DOI: 10.2478/s11686-014-0213-7

Acta Parasitologica, 2014, 59(1), 91–97; ISSN 1230-2821

VERSITA

A new species of *Unilatus* (Platyhelminthes: Monogenoidea) from the gills of *Leporacanthicus galaxias* Isbrücker et Nijssen (Siluriformes: Loricariidae) from Brazil

Bárbara Branches[1] and Marcus V. Domingues[1]*

[1]Laboratório de Sistemática e Coevolução, Universidade Federal do Pará, Campus Universitário de Bragança, Instituto de Estudos Costeiros; Travessa Leandro Ribeiro, s/n, bairro Aldeia, 68600–000, Bragança, Pará, Brazil

Abstract

Unilatus irae sp. nov. (Dactylogyridae) is described from the gills of the armored catfish, *Leporacanthicus galaxias* Isbrücker et Nijssen (Loricariidae: Ancistrinae), from Guamá river, Pará State, Brazil. The new species can be differentiated from its congeneners by the combination of the following features: anterior anchor with well-developed superficial root, inconspicuous deep root, shaft bent at midpoint, forming angle of approximately 60º, evenly short curved point; posterior anchor with inconspicuous roots, sclerotized cap of base with small protuberance for articulation to posterior bar; evenly curved shaft and short point; anterior bar broadly V-shaped, with small posteromedial projection; and posterior bar anteriorly expanded on it midportion, with expanded ends slightly curved in posterior direction.

Keywords

Monogenoidea, Dactylogyridae, *Unilatus irae* sp. nov., Siluriformes, *Leporacanthicus galaxias*

Introduction

Loricariids are endemic to rivers from the Neotropical region and represent the largest family of siluriform fish with approximately 800 known species (¼ of the diversity of the Siluriformes) (Nelson 2006, Armbruster 2011). However, despite of this diversity, only 4% of the loricariids species have been investigated for monogenoidean parasites. Thirty species of monogenoids are known parasitizing suckermouth armored catfishes: Seventeen species reported from the body surface (7 of *Aglaigyrodactylus*, 1 of *Hyperopletes*, 3 of *Nothogyrodactylus*, 2 of *Onychogydactylus*, 1 of *Oogyrodactylus*, 1 of *Phanerothecioides*, and 2 of *Phanerothecium*), and the remaining species described from the gills (2 of *Demidospermus*, 1 of *Heteropriapulus*, 1 of *Paranaella*, 4 of *Trinigyrus* and 5 of *Unilatus*) (Table I).

Unilatus was proposed by Mizelle and Kritsky (1967) to accommodate their new species, *Unilatus unilatus* Mizelle et Kritsky, 1967, from the gills of *Plecostomus* sp. (= *Hypostomus* sp.) obtained from the Steinhart Aquarium, California, U.S.A. and, according the authors, the host specimens were collected from the Amazon river Basin. The genus was characterized by having both pairs of anchors in the dorsal position compared with other dactylogyrids (i.e., one pair dorsal, one pair ventral). Price (1968) proposed *Diaccessorius* Price, 1968 to accomodate *D. anoculus* Price, 1968 described from the gills of *Hypostomus bolivianus* Pearson from the Bolivian Amazonia. The most important diagnostic features for *Diaccessorius* included: the presence of two accessory pieces, and the absence of eyespots. Mizelle *et al.* (1968) redescribed *U. unilatus* and described *U. brittani* Mizelle, Kritsky et Crane, 1968 from the gills of *Plecostomus* sp. from Amazon river Basin, Brazil. Molnar *et al*. (1974) registered the occurrence of *U. unilatus* from the gills of *Hypostomus robinii* Valenciennes in Talparo River near Talparo, Trindad and Tobago. Suriano (1985) redescribed *U. brittani*, and described four new species: *U. brevispinus* Suriano, 1985 and *U. longispinus* Suriano, 1985 from the gills of *Pterigoplichthys multiradiatus* Hancock, *U. dissimilis* Suriano, 1985 from the gills of *Hemiancistrus* sp., and *U. scaphirhynchae* Suriano, 1985 from the gills of *Hemiancistrus scaphirhynchae* (= *Dekeyseria scaphirhyncha* [Kner]) collected from Negro river, Manaus, Brazil, and considered *Diaccessorius* a junior synonym of *Unilatus* based on

*Corresponding author: mvdomingues@ufpa.br

Table I. List of host species, parasite species, site and references. *Agla*. = *Aglaigyrodactylus*, *Demi*. = *Demidospermus*, *Hete*. = *Heteropriapulus*, *Hype*. = *Hyperopletes*, *Noth*. = *Nothogyrodactylus*, *Onyc*. = *Onychogyrodactylus*, *Oogy*. = *Oogyrodactylus*, *Para*. = *Paranaella*, *Phan*. = *Phanerothecium*, *Phane*. = *Phanerothecioides*, *Trin*. = *Trinigyrus*, *Unil*. = *Unilatus.* G = gills, BS = body surface

Host	Parasite	Site	Reference
Acanthicus hystrix	*Trin. acuminatus*	G	Kritsky *et al.* 1986
Ancistrus multispinis	*Onyc. hydaticus*	BS	Kritsky *et al*. 2007
	Onyc. sudis	BS	Kritsky *et al.* 2007
Ancistrus sp.	*Noth. amazonicus*	BS	Kritsky and Boeger 1991
	Noth. clavatus	BS	Kritsky and Boeger 1991
	Noth. plaesiophallus	BS	Kritsky and Boeger 1991
Dekeyseria scaphirhyncha	*Unil. scaphirhynchae*	G	Suriano 1985
Farlowella amazonum	*Oogy. farlowellae*	BS	Harris 1983
Hemiancistrus sp.	*Unil. dissimilis*	G	Suriano 1985
Hypoptopoma thoracatum	*Trin. tentaculoides*	G	Kritsky *et al.* 1986
Hypostomus bolivianus	*Unil. anoculus*	G	Price 1968
H. iheringii	*Unil. unilatus*	G	Zica *et al*. 2012
H. punctatus	*Phan. spinatus*	BS	Boeger *et al.* 1994
H. regani	*Para. luquei*	G	Kohn *et al.* 2000
	Unil. unilatus	G	Zica *et al.* 2012
H. robinii	*Trin. hypostomatis*	G	Hanek *et al.* 1974
	Unil. unilatus	G	Molnar *et al.* 1974
H. strigaticeps	*Unil. unilatus*	G	Zica *et al.* 2012
Hypostomus sp.	*Hete. heterotylus*	G	Jogunoori *et al.* 2004, Kritsky 2007
	Para. luquei	G	Kohn *et al.* 2000
	Phane. agostinhoi	BS	Kritsky *et al.* 2007
	Unil. brittani	G	Suriano 1985
Kronichthys lacerta	*Agla. forficulatus*	BS	Kritsky *et al.* 2007
Loricaria anus	*Demi. anus*	G	Suriano 1983
Loricariichthys platymetopon	*Demi. paranaensis*	G	Ferrari-Hoeinghaus *et al.* 2010
Pareiorhaphis parmula	*Agla. conei*	BS	Kritsky *et al.* 2007
	Agla. ctenistus	BS	Kritsky *et al.* 2007
	Agla. salebrosus	BS	Kritsky *et al*. 2007
Plecostomus plecostomus	*Phan. harrisi*	BS	Kritsky and Boeger 1991
Plecostomus sp.	*Unil. brittani*	G	Mizelle *et al*. 1968
	Unil. unilatus	G	Mizelle and Kritsky 1967
Pseudotothyris obtusa	*Agla. guttus*	BS	Kritsky *et al.* 2007
Pterygoplichthys anisitsi	*Unil. unilatus*	G	Mendoza-Palmero *et al.* 2012
	Unil. brittani	G	Mendoza-Palmero *et al*. 2012
Pterygoplichthys pardalis	*Heteropriapulus* sp.	G	Mendoza Franco *et al.* 2012
Pterigoplichthys multiradiatus	*Unil. unilatus*	G	Suriano 1985
	Unil. brittani	G	Suriano 1985
Rhinelepis aspera	*Para. luquei*	G	Kohn *et al.* 2000
Rhineloricaria sp.	*Hype. malmbergi*	BS	Boeger *et al*. 1994
Schizolecis guntheri	*Agla. calamus*	BS	Kritsky *et al*. 2007
	Agla. forficuloides	BS	Kritsky *et al.* 2007
Squaliforma emarginata	*Trin. mourei*	G	Boeger and Jégu 1994

morphological similarities among species of both genera. Zica *et al.* (2012) reported *U. unilatus* from the gills of *Hypostomus iheringii* Regan, *H. regani* Ihering and *H. strigaticeps* Regan from the Chavantes reservoir, São Paulo, Brazil. Mendoza-Palmero *et al.* (2012) reported *U. unilatus* and *U. brittani* from the gills of *Pterygoplichthys anisitsi* Eigenmann et Kennedy

from the Peruvian Amazonia. These authors considered *U. longispinus* and *U. brevispinus* junior synonymy of *U. brittani* and *U. unilatus*, respectively, based on the morphology and morphometry of the haptoral structures and the copulatory complex.

In the present paper, a new species of *Unilatus* is described from the gills of *Lepracanthicus galaxias* from the Guamá River, Pará, Brazil.

Materials and Methods

Eight host specimens were collected by apnea diving in Guamá River, municipality of Capitão-Poço, Pará State, Brazil (01°34.465´S, 047°02.063´W) in August 2012. Gill arches were removed and placed in vials containing heated water (~65°C). Each vial was vigorously shaken and formalin was added to obtain a 5% solution. In the laboratory, the contents of each vial were examined under a dissecting microscope LEICA S6D and helminths were removed from the gills or sediment using small probes. Some specimens were stained with Gomori's trichrome (Humason 1979) and mounted in Canada balsam to determine internal soft structures and others were mounted in Gray and Wess medium (Humason 1979) for study of sclerotized structures. The measurements, all in micrometers, were made according to the procedures of Mizelle and Klucka (1953). Dimensions of organs and other structures represent the greatest measurement in dorsoventral view; lengths of curved or bent structures (anchors, bars, accessory piece, male copulatory organ) represent the straight line distances between extreme ends. The average measurement is followed by the ranges and the number (n) of specimens measured in parentheses. Illustrations were prepared with the aid of a drawing tube on a Leica DM 2500 microscope with differential interference contrast and phase contrast optics. Definitions of prevalence and mean intensity follow the definition of Bush *et al.* (1997). Type specimens and vouchers were deposited in the following collections: Invertebrate Collection of the Museu Paraense Emílio Goeldi (MPEG), Belém, PA Brazil; Helminthological Collection of the Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, RJ, Brazil; Invertebrate Collection of the Instituto de Pesquisas da Amazônia (INPA), Manaus, AM, Brazil; and the United States National Parasite Collection (USNPC), Beltsville, MD, USA. Host scientific names were validated according to FishBase (Froese and Pauly 2013). Basins and sub-basins nomenclature follow the Agência Nacional de Águas, Ministério do Meio Ambiente, Brazil (http://hidroweb.ana.gov.br/).

Results

Class Monogenoidea Bychowsky, 1937
Subclass Polyonchoinea Bychowsky, 1937
Order Dactylogyridea Bychowsky, 1937
Dactylogyridae Bychowsky, 1933

***Unilatus irae* sp. nov.** (Figs 1–9)

Type-host: *Leporacanthicus galaxias* Isbrücker et Nijssen (Siluriformes: Loricariidae).

Site: Gills.

Type-locality: Guamá River (North/Northeast Atlantic Basin; Meruu, Acará, Guamá sub-basin), municipality of Capitão-Poço, Pará State, Brazil (01°34.465´S, 047°02.063´W) in August, 27, 2012.

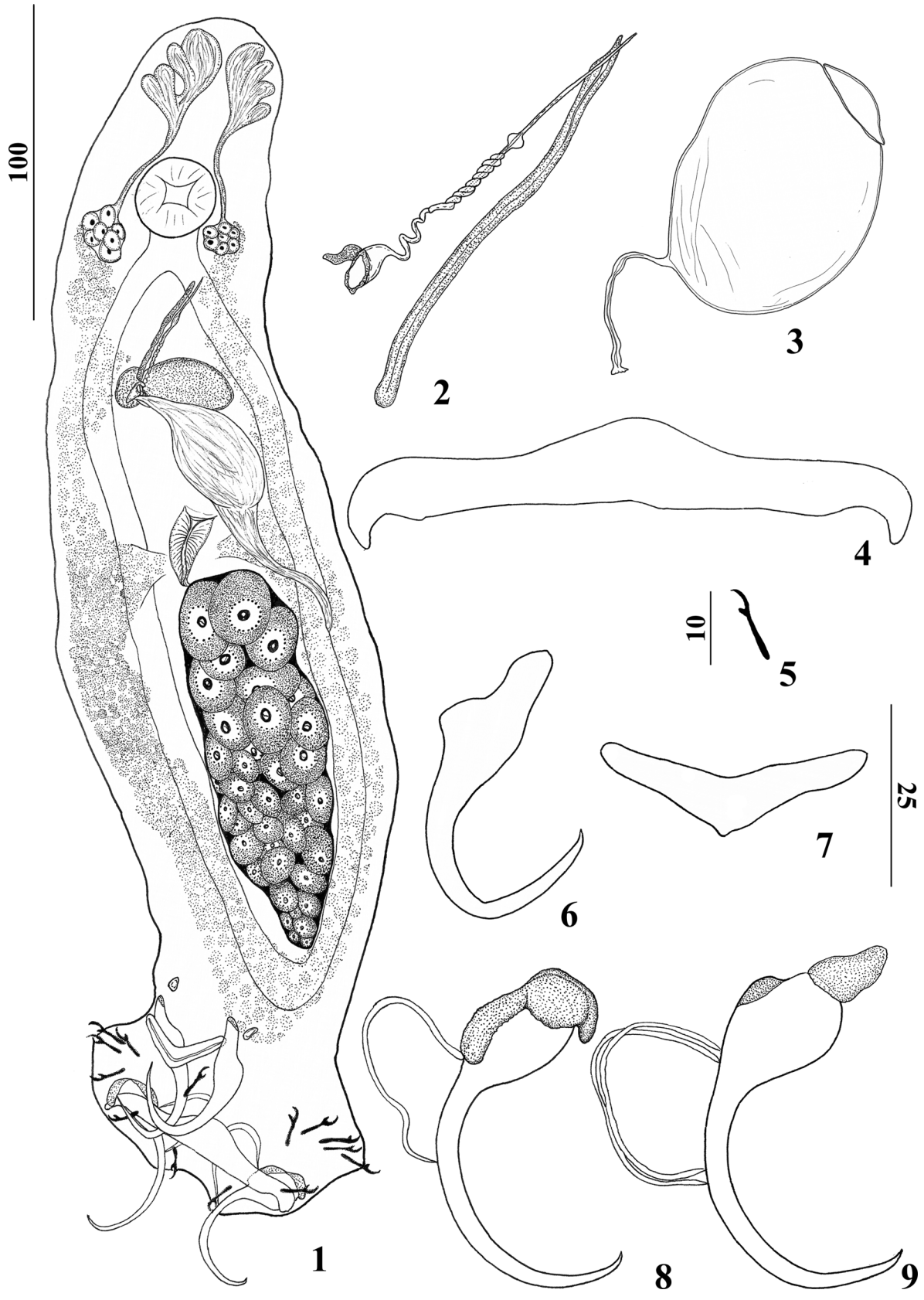
Prevalence: 62,5% of 8 hosts examined.

Mean intensity: 42,6 parasites per infected host.

Specimens studied: Holotype, CHIOC 37861a; 22 paratypes, CHIOC 37861b-k, MPEG 0033–0037, INPA 626a-f, USNPC 106993; 6 vouchers, CHIOC 37862, USNPC 106994–106995.

Etymology: The specific name is in honor of Dra. Maria Iracilda da Cunha Sampaio (Irá), Universidade Federal do Pará, Brazil, in recognition of her valuable work on the Amazonian Biodiversity and for sincere gratitude for helping the senior author with laboratory support when he came to work at the Universidade Federal do Pará.

Description (based on 37 specimens; 11 mounted in Gomori's trichrome, 26 mounted in Gray and Wess): Body fusiform, total length (excluding haptor) 353 (340–575; n = 4), 116 (110–125; n = 3) wide at level of germarium. Tegument smooth. Cephalic lobes poorly developed or absent; 3–4 pairs of head organs and cephalic glands posterolateral to pharynx. Eyes, pigment granules (eye-spots), absent. Mouth subterminal. Pharynx muscular, glandular, spherical to subspherical, 26 (23–29; n = 8) long, 23 (22–25; n = 8) wide; oesophagus short, intestinal caeca two, confluent posterior to germarium, lacking diverticula. Accessory structures (1 pair) associated with the peduncle (Fig. 1). Haptor hexagonal, 77 (70–80; n = 4) long, 87 (80–95; n = 7) wide. Anchors dissimilar, members of anterior pair with well-developed superficial root, inconspicuous deep root, shaft bent at midpoint, forming angle of approximately 60º, short point (Fig. 6), outer 32 (30–35; n = 16) long, inner 40 (37–44; n = 16), base 15 (14–17; n = 22). Posterior anchor with inconspicuous roots, sclerotized cap of base with small protuberance for articulation to posterior bar; evenly curved shaft and short point; anchor filament one or two (Figs 8–9), outer 41 (39–44; n = 17) long, inner 43 (41–47; n = 17), base 14 (12–17; n = 20) – excluding sclerotized cap. Anterior bar broadly V-shaped with small posteromedial projection (Fig. 7), 8 (8–10; n = 15) long, 34 (30–38; n = 13) wide. Posterior bar anteriorly expanded on it midportion, tapered ends, with or without projection, curved in posterior direction (Fig. 4), 11 (10–15; n = 24) long, 85 (82–95; n = 12) wide. Hooks similar in shape (Fig. 5), 12 (10–14; n = 21) long, shank without inflation, erect thumb, lightly curved long shaft, delicate point, filamentous hook loop (FH loop) not observed. Male copulatory organ sclerotized, spiral, counter clockwise, with approximately 13 rings, base with sclerotized cap, distal medial portion with small bulb, distal portion thin (Fig. 2), 66 (65–67; n = 4) long, non–articulated with accessory piece. Accessory piece 52 (40–68; n = 19),



Figs 1–9. *Unilatus irae* sp. nov.: **1** – composite, ventral view, **2** – copulatory complex, **3** – egg, **4** – posterior bar, **5** – hook, **6** – anterior anchor, **7** – anterior bar, **8–9** – posterior anchor. Scale bars: 1 = 100 µm; 2–4, ; 6–9 = 25 µm; 5 = 10 µm

with variable sheath, parallel to the male copulatory organ, distal portion, serving as guide to male copulatory organ. Gonads overlapping; testis dorsal to germarium, subspherical, 32 (27–40; n = 3) long, 30 (25–38; n = 3) wide; seminal vesicle, an expansion of vas deferens, sigmoid; prostatic reservoir oval with medial constriction. Germarium elongated, 109 (103–112; n = 3) long, 41 (36–47; n = 4) wide; Mehlis' gland, ootype not observed. Vagina muscular, vaginal canal with internal sclerotized wall. Vaginal pore medial, ventral, at level of the beginning of the seminal vesicle expansion. Vitelline follicles coextensive with gut, absent in regions of reproductive organs. Egg ovate elongated (Fig. 3), length – excluding filament – 69 (66–71; n = 2) long, 46 (41–52; n = 2) wide, with one short proximal filament, about ½ egg size.

Discussion

Several genera have been proposed for monogenoids from the gills of loricariid fishes (see Table I). Except the monotypic *Paranaella* Kohn, Baptista-Farias et Cohen, 2000 (Microcotylidae) from the gills of *Hypostomus* spp. and *Rhinelepis aspera* Spix et Agassiz, the other genera belong to the Dactylogyridae: *Demidospermus*, *Heteropriapulus*, *Trinigyrus* and *Unilatus*.

Unilatus is distinguished from other dactylogyrid genera occurring in loricariids by a combination of characters, including the morphology of the male copulatory organ (i.e., spiral, cork-screw like, with small bulb in the distal medial portion); absence of eyes; and the haptoral armaments (i.e., anchors, bars) with dorsal distribution.

Unilatus irae sp. nov. differs from *U. anoculus*, *U. dissimilis*, *U. scaphirhynchae*, and *U. unilatus* by having the anterior anchor with well-developed superficial root, inconspicuous deep root, shaft bent at midpoint, forming angle of approximately 60º, evenly short curved point. The new species resembles *U. brittani* in the general morphology of the anterior anchor. However, *Unilatus irae* sp. nov. differs from *U. brittani* in the comparative morphology of the anterior bar and posterior anchor/bar complex. The anterior bar is broadly V-shaped with small posteromedial projection in *U. irae* sp. nov. (Fig. 7), whereas the anterior bar has a short anteromedial projection in *U. brittani* (Mizelle *et al.* 1968: Figs 12–13, Mendoza-Palmero *et al.* 2012: Fig. 45). Suriano (1985) redescribed *U. brittani* as having Y-shaped anterior bar (Suriano 1985: Fig. 5). However, no specimen was available to confirm the feature reported by this author. The posterior bar is anteriorly expanded on it midportion, with expanded ends slightly curved in posterior direction in *U. irae* sp. nov. (Fig. 4), but it is tapered (Mizelle *et al.* 1968: Fig. 14) or flattened W-shaped with expanded ends (Suriano 1985: Fig. 4, Mendoza-Palmero *et al.* 2012: Fig. 44) in *U. brittani*. The posterior anchor has a shaft evenly curved in *U. irae* sp. nov. (Figs 8, 9), whereas it is strongly recurved near midlength in *U. brittani* (Mizelle *et al.* 1968: Fig. 11). Also, *Unilatus irae* sp. nov. differs morphometrically from *U. brittani*. The new species is

Table II. Comparative measurements (μm) of *Unilatus irae* sp. nov. and *U. brittani* Mizelle, Kritsky et Crane, 1968

	***Unilatus irae* sp. nov.**	***Unilatus brittani*[1]**	***Unilatus brittani*[2]**	***Unilatus brittani*[3]**
Body length	353 (340–575)	937 (870–1005)	650 (625–800)	–
Body width	116 (110–125)	102 (100–104)	175 (100–130)	–
Pharynx	26 (23–29) × 23 (22–25)	25 × 26	25 (24–27)	
Peduncle/haptor				
Length	77 (70–80)	87	–	–
width	87 (80–95)	87	–	–
Anterior anchor				
Length	40 (37–44)*	32 (31–34)	26 (25–30)	29 (27–32)
Base width	15 (14–17)	13 (12–14)	18 (16,5–19)	12 (11–13)
Posterior anchor				
Length	43 (41–47)*	30 (27–32)	31,5 (28–35)	30 (27–32)
Base width	14 (12–17)	10	6 (5–7)	8 (8–10)
Anterior bar	34 (30–38)	23 (22–24)	25 (24–26)	24 (20–28)
Posterior bar	85 (82–95)	61 (59–64)	62 (60–63)	64 (57–72)
Hook	12 (10–14)	13 (12–14)	14 (13–15)	12 (11–14)**
MCO	66 (65–67)	54 (52–55)	34 (33–35)	33 (30–37)
Accessory piece	52 (40–68)	40 (38–42)	44 (43–45)	24 (20–30)

[1]Mizelle *et al.* 1968; [2]Suriano 1985; [3]Mendoza-Palmero *et al.* 2012; *For *U. irae* sp. nov. the length of anchors is the outer measurement which represents the greatest distance extreme points; **Mendoza-Palmero *et al*. 2012 separated hook measure in five categories (i.e., hook pairs 1, 6; hook pair 2; hook pairs 3, 4; hook pair 5; hook pair 7). Hooks pair 7 is the only category which is different, 15 (14–19) (See Mendoza-Palmero *et al.* 2012)

smaller than *U. brittani*, however anchors, bars and copulatory complex of *U. irae* sp. nov. are slightly larger when compared with specimens of *U. brittani* (Table II).

Unilatus irae sp. nov. is characterized by having all hook pairs similar in shape (Fig. 5). Mendoza-Palmero *et al.* (2012) reported the presence of expanded shank and highly reduced thumb of hooks of pair 7 for specimens of *U. brittani* from *Pterygoplichthys anisits* (Mendoza-Palmero *et al.* 2012: Fig. 46). However, the original drawings of all hook pairs of *U. brittani* from *Plecostomus* sp. (Mizelle *et al.* 1968: Fig. 15) and *Hypostomus* sp. (Suriano 1985: Fig. 6) seem to be similar in shape, suggesting the existence of intraspecific variation among specimens of *U. brittani* and limiting the usefulness of this feature to distinguish *U. irae* sp. nov. from *U. brittani.*

Acknowledgements. We would like to thank A.R.O. Rodrigues, C.N. Silva, G.B. Soares, J. Muriel-Cunha and L. Araújo for assistance during the collecting trips; C. Chamon (Universidade de Brasília, Brazil), J. Muriel-Cunha (Universidade Federal do Pará, Brazil) and L.R. Py-Daniel (Instituto de Pesquisas da Amazônia, Brazil) for host identification; D.C. Kritsky (Idaho State University, USA) and P. Marcotegui (Universidad Nacional de La Plata, Argentina) for assisting with the location of literature; and D.C. Kritsky (Idaho State University, USA) and J.-M. Cunha (Universidade Federal do Pará, Brazil) for a presubmission review of the manuscript. We thank two anonymous reviewers for their contribution to this manuscript. This study was partially supported by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Programa Institucional de Apoio à Contratação de Doutores (PIAD) from the Universidade Federal do Pará.

References

Armbruster J.W. 2011. Global Catfish Biodiversity. *American Fisheries Society Symposium*, 77, 15–37.

Boeger W.A., Belmont-Jegú E. 1994. Neotropical Monogenoidea. 21. *Trinigyrus mourei* sp. n. (Dactylogyridae) from the gills of the Amazonian catfish *Hypostomus marginatus* (Loricariidae). *Amazoniana*, 13, 13–16.

Bush A.O., Lafferty K.D., Lotz J.M., Shostak A.W. 1997. Parasitology meets ecology on its own terms: Margolis *et al.* Revisited. *The Journal of Parasitology*, 83, 575–583.

Ferrari-Hoeinghaus A.P., Bellay S., Takemoto R. M., Pavanelli G. C. 2010. A new species of *Demidospermus* Suriano, 1983 (Monogenea, Dactylogyridae) parasitic on *Loricariichthys platymetopon* Isbrücker et Nijssen (Loricariidae, Siluriformes) from the Upper Paraná River floodplain, Brazil. *Acta Parasitologica*, 55, 16–19. DOI: 10.2478/s11686-010-0007-5

Froese R., Pauly D. 2013. *FishBase*. World Wide Web electronic publication. Available from: www.fishbase.org. (24 April 2013).

Hanek G., Molnar K., Fernando C.H. 1974. Three new genera of Dactylogyridae (Monogenea) from freshwater fishes of Trinidad. *Journal of Parasitology*, 60, 911–913.

Harris P.D. 1983. The morphology and life cycle of the oviparous *Oogyrodactylus farlowellae* gen et sp. nov. (Monogenea, Gyrodactylidea). *Parasitology*, 87, 405–420.

Humason G.L. 1979. Animal Tissue Techniques. W.H. Freeman Co., San Francisco, USA. 661 pp.

Jogunoori W., Kritsky D.C., Venkatanarasaiah J. 2004. Neotropical Monogenoidea. 46. Three new species from the gills of introduced aquarium fishes in India, the proposal of *Heterotylus* n. g. and *Diaphorocleidus* n. g., and the reassignment of some previously described species of *Urocleidoides* Mizelle and Price, 1964 (Polyonchoinea: Dactylogyridae). *Systematic Parasitology*, 58, 115–124.

Kohn A., Baptista-Farias M.F.D., Cohen S.C. 2000. *Paranaella luquei* gen. et sp. n. (Monogenea: Microcotylidae), a new parasite of Brazilian catfishes. *Folia Parasitologica*, 47, 279–283.

Kritsky D.C. 2007. *Heteropriapulus* nom. nov. (Monogenoidea: Dactylogyridae) for *Heterotylus* Jogunoori, Kritsky and Venkatanarasaiah, 2004, a junior homonym of *Heterotylus* Kirsch in Reitter, 1913 (Coleoptera: Curculionidae). *Systematic Parasitology*, 68, 233. DOI: 10.1007/s11230-007-9111-9.

Kritsky D.C., Boeger W.A. 1991. Neotropical Monogenea. 16. New species of oviparous Gyrodactylidea with proposal of *Nothogyrodactylus* gen. n. (Oogyrodactylidae) *Journal of the Helminthological Society of Washington*, 58, 7–15.

Kritsky D.C., Boeger W.A., Thatcher V.E. 1986. Neotropical Monogenea. 9. Status of *Trinigyrus* Hanek, Molnar and Fernando, 1974 (Dactylogyridae) with descriptions of two new species from loricariid catfishes from the Brazilian Amazon. *Proceedings Biological Society Washington*, 99, 392–398.

Kritsky D.C., Vianna R.T., Boeger W.A. 2007. Neotropical Monogenoidea. 50. Oviparous gyrodactylids from loricariid and pimelodid catfishes in Brazil, with the proposal of *Phanerothecioides* n. g., *Onychogyrodactylus* n. g. and *Aglaiogyrodactylus* n. g. (Polyonchoinea: Gyrodactylidea). *Systematic Parasitology*, 66, 1–34. DOI: 10.1007/s11230-006-9053-7.

Mendoza-Franco E.F., Caspeta-Mandujano J.M., Salgado-Maldonado G. 2012. Primer reporte de *Heteropriapulus* sp. (Platelmintos, Monogenoidea) infectando al pez diablo *Pterygoplichthys pardalis* (Siluriformes, Loricariidae) introducido en la cuenca del Rio Lacantún de la Reserva de la Biosfera Monte Azules, Chiapas, México. *Jaina*, 23, 1–6.

Mendoza-Palmero C.A., Scholz T., Mendoza-Franco E.F., Kuchta R. 2012. New Species and Geographical Records of Dactylogyrids (Monogenea) of Catfish (Siluriformes) from the Peruvian Amazonia. *Journal of Parasitology*, 98, 484–497. DOI: 10.1645/GE-2941.1

Mizelle J.D., Klucka A.R. 1953. Studies on monogenetic trematodes. XVI. Dactylogyridae from Wisconsin fishes. *American Midland Naturalist*, 49, 720–733.

Mizelle J. D., Kritsky D.C. 1967. *Unilatus* gen. n., a unique Neotropical genus of Monogenea. *Journal of Parasitology*, 53, 1113–1114.

Mizelle J.D., Kritsky D.C., Crane J.W. 1968. Studies on Monogenetic Trematodes XXXVIII. Ancyrocephalinae from South America with the proposal of *Jainus* gen. n. *American Midland Naturalist*, 80, 186–198.

Molnar K., Hanek G., Fernando C.H. 1974. Ancyrocephalids (Monogenea) from freshwater fishes of Trinidad. *Journal of Parasitology*, 60, 914–920.

Nelson J.S. 2006. Fishes of the World. 4th. John Wiley and Sons, Inc. Hoboken, New Jersey, USA, 601 pp.

Price CH.E. 1968. *Diaccessorius*, a new genus of Monogenea from the gills of an Amazon river teleost. *Acta Biologica Venezuelica*, 6, 84–89.

Suriano D.M. 1983. *Demidospermus anus* gen. nov. sp. nov. (Monogenea: Ancyrocephalinae) parasita branquial de *Loricaria (L) anus* Valenciennes, 1840 (Pisces: Loricariidae) de la Laguna de Chascomus, Provincia de Buenos Aires, Republica Argentina. *Neotropica*, 29, 169–172.

Suriano D.M. 1985. El genero *Unilatus* Mizelle y Kritsky, 1967. (Monogenea: Ancyrocephalidae) parasite de Siluriformes (Pisces: Loricariidae) del Rio Negro, Manaus, Brasil. *Neotropica*, 31, 163–175.

Zica E.O.P., Abdallah V.D., De Azevedo R.K., Wunderlich A.C., Carvalho E.D., Silva R.J. 2012. *Unilatus unilatus* Mizelle and Kritsky, 1967 (Monogenea, Ancyrocephalinae) in *Hypostomus* spp. (Siluriformes, Loricariidae) from the Chavantes reservoir, São Paulo State, Brazil. *Helminthologia*, 49, 87 – 91.

Received: June 13, 2013
Revised: August 6, 2013
Accepted for publication: December 30, 2013