
By R. D. Vidyarthi, B.Sc. (Hons.), M.Sc.
(From the Department of Zoology, University of Allahabad.)

Received April 9, 1937.
(Communicated by Prof. C. R. Narayan Rao, M.A.)

1. Apatemon indicus n. sp.
(Fig. 1.)

The mature worms, 2.5-2.88* in length are distinctly divided into fore and hind parts. The forebody is deeply cup-shaped, 0.912 long and 0.484 broad, across the acetabulum. The hindbody of 1.872-2.972 length and 0.88-0.92 width is somewhat attenuated at both the ends and much flexed dorsally.

The oral sucker is transversely elongated and terminal, measuring 0.128-0.134 × 0.174 in size. The acetabulum is much larger than the oral sucker and situated dorsally, a little behind the equator of the forebody, measuring 0.24 in diameter. The holdfast organ is well developed and composed of an inner and outer lamellae which usually project beyond the rim of the forebody, measuring 0.864 in length and 0.512 in width. The prepharynx is very small, visible in sections only. The pharynx is transversely oval and muscular, measuring 0.066 in length and 0.075 in width. The short oesophagus bifurcates much in front of the equator of the forebody into two simple cæca which run backwards more or less parallel to one another on either side of the acetabulum by which they are partly overlapped. Behind the latter they bend ventrally and then run ventro-laterally in the hindbody through the dense mass of the vitelline follicles terminating near the genital atrium.

The massive and kidney-shaped testes lie in tandem dorsally to the main mass of the vitellaria and the intestinal cæca. The anterior testis, 0.528-0.576 in length and 0.592-0.64 in width, is somewhat broader than long. The posterior testis, 0.624-0.672 long by 0.592-0.72 broad, is somewhat smaller. The vasa efferentia arise from the anterior concavity of their respective testes and unite just in front of the anterior testis to form the vas deferens, which dilates postero-dorsally to the second testis to form the voluminous S-shaped vesicula seminalis.

* All measurements are in mm.
FIG. 1.

The ovary is spherical or oval, 0.272 in diameter, and situated close in front of the anterior testis and 0.128 mm. behind the body constriction. The shell gland lies between the two testes. The uterus runs forwards almost to the anterior extremity of the hindbody and there it bends on itself to continue its downward course as a slightly sinuous descending limb, which lies ventrally to the gonads. Its distal part along with the terminal portion of the ductus ejaculatorius, opens at the apex of the small, rather undifferentiated genital cone, which, however, can be protruded out of the genital atrium. The ova are large, operculate and a few in number, measuring 0.1–0.116 x 0.053 in size. The vitelline follicles are exclusively confined to the hindbody, extending from the body constriction or a little behind it to the posterior end. The great bulk of the vitelline follicles lies ventrally partly overlapping the gonads. The vitelline reservoir lies in the inter-testicular space, close in front the of posterior testis.

Remarks.—Apatemon indicus n. sp. differs from the three Japanese species, A. pellucidus, A. minor and A. fuligulce, described by Yamaguti in 1933, in size of acetabulum, and position and size of the gonads. It is distinguished from A. gracilis (Rud., 1819) Szidat 1929 and A. graciliformis Szidat 1929, by the size of the body, position and size of the gonads, size of the acetabulum, and size of the ova. It also differs from A. spherocephalus (Brandes, 1888) Szidat 1929, in the size of the acetabulum and the pharynx, position and size of the gonads, and above all in the shape of the...
forebody. It has not been compared to *A. Japonicus* Ishii 1934, the description of which is not available to me.

**Host**... *Casarca ferruginea*, small intestine.

**Locality**... Allahabad, U.P. (India).

2. *Apatemon casarcus* n. sp.

(Fig. 2.)

Sexually mature worms have smooth integument and, feebly developed musculature measuring 2.4–2.8 in length. The body is distinctly divided into two parts. The deeply cup-shaped forebody measures 0.88–0.96 in length and 0.672 in width, across the acetabulum; the cylindrical hindbody is of 1.52–1.84 length and 0.704–1.28 width. The ratio in the length of the fore and hind parts is approximately 1:2.

The oral sucker is oval and terminal measuring 0.1–0.165 in length and 0.135–0.15 in width. The sub-median acetabulum, 0.18–0.2 long and 0.21–0.24 broad, lies a little in front of the equator of the forebody. The holdfast organ, as in other species of this genus, consists of two well-developed lappets, which nearly occupy the whole width of the forebody,
projecting a little beyond the anterior margin of the forebody. The adhesive gland lies at the base of the holdfast organ. The prepharynx is absent; the pharynx is muscular, spherical and 0.069 in diameter. The short oesophagus forks, much in front of the acetabulum, into two simple cæca which terminate in the sub-caudal region.

The gonads occupy the middle of the hindbody. The two testes are asymmetrically bilobed and lie tandem near the dorsal side, close behind one another. The anterior testis measures 0.24–0.352 x 0.24–0.432 and the posterior 0.363 x 0.43. The vesicula seminalis is S-shaped, very voluminous and situated postero-dorsally to the hinder testis.

The transversely elongated ovary of 0.176 length and 0.256 width lies just in front of the anterior testis and approximately 0.32 behind the anterior extremity of the hindbody. The shell gland complex lies between the testes. The thin-walled uterus extends in front of the ovary upto about half the distance between it and the body constriction. The terminal portion of the uterus and the distal part of the ejaculatory duct open into a shallow genital cone, which only slightly protrudes out of the genital atrium. The vitelline follicles are exclusively confined to the hindbody, being specially well developed on the ventral side in front of the ovary. They partly overlap the gonads extending posteriorly to half the distance between the posterior margin of the second testis and the posterior extremity of the hindbody. The vitelline reservoir is inter-testicular. The dorsolateral musculature and the excretory system are feebly developed.

Remarks.—*Apatemon casarcus* n. sp. differs from all the six species so far described, in the peculiar shape of the testes. It, however, stands closest to *Apatemon fuligula* Yamaguti, 1933 on account of the resemblance in the form and size of its body, ratio in the length of the fore and hind parts, size of the oral sucker and pharynx and the extent of the vitellaria. But it differs from it in the large size of the acetabulum, shape and size of the testes and the ovary, and the feeble development of the dorsolateral musculature and the excretory system.

<table>
<thead>
<tr>
<th>Host</th>
<th>Casarca ferruginea, small intestine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locality</td>
<td>Allahabad, U.P. (India).</td>
</tr>
</tbody>
</table>

3. *Pseudostrigea sarcogyponis* n. sp. (Fig. 3.)

The aspinose body, 4.38–6.48 in length, is distinctly divided into fore and hind parts. The forebody is usually deeply cup-shaped with a wide opening and measures 1.408–1.712 in length and 1.264–1.52 in width.
The hind body is $2.736 \times 1.0 - 1.312$, greatly flexed dorsally, sharply constricted off from the forebody and truncated at the posterior extremity. The ratio in the length of fore and hind parts is $1:2$. At the anterior end of the body there are two prominent suckorial pockets, one on each side of the oral sucker. The muscle fibres, originating from the thick cuticular wall of the pockets, are strongly developed forming a pair of longitudinal bundles, which are characteristically disposed in both the fore and hind bodies. They extend on either side of the acetabulum and after entering the hind body run dorso-laterally giving off at intervals a number of lateral branches postero-ventrally; only a few fibres, however, reach the posterior extremity of the hindbody.

The oral sucker, $0.224 \times 0.192$, is oval and terminal in position. The prepharynx is absent. The elongated muscular pharynx, $0.12$ long by $0.087$ broad, is much smaller than pharynx. The simple intestinal cæca run dorsally more or less parallel to one another on either side of the acetabulum and at the junction of the fore and hind parts they pass almost ventrally,
running posteriorly through the dense mass of the vitelline follicles to near
the base of the genital atrium. The more or less spherical acetabulum,
0.288–0.304 in diameter, lies immediately behind the equator of the fore
body. The ratio in the diameters of the two suckers is approximately 1 : 2.
The somewhat cuboidal holdfast organ, 1.088 in length and 1.024 in width,
lies behind the pharynx, and consists of a broader outer and a smaller inner
lobe. The basal portions of these lamellae are thicker and broader and are
fused ventrally nearly at the level of the posterior margin of the acetabulum.
The adhesive gland lies median close behind the holdfast organ, at the
junction of the fore and hind parts.

The genital organs, including the uterine coils and the vitellaria, are
confined to the hindbody. The two large and multilobulated testes are
placed one in front of the other behind the middle of the hindbody. The
anterior testis is slightly smaller than the posterior one and measures 0.512–
0.576 in length and 0.768–0.968 in width. The posterior testis is 0.608–
0.672 × 0.768–1.072 in size. The vasa efferentia arise from the antero-
ventral margin of their respective testes and join cephalad to the anterior
testis to form the vas deferens which runs posteriorly, ventral to the testes.
The voluminous S-shaped vesicula seminalis lies behind the posterior testis
close to the dorsal body wall and continues behind into a short but well-
developed ejaculatory duct, which is surrounded by a strong circular and
a weak longitudinal layer of muscle fibres. The ejaculatory duct at its ter-
rnal end with the end-part of the uterus runs through the genital cone,
which projects more or less distinctly into the spacious genital atrium. The
latter is clearly differentiated from the surrounding parenchyma and measures
0.56 in length and 0.592 in width.

The slightly lobed ovary, 0.224–0.32 long by 0.278–0.464 broad, lies
median in front of the anterior testis, dorsal to the uterine coils, large mass
of the vitelline follicles, and the intestinal cæca. The oviduct arises from
its postero-dorsal side and runs posteriorly after forming a few convolutions.
The Laurer's canal arises from the oviduct soon after its origin. The shell
gland complex is intertesticular in position. The uterus as soon as it arises
turns forwards to about half way between the anterior end of the hindbody
and the ovary and then bends on itself to run backwards as a more or less
straight descending limb. It is filled with numerous eggs of elongated oval
shape and of 0.048 × 0.112 size.

The vitelline follicles are confined to the hindbody where they lie in
broad field along the ventral surface being most concentrated in the pre-
ovidarian region. In the postovarian region they lie in a narrow strip on the
ventro-lateral side extending up to the genital cone. The large vitelline
reservoir is somewhat transversely elongated and lies immediately in front of the second testis. The excretory system shows no remarkable feature.

Remarks.—The new species differs from the type species *Pseudostrigea buteonis*, in the multilobulated condition and larger size of the testes and the ovary, greater length of its body, in the form and size of the oral sucker and the pharynx, larger size of the ventral sucker, the greater development of the dorsolateral musculature and finally in the size of the ova.

The diagnosis of the genus *Pseudostrigea* as given by Yamaguti needs modification in the light of the new form described above.

Amended diagnosis.—Family *Strigeidae* Railliet 1919, sub-family—*Strigeinae* Railliet 1919, sub-subfamily *Cotylurini* Dubois 1936. Body divided into deeply cup-shaped forebody and cylindrical hindbody. Hindbody approximately 2–3 times as long as forebody and curved dorsad. Vitellaria situated on ventral side from anterior end of hindbody to genital cone. Genital atrium spacious and surrounded by strong musculature. Ejaculatory duct well developed, muscular or non-muscular. Testes irregular or multilobulated one behind the other in posterior half of hindbody. Ovary globular or lobed, in front of anterior testis. Uterus extending anteriorly to about half way between ovary and body constriction. Shell-gland complex intertesticular. Laurer’s canal present. Eggs elongated oval, operculate. Parasitic in carnivorous birds.

*Type species—Pseudostrigea buteonis*, Yamaguti 1933.

4. *Cotylurus orientalis* sp. nov.  
(Fig. 4.)

The body is 3.556 in total length. It is distinctly divided into spherical to oval forebody of 1.219 length and 1.118 maximum breadth, which lies close in front of the acetabulum and cylindrical somewhat dorsally flexed hindbody, measuring 2.337 in length and 0.751 in width. The dorso-lateral musculature is fairly well developed in the hindbody. The cuticle is entirely devoid of spines. The ratio in the length of the fore and hind parts is 3:5.

The oral sucker is sub-terminal and spherical or oval measuring 0.134 in length and 0.167 in width. The acetabulum is situated dorsally behind the equator of the forebody. It is much larger than the oral sucker and oval, measuring 0.2 × 0.25 in size. The holdfast organ consists of four to five lobes and occupies the major portion of the post-acetabular region of the forebody. The adhesive gland is small transversely elongated and situated at the base of the holdfast organ. The prepharynx is absent. The pharynx
is transversely oval, measuring $0.083 \times 0.1$ in size. The oesophagus is short and the two simple cæca terminate as usual in the sub-caudal region.

The gonads occupy the middle half of the hindbody. The anterior testis, reniform in shape with the concavity pointing backwards, lies median close behind the ovary, measuring $0.236$ in length and $0.467$ in width. The posterior testis is much larger, somewhat star-shaped and situated $0.134$ behind the anterior testis, measuring $0.568$ in length and $0.467$ in breadth. The vesicula seminalis is feebly developed and lies just behind the posterior testis near the dorsal surface.

The ovary is much smaller than the anterior testis and oval to spherical in form measuring $0.134$ in length, $0.167$ in width. It lies somewhat dorsally closely in front of the anterior testis. The oviduct arises from its posterior margin and after a little distance gives off the Laurer's canal which opens to the exterior dorsally near the anterior margin of the anterior testis. A small receptaculum seminis is present dorsally to the anterior testis. The uterus containing 13–21 yellow, operculate ova, of $0.117 \times 0.066$ size,
extends forwards to near the body constriction; its distal part along with
the narrow and almost straight ejaculatory duct, opens at the apex of the
highly protrusible genital cone. The large muscular genital bulb, lies
ventrally to the genital cone.

The vitellaria composed of small spherical follicles are extensively de-
veloped beginning in the region of the body constriction and terminating at
the posterior end of the body. The large vitelline reservoir lies close to
the dorsal body wall in between the testes.

Remarks.—The new species differs from C. platycephalus (Creplin, 1825)
Szidat 1929, C. variegatus (Crep., 1825) Szidat 1929, C. erraticus (Rudolphi,
1809) Szidat 1929, and C. communis La Rue 1932, in the form and smaller
size of its body, position and shape of the testes, smaller size of the ovary
and the presence of a receptaculum seminis. From Cotylurus aquavis
(Guberlet, 1923) Szidat 1929, it is distinguished by the larger size of the
body, shape of the forebody, form of the testes, and size of the ova. Though
it bears some resemblance to C. hebraicus and C. syricus Dubois 1936, on
account of the shape of the body, position and shape of the anterior testis
and ovary, it differs remarkably in many features, such as the large size
of the body, the shape of the posterior testis, presence of a receptaculum
seminis, and the anterior limit of the vitellaria. It also differs from the
other Indian species, C. streptocorbus Verma 1936, in the shape and size of
the body, shape of the gonads, and the anterior limit of the vitellaria.

Host .. The common teal, Nettion crecca crecca, small intestine.
Locality .. Allahabad, U.P. (India).

I am much indebted to Dr. H. R. Mehra for his constant help and guidance.
Thanks are due to Dr. D. R. Bhattacharya for providing me laboratory
facilities.

EXPLANATION OF THE LETTERING.

Acet., Acetabulum; Adh., Adhesive gland; Atr., Genital atrium; D. ej., Ductus
ejaculatorius; G. b., Genital bulb; G. p., Genital pore; H. f., Holdfast organ; Int.,
Intestine; L. c., Laurer's canal; L. s. p., Lateral suctorial pocket; Oes., Oesophagus; Ov.,
Ovary; Ph., Pharynx; R. s., Receptaculum seminis; Sh. gl., Shell gland; Test., Testes,
Ut., Uterus; V. sem., Vesicula seminalis; Vit., Vitellaria; Vit. res., Vitelline reservoir.

REFERENCES.