

## ON SOME NEW SPECIES OF THE GENUS *CENTRORHYNCHUS* LUHE, 1911.

By E. N. DAS, M.Sc., *Department of Zoology, Vidarbha Mahavidyalaya  
Amraoti, Berar, India.*

The Acanthocephalan fauna of India is very insufficiently known. Not more than a dozen species have been so far described by Van Cleave, Dutta, Bhalerao, Chandler and Thapar. Acanthocephala, either in the encysted form in the mesentery, or free in the intestine, are found in most vertebrates dissected in the laboratories in India. I have in my possession several forms collected from various hosts. This paper describes four new species of the genus *Centrorhynchus* obtained from a fish and birds. Meyer records 32 species of this genus and since the publication of Meyer's book, six more species have been described. These are *C. maryassis* Datta (1932) from India, *C. insularis* Tubangui (1933) from Philippine islands, *C. elongatus* Yamaguti (1935), *C. turdi* and *C. bubonis* Yamaguti (1939) from Japan and *C. conspectus* Van Cleave and Pratt (1940) from North Carolina.

Two chief attempts were made to classify this group of worms, one by Southwell and MacFie (1925) and another by Thapar (1927). Meyer (1933) proposed a classification different from these two and I have followed his classification.

### Genus *Centrorhynchus*

The genus *Centrorhynchus* was created by Lühe in 1911. It was included by Meyer in the family Polymorphidae and sub-family Centrorhynchinae. Its distinguishing characters, according to Meyer, are (i) the presence of two kinds of hooks on the proboscis ; (ii) 1-3 cement glands in East Asian species, and 4 in others ; (iii) oval eggs with concentric coverings and (iv) preying birds as hosts.

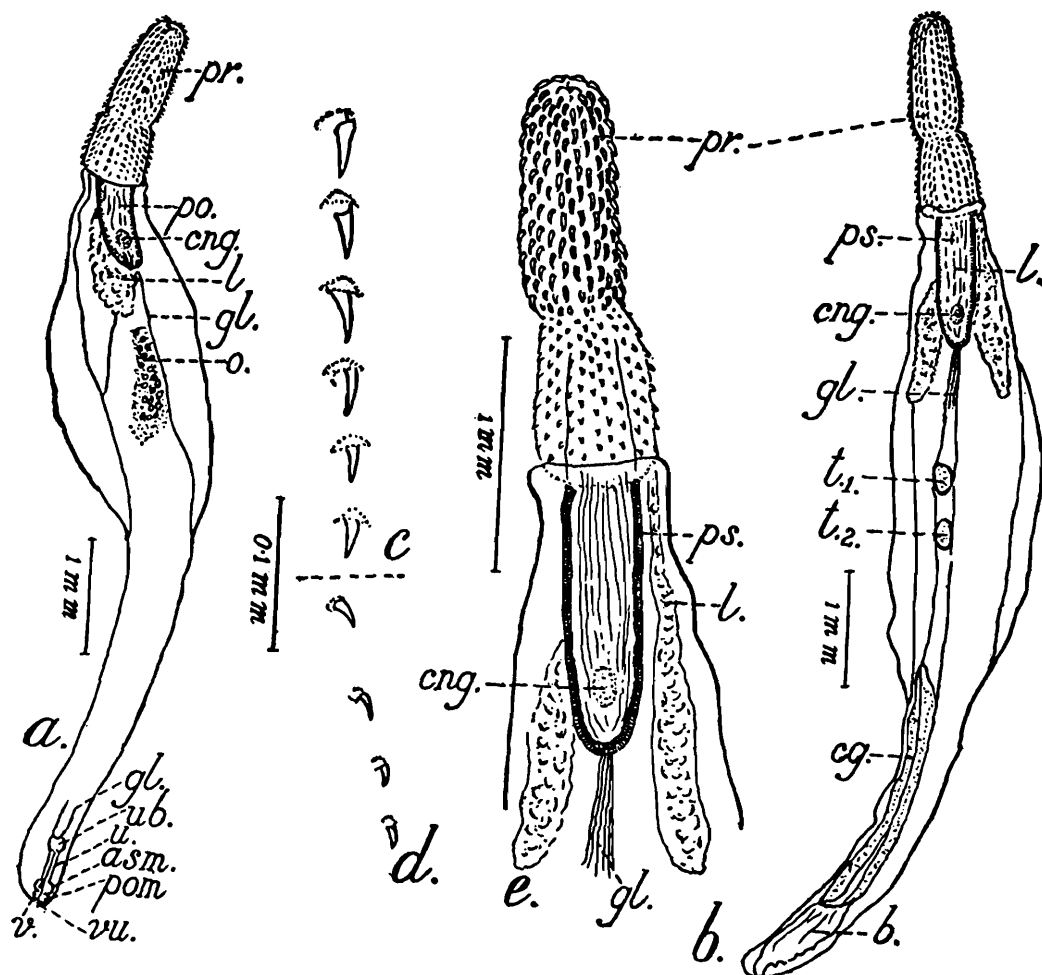
### *Centrorhynchus falconis*, sp. nov.

Both male and female forms were found in the intestine of the host. The proboscis was invariably embedded in the wall of the intestine, rest of the body being in the lumen.

Males and females are almost of the same size measuring 8.8 and 8.7 mm. in length respectively. The body is broadest in the middle where it measures 0.52 mm., the width of the anterior portion of the body being 0.40 mm.

The proboscis (text-fig. 1a, b and e, pr) is long and cylindrical, measuring 0.95 mm. and the whole proboscis-like structure with the neck is 1.62 mm. long. There are 28 to 30 longitudinal rows of hooks, each row having 21 to 23 hooks. The hooks of adjacent rows alternate

with each other throughout the length of the proboscis. The hooks present on the true proboscis are 12 to 14 in number and measure  $36\ \mu$  in length (text-fig. 1c), whereas those present on the neck are less numerous being 9 in number (text-fig. 1d) and are smaller in size measuring  $17\ \mu$  in length, about half the size of those on the true proboscis.



TEXT-FIG. 1.—*Centrorhynchus falconis* sp. nov.

a. Entire female; b. Entire male; c. Some of the hooks on the proboscis; d. Some of the hooks on the neck; e. Proboscis with proboscis sheath; *asm.*, anterior sphincter muscle; *b.*, bursa; *cg.*, cement gland; *gl.*, genital ligament; *l.*, lemnisci; *o.*, ovary; *pr.*, proboscis; *ps.*, proboscis sheath; *psm.*, posterior sphincter muscle; *t<sub>1.</sub>*, anterior testis; *t<sub>2.</sub>*, posterior testis; *u.*, uterus; *ub.*, uterine bell; *v.*, vagina; *vu.*, vulva.

The proboscis sheath (text-fig. 1a, b and e, *ps*) is double-walled and measures  $1.81 \times 0.30$  mm.

The body wall has a thin cuticle. The lacunar system consists of two main lateral canals from which smaller branches arise and form a closed network.

The lemnisci (text-fig. 1a, b and e, *l*) are of medium size. They measure 1.7 mm. in length, and extend up to 0.55 mm. beyond the base of the proboscis sheath.

*Female genitalia.*—The ovary (text-fig. 1a, *o*) lies about the middle of the body, 0.20 mm. behind the posterior end of the lemnisci. It is divided into a number of rounded egg masses which are held together within the genital ligament (text-fig. 1a, *gl*) which arises from the posterior

end of the proboscis sheath and runs on to the two sides of the body enclosing the ovary. Posteriorly, they are attached to the anterior part of the oviduct known as the uterine bell (text-fig. 1a, ub), thus helping to keep in position the posterior genital apparatus, which includes the uterine bell, uterus (text-fig. 1a, u), vagina (text-fig. 1a, v) and vulva (text-fig. 1a, vu) and measures  $0.12 \times 0.10$  mm.; its wall is muscular and disposed to receive the eggs. Posteriorly it communicates with the funnel shaped anterior end of the uterus. The uterus is a tubular structure having a muscular wall. It measures 0.25 mm. in length. Posteriorly it opens into the vagina which measures  $0.19 \times 0.10$  mm. The vaginal canal is enclosed within the anterior and posterior sphincter muscles (text-fig. 1a; asm and psm) and opens into the vulva which forms the external opening.

*Male genitalia.*—There are two testes of almost the same size measuring  $0.30 \times 0.20$  mm. They are held in position by the genital ligament (text-fig. 1b, gl) in the body cavity. The anterior testis (text-fig. 1b, t<sub>1</sub>) is placed at a distance of 3.8 mm. from the anterior end of the worm and the posterior testis 4.3 mm. The cement glands (text-fig. 1b, cg) are 2 in number and are long and tubular. The bursa (text-fig. 1b, b) is stout and consists of several muscular rays. It is about 0.95 mm. long.

*Comparison with other species.*—*Centrorhynchus falconis* sp. nov. has 28 to 30 longitudinal rows of hooks and there are 12 (14) hooks in a row on the proboscis and 9 in a row on the neck. The following table shows species which have 28 to 30 longitudinal rows of hooks :—

Name of Species	Long : rows	Hooks in each row	Hooks on proboscis and neck in each row
<i>C. aluconis</i> (Muller, 1780)	30	15	..
<i>C. buteonis</i> (Schrank, 1788)	30—32	12—16	7—10, 5—7.
<i>C. globocaudatus</i> (Zedder, 1800)	30	18—21	5—6, 13—15.
<i>C. leptorhynchus</i> (Meyer, 1933)	28—30	22	10(9), 4(5), 8.
<i>C. spinosus</i> (Van Cleave, 1924)	30—32	22—23	8(9), 14.
<i>C. polymorphus</i> (Travassos, 1926)	30	17	10, 7.
<i>C. albidus</i> (Meyer, 1933)	28—30	20	7, 13.
<i>C. horridus</i> (Von Linstow, 1897)	26—28	15—16	5—6, 10.
<i>C. turdi</i> (Yamaguti, 1935)	26—29	11—14	..
	26—34	11—13	..
<i>C. elongatus</i> (Yamaguti, 1935)	26—31	13—19	..
<i>C. conspectus</i> (Van Cleave & Pratt, 1940)	30—32	17—18	..

In none of the above species the proboscis bears 23 hooks except *Centrorhynchus spinosus* (Van Cleave, 1924) and in none there are 12 (14)

hooks on the head and 9 on the neck. *Centrorhynchus spinosus* is a much larger worm and has a much larger number of hooks on the neck and the hooks are of much larger size. I therefore consider *Centrorhynchus falconis* to be a new species.

*Diagnosis.*—Males and females with the same length; proboscis 0.95 mm. in length and with neck 1.62 mm.; 28 to 30 longitudinal rows of hooks, 21 to 23 hooks in each row; 12(14) on proboscis and 9 on neck; hooks measure 36  $\mu$  and 17  $\mu$  respectively; lemnisci 1.7 mm. in length and extend upto 0.55 mm. beyond the base of the proboscis sheath; the proboscis sheath double walled, measures 1.81  $\times$  0.30 mm.; cement glands 2, long and tubular in shape; two testes of almost the same size measuring 0.30  $\times$  0.20 mm.

*Host.*—The Pale Harrier, *Circus macrourus* (Gmn.).

*Locality.*—Amritsar (East Punjab), India.

*Type-specimens.*—(W.....) are deposited in the collection of the Zoological Survey of India.

### *Centrorhynchus macrorchis*, sp. nov.

Only two specimens of this species were found in the posterior portion of the intestine of the host sticking firmly to the wall of the intestine. Both were males. They were of a dark brown colour when alive, a character which makes them peculiar among Acanthocephala.

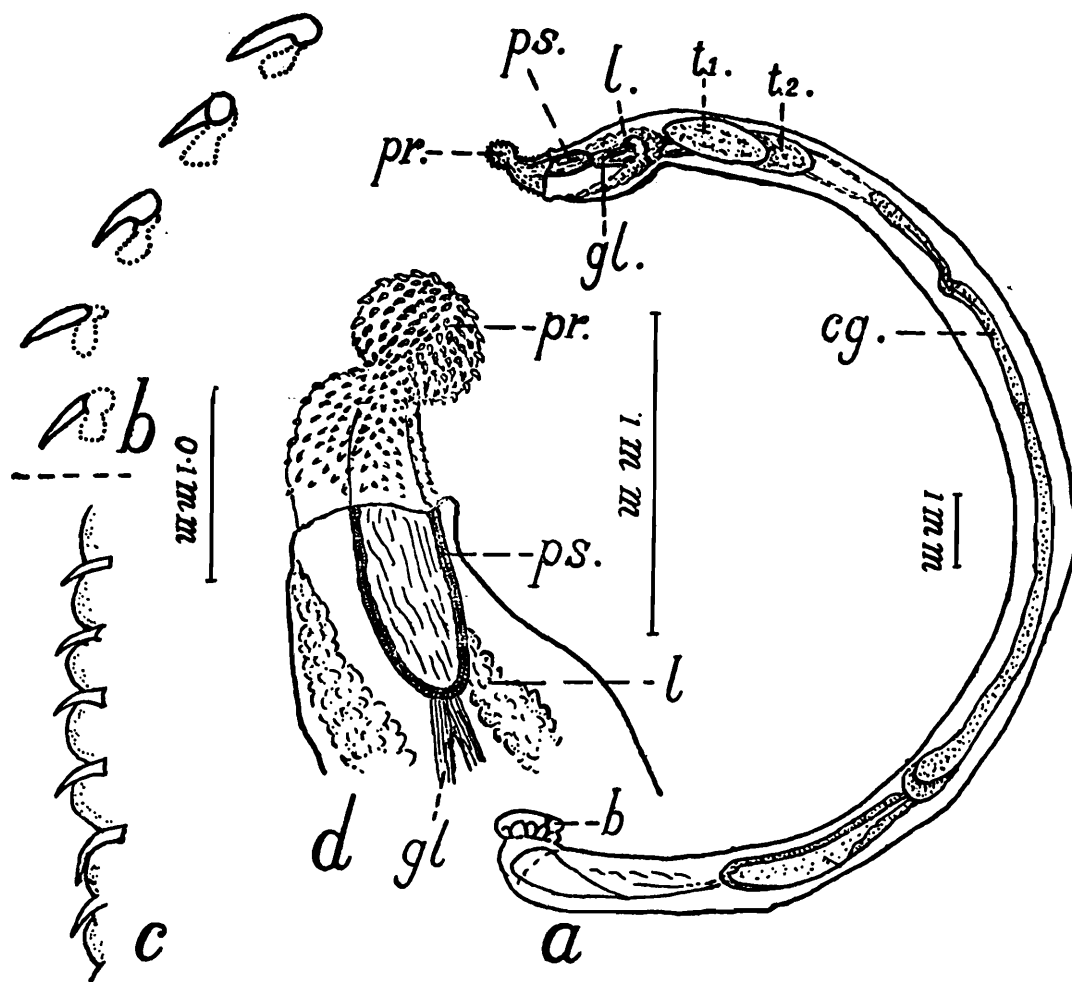
The body is stout, tubular, uniform in girth and curved. The form is fully matured, its total length is 18.8 mm. Its breadth is uniform and measures 0.82 mm.

The true proboscis (text-fig. 2a and d, pr) is a small knob-like structure, almost spherical in shape and measures 0.32  $\times$  0.32 mm. The neck is long and stout and broader than the true proboscis, measuring 0.42 mm. at its base. The whole proboscis measures 0.74 mm. The proboscis sheath (text-fig. 2a and d, ps) is double walled and measures 0.95  $\times$  0.29 mm. There are 24 to 28 longitudinal rows of hooks, each row consisting of 19 hooks, arranged as 9+10. Each hook borne by the bulbous head measures 34  $\mu$  (text-fig. 2b) and each hook on the neck measures 11 to 13  $\mu$  (text-fig. 2c).

There are two testes (text-fig. 2, t<sub>1</sub> and t<sub>2</sub>), which are rather large and disposed so much towards the anterior end that the two lemnisci (text-fig. 2a, l) are folded over each other. The anterior testis is placed at a distance of 2.19 mm. from the extreme anterior end and measures 1.40  $\times$  0.51 mm. The posterior testis is slightly smaller and is overlapped by the anterior testis; it is 3.1 mm. behind the anterior end and measures 1.10  $\times$  0.41 mm.

The cement glands, four in number, are long and tubular; they form two pairs, the anterior pair being longer than the posterior.

The bursa (text-fig. 2a, b) is thick and muscular and is studded with plate-like structures at its root.



TEXT-FIG. 2.—*Centrorhynchus macrorchis*, sp. nov.

a. Entire male; b. Some of the hooks on proboscis; c. Some of the hooks on the neck; d. proboscis with proboscis sheath. Other letterings as in the text-fig. 1.

*Comparison with other species.*—*Centrorhynchus macrorchis* sp. nov. is characterised by the possession of 24 to 28 rows of hooks on the proboscis, each row having 19 hooks, 10 on the proboscis and 9 on the neck. The following table shows other species of *Centrorhynchus* having approximately the same number of rows of hooks :—

Name of Species	Long : rows	Hooks in each row	Hooks on proboscis and neck in each row
<i>C. leptorhynchus</i> (Meyer, 1933)	28—30	22	10(9), 4(5), 8.
<i>C. giganteus</i> (Travassos, 1919)	24—26	27—28	16—17, 11.
<i>C. opimus</i> (Travassos, 1919)	24	12—13	..
<i>C. tumidulus</i> (Rudolphi, 1819)	26	23	..
<i>C. simplex</i> (Meyer, 1933)	22—24	24	14, 10.
<i>C. albidus</i> (Meyer, 1933)	28—30	20	7, 13.
<i>C. horridus</i> (Von Linstow, 1897).	26—28	15—16	5—6, 10.
<i>C. turdi</i> (Yamaguti, 1935).	26—29	11—14	..
	26—34	11—13	..
<i>C. elongatus</i> (Yamaguti, 1935)	26—31	13—19	..

The above table indicates clearly that *C. macrorchis* sp. nov. differs from all others not only in number of hooks but also in the distribution of the hooks on the proboscis and the neck. In view of the above facts I consider it to be a new species.

*Diagnosis.*—Male measuring 18.8 mm. in length and 0.82 mm. in girth; proboscis  $0.32 \times 0.32$  mm.; proboscis with neck measures 0.74 mm.; 24 to 28 longitudinal rows of hooks, each row consisting of 9 hooks on the knob like head and 10 hooks on the neck; hooks measuring  $34 \mu$  and 11 to  $13 \mu$  respectively; proboscis sheath double walled, measuring  $0.95 \times 0.29$  mm.; testes two situated near the lemnisci; anterior testis  $1.40 \times 0.51$  mm., posterior  $1.10 \times 0.41$  mm.; cement glands in two pairs, long and tubular, anterior pair longer than posterior; bursa thick and muscular, studded with plate like structures at its root.

*Host.*—*Cerchneis tinunculus tinunculus*.

*Locality.*—Amraoti, Berar, India.

*Type-specimens.*—(W .) are deposited in the collection of the Zoological Survey of India.

#### *Centrorhynchus brevicaudatus* sp. nov.

Only one male specimen was found in the intestine of the host. The total length of the parasite is 3.31 mm. The body is fusiform. At its anterior end it measures 0.32 mm. In the middle where it is broadest it measures 0.70 mm. The posterior part of the body narrows to form a tail-like structure, which is short and slightly broader at the extreme end and measures 0.75 mm.

The proboscis (text-fig. 3a and d, pr) is 0.50 mm. in length whereas the neck is 0.51 mm. The proboscis is 0.28 mm. at its broadest point.

There are 24 to 26 longitudinal rows of hooks, each row having 23 to 24 hooks. The hooks of the proboscis (text-fig. 3b) are slightly larger than the hooks present on the neck (text-fig. 3c). They measure  $38 \mu$  and  $30 \mu$  respectively.

The proboscis sheath (text-fig. 3a and d, ps) is double walled and measures  $0.62 \times 0.18$  mm.

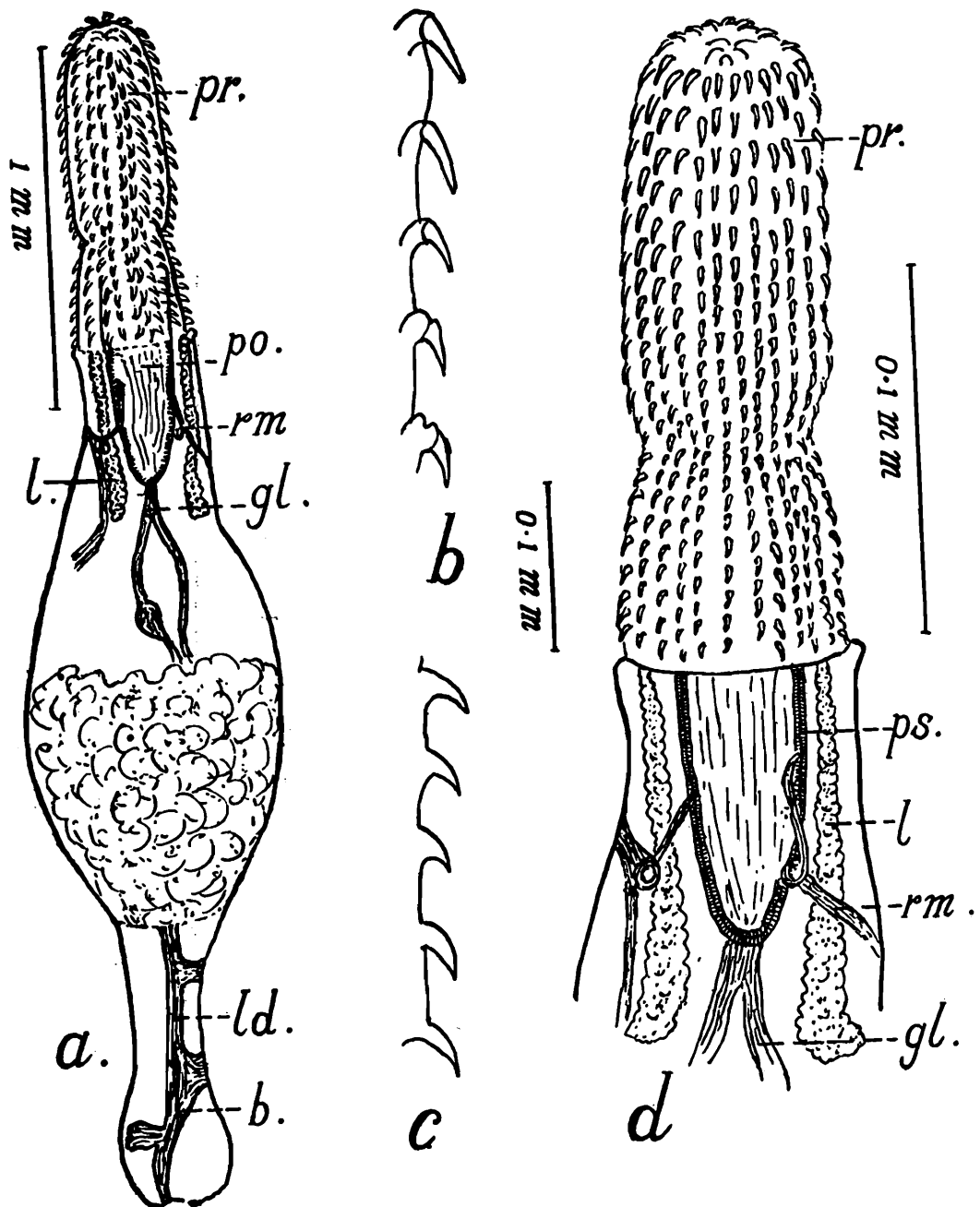
The retractor muscles (text-fig. 3a and d, rm) of the proboscis seem to come down and bend over themselves for some distance and finally attach to the musculature of the body wall on each side.

Lemnisci (text-fig. 3a and d, l) are thin and coiled and measure 0.55 and 0.48 mm. in length.

The genital ligament (text-fig. 3a, gl) arises from the posterior end of the proboscis and proceeds backwards in the body cavity enclosing the genitalia of which a single testis is visible.

The single cement gland (text-fig. 3a, cg) seems to be a big coiled mass filling completely the posterior half of the body.

The ejaculatory duct (text-fig. 3a, ed) and the bursa (text-fig. 3b) are supported by muscular bands which are attached to the body wall.



TEXT-FIG. 3.—*Centrorhynchus brevicaudatus*, sp. nov.

a. Entire male; b. Some of the hooks on the proboscis; c. Some of the hooks on neck; d. Proboscis with proboscis sheath; ed., ejaculatory duct; rm., retractor muscles. Other letterings as in text-fig. 1.

*Comparison with other species.*—*Centrorhynchus brevicaudatus* sp. nov. has 24 to 26 longitudinal rows of hooks. Each row has 13(14)

hooks on the head and 10 on the neck. Other species having approximately the same number of hooks are given in the following table :—

Name of Species	Long : rows	Hooks in each row	Hooks on proboscis and neck in each row
<i>C. giganteus</i> (Travassos, 1919)	24—26	27—28	16—17, 11.
<i>C. opimus</i> (Travassos, 1919)	24	12—13	..
<i>C. tumidulus</i> (Rudolphi, 1819)	26	13	..
<i>C. simplex</i> (Meyer, 1933)	22—24	24	14, 10.
<i>C. horridus</i> (Von Linstow, 1897)	26—28	15—16	5—6, 10.
<i>C. turdi</i> (Yamaguti, 1935)	26—29	11—14	..
	26—34	11—13	..
<i>C. elongatus</i> (Yamaguti, 1935)	26—31	13—19	..

Of all the forms listed in the above table, in none the number of hooks in each row and distribution of hooks on the head and neck resembles that in *C. brevicaudatus*. I therefore consider it to be a new species.

*Diagnosis*.—Length 3.13 mm. ; maximum width 0.70 mm. proboscis and neck measure 0.50 mm. and 0.51 mm. respectively ; 24 to 26 longitudinal rows of hooks, each row having 23 to 24 hooks, 13(14) in each row on the head and 10 on neck ; hooks on the proboscis and neck 38  $\mu$  and 30  $\mu$  in length respectively ; proboscis sheath double walled measuring 0.62  $\times$  0.18 mm. ; lemnisci measuring 0.55 mm. and 0.48 mm. in length ; single cement gland forming a big coiled mass filling completely the posterior half of the body.

*Host*.—*Ophiocephalus* sp.

*Locality*.—Nagpur, Central Provinces, India.

*Type-specimen*.—(W .) is deposited in the collection of the Zoological Survey of India.

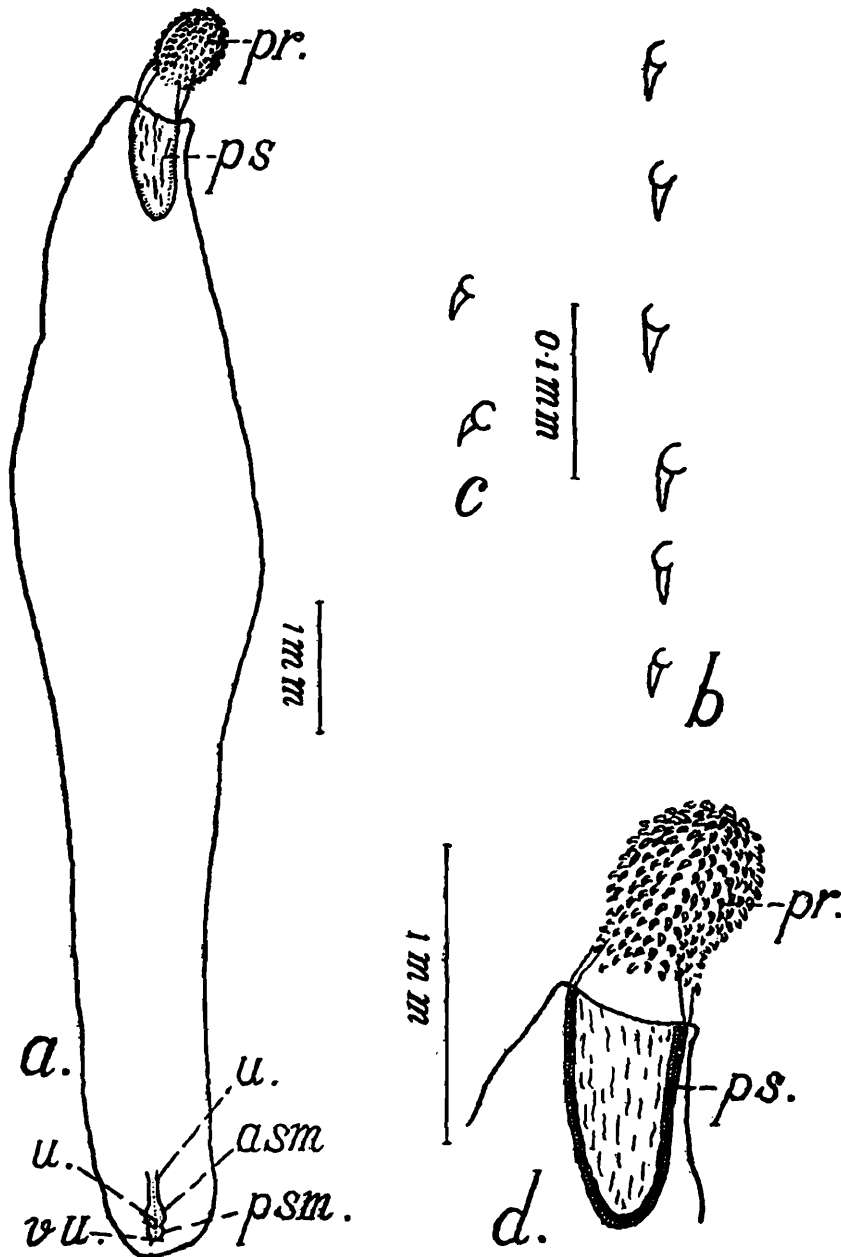
### *Centrorhynchus brevicanthus*, sp. nov.

A single female specimen was obtained. Body is spindle shaped with a blunt tail end, and measures 8.59 mm. in length and 0.51 mm. in breadth at the anterior end. It is broadest in the middle of the body, measuring 1.70 mm., the posterior end being 0.85 mm. broad and rounded



The proboscis (text-fig. 4a and d, pr) is knob-like and 0.39 mm. broad. The proboscis with the neck measures 0.75 mm. in length. The proboscis sheath (text-fig. 4a and d, ps) is double walled and measures  $0.98 \times 0.45$  mm.

There are 30 to 32 longitudinal rows of hooks with 11 to 12 hooks in each row, all with roots directed backwards. Hooks on the proboscis proper and the neck are similar. Other details could not be made out.



TEXT-FIG. 4.—*Centrorhynchus brevicanthus*, sp. nov.

a. Entire female; b. Some of the hooks on proboscis; c. Some of the hooks on the neck; d. Proboscis with proboscis sheath. Other letterings as in text-fig. 1.

*Comparison with other species.*—*Centrorhynchus brevicanthus* sp. nov. has 30 to 32 longitudinal rows of hooks, in each row there are 11 to 12 hooks, with 9 on the head and 2 on the neck.

The following table shows number and distribution of hooks in species which have approximately the same number of longitudinal rows of hooks :—

Name of Species	Long : rows	Hooks in each row	Hooks on proboscis and neck in each row
<i>C. aluconis</i> (Muller, 1780)	30	15	.
<i>C. buteonis</i> (Schrank, 1788)	30—32	12—16	7—10, 5—6.
<i>C. globocaudatus</i> (Zedder, 1800)	30	18—21	5—6, 13—15.
<i>C. lancea</i> (Westrumb, 1821)	30	11—14	7—8, 4—6.
<i>C. leptorhynchus</i> (Meyer, 1933)	28—30	22	10(9), 4(5), 8.
<i>C. pinguis</i> (VanCleave, 1918)	32	16	..
<i>C. spinosus</i> (VanCleave, 1924)	30—32	22—23	8—9, 14.
<i>C. polymorphus</i> (Travassos, 1926)	30	17	10, 7.
<i>C. albidus</i> (Meyer, 1933)	28—30	20	7, 13.
<i>C. turdi</i> (Yamaguti, 1935)	26—29	11—14	..
	26—34	11—13	..
<i>C. elongatus</i> (Yamaguti, 1935)	26—31	13—19	..
<i>C. conspectus</i> (VanCleave and Pratt, 1940)	30—32	17—18	..

The above table indicates that *Centrorhynchus brevicanthus* differs from all the other species both in the number of hooks and their distribution on the head and neck.

I therefore consider this a new species.

*Diagnosis.*—Female 8.59 mm. long ; maximum breadth 1.70 mm ; proboscis knob-like ; 30 to 32 longitudinal rows of hooks with 11 to 12 hooks in each row, 9(10) and 2 hooks on the head and neck respectively.

*Host.*—Black headed Maina, *Temenuchus pagaodarum* (Gmn.).

*Locality.*—Nagpur, Central Provinces, India.

*Type-specimen.*—(W... ....) is deposited in the collection of the Zoological Survey of India.

*Acknowledgment.*—This work was carried out at the College of Science, Nagpur, under the guidance of Dr. M. A. Moghe, to whom I am greatly indebted for help at every step of my work and also for the use of his personal library and collection of Acanthocephala. I am also thankful to Professor K. V. Varadpande, Head of the Biology Department, Vidarbha Mahavidyalaya, Amraoti, for giving me all facilities to collect the material.

## REFERENCES.

- DATTA, M. N., 1932.—Acanthocephala from Northern India II. A new species of *Centrorhynchus* from a Himalayan bird, *Urocissa melanocephala occipitalis* (Blyth). *Proc. Ind. Sci. Cong. Calcutta*, 1932 (Abstract).
- LÜHE, M., 1911.—*Die Süßwasserfauna Deutschlands* Heft 16 Acanthocephalen.
- MEYER, A., 1933.—Acanthocephala. *Bronn's Klassen und Ordnungen Les Tierreichs* II.
- SOUTHWELL, T. & MACFIE, J. W. S., 1925.—On a collection of Acanthocephala in the Liverpool School of Tropical Medicine. *Ann. Trop. Med. Parasitol.* XIX.
- THAPAR, G. S., 1927.—On *Acanthogyrus* n.g. from the intestine of the Indian Fish, *Labeo rohita*, with a note on the classification of the Acanthocephala. *Journ. Helminth.* V
- TUBANGUI, P., 1933.—Notes on Acanthocephala in the Philippines. *Philipp. Jour. Sci.* L.
- VAN CLEAVE, H. J. & PRATT, S. M., 1940.—A new species of the genus *Centrorhynchus* (Acanthocephala) from the barrel owl. *Jour. Parasitol.* XXVI.
- YAMAGUTI, S., 1935.—Studies on the Helminth Fauna of Japan. Part 8. Acanthocephala 1. *Jap. Journ. Zool.* VI.
- 1939.—Studies on the Helminth Fauna of Japan. Part 29. Acanthocephala II. *Jap. Journ. Zool.* VIII.