

CESTODES OBTAINED FROM ANIMALS DYING IN THE
CALCUTTA ZOOLOGICAL GARDENS DURING 1931.

By F. J. MEGGITT (*Helminthological Institute, University of Rangoon*).

For the opportunity of studying this collection I am indebted to Dr. Maplestone of the Calcutta School of Tropical Medicine, to whom I wish to express my thanks. The material, with a few exceptions, was in extremely good condition. In many cases no cestodes have previously been recorded from the hosts and approximately one-third of the species are new. All measurements are given in mm. The names of the hosts are according to the List of Vertebrate Animals Exhibited in the Gardens of the Zoological Society of London, 1828-1927

Order CYCLOPHYLLIDEA Carus 1863.

Family DAVAINIIDAE Fuhrmann 1907

Subfamily DAVAINIINAE Braun 1900.

Cotugnia Diamare 1893.

Cotugnia joyeuxi Baer 1924.

Host.—*Sphenocercus sphenurus* (Vigors 1831). (Columbiformes.)
The first record of any cestode from this genus of host.

Cotugnia seni Meggitt 1926.

Host.—*Psittacula manillensis* (Bechstein 1794). (Psittaciformes.)
Cirrus-sac 0.15—0.2 × 0.035—0.05. Testes 79—87 Otherwise agreeing with the previous description (Meggitt 1926, 231). First record of any cestode from this genus of host.

Raillietina Fuhrmann 1920.

Raillietina (Paroniella) compacta (Clerc 1906).

Host.—*Oriolus chinensis indicus* Jerdon 1847 (Passeriformes.)
A few fragments devoid of scolex. The first record of any cestode from this species of host.

REFERENCE LETTERS FOR TEXT-FIGURES.

cav. internal cavity of scolex ; *c. r.* bars of scolex ; *c. s.* cirrus-sac ; *e. c.* egg-capsule ; *l.* lumen of cirrus ; *ov.* ovary ; *p.* paruterine organ ; *r. s.* receptaculum seminis ; *s.* internal sucker of scolex ; *ś.* column supporting internal sucker ; *t.* testes ; *ut.* uterus ; *ut'* strand connecting the two uterine portions ; *v.* vagina ; *v. d.* vas deferens ; *v. g.* vitelline gland ; *v. s.* vesicula seminalis ; *w'* wall of scolex ; *w.* wall of cirrus ; *w''.* wall of cirrus-sac,

Raillietina (Paroniella) cruciata (Rudolphi 1819).

Host.—*Brachypterus aurantiacus* (L. 1766). (Piciformes.)

A few fragments with a single scolex. Maximum breadth 0.6. Scolex 0.4 dia. Rostellum 0.11 dia.: rostellar hooks approximately 200, 0.01—0.011 long. Acetabular hooks present though most had fallen off. Genital pore unilateral, at anterior quarter of proglottis margin. Cirrus-sac 0.086—0.092 × 0.056—0.066, extending to nerve. Testes 10-16, but the exact number difficult to ascertain owing to the macerated condition of the proglottides. Egg capsules not extending laterally to excretory vessels. Gravid proglottides absent.

The above description corresponds with that of *R. cruciata* except for the slightly smaller size of the rostellar hooks and the rather larger size of the cirrus-sac. The first record of a *Raillietina* from this genus of hosts.

Raillietina (Paroniella) facile Meggitt 1926.

Host.—*Tragopan satyra* (L. 1758). (Galliformes.)

Raillietina (Paroniella) fulvia. sp. nov.

Host.—*Pterocles orientalis* (L. 1758). (Pterocletiformes.)

Numerous fragments but no complete strobilae. Maximum breadth 6.0. Scolex 0.11—0.12 dia. Rostellum 0.035—0.04 dia., hooks absent. Acetabular hooks in several rows. Genital pore unilateral, at centre of proglottis margin. Cirrus-sac in proglottides with mature male but immature female organs 0.092—0.106 × 0.054—0.064, not extending to excretory vessels. Testes 1-3 poral, 6-8 aporal, total 8-10. Onchospheres 0.035—0.04. Egg-capsules 0.092—0.19 × 0.074—0.086, extending laterally to excretory vessels.

The above combination of characters sufficiently separates the present species from all others of the same sub-genus except the following: *R. blanchardi* (Parona 1898) from rodents, the description of which is incomplete, and *R. conopophilae* (Johnston 1912) from Passeriformes, the description of which is inaccessible to me in Rangoon.

Raillietina (Raillietina) paucitesticulata (Fuhrmann 1909).

Host.—*Pterocles orientalis* (L. 1758). (Pterocletiformes.)

The first record of this cestode from Pterocletiformes.

Raillietina sp.

Host.—*Dendrocitta rufa* (Latham 1790). (Passeriformes.)

A few strobilae, 12 long, 0.4 wide. Scolex 0.336 dia. Rostellum 0.104 dia., rostellar hooks 100—150, 0.016—0.018 long. Acetabular hooks absent. No signs of genitalia. The first record of any species of Davaineidae from this genus of hosts.

Subfamily IDIOGENINAE Fuhrmann 1907.

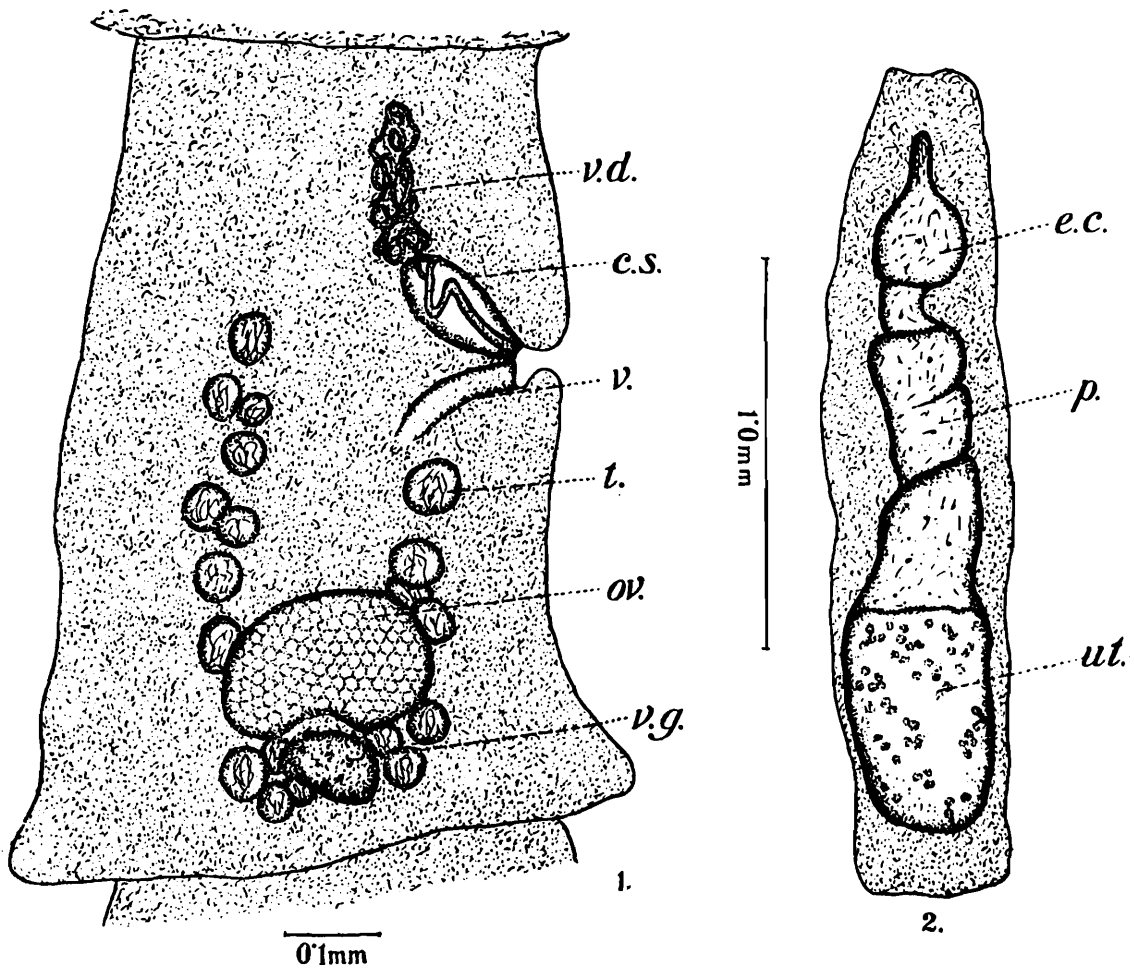
Idiogenes Krabbe 1868.

Idiogenes furtiva, sp. nov.

(Figs. 1, 2.)

Host.—*Falco peregrinus peregrinus* Tunstall 1771. (Accipitriformes.)

A few fragments of strobilae. Scolex absent. Genital pore irregularly alternating, at centre of proglottis margin. Cirrus-sac 0.15—0.18 × 0.06—0.074, tapering towards genital pore, extending past excretory vessels one-third across proglottis. Testes 0.052 dia., 6-8 poral, 6-10



Idiogenes furtiva, sp. nov.

TEXT-FIG. 1.—Mature proglottis.

TEXT-FIG. 2.—Gravid proglottis.

aporal, total 14-18, forming a group posterior to female glands and extending anteriorly approximately to level of genital pore. Egg-capsules and eggs not fully developed.

The number of testes and their arrangement sufficiently distinguish the present species from all others of the same genus.

Schistometra Chlodkovsky 1912.**Schistometra togata** Chlodkovsky 1912.

Host.—*Choriotis kori* (Burchell 1822). (Charadriiformes.)

Genital ducts pass between longitudinal excretory vessels, in one case dorsal to them. Cirrus-sac reaching outer excretory vessel but not passing it. Testes in several rows dorso-ventrally, 80 in one transverse section. Ovary and vitelline gland very poral, may be situated between the two longitudinal vessels of the same side or just internally to the inner: in any case with the ovary touching the inner vessel. Vitelline gland internal and slightly anterior to ovary. Genitalia embedded in excretory commissure. Otherwise agreeing with the description of Skrjabin (1914, p. 402).

Family DIOICOCESTIDAE Southwell 1929.

Dioicocestus Fuhrmann 1900.**Dioicocestus fevita**, sp. nov.

(Figs. 3-5.)

Host.—*Podiceps ruficollis* (Pallas 1764). (Podicipediformes.)

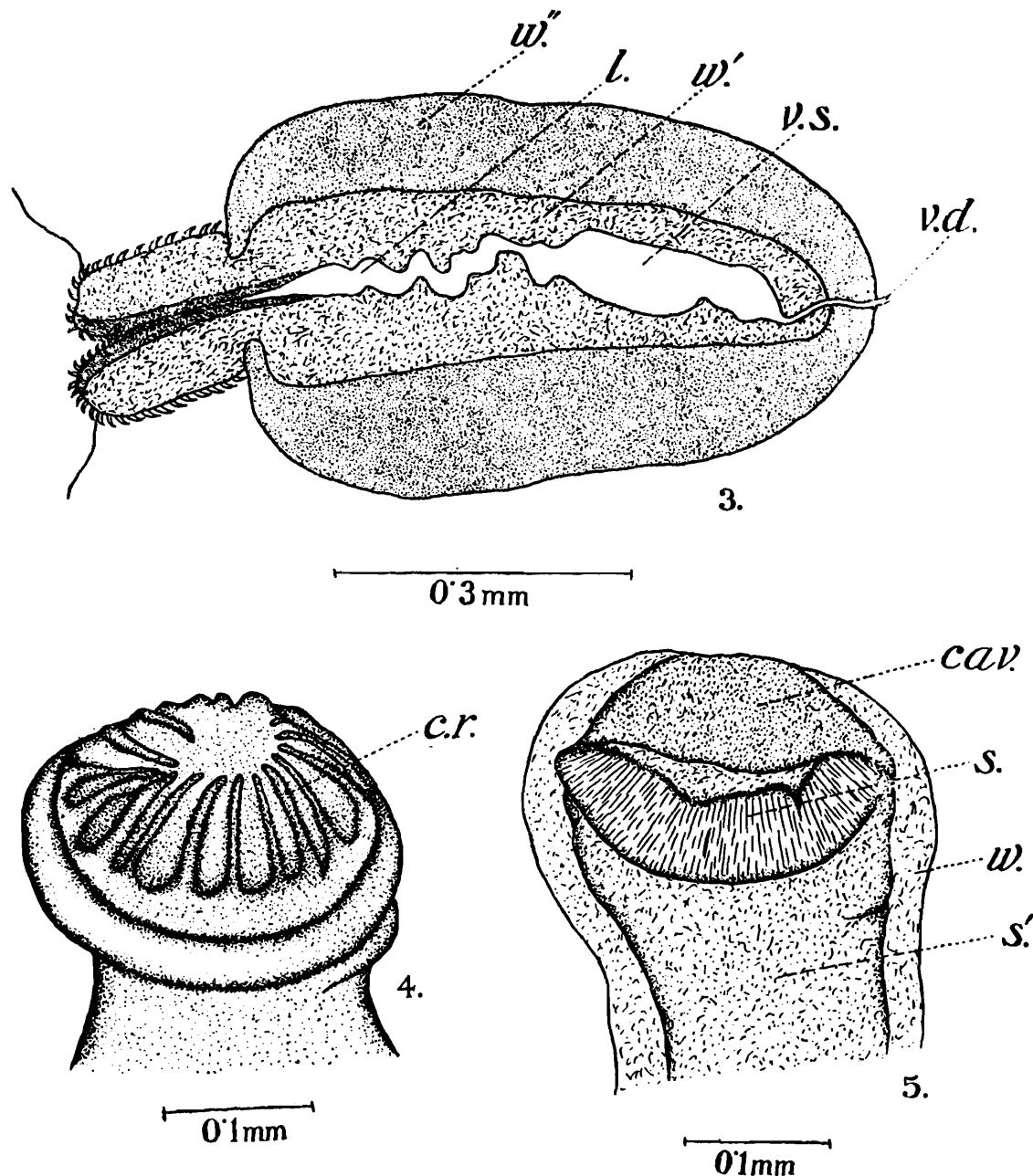
Two strobilae, one male and the other female.

Male.—Length 105, maximum breadth 3. Rostellum 0.264 dia., consisting of an apical portion externally surrounded with apparent bars, 0.09 long \times 0.01 wide. At apex an opening, 0.072 dia., leading into a chamber at bottom of which is a large sucker, 0.148 dia., on the end of a muscular column inside the rostellar sheath. Rostellar hooks absent. Genital pore approximately at centre of proglottis margin. Two cirrus-sacs in each proglottis, each 0.75—0.85 \times 0.48—0.55, extending past excretory vessels and consisting of a smooth sheath, 0.145—0.17 thick, inside which a muscular tube, 0.19—0.21 dia., with a lumen of 0.008—0.02, ends internally in an elongated vesicula seminalis, 0.07 dia., and externally in a cirrus. Cirrus 0.13—0.15 dia., armed with spines 0.01 long at apex, 0.012 in centre, and 0.018 at base. Testes in a single group, too indistinct and numerous to count.

Female.—Length 76, maximum breadth 5. Scolex 0.86 dia., of the same type as that of the male, *i.e.*, with small flattened suckers on anterior end. Rostellum also of same type as male, 0.288 dia., 0.86 long. Rostellar sheath 0.89 long. Internal sucker 0.34 dia. Bars thinner than those of male. Ovary and vitelline gland slightly aporal, the former a compact crescent, the latter an unbroken disc. Vagina wide from ovary to excretory vessels, then narrowing considerably, opening into a narrow elongated receptaculum seminis, narrowing again, and finally ending in a funnel-shaped opening to the exterior. Uterus a much divided sac, extending laterally to excretory vessels. Mature eggs absent.

The present species can be distinguished from all others by the peculiar structure of its rostellum: in addition, from *D. acotylus* Fuhrmann 1904 by the absence of coils in the cirrus-sac, from *D. aspera* (Mehlis 1831)

and *D. paronai* Fuhrmann 1900 by the actual and relative lengths of the cirrus-sac, from *D. novae-guinæe* Fuhrmann 1914 (Southwell 1930,



Dioicocestus fevita, n. sp.

TEXT-FIG. 3.—Cirrus-sac.

TEXT-FIG. 4.—External view of male scolex.

TEXT-FIG. 5.—Optical section of female scolex.

p. 202) by the armed cirrus. A description of *D. novae-hollandiae* (Kreff 1871) is not available in Rangoon.

Family HYMENOLEPIDIDAE Railliet and Henry 1909.

Subfamily DILEPIDINAE Fuhrmann 1907

Bancroftiella Johnston 1911.

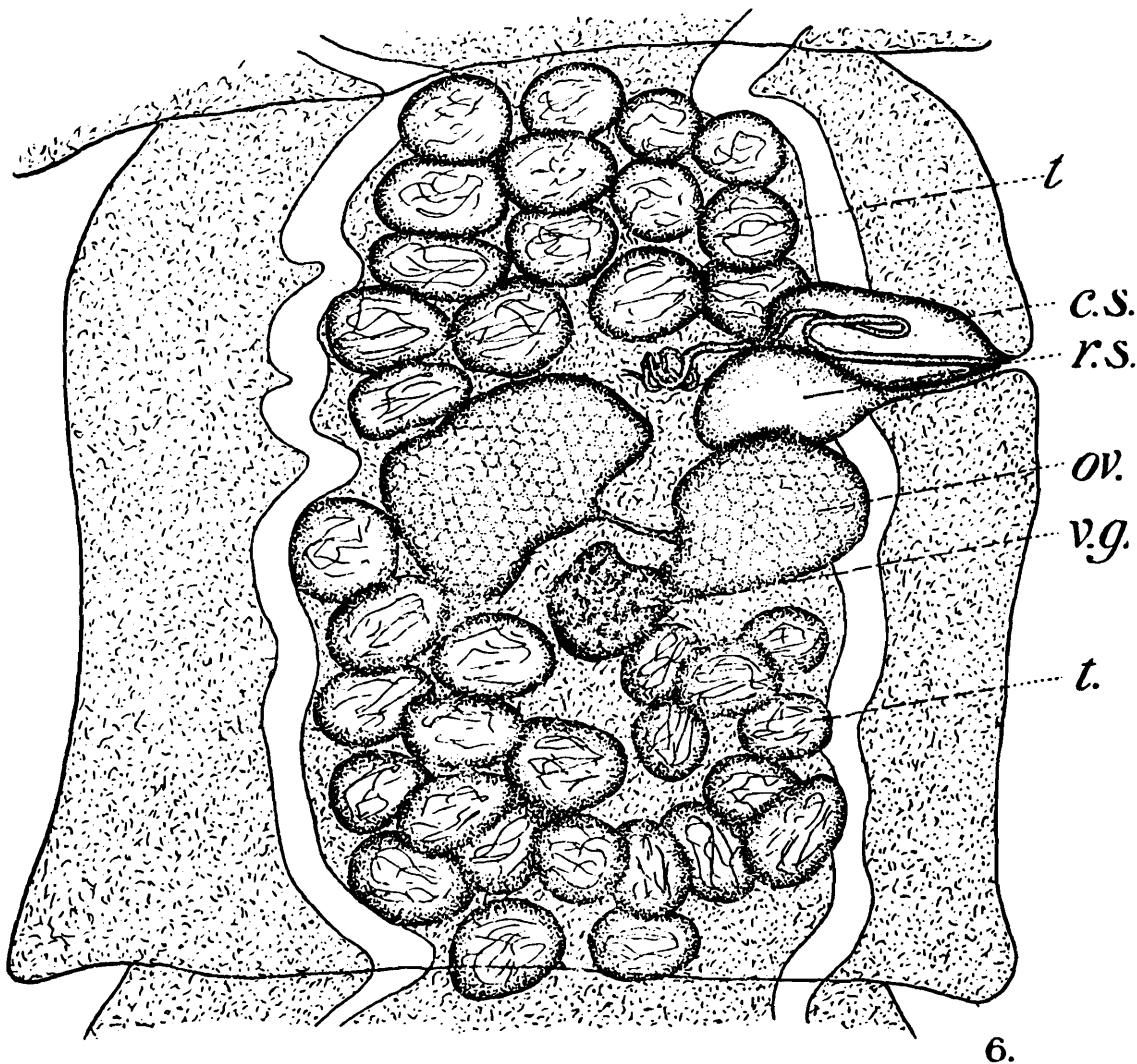
Bancroftiella forna, sp. nov.

(Figs. 6, 7.)

Host.—*Tringa hypoleucos* L. 1758. (Charadriiformes.)

Length 10—18, maximum breadth 0.53. Scolex 0.2—0.25 dia. Rostellum 0.05—0.06 dia.: rostellar hooks 14—16, 0.016—0.02 long.

Genital pore irregularly alternates, mostly on one side of the strobilus : in young proglottides at anterior third of proglottis margin but in gravid



6.

0.1mm

TEXT-FIG. 6.—*Bancroftiella forna*, sp. nov, Mature proglottis.

ones at the centre. Cirrus-sac in mature proglottides $0.136-0.152 \times 0.064-0.07$, in gravid ones $0.132-0.158 \times 0.068-0.072$, extending past ventral excretory vessels. Testes $0.056-0.07 \times 0.052-0.064$, in two groups, anteriorly and posteriorly, separated by the female glands, 14-16 anteriorly, 19-22 posteriorly, total 34-35. Receptaculum seminis



0.01mm

TEXT-FIG. 7.—*Bancroftiella forna*, sp. nov. Rostellar hooks.

very large, in mature proglottides $0.142-0.19 \times 0.122-0.146$, in gravid ones $0.16-0.168 \times 0.102-0.112$.

The descriptions of two of the three species of this genus are not available in Rangoon. *B. tenuis* Johnston 1911 is from a marsupial and therefore not likely to be the same as the present form: *B. ardeae* Johnston 1913 is from *Nycticorax* and may be the same. The shape of the hooks sufficiently separates the third species, *B. glandularis* (Fuhrmann 1905). The first record of this genus from Charadriiformes.

Choanotaenia Railliet 1896.

Choanotaenia infundibulum (Bloch 1779).

Host.—*Francolinus pintdeanus phayrei* (Blyth 1843). (Galliformes.)
The first record of a *Choanotaenia* from this genus of host.

Choanotaenia mutabilis (Linton 1927).

Host.—*Nycticorax nycticorax* (L. 1758). (Ardeiformes.)

Several strobilae but none with female organs. Maximum length 11. Scolex 0.18—0.2 dia. Rostellum 0.036 dia., armed with 10 hooks, 0.3—0.32 long: rostellar sac 0.05 dia., extending past posterior margin of suckers. Genital pore irregularly alternates, mostly on one side of the strobilae, at anterior corner of proglottis. Cirrus-sac 0.17—0.21 × 0.05—0.06, extending half-way across proglottis or even to aporal margin, containing a thickly armed cirrus and several coils of the vas deferens. Testes 10—13, 0.032—0.038 × 0.024—0.03, occupying the greater part of the proglottis but mostly aporal. A small receptaculum seminis.

The above description differs from that of *Valipora mutabilis* Linton (1927, 53), from the night heron, Wood's Hole, in the disposition of the genital pore and the extent of the cirrus-sac. With regard to the second point, the outlines of the sac are very indistinct: in most proglottides it appears as figured by Linton, with the internal coils of the vas deferens appearing as though external. With regard to the first, unless a large extent of strobilus be taken, indubitably the genital pores will appear unilateral. In view of the close correspondence in number and size of hooks, number of testes, diameter of scolex, etc., it is preferable to regard the points discussed as errors in the former description rather than to create a new species. The genus *Valipora* thus becomes a synonym of *Choanotaenia*: should the original description be correct as regards the genital pore, then the genus becomes a synonym of *Dendrouterina*.

Cyclorchida Fuhrmann 1907

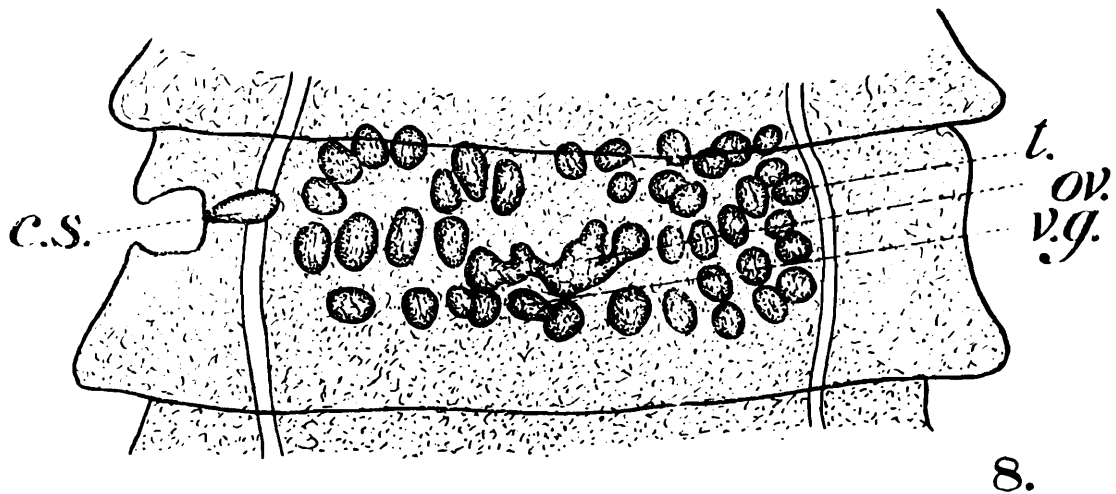
Cyclorchida foteria, sp. nov.

(Fig. 8.)

Host.—*Geocichla citrina* (Latham 1790). (Passeriformes.)

A single specimen. Length 59, maximum breadth 2. Scolex 0.43 dia. Rostellum 0.14 dia., devoid of hooks, enclosed within a sheath 0.18 dia., extending to posterior limit of suckers. Genital pore at centre of proglottis margin. Cirrus-sac in mature proglottides 0.094—0.098

$\times 0.049-0.053$, in gravid ones $0.142-0.145 \times 0.403-0.053$, not—or only just—extending to excretory vessels, opening into a deep genital cloaca. Testes 30—40, surrounding female glands. Uterus an elongated sac with



TEXT-FIG. 8.—*Cyclorchida foteria*, sp. nov. Mature proglottis.

anterior outgrowths, finally reticulate, filling the proglottis and extending laterally to excretory vessels. Onchospheres $0.034-0.045$ dia., shells $0.047-0.063$ dia. The above characters sufficiently separate the present form from all others of this genus. The first record of this genus from Passeriformes.

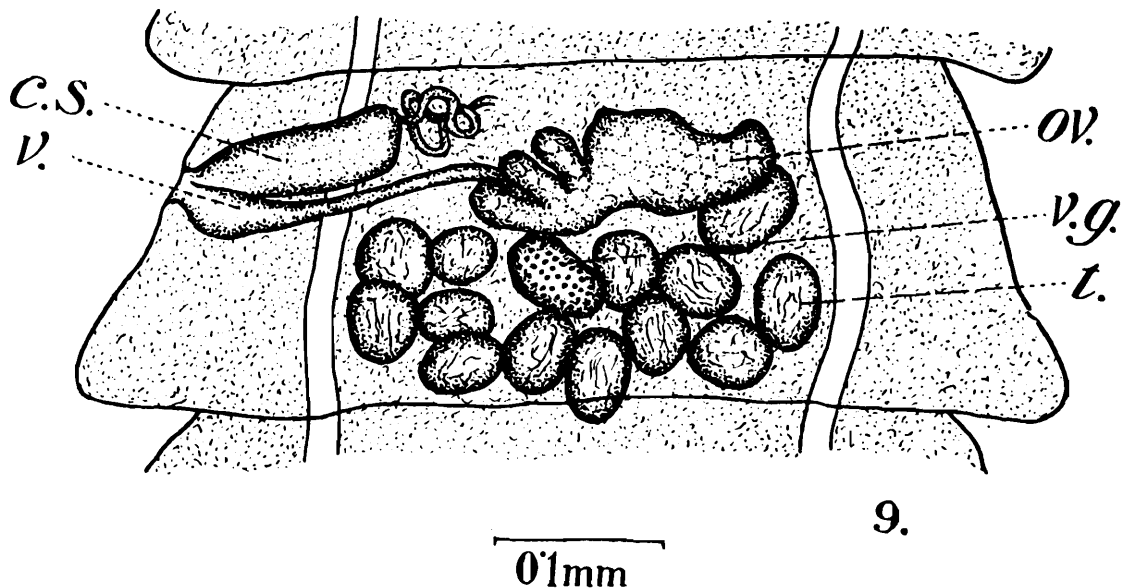
Dendrouterina, Fuhrmann 1912.

Dendrouterina fovea, sp. nov.

(Figs. 9, 10.)

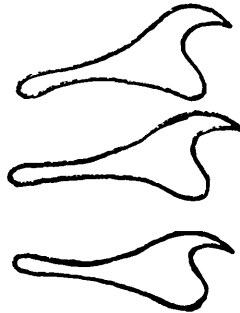
Host.—*Dendrocitta rufa* (Latham 1790). (Passeriformes).

Length 35—45, maximum breadth 1. Scolex $0.2-0.3$ dia. Rostellar sac $0.1-0.15$ dia., extending to anterior margin of suckers, with muscular



TEXT-FIG. 9.—*Dendrouterina fovea*, sp. nov. Mature proglottis.

base. Rostellum 0.1—0.13 dia.: rostellar hooks 70, 0.018—0.021 long, in two rows. Genital pore approximately at centre of proglottis margin. Cirrus-sac in mature proglottides 0.14—0.15×0.056—0.06, with thick muscular walls, extending to or just past excretory vessels. Testes 11—15, mostly posterior to female glands but occasionally lateral to them. Uterus a branched sac, not extending laterally to excretory vessels.



0.01mm

TEXT-FIG. 10.—*Dendrouterina fovea*, sp. nov. Rostellar hooks.

The above characters differentiate this species from all others of the same genus.

The first record of this genus from Passeriformes.

Subfamily FIMBRIARIINAE Meggitt 1924.

Fimbriaria Frölich 1802.

Fimbriaria fasciolaris (Pallas 1781).

Hosts.—*Anas poecilorhyncha* Forster 1781, *Casarca ferruginea* (Pallas 1764), *Francolinus pintdeanus phayrei* (Blyth 1843). (Anseriformes, Galiformes.)

Fimbriaria intermedia Fuhrmann 1914.

Host.—*Cereopsis novae-hollandiae* Latham 1801. (Anseriformes.)

Testes all poral. First record of a cestode from this genus.

Subfamily HYMENOLEPIDINAE Ransom 1909.

Aploparaksis Clerc 1903.

Aploparaksis sp.

Host.—*Anas poecilorhyncha* Forster 1781. (Anseriformes.)

Length 78, maximum breadth 2. Complete strobilae absent. Scolex disc-shaped, 1.5 dia. Rostellum 0.14 dia.; the presence or absence of rostellar hooks could not be ascertained without destroying the scolex. Cirrus-sac 0.36—0.39×0.05—0.06, extending to or just past longitudinal excretory vessels. Testis 0.14—0.17×0.11—0.13, poral. Ovary near aporal excretory vessel.

The above form differs from all others of the same genus by the combination of 8 longitudinal muscle bands, 4 each side, and a cirrus-sac only just reaching the excretory vessels. By reason of the incomplete description and of the lack of material it is best left unnamed. The first record of an *Aploparaksis* from this host.

Diorchis Clerc 1903.

Diorchis inflata (Rudolphi 1819).

Host.—*Fulica atra* (L. 1758). (Ralliformes.)

Diorchis sp.

Host.—*Anas poecilorhyncha* Forster 1781. (Anseriformes.)

A single fragment. Testes two, close together. Cirrus-sac in proglottides without ovary 0.2×0.035 , extending half-way across proglottis. In the absence of a scolex it is impossible to separate the present form from *D. acuminata* (Clerc 1902), *D. acuminata* Linton 1927—both different species—*D. flavescens* (Kreffit 1871), *D. bulbodes* Mayhew 1929, and *D. microcirrosa* Mayhew 1929, all from Anseriformes. First record of a *Diorchis* from this host.

Hymenolepis Weinland 1858.

Hymenolepis brevis Fuhrmann 1906.

Host.—*Copsychus saularis* (L. 1766). (Passeriformes.)

Rostellar hooks 0.032 — 0.037 instead of 0.04 . Cirrus-sac extending half-way across proglottis. Testes of the *Weinlandia* type. First record from this host.

Hymenolepis collaris (Batsch 1786).

Host.—*Anas poecilorhyncha* Forster 1781. (Anseriformes.)

First record from this host.

Hymenolepis echinocotyle Fuhrmann 1907

Host.—*Casarca ferruginea* (Pallas 1764). (Anseriformes.)

Rostellar hooks 0.024 — 0.028 (Fuhrmann 0.03). Cirrus-sac 0.16 — 0.21×0.034 — 0.04 (Fuhrmann 0.16×0.012) in young proglottides, extending to excretory vessels. Otherwise agreeing with the original description (Fuhrmann 1907, 532). First record from this host.

Hymenolepis farciminosa (Goeze 1782).

Hosts.—*Gracupica nigricollis* (Paykull 1807): *Sturnia malabarica* (Gmelin 1789). (Passeriformes.)

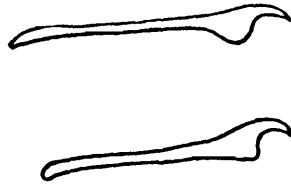
The first cestodes to be recorded from these hosts.

Hymenolepis filta, sp. nov.

(Fig. 11.)

Host.—*Bubulcus coromandus* (Boddaert 1783). (Ardeiformes.)

Length 12—20, maximum breadth 0.23. Scolex 0.12—0.13 dia. Rostellum 0.04—0.05 dia., rostellar hooks 8, 0.03—0.034 long. Genital pore at centre of proglottis margin. Sacculus accessorius absent. Cirrus-



0.01mm

TEXT-FIG. 11.—*Hymenolepis filta*, sp. nov. Rostellar hooks.

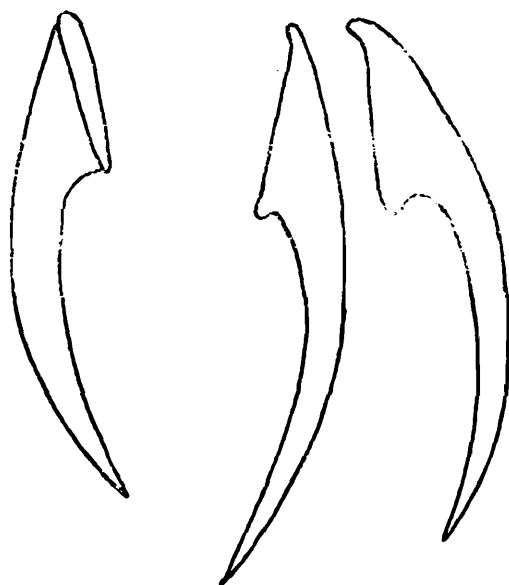
sac in proglottides with fully developed genital organs 0.1×0.008 , extending half-way across proglottis. Testes 0.03—0.035 dia., arranged either in the *Hymenolepis* or in the *Weinlandia* type, usually the former. The present species is distinguished from all others of the same genus by the shape and size of the rostellar hooks. First record of any cestode from this genus of host.

Hymenolepis fimula, sp. nov.

(Fig. 12.)

Host.—*Nyroca ferina* (L. 1758). (Anseriformes.)

Length 30—40, maximum breadth 1.0. Scolex 0.065—0.155. Rostellum 0.07—0.08 dia., rostellar hooks 8, 0.102—0.110 long, in shape



0.01mm

TEXT-FIG. 12.—*Hymenolepis fimula*, sp. nov. Rostellar hooks.

like those of *H. gracilis* (Zeder 1803). Cirrus-sac 0.156—0.158×0.026—0.03, extending half-way across proglottis. Testes of the *Weinlandia* type. The present form most resembles *H. gracilis* but differs from it in the absence of a sacculus accessorius and in the larger size of the rostellar hooks.

***Hymenolepis finta*, sp. inq.**

Host.—*Ketupa zeylonensis* (Gmelin 1788). (Strigiformes.)

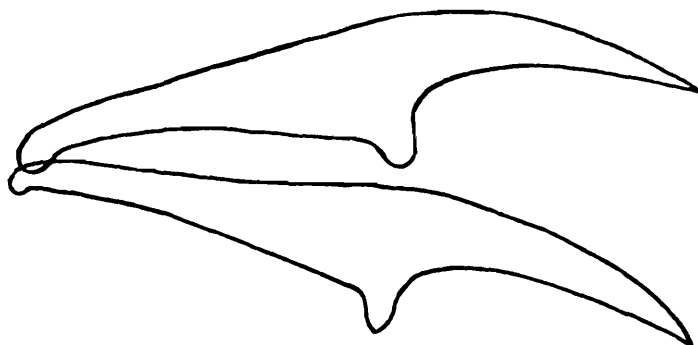
Length 10—25, breadth 0.6—0.8. Scolex absent. Genital pore at centre of proglottis margin. Cirrus-sac 0.16—0.2×0.025—0.03, extending half-way across proglottis in mature segments but less in younger ones. Sacculus accessorius absent. Testes of the *Weinlandia* type. No species of this genus have been recorded from Strigiformes. In view of the absence of a scolex a definite identification is impossible. A fragment of a *Hymenolepis* without scolex or genitalia has been found in *Tyto alba javanica* in Burma.

***Hymenolepis fista*, sp. nov.**

(Fig. 13.)

Host.—*Nettapus coromandelianus* (Gmelin 1789). (Anseriformes.)

Length 15—30, maximum breadth 1. Scolex 0.098—0.2. Rostellar sac 0.048—0.052, extending to or past posterior margin of suckers. Rostellum 0.04—0.064 dia., rostellar hooks 8, 0.057—0.067 long. Genital pore approximately at centre of proglottis margin: normally unilateral



0.01mm

TEXT-FIG. 13.—*Hymenolepis fista*, sp. nov. Rostellar hooks.

but in a few cases alternating. Cirrus-sac in proglottides with mature ovaries 0.39—0.42×0.065, in proglottides with uterus 0.65—0.66×0.106—0.12, extending half-way across proglottis or to aporal excretory vessel. Sacculus accessorius absent. Receptaculum seminis large. Uterus developing very quickly: in one proglottis no trace of it, in the next fully developed.

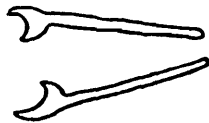
Hymenolepis fola, sp. nov.

(Fig. 14.)

Host.—*Rostratula benghalensis* (L. 1758). (Charadriiformes.)

Length 8—20, maximum breadth 0·8. Scolex 0·18—0·19 dia. Rostellar sheath 0·048—0·07 dia.: rostellum 0·04—0·05 dia.: rostellar hooks 10, 0·032—0·034 long. Genital pore at anterior third of proglottis margin. Cirrus-sac 0·33—0·4 × 0·035—0·04, extending half-way across proglottis. Sacculus accessorius absent. Testes of the *Weinlandia* type.

None of the species of this genus recorded from Charadriiformes agrees

TEXT-FIG. 14.—*Hymenolepis fola*, sp. nov. Rostellar hooks.

with the above form. Of the others, the shape of the hooks and their length, the arrangement of the testes, and the length of the cirrus-sac distinguish it from all except those mentioned under the succeeding species, the descriptions of which are not available in Rangoon, and the following: *H. armata* Fuhrmann 1906, *H. zosteropis* Fuhrmann 1918 which are distinguished by the absolute and relative lengths of the cirrus-sac, *H. corvi* (Mayhew 1925) by the relative length of the cirrus-sac, *H. phalacrocorax* (Woodland 1929) by the position in that species of the testes external to the excretory vessels, *H. brevicirrosa* Fuhrmann 1913, *H. fringillarum* (Rudolphi 1810), *H. voluta* (Linstow 1904), and *H. dahurica* (Linstow 1903) of which the descriptions are incomplete. In view of these facts and of the different order of the host it appears necessary to create a new species. First record of a *Hymenolepis* from this genus of host.

Hymenolepis fona, sp. nov.

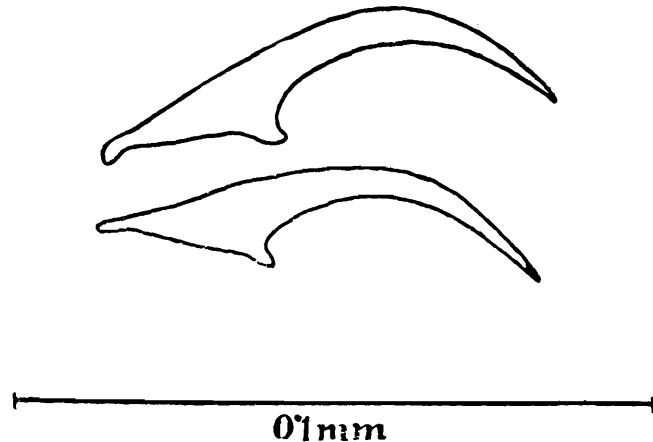
(Fig. 15.)

Host.—*Cygnus olor* (Gmelin 1789). (Anseriformes.)

Length 1·5, breadth 0·3. Scolex 0·18 dia. Rostellum 0·053 dia., extending to centre of suckers: rostellar hooks 10, 0·07—0·074 long. Genital pore in anterior portion of proglottis margin. Cirrus-sac 0·19—0·2 × 0·023—0·03, extending two-thirds of the way across the proglottis.

The characters above given separate the present form from all others of the same genus except the following: *H. anatis* (Müller 1780), *H. carenula* Skrjabin 1926, *H. filamentosa* (Goeze 1782), *H. ovoides* Galli-Valerio 1929, *H. passeris* (Gmelin 1790), *H. sphaerophora* (Rudolphi 1810) of which no valid descriptions exist: *H. mesacantha* (Daday 1900), *H. sibirica* (Linstow 1905)—Anseriformes—*H. sinuata* Rosseter 1909—

Anseriformes,—*H. taeniata* Skrjabin 1914—Anseriformes,—*H. vallei* (Stossich 1902), *H. villosoides* Solowiow 1911—Anseriformes,—of which



TEXT-FIG. 15.—*Hymenolepis fona*, sp. nov. Rostellar hooks.

the descriptions are either incomplete or not available in Rangoon: *H. breviannulata* Fuhrmann 1906 is separated by its considerably shorter cirrus-sac.

***Hymenolepis foveata*, sp. nov.**

Host.—*Anas poecilorhyncha* Forster 1781. (Anseriformes.)

Length 23, maximum breadth 1. Scolex 0.176 dia., without rostellum. Genital pore very anterior. Sacculus accessorius absent. Cirrus-sac in proglottides with mature testes but immature ovary 0.7 × 0.088. Testes 0.19—0.27 × 0.12—0.16, arranged in the *Weinlandia* type. The complete absence of a rostellum separates this form from all species of *Hymenolepis* and may, if proved to be absent in other species, be the basis for the foundation of a new genus.

***Hymenolepis introversa* (Mayhew 1925).**

Host.—*Anas poecilorhyncha* Forster 1781. (Anseriformes.)

***Hymenolepis longicirrosa* Fuhrmann 1906.**

Host.—*Anas crecca* L. 1758. (Anseriformes.)

Genital pore slightly anterior. Genital cloaca small, genital sphincter not seen. Cirrus-sac in mature proglottides 0.4—0.47 × 0.024—0.036, opening nearer the margin of the proglottis than shown by Fuhrmann (1906, fig. 17), Chitinous lining of cirrus extending to aporal excretory vessel and capable of evagination as shown by Clerc (1906, fig. 4—L'aiguille chitineuse) for *H. rugosa*. External vesicula seminalis large, 0.17—0.18 × 0.12—0.126, in the anterior and aporal portion of proglottis. Testes 0.108—0.132 × 0.078—0.102, in young proglottides disposed as in *Weinlandia* but in mature ones filling practically all the proglottis and being in the same straight line. Testes often with lobes, connected with the main portion only by a narrow isthmus. Sacculus accessorius

conspicuous. Vaginal opening anterior, posterior or ventral to cirrus-sac. Receptaculum seminis large, $0.116-0.118 \times 0.086-0.096$, spherical, transversely across proglottis, approximately central. The above account differs in details from that of Fuhrmann but not sufficiently to justify the separation of the two forms.

Hymenolepis setigera (Frölich 1789).

Host.—*Nyroca ferina* (L. 1758). (Anseriformes.)

Differs from the usual form in that the rostellar hooks are $0.046-0.05$ long instead of $0.035-0.044$.

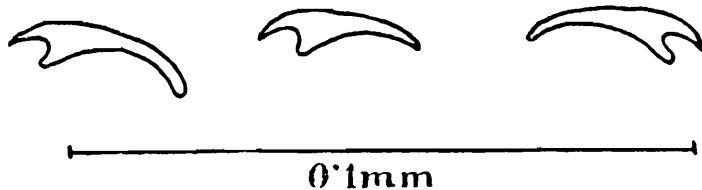
Hymenolepis sp.

(Fig. 16.)

Host.—*Coccothraustes coccothraustes* (L. 1758). (Passeriformes.)

Length 4, maximum breadth 0.25. Scolex 0.1—0.15. Rostellum 0.03—0.04: rostellar hooks 12, 0.025—0.03 long. Genital pore unilateral. Genital organs immature.

The size and shape of the hooks agree with those of *Diorchis acuminata* (Clerc 1902), and approximately with those of *Hymenolepis echinocotyle*



TEXT-FIG. 16.—*Hymenolepis* sp. Rostellar hooks.

Fuhrmann 1907, *H. longistylota* Tscheng 1932, *H. magniovata* Fuhrmann 1918, *H. serpentulus* (Schrank 1788) and *H. ambiguus* Clerc 1906. The only cestodes recorded from this genus of host are *Taenia coccothraustis* Rudolphi 1819, *T. nasigera* Creplin 1849, the latter of which is regarded as invalid by Fuhrmann (1908, 96). In the circumstances it is best to leave the form unnamed.

Hymenolepis sp.

Host.—*Spinus ictericus* (Lichtenstein 1823). (Passeriformes.)

A single specimen, 35 long \times 2 broad. Scolex 0.24 dia. Rostellar sac 0.08 dia. Rostellum 0.06 dia. rostellar hooks absent. Genital pore anterior. Cirrus-sac 0.07×0.15 , not reaching excretory vessels. Testes arranged in the *Weinlandia* type.

In the absence of rostellar hooks this form cannot be definitely identified. *H. fringillarum* (Rudolphi 1809) has been recorded from *Spinus spinus* (L. 1758) but in the absence of internal characters cannot be compared.

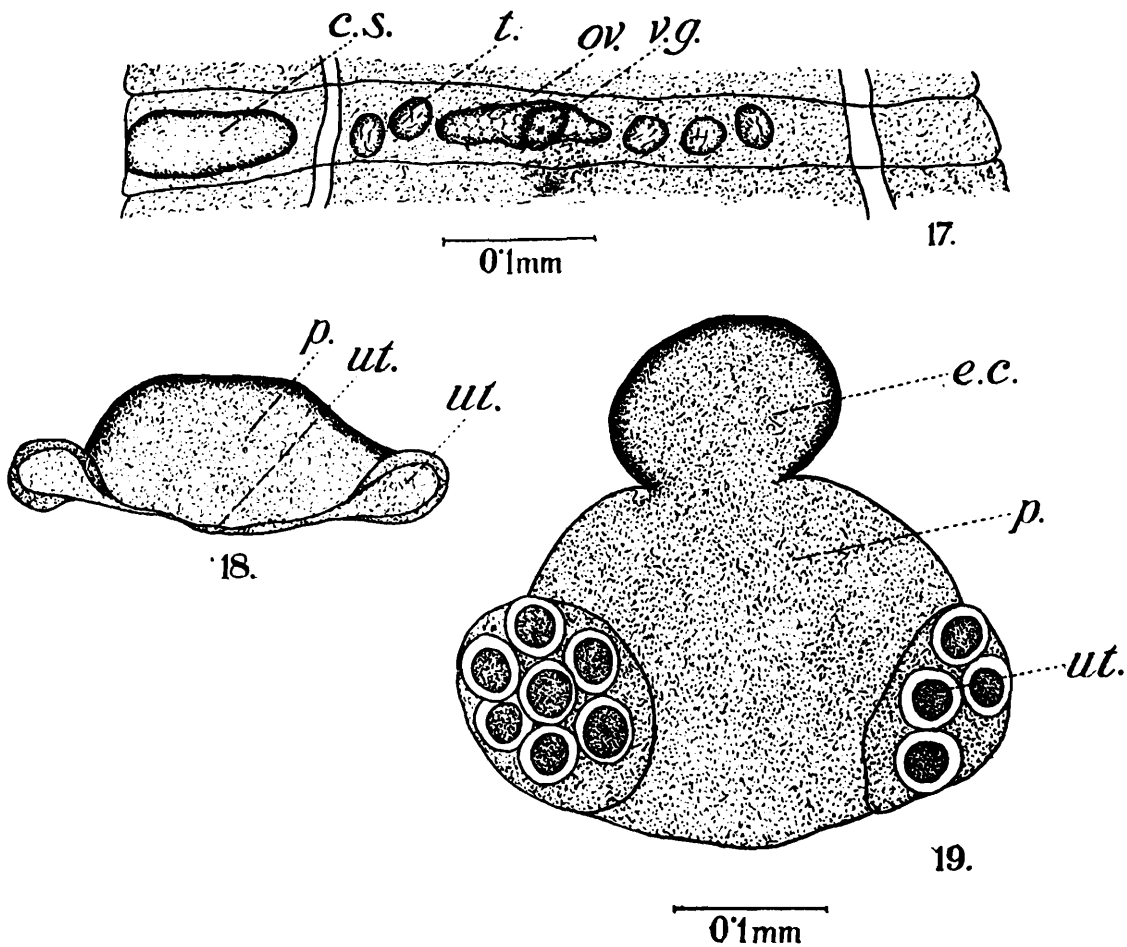
Subfamily PARUTERININAE Ransom 1909.

Metroliastes Ransom 1900.**Metroliastes fulvida**, sp. nov.

(Figs. 17, 18, 19.)

Host.—*Oriolus chinensis indicus* Jerdon 1847. (Passeriformes.)

Length 35—40, maximum breadth 8. Scolex 0.35—0.4 dia., without rostellum or hooks. All proglottides, but more especially the anterior, much broader than long. Genital ducts pass between excretory vessels. Genital pore slightly anterior to centre of proglottis margin. Cirrus-sac in proglottides with testes but without fully developed female glands 0.12—0.124 × 0.046—0.052, not passing excretory vessels and tapering towards the interior. Testes 6—10, lateral to female glands. Ovary slightly poral. Vitelline gland ventral and slightly aporal. Uterus develops as an aporal outgrowth of the female ducts leading from the

*Metroliastes fulvida* n. sp.

TEXT-FIG. 17.—Mature proglottis.

TEXT-FIG. 18.—Young uterus and peruterina organ.

TEXT-FIG. 19.—Mature stage of preceding figure.

ovary, increases in size so as to form a narrow sac occupying the central third of the proglottis, then separates into two portions. These are at first linked together by a narrowing isthmus which becomes a thin strand and finally disappears entirely, leaving two completely separate portions of the uterus. Anterior to uterus a paruterine organ develops, enveloping the inner and anterior ends of the two uterine portions and developing

at its anterior end a small egg-capsule into which the eggs finally pass. It is noteworthy that the eggs remain most of the time in the uterus and do not pass into the paruterine organ until late, immediately afterwards entering the egg-capsule.

The definition of the genus requires alteration so as to allow of the inclusion of the present form. "Testes 20—30" should be omitted, while "two spherical sacs touching in the median line and more or less fused with one another" should be altered to "two spherical sacs either fused or separate". This is the first record of a *Metroliastes* from Passeriformes.

Family TAENIIDAE Ludwig 1886.

Cladotaenia Cohn 1901.

The genus *Cladotaenia* was created by Cohn for the reception of *Taenia globifera* Batsch 1786. Most authorities have subsequently agreed that this species is synonymous with *T. cylindracea* Bloch 1782. The material in four tubes of the collection obviously belonged to this genus but the different tubes showed more differences than could be accounted for by individual variation. In attempting to decide which conformed most closely with the original description it was found that many of the points investigated had been ignored by previous workers. The type is therefore regarded as the form from *Falco*, that being the host most closely related to the original: moreover the presence of rostellar hooks enables a closer inspection to be made.

Cladotaenia cylindracea (Bloch 1782).

Host.—*Falco tinnunculus* L. 1758. (Accipitriformes.)

Mature proglottides approximately 0.96 long \times 0.68 broad. Scolex 0.27 dia. Rostellum 0.096 dia., rostellar hooks in two rows, approximately 28 in each, 0.02—0.025 long. Genital pore very anterior in young proglottides, more central in mature ones. A deep genital cloaca present. Cirrus-sac 0.14—0.15 \times 0.059—0.069 in mature proglottides, extending to excretory vessels. Testes 0.046—0.067 dia., in number 37—38 aporal, 28—33 poral, total 64—67, extending posteriorly to ovary. Uterus with 11—14 lateral branches each side, but as no fully gravid proglottis was seen this number is not necessarily accurate: not extending more than slightly anteriorly to genital pore.

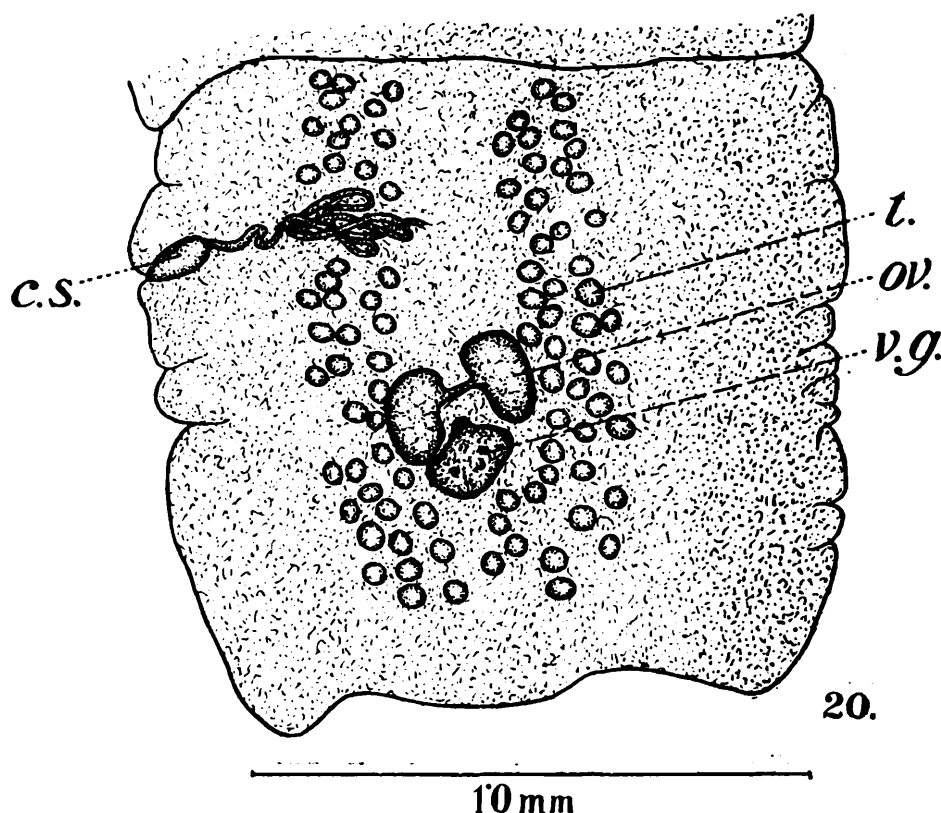
Cladotaenia feuta, sp. nov.

(Fig. 20.)

Host.—*Circus assimilis* Jardine and Selby 1828. (Accipitriformes.)

Scolex 0.19. Rostellum 0.13 dia.: rostellar hooks absent. Mature proglottides 1.25—1.45 long \times 0.82—1 wide. Genital pore at anterior

quarter of proglottis margin. Cirrus-sac $0.12-0.16 \times 0.05-0.07$, not extending to longitudinal excretory vessel. Testes 85-97, extending



TEXT-FIG. 20.—*Cladotaenia feuta*, sp. nov. Mature proglottis.

posteriorly to ovary. Uterus with 17-21 lateral branches each side, not extending more than slightly anterior to genital pore. The following table gives the differences between the three forms.

<i>Cladotaenia</i> .	Length of mature proglottis.	Breadth of mature proglottis.	Extent of cirrus-sac.	Length of cirrus-sac.	Breadth of cirrus-sac.	Number of testes.	Position of testes.	Extent of uterus.	Uterine diverticulae.
<i>cylindracea</i> (Bloch 1782).	0.96	0.68	to excretory vessels.	0.14-0.15	0.059-0.069	64-67	extending posteriorly anterior to ovary.	not to genital pore.	11-14
<i>fania</i> sp. nov.	1.36	0.9	not	0.11-0.164	0.072-0.1	73-94	not	all proglottis.	12-13
<i>feuta</i> sp. nov.	1.25-1.45	0.82-1.0	not	0.12-0.16	0.05-0.07	85-97	posteriorly	not	17-21

Cladotaenia fania, sp. nov.

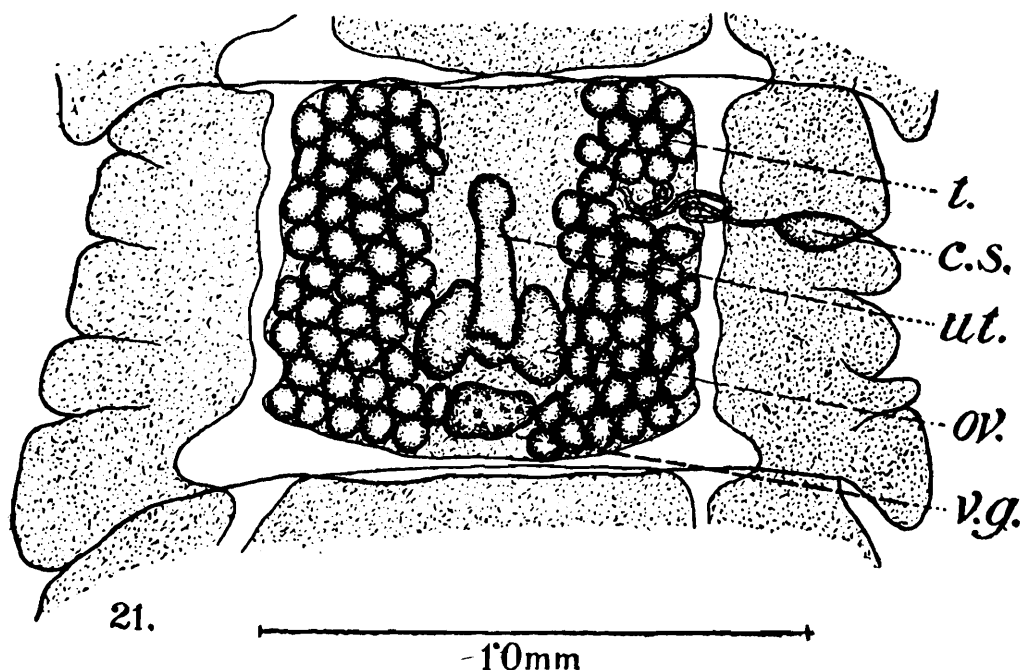
(Fig. 21.)

Host.—*Hieraaëtus pennatus* (Gmelin 1782). (Accipitriformes.)

Choriotis kori (Burchell 1822). (Charadriiformes.)

Scolex 0.21. Rostellum 0.065 dia.: rostellar hooks 20, 0.006-0.007 long. Mature proglottides 0.9 broad \times 1.36 long. Genital pore at anterior quarter or third of proglottis margin. Cirrus-sac spherical, $0.11-0.164 \times 0.072-0.1$, not extending to excretory vessels. Testes 39-41 poral, 49-53 aporal, total 73-94, not extending posteriorly to ovary. Uterus with 12-13 lateral diverticulae each side and occupying all the proglottis: again no fully gravid proglottides seen.

T. globifera is figured by Morell (1895, pl. 7, fig. 7) as having the testes absent from the region posteriorly to the ovary but with them in that



TEXT-FIG. 21.—*C. fania* sp. nov. Mature proglottis.

region by Cohn (1901, pl. 32, fig. 51). That name cannot be employed. This is the first record of a cestode from the genus *Hieraaëtus* and of a *Cladotaenia* from Charadriiformes. The latter form was in better condition than the former and no appreciable differences between them could be found: the form is therefore not a pseudoparasite.

Order PSEUDOPHYLLIDEA Carus 1863.

Family DIPHYLLOBOTHRIIDAE Lühe 1911.

Subfamily DIPHYLLOBOTHRINAE Lühe 1910.

Bothridium Blainville 1824.

Bothridium pithonis Blainville 1824.

Host.—*Python molurus* (L. 1768).

Duthiersia Perrier 1873.

Duthiersia fimbriata (Diesing 1854).

Host.—*Varanus flavescens* (Gray 1831).

Order TETRAPHYLLIDEA Carus 1863.

Family PROTEOCEPHALIDAE La Rue 1911.

Crepidobothrium Monticelli 1899.

Crepidobothrium biroi (Ratz 1900).

Host.—*Varanus flavescens* (Gray 1831).

Complete strobilae absent. Scolex 0.17—0.19 dia. Apical sucker 0.05—0.06 dia. Cuticular spines absent, but material in bad condition.

Genital pore anterior to centre of proglottis margin, opening on a small genital papilla. Cirrus-sac $0.164-0.246 \times 0.08-0.142$, mostly crescent-shaped, extending past excretory vessels approximately $\frac{1}{4}$ to $\frac{1}{3}$ across proglottis. Vagina anterior or posterior to cirrus-sac. Testes 11—16 poral and anterior to genital pore, 8—13 posterior to it, 25—32 aporal, total 48—54: in size $0.056-0.086 \times 0.056-0.074$: in two irregular groups, but with a tendency to fuse at anterior end of proglottis. Fully gravid proglottides absent. In the most gravid ones available, the uterus swells at places so as to fill the whole width of the proglottis in the form of a local sac: in addition to these swellings were approximately 20 diverticulae each side.

The descriptions of the forms with cuticular spines belonging to this genus are mostly incomplete and inadequate, and the old genus *Acanthotaenia* is in need of a thorough revision. In placing the present form great difficulty was experienced in separating the allied species (e.g., *C. shipleyi*, *C. articulatum* etc.) and the final result is more of an approximation than an identification.

Crepidobothrium fima Meggitt 1927.

Host.—*Natrix stolatus* (L. 1758).

Cirrus-sac $0.21-0.25 \times 0.05$. Testes 91—95. Uterine diverticulae 19—30 each side. The present form being intermediate between *C. fixa* and *C. fima*, the former species becomes a synonym of the latter.

Crepidobothrium sp.

Host.—*Hyalobates hoolock* (Harlan 1834).

A single scolex with a few fragments. Scolex 0.33 dia., devoid of any terminal sucker. Maximum breadth of strobilus 0.8 . Genital pore at centre of proglottis margin. Cirrus-sac and vagina alternating: the former extending well past excretory vessels and approximately $\frac{1}{5}$ of proglottis width. Testes in two distinct groups. No proglottis sufficiently mature to count the testes or measure the cirrus-sac. Only one species of this family, *C. punica* (Cholodkovsky 1908) has been recorded from mammals.

UNIDENTIFIED SPECIES.

Cestode sp.

Host.—*Garrulax leucolophus* (Hardwick 1815). (Passeriformes.)

A single strobilus. Length 18, breadth 1.33 . Scolex of the same diameter as the strobilus. Rostellum absent. Genital pore irregularly alternating. Genitalia not developed. All proglottides much broader than long.

Cestode sp.

Host.—*Perdica argoondah* (Sykes 1832). (Galliformes.)

A few isolated fragments in a bad state of preservation. Genital pore irregularly alternating, in anterior portion of proglottis margin. Cirrus-sac not quite reaching excretory vessels. Ovary towards anterior border of proglottis. All proglottides very immature.

Cestode sp.

Host.—*Rostratula benghalensis* (L. 1758). (Charadriiformes.)

A single strobilus, 12×0.5 . Scolex absent. Genital pore very anterior, almost at anterior corner of proglottis. Cirrus-sac 0.27×0.042 , extending just past longitudinal excretory vessels. Testes 30—34, posterior and lateral to female organs. Gravid proglottides absent. The only cestodes recorded from this host are *Hymenolepis spinosa*, Linstow 1906 and *Monopylidium macracanthum* Fuhrmann 1907. The latter form differs from the present one in the slightly smaller number of testes, smaller size of the cirrus-sac, relative smaller extent of that organ, and position of the genital pore. In the absence of scolex and gravid proglottides a definite identification is impossible.

REFERENCES.

- Clerc, W. (1906). Notes sur les cestodes d'oiseaux de l'Oural. A. Sur quelques especes d'*Hymenolepis*. *Centrbl. Bakt. Abt. i. Orig.* XLII, 433—436.
- Cohn, L. (1901). Zur Anatomie und Systematik der Vogelcestoden *Nov. Act. Leop. Carol. Akad.* LXXIX, 265—450.
- Fuhrmann, O. (1906). Die *Hymenolepis*arten der Vögel ii. *Centrbl. Bakt. Abt. i, Orig.* XLII, 730—755.
- Fuhrmann, O. (1907). Bekannte und neue Arten und Genera von Vogeltaenien. *Ibid.* XLV, 516—536.
- Fuhrmann, O. (1908). Die Cestoden der Vögel. *Zool. Jahrb., Suppl.* X.
- Linton, E. (1927). Notes on cestode parasites of birds. *Proc. U. S. Nat. Mus.* LXX, art. 7.
- Meggitt, F. J. (1926). On a collection of Burmese cestodes. *Parasit.* XVIII, 230—237.
- Meggitt, F. J. (1927). Remarks on the cestode families Monticellidae and Ichthyotaeniidae. *Ann. Trop. Med. Parasit.* XXI, 69—87.
- Morell, A. (1895). Anatomisch-histologische Studien an Vogeltaenien. *Arch. Naturg.* LXI, 81—102.
- Skrjabin, K. J. (1914). Vergleichende Charakteristik der Gattungen, *Chapmania* Mont. und *Schistometra* Cholod. *Centrbl. Bakt. Abt. i, Orig.* LXXIII, 397—405.