



Acleotrema lamothei n. sp. (Monogenea: Diplectanidae) from the gills of *Kyphosus incisor* in Brazilian waters

Acleotrema lamothei n. sp. (Monogenea: Diplectanidae) de las branquias de *Kyphosus incisor* en aguas brasileñas

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Abstract. A diplectanid monogenean, *Acleotrema lamothei* n. sp., is described from the gills of the yellow sea chub *Kyphosus incisor* (Cuvier, 1831) in Brazilian waters off Rio de Janeiro State. This species is distinguished by the facts that the male copulatory organ is armed with spines throughout most of its length, the ventral hamuli have a very long, stout outer root, which is slightly notched proximally, an inner root less than half the length of the outer root and a fine blade and point. It also differs from most species of the genus by the greater size of the haptor and its hard parts. This is the first record of a species of *Acleotrema* Johnston and Tieg, 1922 from South American waters.

Key words: Monogenea, Diplectanidae, *Acleotrema lamothei* n. sp., *Kyphosus incisor*, Brazil.

Resumen. Se describe *Acleotrema lamothei* n. sp. de las branquias del pez *Kyphosus incisor* (Cuvier, 1831) recolectado en las costas del estado de Rio de Janeiro, Brasil. La nueva especie se distingue por la armadura del órgano copulador con espinas en casi toda su longitud, por la presencia de una raíz externa larga y robusta en el hámuli ventral, provista de una pequeña muesca proximal, por la raíz interna que mide menos de la mitad de la longitud de la externa y por tener la hoja y la punta finas. Asimismo, difiere de muchas de las especies del género por el gran tamaño del haptor y de sus partes esclerotizadas. El presente constituye el primer registro de una especie de *Acleotrema* Johnston y Tieg, 1922 en aguas sudamericanas.

Palabras clave: Monogenea, Diplectanidae, *Acleotrema lamothei* n. sp., *Kyphosus incisor*, Brasil.

Introduction

Species of the diplectanid genus *Acleotrema* Johnston and Tieg, 1922 are characterised by possessing squamodiscs with articulated rodlets forming divergent rows such that the internal rows form a 'V'-shape, the male copulatory organ comprises 2 nested tubes surrounded proximally by a slightly sclerotised sac, and the genital atrium is heavily sclerotised (Domingues and Boeger, 2007). They have been reported parasitising perciform fishes, mainly kyphosids, throughout much of the warmer regions of the world's oceans. There have, however, been no reports of their occurrence in South American waters (Kohn and Cohen, 1998; Santos and Carbonell, 2000; Gibson et al., 2005). During a survey of kyphosids off Rio de

Janeiro State, specimens of *Acleotrema* were encountered on the yellow sea chub *Kyphosus incisor* (Cuvier, 1831). This fish occurs widely in the equatorial and subequatorial regions of the Atlantic; however, although digeneans have been reported from this host (e.g. Lamothe-Argumedo et al., 1997), no monogeneans appear to have been recorded (e.g. Hendrix, 1994; Kohn and Cohen, 1998; Santos and Carbonell, 2000; Gibson et al., 2005). The diplectanid specimens recovered in this study are considered to be new to science and are described below.

Materials and methods

Ilha Grande Bay, off Rio de Janeiro State, has an area of 1 124 km², a maximum depth of 50m and an average water temperature of 27°C. Fish were collected

by netting and spear-fishing and maintained in ice for transportation to the laboratory and until examination. The gills were removed, separated in Petri dishes and examined under a stereo microscope. The parasites were fixed in 70% alcohol or Bouin's solution; some under a slight coverslip pressure. Some specimens were cleared in Hoyer's medium (Humason, 1979) for improving the visibility of the sclerotised structures. The parasites were otherwise stained in Mayer's alum carmine or Gomori's trichrome (Humason, 1979). Measurements are presented in micrometers, with the mean in parentheses. Drawings were made with the aid of a drawing tube. The specimens are deposited at the Helminthological Collection of the Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Brazil.

The gills of 6 specimens of *K. incisor* from Ilha Grande Bay (23°00'–23°40'S, 44°00'–44°40'W) were examined. These fish measured 34–39 (35) cm in length and 525–976 (790) g in weight. All 6 specimens harboured specimens of *Acleotrema* on the gills, mainly between the third and fourth branchial arches. The number of parasites collected was 28.

Description

Acleotrema lamothei n. sp. (Figs. 1–3)

Based on 28 specimens; 10 specimens measured. Body fusiform, 939–1,230 (1,120) in length, 169–184 (178) in width at level of ovary (Fig. 1). Tegumental scales not seen. Cephalic lobes well developed; 3 pairs of head organs; small cephalic glands at level of pharynx. Two pairs of eye-spots anterior to pharynx. Pharynx subglobular, 50–64 (56) × 43–60 (52). Oesophagus short. Intestinal caeca not confluent, end posteriorly close to peduncle. Haptor short, wide, twice width of body proper, 92–109 (102) × 323–408 (367). Squamodiscs 50–80 (65) × 238–356 (270), with 46–61 (57) radial rows of contiguous dumbbell-shaped rodlets (Fig. 1); internal rows of rodlets form 'V'-shape. Lateral (dorsal) bars 2, stout, dumbbell-shaped, 78–92 (81) × 13–16 (14). Ventral bar slender, with transverse groove, 263–298 (254). Seven pairs of hooklets, 11–13 (11) in length. Ventral hamuli 50–82 (66) × 9–11 (10); outer root very long, 46–61 (55), stout, slightly notched at broad proximal end; inner root conical, 18–29 (25), less than half length of outer root; blade and recurved point short, fine. Dorsal hamuli 73–87 (77); base large, stout, 9 in greatest width, with only lateral rudiment of roots; blade and point long, curved (Fig. 2). Male copulatory organ 145–186 (169); proximal part a bulbous, thin-walled sac, 82–101 (86) × 46–64 (50); distal sclerotised part 76–92 (82) × 13–20 (19), tapered, composed of well-defined, sclerotised anterior sheath 18–25 (22) long with postero-

lateral spur c.10 long and more lightly sclerotised distal region with mid-lateral protuberance (Fig. 3). Inner tube (cirrus) of male copulatory organ extends from inside thin-walled sac to male genital pore, 115–138 (130) in length; proximal region armed with delicate spines; middle region with larger spines; distal region with irregular tiny spines, ending as smooth duct (Fig. 3). Testis longitudinally ovoid, post-ovarian, 169–209 (187) × 76–118 (100). Vas deferens arises from anterior region of testis. Seminal vesicle tubular, sinuous. Prostatic region fusiform. Ovary 29–36 (32) × 43–55 (49), curves around right intestinal caecum. Seminal receptacle and Mehlis' gland anterior to ovary. Uterus intercaecal. Genital atrium large, in midbody, sclerotised. Vagina sinistral opens lateral to male genital pore. Vitelline follicles dense; fields lateral, extend from level of pharynx almost to peduncle. Eggs not observed.

Taxonomic summary

Type-host: *Kyphosus incisor* (Cuvier, 1831) (Kyphosidae).

Type-locality: Ilha Grande Bay, off Rio de Janeiro, Rio de Janeiro State, Brazil (23°00'–23°40'S, 44°00'–44°40'W).

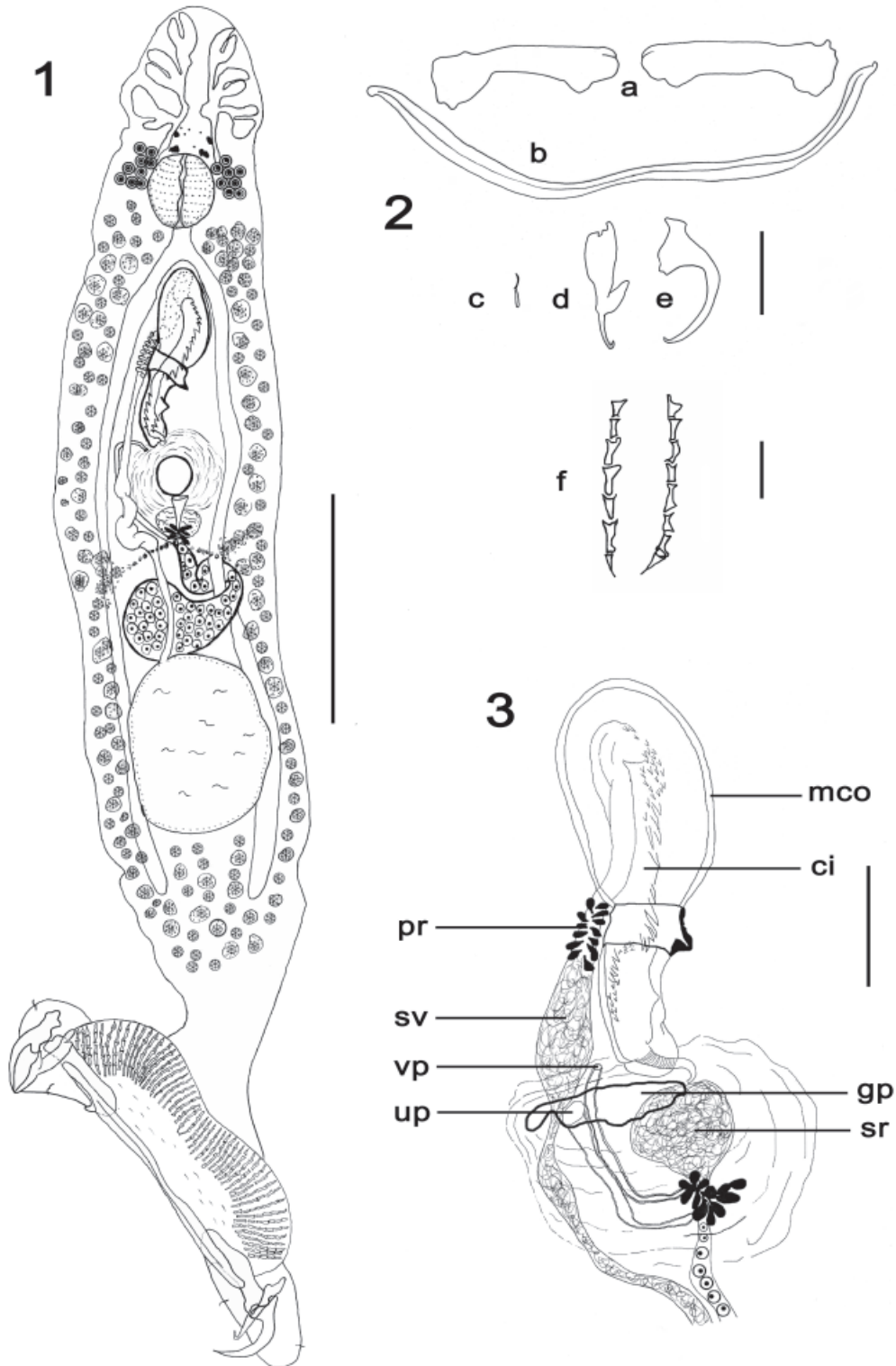
Site: gills.

Type-material: holotype CHIOC 36926a and 3 paratypes CHIOC 36926b,c,d.

Etymology: the new species is named for Professor Lamothe Argumedo of the Instituto de Biología, Universidad Nacional Autónoma de México, México D.F., Mexico, in recognition of his contributions to parasitology.

Remarks

Acleotrema was originally proposed by Johnston and Tiegs (1922) for *Acleotrema girellae* Johnston and Tiegs, 1922 from *Girella tricuspidata* (Quoy and Gaimard) in Australian waters, and, although Price (1937) considered it a junior synonym of *Diplectanum* Diesing, 1858, most authors have retained it as a valid genus (Yamaguti, 1963, 1968; Young, 1969, 1972). A second species, *Acleotrema kyphosi* Yamaguti, 1968, was added by Yamaguti (1968) from *Kyphosus cinerascens* (Forsskål, 1775) off Hawaii. Rakotofiringa et al. (1987) proposed *Heteroplectanum* Rakotofiringa, Oliver and Lambert, 1987 for 4 new species from sparid and carangid fishes off Madagascar. However, recently Domingues and Boeger (2007) have revised this group and considered *Heteroplectanum* a junior synonym of *Acleotrema*, to which they attributed 10 species. Shortly before the publication of the latter paper, Lim (2006) described another species of *Heteroplectanum*, *Heteroplectanum flabelliforme* Lim, 2006, from the toxotid



Figures 1-3. 1, *Acleotrema lamothei* n. sp., entire body in dorsal view. Scale bar = 200µm. 2, *Acleotrema lamothei* n. sp., (a) lateral (dorsal) bars, (b) ventral bar, (c) hooklets, (d) ventral hamulus, (e) dorsal hamulus and (f) rodlets of squamodisc. Scale bars: (a-e) = 100µm, (f) = 10 µm. 3, *Acleotrema lamothei* n. sp., detail of male copulatory organ and other terminal genitalia, dorsal view. Abbreviations: ci, cirrus; gp, genital pore (aperture of sclerified genital atrium); mco, male copulatory organ; pr, prostatic region; sr, seminal receptacle; sv, seminal vesicle; up, uterine pore; vp, vaginal pore. Scale bar = 50µm.

(archerfish) *Toxotes jaculatrix* (Pallas, 1767) off the western coast of the Malaysian peninsula. As pointed out by Lim, the generic allocation of this species is somewhat problematical.

Most species of *Acleotrema* parasitise kyphosid fish (Domingues and Boeger 2007). Diplectanids described from *Kyphosus* spp., *Acleotrema diplobulbus* (Yamaguti, 1968), *Acleotrema nenu* (Yamaguti, 1968), *Acleotrema spiculare* (Yamaguti, 1968), *Acleotrema kyphosi* Yamaguti, 1968, *Acleotrema yamagutii* (Oliver, 1983) and *Acleotrema oliveri* (León-Règagnon, Pérez-Ponce de León and García Prieto, 1997), were all, apart from the last one, originally described from off Hawaii (Yamaguti, 1968; Oliver, 1983). León-Règagnon et al. (1997) described *A. oliveri* and also recorded *A. kyphosi* and *A. nenu* from *Kyphosus elegans* (Peters) off the Pacific coast of Mexico. In their revision of the genus, Domingues and Boeger (2007) made *A. kyphosi* a synonym of the type-species, *A. girellae*, even though the latter was originally described from different subfamily of kyphosid in Australian waters.

Acleotrema lamothei n. sp. differs from those species listed above recorded from *Kyphosus* in a number of features: the ventral bar is longer (263–298 vs <250 µm); the ventral hamuli are smaller in relation to the dorsal hamuli; and the ventral hamuli have a different shape, with a very long, stout outer root, which is slightly notched proximally, an inner root less than half the length of the outer root, and a fine blade and point. They also differ from most of these species in that: the lateral (dorsal) bars are longer (78–92 vs <85 µm); the dorsal hamuli are larger (73–78 vs <75 µm); the haptor is wider (twice the width of the body); there are more rows of rodlets on the squamodiscs (46–61 vs ≤50, apart from *A. oliveri* (63–65)); and the form of the male copulatory organ differs significantly from all species except *A. oliveri*.

The new species appears morphologically closest to those species with a spined male copulatory organ, i.e. *Acleotrema serrulopenis* Rakotofiringa, Oliver and Lambert, 1987 and *A. oliveri*.

Acleotrema serrulopenis was originally described from the 2 different sparid fishes, *Rhabdosargus sarba* (Forsskål, 1775) and *Polyamblyodon gibbosum* (Pellegrin, 1914), from off Madagascar (Indian Ocean). In fact, the measurements of specimens from these 2 hosts differ, for example the dorsal bars in *R. sarba* were reported as 70–90 µm but as 130–140 µm in *P. gibbosum*. Although Rakotofiringa et al. (1987) considered these differences, they preferred to treat the material as conspecific. Even considering these reported *intraspecific* differences and ignoring the host-group (sparid) and geographical distribution (off Madagascar), *A. lamothei* n. sp. can be differentiated from *A. serrulopenis* in terms of the shape

of the male copulatory organ, which has a spur on the medial sclerotised sheath and a protuberance on the side of the distal region, the shape of the ventral hamuli and the greater size of the dorsal hamuli (73–87 vs 48–55 and 40 µm).

The new species can be differentiated from *A. oliveri*, which parasitises *K. elegans* off the west coast of Mexico (Pacific Ocean), by the dimensions of the haptor (323–408 vs 246–267 µm), dorsal hamuli (73–87 vs 51–75 µm), lateral (dorsal) bars (78–92 vs 54–66 µm), ventral bar (263–298 vs 216–225 µm) and pharynx (50–64 vs 24–51 µm), the shape of the ventral hamuli, the absence of a lateral protuberance on the distal region of the male copulatory organ and the absence of spines on the distal region of this organ.

As indicated above, this is the first record of a species of *Acleotrema* in South American waters. This also seemed to be the case for Atlantic waters (e.g. Hendrix, 1994; Kohn and Cohen, 1998; Santos and Carbonell, 2000; Gibson et al., 2005). However, there are recent reports by Domingues and Boeger (2007) of specimens deposited by P. C. Young in Queensland Museum from *Kyphosus spectator* Linnaeus, 1758, which (judging by the host: Froese and Pauly, 2007) was collected off the Atlantic coast of Mexico: 1 report is listed as off Tabasco. Although the material was not in good condition, they tentatively identified 2 species, *A. oliveri* and *A. diplobulbus*. However, León-Règagnon et al. (1997) considered the former species highly specific to *K. elegans*, an eastern Pacific species.

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