ACANTHOCEPHALA FROM INDIA.

III. On a New genus of Acanthocephalan parasite of the family Quadrigyridae, from a Calcutta fish, *Mystus cavasius* (Ham.).

By M. N. Datta, M.Sc., *Assistant Zoologist, Zoological Survey of India, Benares Cantt.*

The parasites described in the present note were collected by Dr. T. N. Podder of the Carmichael Medical College, Calcutta from the intestines of small siluroid fishes, *Mystus cavasius* (Ham.) found in the Calcutta fish markets. The worms are small and on examination revealed characters of the family Quadrigyridae. They do not, however, tally completely with the descriptions of any of the existing genera, and a new genus *Raosentis*, with *Raosentis podderi* as its genotype, is, therefore, proposed to accommodate them.

Raosentis, gen. nov.

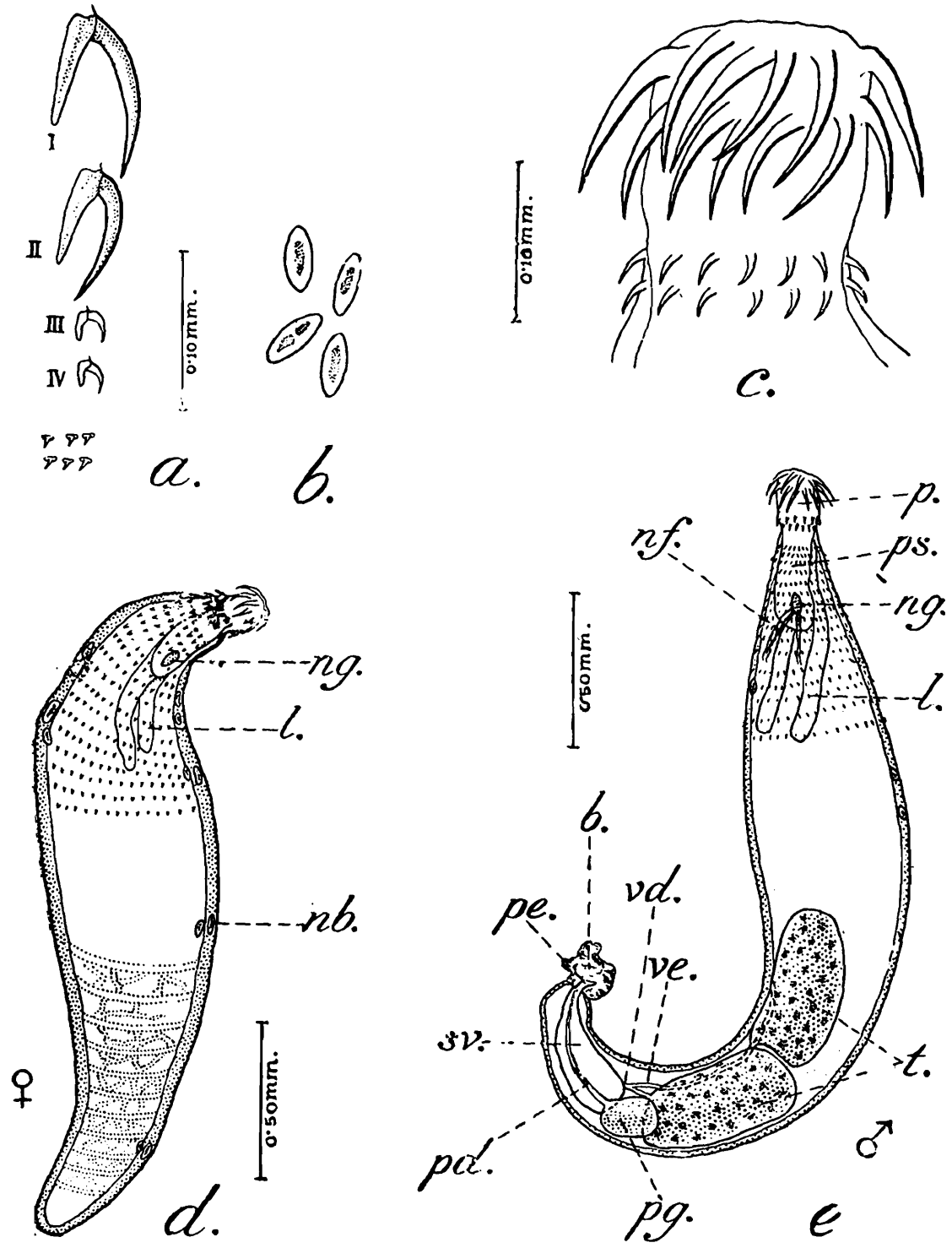
Generic diagnosis.—With the characters of the family Quadrigyridae; worms of small size parasitic as adult in the alimentary tracts of fishes. Proboscis slightly elongated or globular with 4 circles of hooks, 6 in the first two circles very long and stout and 7 in the next two circles small and slender. Some space devoid of spines, present between the second and third circles of proboscis hooks. Anterior region of the body provided with 17 rows of close-set rose-thorn-like spines. Proboscis-sheath composed of a single layer of muscles. Central nerve ganglion situated near the posterior end of proboscis-sheath. Subcuticular nuclei in pairs, 4 or 5 pairs on the dorsal and 1 or 2 on the ventral side.

Raosentis podderi, gen. *et* sp. nov.

The worms are of small size, spindle-shaped and whitish in colour. The proboscis is globular and sometimes slightly elongated, 0·14—0·25 × 0·12—0·18 mm. in size. The hooks on the proboscis are in four circles, the anterior two circles have 6 hooks in each and the posterior two circles have 7 in each. Hooks of the anterior two circles are stouter and longer than those of the third and fourth circles. There is a prominent gap of spineless space between the second and third circles of proboscis hooks. Measurements of proboscis hooks are: first circle 0·085—0·115 mm; second 0·070—0·095 mm; third 0·025—0·035 mm; fourth 0·025—0·030 mm. The anterior end of the body is provided with 16 or 17 circles of 32-34 rose-thorn-like hooks each; the basal plates of these hooks are embedded in the body-wall (Text-fig. 1, *a* and *c*).

The subcuticular nuclei are small and in pairs, four or five pairs on the dorsal and one or two pairs on the ventral side of the body-wall. The proboscis-sheath is a thin single-layered muscular sack. The retractor and protractor muscles controlling the movements of the

proboscis are thin but firmly attached to the proboscis-sheath. The central nerve ganglion is a small, elongated structure situated at the base of the proboscis-sheath and the nerve retinaculi coming out from the ganglion pass out to the body-wall through the posterior side of the proboscis-sheath. The two lemniscii are slightly longer than the sheath, 0·28—0·60×0·05—0·07 mm. (Text-fig. 1, *d.*).



TEXT-FIG. 1.—*Raosentis podderi*, gen. *et* sp. nov.

a. Hooks of the proboscis and body magnified; *b.* Eggs; *c.* Proboscis showing arrangement of hooks; *d.* Female showing arrangement of body hooks and lacunar system; *e.* Male showing genitalia, proboscis sheath, lemnisci, nerve ganglion and nerve fibres.

b. bursa; *l.* leminsci; *nb.* body nucleus; *nf.* nerve fibres; *ng.* central nerve ganglion; *p.* proboscis; *pd.* prostatic duct; *pe.* penis; *ps.* proboscis-sheath; *sv.* seminal vesicle; *t.* testes; *vd.* vas-deferens; *ve.* vas-efferens.

Lacunar system is clearly seen. There are two longitudinal canals running along the dorsal and ventral sides of the body and lateral canals coming out from these longitudinal canals run round the body at regular intervals, giving it a segmented appearance. Branches from the lateral canals, called canaliculi, are also present. In the females the lacunar system is very prominent in the posterior portion (Text-fig. 1, *d*).

The genitalia are situated in the posterior half of the worms. The male genitalia (Text-fig. 1, *e*) consist of a pair of ovoid testes arranged tandemwise close to each other. The two vasa-efferentia leading from the two testes join together below the prostatic gland to form the vas-deferens before opening into the seminal vesicle. The prostatic gland is a round mass just behind the posterior testis and contains about 8-10 nuclei. A duct from the prostatic gland, the prostatic duct, opens in the seminal vesicle near the posterior end and the seminal vesicle opens into the thick muscular and conical penis, which hangs at the top of the eversible bursa. The seminal vesicle is a thin-walled muscular sac which, in the breeding season, is full of sperms. In some cases a couple of glandular structures are seen on top of the bursa, just on the sides of the seminal vesicle, and their function seems to be to lubricate the copulatory organs at the time of mating. The female genitalia consist of a uterine-bell, which hangs in the body cavity by means of some muscle fibres attached at the anterior extremity to the base of the proboscis-sheath. The uterine-bell leads into a long tubular uterus ; the uterus leads into the narrow vagina which opens at the posterior end of the worm by means of a small opening, the vulva. The vagina is guarded by two bands of muscles to control the extrusion of the mature ova in a single file. A pair of small glands, termed as vaginal glands, are seen on both sides of the vulva. At the base of the uterine-bell there are a few cells, known as guard cells, which serve to sort out the mature from immature ova ; the mature ones are allowed to pass into the uterus and the immature ones are thrown back into the body cavity for further development. Eggs are elliptical, measuring 0·050×0·020 mm. (Text-fig. 1, *b*.)

Measurements.—Males, 0·67—2·37×0·27—0·53 mm.; females, 1·31—2·53×0·42—0·64 mm.; proboscis, 0·14—0·25×0·11—0·18 mm.; proboscis hooks, (i) 0·085—0·115 mm. ; (ii) 0·070—0·095 mm.; (iii) 0·025—0·035 mm.; (iv) 0·025—0·030 mm.; proboscis-sheath, 0·16—0·37×0·05—0·14 mm., lemnisci, 0·28—0·60×0·05—0·07 mm.; testis anterior, 0·506×0·242 mm., posterior, 0·460×0·184 mm.; prostatic gland, 0·184 mm.; seminal vesicle, 0·368 mm.; bursa, 0·138 mm.

Host.—*Mystus cavasius* (*Ham.*).

Location.—Intestine.

Locality.—Calcutta (Market).

Types.—Male and female (W3679/1) deposited in the collections of the Zoological Survey of India.

Discussion.—It is evident from the accompanying table that the new genus agrees in some points with the existing genera of the family Quadrigyridae, but it differs considerably in the shape and size of the body, the size of the proboscis, circles of hooks on the proboscis, the position and number of hooks in each circle, the comparative size of the leminsci

Characters of genera of the family Quadrigyridae.

Names of genus.	Dimensions of body.	Measurements of proboscis.	Proboscis hooks.		Measurements of prob. hooks.	Body spines.	Lemnisci.	Body nuclei.	Host.
			No. of circles.	No. in each circle.					
1. *Quadrigyrus* Van-Cleave 1920	♂8·0—10·0 × 0·6 ♀10·0—20·0 × 9·0—1·25	0·024	4	5	i. 0·096—0·106 ii. 0·076—0·100 iii. 0·053—0·059 iv. 0·041—0·047	4 rows at anterior end	longer than prob.-sheath.	ant. elliptical in saggital plane, rest large branched, laterally placed.	fishes.
2. *Pallisentis* Van-Cleave 1928	6·0—10·0 × 0·3	0·2 in diameter.	4	6	i. 89—119 μ ii. 83—100 μ iii. 53—65 μ iv. 35—41 μ	collar of 6-9 rows of spines at ant. extremity followed by 20—40 widely separated rows.	long, cylindrical.		fishes.
3. *Acanthosentis* Verma & Datta 1929.	♂1·0—1·25 × 0·2—0·25 ♀2·0—3·0 × 0·75—1·0	0·04—0·25 × 0·04—0·16	3	6	i. 72·0 × 16·6 ii. 52·0 × 13·2 iii. 48·0 × 12·0	20—31 rings on anterior two-fifth of body.	longer than prob.-sheath. 0·04—0·34 × 0·03—0·10	few branched and oval nuclei.	fishes.
4. *Neosentis* Van-Cleave 1928	♂10·0 × 0·85 ♀17·0 × 1·70		4	8	i. 53—59μ ii. 53—59μ iii. 35—41μ iv. 30—35μ	5-6 rings at ant. extremity a gap and then 6-8 circles and scattered hooks.	long, cylindrical and in male reaching upto ant. testis.		fishes.
5. *Heterosentis* Van-Cleave 1931	♂4·94 × 0·59 ♀4·75—5.85 × 0·4—0·79		10	4 or 5					fishes.
6. *Raosentis*, gen. nov.	♂0·67—2·37 × 0·27—0·53 ♀1·31—2·53 × 0·42—0·64	0·14—0·25 × 0·12—0·18	4	1st and 2nd rows 6 each; 3rd and 4th rows 7 each.	i. 0·085—0·115 ii. 0·070—0·095 iii. 0·025—0·035 iv. 0·025—0·030	17 rings of close-set, rose-thorn-shaped spines.	a little longer than prob. -sheath.	small, in pairs, 4-5 dorsal, 1-2 ventral.	fishes.

Measurements are in millimetres, except where indicated.

and the proboscis-sheath and the shape and disposition of the body spines. From Van Cleave's description of the genera *Quadrigyrus*[1] *Pallisentis*,[2] *Neosentis*[3] and *Heterosentis*[4] it is evident that the specimens of these genera are much longer than those of the new genus. The number of circles of proboscis hooks is the same, but the number of hooks in each circle in the new genus differs from them and in Verma & Datta's *Acanthosentis*.[5] In the disposition of the body spines also there are considerable variations and the new genus is easily differentiated. In *Quadrigyrus* there are only four rows at the anterior end, in *Pallisentis* there is a collar of 6-9 rows of spines at the anterior extremity followed by 20-40 widely separated rows, in *Acanthosentis* there are 20-31 rings on the anterior two-fifth of the body and in *Neosentis* there are 5-6 rings at the anterior extremity, then a spineless gap, followed by 6-8 circles and scattered spines; in the new genus there are 17 rings of close-set rose-thorn-like small spines. In the size of the lemnisci and their comparative size with the proboscis-sheath, *Raosentis* differs from the existing genera. The body nuclei also differ in being peculiarly placed in pairs. On the basis of the characters enumerated above, the new genus *Raosentis* can be easily distinguished from all the existing genera of the family Quadrigyridae.

I have great pleasure in associating the generic name with that of Dr. H. S. Rao, D.Sc., Deputy Fisheries Development Adviser, Government of India. The specific name is associated with the name of Dr. T. N. Podder, M.Sc., M.B. of Carmichael Medical College, Calcutta who very kindly gave me the specimens for study. My thanks are due to Dr. B. N. Chopra, D.Sc., Director, Zoological Survey of India, for kindly giving me help and facilities for my work here. I must also record my thanks to Mr. R. C. Bagchi, our Artist who finished the figures for this paper.

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[1] Van Cleave, H. J., Two new genera and species of Acanthocephalous worms from Venezuelen fishes. *Proc. U. S. Nat. Mus.* LVIII, pp. 455-466 (1920).

[2] Van Cleave, H. J., Acanthocephala from China. I. New species and new genera from Chinese fishes. *Parasitology* XX, pp. 1-9 (1928).

[3] Van Cleave, H. J., *Ibid.*

[4] Van Cleave, H. J., *Heterosentis*, a new genus of Acanthocephala. *Zoolog. Anz.* XCIII, pp. 144-146 (1931).

[5] Verma, S. C. and Datta, M. N., Acanthocephala from Northern India. I.—A new genus *Acanthosentis* from a Calcutta fish. *Ann. Trop. Med. Parasit.* Liverpool XXIII, pp. 483-494 (1929).