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AN ASPIDOGASTRIAN PARASITE ASPIDOGASTER NILOTICUS SP. NOV. FROM MOLLUSCAN HOST, RIVER, NILE, EGYPT.

(With one Table & 2 Plate)

By

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**طفيل اسبيدوجاستر نيلوتيكيكس نوع جديد
جمع من عائل رخوى يعيش
في نهر النيل بمصر**

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تقدّم تعريف وتصنيف نوع جديد من طفيليات الاسبيدوجاسترين والتابع للجنس اسبيدوجاستر . ولقد تم دراسته بواسطة الميكروسكوب الضوئى والالكترونى لأول مره . ولقد تم جمع الطفيل من التجويف حول القلب وتجويف الكلى لحيوان رخوى من ذوات المصراعين يعيش بنهر النيل بمحافظة سوهاج . واتضح من الدراسه ان هذا الطفيل له مميزات خاصه به تميزه عن باقى الانواع من نفس الجنس مما يؤهله لان يكون نوع جديد من جنس اسبيدوجاستر والتابع لعائله اسبيدوجاسترينى . وهذه الصفات هى ان الممص البطنى مقسم الى حواجز عرضيه وطوليه وان عدد الحواجز العرضيه هى ٢٢ حاجزاً عرضياً فى الصفوف الخارجيه و ٢٣ حاجزاً فى الصفوف الداخليه ، ٤ حواجز طوليه . هذا بالاضافه الى ان قياساته تختلف عن الانواع السابق اكتشفها فى نفس الجنس كما انه جمع لأول مره من عائل رخوى من ذوات المصراعين . واقترح تسميته أسبيدوجاستر نيلوتيكيكس .

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SUMMARY

An aspidogastrea parasite *Aspidogaster niloticus* sp. nov. is recorded for the first time from the molluscan host, *Anodonta rubens*. It is found in the pericardial and nephridial cavities of the host which is collected from the River Nile at Sohag Governorate, Egypt. The present parasite has its own diagnostic characters by which it is considered as a new species belonging to the genus *Aspidogaster*, subfamily Aspidogastrinae. Such characters are; its measurements are different from those of the other known species of the same genus, the number of alveoli is 90 arranged in 4 rows and the parasite is collected for the first time from the molluscan host in Egypt.

INTRODUCTION

Mollusca is one of the interesting group that incubates many of intermediate or final stages of many trematode parasites. Aspidogastreae are trematode parasites that received little attention from Helminthologists all over the world. The aspidogastrea group containing eight genera were described since 1826. These genera are *Aspidogaster*, VON BAER, 1826; *Cotylospis* LEIDY, 1857; *Macraspis* OLSSON, 1868; *Stichocotyle* CUNNINGHAM, 1884; *Platyaspis* MONTICELLI, 1892; *Cotylogaster* MONTICELLI, 1892; *Lophotaspis*, LOOSS, 1901 and *Lobatostoma* ECKMANN, 1932. The species of the genera were collected from different hosts as molluscan gastropods or bivalves, crustaceans, fishes and turtles.

Few species of the genus *Aspidogaster* were recorded as *A. conchicola* VON BAER, 1827 mainly parasitic in molluscan bivalves; *A. limacoides* DIESING, 1835 mainly parasitic on the cyprinid fishes; *A. decatis* ECKMANN, 1932 mainly parasitic on barbel (*Barbus* sp.); *A. antipai* LEPSI, 1932 parasitic on *Unio batavus*; *A. ascidiaie* DIES, 1858, parasitic on *Mentula marina*; *A. ijimai* KAWAMURA, 1915, parasitic in the fish *Cyprinus carpio*; *A. INDICA* DAYAL 1943 parasitic in the fish *Barbus tor*; *A. piscicola* RAWAT, 1948, parasitic in *labeo rohita* and *Aspidogaster* sp. parasitic in pearl Oyster (YAMAGUTI, 1963).

The taxonomy of the Aspidogastrea has been subject to controversy. GIBSON (1983) gave a new classification for the subclass: Aspidogastrea, where he divided it into two Orders Aspidogastrida and Stichocotylida. He recognized only the family Aspidogastridae belonging to the former order which in turn was subdivided into three subfamilies; Aspidogastrinae, Cotylaspidinae and Rohdellinae.

The present material was collected from Molluscan host and belonging to the genus *Aspidogaster*. The parasite under investigation has specific different characters from those of other species of the genus *Aspidogaster*. It was studied by light and scanning electron microscopy to give a complete description and identification for the species.

MATERIAL and METHODS

A total of 200 alive molluscan bivalve, *Anodonta rubens* were collected from the River Nile at a site placed north east of Sohag city. The bivalves were dissected and examined for collecting the parasite.

The present parasite was found with considerable incidence in the host. The collected materials were washed in physiological saline and fixed after mild pressure between the slide and its cover in 10% formalin solution. They were stained in acetic acid alum carmine, mounted in Canada balsam and photocopied. Measurements were done by calibrated ocular micrometer. All measurements are in millimeters.

For scanning electron microscope studies fresh materials were fixed in a 3:1 mixture of 4% glutaraldehyde and 1% Osmium tetroxide, dehydrated in a graded series of alcohol, critical point dried, gold coated and examined under a JOEL 5300 scanning electron microscope at operating voltage of 20kv.

The characters and identification of the present material were compared with other species of the same genus according to YAMAGUTI (1963).

RESULTS

The parasite of the present species is collected from the pericardial and renal cavities of the molluscan bivalve *Anodonta rubens*. The number of parasites collected per infected host ranged from 2 to 26.

The fresh parasite was creamy yellowish or brownish in colour, small in size, dorsoventrally compressed, oval to elongate in shape and its measurements ranged from 1.52-3.17 and 0.84-1.12mm in length and width respectively. The holdfast covers the most of the ventral side of the body, except a small area at the anterior and posterior margins (Pl. 1, A; 2, B). Its measurements ranged from 1.07 to 2.25mm and 0.46 to 0.56mm in length and width respectively. The holdfast is transversely and longitudinally divided with septa forming a number of alveoli. Accordingly, the holdfast consists of four longitudinal rows; two of which are median and the others are marginally situated (PL.2, B). Each median row contains 22 alveoli while each of the marginal ones contains 23 alveoli.

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with total number being 90 (PL. 1, A: 2, B). The majority of the alveoli are rectangular in shape, a small number of which are oval or triangular in shape (PL. 2, B).

The oral funnel of the parasite is large, rounded in shape and measures about 0.068-0.085mm and 0.028-0.031mm in long and short axes respectively. The oral funnel is devoid from sucker and leads to prepharynx that measures about 0.13-0.24mm in length. The prepharynx leads to a well developed, short and muscular pharynx about 0.14-0.20mm and 0.14-0.16mm in length and width respectively (PL. 1, C). The pharynx leads to a single and blind intestinal sac extending posteriorly being 1.26-1.68mm long. A single testis is placed posterior to the ovary and slightly below to the middle of the body, measures about 0.193-0.432mm by 0.166-0.169mm. The vas deferens originated from the testis, extending anteriorly and terminates in the cirrus sac. The cirrus sac is oval and measures about 0.26-0.48mm and 0.14-0.20mm in long and short axes respectively. It joins with the female genitalia forming a short hermaphroditic duct. The hermaphroditic duct leads to a common genital pore which is located at ventral and median position to the lateral margin of the holdfast (PL. 1, C; 2, A).

The ovary is situated anterior to the testis slightly anterior to the middle of body, measures about 0.193-0.383mm and 0.139-0.277mm in long and short axes respectively. The uterus is large coiled and contains a large number of eggs. Vitellaria are situated along the two sides of the body and consists of elongate rows of follicles on either sides of the intestine. Eggs are elongated to oval in shape, brownish in colour, thick shelled and operculated (PL. 1, B; 2, D). The egg measures about 0.088-0.092mm and 0.036-0.042mm in long and short axes respectively.

DISCUSSION

The species was studied for the first time with the light and scanning electron microscope (PL. 1, 2). Controversy has been focused on the systematic position of Aspidogastrea worms. Some workers considered these worms as belonging to Monogenea, others to the Digenea (WARD, 1918), while other investigators regarded them as independent intermediate group; subclass Aspidogastrea (FAUST & TANG, 1936). A new classification for the subclass Aspidogastrea has been adopted by GIBSON and CHINABUT (1984). They recognized the two orders Aspidogasterida and Stychocotyliida. The first order has a single family Aspidogastridae, contains 3-subfamilies; Aspidogastrinae, Cotylaspidinae and Rohdellinae. The second order contains three families; Rugogastridae, Stichocotyliida

and Multicalycidae Accordingly, the classification of Aspidogastreans is as follows:

- Class : Trematoda
- Subclass : Aspidogastrea Faust and Tang, 1936.
- Order : Aspidogastrida Olfust, 1958.
- Family : Aspidogastridae Poche, 1907
- Subfamily : Aspidogastrinae Poche, 1907.
- Subfamily : Cotylaspidinae Chauhan, 1954.
- Subfamily : Rohdellinae Gibson and chinabut, 1984.
- Order : Stichocotylida Gibson and chinabut, 1984.
- Family : Stichocotylidae Faust and Tang, 1936.
- Family : Multicalycidae Gibson and chinabut, 1984.
- Family : Rugogastridae Schell, 1973.

The characters of the family Aspidogastridae are: The body has various shapes, ventral haptor is large (oval or elongate) composed of numerous alveoli arranged in one or several rows, oral sucker poorly presented or absent, Pharynx present, intestine is simple and not forked, testis single or double and post ovarian, cirrus sac present or absent, genital pore mid ventral or sub median (anterior to haptor), vitellaria extending laterally along the body margins as numerous follicles, Excretory pore dorsoterminal and endoparasitic in Mollusca and cold blooded vertebrates (YAMAGUTI, 1963).

YAMAGUTI (1963) put keys for subfamilies and genera of the family Aspidogastridae as follows:

key to subfamilies of family Aspidogastridae:

- 1- Haptor alveoli in several longitudinal rows 2
- Haptor alveoli in single longitudinal row Macraspidinae

- 2- Three rows of alveoli Cotylaspidinae
- four rows of alveoli Aspidogastrinae

Characters of subfamily Aspidogastrinae CHAUHAN 1954 (YAMAGUTI, 1963):

With 4 longitudinal rows of alveoli and marginal organs on ventral haptor. Mouth is terminal or subterminal, with or without lip-like process, lobular oral sucker absent. Testis is one or two, cirrus pouch present or absent. Parasitic on Mollusca, Fishes and Reptiles.

key to the genera of subfamily Aspidogasterinae

- 1- Testis single 2
- Testis is two, alveoli numerous and slit-like Multicotyle

- | | | |
|----------------------------------------------------------------------|-------------------------------------------------------------------|---------------------|
| 2- Papillae absent on central region of haptor, cirrus pouch present | Papillae present on central region of haptor, cirrus pouch absent | 3 |
| 3- Mouth with lip-like process | Mouth without lip-like process | |
| | | <i>Lophotaspis</i> |
| | | <i>Lopatostoma</i> |
| | | <i>Aspidogaster</i> |

The present species has ventral haptor disc-shaped and has 4 rows of alveoli, the mouth is terminal and without lobular projections, the oral sucker is absent, pharynx is well developed, the intestine is simple and median sac, the testis is single and the seminal and cirrus are enclosed within a cirrus sac. These characters are in accordance with those for the family Aspidogastridae, subfamily Aspidogastrinae and genus *Aspidogaster* mentioned by YAMAGUTI (1963). So, the suggested classification of the present parasite as follows:

- Class : Trematoda.
 Subclass : Aspidogastrea Faust et Tang, 1936.
 Order : Aspidogastrida Dolfus (Dollfus, 1958).
 Family : Aspidogastridae (Poche, 1907).
 Subfamily : Aspidogastrinae (Poche, 1907).
 Genus : *Aspidogaster* Baer, 1827.

The diagnostic characters of the species.

Host: The fresh water molluscan bivalve, *Anodonta rubens*.

Distribution of host: River Nile

Location of parasite: Pericardial and renal cavities.

Specific characters: The total number of alveoli is 90 arranged in 4 rows (two outer and two inner), each outer row contains 23 alveoli while each inner one contains 22.

The comparison between the specific characters of the present material and other related species (Table 1) shows that the present species has its own characters which are different than those of the other species. It is likely to assume that, ABDEL MAKSOUH (1988) redescribed *Aspidogaster* species from fishes in Egypt, *A. dectalis* BAER, 1926 which is different from the present species. The present authors collected another parasite, *Rohdella anodentiae* from the same host belonging to the genus *Rohdella* (ABOUL-DAHAB et al., 1993). The present parasite is more common than *Rohdella anodentiae* and easily to differentiate them by their holdfast under the binocular microscope. So, the specific characters of the present material suggest that the present parasite is a new one to which the name *Aspidogaster niloticus* sp. nov. is proposed.

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EXPLANATION OF PLATES

PL. 1.

- (A): Photomicrograph for *Aspidogaster niloticus* sp. nov., showing general characters of the parasite. Pharynx (P); oral funnel (F); ovary (O); testis (T); holdfast (H). X=40
- (B): Magnified part of (A) showing Egg (E), longitudinal septa (LS), transverse septa (TS). X=200
- (c): Magnified anterior part of the parasite showing common genital opening (G) x= 200.
- (D): Magnified anterior part of the parasite showing the female genitalia (FG), cirrus sac (S) and hermaphroditic duct (HD). X=400

Pl. 2.

- (A): Scanning electron micrograph showing the general characters of the parasite, genital opening (G), oral funnel (F).

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- (B): Scanning electron micrograph showing the structure of the holdfast (H).
- (C): Scanning electron micrograph showing the oral funnel (F).
- (D): Scanning electron micrograph showing the operculated egg (OP).

PLATE 1

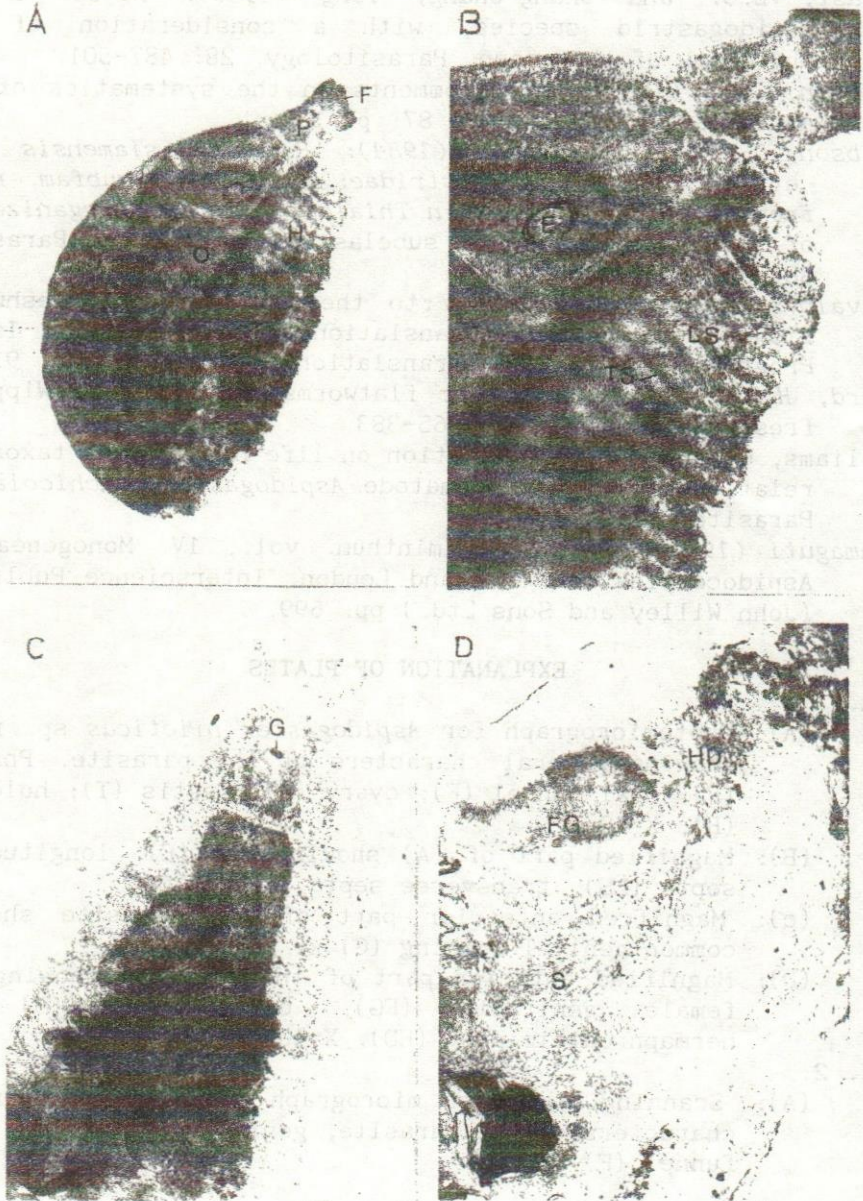
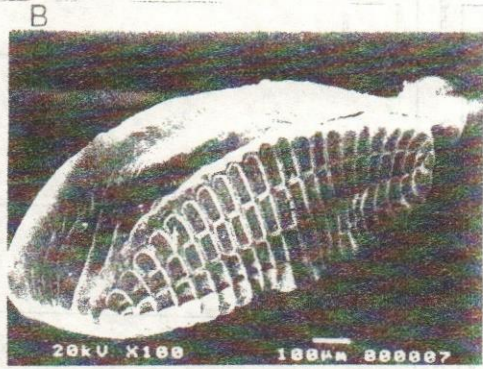


PLATE 2



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Table (1) : The main differences between scribed species *Aspidogaster*

Character	The present	<i>A. dreaticis</i>	<i>A. lamicoloides</i>	<i>A. conchicola</i>	<i>A. piscicola</i>	<i>A. antipai</i>	<i>A. ascidiae</i>	<i>A. ijimai</i>	<i>A. indica</i>	<i>A. sp.</i>
Total body length	1.51 - 3.17	2.34 - 2.70	0.5 - 4.0	2.5 - 2.75	3mm		2-3.2mm	4.52mm		
Total body width	0.84 - 1.12	0.65 - 0.90	0.4 - 1.5	1.15 - 1.23			0.7mm	2.2mm		
Oral funnel	0.068-0.085 X 0.028-0.31	0.118-0.12 X 0.218-0.274		0.29 (in diameter) 0.55 (in diameter)						
Holdfast	1.07-2.25X0.47-0.56	1.30-1.36X0.40-0.48								
Prepharynx	0.13-0.24	0.038-0.045								
Pharynx	0.14-0.20X0.14-0.16	0.13-0.136X 0.138-0.150								
Intestine	1.26-1.68 (blind sac)	Blind sac	Blind sac	Blind sac						
Testis	0.193-0.422X 0.166-0.169	0.40-0.48X0.34-0.40								
Ovary	0.193-0.383X 0.139-0.277	Middle of the body	post-ovarian							
Cirrus sac	0.26-0.48X0.14-0.20	0.365-0.377								
Position of Genital pore	ventral margin, anterior to the hold fast organ									
Egg	0.088-0.092* 0.036-0.042	0.082-0.090* 0.040-0.046	0.06-0.108* 0.03-0.04	0.0128-0.134* 0.048-0.050						
No. of Alveoli in each row	44 (inner) 46 (outer)	29-33 (inner) 31 (outer)	12-18 each row 50-74	not mentioned	58 alveoli		42 alveoli	62 alveoli		
Total no. of Alveoli	90	60-64	not mentioned	not mentioned						
Host	<i>Anodonta</i> sp.	Barbel fishes (<i>Barbus bunnii</i>)	Cyprinid fish	Mussel <i>Anodonta</i> sp.	<i>Labes robita</i>	<i>Unio batavus</i>	<i>Mytilus marina</i>	<i>Cyprinus carpio</i>	<i>Barbus cor</i>	<i>Beari Oyster</i>
Habitat	Precaudic & noperidial cavities	Intestine	Intestine	Nephridial and Pericardial cavities						
Locality	Egypt	Egypt	U.S.S.R.	India						
Source	Present material	Abdel-Hassoud, 1988	Pavalovski, 1984	Williams, 1942	Yamaguti, 1963	Yamaguti, 1963	Yamaguti, 1963	Yamaguti, 1963	Yamaguti, 1963	Yamaguti, 1963