

XIX. ON SOME INDIAN CESTODA

PART I.

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The present paper on the Cestoda of British India is the first of a series which the writer proposes preparing, as opportunity permits.

Up to a very short time ago the number of species of Cestoda in the collection of the Indian Museum did not exceed twenty. These are all included in the present paper, together with much fresh material.

It is proposed in the second paper of this series to deal with Cestoda from birds, of which about 50 species have been collected up to date, and in the third with Cestoda from fish, of which we have at present about 70 species.

For the characters of the order Pseudophyllidea and the sub-family Dibothriocephalinae I am indebted to Stiles (1906).

The characters of the families Mesocestoides, Anoplocephalidae, Davaineidae, Hymenolepididae and Taenidae, with their sub-families and genera, are those given by Ransom (1909), whilst the characters of the genera *Rhynchobothrium*, *Tetrarhynchus*, *Otobothrium*, and *Syndesmbothrium* are after Linton (1887).

Order PSEUDOPHYLLIDEA, Carus, 1863.

= BOTHRIOCEPHALOIDEA, Braun, 1903.

General diagnosis:—Cestoda. Scolex armed or unarmed, with two groove-like suckers, situated dorsally and ventrally; they are usually not highly developed, but in some cases are considerably modified by development of their walls, or by more or less coalescence of their margins; or they may unite to form a single apical sucker, or may become rudimentary, their function being performed by an unpaired apical sucker. In some cases a pseudo-scolex may form. External segmentation present or absent. Neck present or absent. Three genital pores present; uterine pore is always on one of the surfaces; the vaginal and cirrus pores may be on the same surface as the uterine, or on the opposite surface, or marginal. Genital organs usually single, rarely double. Their development progresses from anterior end, posteriorly, but does not

pass from the mature stage into an atrophying stage. Testicles numerous, situated in two more or less separated lateral fields in the medullary layer; vas deferens always highly developed, usually forming a coil. Ovary distinctly or indistinctly bipartite, situated in distal portion of segment, usually median in forms with single series of genitalia; in forms with double series, sub-median; in forms with lateral pores, on side of median line toward the pore.

“Schluckorgan” always present. Vitelline glands with numerous follicles, situated in two more or less separated lateral fields nearly always dorsal and ventral, and usually in cortical layers. Eggs quite similar to those of *Fasciola*, but not always with operculum.

Family BOTHRIOCEPHALIDÆ, Cobbold, 1864.

= DIBOTHRIOCEPHALINÆ, Lühe, 1899.

With the characters of the order.

Sub-family (I) *LIGULINÆ*, Mont. & Crety, 1891.

General characters:—Scolex armed, short and three-cornered. Suckers small and feeble. Neck absent. External segmentation present or absent. Genitalia simple. Genital pores situated ventrally, posteriorly, or close together, approximately median. Testes dorsal. Ovary median and ventral. Shell gland median and dorsal. Vitelline glands lateral. Vas deferens dorsal, strongly coiled, and lying in front of the opening of the cirrus pouch, which latter is continuous with the vesicula seminalis which is always present. Eggs covered. Adults in water-birds. Larvae in coelom of Teleosts.

Genus *Ligula*, Bloch, 1782.

General characters:—Adult form only, segmented anteriorly. These segments, however, do not coincide with the inner segmentation of the genitalia. Suckers feebly developed. Larvae without suckers and unsegmented. Larvae in coelom of Cyprinoids. Adults in water-birds.

Ligula simplicissima, Rudolphi, 1802.

Several specimens:—

Z E V $\frac{4686-7}{7}$. No history.

Z E V $\frac{5147}{7}$. *Labeo rohita*. Berhampur, Bengal. T. Southwell.

Z E V $\frac{2382}{7}$. *Labeo rohita*. Calcutta. ?

Z E V $\frac{4695}{7}$. *Nemachilus rupicola*. Kurseong, E. Himalayas. F. H. Gravely.

Another specimen has lately been obtained by the writer from *Rasbora daniconius* from Sambalpur, Behar, June, 1913.

Synonymy:—

- Ligula intestinalis*, Gmel., 1790.
 „ *abdominalis* (Goeze, 1782), Gmel., 1790.
 „ *avium*, Bloch, 1782.
 „ *piscium*, Bloch, 1782.
 „ *monogramma*, Creplin, 1839.
 „ *diagramma*, Creplin; 1839.
 „ *uniserialis*, Rudolphi, 1810.

Literature:—

- Donnadieu, 1877. Zschokke, 1884.

Sub-family (II) *DIBOTHRIOCEPHALINAE*, Lühe, 1899.

Sub-family diagnosis:— Scolex unarmed; suckers either two small grooves (one dorsal and one ventral), or two funnel-shaped organs with highly developed borders, or, by coalescence of their borders changed to sucker-tubes, or rudimentary, and then replaced by an apical sucker. Neck present or absent. External segmentation complete. Genital organs single or double. Genital pores ventral, median or sub-median; cirrus, vagina and uterine pores in a longitudinal row, in order named; genital atrium, into which cirrus and vagina open, is provided with numerous papillae. Ovary ventral and shell gland dorsal, always median in forms with single sets of pores. Vitelline follicles always in cortical layer. Vas deferens very sinuous, running dorsally, and changing to a globular, or pyriform vesicula seminalis before opening into the cirrus pouch. Testicles in the medullary layer, for the greater part outside of the longitudinal bands. The vagina, extending ventrally, crosses the uterus near its pore, and widens to a receptaculum seminalis (the limits of which are not distinctly defined distally, but distinctly defined proximally) opposite the narrow and short seminal canal which unites with the oviduct to form the fertilization canal. Uterus often forms a "rosette." Eggs with operculum. Larval stages, for most species, unknown; adults in intestine of mammals, birds and reptiles.

(1) Genus *Duthiersia*, Perrier, 1873.

General characters:—The characteristic form of the head (three-cornered with the base anterior) is occasioned by the strongly curved funnel-shaped sucking organs. These are not perforated posteriorly as figures generally show, but are blind.¹ Neck absent. Yolk glands situated superficially. A sphincter vagina is present. Loops of the uterus not numerous, and on this account the rosette is seldom obvious. In *Varanus* spp.

Type-species *Duthiersia fimbriata* (Diesing, 1850) Mont. and Crety, 1891.

¹ See, however, Shipley, 1903. The perforations are quite distinct in our specimens.

Duthiersia fimbriata (Diesing, 1850), Mont. and Crety, 1891.

Four specimens:—

Z E V $\frac{3664}{7}$. *Varanus exacanthematicus*. Katagum, N. Nigeria. Dr. J. H. Ashworth.

(Two specimens, presented by Dr. Ashworth.)

Z E V $\frac{5506}{7}$. *Varanus* sp. Berhampur, Bengal. Major Clayton Lane, I.M.S.

Synonymy:—

Solenophorous fimbriatus, Diesing, 1854?.*Duthiersia expansa*, Perrier, 1873.*Duthiersia elegans*, Perrier, 1873.

Literature:—

Lühe, 1899. Perrier, 1873. Montecelli and Crety, 1891.

The head-folds in our specimens had become so contorted during preservation that the identification was somewhat difficult. A similar contortion is figured by Shipley (1903).

(2) Genus **Bothridium**, Blainville, 1824.

General characters:—Scolex with two muscular sucking tubes, bearing openings at their anterior and posterior ends, which have been developed from bothridia by the growth of their free edges. In their walls there is a sphincter for each opening. Neck short. The yolk glands lie chiefly between the inner and outer longitudinal muscles. Uterus does not form a "rosette," but consists of two large cavities, connected with a delicate passage.

Bothridium pithonis, Blainville, 1824.

Several hundred specimens.

Z E V $\frac{4667-8}{7}$. *Python reticularis*. Goalundo, E. Bengal. Purchased.Z E V $\frac{2772}{7}$. *Felis tigris*. Onchagaon, Naini Tal, U. P. R. Hodgart, Museum Collector.

(It appears certain that this tiger had been feeding on a python.)

Z E V $\frac{4681}{7}$. *Python molurus*. Nepal Terai. B. Warren.

Synonymy:—

Botrynocephalus pithonis (Retzius, 1830), Nordm, 1840.*Prodicoclia ditrema*, Lebland, 1836.*Solenophorus megalcephalus*, Creplin, 1839.

Literature:—

Blainville, 1828.

Sub-family (III) **PTYCHOBOTHRIINAE**, Lühe, 1899.

General characters:—Scolex unarmed with two flattish suckers, which may, however, possess accessory suckers, or may be modified by a proliferation of their edges. Neck absent. All the genital openings lie on the surfaces of the segments. The cirrus

and the vagina open dorsally, uterus ventrally. The latter is coiled and runs dorsally. A vesicula seminalis, situated outside the cirrus-sac, is absent. The vagina crosses the uterus, and in this way reaches the ventral surface. A separate receptaculum seminalis is usually absent. Ovary ventral, and, in the case of single genital organs, always median. Shell gland median and dorsal. Yolk glands lateral, or even on the edges. Testes lateral, a large part of them lie external to the longitudinal nerves, which latter are situated much further inwards. The uterus never forms a "rosette." Genitalia often double. Eggs thin-shelled and without cover. In fish.

(1) Genus **Bothriocephalus**, Rudolphi, 1808.

General characters:—Scolex long. Suckers weakly developed. Neck wanting. Segments incomplete. Yolk glands in skin layer. Ovary median, ventral. No receptaculum seminalis. Mouth of uterus ventral and median, both other openings dorsal and median.

Bothriocephalus (Anchistrocephalus) polyptera (Leyd),
1853.

Two slide specimens only.

ZEV ⁵¹⁹⁸/₇. *Labeo rohita* and *Ophiocephalus striatus*. Berhampur, Bengal. T. Southwell.

Literature:—

Lühe, 1899. Southwell, 1913.

Family MESOCESTOIDIDAE, Fuhrmann, 1907.

= MESOCESTOIDINAE, Lühe, 1894.

= MESOCESTOIDAE, Ariola, 1899.

Family diagnosis:—Taenioidea. Scolex without rostellum or hooks. Suckers unarmed. A single set of reproductive organs in each segment. Genital pores located in the ventral surface of the segment. Vagina opens in front of, or besides, the cirrus pouch. Eggs in gravid segments enclosed in a single thick-walled egg capsule. Adults in mammals and birds.

Type-genus *Mesocestoides*, Vaillant, 1863.

(1) Genus **Mesocestoides**, Vaillant, 1853.

= *Monodoridium*, Walter, 1866 (type *Taenia utriculifera*, Walter, 1866).
= *Ptychophysa*, Hamann, 1885 (type *Taenia canis-lagopodis*, Rudolphi, 1810).

Generic diagnosis:—Mesocestoididae, with the characters of the family. Adults in mammals and birds.

Type-species *Mesocestoides ambiguus*, Vaillant, 1863.

Mesocestoides lineatus (Goeze, 1782), Railliet, 1893.

One specimen, without head, probably from the Zoological Gardens, Calcutta.

Z E V $\frac{1683}{7}$. *Felis tigris*. ? ?.

Synonymy:—

- Taenia canis-lagopodis*, Rudolphi, 1810.
 ,, *pseudo-cucumerina*, Baillet, 1863.
 ,, *pseudo-elliptica*, Baillet, 1863.
Ptychophysa lineata (Goeze, 1782), Hamann, 1885.

Literature:—

Ransom, 1909. Lühe, 1894. Ariola, 1899. Fuhrmann, 1907. Walter, 1866. Hamann, 1885.

Family ANOPLOCEPHALIDAE, Fuhrmann, 1907.

Family diagnosis:—Taenioidea. Scolex unarmed, without rostellum. Suckers relatively large, unarmed. Neck absent. Segments usually broader than long. A single or double set of reproductive organs in each segment. Genital pores marginal and bilateral, unilateral, or irregularly alternate or (?) absent. Testicles numerous or rarely (*Triplotaenia*) one in each lateral half of the segment. Median axis of female glands lateral of the median axis of segment. Uterus persistent, and transversely elongated, either tubular, sac-like, branched or reticular; or not persistent replaced by egg capsules whose formation may, or may not, be preceded by the appearance of para-uterine organs. Eggs with thin transparent shells, with or without a pyriform apparatus. Adults in mammals and birds.

Sub-family (I) ANOPLOCEPHALINAE, Blanchard, 1891.

Sub-family diagnosis:—Anoplocephalidae. Uterus persistent and tubular, sac-like, branched or reticular. Adults in mammals and birds.

Type-genus *Anoplocephala*, E. Blanchard, 1848.

Genus *Anoplocephala*, E. Blanchard, 1848.

= *Plagiotaenia*, Peters, 1871 (type *Taenia gigantea*, Peters, 1857).

Generic diagnosis:—Anoplocephalinae. Segments usually much broader than long, occasionally longer than broad. A single set of reproductive organs in each segment. Genital pores unilateral, or irregularly alternate. Genital canals pass on the dorsal side of the longitudinal excretory vessels and nerve. Testicles and female glands in the median field; female glands toward the pore side of the segment, testicles toward the opposite side. Uterus a transversely elongated sac with pocket-like appendages, anteriorly and posteriorly. Eggs with well-developed pyriform apparatus. Adults in mammals.

Type-species *Anoplocephala perfoliata* (Goeze, 1782), E. Blanchard, 1848.

(1) *Anoplocephala plicata* (Zed., 1800), R. Blanchard, 1891.

One specimen:—

Z E V $\frac{467.0}{7}$. Horse (*Equus caballus*). Lahore. Punjab Civil Veterinary Department.

Synonymy:—

Taenia plicata (Zed., 1800), Rudolphi, 1805.

„ *equina*, Pallas, 1781.

„ *magna*, Abeldg. in Mueller, 1789.

Alyselminthus plicatus, Zeder, 1800.

Literature:—

Rudolphi, 1810. Neumann, 1892.

(2) *Anoplocephala gigantea* (Peters, 1856), R. Blanchard, 1891.

Five specimens:—

Z E V $\frac{467.0}{7}$. *Rhinoceros unicornis*. Janakpur, Nepal Terai. Museum Collector, R. Hodgart.

Synonymy:—

Taenia gigantea, Peters, 1857.

Plagiotaenia gigantea, Peters, 1871.

Literature:—

Peters, 1857 and 1871.

Sub-family (II) *THYSANOSOMINAE*, Fuhrmann, 1907.

Sub-family diagnosis:—Anoplocephalidae. Uterus transversely elongated, consisting of several or numerous communicating sacs, with parenchymatous para-uterine organs, into which the eggs probably pass in the oldest segments. Adults in mammals.

Type-genus *Thysanosoma*, Diesing, 1835.

(1) Genus *Thysanosoma*, Diesing, 1835.

Generic diagnosis:—Thysanosominae. Segments much broader than long, end segments only showing a tendency to become longer and narrower. A double set of reproductive organs, but only a single uterus in each segment, with opposite, or with irregularly alternating pores, those of one side, with the corresponding cirrus pouch, ovary, and vagina having been suppressed. Genital canals pass between the longitudinal excretory vessels, and dorsal of the nerve. Uterus transverse, undulating, composed of numerous ascon-like pouches, each supplied with a para-uterine organ. Horns of pyriform apparatus absent. Adults in mammals (ruminants).

Type-species *Thysanosoma actinioides*, Diesing, 1835.

Thysanosoma actinioides, Diesing, 1835.

Two specimens:—

Z E V $\frac{4680}{7}$. *Rhinoceros sondiacus*. ? ?

Synonymy:—

Taenia fimbriata, Diesing, 1850.

Literature:—

Curtice, 1890.

(2) Genus **Cittotaenia**, Riehm, 1881.= *Ctenotaenia*, Railliet, 1893 (type *Taenia marmotae*, Frolich, 1802).= *Coelodela*, Shipley, 1900 (type *Coelodela kuvvara*, Shipley, 1900). (See also Fuhrmann, 1902).

Generic diagnosis:—Anoplocephalinae. Segments broader than long. Two sets of reproductive organs in each segment. Genital pores bilateral. Genital canals pass dorsal of longitudinal excretory vessels and nerves. Interproglottidal glands absent. Vagina ventral of cirrus pouch on both sides of segment. Uterus single or double (one on each side of median line), transversely elongated, tubular generally, with simple anterior and posterior outpocketings. Eggs with well-developed pyriform apparatus, the horns of which are long, crossing each other, or in some cases without this apparatus (see Fuhrmann, 1902, p. 142). Adults in mammals and birds.

Type-species *Cittotaenia latissima*, Riehm, 1881 = *Cittotaenia denticulata* (Rudolphi, 1804), Stiles and Hassall, 1896.

(i) **Cittotaenia bursaria**, Linstow, 1906.

Several specimens:—

Z E V $\frac{2171}{7}$. *Lepus ruficaudatus*. Songara, Gondar Dist., U.P. Museum Collector, R. Hodgart.

Literature:—

Linstow, 1906.

(ii) **Cittotaenia pectinata** (Goeze, 1782, *partim*, Riehm, 1881), Stiles and Hassall, 1896.

Several specimens:—

Z E V $\frac{5510}{7}$. Hare (*Lepus ? hispidus*). Berhampur, Bengal. Major Clayton Lane, I.M.S.

Literature:—

Goeze, 1782. Riehm, 1881. Stiles and Hassall, 1896.

Family HYMENOLEPIDIDAE, Railliet and Henry, 1909.

=HYMENOLEPIDAE, Ariola, 1899 (type-genus *Hymenolepsis*).=ECHINOCOTYLIDAE, Ariola, 1899 (type-genus *Echinocotyle*).=DILEPINIDAE, Fuhrmann, 1907 (type-genus *Dilepis*).

Family diagnosis:—Taenioidea. Scolex with an armed rostellum, or without rostellum. Hooks on rostellum not hammer shaped. Suckers usually unarmed. A single, or rarely a double set of reproductive organs in each segment. Genital pores marginal and bilateral, unilateral, or regularly or irregularly alternate. Egg with thin transparent shell. Adults in birds, mammals, reptiles and amphibia.

Type-genus *Hymenolepis*, Weinland, 1858.

Sub-family (I) *DIPYLIDIINAE*, Stiles, 1896.

- =Rhynchotaenia, Diesing, 1850.
- =Malacolepidota, Weinland, 1858.
- =Cystoideae, Leuckart, 1863.
- =Cystoidotaeniae, Railliet, 1886.
- =Microtaenia, Claus, 1891.
- =Dipylidinae, Railliet, 1896.
- =Dilepininae, Fuhrmann, 1907.
- =Dilepidinae, Railliet and Henry, 1909.

Sub-family diagnosis:—Hymenolepididae. Rostellum armed or rarely absent. Suckers unarmed. A single set, or rarely a double set of reproductive organs in each segment. Uterus sac-like, simple or lobulated, or not persistent, breaking down into numerous egg capsules, each containing one or several eggs. Para-uterine organs not developed. Adults in birds, mammals and reptiles.

Type-genus *Dipylidium*, Leuckart, 1863.

Genus *Dipylidium*, Leuckart, 1863.

Generic diagnosis:—Dipylidiinae. Rostellum armed with several rings of rose-thorn hooklets, which usually have a discoidal base. Suckers unarmed. Gravid segments generally longer than broad. A double set of reproductive organs in each segment. Genital pores double and opposite. Testicles very numerous and scattered throughout entire medullary parenchyma. Vas deferens coiled, seminal vesicle absent. Uterus at first reticular, later breaking up into egg capsules, each containing one or more eggs. Eggs with two shells. Adults in mammals and birds.

Type-species *Dipylidium caninum* (Linn.), 1758.

Dipylidium caninum (Linn., 1758).

Numerous specimens:—

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| Z E V $\frac{5505}{7}$. | Dog (<i>Canis familiaris</i>) | ? | ? |
| Z E V $\frac{5507}{7}$. | Dog (<i>Canis familiaris</i>). | Colombo, Ceylon. | T. Southwell. |
| Z E V $\frac{2979}{7}$. | Cat (<i>Felis domestica</i>). | Egypt. | London School of Tropical
Medicine. |
| Z E V $\frac{4975}{7}$. | Dog (<i>Canis familiaris</i>). | Lahore, Punjab. | Punjab Civil
Veterinary Department. |

Synonymy :—

- Alyselminthus ellypticus* (Batsch, 1786), Zeder, 1800.
Cryptocystis trichodectis, Villot, 1882.
Halysis ellyptica (Batsch, 1786), Zed., 1803.
Taenia canina, Linn., 1758.
 „ *cateniformis*, Goeze, 1782.
 „ *cateniformis-canina* (Linn., 1758), Gmel., 1790.
 „ *ccteniformis-felis*, Gmel., 1790.
 „ *cucumerina*, Bloch, 1782.
 „ *elliptica*, Goeze, 1782.
 „ *moniliformis*, Pallas, ? 1781.

Literature :—

Linnaeus, 1758. Neumann, 1892.

Sub-family (II) *PARUTERININAE*, Ransom, 1909.

= Paruterinae, Fuhrmann, 1907.

Sub-family diagnosis:—Hymenolepididae. Scolex usually armed, rarely without rostellum. A single (double in *Stilesia*, provisionally placed by Ransom in this sub-family) set of reproductive organs in each segment. Uterus simple or double, with a single para-uterine organ, or multiple with several para-uterine organs, into which the eggs pass in the final stage of development of the segment. Adults in birds and amphibia (*Stilesia* in mammals).

Type-genus *Paruterina*, Fuhrmann, 1906.

Genus *Stilesia*, Railliet, 1893

Generic diagnosis:—(?) Paruterininae. Head unarmed, without rostellum. Neck present. Segments broader than long. A double set of reproductive organs in each segment, with opposite pore, or with irregularly alternating pore, those on one side with the corresponding cirrus pouch, vagina and ovary having been suppressed, both of which conditions may occur in the same stobila. Genital canals pass between the longitudinal excretory vessels and dorsal of the nerve. Dorsal excretory vessel a considerable distance mediad from the ventral vessel. Testicles relatively few (six to twelve in each set), in the lateral portions of the segment in the neighbourhood of the longitudinal excretory vessel. Ovary small, globose, between the dorsal and ventral excretory vessel on pore side of segment. Yolk glands not apparent. Uterus small, spherical, sac-like, one in each lateral half of the segment between the dorsal and ventral excretory vessels. When the ovary is absent from one side eggs from the opposite side of the segment appear to pass across through the median field, in a manner not understood, and enter the uterus of the side in which the ovary is lacking. Immediately anterior and mediad of each uterus, a para-uterine organ develops, into which the eggs probably pass. Eggs with two envelopes. Adults in mammals (ruminants).

Type-species *Stilesia globipunctata* (Rivolta, 1874), Railliet, 1893.

Stilesia globipunctata (Rivolta, 1874), Railliet, 1893.

A few specimens:—

Z E V $\frac{5511}{7}$. Goat (*Capra hircus*). Kasauli. Major Clayton Lane, I.M.S.

Z E V $\frac{4673}{7}$. Sheep (*Ovis aries*). Lahore, Punjab. Punjab Civil Veterinary Department.

Synonymy:—

Taenia globipunctata, Rivolta, 1874.

Literature:—

Curtice, 1890.

Family DAVAINIÆ, Fuhrmann, 1907.

Family diagnosis:—Taenioidea. Scolex with simple rostellum, armed with double row (rarely a simple row) of very numerous (and generally very small) hammer-shaped hooks. Suckers armed, or, rarely unarmed. A single or double set of reproductive organs in each segment. Genital pores marginal, and bilateral, unilateral, or alternating. Uterus sac-like, persisting, or sac-like or branched not persistent, replaced either by numerous egg capsules, or by a single egg capsule, whose formation is preceded by the appearance of a para-uterine organ. Egg with thin transparent shell. Adults in mammals and birds.

Type-genus *Davainea*, Blanchard and Railliet, 1891.

Sub-family OPHRYOCOTYLINÆ, Fuhrmann, 1907.

Sub-family diagnosis:—Davaineidae. Rostellum very broad, armed with a double row of hooks on the border. Surface of suckers armed only near the anterior border. A single set of reproductive organs in each segment. Genital pores irregularly alternate. Uterus sac-like, slightly bilobed, persistent. Adults in birds.

Type-genus *Ophryocotyle*, Friis, 1870.

Genus *Ophryocotyle*, Friis, 1870.

Generic diagnosis:—Ophryocotylinæ, with the characters of the sub-family.

Type-species *Ophryocotyle proteus*, Friis, 1870.

Ophryocotyle bengalensis, Southwell, 1913.

About 60 specimens:—

Z E V $\frac{5102}{7}$. *Labeo rohita* and *Ophiocephalus striatus*. Berhampur, Bengal ... T. Southwell. (TYPES).

Z E V $\frac{5110}{7}$. *Wallago attu*. Berhampur, Bengal ... T. Southwell.

Literature:—

Southwell, 1913. See also Friis, 1870. Fuhrmann, 1908. Fuhrmann, 1909.

The occurrence of a species of *Ophryocotyle* in a fish is remarkable, as this genus has, up to the present, only been recorded from birds. The species is placed provisionally in this genus pending a more careful anatomical examination than has been found possible up to the present.

Family TAENIIDAE, Ludwig, 1886.

Family diagnosis:—Taenioidea. Scolex usually with well-developed rostellum, armed with a double crown of hooks, rarely with rudimentary unarmed rostellum. Suckers unarmed. Gravid segments longer than broad. A single set of reproductive organs in each segment. Genital pores irregularly alternate. Vas deferens coiled. Seminal vesicle absent. Testicles numerous, usually very numerous, and scattered throughout the medullary parenchyma, except in the posterior median portion, occupied by the double ovary, posterior of which is the double yolk gland. Uterus with median stem, and, when fully developed, with lateral branches. Eggs with a thin outer membrane, and a thick brown radially-striated inner shell. Adults in mammals and birds.

Type-genus *Taenia*, Linnaeus, 1758.

Genus *Taenia*, Linnaeus, 1758.

Generic diagnosis:—Taeniidae, with the characters of the family. Adult in mammals and birds.

Type-species *Taenia solium*, Linnaeus, 1758.

(i) *Taenia saginata* (Goeze, 1782), Leuck., 1867.

Two specimens:—

Z E V $\frac{1180}{7}$.	Man.	Calcutta.	Major L. Rogers, I.M.S.
Z E V $\frac{4690}{7}$.	Man.	Calcutta.	?

Synonymy:—

- Taenia solium* var. *mediocanellata*, Kuech., 1854.
- „ *dentata*, Batsch, 1786.
- „ *tropica* (Schmidtmueller, 1847), Moq.-Tandon, 1860.
- „ *mediocanellata*, Kuechenmeister, 1852.
- „ *cucurbitina*, Pallas, 1766.
- „ *inermis*, Laboulbène, 1876.
- „ *lata*, Moq.-Tandon, 1860.

Literature:—

Goeze, 1782. Leuckart (Hoyle's translation), 1886.

(ii) *Taenia solium*, Linnaeus, 1758.

One specimen, fragmented.

Z E V $\frac{4688}{7}$.	Man.	Calcutta.	?
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Synonymy:—

- Taenia cucurbitina*, Pallas, 1766.
 ,, " *plana pellucida*, Goeze, 1782.
 ,, *dentata*, Batsch, 1786.
 ,, *vulgaris*, Linnaeus, 1758.
 ,, *humana armata*, Rudolphi, 1810 ?.
Halysis solium (Linn., 1758), Zeder, 1803.

Literature:—

Leuckart (Hoyle's translation), 1886.

(iii) *Taenia echinococcus*, Von Siebold, 1853.

One specimen:—

Z E V $\frac{5509}{7}$. *Canis familiaris*. Berhampur, Bengal. Major Clayton Lane, I.M.S.

For synonymy see Stiles and Hassall, 1898.

Literature:—

Von Siebold, 1853.

(iv) *Taenia serialis* (Gerv., 1847), Baillet, 1863.

Numerous specimens:—

Z E V $\frac{4671}{7}$. *Canis familiaris*. Lahore, Punjab. Civil Vety. Department.
 Z E V $\frac{5506}{7}$. *Canis familiaris*. Angul, Orissa. Vety. Asstt., Angul.

For synonymy see Stiles and Stevenson, 1905.

Literature:—

Baillet, 1863. Neumann (Fleming's translation), 1892.

(v) *Taenia serrata*, Goeze, 1782.

Several specimens:—

Z E V $\frac{4669}{7}$. *Canis familiaris*. Lahore, Punjab. Civil Vety. Depart.
 Z E V $\frac{4682}{7}$. *Felis tigris*. Burduar, Nepal Terai. B. Warren.
 Z E V $\frac{4685}{7}$. *Canis aureus*. Museum compound, Calcutta.

For synonymy see Stiles and Stevenson, 1905.

Literature:—

Goeze, 1782. Neumann (Fleming's translation), 1892.

LARVAL FORMS OF THE GENUS *Taenia*, Linn.(I) *Coenurus serialis*, Gervais, 1847.

(Larval form of *Taenia serialis*, Baillet.)

One large specimen:—

Z E V $\frac{4676}{7}$. Goat (*Capra hircus*). Lahore, Punjab. Punjab Civil Veterinary Department.

Synonymy:—

- (a) Adult. *Taenia coenuri-canicula*, Diesing, 1864.
 (b) Larva. *Coenurus-cerebralis leporis-canicula*, Diesing, 1863.

Literature:—

Gervais, 1847.

(2) *Cysticercus tenuicollis*, Rudolphi, 1810.

(Larval form of *Taenia marginata*, Batsch.)

One very large specimen:—

Z E V $\frac{4674}{7}$. Sheep (*Ovis aries*). Lahore, Punjab. Punjab Civil Veterinary Department.

For synonymy see:—

Stiles and Stevenson, 1905.
 Stiles and Hassall, 1912, except in the case of *Cysticercus cellulosae*.

Literature:—

Rudolphi, 1810. Neumann, 1892.

(3) *Cysticercus fasciolaris*, Rudolphi, 1808.

(Larval form of *Taenia crassicollis*, Rudolphi.)

About 10 specimens:—

Z E V $\frac{4367}{7}$. *Mus decumanus*. Calcutta?. Col. A. Alcock, I.M.S.
 Z E V $\frac{4672}{7}$. *Mus rattus*. Lahore, Punjab. Punjab Civil Veterinary Department.
 Z E V $\frac{4689}{7}$. No history.

For synonymy see:—

Stiles and Stevenson, 1905. Stiles and Hassall, 1912.

(4) *Cysticercus pisiformis*, Zeder, 1803.

(Larval form of *Taenia serrata* (Goeze)).

Very numerous specimens:—

Z E V $\frac{5146}{7}$. *Mus rattus?* Berhampur, Bengal. Major Clayton Lane, I.M.S.
 Z E V $\frac{927}{7}$. *Mus rattus?* Calcutta. Major R. Milne, I.M.S.
 Z E V $\frac{4677-8}{7}$. *Mus rattus* (liver). Amritsar, Punjab. Capt. G. I. Davys, I.M.S.

For synonymy see:—

Stiles and Stevenson, 1905. Stiles and Hassall, 1912.

Literature:—

Zeder, 1803. Neumann, 1892.

(5) *Cysticercus cellulosae* (Gmel., 1790), Rudolphi, 1808.

(Larval form of *Taenia solium*, Linn., 1758.)

Several specimens:—

Z E V $\frac{5927}{7}$. Human brain. Ceylon. Medical College, Colombo.
 Z E V $\frac{5929}{7}$. *Bos taurus* (muscles). Ceylon. T Southwell.

Synonymy:—

- Cysticercus albopunctatus* (Treutler, 1793), Zed., 1803.
 „ *pyriformis*, (Treutler, 1793), Zed., 1803.
 „ *finna* (Gmel., 1790), Zed., 1803.
Finna humana, Fisher in Werner, 1786.
Hydalis finna (Gmel., 1790), Bosc, 1802.
Taenia albopunctata, Treutler, 1793.
 „ *cellulosae*, Gmel., 1790.
 „ *finna*, Gmel., 1790.
 „ *hydatigena-anomala*, Steinbuch, 1801.
 „ *hydatigena-suilla*, Fischer of Chiaje, 1825.
 „ *muscularis*, Joerdens, 1802.
 „ *pyriformis*, Rudolphi, 1810.
 ? *Vermes vesicularis*, Bloch, 1780.
Vesicaria finna (suilla), Schrank, 1793.
 „ *hygroma (humana)*, Schrank, 1793.
 „ *lobata*, Fabr., 1783.

Literature:—

Stiles, 1906.

The occurrence of *Cysticercus cellulosae* in the muscles of the cow is somewhat remarkable, and, as far as I have been able to ascertain, this is the first record for this host. My first impression was that these cysts were those of *C. bovis*, but subsequent examination showed that the head was armed.

- (6) **Echinococcus granulosis** (Batsch, 1786), Rudolphi, 1805.
 (Larval form of *Taenia echinococcus* (Zed., 1803), Siebold, 1853.)

One specimen:—

Z E V $\frac{5928}{7}$. Lungs of *Bos taurus*. Colombo, Ceylon. T. Southwell.

For the synonymy, which is very extensive, see:—

Stiles and Hassall, 1905. Stiles, 1906.

Literature:—

Stiles, 1906.

Order **TRYPANORHYNCHA**, Dies., 1863.

General characters:—Head with two or four bothridia and with four retractile and armed proboscides. Segmentation complete. Segments detach themselves usually before fully ripe. Genital pores marginal or sub-marginal. Uterus opening? Genitalia as in the Tetrphyllidea. Larvae in various marine animals. Adults mostly in gut of Plagiostomes.

(I) Genus **Rhynchobothrium**, Rudolphi, 1819.

Tetrarhynchus of authors.

General characters:—Body taeniaeform. Neck tubular. Head continuous with neck, with two opposite bothridia, parallel or converging at the apices, lateral or marginal, entire or undivided, or, either bilocular with a longitudinal partition, or

bilobed or divided. Proboscides four, terminal, armed, retractile in the neck, for the most part longer than the head. Genital apertures, male marginal, female lateral, or male and female marginal, approximate.

I. *Rhynchobothrium* sp.

Numerous specimens:—

Z E V $\frac{5914}{7}$. *Cybbium guttatum*. Puri, Orissa. T Southwell.

Literature:—

Southwell, 1912 and 1913.

II. *Rhynchobothrium* sp.

Numerous specimens:—

Z E V $\frac{5917}{7}$. *Serranus undulosus*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

III. *Rhynchobothrium* sp. I.

Numerous specimens:—

Z E V $\frac{5915}{7}$. *Cybbium guttatum* and *Chorinemus lysan*.
Pearl Banks, Ceylon T. Southwell.

Literature:—

Southwell, 1912 and 1913.

IV. *Rhynchobothrium* sp. II.

Numerous specimens:—

Z E V $\frac{5919}{7}$. *Lutianus argentimaculatus*,
Drepane punctata,
Diagramma sp.
Serranus undulosus. } Pearl
Banks, Ceylon. T Southwell.

Literature:—

Southwell, 1912.

V. *Rhynchobothrium* sp. III.

Numerous specimens:—

Z E V $\frac{5916}{7}$. *Balistes*, sp. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

VI. *Rhynchobothrium* spp. A, B, & C.

Few specimens:—

Z E V $\frac{5918}{7}$. *Serranus undulosus*,
Lutianus gibbus,
Psettodes erumei. } Pearl Banks, Ceylon. T Southwell.

Literature:—

Southwell, 1912.

The above species appear to differ from those described by Shipley and Hornell (1906) from the same region, and from the same species of fish.

(II) Genus **Tetrarhynchus**, Rudolphi, 1809.

=*Tetrarhynchobothrium*, Diesing, 1850.

General characters:—Body articulate, taeniaeform. Neck tubular. Head with four bothridia in two lateral pairs, parallel with the head. Proboscides four, terminal, filiform, armed, retractile in the neck, free, *i.e.* not running through the bothria. Genital apertures marginal or lateral.

(1) **Tetrarhynchus gangeticus**, Shipley and Hornell, 1906.

Larvae. About 100 specimens.

Z E V $\frac{5920}{7}$. *Sphyraena jello*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Shipley and Hornell, 1906. Southwell, 1912.

(2) Larva of **Tetrarhynchus platycephalus**, Shipley and Hornell, 1906.

Few specimens:—

Z E V $\frac{5921}{7}$. *Trygon walga*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Shipley and Hornell, 1906.

(3) **Tetrarhynchus** sp.

Larvae. Numerous specimens:—

Z E V $\frac{5922}{7}$. *Balistes* sp. Pearl Banks, Ceylon. T. Southwell.

(4) **Tetrarhynchus** sp.

Larvae. Many specimens:—

Z E V $\frac{5923}{7}$. *Lutianus* sp. Pearl Banks, Ceylon. T. Southwell.

(5) **Tetrarhynchus** sp.

Larvae. Many specimens:—

Z E V $\frac{5924}{7}$. *Serranus undulosus*. Pearl Banks, Ceylon. T. Southwell.

(III) Genus **Otobothrium**, Linton, 1891.

General characters:—Body articulate, taeniaeform, head separated from body by a neck. Bothridia two, opposite, lateral,

each with two supplemental ciliated pits at the posterior free angles. Proboscides four, terminal, filiform, armed, retractile in neck. Reproductive apertures marginal.

Larva of *Otobothrium insigne*, Linton, 1905.

Many specimens:—

Z E V $\frac{5925}{7}$.	<i>Diagramma crassispinum,</i>	} Pearl Banks, Ceylon ... T. Southwell.
	<i>Serranus undulosus,</i>	
	<i>Balistes</i> sp.	

Literature:—

Linton, 1887. Southwell, 1912.

(IV) Genus *Syndesmobothrium*, Diesing, 1854.

=*Synbothrium*, Diesing, 1850.

General characters:—Body articulate, taeniaeform, neck tubular, rounded at base. Head tetragonal, with four terminal prominent bothridia, attached to head by posterior margin, cruciformly disposed, oval, slightly curved, joined with each other at the base by a membrane. Proboscides four, filiform, armed, each one running through a bothridium (pedicel) excurrent at apex, long, retractile in the neck. Genital apertures marginal (?).

Syndesmobothrium filicolle, Linton, 1889.

Larvae. Few specimens.

Z E V $\frac{5926}{7}$. *Clupea ilisha*. Calcutta. T. Southwell.

This species was also obtained from the mesenteries of *Cybium guttatum* and *Chorinemus lysan* in Ceylon waters.

Literature:—

Linton, 1887. Southwell, 1912.

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