

MONOGENEANS FROM PANGASIIDAE (SILURIFORMES) IN SOUTHEAST ASIA: X. SIX NEW SPECIES OF THAPAROCLEIDUS JAIN, 1952 (ANCYLODISCOIDIDAE) FROM PANGASIUS MICRONEMA

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Summary:

The examination of gill parasites from *Pangasius micronema* Bleeker, 1847 (Siluriformes, Pangasiidae) in Southeast Asia revealed the presence of nine species of Monogenea. Two (*Thaparocleidus brevicochleus* Pariselle, Lim & Lambert, 2001 and *T. sinespinae* Pariselle, Lim & Lambert, 2001) have been previously described. Among the others, six species, belonging to *Thaparocleidus* Jain, 1952 (Monogenea, Ancylodiscoïdidae) as defined by Lim (1996) and Lim *et al.* (2001), are considered new species: *T. tacitus* n. sp., *T. summagracilis* n. sp., *T. portentosus* n. sp., *T. rukyanii* n. sp., *T. durandi* n. sp., and *T. lebrunae* n. sp. The remaining species is represented by too few individuals to be conclusively described.

KEY WORDS: Monogenea, Ancylodiscoïdidae, *Thaparocleidus tacitus* n. sp., *Thaparocleidus summagracilis* n. sp., *Thaparocleidus portentosus* n. sp., *Thaparocleidus rukyanii* n. sp., *Thaparocleidus durandi* n. sp., *Thaparocleidus lebrunae* n. sp., freshwater fish, Siluriformes, Pangasiidae, *Pangasius micronema*, Southeast Asia.

Résumé: MONOGENÈS DE PANGASIIDAE (SILURIFORMES) EN ASIE DU SUD-EST: X. SIX ESPÈCES NOUVELLES DE *THAPAROCLEIDUS* JAIN, 1952 (ANCYLODISCOIDIDAE) CHEZ *PANGASIUS MICRONEMA*

L'examen des parasites branchiaux de *Pangasius micronema* Bleeker, 1847 (Siluriformes, Pangasiidae) en Asie du Sud-Est a révélé la présence de neuf espèces de Monogenea. Deux (*Thaparocleidus brevicochleus* Pariselle, Lim & Lambert, 2001 et *T. sinespinae* Pariselle, Lim & Lambert, 2001) ont déjà été décrites. Parmi les autres, six espèces, appartenant au genre *Thaparocleidus* Jain, 1952 (Ancylodiscoïdidae) tel que défini par Lim (1996) et Lim *et al.* (2001), sont considérées comme nouvelles: *T. tacitus* n. sp., *T. summagracilis* n. sp., *T. portentosus* n. sp., *T. rukyanii* n. sp., *T. durandi* n. sp. et *T. lebrunae* n. sp. La dernière espèce est représentée par trop peu d'individus pour être décrite de manière satisfaisante.

MOTS CLÉS: Monogenea, Ancylodiscoïdidae, *Thaparocleidus tacitus* n. sp., *Thaparocleidus summagracilis* n. sp., *Thaparocleidus portentosus* n. sp., *Thaparocleidus rukyanii* n. sp., *Thaparocleidus durandi* n. sp., *Thaparocleidus lebrunae* n. sp., poissons d'eau douce, Siluriformes, Pangasiidae, *Pangasius micronema*, Asie du Sud-Est.

INTRODUCTION

Within the framework of a European Commission project on the biodiversity and culture of Southeast Asian catfishes, the gills from pangasiid fishes (Siluriformes, Pangasiidae) were examined for monogeneans. This paper presents the descriptions of the six new species of *Thaparocleidus* Jain, 1952 (Monogenea, Ancylodiscoïdidae) found on *Pangasius micronema* Bleeker, 1847. This fish species was collected in Indonesia and Malaysia and had not been previously examined for parasites. To date a total of 40 monogenean species (39 *Thaparocleidus* and one *Pangasitrema* Pariselle, Euzet & Lambert, 2004) have

been described from *Pangasius bocourti* Sauvage, 1880; *P. djambal* Bleeker, 1846; *P. elongatus* Pouyaud, Gustiano & Teugels, 2002; *P. gigas* Chevey, 1930; *P. humeralis* Roberts, 1989; *P. hypophthalmus* (Sauvage, 1878); *P. kinabatanganensis* Roberts & Vidthayanon, 1991; *P. krempfi* Roberts & Vidthayanon, 1991; *P. kunyit* Pouyaud, Teugels & Legendre, 1999; *P. lithostoma* Roberts, 1989; *P. mahakamensis* Pouyaud, Gustiano & Teugels, 2002; *P. mekongensis* Gustiano, Teugels & Pouyaud, 2003; *P. nasutus* (Bleeker, 1862); *P. nieuwenhuisii* (Poeta, 1904); *P. pangasius* (Hamilton, 1822); *P. polyuranodon* Bleeker, 1852; *P. rheophilus* Pouyaud & Teugels, 2000 and *P. sababensis* Gustiano, Teugels & Pouyaud, 2003, from India, Bangladesh, Indonesia, Malaysia, Thailand and Vietnam (see Tripathi, 1957; Lim, 1990, Pariselle *et al.* 2001a, 2001b, 2002a, 2002b, 2003, 2004a, 2004b, 2005a and 2005b).

MATERIALS AND METHODS

Fish (five specimens per locations), caught by hook and line, were bought in fish markets or directly from fishermen in Indonesia (Sumatra

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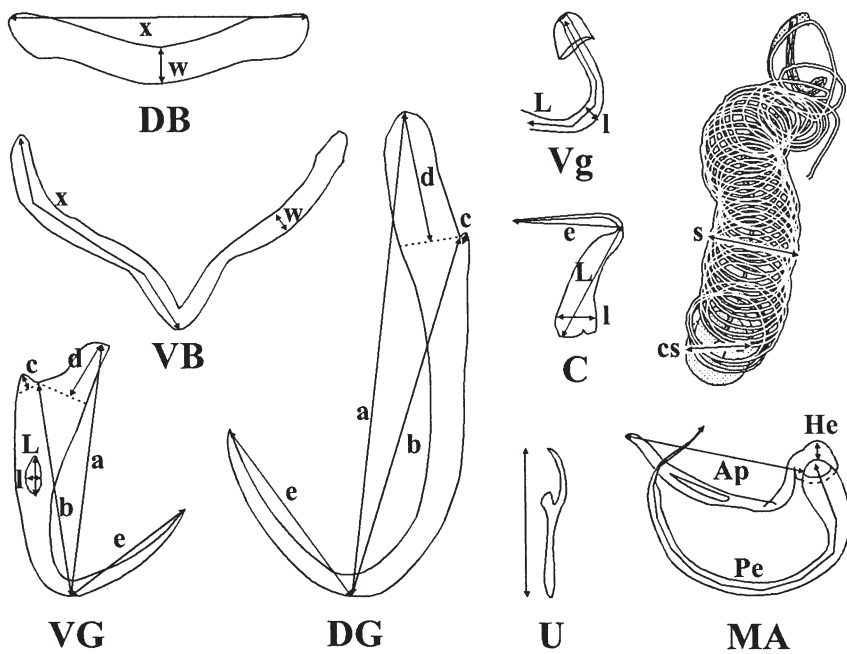


Fig. 1. – Measurements used in this study. C = cuneus: L = length; l = largest width; e = extension length. DB = dorsal transverse bar: x = total length; w = width in the middle. DG = dorsal gripus: a, b, c, d and e = standard measurements. MA = male apparatus: Pe = total length of the penis; Ap = length of the accessory piece; He = length of the heel; s: diameter of the penis spiral; cs: diameter of the cupule like structure. U = total length of the uncinuli. VB = ventral transverse bar: x = length of one branch; w = largest width. VG = ventral gripus: a, b, c, d and e = standard measurements; L and l = length and width of gripus aperture. Vg = vagina: L = total length; l = maximum width.

and Borneo) and Malaysia (Borneo). The fish were dissected as soon as possible, and the left branchial arches were frozen in liquid nitrogen, until examination. To verify the specific identity of host fishes, the carcasses were numbered, fixed and preserved in formalin. In the laboratory, the gills were thawed and the monogeneans were detached from the gill using a strong water current. The worms were then transferred individually into a drop of ammonium picrate-glycerine (mixture described by Malmberg (1957)) on a slide with a mounted needle. The preparation was then covered with a round cover slip and sealed with Glyceel (GURR-BDH Chemicals Ltd.). From these preparations, drawings were made of the sclerotised pieces of the haptor and of the copulatory complex using a camera lucida. Measurements, made with a digitiser, in micrometers, and presented as the mean \pm standard deviation followed by the range in parentheses, are those proposed by Gussev (1962) (Fig. 1). The method of numbering of the haptor pieces is that adopted at ICOPA IV (Euzet & Prost, 1981). Terminology is that of Pariselle and Euzet (1995) and N'Douba *et al.* (1999).

RESULTS

Nine species of gill Monogenea were recovered in South East Asia from *Pangasius micronema* (Siluriformes, Pangasiidae). Two have been previously described (*T. brevicochleus* Pariselle, Lim & Lambert, 2001 and *T. sinespinae* Pariselle, Lim & Lambert, 2001). One is represented by too few individuals (only four among the 902 worms observed) to be

conclusively described. The remaining six species are considered new, their anatomy (soft and hard parts) complies with that of *Thaparocleidus* Jain, 1952 (Monogenea, Ancylocoididae) as defined by Lim (1996) and Lim *et al.* (2001).

DESCRIPTIONS

THAPAROCLEIDUS TACITUS N. SP. (Fig. 2)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Rajang River at Sibul (Sarawak State, Borneo Island, Malaysia).

Other records: found on the same host in the Kapuas River at Sintang (East Kalimantan Province, Borneo Island, Indonesia) and in the Batang Hari River at Muara Tebo (Jambi Province, Sumatra Island, Indonesia).

Material studied: 30 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 273 HG; Ti 240. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 273 HG; Ti 240bis.

Adults: 1324 \pm 359.7 (472-2107) long, 110 \pm 22.8 (61-170) wide at the level of the penis. Pharynx 58 \pm 7.6 (40-71) wide. Small dorsal gripus with blade bent at distal third and marked guard: a = 37 \pm 1.2 (34-40), b = 30 \pm 1 (28-33), c = 2 \pm 0.6 (1-3), d = 11 \pm 1 (9-13), e = 17 \pm 1.2 (14-19). Small cuneus with very short extension: L = 9 \pm 0.8 (7-11), l = 3 \pm 0.6 (2-4), e = 1 \pm

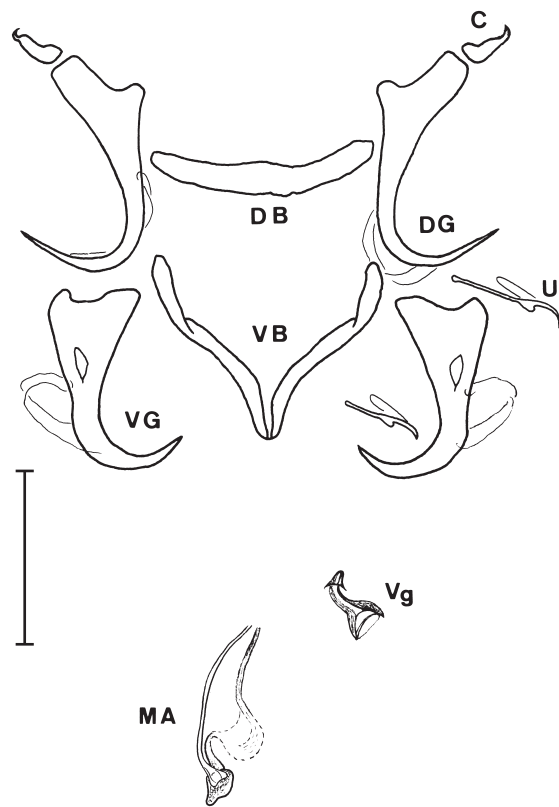


Fig. 2. – *Thaparocleidus tacitus* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; MA = male apparatus; VB = ventral transverse bar; VG = ventral gripus; Vg = vagina; U = uncinuli. Bar = 30 μ m.

0.7 (0.1-3). Nearly straight dorsal transverse bar: $x = 36 \pm 1.1$ (33-39), $w = 5 \pm 0.4$ (4-5). Ventral gripus with well marked aperture, regularly arched and strong blade and developed guard: $a = 30 \pm 0.9$ (28-33), $b = 31 \pm 1$ (28-33), $c = 3 \pm 0.7$ (2-5), $d = 7 \pm 1$ (4-9), $e = 9 \pm 1$ (7-11), $L = 7 \pm 0.7$ (5-8), $l = 3 \pm 0.6$ (2-4). V-shaped ventral transverse bar: $x = 35 \pm 1.3$ (32-37), $w = 3 \pm 0.3$ (3-4). Thin uncinuli II = 23 ± 0.8 (21-25), uncinuli I and III to VII = 19 ± 2.6 (12-23). Short and very thin penis with a small basal bulb, poorly developed heel: $Pe = 37 \pm 2$ (33-41), $He = 3 \pm 0.6$ (2-5). Thin and slightly sclerotised accessory piece, attached to basal bulb of the penis, with median part practically non visible: $Ap = 30 \pm 3.4$ (22-36). Short, well sclerotised and thin vagina with one extremity turn inside out and the other one conical: $L = 10 \pm 1.4$ (7-13), $l = 1 \pm 0.2$ (1-2).

Comments

This new species is easily distinguishable from all described *Thaparocleidus* from pangasiid fishes in having:
 - a very thin penis and weakly sclerotised accessory piece (hard to observe);
 - almost the same size of both dorsal and ventral gripus.

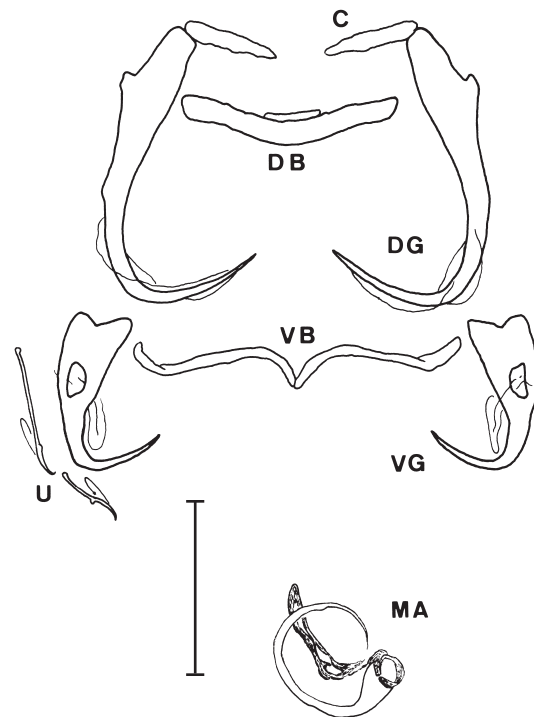


Fig. 3. – *Thaparocleidus summagracilis* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; MA = male apparatus; VB = ventral transverse bar; VG = ventral gripus; U = uncinuli. Bar = 30 μ m.

Thaparocleidus tacitus n. sp. is proposed because of the poorly visible copulatory organs (*tacitus* (Latin) = discreet).

THAPAROCLEIDUS SUMMAGRACILIS N. SP. (Fig. 3)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Kapuas River at Sintang (East Kalimantan Province, Borneo Island, Indonesia).

Other records: found on the same host in the Rajang River at Sibiu (Sarawak State, Borneo Island, Malaysia) and in the Batang Hari River at Muara Tebo and Jambi (Jambi Province, Sumatra Island, Indonesia).

Material studied: 30 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 274 HG; Ti 241. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 274 HG; Ti 241bis.

Adults: 747 ± 107 (588-983) long, 83 ± 15 (49-115) wide at the level of the penis. Pharynx, poorly visible: 37 ± 4.2 (28-45) wide. Dorsal gripus with blade bent at distal third and poorly marked guard: $a = 47 \pm 1.1$ (45-49), $b = 39 \pm 1.1$ (36-41), $c = 1 \pm 0.3$ (1-2), $d = 11 \pm 0.8$ (9-13), $e = 19 \pm 1.4$ (16-22). Straight cuneus without extension: $L = 14 \pm 0.8$ (12-16), $l = 4 \pm 0.7$ (3-6). Slightly curved dorsal transverse bar with thickened central por-

tion on the concave side: $x = 35 \pm 1.3$ (33-41), $w = 6 \pm 0.4$ (5-6). Ventral gripus with well marked aperture, blade bent at the middle and marked guard: $a = 25 \pm 0.7$ (23-26), $b = 23 \pm 0.7$ (22-25), $c = 2 \pm 0.3$ (1-2), $d = 5 \pm 0.7$ (4-7), $e = 13 \pm 0.7$ (11-15), $L = 6 \pm 0.5$ (5-8), $l = 3 \pm 0.4$ (2-3). V-shaped ventral transverse bar: $x = 29 \pm 1.2$ (26-32), $w = 3 \pm 0.4$ (2-4). Long and thin uncinuli II = 17 ± 1 (14-19), long and thin uncinuli I and IV to VII, III shorter = 19 ± 4 (10-25). C-shaped penis consisting of a tube getting dramatically thinner at distal quarter, with a large basal bulb: $Pe = 58 \pm 2.3$ (53-64). Very reduced heel: $He = 1 \pm 0.2$ (0.4-1). Simple accessory piece bent at proximal quarter, linked to the basal bulb of the penis: $Ap = 23 \pm 1.3$ (21-26). No visible vagina.

Comments

T. summagracilis n. sp. is easily distinguishable from all described *Thaparocleidus* from pangasiid fishes in having no extension on the cuneus and a penis getting dramatically thinner at distal quarter.

Thaparocleidus summagracilis n. sp. is named after the shape of the penis (summa (Latin) = end, gracilis (Latin) = slender).

THAPAROCLEIDUS PORTENTOSUS N. SP. (Fig. 4A, B)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Kapuas River at Sintang (East Kalimantan Province, Borneo Island, Indonesia).

Other records: found on the same host in the Rajang River at Sibul (Sarawak State, Borneo Island, Malaysia) and in the Batang Hari River at Jambi (Jambi Province, Sumatra Island, Indonesia).

Material studied: 30 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 275 HG; Ti 242. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 275 HG; Ti 242bis.

Adults: 557 ± 91.9 (384-741) long, 81 ± 13.6 (51-117) wide at the level of the penis. Pharynx: 34 ± 3.6 (27-40) wide. Dorsal gripus with blade bent at distal third and poorly marked guard: $a = 51 \pm 1.8$ (47-55), $b = 41 \pm 1.6$ (37-45), $c = 1 \pm 0.2$ (0.4-2), $d = 13 \pm 0.9$ (11-15), $e = 24 \pm 1.3$ (21-27). Straight cuneus with long extension: $L = 11 \pm 1$ (9-14), $l = 4 \pm 0.4$ (3-5), $e = 11 \pm 1.5$ (7-15). Slightly curved dorsal transverse bar: $x = 34 \pm 1.8$ (30-38), $w = 5 \pm 0.4$ (4-6). Ventral gripus with marked guard and small aperture: $a = 28 \pm 1.1$ (26-30), $b = 23 \pm 1$ (21-25), $c = 2 \pm 0.4$ (1-3), $d = 8 \pm 0.7$ (7-10), $e = 16 \pm 0.8$ (13-18), $L = 4 \pm 0.5$ (3-5), $l = 1 \pm 0.2$ (1-2). V-shaped ventral transverse bar: $x = 33 \pm 1.6$ (30-36), $w = 3 \pm 0.4$ (3-4). Uncinuli II = 15 ± 1.3 (11-18), uncinuli I and III to VII = 16 ± 2.7 (9-20). Very long,

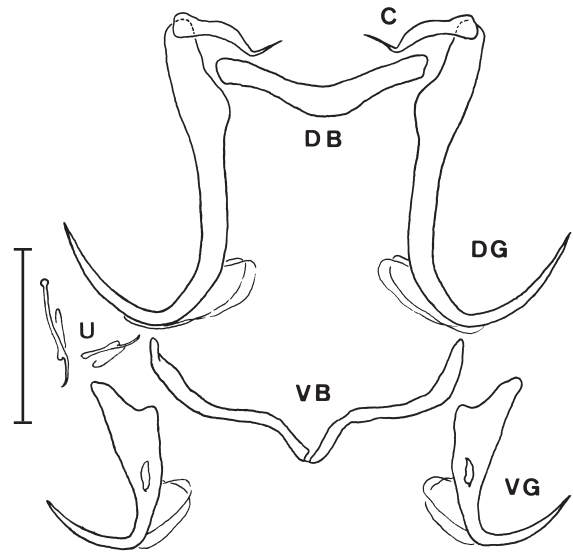


Fig. 4A. – *Thaparocleidus portentosus* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; VB = ventral transverse bar; VG = ventral gripus; U = uncinuli. Bar = 30 μ m.

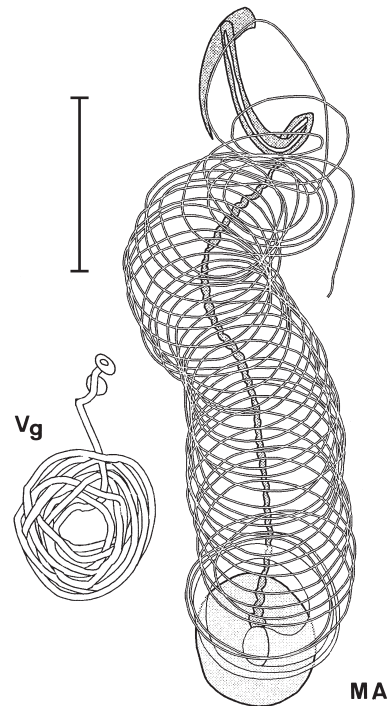


Fig. 4B. – *Thaparocleidus portentosus* n. sp. MA = male apparatus; Vg = vagina. Bar = 30 μ m.

thin and regularly spirally coiled penis (about 35 turns) with marked basal bulb attached on large cupule like structure (diameter = 16 ± 1.2 (13-20)), spiral is = 19 ± 1.6 (14-23) in diameter. Total length of the penis could be estimated to be more than 2250 μ m. Long accessory piece linked to the basal bulb of the penis, first portion (four fifth) made up of a spirally coiled ribbon, the distal fifth is a J-shaped piece with a gutter like

depression all along the middle and topped by a thin voile: $Ap = 93 \pm 7.5$ (80-108). Spirally coiled (diameter of spiral = 17 ± 1.6 (14-21)) and thin vagina: $l = 1 \pm 0.3$ (1-2), as the number of turns could not be estimated we could not give a measurement for the vagina.

Comments

T. portentosus n. sp. is the second species of *Thaparocleidus* found on pangasiid hosts with a very long, thin and spirally coiled penis (about 35 turns). It may be distinguished from *T. euzeti* Pariselle, Lim & Lambert, 2002 mainly by the presence a long accessory piece linked to the basal bulb of the penis (*vs.* short and not linked), and by the total length of the penis (spiral diameter is 19 *vs.* 61 μ m and both are 35 turns). *Thaparocleidus portentosus* n. sp. is named after the length of the penis (*portentosus* (Latin) = strange).

THAPAROCLEIDUS RUKYANII N. SP. (Fig. 5)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Batang Hari River at Muara Tebo (Jambi Province, Sumatra Island, Indonesia).

Other records: found on the same host in the Kapuas River at Sintang (East Kalimantan Province, Borneo

Island, Indonesia) and in the Rajang River at Sibul (Sarawak State, Borneo Island, Malaysia).

Material studied: 25 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 276 HG; Ti 243. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 276 HG; Ti 243bis.

Adults: 615 ± 81.7 (484-855) long, 89 ± 19.5 (41-134) wide at the level of the penis. Pharynx: 36 ± 6.4 (24-56) wide. Dorsal gripus with blade bent at distal third and poorly marked guard: $a = 58 \pm 2.3$ (52-62), $b = 45 \pm 1.8$ (39-49), $c = 1 \pm 0.2$ (0.4-1), $d = 15 \pm 1.2$ (13-18), $e = 26 \pm 1.4$ (22-28). Straight cuneus with long and visible extension: $L = 13 \pm 1.3$ (9-15), $l = 5 \pm 0.5$ (4-6), $e = 10 \pm 1.7$ (6-16). Slightly V-shaped dorsal transverse bar: $x = 35 \pm 2.1$ (29-38), $w = 5 \pm 0.5$ (4-6). Ventral gripus with poorly marked guard, blade bent at proximal third and small apertures: $a = 29 \pm 0.9$ (27-31), $b = 23 \pm 0.9$ (21-26), $c = 1 \pm 0.3$ (1-2), $d = 9 \pm 0.8$ (8-11), $e = 17 \pm 0.8$ (16-18). Long and V-shaped ventral transverse bar: $x = 33 \pm 1.4$ (29-35), $w = 4 \pm 0.6$ (2-4). Uncinuli II = 15 ± 1.1 (12-18), uncinuli I and III to VII = 16 ± 3 (8-22). Short and spirally coiled (one turn) penis directly attached on a cupule like structure (diameter = 19 ± 1.7 (16-22): $Pe = 42 \pm 3.6$ (35-48). Simple sinuous accessory piece: $Ap = 33 \pm 3.6$ (20-37). Thin and curved vagina with one extremity turn inside out: $L = 16 \pm 2.7$ (11-22), $l = 1 \pm 0.3$ (1-2).

Comments

T. rukyanii n. sp. belongs to the group of *Thaparocleidus* with a spirally coiled penis attached to a cupule-like structure: *T. brevicochleus* Pariselle, Lim & Lambert, 2001; *T. kapuasensis* Pariselle, Lim & Lambert, 2001; *T. euzeti* Pariselle, Lim & Lambert, 2002; *T. levangi* Pariselle, Lim & Lambert, 2004; *T. slembroucki* Pariselle, Lim & Lambert, 2004 and *T. portentosus* n. sp. Among these, only two also possess cuneus with long and visible extension (10 μ m long or more): *T. kapuasensis* and *T. portentosus* n. sp. *T. rukyanii* n. sp. is easily distinguishable by the length and number of turn in the penis (42 μ m and 1 *vs.* 115 μ m and 2 or more than 2250 μ m and about 35).

Thaparocleidus rukyanii n. sp. is named for our late lamented colleague Dr Ahmad Rukyani, former Director of Fish Diseases and Environment at the Directorate General of Fisheries (Jakarta, Indonesia).

THAPAROCLEIDUS DURANDI N. SP. (Fig. 6A, B)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Kapuas River at Sintang (East Kalimantan Province, Borneo Island, Indonesia).

Other records: found on the same host in the Rajang River at Sibul (Sarawak State, Borneo Island, Malaysia)

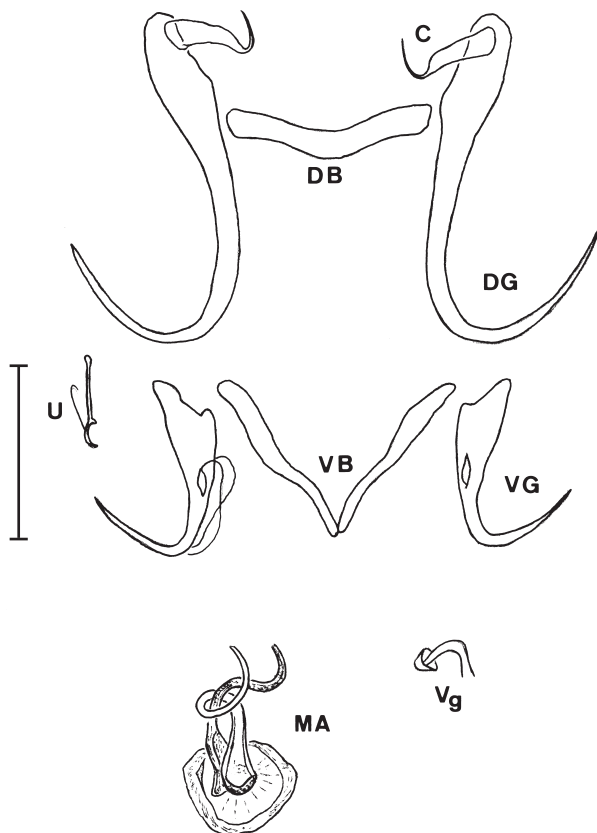


Fig. 5. – *Thaparocleidus rukyanii* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; MA = male apparatus; VB = ventral transverse bar; VG = ventral gripus; Vg = vagina; U = uncinuli. Bar = 30 μ m.

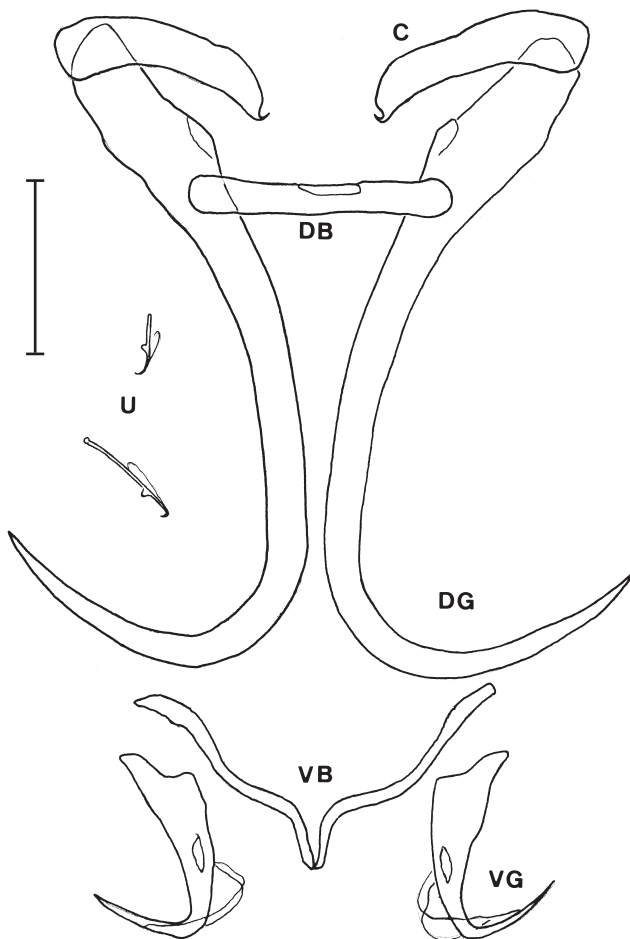


Fig. 6A. – *Thaparocleidus durandi* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; VB = ventral transverse bar; VG = ventral gripus; U = uncinuli. Bar = 30 µm.

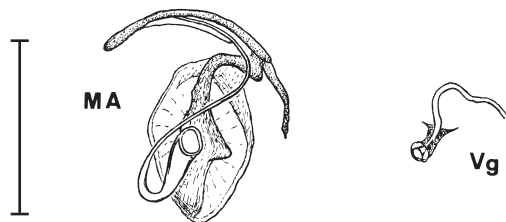


Fig. 6B. – *Thaparocleidus durandi* n. sp. MA = male apparatus; Vg = vagina. Bar = 30 µm.

and in the Batang Hari River at Muara Tebo and Jambi (Jambi Province, Sumatra Island, Indonesia).

Material studied: 19 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 277 HG; Ti 244. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 277 HG; Ti 244bis.

Adults: 772 ± 204.2 (507-1200) long, 97 ± 23.9 (57-140) wide at the level of the penis. Pharynx: 40 ± 6.4 (27-50) wide. Large dorsal gripus with blade bent at distal

third and poorly marked guard: a = 107 ± 7 (90-119), b = 91 ± 5.8 (78-100), c = 2 ± 0.6 (1-3), d = 21 ± 1.9 (17-24), e = 43 ± 3 (37-49). Large and slightly curved cuneus with very short extension: L = 37 ± 2.3 (31-41), l = 10 ± 1 (7-12), e = 3 ± 1.3 (1-7). Strong and straight dorsal transverse bar: x = 42 ± 1.6 (39-45), w = 5 ± 0.5 (3-6). Ventral gripus with narrow aperture and poorly marked guard: a = 33 ± 0.9 (31-35), b = 27 ± 0.9 (25-29), c = 1 ± 0.4 (1-2), d = 10 ± 0.8 (8-12), e = 17 ± 1.1 (14-19), L = 6 ± 0.8 (4-8), l = 1 ± 0.2 (1-2). Long V-shaped ventral transverse bar: x = 43 ± 2 (40-47), w = 3 ± 0.5 (3-4). Thin uncinuli II = 15 ± 1 (13-17), uncinuli I and III to VII = 16 ± 3.4 (8-21). Thin curved penis with a poorly marked basal bulb, directly attached to a cupule-like structure (24 ± 2.4 (20-28) at its width), no visible heel: Pe = 69 ± 5.4 (52-77). Sinuous accessory piece linked to the cupule-like structure near to the penis attachment: Ap = 66 ± 10 (45-81). Thin and sinuous vagina, one extremity turned inside out: L = 23 ± 3.1 (18-29), l = 1 ± 0.2 (1-1).

Comments

T. durandi n. sp. belongs to the group characterised by the presence of a cupule-like structure to which the penis is attached. This new species is easily distinguishable by the size of dorsal haptorial sclerotised pieces (e.g. dorsal gripus a = 107 µm and cuneus L = 37 µm), largest sizes observed in this group.

The name *Thaparocleidus durandi* n. sp. is proposed in honour of Dr Jean-René Durand, fish biologist from IRD (ex ORSTOM).

THAPAROCLEIDUS *LEBRUNAE* N. SP. (Fig. 7A, B)

Type host: *Pangasius micronema* Bleeker, 1847.

Site: gills.

Type locality: Rajang River at Sibul (Sarawak State, Borneo Island, Malaysia).

Other records: found on the same host in the Kapuas River at Sintang (East Kalimantan Province, Borneo Island, Indonesia), in the Batang Hari River at Muara Tebo (Jambi Province, Sumatra Island, Indonesia) and on *Pangasius polyuranodon* (only two individuals among 988 collected, see Pariselle *et al.*, 2004b and "Conclusions" below) in the Barito River at Buntok (Central Kalimantan Province, Borneo Island, Indonesia).

Material studied: 20 individuals fixed and mounted in Malmberg solution.

Type material: holotype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 278 HG; Ti 245. Paratype deposited in the Muséum National d'Histoire Naturelle (Paris): n° 278 HG; Ti 245bis.

Adults: 616 ± 101.6 (446-782) long, 96 ± 21.8 (64-132) wide at the level of the penis. Pharynx: 43 ± 7 (32-57) at its width. Dorsal gripus with blade bent at distal third and marked guard: a = 47 ± 2 (43-51), b = 38 ± 2

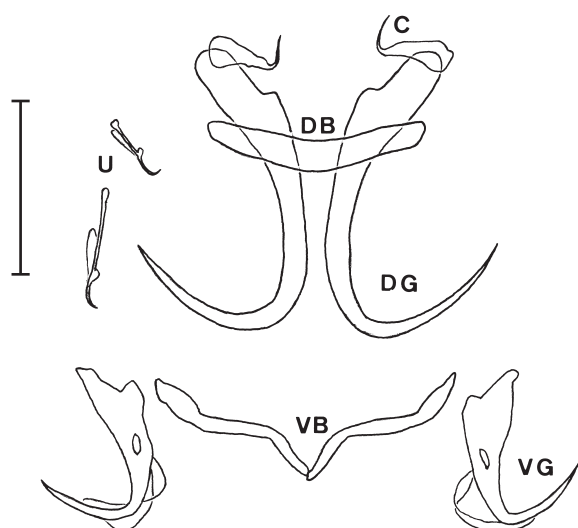


Fig. 7A. – *Thaparocleidus lebrunae* n. sp. C = cuneus; DB = dorsal transverse bar; DG = dorsal gripus; VB = ventral transverse bar; VG = ventral gripus; U = uncini. Bar = 30 μ m.

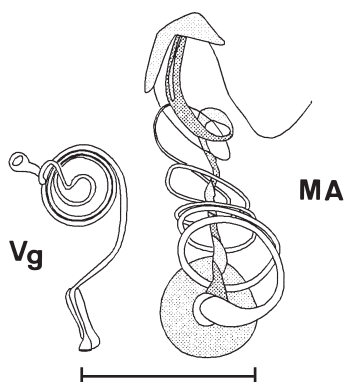


Fig. 7B. – *Thaparocleidus lebrunae* n. sp. MA = male apparatus; Vg = vagina. Bar = 30 μ m.

(33-42), $c = 1 \pm 0.4$ (1-3), $d = 12 \pm 1$ (10-14), $e = 25 \pm 1.1$ (23-28). Small cuneus with thin extension: $L = 10 \pm 0.9$ (8-12), $l = 4 \pm 0.6$ (3-5), $e = 6 \pm 1.3$ (3-8). Slightly V-shaped dorsal transverse bar: $x = 34 \pm 1.9$ (30-37), $w = 5 \pm 0.7$ (4-6). Ventral gripus with small aperture and guard: $a = 26 \pm 1$ (25-29), $b = 21 \pm 0.9$ (20-23), $c = 1 \pm 0.3$ (1-2), $d = 8 \pm 0.7$ (7-10), $e = 16 \pm 1$ (13-17), $L = 3 \pm 0.5$ (2-4), $l = 1 \pm 0.4$ (1-2). V-shaped ventral transverse bar: $x = 29 \pm 1.6$ (26-33), $w = 4 \pm 0.5$ (3-4). Thin uncini II = 15 ± 1.5 (11-18), uncini I and III to VII = 17 ± 3.6 (9-22). Long, thin and spirally coiled penis (4-5 turns) attached to a cupule-like structure (diameter = 19 ± 2.2 (16-23)): $Pe = 271 \pm 20.2$ (231-304). Long and thin accessory piece, two first third straight and shape as a screw with a large thread, linked by a loop to the last third, this part, C-shaped and stronger with a gutter depression, is topped by a thin piece, the accessory piece is attached near to the basal bulb of the penis: $Ap = 66 \pm 5.3$ (56-75). Long,

thin and spirally coiled (3 turns) vagina: $L = 142 \pm 15.9$ (113-176), $l = 1 \pm 0.2$ (0.8-1.3).

Comments

T. lebrunae n. sp. belongs to the group with spirally coiled penis attached to a cupule-like structure: *T. brevicochleus* Pariselle, Lim & Lambert, 2001; *T. kapuasensis* Pariselle, Lim & Lambert, 2001; *T. euzeti* Pariselle, Lim & Lambert, 2002; *T. levangi* Pariselle, Lim & Lambert, 2004; *T. slembroucki* Pariselle, Lim & Lambert, 2004; *T. portentosus* n. sp. and *T. rukyanii* n. sp. In this group only two species also possess a spirally coiled vagina (*T. euzeti* and *T. portentosus*). *T. lebrunae* n. sp. could be easily distinguished by the number of turns described by the penis (4-5 vs. 35 for both *T. euzeti* and *T. portentosus*).

The name *Thaparocleidus lebrunae* n. sp. is proposed to acknowledge Dr. Nathalie Le Brun who helped in drawing the figures.

CONCLUSIONS

The only two *T. lebrunae* n. sp. individuals found on *P. polyuranodon* are morphologically similar to those collected from *P. micronema*, but their measurements are always (genitalia and haptor) smaller. As no *P. micronema* could be sampled in the same location nothing could be concluded about their specific identity (lateral transfer, rare sister species?).

T. brevicochleus and *T. sinespinae*, initially recorded only from Kalimantan (South part of Borneo Island) on *P. humeralis* (the two parasite species) from Kapuas River and on *P. polyuranodon* (*T. brevicochleus* only) from the Barito River, were found on *P. micronema* from all the sampled rivers (Sumatra, North and South parts of Borneo Island) (nobis). As the host species are not closely related (see Pouyaud *et al.*, 2000) and as the locations are distant and well separated, we cannot conclude anything about their specific identity (lateral transfer or inheritance from ancestor?).

As all the parasitic species from *P. micronema* quoted in this paper were recorded from all the locations (North and South Borneo, Central Sumatra) without evidence of morphometrical differences; we may conclude that the isolation of host populations is not ancient (Isolation of host populations is effective as *P. micronema* is strictly from freshwater and as rivers from North and South Borneo are not connected). Otherwise, we would probably have found differences among parasitic populations (see "Conclusions" in Pariselle *et al.*, 2002b).

The present six new species bring the number of monogenean parasitic species described on 19 species of pangasiids (*P. bocourti*, *P. djambal*, *P. elongatus*, *P. gigas*, *P. humeralis*, *P. hypophthalmus*, *P. kinabatanganensis*, *P. krempfi*, *P. kunyit*, *P. lithostoma*, *P. mabakamensis*,

P. mekongensis, *P. micronema*, *P. nasutus*, *P. nieuwenhuisii*, *P. pangasius*, *P. polyuranodon*, *P. rheophilus* and *P. sababensis*) to 46.

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