Trichodinid ectoparasites (Ciliophora: Peritrichia) of *Mugil cephalus* Linnaeus, 1758 from Lake Qarun, Egypt

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ABSTRACT

During a parasitological survey in Lake Qarun, 140 fish of *Mugil cephalus* were investigated for protozoan ectoparasites. Three trichodinid species were found on gills of the investigated fish. These species are; *T. lepsii* Lom, 1962 ; *T. puytoraci Lom*, 1962 and *T. batala* Ali, 1996. Comparative descriptions are presented for the recorded species. The present study proved that the stocking process of the lake is the main source for the recorded trichodinids. Also, the study recommended quarantine measures for the stocking fry before releasing into the water bodies.

INTRODUCTION

Lake Qarun is the third largest lake and the only enclosed inland saline water body in Egypt (El Raey et al., 2000). It occupies 235 km² and lies at lowest point of Al-Fayoum depression in the western desert (about 100 km from Cairo) (Meshal, 1973). According to Ball (1939), the lake was dug during the reign of the ancient Egyptian king Moreis. He described it as a big reservoir,

which was freely connected to the Nile and was used as a storage for the Nile water during the high flood and ended up nowadays as a saline lake (Meshal, 1973).

Many reasons contributed to the transformation of Lake Qarun from freshwater to saline through the years, but the main cause was the greatly reduced freshwater input after the construction of the High Dam. Also, the high content of salts in the agricultural drainage water, the high evaporation rate in addition to the absence of any inlet to the lake contributed to the increased salinity (Ahmed, 1994). As the salinity increased, all the Nile fishes species gradually disappeared from the lake except *Tilapia zilli* which was able to acclimatize in the saline condition (Shafik,1991). To compensate the loss of freshwater fishes due to salinity increase, the National Institute of Oceanography and Fisheries began to work on the acclimatization of some marine fishes in the lake. The first message of Mullet fry were transported from Alexandria in 1928 and continued in following years till now. The fish fauna of the lake is now composed mainly of the mullets, Sole and tilapia fishes (El Raey, 2000).

Three parasitological surveys were carried out on Qarun Lake by Al-Bassel (1987) & (1990) and Ali (1996). The first and second surveys dealt with helminthology of fishes, while the third one studied the protozoan parasites of fishes in the lake in comparison with Lake Wadi El-Raiyan. During the present survey on the protozoan parasites from selected lake Qarun fish, three trichodinid species were recorded from *Mugil cephalus*.

MATERIALS AND METHODS

Freshly caught fish were purchased from fishermen at lake Qarun during monthly visits from January 2005 to March 2007. A total of 140 *Mugil cephalus* were examined. Skin and gills smears were examined and positive slides were air-dried. Smears were then impregnated with silver nitrate in order to study the details of adhesive disc. Some smears were also stained with haematoxylin for studying the nuclear apparatus. All measurements were presented in (µm) and followed the uniform characteristic system proposed by Lom (1958). Detailed description of the denticles was presented in accordance with the method proposed by Van As & Basson (1989) & (1992). Body diameter was measured as the adhesive disc plus border membrane. In case of the number of denticles and radial pins, the mode was given instead of the arithmetic mean (Basson et al., 1983).

RESULTS AND DISCUSSION

1- *Trichodina lepsii* Lom, 1962 (Figs. 1-6, 19a)

Description:

Body: Small sized trichodinid of 28.4 ±1.7 (25-30) diameter.

Adhesive disc: Concave of 23 ±1.7 (22-27) diameter.

Border membrane: 3.1 ±0.8 (2-5) wide.

Denticle ring: 15.5 ±1.8 (13-19) diameter.

Center of adhesive disc: Texture the same as rest of adhesive disc.

Number of denticles: 22 (21-26).

Number of radial pins per denticle: 6 (5-7).

Span: 6.5 ± 0.4 (6.2-7.0).

Denticle length: 3.5 ± 0.3 (3.0-4.5).

Blade: 3.2 ±0.4 (3-4).

Central part: 2.8 ±0.3 (2.5-3).

Thorn: 1.3 ±0.3 (1-2).

Denticle description:

Blade almost straight and fills almost entire space between Y axes. Distal surface flat and parallel to the border membrane. Tangent point very small and slightly rounded. Anterior blade surface almost parallel to Y axis with no apex in most cases. Posterior blade surface forming a relatively shallow curve. The deepest point of the curve closer to central part. Blade apophysis not prominent and only visible in some specimens. Blade connection relatively thin. Central part thin, delicate and slightly slopes downward to end with a thin tip fitting loosely to the preceding denticle. Central part extends more than halfway towards Y-1 axis. Section above and below X-axes is nearly similar. No indentation observed in the lower section below X-axis. Ray relatively short with no distinct ray connection. Ray connection is indistinguishable. Ray apophysis absent. Rays parallel to Y-axes and sometimes curved posteriorly. Ratio of denticle above to denticle below X-axis more than one. (1.5).

Taxonomic summary:

Host: *Mugil cephalus*

Locality: Lake Qarun

Site of infection: Gills

Prevalence: 20/140 (14%)

Type material: Slide no. Tricho.-10 deposited at the museum of Zoology department, Faculty of Science, Beni-Suef University, Beni-Suef, Egypt.

Remarks:

This species can be easily recognized by its unique denticle shape. This population corresponds closely to the type population recorded by Lom (1962); Grupcheva et al., (1989) ; Grupcheva (1995); Loubser et al., (1995) and Ozer and Ozturk (2004), *T. lepsii* was recorded in very high density compared to "scarce" population in the original description (Lom, 1962). This finding suggests that *M. cephalus* is the type host of this trichodinid and not *Mugil auratus* as proposed by Lom (1962). This finding concurs with Ali (1996).

2- *Trichodina puytoraci* Lom, 1962 (Figs. 7-12, 19b)

Description:

Body: Medium sized trichodinid of 43.2 ±5.6 (36.9-50) diameter.

Adhesive disc: Concave of 36.3 ±5.2 (31.5-42.3) diameter.

Border membrane: 4.3 ±0.7 (4.1-5) wide.

Denticle ring: 22.7 ±3.6 (20-26.3) in diameter.

Center of adhesive disc: dotted with small irregular spots.

Number of denticles: 28 (27-30).

Number of radial pins per denticle: 8 (7-9).

Span: 13.5 ± 0.4 (13-14.6).

Denticle length: 7.0 ± 0.3 (6.5-7.5).

Blade: 5 ±0.3 (4.5-5.5).

Central part: 2.2 ±0.4 (2-3.1).

Thorn: 6.2 ±0.3 (5.5-6.6).

Denticle description:

Blade broad, open sickle-shaped, with distal surface parallel to the border membrane. Tangent point rounded situated slightly below the distal surface. Anterior margin forms smooth curve without pointed apex. Posterior margin forms a shallow curve with Y-axes the deepest point of which shifted downwards. Blade connection thin and relatively broad with no clear posterior projection. Central part robust, tapering to round ends and fitting tightly to preceding denticle, extending to slightly more than halfway towards Y-1 axis. Shape of section above and below X axis similar. Ray connection short and thin. Ray strongly developed, mostly straight, of equal thickness throughout with rounded tips. Rays in most cases parallel to Y axis or slightly directed anteriorly. Section of denticle above X axis slightly smaller than section below; ratio less than one (0.9). Central part of adhesive disc dotted with small irregular spots.

Taxonomic summary:

Host: *Mugil cephalus*

Locality: Lake Qarun

Site of infection: Gills

Prevalence: 30/140 (21%)

Type material: Slide no. Tricho.-11 deposited at the museum of Zoology department, Faculty of Science, Beni-Suef University, Beni-Suef, Egypt.

Remarks:

*Trichodina puytorac*i can be clearly distinguished from any other species by its very characteristic and peculiar central structure. The denticle morphology and dimensions recorded in this study are confirmed by those reported in literature (Lom, 1962; Bykovskaya- Pavlovskaya et al., 1964; Kinne, 1984; Grupcheva et al., 1989; Ozer and Ozturk, 2004). The only difference is related to Kinne (1984) who presented data from one specimen displaying very small dimensions compared with those recorded here. Grupcheva (1993) "believed" that blades of T. *puytoraci are* longer than rays. Our results contradict with this finding and concur with Stein (1984) and Ali (1996) that the typical rays of this species are longer than blades (some times equal). Meanwhile, the present results agree with Grupcheva (1993) and Ali (1996) that *T. puytoraci* is a species with low morphological variability.

3- *Trichodina batala* Ali, 1996 (Figs. 13-18, 19c)

Description:

Body: medium sized trichodinid of 37 ±3.3 (32-44) diameter.

Adhesive disc: Concave of 28 ±3.1 (25-34) diameter.

Border membrane: 4.5 ±0.8 (3-5) wide.

Denticle ring: 25 ±3.1 (23-28) in diameter.

Center of adhesive disc: Texture showed different degrees of fragmentation which ranged from 1-5 fragments

Number of denticles: 21 (21-25).

Number of radial pins per denticle: 8 (7-9).

Span: 6.5 ± 0.4 (6.2-7).

Denticle length: 4.5 ± 0.4 (4.0-5.0)

Blade: 4 ±0.7 (3-4.6).

Central part: 1.8 ±0.3 (1.5-2.5).

Thorn: 2.1 ±0.7 (2-4).

Denticle description:

Blade triangular and filling all the area between Y-axes. Distal surface round and sloping downward in anterior direction. Tangent point round and situated slightly below the distal surface. Anterior blade surface with blunt rounded apex (extends to Y+1 axis). The posterior surface of the blade forms almost a right angle with the Y-axes. Blade connection prominent and clearly distinguishable from the blade. Central part tapers towards rounded points and extends to more than halfway to Y-1 axis. Central part fitting tightly to the blade apophysis of the preceding denticle. Section above and below X-axes similar. Rays extends almost directly from the central part. Ray apophysis not clearly visible in most specimens and no clear indentation corresponding to apophysis. Rays straight and sometimes slightly curved in posterior direction. Rays taper to round ends when properly impregnated. Ratio of denticle above to denticle below X-axis equals one. The central circle of the adhesive disc showed different degrees of fragmentation which ranges from 1-5 fragments.

Taxonomic summary:

Host: *Mugil cephalus*

Locality: Lake Qarun

Site of infection: Gills

Prevalence: 20/140 (14%)

Type material: Slide no. Tricho.-12 deposited at the museum of Zoology department, Faculty of Science, Beni-Suef University, Beni-Suef, Egypt.

Remarks:

Despite of the unique shape of the adhesive disc of the present species, three trichodinids were found to be close in shape. These are *T. tenuidens* Faure-Fremiet, 1943 (Stein, 1967) from *Pungitius pungitius & Gastersteus aculeatus*, *T. elegans* Stein, 1979 from P. *tymensis*, *T. labyrinthipiscis* Basson and Van As, 2002 from *Microctenopoma intermedium* and *T. bassonae* Dove and O'Donoghue, 2005 from *Selenotoca multifasciata*. *T. tenuidens* and *T. elegans* have a close resemblance of the blade compared with the present specimens, while many other differences were found. *T. tenuidens* is far larger in all dimensions as well as morphology of the other components of the adhesive disc. *T. elegans* has smaller adhesive disc, denticulate ring, and central circle, while its rays are longer and posteriorly directed. *T. labyrinthipiscis* have very similar adhesive disc center structure, while the body dimension is quite larger , while the morphology of the adhesive disc components is quite different. *Trichodina bassonae* is very close in all body dimensions but differs in having denticle blade with a straight leading edge and a ray which is not tapered. *T. bassonae* also has a very characteristic circular central inclusion, which is not similar to any known trichodinid species (Dove and O'Donoghue, 2005).

The present specimens highly conform to *T. batala* Ali 1996 which was described from the same locality on the same hosts.

Therefore the presence of this trichodinid is confirmed in the community of *Mugil cephalus* in Lake Qarun.

Conclusively, the fish production of Lake Qarun is maintained through annual stocking with mullet fry. This study proved that the stocking process is the main source for the present trichodinid. The continuous introduction of such parasites into the lake could threat the natural stability of parasitofauna. Therefore, quarantine measures should be taken for the exotic fishes before releasing into the water bodies. In addition, further investigation should assess the potential hazard of such trichodinid on *mugil cephalus* as well as on other lake fishes. Ali (1996) recommended changing the locality of fry collection based on screening of parasites at the new locality and suggested stocking the lake with hatchery-bred fry that needs feasibility study.

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Legend of figures

Figs. (1-6): Photomicrographs of silver nitrate impregnated adhesive disc of *Trichodina lepsii* Lom, 1962 from the gills of *Mugil cephalus*. Scale-bar = 10 µm.

Figs. (7-12): Photomicrographs of silver nitrate impregnated adhesive disc of *Trichodina puytoraci* Lom, 1962 from the gills of *Mugil cephalus*. Scale-bar = 10 µm.

Figs. (13-18): Photomicrographs of silver nitrate impregnated adhesive disc of *Trichodina batala* Ali, 1996 from the gills of *Mugil cephalus*. Scale-bar = 10 µm.

Fig. (19): Diagrammatic drawings of the denticles of trichodinid ciliophorans. **(A)** *Trichodina lepsii***, (B)** *Trichodina puytoraci*, **(C)** *Trichodina batala*. Scale-bar = 10 µm.

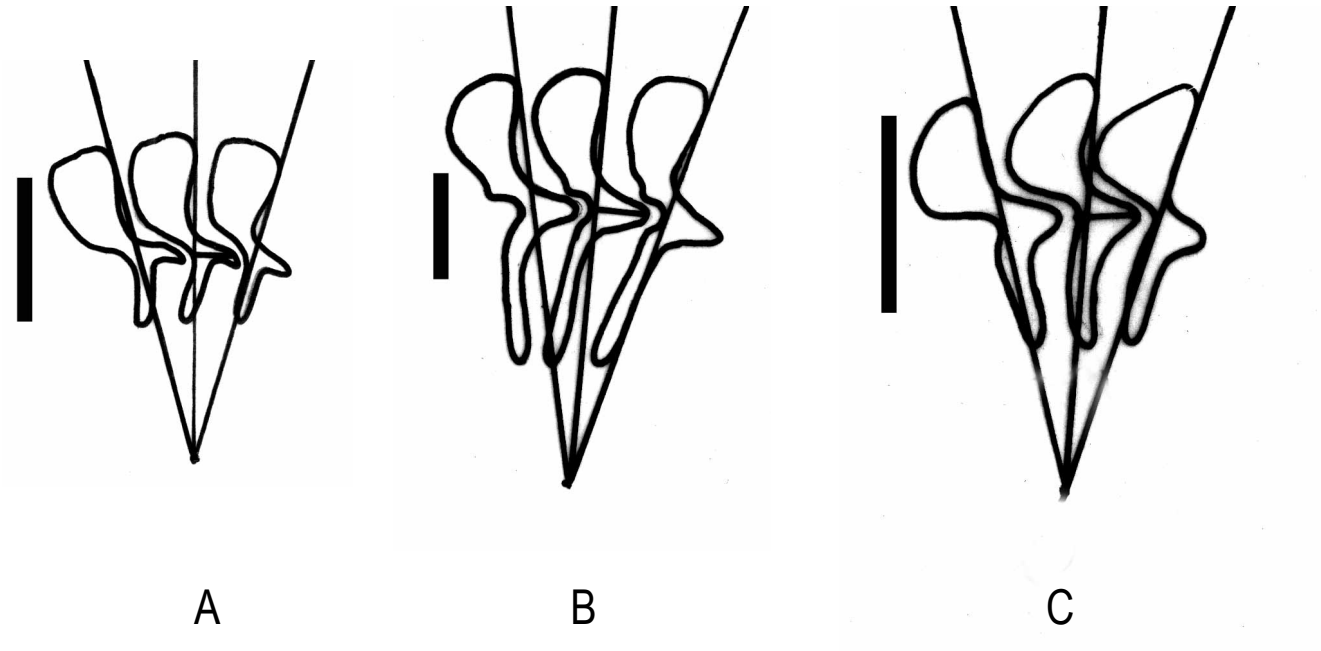

Fig. (19): Diagrammatic drawings of the denticles of trichodinid ciliophorans. **(A)** *Trichodina lepsii*, **(B)** *Trichodina puytoraci*, **(C)** *Trichodina batala*. Scale-bar = 10 µm.

تريكودينا (هدبيات- بيرتريكيا) متطفلة خارجيا على اسماك *البورى الأصيل* من بحيرة قارون بجمهورية مصر العربيه

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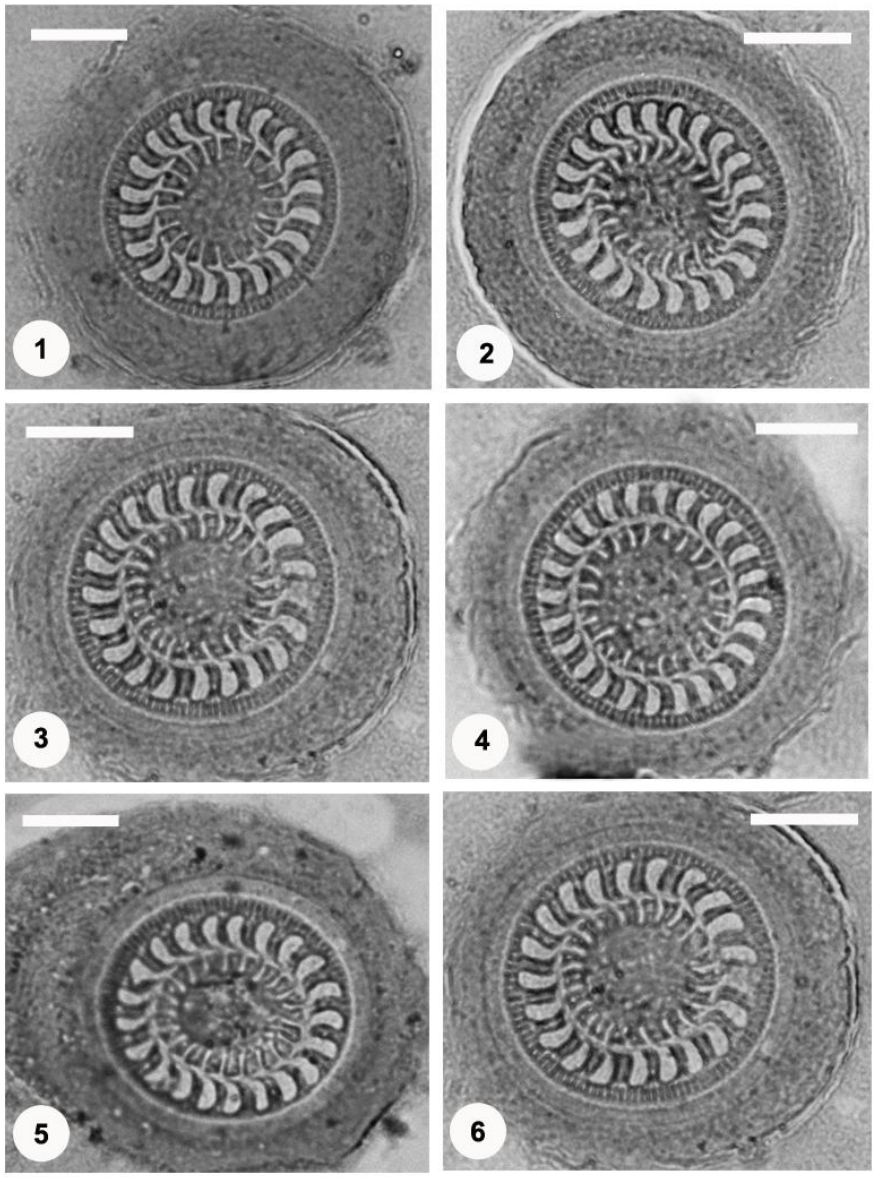
تم فى هذا البحث فحص الجلد والخياشيم لعدد مائه واربعون سمكه من اسماك *البورى الأصيل* من بحيرة قارون للبحث عن الأوليات المتطفله وقد تبين وجود ثلاث انواع من التريكودينا على الخياشيم . *تريكودينا لبسى ، تريكودينا بيوتوراسى و تريكودينا باتالا* . وقد تم وصف ومقارنه بين الانواع الثلاثه . وقد اثبتت الدراسه الحاليه ان تلك الانواع قد نقلت مع زريعة اسماك البورىالاصيل للبحيرة من البحر المتوسط كمصر رئيسى للعدوى. وقد اوصت الدراسة بضرورة عمل فحص وحجر للزريعة قبل اطلاقها فى مياه البحيرة .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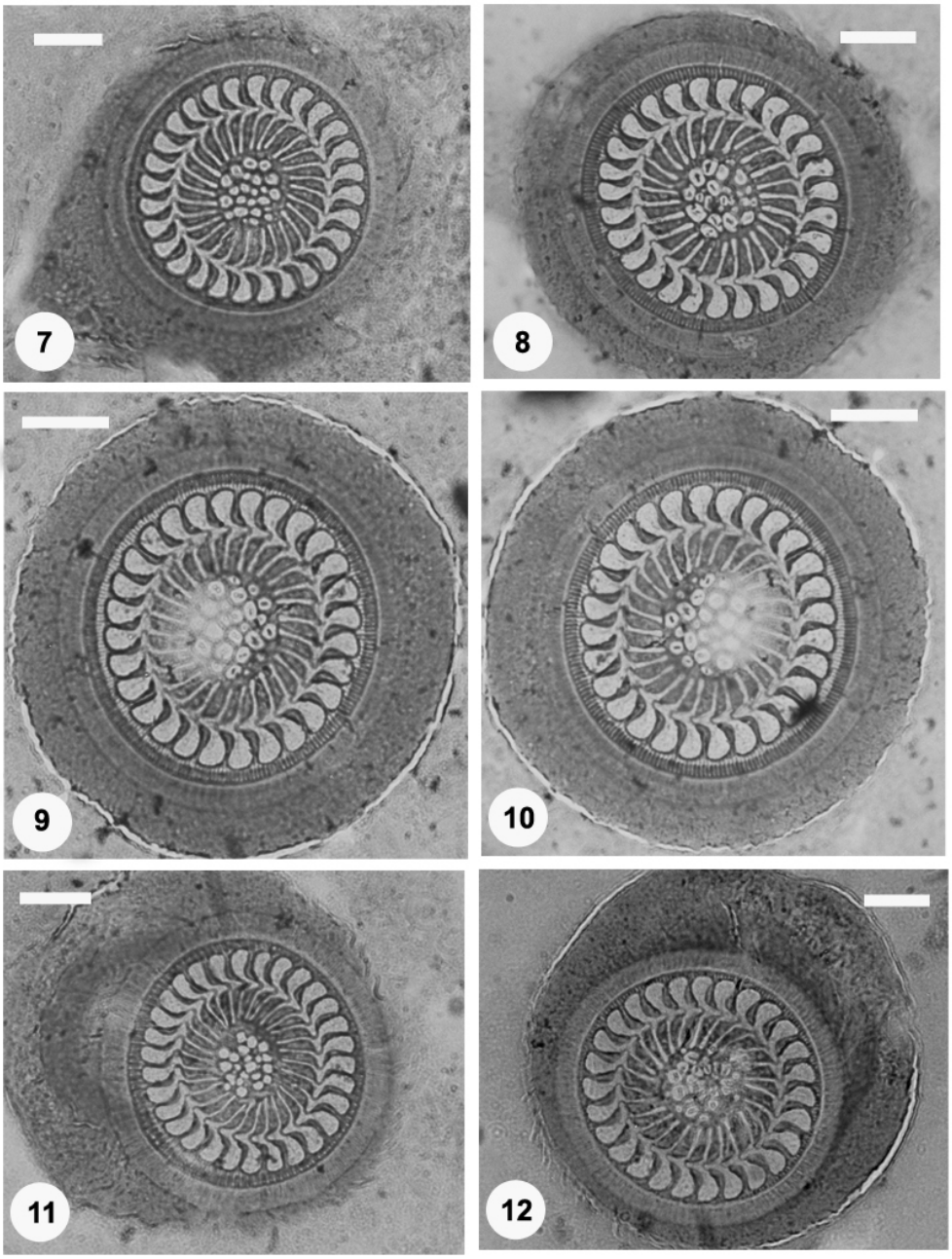
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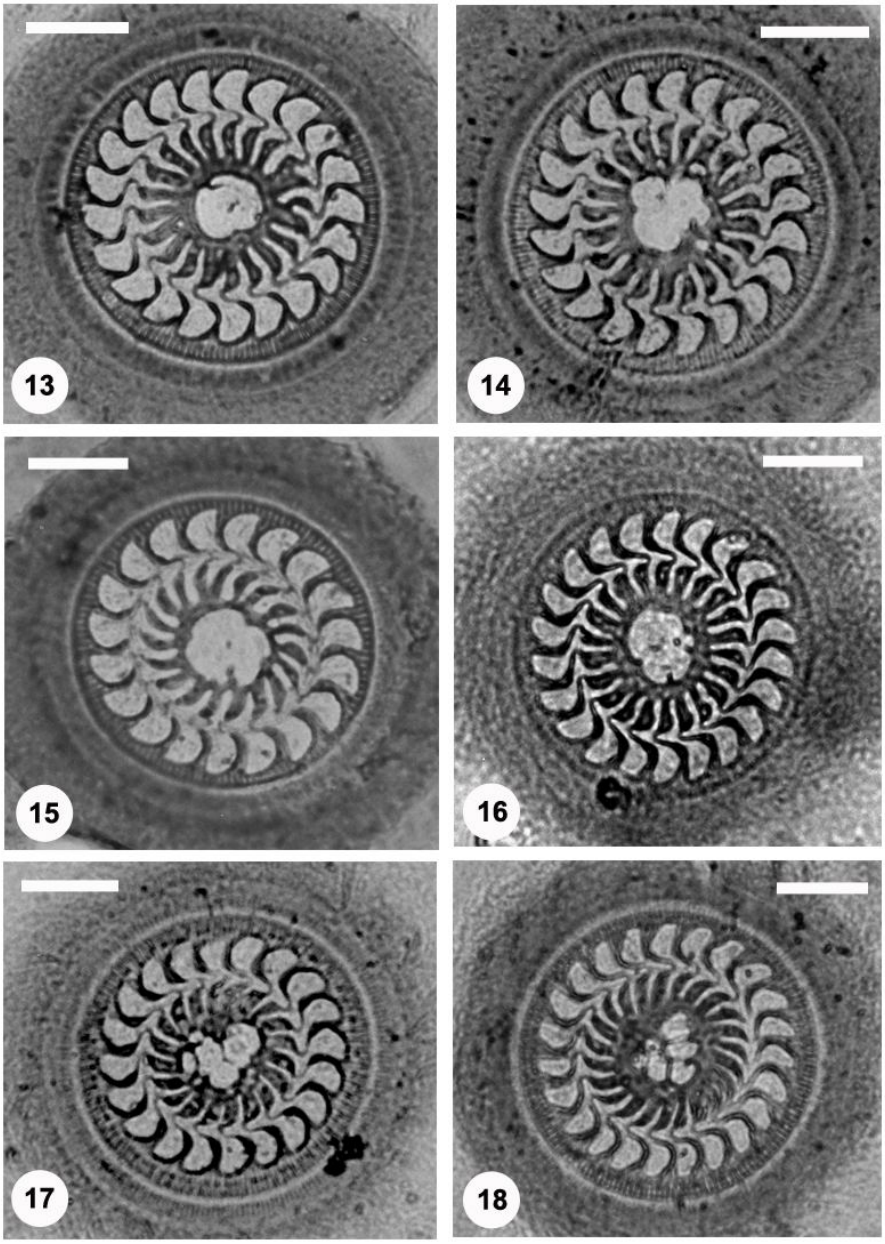
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