

On *Devendrosentis garuai*, Gen. et sp. nov
(*Neoechinorhynchidae* Southwell and Macfie, 1925,
Quadrigyridae Van Cleave 1920, *Acanthocephala*
from a fresh water Indian fish *Clupisoma garua* (Ham)

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Résumé

Les auteurs décrivent un nouveau genre et une nouvelle espèce d'Acanthocéphales de la famille des *Quadrigyridae* Van Cleave, 1920, *Devendrosentis garuai*, et ils en discutent la validité. Ces vers, récoltés dans l'intestin d'un poisson d'eau douce, *Clupisoma garua*, semblent avoir une faible incidence d'infestation puisqu'un seul poisson, sur les nombreux spécimens examinés, était porteur de 2 mâles et de 6 femelles.

Summary

The present paper gives an account of a new genus and species of an *Acanthocephala* of the family *Quadrigyridae* Van Cleave, 1920, collected from the intestine of a fresh water fish *P. garua* (= *Clupisoma garua*) at Patna. Only one of a large number of fishes examined harboured these worms. Their incidence, therefore, appears to be low. The number of specimens recovered from the host were two males and six females.

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Introduction, Materials and methods.

During April and May 1968 several specimens of *Clupisoma garua* were brought to the laboratory. The specimens were examined carefully for all types of helminth infections. The fishes were cut open and a thorough search of the alimentary canal of the host was made. The worms recovered were washed thoroughly in tap water and were fixed in hot 70 % alcohol and stained in Ehrlich's haematoxylin.

Description.

The worms are large. The body is provided with a distinct ventral flexure. It is cylindrical and clearly distinguishable into proboscis, neck and the body proper. The proboscis proper is separated from the neck by a transverse muscular band.

PROBOSCIS : The proboscis is somewhat globular and is armed with four circles of hooks, each circle bearing six hooks. The hooks of the anterior two circles are stouter and longer than the hooks of posterior two circles. The proboscis measures 0.224-0.261 mm in female and 0.187-243 mm in male. The hooks of the first and second row from top measure 0.08-0.10 mm and 0.06-0.08 mm while the hooks of third and fourth rows measure 0.04-0.06 mm and 0.032-0.06 mm respectively.

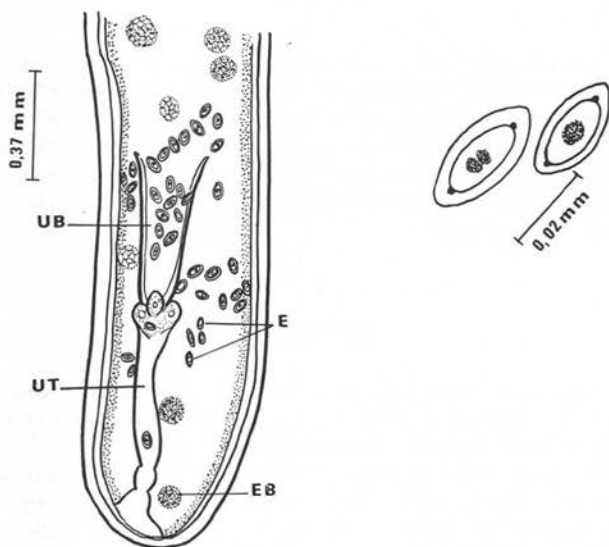


FIG. 1. — Posterior and female ($\times 50$)

FIG. 2. — Eggs ($\times 250$)

NECK : It is the nonspined area immediately behind the proboscis. It measures 0.187-0.29 mm in female and 0.187-0.223 mm in male specimens.

BODY : Immediately following the neck there are twelve to seventeen rows of close-set spines in female and thirteen to fifteen rows in male specimens, followed by a spineless area, after which again there are regular rows of widely placed thinner spines, the number varies from fifty-one to seventy-six in female and twenty-eight to thirty-two in male worms respectively. The variability in the number of body spines as mentioned in male, and female specimens, may arouse some suspicion as to their being of two different species but it is quite unlikely and improbable that a single sex only of each species is occurring in the same host, as such the worms are definitely one species.

MALE : The males are smaller than the females and measure 8.97-10.49 mm \times 0.58-0.78 mm. The male reproductive organ is situated in the middle of the body and consists of a pairs of cigar-shaped testes, situated one behind the other. The anterior testis measures 0.729-0.748 mm \times 0.095-0.205 mm while the posterior testes

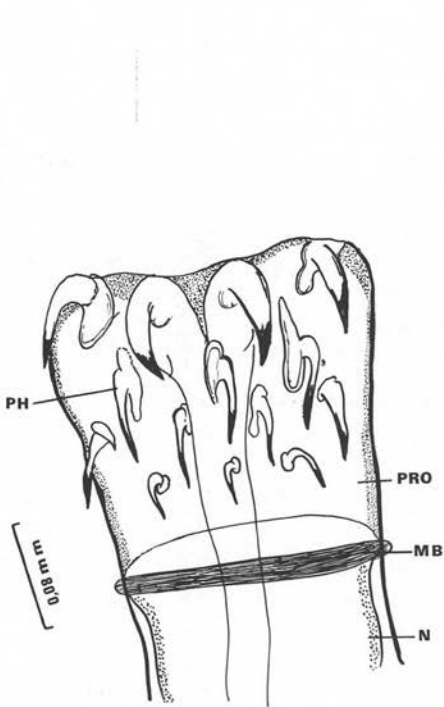


FIG. 3. — Proboscis of female (\times 250)

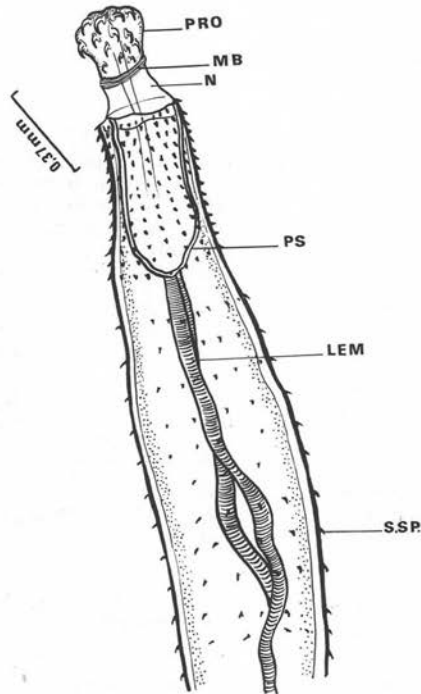


FIG. 4. — Anterior and female (\times 50)

	1	2	3	4
	<i>Quadrigyus</i> Van-Cleave, 1920	<i>Pallisentis</i> Van Cleave 1928 syn. <i>Farzandia</i> Thapar, 1931 and <i>Neosentis</i> Van Cleave, 1928	<i>Neosentis</i> Van-Cleave, 1928	<i>Acanthosentis</i> Verma et Datta, 1929 Syn. <i>Acanthogyrus</i> Thaper, 1927. Dollfus and Golvan, 1956 Sub. <i>Acanthogyrus</i> Golvan, 1959
Body	Medium sized.	—	Harda (1935) and Yamaguti (1961) considered <i>Pallisentis</i> and <i>Neosentis</i> synonyms while Golvan (1959) considered <i>Neosentis</i> a subgenus of <i>Pallisentis</i> .	Body small, curved ventrally.
Proboscis	3-4 circular rows.	Short, cylindrical to globular with 4 circles of 6-10 hooks in each.		Short globular to cylindrical with three circles of six hooks each.
Trunk spines ..	Anterior region of trunk with 4-10 circular rows of spines, may be interrupted dorsally.	In two sets : (i) Collor of spines arranged in 6-14 closely set rings anteriorly. (ii) Posterior to this collar is a non-spined area. (iii) Followed by 20-40 widely spaced rings of spines. (iv) Remaining part devoid of spines.		(1) Closely set anteriorly but wide apart as they proceed backward. (2) Posterior region of the body usually devoid of spines specially in mature specimens.
Proboscis receptacle	Single layered muscular.	Cylindrical to saccate and single layered.		Cylindrical, single layered.
Ganglia	Close to the base of proboscis.	Near the base of proboscis.		Close to proboscis.
Leminisci	Claviform with giant nucleus.	Long, slender, cylindrical.		Cylindrical to claviform longer than the proboscis sheath.

OF DIFFERENT GENERA OF THE FAMILY *Quadrigyridae*

5	6	7	8
<p><i>Heterosentis</i> Van Cleave, 1931</p>	<p><i>Raosentis</i> Datta, 1947</p>	<p><i>Polliolisentis</i> Machado, 1940</p>	<p><i>Devendrosentis garuai</i>, proposed gen. et sp. nov. Sahay, Sinha and Ghosh</p>
<p><i>Heterosentis</i> VanCleave, 1931 was kept in the family <i>Quadrigyridae</i> by Mayer 1931. 33 but Van-Cleave, 1940 did not like this idea and included <i>Heterosentis</i> under the family <i>Arhythmacanthidae</i> under order <i>Echinorhynchida</i> Southwell et Macfie, 1925.</p>	<p>Small fusiform.</p> <p>(1) Globular or slightly elongated with 4 circles of hooks. Hooks of the anterior two circles-stouter and longer than the posterior two circles.</p> <p>(2) There is a free space devoid of spine between second and third circles.</p> <p>Anterior part of trunk with 16-17 circles of rose thorn-shaped spines.</p> <p>Single layered.</p> <p>At the base of proboscis.</p> <p>Longer than the proboscis sheath.</p>	<p>Small medium sized.</p> <p>Cylindrical with 6 oblique rows of strongly rooted hooks.</p> <p>5 circular rows of cuticular spines anteriorly.</p> <p>Single layered, muscular.</p> <p>In the posterior part of Proboscis.</p> <p>Claviform, longer than the proboscis receptacle each with a single nucleus.</p>	<p>Large, curved ventrally.</p> <p>Four circles of hooks, hooks of anterior two circles stouter and longer than the posterior two circles. Six hooks in each circle.</p> <p>(1) Anteriorly close set spines of 16-17 rows.</p> <p>(2) Following this is a non spined area which is followed by spined area, throughout the length.</p> <p>(1) Single layered, muscular.</p> <p>(2) Shape-saccate.</p> <p>At the base of the proboscis sheath.</p> <p>Cylindrical, approximately three times longer than the proboscis sheath.</p>

	1	2	3	4
	<i>Quadrigyrus</i> Van Cleave, 1920	<i>Pallisentis</i> Van Cleave 1928 syn. <i>Farzandia</i> Thapar, 1931 and <i>Neosentis</i> Van Cleave, 1928	<i>Neosentis</i> Van-Cleave, 1928	<i>Acanthosentis</i> Verma et Datta, 1929 Syn. <i>Acanthogyrus</i> Thaper, 1927. Dollfus and Golvan, 1956 Sub. <i>Acanthogyrus</i> Golvan, 1959
Testis	Oval to elliptical or fusiform, may be wide apart from each other.	Oval to cylindrical, contiguous.	Harda (1935) and Yamaguti (1961) considered <i>Pallisentis</i> and <i>Neosentis</i> synonyms while Golvan (1959) considered <i>Neosentis</i> a subgenus of <i>Pallisentis</i> .	Rounded, tendem, contiguous in posterior region of the body.
Cement gland ..	Compact or elongate mass with several nuclei.	Long, cylindrical syncytial containing a number of nuclei.		Syncytial with several nuclei.
Hypodermic nuclei	2 types : (i) anterior nuclei mid dorsal mid ventral. (ii) Others usually lateral strongly branched.	—		Few oval or branched exclusively median.
Genital pore ...	Ventro-subterminal.	—		Ventro-terminal.
Eggs	Oval.	—		Elongate.
Lac. system ...	—	—		Reticular with prominent transverse vessels.
Uterus	—	—		—
Uterine bell ...	—	—		With ventral anterior opening.
Host	Parasites of fishes.	Parasites of fresh water fishes.		Parasites of fishes.

OF DIFFERENT GENERA OF THE FAMILY *Quadrigyridae*

5	6	7	8
<i>Heterosentis</i> in Cleave, 1931	<i>Raosentis</i> Datta, 1947	<i>Polliolisentis</i> Machado, 1940	<i>Devendrosentis garuai</i> , proposed gen. et sp. nov. Sahay, Sinha and Ghosh
<p><i>Heterosentis</i> VanCleave, 1931 was kept in the family <i>Quadrigyridae</i> by Mayer 1931, 33 but VanCleave, 1940 did not like this idea and included <i>Heterosentis</i> under the family <i>Arhythmacanthidae</i> under order <i>Echinorhynchidea</i> Southwell et Macfie, 1925.</p>	Contiguous, tendem near posterior extremity.	Contiguous in posterior half of the trunk.	Cylindrical, cigar shaped, in the middle region of the body.
	Syncitial with 8-10 nuclei.	Syncytial.	Syncytial, long, nuclei not clear.
	Small, 4-5 pairs dorsally, 1-2 pairs ventrally.	Ramified.	Not observed.
	—	Terminal in both sexes.	Almost terminal.
	Elliptical, small.	—	Shelled, elliptical with polar prolongations.
	Lacunar vessels dorsal and ventral connected by transverse anastomoses.	Annular without prominent main vesssels.	Anastomosing.
	—	Expanded.	Long.
	Leads into a long tabular uterus, then into vagina with two spincters.	—	Long, opening into vagina, with sphincter muscles.
	Parasites in the intestine of fishes.	Parasites of fresh water fishes.	Parasites of fishes.

measures 0.654-0.841 mm \times 0.093-0.392 mm respectively. From each of the testes arises a duct, the vas deferens which runs for a short distance alongside the prostate gland, joins with the other to form a vas deferens which opens at the base of the penis. The prostate gland measures 1.683-2.47 mm \times 0.132-0.34 mm. The nature of the prostate gland as regards the number of nuclei could not be determined. It was so dense so as to obscure the finer details. The proboscis receptacle is single layered muscular and saccate and measures 0.841-0.916 mm.

Table I

(All measurements in mms)

	FEMALE SPECIMENS		MALE SPECIMENS	
	Extremes	Average	Extremes	Average
Body-length.	14.02-28.723	22.483	8.97-10.49	9.73
Max. breadth.	0.430-0.598	0.532	0.579-0.785	0.682
Length of proboscis.	0.224-0.261	0.240	0.187-0.243	0.215
Length of neck.	0.187-0.299	0.245	0.187-0.224	0.205
Length of proboscis hooks from top :				
1st row.	0.08-0.10	0.085	0.068-0.076	0.072
2nd row.	0.06-0.08	0.06	0.06-0.076	0.068
3rd row.	0.04-0.06	0.046	0.040-0.06	0.05
4th row.	0.032-0.06	0.044	0.028-0.032	0.03
Length of proboscis sheath	0.841-0.916	0.878	0.828-0.86	0.844
Number of body spines ..	Anterior set- Posterior set-	12-17 51-76	Anterior set- Posterior set-	13-15 28-32
Length of eggs.	0.05-0.067	0.06	..	..
Diam of eggs.	0.018-0.08	0.036	..	..
Length of leminisci.	2.767	2.767	3.553	3.553
Length and breadth of anterior testis. ....	..	..	0.729-0.748 X 0.092-0.205	0.738 X 0.149
Length and breadth of posterior testis. ....	..	..	0.654-0.841 X 0.093-0.392	0.747 X 0.242
Prostate gland. ....	..	..	L. 1.683-2.468 B. 0.132-0.336	2.075 0.234
Seminal vesicle. ....	..	..	0.841	0.841

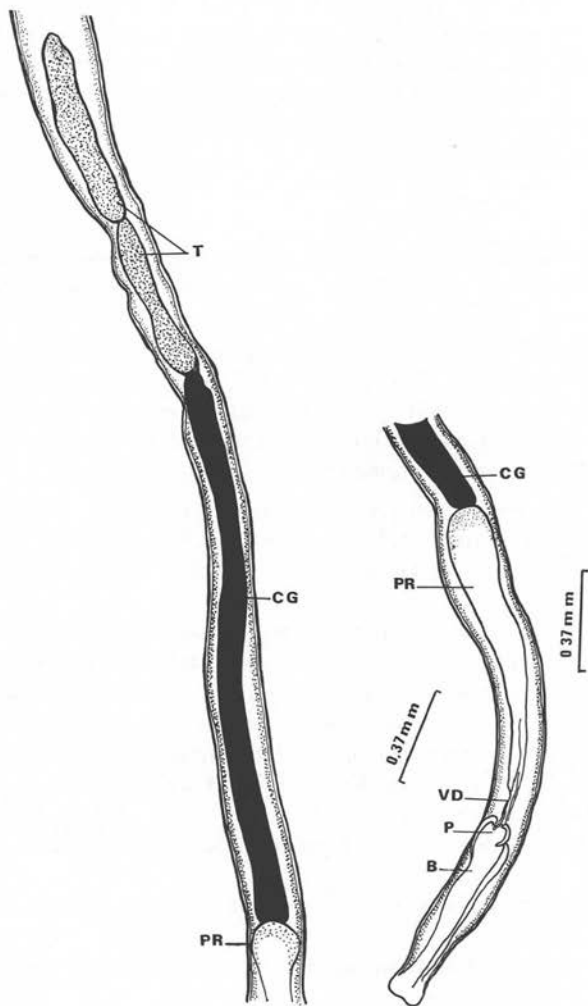


FIG. 5. — Part of the middle region showing Testes (X 50)

FIG. 6. — Posterior region male (X 50)

FEMALE : The female worms measure 14.02-28.72 mm \times 0.43-0.59 mm in maximum breadth. The female genital organ consists of a uterine bell, the uterus, the vagina, the vulva and the ovary which is seen only in young specimens. In mature worms the ovary bursts liberating the round eggballs which float in the body cavity. The uterine bell is thin, funnel shaped and opens into vagina which is provided with sphincter muscles. The proboscis sheath measures 0.83-0.86 mm in length. The eggs are shelled, elliptical with polar prolongations measuring 0.05-0.07 mm \times 0.018-0.08 mm in maximum diameter.

Discussion.

The family *Quadrigyridae* at present includes the following genera : (1) *Quadrigyrus* Van Cleave, 1920, (2) *Pallisentis* Van Cleave, 1928 (Syn. *Farzandia* Thapar, 1931, and *Neosentis* Van Cleave, 1928), (3) *Acanthosentis* Verma and Dutta, 1929, (4) *Raosentis* Dutta, 1947, (5) *Palliolisentis* Machado, 1960. From the comparative study of these genera (Table. II) it appears that a new genus *Devendrosentis* (in honour of Dr. Devendra Prasad, Professor of Zoology, Science College, Patna University, Patna-5, India) has to be created for the reception of the worms under discussion as the worms show the following peculiarities :

1. Body large and curved ventrally (differs from the five existing genera).
2. Proboscis with four circles of hooks, six hooks in each circle. The hooks of the anterior two circles are stouter and longer than the posterior two circles.
3. Trunk spines disposed in two sets. The anterior set bears 16-17 rows of spines in female worms (*resembles Pallisentis*, *Raosentis*) and 13-15 in male worms. A non-spined area follows the anterior set immediately behind (*resembles Pallisentis*) after which again there are regular rows of widely placed thinner spines numbering 28-32 spines in males and 36-76 spines in females. The spines are found throughout the body length (*differs from the existing five genera*).
4. Proboscis receptacle-single layered muscular and saccate (*resembles Pallisentis*).
5. Leminisci-three times longer than the proboscis sheath (*differs from the existing genera*).
6. Testis cylindrical to cigar-shaped in the middle region of the body (*differs from the existing genera*).
7. Cement gland-syncytial (characteristic of the family *Quadrigyridae*) long, number of nuclei ?
8. Hypodermic nuclei absent (*differs from the existing genera*).
9. Genital pore terminal (*resembles Palliolisentis*).
10. Eggs elliptical shelled with polar prolongations.
11. Lacunar system anastomosing.
12. Neck separated from proboscis by a transverse circular muscle band (*differs from the existing genera*).

Generic diagnosis.

« Body large, curved ventral, Trunk spines closely set anteriorly but wider apart as they proceed backwards, body spines throughout the length, Proboscis globular with 4 circles of 6 hooks each, neck separated from proboscis by a transverse circular muscle band. Proboscis receptacle saccate, with single layered wall, ganglion situated at the base of the proboscis sheath. Hypodermic nuclei absent, lacunar system anastomosing, lemnisci cylindrical three times longer than the proboscis sheath. Testes cigarshaped tendem contiguous in the middle region of the body, cement gland syncytial nuclei (?) genital pore terminal, eggs shelled elliptical with polar prolongations. Parasites of fishes. »

HOST : *Clupisoma garua*.

LOCALITY : PATNA.

LOCATION : Intestine.

TYPE SPECIMENS : deposited in the helminthology section of the department of Zoology, Science College, PATNA-5.

Acknowledgements.

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References

- DATTA (M. N.), 1947. — *Acanthocephala* from India. III. A new genus of Acanthocephalan parasite of the family *Quadrigyridae* from Calcutta fish *Mystus cavasius*. *Rec. Ind. Mus.*, 44, 363-365.
- GOLVAN (Y. J.), 1959. — Le phylum des *Acanthocephala* (2 notes), La classe des *Euacanthocephala* Van Cleave, 1936. *Ann. Parasit.*, 34, 5-52.
- MACHADO, FILHO (D. A.), 1960. — Um nove genero da familia « *Quadrigyridae* Van Cleave, 1920 (*Metacanthocephala*, *Palaeacanthocephala*), *Rev. Brasil. Biol.*, 20 (1), 79-84.
- MAYER (A.), 1931. — Die stellung des *Heterosentis* Van-Cleave 1931, in Acanthocephalensystem. *Zool. Anz.*, 94 (9-10), 258-265.
- SOUTHWELL (T.) et MACFIE, 1925. — On a collection of *Acanthocephala* in the Liverpool school of Tropical Medicine. *Ann. Trop. Med. Par.*, 19, 141-184.
- THAPAR (G. S.), 1930. — On *Farzandia*, a new genus of Acanthocephalid worms, from the intestine of *Ophiocephalus marulius*. *Ann. Mag. Nat. Hist.*, 10 (6), 76-81.

- VAN CLEAVE (H. J.), 1920. — Two new genera and species of acanthocephalous worms from venezuelan fishes. *Proc. U.S. Mus.*, 58, 455-466; *Anat. Rec.*, 17 (5), 334.
- , 1920. — *Acanthocephala* of the Canadian Arctic Expedition 1913-1918. *Rep. Canad. Arctic Exped. 1913-1918*, Vol. 9 (E), 11.
- , 1928. — Some biological aspects of the *Acanthocephala* (Abstr.), *J. Par.*, 15 (2), 149.
- , 1928. — *Acanthocephala* from China. 1. New species and genera from China fishes. *Parasit.*, 20, 1-9.
- , 1928. — Two new genera and species of *Acanthocephala* from fishes of India. *Rec. Ind. Mus.*, 30 (2), 1-9.
- , 1929. — New genera and new species of *Acanthocephala* from the Antarctic. *Ann. Mag. Nat. Hist.*, 10 (4), 229-232.
- , 1931. — *Heterosentis* a new genus of *Acanthocephala*. *Zool. Anz.*, 93 (5-6), 144-146.
- VERMA (S. C.) et DATTA (M. N.), 1929. — *Acanthocephala* from North India. I. A new genus *Acanthosentis* from a Calcutta fish. *Ann. Trop. Med. Par.*, 23, 483-500.
- YAMAGUTI (S.), 1961. — *Systema Helminthum*. Vol. V. *Acanthocephala* Interscience Publishers, New York, London.
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