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# *Lamellodiscus iraqensis* Sp. Nov. (Monogenea: Diplectanidae) from Gills of *Acanthopagrus arabicus* (Teleostei: Sparidae) from Iraqi Marine Waters

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**Abstract:** *Lamellodiscus iraqensis* sp. nov. is described from the gills of Arabian yellowfin seabream *Acanthopagrus arabicus* Iwatsuki (Sparidae) captured from marine waters of Iraq. The new species belongs to the "elegans" group within the genus *Lamellodiscus* and it is distinguished from other species of this genus by some morphological features, especially the shape of the male copulatory organ (MCO). With the present new species (*L. iraqensis*) a total of 61 valid *Lamellodiscus* species are so far known in the World.

**Keywords:** Monogenea, Diplectanidae, *Lamellodiscus iraqensis*, *Acanthopagrus arabicus*, Iraqi marine waters.

## Introduction

Fishes of the family Sparidae have been considered as of great commercial and marketing table fishes (Froese & Pauly, 2019). Ali et al. (2018) mentioned there are 11 valid species of sparids in Iraq. *Acanthopagrus arabicus* is one of the most important fishes in Iraq.

The genus *Lamellodiscus* Johnston et Tiegs, 1922 (Monogenea: Diplectanidae) is composed of 61 described species (Ogawa & Egusa, 1978; Kritsky et al., 2000; Neifar et al., 2004; Amine et al., 2006a, b, 2007a, b; Neifar, 2008; Boudaya et al., 2009; Justine & Briand, 2010; Diamanka et al., 2011a, b; Machkewskyi et al., 2014; Kritsky & Bakenhaster, 2019), that have been mainly studied in sparids. Species of *Lamellodiscus* are characterized by a special attaching organ (lamellodisc) which allows the worm to securely attach itself among the gill filaments of its host (Bychowsky, 1957). They show relatively strict host specificity, although they were commonly found on more than one host species (Byrnes & Rohde, 1992). Justine & Briand (2010) mentioned that there are three patterns of lamellodiscs in *Lamellodiscus* species and following to this patterns there are three groups, namely ignoratus, elegans and tubulicornis.

According to a recent account (Mhaisen et al., 2018), a total of 28 parasite species are so far known from *Acanthopagrus arabicus* Iwatsuki, 2013 (= *A. latus*) in Iraqi waters. The monogenean fauna of this fish in Iraq is neglected as it is covered only with few accounts (Al-Daraji, 1995; Al-Daraji et al., 2010; Al-Janae'e, 2010; Jassim, 2013). So, this valuable commercial fish species needs more investigation to contribute on its parasitic fauna.

## Materials and Methods

Forty specimens of *A. arabicus* were collected from Iraq marine waters, northeast of Arabian Gulf (29º 40'- 48'N, 48º 30'E) during March and April 2011. Fishes were frozen until examination. Total weight and length of fishes were measured (51-972 g and 13-36 cm, respectively). The gills were removed, placed in separate Petri dishes and examined under a

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dissecting microscope. The parasites were detached from the gills with strong water current and transferred to a watch glass, fixed in AFA and stored in 70% ethyl alcohol. Some parasites were studied directly. The parasites were compressed beneath coverslip and stained with acetocarmine. Other parasites were transferred and mounted onto a slide in a drop of glycerine jelly (Heil, 2009). Drawing were made with the aid of a camera Lucida and digital camera. Measurements of the sclerotized structures (in micrometres) were taken according to Neifar (2008) and presented in Figure 1. Paratypes and vouchers were deposited in Muséum National d'Histoire Naturelle, France (MNHN), while the holotype was deposited in the collections of the senior author.

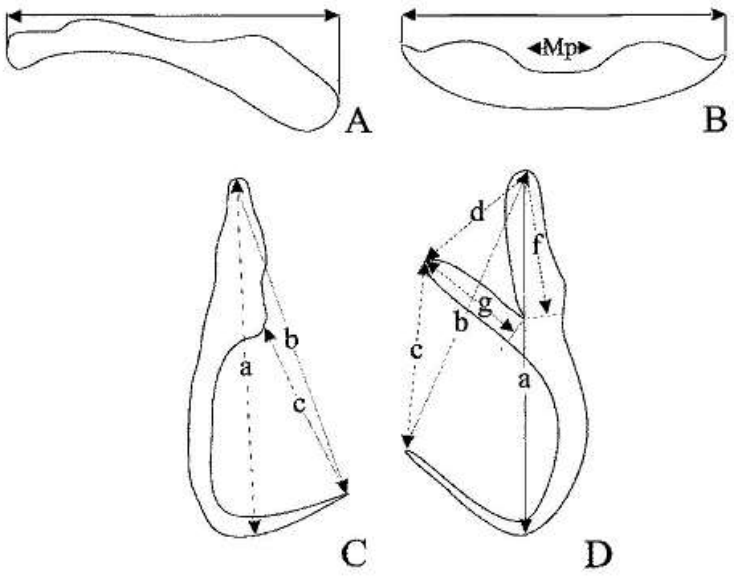


Figure 1: Measurements of sclerotized organs: A- dorsal bar; B- ventral bar; C- dorsal anchor (a- total length, b- length of shaft-point, c- length of guard-point); D- ventral anchor (a- total length, b- length of shaft-point, c- length of guard-point, d- length of shaft-guard, f- shaft length, g- guard length).

**Results**

Inspection of the examined fishes revealed the occurrence of unidentified species of *Lamellodiscus* of the family Diplectanidae, order Dactylogyrida, subclass Monopisthocotylea of the class Monogenea.

***Lamellodiscus iraqensis* sp. nov. (Figure 2)**

Type host: *Acanthopagrus arabicus*.
Type locality: Iraq, Iraqi marine waters (29º 40'- 48'N, 48º 30'E).
Site of infection: Gills filaments.
Prevalence: 25%
Mean intensity of infection: 11.9
Paratypes: MNHN HEL248, MNHN HEL249
Vouchers: MNHN HEL250
Etymology: The specific name "*iraqensis*" is derived from the country where they were collected.
Description (in micrometres), based on flattened specimens: Length including haptor 508 (360-604, n= 11), maximum width 77 (58-151, n= 11) at level of testis. Dorsal and ventral lamellodiscs of "elegans" group, ventral lamellodiscs 63 (58-71, n= 10) and dorsal

lamellodiscs 62 (54-68, n= 10) in diameter; anterior lamella forming complete ring 30 (27-34, n= 10) in maximum width for dorsal lamellodisc and 32 (30-35) in ventral lamellodisc. Dorsal anchor total length: 34 (30-37, n= 8); length of shaft-point: 32 (27-36, n= 8) and length of guard-point: 18 (17-18, n= 8). Ventral anchor: total length: 37 (36-38, n= 8); length of shaft-point: 33 (31-36, n= 8); length of guard-point: 25 (23-27, n= 8); length of shaft-guard: 11 (9-11, n= 8); shaft length: 11 (10-13, n= 8); guard length and h (5-9, n= 8). Ventral median bar long, 68 (57-84, n= 8). Two lateral dorsal bars with rounded distal end with jag (in small specimens, not clear as adult), 54 (44-70, n= 8) long. Male copulatory organ (MCO) at the first third of body, belonging to lyre type, length of single piece 17 (14-20), axial branch 19 (14-20, n=8), lateral branch 14 (14-16, n=8). Sclerotized vagina 18 (16-20, n= 8) long and located in the second third of body. Ovarian ovary, testis elongated, posterior to ovary. Three head organs on each side of anterior margin, oesophagus short, vitelline follicles lateral.

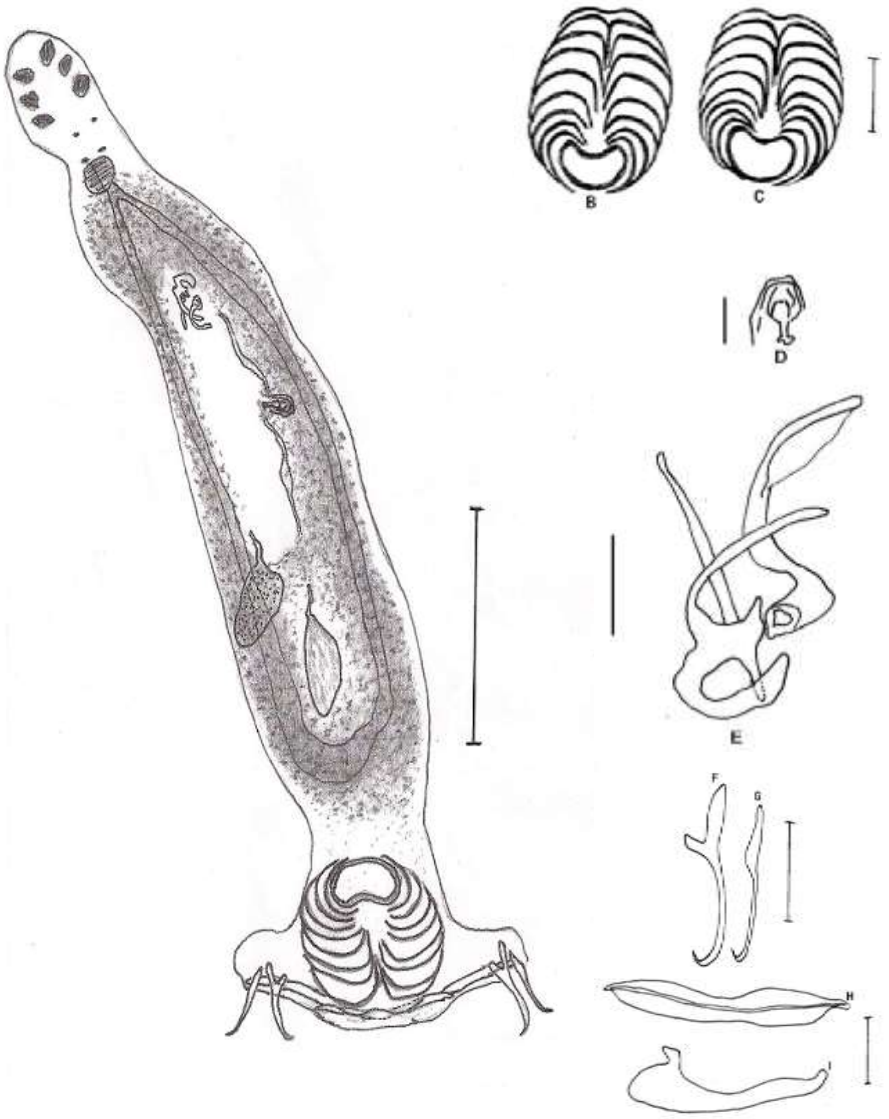


Figure 2: *Lamellodiscus iraqensis* sp. n., holotype: A- ventral view; B- dorsal lamellodisc; C- ventral lamellodisc; D- sclerotized vagina; E- sclerotized male copulatory organ; F- ventral anchor; G- dorsal anchor; H- ventral bars; I- dorsal bars. Scale bar A= 100 µ; B & C= 50 µ; D=30 µ; E, F, G, H & I= 25 µ.

**Discussion**

Oliver (1987) distinguished three types of *Lamellodiscus* based on the morphology of the MCO: "lyre", "forked" and "polymorphous". There are three morphological groups in members of *Lamellodiscus* species which are recognized by Justine & Briand (2010): “ignoratus”, “elegans” and “tubulicornis” (see Figure 9 in Justine & Briand, 2010). Justine & Briand (2010) mentioned that species of any group can be easily distinguished from the other groups by the structure of the second row of the lamellodisc. These three groups can be distinguished as follows:

- Ignoratus group: row 1 closed, rows 2-10 single elements.
- Elegans group: row1 closed, rows 2-9 paired elements, row 10 a single element.
- Tubulicornis group: row 1 closed, row 2 almost closed, rows 3-9 paired elements, row 10 a single element.

Diamanka et al. (2011b) added a new type of MCO which is morphologically different to "elegans" and put the species *L. dentexi* Aleshkina, 1984, *L. virgule* Euzet et Oliver, 1967 and *L. obeliae* Oliver, 1973 within the elegans group. According to the structure of the lamellodisc, the present species, belongs to the “elegans” group, and to "lyre" type according to the shape of MCO.

The new species is distinguished from others species that belong to the “elegans” group on the basis of characteristic shape of MCO, vagina and the haptor. The shape of MCO is different from all other species of *Lamellodiscus*: the axial and lateral branches of MCO are separated from the base and the axial branch extends with trend to the base. Shape of vagina is somewhat similar to the flower-shaped ovary. The ventral bar is constricted in the middle with tapered ends and the paired dorsal bar are club-shaped. The present new species *L. iraqensis* of the present article has both “elegans” and lyre types together. None of the so far known *Lamellodiscus* species has such unique feature.

Kritsky et al. (2000) described *L. furcillatus* from the sparid Red Sea seabream, *Diplodus noct* (Valenciennes, 1830) off Kuwait. The ventral bar of this species is plate-like with end constricted subterminally and the paired dorsal bar being morphologically complex and broad with protruding slightly depressed thumb. The MCO of *L. takitai* Ogawa & Eugusa, 1978 and *L. japonicus* Ogawa & Egusa, 1978 consists of the cirrus and accessory only without single piece, the vagina shape of the first species is opening form and with arched row of lightly chitinized spines while in the second species it is funnel and flame shaped at its opening. The vagina of *L. spari* Zhukov, 1970 consists of chitinous opening and a very lightly chitinized duct and MCO is a simple tube and curved strongly so as to form U shape. The MCO of *L. verberis* Euzet & Oliver, 1967, *L. mormyri* Euzet & Oliver, 1967 and *L. flagellatus* Boudaya, Neifar & Euzet, 2009 have two articulated pieces and the vagina is armed with single crown of 9-12 minute spines in *L. verberis* and with 4-5 minute spines in *L. flagellatus* while in *L. mormyri*, the small vaginal duct forms heavily sclerotized funnel-shape prior entering apparently muscular seminal receptacle.

Roubal (1981) described *L. acanthopagri* Roubal, 1981, *L. squamosus* Roubal, 1981 and recorded *L. major* Murray, 1931 from yellow bream *Acanthopagrus australis* (Günther, 1859) in Australia. The MCO, vagina, ventral and dorsal bars and the anchors of the present new species are very different from the above species. The copulatory sclerites in *L. major* consist of 2 elements: posterior and anterior curved to the left of posterior sclerites and its vagina and that of *L. squamosus* are complexly sclerotized while it is V-shaped in *L. acanthopagri*.

WoRMS (2019) documented the occurrence of 58 valid species of *Lamellodiscus* as well as eight invalid species of the same genus. According to GBIF (2019), there are 60 valid *Lamellodiscus* species in the World. So, with the present new species (*L. iraqensis*), a total of 61 *Lamellodiscus* species are so far known in the World.

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