

ANNALES DE PARASITOLOGIE

HUMAINE ET COMPARÉE

Tome XLIV

1969

N° 1

Annales de Parasitologie (Paris), t. 44, 1969, n° 1, pp. 5 à 12

MÉMOIRES ORIGINAUX

On *Centrorhynchus* (*Centrorhynchus*) *golvani*,
a new species of an Acanthocephalan
from the Booted Eagle,
Hieraaetus pennatus in Madras

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Résumé

Trois mâles et deux femelles d'Acanthocéphale, provenant d'un aigle « botté », *Hieraaetus pennatus* à Madras (Indes), ont été rapportés au genre *Centrorhynchus*. L'armature du proboscis comporte 26 rangées longitudinales de 5 crochets et 4 épines chacune. Cette disposition n'ayant été observée dans aucune espèce connue, ces vers ont été identifiés à une espèce nouvelle : *Centrorhynchus* (*Centrorhynchus*) *golvani*. La taxonomie et les affinités pour l'hôte dans le genre *Centrorhynchus* sont discutées. Les hôtes présumés du cycle évolutif de ce parasite seraient un Insecte comme hôte intermédiaire et un Oiseau comme hôte définitif ; occasionnellement, des hôtes paraténiques, tels que des Amphibiens, des Reptiles ou des Oiseaux, pourraient intervenir. Un tableau des espèces connues de *Centrorhynchus*, de leurs hôtes et des publications les concernant termine ce travail.

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Summary

Three males (15.0-18.0 mm) and two females (21.0-22.3 mm) of an Acanthocephalan recovered from the intestine of a Booted Eagle, *Hieraaetus pennatus* in Madras were found to belong to the genus *Centrorhynchus*. The proboscis armature consisted of 26 longitudinal rows of 5 hooks and 4 spines each, an arrangement not observed in any other known species. The worms were therefore referable to a new species *Centrorhynchus (Centrorhynchus) golvani*. The taxonomy and host relationships in the genus *Centrorhynchus* are discussed, and the transmission of infection is expected to take place normally between an insect intermediate host and a bird (or mammalian) definitive host, and occasionally through paratenic hosts as Amphibians, Reptiles or Birds. A table of all species of *Centrorhynchus* in India, with their hosts and recorders is provided.

The genus *Centrorhynchus* was created by Luhe in 1911, under the family Polymorphidae, for the acanthocephalan which had an unarmed trunk and a proboscis sheath attached to the middle of the proboscis. Meyer (1933) described 32 named and 2 unnamed species of *Centrorhynchus* in the sub-family Centrorhynchinae Meyer 1931, and illustrated most of them. He also defined the generic characters and provided a host-parasite list.

Between 1933 and 1939, several new species of this genus have been reported from a variety of hosts, in India and the rest of the world. A monograph on the genus was contributed by Golvan (1956); it provided a clear and revised account of the various species of the genus with taxonomic details. He enumerated the generic characters as consisting chiefly of:

« Polymorphidae with trunk devoid of spination, proboscis receptacle attached at the middle of the proboscis, proboscis armature of 2 sets, testes situated in the anterior region, cement glands 3, long and tubular, parasites normally of carnivorous and insectivorous birds and also in batrachians, reptiles and insectivorous mammals. ».

Golvan (*loc. cit.*) recognized 2 new sub-genera *Sphaerirostris* and *Longirostris* according as the proboscis was globular or cylindrical, and the trunk short and fusiform or long and tubular respectively. The former sub-genus included 12 species and the latter 41, besides 7 undetermined species. A detailed host list for the species was appended to the descriptions.

As regards the species recorded from India, most of which were reviewed by Golvan (1956), reference ought to be made to the contributions of Chandler (1925), Bhaléao (1931), Datta (1932, 1933), Das (1949, 1950, 1952, 1957), Gupta (1950), Pujatti (1950 *a*, 1950 *b*, 1952), Datta & Soota (1955, 1956) and Yamaguti (1963). Juveniles and adults of several new species of *Centrorhynchus* from amphibian, reptilian, avian

and mammalian hosts described by the earlier authors cited above are included in the monograph by Yamaguti (1963). Essential details of these species are tabulated at the end of this paper (Table I).

Description

Five specimens, 3 males and 2 females, of *Acanthocephala* were discovered in the intestine of a Booted Eagle, *Hieraaetus pennatus*, captured in Madras.

They were whitish and long, the males measuring 15.0×1.0 , 18.0×1.0 , and 16.3×0.9 mm., and the females 21.0×1.0 and 22.3×1.0 mm. Their morphology was studied on specimens stained in acetic-alum carmine and mounted in Goldstein's medium.

Body cylindrical and sturdy, shorter in males. Proboscis cylindrical and club-shaped when fully extended, 0.60×0.32 mm., and somewhat globular when contracted, 0.58×0.45 mm. Proboscis armature (Fig. 1) consists of 26 longitudinal rows each with 9 (or 8) prominences, which may be distinguished in two series, one of 5 hooks and the other of 4 spines. Each hook is strongly arched and the blade continues posteriorly as the root imbedded in the proboscis wall; the spine is only slightly arched and has a rectangular root which shows an anterior extension (Fig. 2). The fourth hook is the largest, 0.086×0.033 mm., and the last spine is the smallest, 0.040×0.011 mm. Proboscis sheath double-walled commencing behind the fifth hook and extending into the body as a sac, 1.00×0.20 mm., and supported by a pair of retractor muscles. Lemnisci, one on each side of the proboscis receptacle, $1.8-1.9 \times 0.2$ mm. Trunk non-spinous, long and of fairly uniform width, with rounded posterior end in both sexes.

MALE: Testes ovoid, 1.1×0.6 mm., located closely one behind the other, the anterior about 3.30 mm., from the base of the proboscis. Cement glands long and tubular, 3 (or 4?), ductus ejaculatorius muscular, 1.4 mm., long, bursa copulatrix 1.5 mm., long, with folded and twisted walls, opening sub-terminally (Fig. 3).

FEMALE: Floating ovarian balls oval, 0.17×0.1 mm., scattered in the body cavity. Genital ligament along the middle of the body, supporting the uterus 0.23 mm., long, enlarged at the anterior end and followed by a vagina 0.27 mm., long opening ventro-terminally (Figs 4, 5, 6).

HOST: *Hieraaetus pennatus*.

HABITAT: Intestine.

LOCALITY: Madras City.

These specimens could be identified as belonging to the genus *Centrorhynchus*, primarily on the basis of the following generic characters: Non-spinous body, proboscis armature distinguishable into two types, testes situated in the anterior region, and tubular cement glands. The species of *Centrorhynchus* described in the monographs by Meyer (1933) and Golvan (1956), and those new species reported upon thereafter, have all been compared, and it is observed that the spination on the proboscis is a diagnostic specific character. The species described herein is unique in possessing 26 longitudinal

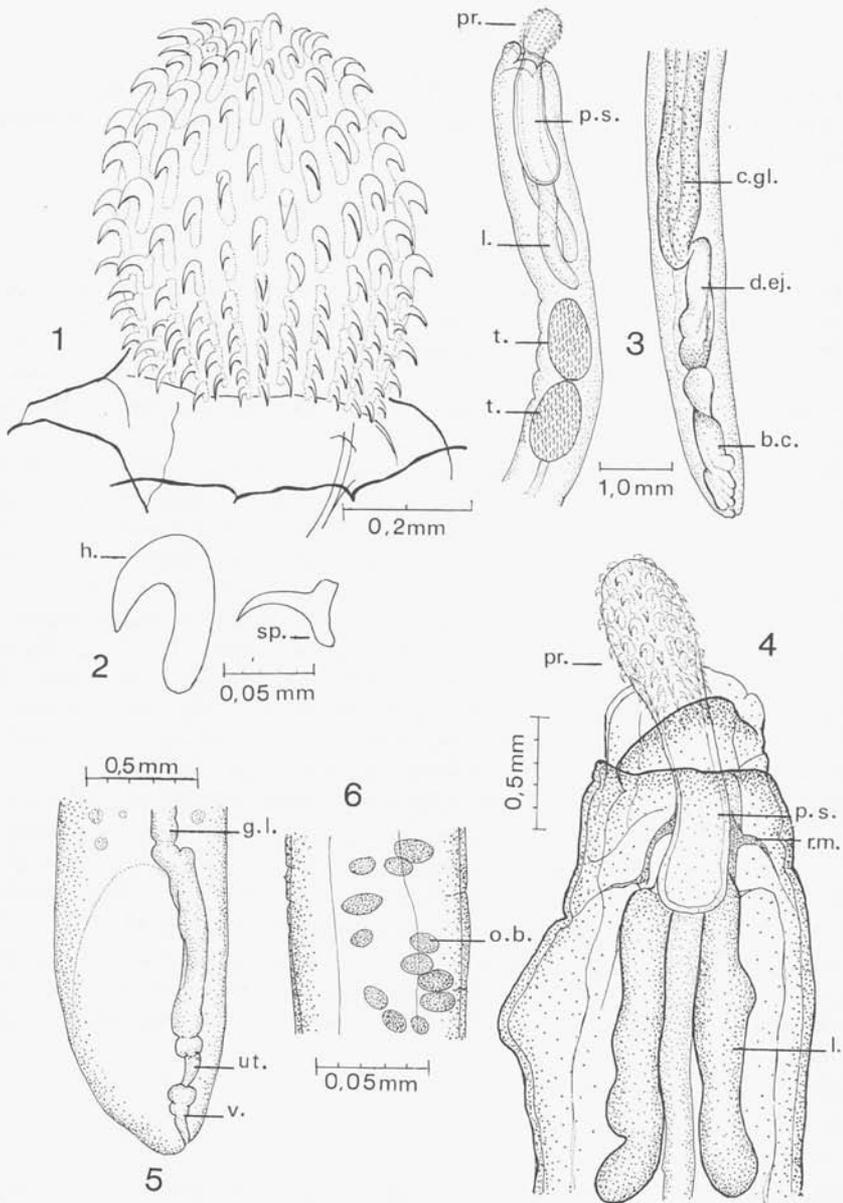


FIG. 1. — Proboscis to show number and arrangement of hooks and spines

FIG. 2. — A typical hook and a spine

FIG. 3. — Male worm, anterior end on left and posterior end on right to show genitalia

FIG. 4. — Female worm, anterior end to show proboscis, proboscis sheath, retractor muscle and lemnisci

FIG. 5. — Female worm, posterior end to show genital ligament, uterus and vagina

FIG. 6. — Female worm, middle region showing free ovarian balls

b.c. bursa copulatrix. c.gl. cement glands. d.ej. ductus ejaculatorius. g.l. genital ligament. h. hook. l. lemniscus. o.b. ovarian ball. pr. proboscis. p.s. proboscis sheath. r.m. retractor muscle. sp. spine. ut. uterus. vag. vagina

rows of 9 hooks and spines (5 + 4). It is therefore undescribed species and is named *Centrorhynchus golvani* nov. spec., after Dr Yves Golvan of Paris, France, whose studies on acanthocephala are well-known.

Discussion

(a). TAXONOMY :

The name *C. falconis* given to the species from *Circus macrourus* by Das (1949) was found to be a homonym and was therefore revised by Golvan (1956) as *C. indicus* nom. nov. Datta & Soota (1956) reported *C. cinctus* (Rud. 1819) known earlier from *Coluber viridiaeneus* in Italy, as a parasite of *Ptyas mucosus* in India. But, Golvan (1956) has explained that the species recorded in Italy was originally confused with *Echinorhynchus cinctus* and later described as *C. cinctus* by Meyer (1933). Accordingly, *C. cinctus* (Rud. 1819) has been suppressed by him, having been identified with *C. leptorhynchus* Meyer 1933 in one part, and with *C. lancea* Skrjabin 1913 in the other. *C. cinctus* described by Datta & Soota (1956) agrees in its spination with *C. lancea*, and is therefore re-named *C. lancea* in the present account. Yamaguti (1963) however retains *C. cinctum* as an independent species.

Pujatti (1950 a, 1950 b and 1952) contributed observations on vertebrate intermediate and definitive hosts of *C. spinosus* in India, having found 'acanthellae' encysted in the serous membranes of the former. Golvan (1956) comments on them thus : « Nous pensons qu'il s'agit là d'une erreur de détermination » (we consider that there should have been a mistake in identification).

There has recently been an interesting discussion of the nomenclature of the genus. Golvan (1957) pointed out that the names of the genus and sub-genus, namely *Centrorhynchus* (*Longirostris*), were pre-occupied and should therefore be substituted by *Gordiorhynchus* (*Gordiorhynchus*). Dollfus & Golvan (1957) held that the name *Centrorhynchus* Luhe 1911 was pre-occupied, and as *Centrorhynchus* and *Gordiorhynchus* are synonymous, the generic name should be *Gordiorhynchus* with two sub-genera *Gordiorhynchus* (in place of *Longirostris*) and *Sphaerirostris*. Dollfus (1958), after a scrutiny of the paper in which « *Centrorhynchus* » was suggested prior to Luhe 1911, found that it was a typographical mistake for *Centorhynchus*, and he concluded that *Centrorhynchus* Luhe 1911 should be retained. This view was also confirmed by Ward (1959). If the argument concerning the validity of the generic name *Centrorhynchus* is followed carefully, it would appear that the sub-generic name *Longirostris*, which remains pre-occupied, is untenable. The sub-genus should then be *Centrorhynchus*, in accordance with Rule 9 of the International Rules of Zoological Nomenclature.

On a consideration of the morphology of the present species described above and the nomenclatorial revisions suggested by Golvan (1956) and Dollfus (1958), its name should be given as *Centrorhynchus* (*Centrorhynchus*) *golvani* n. sp.

(b). HOST RELATIONSHIPS :

The variety of hosts in which *Centrorhynchus* has been encountered by different workers warrants a critical analysis. The worm has been found to parasitize birds and

Table I
SPECIES OF *Centrorhynchus* IN INDIA

SPECIES	ROWS OF HOOKS	HOST	RECORDER
I. Sub-genus <i>Sphaerirostris</i>.			
1. <i>C. erraticus</i> A	36 of 21-22 ..	<i>Felis catus</i>	Chandler (1925)
2. <i>C. reptans</i> (J) ?	of 24	<i>Naja hannah</i>	Bhalerao (1931)
3. <i>C. maryasis</i> A	24-28 of 14-16	<i>Urocissa melanocephala</i> <i>occipitalis</i>	Datta (1932, 1933)
4. <i>C. lancea</i> (J)	30-32 of 5 & 7 . (= <i>C. cinctus</i>)	<i>Ptyas mucosus</i>	Datta & Soota (1956)
II. Sub-genus <i>Centrorhynchus</i>.			
5. <i>C. brevicaudatus</i> *	(J) 24-26 of 13-14 & 10	<i>Ophiocephalus</i> sp.	Das (1949)
6. <i>C. indicus</i> nom. nov. (= <i>C. falconis</i>) A	28-30 of 12-14 & 9 . J	<i>Circus macrourus</i> <i>Ptyas mucosus</i>	Das (1949) Das (1957)
7. <i>C. brevicanthus</i> A	30-32 of 11-12	<i>Temenuchus pagodarum</i>	Das (1949)
8. <i>C. macrorchis</i> A	24-28 of 10 & 9	<i>Falco (Cerchneis) t. tinnunculus</i>	Das (1949)
9. <i>C. crocidurus</i> (J)	34-38 of 24- 25	<i>Crocidura caerulea</i>	Das (1950)
10. <i>C. amphibius</i> (J)	26-30 of 20- 21	<i>Rana tigrina</i> <i>Ptyas mucosus</i>	Das (1950)
11. <i>C. longicephalus</i> (J)	24-26 of 21-23	<i>Lycodon</i> sp.	Das (1950)
12. <i>C. microcervicanthus</i> (J)	26-30 of 19-22	<i>Naia tripudians</i>	Das (1950)
13. <i>C. ptyasus</i> L & (J)	22-24 of 26- 28	<i>Ptyas mucosus</i>	Gupta (1950)
14. <i>C. spinosus</i> (J)	30-32 of 8(9) & 14	2 amphibians 9 reptiles 3 mammals	Pujatti (1950 a)
	(J)	<i>Lycodon flavomaculatus</i> <i>Zamenis gracilis</i> <i>Sinotes arnensis</i>	Pujatti (1952)
	A	<i>Dryophis mycterizans</i> <i>Milvus migrans govinda</i> <i>Corvus coronoides culminatus</i> <i>C. s. splendens</i> <i>Tyto alba javanica</i>	Pujatti (1950 b)
15. <i>C. batrachus</i> L	32 of 10 & 12	<i>Rana tigrina</i>	Das (1952)
16. <i>C. bengalense</i> A	35-40 of 14-18	<i>Dinopium</i> sp.	Datta & Soota (1955)
17. <i>C. knowlesi</i> A	42-46 of 14-16	<i>Otus</i> sp.	Datta & Soota (1955)
18. <i>C. golvani</i> n. sp. A	26 of 9 (10)	<i>Hieraetus pennatus</i>	Present authors

L. = larva

(J) = juvenile

A = adult

* *C. brevicaudatus* was described as an adult by Das (1949) and as a juvenile by Golvan (1956).

mammals in its adult condition, amphibians and reptiles in its juvenile state. Read (1950) successfully infected rats with *C. spinosus*, normally of birds, by feeding them with cystacanths from a snake, and interpreted that the genus exhibited a low degree of host specificity.

Van Cleave (1953) considered that the species of *Centrorhynchus* « are always restricted to birds as normal definitive hosts » and that those from mammals would seem to be « accidental infection obtained when the mammals ate an infected bird or an infected second intermediate host — such as an insect, an amphibian, or a reptile ». The transmission of *Centrorhynchus* should therefore be effected normally between an insect intermediate host and a bird (or mammalian) definitive host, and occasionally through paratenic hosts consisting of amphibians, reptiles or birds.

ACKNOWLEDGEMENT.

The authors are grateful to Dr Yves Golvan, Institut de Parasitologie, Faculté de Médecine, Paris, for his kindness in scrutinizing the paper before publication, and to Dr A.-G. Chabaud of the same Institution for his assistance in procuring the literature.

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