GIGANTORHYNCHUS ORTICEI A NEW SPECIES (ACANTHOCEPHALA) FROM A PERUVIAN MARSUPIAL

by

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INTRODUCTION

In 1951, while on an expedition into the jungle in Tingo Maria, Peru, Javier Ortiz de la Puente, ornithologist at the Museum of the University of San Marcos, Lima, Peru, collected one specimen of the rat-tailed marsupial, Metachirus nudicaudatus.

From the intestine of this animal there were taken twenty-four specimens of acanthocephalan parasites. Further examination of the specimens by the author indicated that they were members of the family Gigantorhynchidae Hamann, 1892. Since the literature reveals no report of parasitism of this host animal by Acanthocephala, the opportunity of describing the parasite as present for the first time in this marsupial is indicated. Because of this single occurence, it is very likely that the parasite can be described as a new species.

The writer wishes to acknowledge her indebtedness to Dr. W. L. Threlkeld for his encouragement, kindness, and helpful suggestions, and under whose supervision this work was carried out. Grateful acknowledgement is extended to Dr. I. D. Wilson, Head of the Biology Department, for his general support of her work, and the writer also wishes to express her thanks and appreciation to Mr. H. L. Hollaway, Jr., of the University of Virginia for his aid in obtaining references and for his helpful suggestions. Sincere appreciation is extended to Dr. H. L. Mosby of the Wildlife Department for his aid in obtaining the photographs and to Dr. W. B. Gross for the photomicrographs. Recognition is also due Miss C. Villanueva for the collection of this parasite.

REVIEW OF LITERATURE

The literature on Acanthocephala, in the past century presents a rather confused taxonomical picture. One species of Acanthocephala was described by Diesing in 1851 (original not seen) (4) from Myrmecophaga jubata (L.) and was named Echinorhynchus echinodiscus. In 1892 Hamann lifted this species out of the above named genus and placed it in a new genus designated as Gigantorhynchus. Travassos (4) in 1917 working in Brazil, S. A., redescribed the same species emphasizing two rows of hooks at the summit as a characteristic of the genus.

In 1923, H. J. Van Cleave (6) compiled a key to thirty-one genera of Acanthocephala including a description of the genus Gigantorhynchus: "Proboscis provided with a crown of a few circles of strong hooks crowded so that they may have the appearance of a single row and behind this crown a region of some length closely set with fine spines." Since Van Cleave's definition was announced concerning this genus, new concepts of description have been stated and it is generally conceded by most workers that the number, size and arrangement of the hooks on the proboscis (8), (13) and the position of the proboscis receptacle (11) constitute the best criteria for describing the genus and species.

Until 1941 only one species of the genus Gigantorhynchus was known. At this time Machado (3) in Brazil described a new species, Gigantorhynchus lutzi, from a marsupial, Caluromys philander (L.). His description of this parasite is not complete, and it appears that further study of the Acanthocephala which he has described as a new species might be a basis for the establishment of a new genus as will be shown later in connection with the parasite which is described herein.

EXPERIMENTAL

Objective

The main objective of this work is to give a description of the morphology and taxonomy as far as it is possible of the Acanthocephalan parasite of M. mudicaudatus and to compare the results with those obtained by Machado in his description of G. lutzi and on the basis of these differences determine if a new species in the genus Gigantorhynchus should be established.

Materials and Methods

Twenty-four specimens of Acanthocephala were fixed eight days in ten percent formalin, and then preserved in seventy percent alcohol. Different stains were used in order to show the complete morphology. The stains employed were: Picro-carmin, Mayer's carmalum, Reynold's stain, and Delafield's hematoxylin slightly acidified with acetic acid. Some specimens were cleared in xylene, while others were cleared in wintergreen. All specimens were mounted in permount. Two specimens were sectioned in series and stained in Delafield's hematoxylin-eosin.

An ocular micrometer was employed to obtain the biometric data. The hooks were measured by means of a camera lucida. The following method was employed: The length of the hooks with double root from the base of the hook to the tip, and the length of the root from the basal end to the distal end of the root; the length of the hooks with simple root, from the origin of the root to the exposed extremity of the hook. All drawings were made with the aid of the camera lucida

and projector. Measurements were not obtained from fresh specimens.

Results

The results of the biometric and comparative studies of twenty-four Acanthocephala collected from M. nudicaudatus are shown in Table I. Morphological and histological characteristics are shown in Plates I, II, III, IV, and V.

On the basis of morphological and histological studies a diagnosis of a new species has been made possible in the genus Gigantorhynchus, which will be named Gigantorhynchus orticei.

Gigantorhynchus orticei N. Sp.

General diagnosis: Acanthocephala of large and cylindrical body, the pseudosegementation of body inbricated, and divided in three portions by three grooves, one dorsal and two lateral that run along the body. A collar-like structure is present at 1.80 mm. beyond the cuticular ring or neck fold. Body of females attenuated in both extremity, length 130 to 242 mm. with maximum dorso-ventral diameter of 1.50 to 2 mm. Males curved posteriorly 46 to 75 mm. long with maximum diameter at approximately the cement glands from 1.4 to 1.92 mm.

Proboscis in both sexes cylindrical and curved ventrally, neck short devoid of hooks. Retractile praesoma is 1.45 to 1.72 mm long by 0.435 to 0.555 mm wide.

Proboscis at the summit is armed with two rows of six hooks with double root (Figure 1). The dimensions of these hooks from their base to the tip is approximately 160 u for the first row and 140 u for the second row. The length of the roots in the first row ranges from 0.100

to 0.102 mm. and the length of the roots of the second row from 0.090 to 0.095 mm. The posterior portion of the proboscis is armed with small hooks with a simple root (Figure 2) about 50 u long. There are eleven or twelve hooks in each longitudinal row. According to Van Cleave (8), the number of circles of hooks in this specimen would be twenty-one or twenty-three. The proximal rows consist of numerous small hooks which increase in length as they approach the equatorial zone and decrease in number at the distal portion. (Figure 3).

The proboscis receptacle is a closed muscular pouch which is suspended inside the anterior end of the proboscis. This pouch, from 0.750 to 0.920 mm. long does not receive the proboscis when it is inverted. In no specimen was the receptacle observed to extend posteriorly to the middle of the praesoma. Within the cavity are the invertor and retractor muscles, and between the invertor muscles lies a pyramidal mass of nerve cells which constitute the brain (Figure 4).

The lemnisci are long and cylindrical; they measure from 5.48 to 6.80 mm. in length by 0.129 to 0.163 in width. The number of nuclei in each lemnisci varies from five to six in the same specimen (Figure 5).

At the anterior portion of the trunk there is a special arrangement of subcuticular nuclei, which are of a fragemented type. They form the collar-like structure. (Fig. 9) In addition to these nuclei several other types of subcuticular nuclei have been observed throughout the body of the parasite. Immature forms show a spherical and ameboid type, (Fig. 10), and older forms display a fragmentation which resembles the nuclei present in the collar.

Males: The genital organs of the males are located in the posterior one-fifth of the body. The testes are eliptical. They measure from 1.98 to 3.00 mm. long by 0.56 to 0.920 mm. wide. Just posterior to the testes are the eight cement glands. These are closely grouped, but they possess distinctive walls and one single nucleus for each (Fig. 6). The two vas efferentia posterior to the cement glands unite to form a common sperm duct. The seminal vesicle, with the ducts of the cement glands, are enclosed in the genital sheath. The penis projects into the bursa which is eversible.

Females: The ovary is represented by a large number of small ovoid fragments. These ovarian fragments are from 0.150 to 0.270 mm. wide. The genital complex conforms with that usually described for this family. The vagina is short and muscular. The eggs are elliptical and surrounded by four membranes. The exterior membrane is wrinkled. The eggs measure from 0.079 to 0.085 mm. in length by 0.049 to 0.054 mm. in width.

Host: Metachirus nudicaudatus

Location: Intestine

Geographic distribution: Peru, South America

Table I. Comparison of the Three Species in the Genus Gigantorhynchus

	G. echinodiscus* Diesing 1851	G. lutzi Machado 1941	G. orticei n. sp.
Body length male	50 - 70 mm.	35 - 60 mm.	465 - 75 mm.
Body length female	150 - 220 mm.	130 - 200 mm.	130 - 242 mm.
Body width male	1 - 2 mm.	0.75 - 1.5 mm.	1.4 - 1.92 mm.
Body width female	1.5 - 3 mm.	1 - 2.5 mm.	1.5 - 2 mm.
Praesoma length	1 mm. (neck)	1.69 mm. (neck)	1.45 - 1.72 mm.
Praesoma width	0.5 mm. "	0.735 mm. "	0.48 - 0.55 mm.
No. hooks at summit	18	12	12
Hook length 1st. row	0.200 mm.	0.210 mm.	0.170 mm.
Hook length 2nd row	0.150 mm.	0.180 mm.	0.140 mm.
Root length 1st. row	0.130 mm.	0.165 mm.	0.090 - 0.102 mm.
Hook length with simple root	0.040 mm.	0.048 mm.	0.060 mm.
Lemnisci	20 - 30 mm.	2.595 X 0.735mm.	6.14 X 0.146 mm.
Proboscis receptacle			0.750 X 0.920 mm.
Testes length	6 - 8 mm.	5.752 - 6.045 mm.	1.98 - 3.mm.
Testes width	0.5 - 0.8 mm.	0.750 - 0.900 mm.	0.56 -0.92 mm.
Cement glands	0.5 - 0.6 mm.	1.20 X 0.90 mm.	0.60 - 0.75 mm. (approximately)
Ovarian fragments		0.60 X 0.167 mm.	0.195 X 0.102 mm.
Eggs	0.064 X 0.042mm.	0.115 X 0.064	0.082 X 0.051 mm.
Host	Myrmecophaga jubata Tamandua tatradactila	Caluromys philander	Metachirus nudicaudatus
Geographic distribution	Panama-Brasil	Brasil	Peru

*measurements by Travassos 1917. (4)

PLATE I

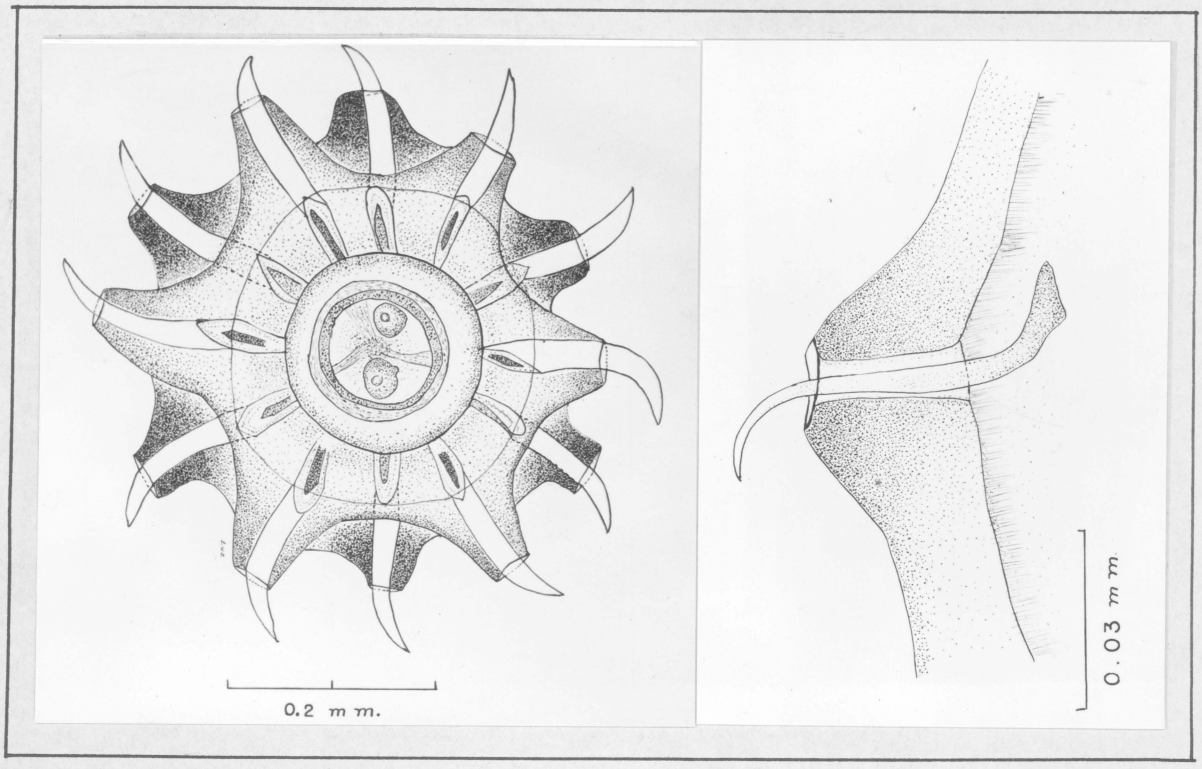

Figure 1 - Apical view of the proboscis showing the hooks with double root in Gigantorhynchus orticei.

Figure 2 - Hook of Gigantorhynchus orticei with simple root.

PLATE II

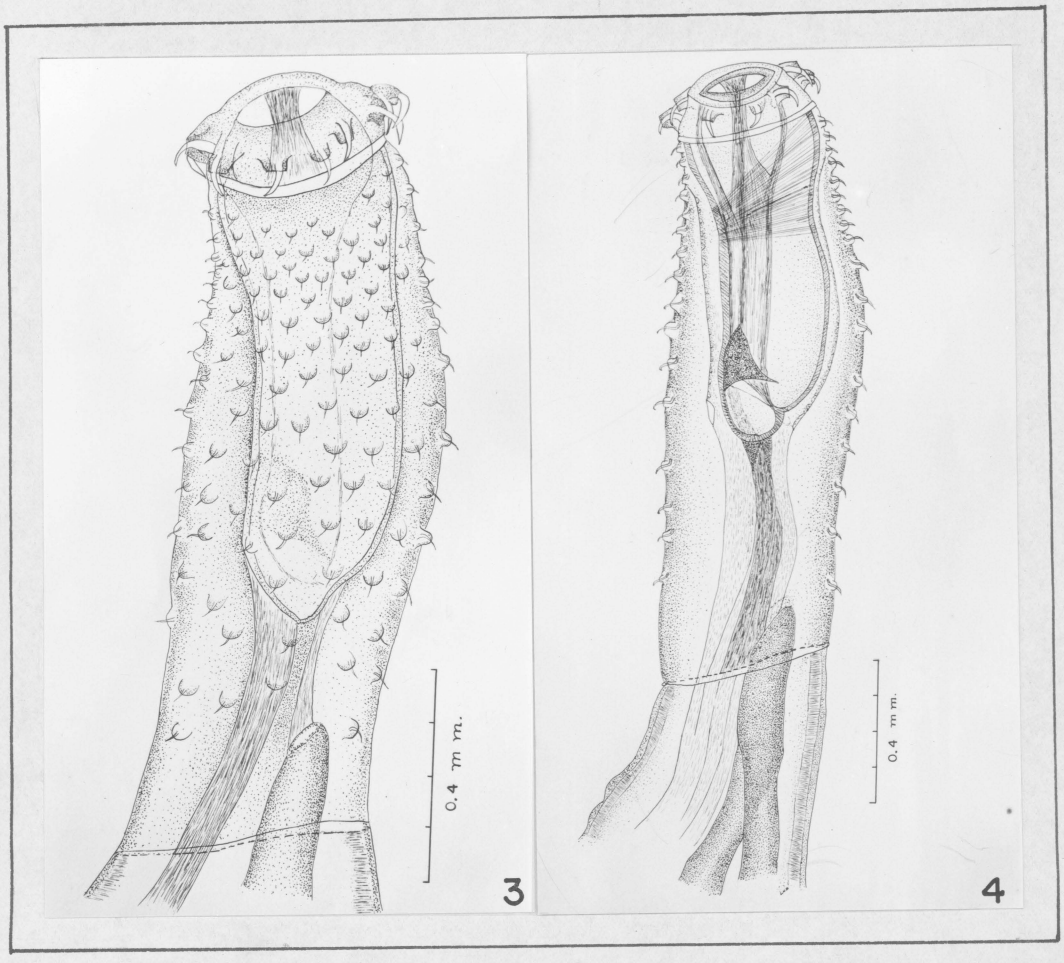

Figure 3 - Proboscis, showing the arrangement of hooks, Gigantorhynchus orticei.

Figure 4 - Praesoma, showing proboscis receptacle and associated structures in detail in Gigantorhynchus orticei.

P L A T E III

Figure 5 - Anterior portion of Gigantorhynchus orticei showing the lemnisci and inverted proboscis.

Figure 6 - Posterior end of male Gigantorhynchus orticei showing testes and cement glands.

P L A T E IV

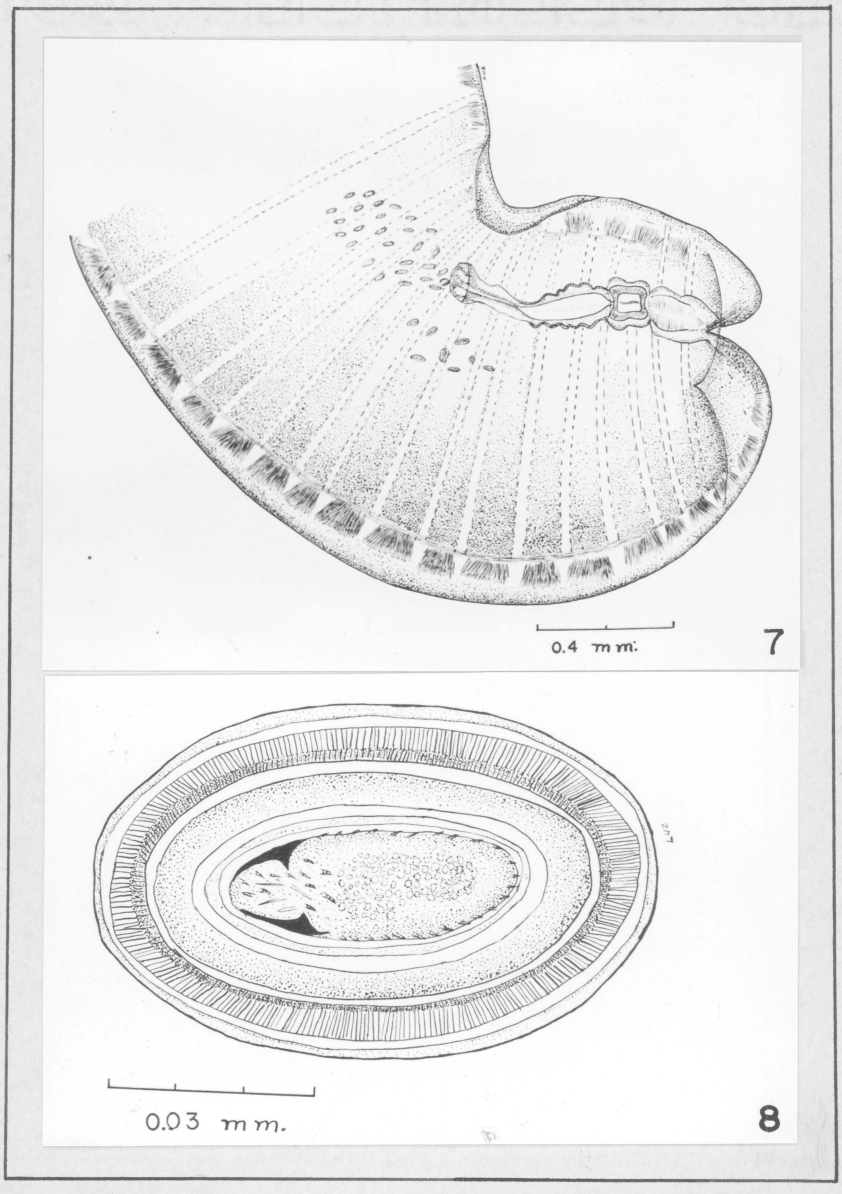

Figure 7 - Posterior end of female Gigantorhynchus orticei.

Figure 8 - Egg showing four membranes, Gigantorhynchus orticei.

PLATE V

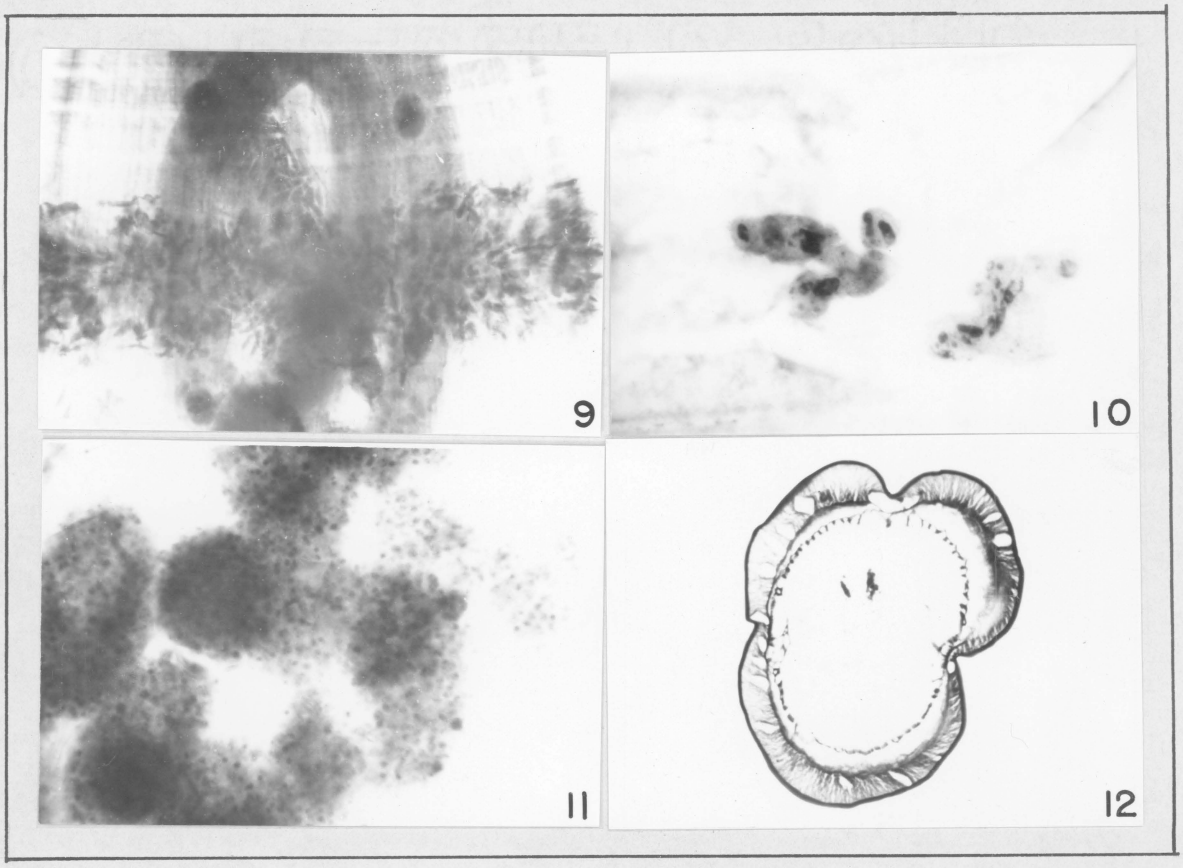

Figure 9 - Photomicrograph, showing the collar-like structure of fragmented nuclei in Gigantorhynchus orticei, 57 X .

Figure 10 - Photomicrograph of subcuticular ameboid nuclei of Gigantorhynchus orticei, 196 X .

Figure 11 - Photomicrograph of ovarian fragments, Gigantorhynchus orticei, 220 X .

Figure 12 - Photomicrograph of transversal section of Gigantorhynchus orticei showing dorsal and lateral grooves, 57 X .

DISCUSSION

Since the literature on Acanthocephala reports only two species in the genus Gigantorhynchus; G. echinodiscus, Diesing, 1851, and G. lutzi, Machado, 1941, the new species under study can be compared with both species already described.

As has been noted previously, Machado (3) described a new species of Acanthocephala from Caluromys philander, a marsupial in Brazil. The species here described has been taken from the intestine of Metachirus nudicaudatus, a marsupial found in Peru. This represents an initial report on an Acanthocephala from this host animal.

While there is considerable similarity between these two species of parasites, an analysis of the work by Machado leaves much to be described because of the meager description of his reported G. lutzi. The several differences which have diagnostic value make it possible to describe the Acanthocephala under study as a new species, named Gigantorhynchus orticei.

The over-all length of the species here reported exceeds the dimensions reported by Machado for G. lutzi. The external appearance also is different. In G. lutzi there are two grooves, one dorsal and one ventral, whereas in G. orticei there have been found one dorsal and two laterals. A characteristic feature of G. orticei is the presence of a nuclear collar at the anterior protion of the trunk which is not mentioned for the other species of the genus Gigantorhynchus.

The hooks at the summit of the proboscis are smaller than in the other species, but the hooks with simple root are larger on the average. The arrangement of small hooks in the proboscis differs from Machado's drawing; he shows an equal number along the proboscis. In G. orticei they are numerous and smaller in the first six or seven rows, and decrease in number at the equatorial zone. It is not possible to establish a numerical difference because the number for G. lutzi was not reported by Machado.

Based on Figure 3 by Machado (3) it is evident that the proboscis receptacle extends up to the neck collar, while in G. orticei this pouch is much shorter and displays a cleft in the ventral side. The position of the brain is described as terminal to the pouch in G. lutzi, but in G. orticei it is not terminal. The lemnisci, in relation to the length of the body, differ in both species, as do the number of nuclei.

Marked differences with respect to the genital organs have also been found. The testes are smaller and the disposition of the cement glands follows a pattern, under all conditions, unlike that of G. lutzi in that in no instance are they separated. The ovarian fragments also are much smaller than those described for G. lutzi.

The entire structure of the specimen, from the anterior tip to the cuticular ring, is here described as the praesoma, which includes the true proboscis and the neck. (11)

CONCLUSIONS

From the comparative study of twenty-four stained specimens of an Acanthocephala it is concluded that this species differs from the other species in the genus Gigantorhynchus in the following characteristics:

I. In G. orticei there are three grooves on the surface of the body, one dorsal and two laterals.

II. In G. orticei there is a collar-like structure at the anterior end of the body composed of fragmented nuclei.

III. The hooks at the summit of the proboscis are smaller than the hooks described in the other two species in the genus Gigantorhynchus and the length and arrangement of hooks with simple roots are different.

IV. The length of the proboscis receptacle is shorter than the length reported for G. lutzi.

V. The lemnisci are shorter than the lemnisci of G. echinodiscus but longer than those of G. lutzi.

VI. The testes are shorter as compared with the testes of the other species in this genus and the cement glands follow a constant pattern arrangement.

VII. In the female, the ovarian fragments and eggs are smaller. These eggs possess four distinctive membranes.

SUMMARY

Two species of Acantocephala of the genus Gigantorhynchus (G. echinodiscus, G. lutzi)are considered with relation to the proposed new species, Gigantorhynchus orticei, found in the intestine of Metachirus nudicaudatus from Peru, South America.

The specific name is dedicated to the late Javier Ortiz de la Puente, chief ornithologist of the Museum of San Marcos University at Lima, Peru.

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