular, at 1.402–1.512 from anterior end. Vagina a long muscular tube, reflexed. Gonads opisthodelphic and reflexed. Viviparous. Microfilariae very numerous, colourless and unsheathed, 265–280×3 μ.

**Host**: *Francolinus pondicerianus* (GMELIN)

**Site**: Air sacs

**Locality**: Agra, U. P.

**REFERENCES**


Plate I. Figs. 1-6: *Farooqifilaria pecta* n. gen., n. sp. 1-Anterior end, ventral (surface view), 2-Egg, 3-Esophageal region, 4-Annules near middle of body, 5-Male tail, 6-Female tail. Figs. 7-13: *Francolinema francolina* n. gen., n. sp. 7-Esophageal region, 8-*En face* view, 9-Vulva, 10-Female tail, vental, 11-Male tail, 12-Spicules, 13-Female tail, lateral.
Plate II. Figs. 1-5: Aproctoides crassum n. sp. 1-Esophageal region, male, 2-Spicules, 3-Esophageal region, female, 4-Female tail, 5-Male tail. Figs. 6-10: Francoflaria basiri n. gen., n. sp. 6-Esophageal region, 7-Male tail, 8-Female tail, 9-En face view, 10-Vulva.