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MORPHOBIOLOGICAL STUDIES ON A PSEUDOPORRORCHIS SPECIES (ACANTHOCEPHALA); INFECTING THE EGYPTIAN CUCULUS (CENTROPUS SENEGALENSES AEGYPTIUS)

(With 6 Figs.)

By

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دراسات مورفوبيولوجية على نوع من بوسيدوبرورکس (شوکيات الرأس)
المتطفل على الكوكو المصرى (سنتروبس سينجالينس ايجيبتباس)

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تم تسجيل طفيل بورسيدوبرورکس اندكس (داس ١٩٥٧) وذلك لأول مرة في الطيور المصرية . وقد تم تجميع الديدان البالغة والغير بالغة من الأمعاء الدقيقة لطيور السنتروبس التي تم اصطيادها من أدفينا ـ محافظة البحيرة ـ مصر . وقد وصلت نسبة الاصابة بهذا الطفيل الى ٨٠ر٨٠٪ ـ تم عمل وصف كامل ومقارنة لهذا الطفيل مع ماسبق وصفه مع هذا الجنس من شوكيات الرأس . تمت دراسة الصورة الباثولوجية المتسببة من هذا الطفيل . ايضا تم عمل محاولات للبحث عن العائل الوسيط لهذا الطفيل وتم تسجيل الطور المعدى في تجويف الجسم لاحدى الزواحف الصغيرة من نوع الشاميليون.

SUMMARY

Pseudoporrorchis indicus (DAS, 1957) was recorded for the first time infesting the Egyptian birds. Its immature and adult forms were collected from the small intestine of Centropus senegalenses aegyptius hunted from edfina, Bahera Province, Egypt. The general prevalence of infection with that parasite was about 80.8%. Full description of that Acanthocephala was given together with complete differentiation from other related species of that genus. The pathological efects caused by that parasite were also investigated. Trials to find out the proper intermediate hosts succeeded to demonstrate its larval stages in the body cavity of a small reptile (Chamaelion species).

INTRODUCTION

Acanthocephala of the genus Pseudoporrorchis (JOYEUX & BAER, 1935) occurred commonly in the predatory birds especially those of genus Centropus (YAMAGUTI,

1963). Several species were recorded from different parts of the world (GOLVAN, 1956; DAS, 1957 and others). Although, many surveys were carried out to investigate the parasitic fauna of native and migrant birds in Egypt (LOOSS, 1896; WARD, 1960; SELIM and EL KASSABY, 1965; HEGAZY, 1978 and others); yet non recorded parasites of genus Pseudoporrorchis. Therefore, the present study was conducted to throw the light on some of the morphobiological status of one of these parasites which was commonly observed obstructing the small intestine of Centropus senegalenses aegyptius hunted from Edfina, Behera Province, Egypt.

MATERIAL and METHODS

Adults as well as immature forms of Acanthocephala were collected from the small intestine of birds which were recently shot in the area of Edfina, Behera Province, Egypt; during the months of the years 1988 & 1989. After careful washing the parasites were gently pressed between two glass slides. They were fixed in 10% formalin. Then, they were stained in acetic acid alum carmine and dehydrated in ethanol. Clearance was performed in cresot and mounting in canada balsam. Some specimens were cleared and mounted in Poly Venyl Alcohol. A number of fixed adult forms were sectioned to study the structures which in whole mounts could not be made out. Also, small portions from the small intestine that were impacted with the parasite were taken, washed and fixed in 10% formalin. Then, histopathological sections were made according to the techniques mentioned by CARLETON (1957), Moreover, trials were done searching for the intermediate hosts of that parasite. This was performed by thorough examination of the possible material (Arthropods, Reptiles and Amphibians); used as food by the Centropus birds. The examination was done either by the dissection or clearance in lactophenol of the collected material (Beetles; Flies; Frogs; Tadpoles; Chamaelions and other small reptiles); searching for the larval stages of Acanthocephala. The use of a dissecting binocular microscope helped in the examination. The present study was performed on 52 Centropus senegalenses aegyptius.

RESULTS

Out of the 52 Centropus senegalenses aegyptius shot from Edfina, Behera Province, Egypt; 42(80.8%) were found infected with both adult and immature stages of Acanthocephala in its small intestine. The average number of the adults per infested bird was 20.

Specific description of the adult forms:

The full mature stages were of large cylindrical body with the anterior part

(1/4 - 1/5) distinctly swollen (Fig. I). The female was 42-48 mm long and 1.8-2.1mm in maximum diameter of the anterior swollen part and 1.4-1.6 mm in the rest of the body. The posterior part of the female was tapering very gradually to a diameter of 1.2-1.4 mm; posterior to which a swelling occurred ranging from 1.6-1.8 mm in diameter. Beyond this swollen area the body tapered abrubtly to about 0.5-0.7 mm at the extrene posterior tip of the body (Fig. 2). The males were somewhat smaller measuring 28-30 mm X 1.6-1.8 and 1.2-1.4 in the anterior swollen part and in the rest of the body. They lack the conspicious swelling noticed in the posterior end of the female worm (Fig. 1). The proboscis was oval with the anterior armed zone measuring 0.6-0.8 X 0.4-0.5 mm. It was armed with 20-24 approximated longitudinal rows of 7-10 hooks. The anterior 3-4 hooks in a row were much longer than the posterior ones (Fig. 3 a). Their blades were large, sharp and pointed. The part protruded from the wall measured 0.05-0.06 mm. Their roots were wide posteriorly and longer than the blades; measuring 0.075-0.09 mm. The roots of the following two hooks were somewhat smaller and its blades were located in the middle of the roots (Fig. 3 b). The rest of the hooks in a row were the smallest; where their blades measured only 0.03-0.032 mm. The roots were also small and directed anteriorly (Fig. 3 c&d). The basal zone of the proboscis was 0.3 x 0.15 mm and was devoid of hooks but was armed with small spines.

The proboscis sheath was cylindrical with an elliptical posterior end. It was double walled and measured 1.6-1.9 x 0.3-0.6 mm. The two lemnsci were long and tubular; measuring 2.4-2.7 mm (Fig. 1).

The two testes were located close together; one behind the other. They were found just behind the anterior swollen part of the body. They were ovalin outline and both were nearly of equal size; 1.2-1.4 x 0.5-0.7 mm. The intertesticular space was very narrow. The cement glands were long and tubular and pour its secretion into a common reservour located at the posterior end and was jointed with the bursa at its distal end (Fig. 1).

The eggs were very numerous, ovoid and measured 0.038-0.052 x 0.016-0.02 mm (Fig. 5).

Description of the immature stages collected from the Centropus:

The proboscis of the immature stages that were collected from the small intestine of the infected Centropus senegalenses aegyptius had almost the same shape and structure as that of the adult form. The body was oval; 1-1.2 x 0.5-0.7 mm. It showed in more developed stages an everted caudal process from the bottom of the oval body (Fig. 4). This projected part was long and slender and almost several times the length of the oval body. This gradually enlarged to form the body of the adult. The oval shaped body remained marked off by a narrow constriction in the body of the adult. It formed the anterior swollen part of the body of the adult stages.

Investigation of the Intermedite Hosts:

Thorough examination of the arthropods, amphibians and reptiles present in the same area and used as food by the infested birds revealed the presence of juvenile forms of Acanthocephala in the body cavity of three small reptiles (Chamaelion species). Arthropods, tadpoles, frogs and other reptiles showed negative results.

The proboscis of the collected stages had almost the same features described previously in the adult stages collected from Centropus senegalenses aegyptius. Moreover, it had an oval body as that of the immature stages collected from the infested Centropus birds (Fig. 6).

Pathological findings:

Macroscopic examination:

The walls of the intestine of infested birds appeared so thin and worn out. Sometimes, perforations as well as obstructions of the intestine due to heavy infestation with the parasite were also commonly seen.

Microscopic examination:

The histopathological sections revealed the presence of degeneration and also necrosis in the epithelial lining of the mucosa of the intestine and some intestinal glands. Moreover, some lymphocytic and monocytic cell aggregations were observed within the intestinal wall either in the lammina propria or in its mucosa (Microphoto, 4).

DISCUSSION

Relying on the keys given by YAMAGUTI (1963), it is clear that the Acanthocephala encountered in the small intestine of Centroupus senegalenses aegyptius shot from Edfina, Behera Province, Egypt; is related to genus Pseudoporrorchis. On reviewing the literature, it was found that this is the first time to record Pseudoporrorchis species infesting the Egyptian birds.

The genus Pseudoporrorchis was established by JOYEUX & BAER (1935). They recorded P.houdemeri as the type species for a new Acanthocephala obtained from the small intestine of Centropus sinenses intermedius in Tonkin. Moreover, they transferred 5 more bird species to this genus namely; Echinorynchus rutundatus (LINSTOW, 1897); E.centropi (PORTA, 1910); E.hylae (JONSTON, 1912); E.bazae (SOUTHWENN & MACFIE, 1925) and E.centropusi (TUBANGI, 1933). Later on DAS (1957) added another new species and giving it the taxonomic name; Pseudoporrorchis indicus.

When the present species was compared with the previously reported ones; it was found to be distinct from all with the exception of P.indicus (Table 1). The

present specimens were somewhat smaller than P.centropi and with a smaller armed proboscis. The number, dimentions and shape of the proboscis hooks also differed. P.houdemeri was a larger form with large number of hooks in each longitudinal row. The hooks and eggs also were larger than those of the present material. P.hylae was easily differentiated from the present species by its larger proboscis that had many more longitudinal rows of hooks. Also, the eggs were larger when compared with those of the present material. P.rotundatus had 30 longitudinal rows and 5 hooks in each row as compared with 20-24 longitudinal row of 7-10 hooks in each one in the present species. P.centropusi was a smaller species and its eggs and proboscis were smaller than those of the present material.

The present species could be identified as P.indicus. Since, the measurements of the body, eggs and internal features were quite similar. Also, the shape and distribution of the proboscis hooks were within the range in the two species (Table 1).

Trials to find out the intermediate hosts of that parasite showed the presence of eacysted juvenile forms of Acanthocephala in the body cavity of three small reptiles of the genus Chamaelion. The proboscis hooks were identical with that noticed in the proboscis of the adult Acanthocephala collected from the small intestine of the infested Centropus birds. This indicated that it could be an infective stage of that parasite. Therefore, this observation concluded that reptiles may act as intermediate hosts for the present Pseudoporrorchis species. In accordance with the present finding; JONSTON and EDMONDS (1948) found immature stages of P.hylae in the mesentry of Limnodynastes dorsalis, Hyla coerulae and Hyla aurea. Also, DAS (1957) succeeded to find the infective stages of P.indicus in the peritoneum of a snake; Lycodon species. However, VAN CLEAVE (1949) stated that the intermediate hosts of Pseudoporrorchis species were not known.

Gross examination of the small intestine of the infested birds showed that its walls were thin and worn out and the bodies of the worms pressing against the walls could be easily come out. These findings were also described due to infestation with other Pseudoporrorchis species (GOLVAN, 1956). Also, the perforations and obstruction of the intestine due to the pronounced number of adult worms present were described similarly by DAS (1957). Moreover, the histopathological findings recorded in the present study were similar to that caused by other species of Acanthocephala (BABERO, 1960).

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Discription of Plate (1):

Plate (1): Pseudoporrorchis indicus

Fig.s (1 – 5): From the intestine of Centropus s. aegyptius.

Fig. (6): From the body cavith of Chamaelion species (The intermediate host).

Fig. (1): Adult male; whole worm (Proboscis hooks ommited; for details see Fig. 3 a; 3 b; 3 c and 3 d).

Fig. (2): Adult female; posterior end.
Fig. (3): Proboscis hooks.
a) Anterior hooks.
b) Middle hooks.
c & d) Posterior hooks in a longitudinal row.
Fig. (4): Immature form with the caudal process.
Fig. (5): Eggs.
Fig. (6): Juvenile form.

Plate (1): Referance letters

A. Acanthor; bl. Blade; B. Bursa; C. Caudal Process; C.gl. Cement glands; C.R. Common Reservoir; E. Egg; E.b. Egg ball; L. Lemnisci; P. Proboscis; P.h. Proboscis hooks; P.s. Proboscis sheath; R. Root; T. Testis; U. Uterine II.

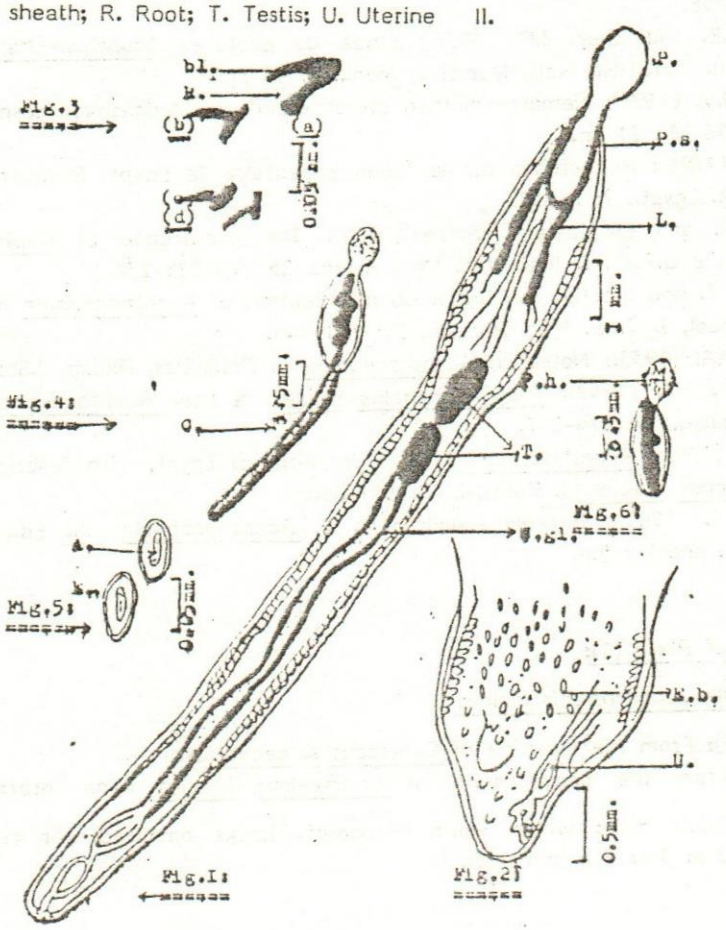
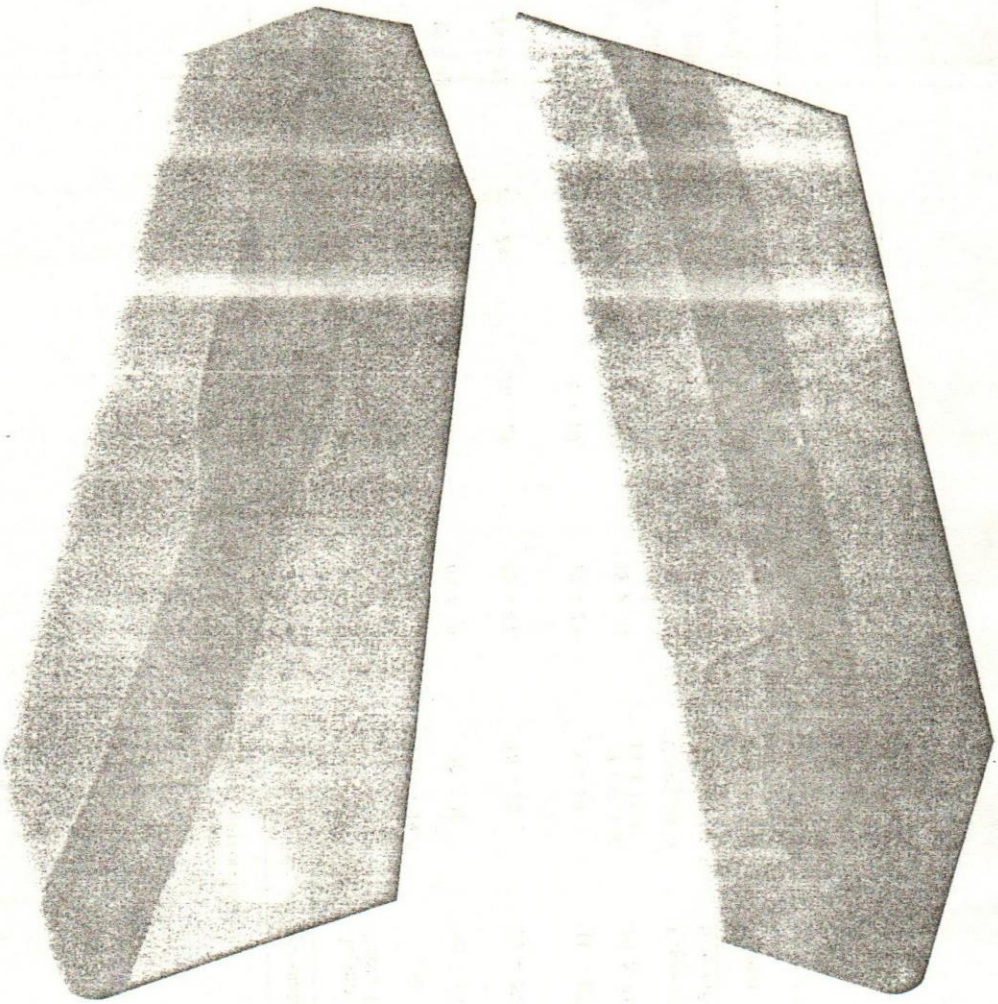
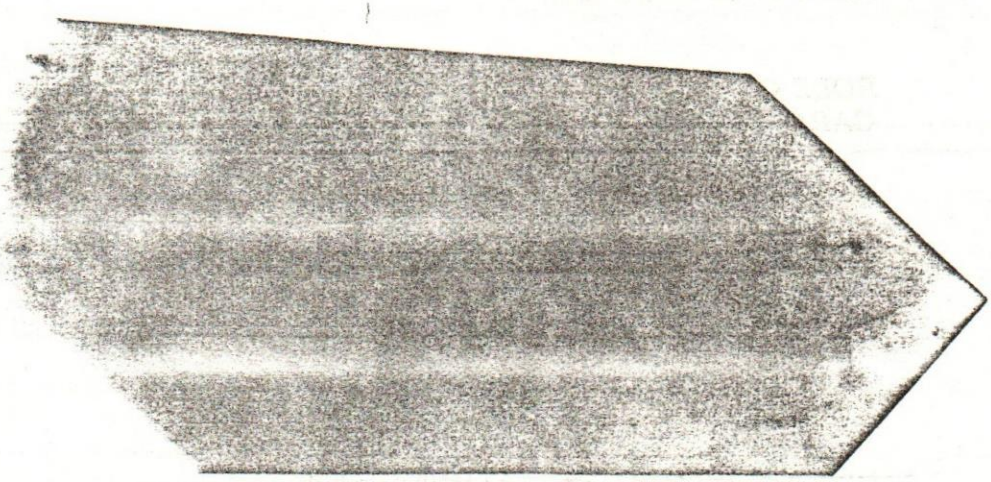


Table (I)
Revision to all the species related to genus Pseudoporrorchis.

Species	P.rutundatus	P.centropi	P.hylae;	P.bazae	P.centropusi	P.houdemeri	P.indicus	Present
Criteria	Linstow, 1897	Porta, 1910	Johnston, 1912	Southwell & M. 1925	Tubangi, 1933	Joyeux & Baer, 1935	Sas, 1957	Material
Male (mm)	30 - 35	30 - 35	26	33	11.5 - 14.5	36	28	28 - 30
Female (mm)	32 - 48	30 - 50	58	45 - 50	20 - 30	50 - 55	46	42 - 48
Proboscis Hooks Long. Rows	28 - 32	20 - 24	26 - 28	38 - 41	16 - 20	22 - 24	20 - 24	20 - 24
Hooks/Row	5 - 11	10 - 12	9 - 10	12 - 23	8 - 10	11 - 12	8 - 9	7 - 10
Eggs (U.)	60 X 31	80 X 30	60 X 30	38 X 41	29 -37.5 X 14.5-18.7	70 X 31	32 - 50 X 11 - 20	38 - 52 X 16 - 20
Host	C.sinenses & C.toulu.	C.senegalenses & C.monachus	C.phasianus	Baza cristata	C.viridus & Dasylophus sp.	C.sinenses intermedius	C.castano-pterum	C.senegalae nses aegypt
Locality	Madgascar	Guinea Port & Senegal	Australia	Australia	Philippines	Tonkin	India	Egypt



Microphoto (1): Pseudoporrorchis indicus male; anterior region
Microphoto (2): Pseudoporrorchis indicus female; posterior region



Microphoto (3): Pseudoporrorchis indicus; juvenile form collected from the intermediate host.

Microphoto (4): Histopathological section in the small intestine of Centropus S.aegyptius infested with Pseudoporrorchis indicus.