Hyphessobrycon platyodus (Teleostei: Characiformes), a new species from the Rio Madeira basin, Brazil, with comments on how multicuspid teeth relate to feeding habits in Characidae

Article *in* Journal of Fish Biology · July 2017

DOI: 10.1111/jfb.13383

3 authors:

Willian M. Ohara
Federal University of Amazonas
59 PUBLICATIONS **662** CITATIONS
SEE PROFILE

Vitor Abrahão
19 PUBLICATIONS **115** CITATIONS
SEE PROFILE

Vinicius Espindola
University of São Paulo
4 PUBLICATIONS **45** CITATIONS
SEE PROFILE

Journal of FISH BIOLOGY

Journal of Fish Biology (2017)
doi:10.1111/jfb.13383, available online at wileyonlinelibrary.com

Hyphessobrycon platyodus (Teleostei: Characiformes), a new species from the Rio Madeira basin, Brazil, with comments on how multicuspid teeth relate to feeding habits in Characidae

W. M. Ohara*, V. P. Abrahão and V. C. Espíndola

Museu de Zoologia da Universidade de São Paulo, Ictiologia Caixa Postal 42494, 04218–970, São Paulo, SP, Brazil

urn:lsid:zoobank.org:pub:9DCE008E-51FC-4891-9D20-08AA0A54FDDC

(Received 14 November 2016, Accepted 19 June 2017, Published online 26 July 2017)

A new species of *Hyphessobrycon* is described from the Rio Juma, a tributary of the lower Rio Aripuanã–Rio Madeira basin, Amazonas, Brazil. *Hyphessobrycon platyodus* can be distinguished from its congeners by the: presence of an elongated dorsal fin in adult males, 25–28 branched anal-fin rays and absence of dark blotches from the dorsal fin and caudal peduncle. The presence of multicuspid teeth in species of Characidae and its relation with feeding habits are briefly commented on.

Key words: Amazon; endemism; *Hyphessobrycon loweae*-group; sexual dimorphism; tooth cusps.

INTRODUCTION

Hyphessobrycon Durbin 1908 is one of the most species-rich genera of small characid fishes, comprising 143 species currently considered valid (Ohara & Lima, 2015; Teixeira *et al.*, 2016; Lima & Flausino, 2016; Pastana & Ohara, 2016). Species of the genus are widely distributed from southern México to the Río de La Plata in Argentina (Lima *et al.*, 2003), with its highest species richness occurring in the Amazon Basin (Ohara & Lima, 2015). *Hyphessobrycon* can be diagnosed by a combination of non-exclusive characters rearranged by Eigenmann (1917), which are: lateral line incomplete; premaxillary teeth in two series with an inner series of five teeth; second suborbital (=third infraorbital *sensu* Weitzman, 1962) not in contact with the preopercle ventrally; few maxillary teeth; naked caudal fin and the adipose fin present.

There are currently 12 species of *Hyphessobrycon* listed from the Brazilian portion of Rio Madeira basin (Lima *et al.*, 2013). This number continues to increase, however, as new species are regularly described (Ohara & Lima, 2015; Pastana & Ohara, 2016; Ohara *et al.*, 2017). Furthermore, recent fieldwork in the middle portions of the Rio Madeira basin in Amazonas State has yielded additional undescribed species that fit the current definition of *Hyphessobrycon*, suggesting that the real diversity of *Hyphessobrycon* in the Brazilian portion of Rio Madeira basin is far from completely described.

---

*Author to whom correspondence should be addressed. Tel.: +55 11 2065 8119; email: willianmohara@gmail.com

The main goal of the present contribution, therefore, is to describe one of these species recently collected and provide comments on teeth morphology and feeding habits in Characidae.

MATERIALS AND METHODS

Meristics follow Fink & Weitzman (1974), except for the number of horizontal scale rows below the lateral line, which were counted to the pelvic-fin insertion (excluding the axillary scale). Morphometrics also follow Fink & Weitzman (1974) with the addition of the distance from pelvic-fin origin to anal-fin origin. Standard length (L_S) is given to the nearest mm and all other measurements are expressed as percentages of L_S, except subunits of the head, which are expressed as percentages of head length (L_H). In the description, counts are followed by their absolute frequency in parentheses. The asterisks indicate counts of the holotype. The *circuli* and *radii* of the scale were counted from the scale row immediately dorsal to the lateral line at the vertical through the dorsal-fin origin. Counts of supraneurals, branchiostegal rays, gill-rakers of the first branchial arch, tooth cusps, diminutive dentary teeth, unbranched anal fin rays, procurrent caudal fin rays and position of pterygiophores were taken from cleared and stained (c&s) specimens, prepared according to Dingerkus & Uhler (1977) and Taylor & Van Dyke (1985). The vertebrae of the Weberian apparatus were counted as four precaudal elements and the compound caudal centrum (PU1+U1) as a single caudal element. The precaudal vertebral counts include both the Weberian apparatus and vertebrae lacking haemal spines. Caudal vertebral counts include all vertebrae with haemal spines. Catalogue numbers are followed by the total number of specimens and their L_S range. The number of c&s specimens is given in parentheses, followed by their respective L_S range. Sexual dimorphism was confirmed by sexing individuals *via* direct examination of their gonads and by the shape of their anal and, or dorsal fins (see Sexual Dimorphism section). Specimens examined herein belong to the following institutions: (ANSP) Academy of Natural Science of Drexel University, Philadelphia; (INPA) Instituto de Pesquisas da Amazônia, Manaus; (MCP) Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul; (MNRJ) Museu Nacional da Universidade Federal do Rio de Janeiro, Rio de Janeiro; (MZUSP) Museu de Zoologia da Universidade de São Paulo, São Paulo; (ZUEC) Museu de Zoologia da Universidade Estadual de Campinas 'Adão José Cardoso', Campinas.

RESULTS

HYPHESSOBRYCON PLATYODUS NOV. SP.

Holotype

MZUSP 120555, male, 31·1 mm L_S, Rio Juma, tributary of Rio Aripuanã, Rio Madeira basin, Apuí town, Amazonas, Brazil, nearby the bridge on road BR 230 between Santo Antônio do Matupi (Vila dos 180) and Apuí, 7° 12′ 43″ S; 59° 55′ 18″ W; W. M. Ohara & V. P. Abrahão, 22 June 2015 (Figs 1 and 2).

Paratypes

All from Brazil, Amazonas State, Apuí town, Rio Aripuanã, Rio Madeira basin. MZUSP 117607 (21 specimens, 24·4–32·8 mm L_S, three specimens c&s, 24·4–26·6 mm L_S), INPA 53127 (six specimens, 24·7–29·9 mm L_S), ZUEC 13031 (six specimens, 26·3–29·4 mm L_S), collected with holotype. ANSP 200305 (20 specimens, 25·4–32·0 mm L_S), MCP 50785 (20 specimens, 25·1–31·1 mm L_S), MNRJ 48589 (20 specimens, 26·9–32·6 mm L_S), MZUSP 120938 (20 specimens,

FIG. 1. (a) *Hyphessobrycon platyodus*, holotype MZUSP 120555, 31·1 mm standard length (L_S), male; (b) paratype, MZUSP 117607, 28·4 mm L_S, female.

26·4–32·1 mm L_S), Rio Juma, 7° 16′ 45″ S; 59° 57′ 3″ W; Oyakawa *et al.*, 8 October 2016. MZUSP 120939 (11 specimens, 27·5–33·2 mm L_S), igarapé Mutum, tributary of Rio Juma, 7° 14′ 57″ S; 59° 58′ 41″ W; Oyakawa *et al.*, 8 October 2016.

Diagnosis

Hyphessobrycon platyodus differs from all congeners, except *Hyphessobrycon diastatos* Dagosta, Marinho & Camelier 2014, *Hyphessobrycon elachys* Weitzman 1985, *Hyphessobrycon heliacus* Moreira, Landim & Costa 2002, *Hyphessobrycon loweae*

FIG. 2. *Hyphessobrycon platyodus*, MZUSP 117607, male, paratype, immediately after capture.

Costa & Géry 1994, *Hyphessobrycon notidanos* Carvalho & Bertaco 2006, *Hyphessobrycon peugeoti* Ingenito, Lima & Buckup 2013, *Hyphessobrycon procyon* Pastana & Ohara 2016 and *Hyphessobrycon* spp. comprising the rosy-tetra group (*sensu* Weitzman & Palmer, 1997), by the presence of an elongated dorsal fin in adult males (*v.* dorsal fin not elongated). *Hyphessobrycon platyodus* differs from *Hyphessobrycon* species of the rosy-tetra group, by the absence of a conspicuous dark blotch on the dorsal-fin rays (*v.* dark dorsal-fin blotch present) and by the absence of an anal-fin lobe in adult males (*v.* anal-fin lobe present, formed by the posteriormost unbranched and anteriormost branched anal-fin rays, which are more elongate than remaining rays). *Hyphessobrycon platyodus* differs from *H. elachys, H. heliacus, H. loweae*, *H. peugeoti* and *H. procyon* by the absence of a caudal-peduncle blotch (*v.* caudal-peduncle blotch present) and from *H. notidanos* and *H. diastatos* by the presence of a higher number of branched anal-fin rays (24–27, *v.* 16–21 in *H. notidanos*; 15–18 in *H. diastatus*) and by the presence of chevron-like dark marking along of the body midline (*v.* chevron-like marking absent in *H. notidanos* and *H. diastatos*).

Description

Morphometric data of holotype and paratypes in Table I. Body compressed and moderately deep; greatest body depth slightly anterior to dorsal-fin origin. Dorsal profile of head convex from upper lip to vertical through posterior nostril; nearly straight from posterior nostril to tip of supraoccipital spine. Dorsal profile of the body slightly convex from supraoccipital spine to dorsal-fin origin; straight to slightly convex along dorsal-fin base; nearly straight from base of last dorsal-fin ray to adipose fin; concave along caudal peduncle. Ventral profile of head convex along the dentary; nearly straight along ventral portion of the head; convex from gular region to anal-fin origin; straight to slightly convex along anal-fin base; concave along caudal peduncle.

Mouth terminal. Posterior terminus of maxilla reaching vertical through anterior margin of orbit. Premaxillary teeth in two rows; outer tooth row with two (1) or three (3) pentacuspid teeth; inner row with five (3) tetra to octacuspid teeth, symphyseal tooth of inner series narrow and asymmetric. Tooth cusps of inner premaxillary row arranged in semicircular line, directed outward. Maxilla with two (1) or three (2) tetra- to heptacuspid teeth. Dentary with nine (1), 10 (1), or 11 (2) teeth, decreasing gradually from symphyseal tooth, four or five anterior hepta-pentacuspid teeth (Fig. 3). Cusps of large dentary teeth arranged in semicircular line, directed inward.

Scales cycloid, with six to 11 *radii*; *circuli* marked anteriorly, absent posteriorly. Lateral line slightly deflected downward and incompletely pored, with eight (4), nine* (21), or 10 (5) perforated scales and a total of 32 (2), 33 (11), 34 (13), or 35* (4) scales on longitudinal series. Longitudinal scale rows between dorsal-fin origin and lateral line five (30). Longitudinal scale rows between lateral line and pelvic-fin origin four * (30). Scales around caudal peduncle 11 (2) or 12* (28). Predorsal scales nine (1) or 10* (29). Caudal fin with scales restricted to its base.

Dorsal-fin rays ii, nine* (30). Dorsal-fin origin at mid-body of L_S, slightly posterior to vertical through pelvic-fin origin. First unbranched dorsal-fin ray half length, or less, than second. Adult males with elongated dorsal fin, reaching adipose-fin origin when adpressed (reaching area between adipose and caudal-fin origin in two specimens); first to third branched dorsal-fin rays longest. Adult females with dorsal fin not reaching adipose-fin origin. Base of last dorsal-fin ray at vertical through anal-fin origin. First dorsal-fin pterygiophore inserted behind neural spine of ninth (3) vertebra. Adipose fin

Table I. Morphometric data for holotype and paratypes of *Hyphessobrycon platyodus* ($n = 30$; 17 dimorphic males, 13 females and unsexed juveniles)

Characters	Holotype	Range	s.d.
Standard length (L_S; mm)	31·1	24·8–32·8	28·3
% L_S			
Depth at dorsal-fin origin	36·4	31·2–36·9	34·0 ± 1·6
Snout to dorsal-fin origin	51·0	46·6–54·1	50·9 ± 1·6
Snout to pectoral-fin origin	26·0	25·6–29.7	26·6 ± 1·3
Snout to pelvic-fin origin	45·9	38·5–47·2	44·3 ± 1·9
Snout to anal-fin origin	55·6	53·0–61·9	57·9 ± 1·9
Caudal-peduncle depth	10·3	9·1–13·8	10·1 ± 1·0
Caudal-peduncle length	11·6	9·0–13·3	11·6 ± 1·1
Pectoral-fin length	19·9	15·2–20·6	18·6 ± 1·6
Pelvic-fin length			
Males	20·6	14·8–21·1	18·6 ± 2·1
Females–immature	-	13·4–16·5	14·8 ± 1·2
Pelvic-fin origin to anal-fin origin	13·6	11·9–16·4	13·7 ± 1·2
Dorsal-fin-base length	13·8	10·5–15·0	13·2 ± 1·2
Dorsal-fin length			
Males	33·1	30·0–42·0	34·6 ± 2·9
Females–immature	-	22·9–31·4	28·3 ± 2·6
Dorsal-fin origin to caudal-fin origin	51·6	50·3–56.5	52·9 ± 1·7
Anal-fin base length	36·4	30·7–38·1	34·5 ± 1·9
Anal-fin length	13·6	12·4–18·3	16·3 ± 1·6
Posterior margin of eye to dorsal-fin origin	37·2	31·2–39·9	35·4 ± 1·9
Head length (L_H, mm)	25·0	23·9–26·9	25·6 ± 0·9
% L_H			
Horizontal length eye	44·5	40·0–46·9	42·7 ± 1·9
Snout length	20·3	16·3–24·3	20·5 ± 1·8
Least interorbital width	37·1	31·6–38·5	33·6 ± 1·7
Upper jaw length	47·5	42·8–49·6	45·8 ± 1·8

present. Anal-fin rays iv, 25 (9), 26 (10), 27* (9) or 28 (2). Distal margin of anal fin straight in males (17)*, decreasing gradually in length posteriorly, not forming a conspicuous lobe. Distal margin of anal fin with a conspicuous lobe in females, formed by last unbranched and first to seventh branched rays more elongated, remaining rays gradually decreasing in length posteriorly. First anal-fin pterygiophore inserted behind haemal spine of 15th (3) vertebra. Pectoral-fin rays i, nine (1) or 10* (29); tip of pectoral fin surpassing pelvic-fin origin. Pelvic-fin rays i, seven* (30); tip of pelvic fin surpassing third branched anal-fin ray in males. Pelvic fin of adult females and immature specimens slightly shorter in length, reaching the last unbranched anal-fin ray. Caudal-fin rays i, 9/8, i* (30). Caudal fin forked; upper and lower lobes similar in size. Dorsal procurrent caudal-fin rays and 10 (1) or 11 (2); ventral procurrent caudal-fin rays nine (3).

Branchiostegal rays four (3), three branchiostegal rays articulating with anterior ceratohyal and one with posterior ceratohyal. First gill arch with 14 (2) or 15 (1) gill rakers: four (2) or five (1) rakers on epibranchial, one (3) between epibranchial and

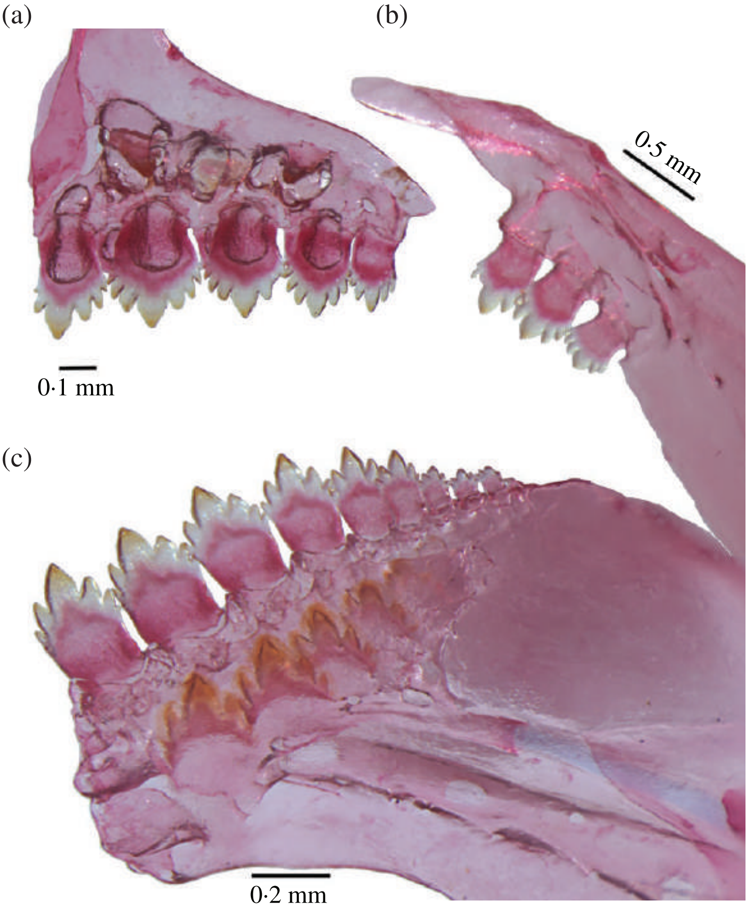

FIG. 3. *Hyphessobrycon platyodus*, medial view of the right-side (a) premaxilla, (b) dentary and (c) maxilla; MZUSP 117642, paratype, 25·4 mm standard length.

ceratobranchial, eight (3) on ceratobranchial, one (3) between ceratobranchial and hypobranchial and one (3) on hypobranchial. Vertebrae 34 (3); precaudal and caudal vertebrae 14 (3) and 20 (3) respectively. Supraneurals 4 (3).

Colour in alcohol

Overall ground colouration of head and body pale to light yellow. Dorsal portion of head and body dark from snout to caudal fin. Ventral portion of head and body with few scattered chromatophores. Small dark chromatophores densely concentrated on dorsal surface of premaxilla, anterior portion of maxilla, dentary, antorbital and first and second infraorbitals. Vertical black stripe across the middle portion of the eye. Opercle with high concentration of guanine and scattered dark chromatophores. Two or three first longitudinal series of scales bordered by dark pigmentation forming faint reticulated pattern, on dorsal portion of body. One humeral blotch present and conspicuous, slightly oriented at vertical, upper portion wider, located along second to fourth lateral line scales. Humeral blotch encompassing *c.* three to four scales horizontally and three to five vertically. Humeral blotch followed by a clear area and then by a pigmented area progressively fading posteriorly from vertical through sixth or seventh lateral line scale, over second or third longitudinal scales rows. Chromatophores at myosepta forming a narrow midlateral dark stripe formed by chromatophores at myosepta between hypaxial and epaxial bundle of muscles, anterior to dorsal-fin base. Dark chromatophores at midline along myomere junctions forming series of 16–22 transverse, anteriorly directed chevron-shaped bars, starting at vertical through dorsal-fin origin. Dark pigmentation concentrated along the entire length of anteriormost five dorsal-fin rays and interradial membranes; remaining rays with scattered chromatophores along their posterior margins and interradial membranes. Anal fin with chromatophores spread along its rays and interradial membranes; chromatophores more concentrated on distal portion of fin. Dark chromatophores scattered mainly over interradial membranes and rays of pectoral, pelvic and caudal fins (Fig. 1).

Colour in life

Based on photographs taken in the field of three specimens (Fig. 2). Males and females with similar colour pattern. Overall body colouration silver. Infraorbitals 2–5, opercle, preopercle and ventrolateral surface of midanterior portions of the body covered with guanine. Scattered red chromatophores on body, more concentrated on the ventrolateral portion. Upper lip and upper half of dentary faint yellow. Dorsal portion of eye red, lower portions silver. Dorsal, pelvic and anal fins with scattered red chromatophores concentrated on interradial membranes of all fin rays. Pectoral fin hyaline. Adipose fin with scattered red chromatophores. Caudal fin mainly hyaline with faint yellow chromatophores on dorsal and ventral portions. Humeral blotch conspicuous. Anteriorly directed chevron-shaped bars distinctly visible on live specimens.

Sexual dimorphism

Mature males possess a longer dorsal fin that results from a pronounced elongation of the last unbranched and first four branched dorsal-fin rays. Dorsal fin of sexually mature males, when depressed, reaching the adipose-fin origin (two specimens extending further posteriorly) [Fig. 1(a)]. Females and immature specimens do not exhibit an elongated dorsal fin, with it not reaching the adipose fin. Mature males with anal-fin margin straight, not forming a discernible lobe along the anterior portion [Fig. 1(a)]. Females exhibiting a discernible lobe on the anterior portion with the last unbranched and first five to seven branched anal-fin rays more elongated [Fig. 1(b)]. Additionally, mature males possess a longer pelvic fin, with its tip surpassing the third branched anal-fin ray when adpressed. Females and immature specimens exhibit a shorter pelvic, reaching up to the last unbranched anal-fin ray when depressed. Males apparently reach larger L_S than females (largest male 32·8 mm L_S, largest female 30·1 mm L_S). Bony hooks on fins, a common dimorphic feature among characids (Malabarba & Weitzman, 2003), is absent in all examined specimens. Colour pattern is not sexually dimorphic.

Etymology

The specific epithet *platyodus* derives from the Greek, *platy*, flat; *odon*, tooth, in allusion to the compressed teeth with many cusps, an unusual feature in *Hyphessobrycon*.

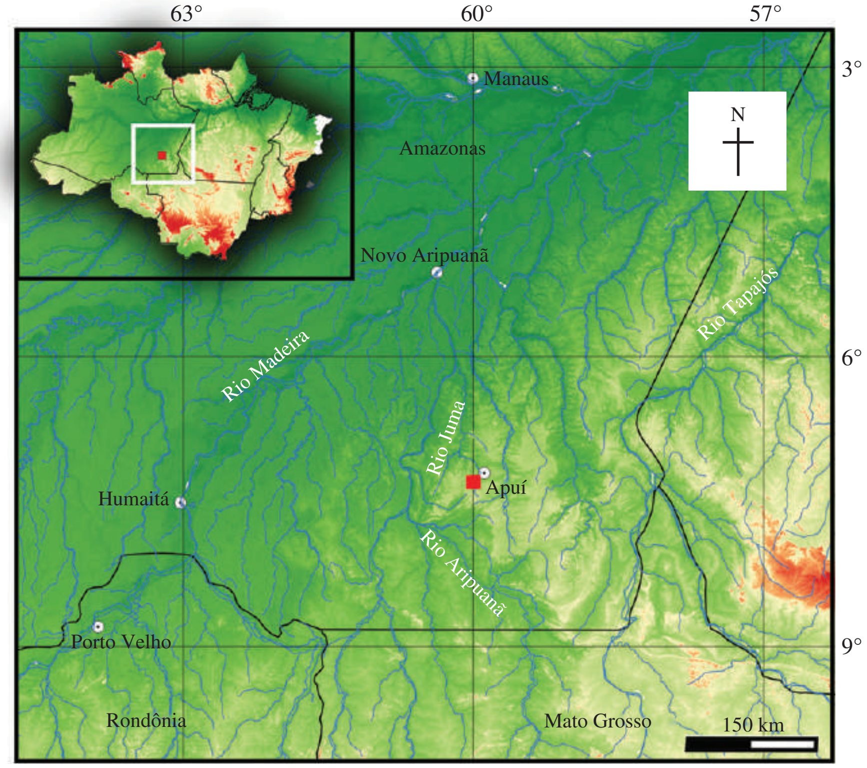

FIG. 4. Map showing the type locality (red square) of *Hyphessobrycon platyodus*, Rio Juma, a tributary from the Rio Aripuanã, Rio Madeira basin, Apuí, Amazonas, Brazil.

Distribution

Hyphessobrycon platyodus is known only from Rio Juma drainage, upstream of the Paredão Waterfall (7° 2′ 58·2″ S; 60° 3′ 4·9″ W), a tributary of the Rio Aripuanã, Rio Madeira basin, Apuí, Amazonas, Brazil (Fig. 4).

Ecological notes

The type-locality of *Hyphessobrycon platyodus* is 115 m above sea level. It is a clear water river that is *c.* 40 m wide and 0·5–2 m deep, with swift currents and a rocky bottom (Fig. 5). The river has little riparian vegetation near the town of Apuí. Syntopic species included *Ancistrus* sp., *Characidium* aff. *zebra* Eigenmann 1909, *Crenicichla pellegrini* Ploeg 1991, *Eigenmannia* gr. *trilineata* López & Castello, 1966, *Farlowella amazonum* (Günther 1864), *Gymnotus coropinae* Hoedeman 1962, *Helogenes marmoratus* Günther 1863, *H. procyon*, *Leporinus maculatus* Müller & Troschel 1844, *Moenkhausia comma* Eigenmann 1908, *Moenkhausia collettii* (Steindachner 1882), *Otocinclus mura* Schaefer 1997, *Pimelodella* cf. *howesi* Fowler 1940, *Poptella compressa* (Günther 1864), *Satanoperca jurupari* (Heckel 1840) and *Tatia dunni* (Fowler 1945). Stomach contents of the three (c&s) paratypes contained mostly vegetal matter (filamentous algae and macrophyte fragments) and a smaller proportion of unidentified insect fragments, nematodes and sediments.

FIG. 5. Type locality of *Hyphessobrycon platyodus.* Rio Juma, Rio Aripuanã drainage, Rio Madeira basin, Apuí, Amazonas, Brazil.

Conservation status

Hyphessobrycon platyodus is currently known only from the Rio Juma and it may have a very restricted distribution (see Discussion section). Considering, however, that no imminent threats to the species were detected in the area of its occurrence, *H. platyodus* would be classified as least concern (LC) according to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN, 2014).

DISCUSSION

The Rio Juma is a short river that extends *c.* 300 km from its headwaters in the eroded Planalto do Rio Juma, Médio Rio Sucunduri until Rio Aripuanã (IBGE, 2009). Near to the town of Apuí, the Rio Juma has many rapids and waterfalls which may function as barriers to fish dispersal (*sensu* Dias *et al.*, 2013) or ecological filters (*sensu* Torrente-Vilara *et al.*, 2011). Based on personal observations and interviews with local fishermen, the fish fauna above Paredão Waterfall, is only composed of small to medium size fishes (see above), with large species absent (≥300 mm L_S). A similar community shift was observed from the upper Rio Aripuanã above the Dardanelos and Andorinha waterfalls (10° 09′ 48·7″ S; 59° 27′ 26″ W) (Britski & Akama, 2011), where medium to large carnivores are naturally absent (W. M. Ohara pers. obs.). Despite intensive and broad collecting efforts in the Rio Madeira basin (Santos, 1996; Camargo & Giarrizzo, 2007; Rapp Py-Daniel *et al.*, 2007; Perin *et al.*, 2007; Araújo *et al.*, 2009; Torrente-Vilara *et al.*, 2011; Pedroza *et al.*, 2012; Queiroz *et al.*, 2013*a*,*b*; Casatti *et al.*, 2013; Vieira *et al.*, 2016; Costa *et al.*, 2017), *H. platyodus* was only collected in the Rio Juma, upstream of the Paredão Waterfall. Furthermore, surveys conducted in the upper Rio Aripuanã, near the town of Aripuanã since 1976 by various ichthyologists from several institutions (INPA, MNRJ, MZUSP and UFRO) and expeditions in the lower Rio Aripuanã (Rapp Py-Daniel *et al.*, 2007; Queiroz *et al.*, 2013*a*) failed to detect *H. platyodus* in localities other than the type locality. Although fish endemism has been primarily discussed with respect to the upper Rio Aripuanã (Kullander, 1995), other species with restricted distributions are also only known from the middle Rio Aripuanã (*i.e. Corydoras brittoi* Tecantt & Ohara 2016*, Corydoras gracilis* Isbrücker & Nijssen 1976*, C. pavanelliae* Tencatt & Ohara 2016, *C. zawadski* Tencatt & Ohara 2016*, Gladioglanis anacanthus* Rocha, de Oliveira & Rapp Py-Daniel 2008*, Hypostomus dardanelos* Zawadski & Hollanda 2014, *Jupiaba citrina* Zanata & Ohara 2009, *Myloplus zorroi* Andrade, Jégu & Giarrizzo 2016 and *Scoloplax baskini* Rocha, de Oliveira & Rapp Py-Daniel 2008 (*cf.* Tencatt & Ohara, 2016). Thus, there is an indication that endemic species are patchily distributed along the Rio Aripuanã, especially in the upper and middle portions.

Eighteen *Hyphessobrycon* species were previously recorded from the Rio Madeira basin: *Hyphessobrycon agulha* Fowler 1913, *Hyphessobrycon bentosi* Durbin 1908, *Hyphessobrycon copelandi* Durbin 1908, *Hyphessobrycon diancistrus* Weitzman 1977, *Hyphessobrycon eques* (Steindachner 1882), *Hyphessobrycon hasemani* Fowler 1913, *Hyphessobrycon megalopterus* (Eigenmann 1915), *H. sweglesi* (Géry 1961), *Hyphessobrycon dorsalis* Zarske 2014 (=*Hyphessobrycon* sp. 'falso *Microschemobrycon*' in Lima *et al.*, 2013), *Hyphessobrycon lucenorum* Ohara & Lima 2015, *Hyphessobrycon petricolus* Ohara, Lima & Barros 2017, *H. procyon*, *Hyphessobrycon nigricinctus* Zarske & Géry 2004, *Hyphessobrycon eschwartzae* García-Alzate, Román-Valencia & Ortega 2013, *Hyphessobrycon taphorni* García-Alzate, Román-Valencia & Ortega 2013 and three undescribed species (Lima *et al.*, 2013). *Hyphessobrycon platyodus* can be easily distinguished from the aforementioned species by having a unique combination of features: elongated dorsal fin in adult males (*v.* dorsal fin not elongated) and absence of a conspicuous dark blotch on dorsal-fin rays (*v.* dorsal-fin blotch present).

Hyphessobrycon platyodus shares some features with the species of *Hyphessobrycon loweae*-group (*sensu* Ingenito *et al.*, 2013; Pastana & Ohara, 2016), which include elongated dorsal fin in adult males, absence of bony hooks on the fin rays and a straight profile of the distal margin of the anal fin. Pastana & Ohara (2016) mentioned that, although tooth cusps are highly variable among Neotropical tetras, multiple tooth cusps (with several or more cusps) are an additional shared character for the *Hyphessobrycon loweae*-group. Additionally, the species assigned to the *H. loweae*-group exhibit sexually dimorphic live colouration (except, *H. moniliger* Moreira, Lima & Costa 2002). On the other hand, the large caudal-peduncle blotch and dimorphic colouration in life are lacking in *H. platyodus*. Thus, the inclusion of *H. platyodus* within the *Hyphessobrycon loweae*-group is uncertain and should be tested in a cladistic context.

As mentioned, *H. platyodus* has a tooth morphology similar to the *H. loweae*-group and analysis of the stomach contents of *H. platyodus*, *H. heliacus* (MZUSP 115299), *H. loweae* (MZUSP 118288) and *H. procyon* (MZUSP 117642) revealed a predominance of algae. Although there may be evolutionary convergence in the tooth morphology of phylogenetically unrelated species based on the use of similar food resources (Wootton, 1990). Shared tooth morphology can indicate shared feeding habits (Winemiller, 1992), as may be the case in *H. platyodus* plus species of the *Hyphessobrycon loweae*-group.

Dentary and premaxillary teeth with increased cusp number is an uncommon condition among *Hyphessobrycon*, *Hemigrammus* Gill 1858 and related small characid genera (Teixeira *et al.*, 2014). Few characids possess multicuspid and compressed teeth (frequently with seven or more cusps). Studies of feeding habits indicate that these characids share a similar diet, composed either primarily of algae (algivores) or secondarily of vegetal matter, as in *Deuterodon* spp. (Aranha *et al.*, 1998; Mazzoni & Rezende, 2003; Barreto & Aranha, 2006; Vitule *et al.*, 2008), *Iguanodectes* spp. (W. M. Ohara pers. obs.), *Hyphessobrycon kayabi* Teixeira, Lima & Zuanon 2014 (Teixeira *et al.*, 2014), *Jupiaba* spp. (Zanata & Lima, 2005; Birindelli *et al.*, 2009), *Myxiops aphos* Zanata & Akama 2004 (Zanata & Akama, 2004), *Piabucus melanostomus* Holmberg 1891 (Resende *et al.*, 1998) and *Serrapinus* spp. (Luiz *et al.*, 1998; Hahn & Loureiro-Crippa, 2006; Casatti *et al.*, 2003; Pelicice & Agostinho, 2006).

On the other hand, small characid species usually possess cylindrical teeth with few cusps (frequently three or five) on the upper and lower jaws (Teixeira *et al.*, 2014). The majority of species with few tooth cusps are predominantly insectivorous, herbivorous and omnivorous. These feeding habits have been found in *Astyanax* spp. (Hahn *et al.*, 1998; Hahn *et al.*, 2002; Bennemann *et al.*, 2005; Bennemann *et al.*, 2006; Manna *et al.*, 2012), *Bryconamericus* spp. (Casatti *et al.*, 2003; Novakowski *et al.*, 2008; Brandão-Gonçalves *et al.*, 2009; Rondineli *et al.*, 2011; Bonato *et al.*, 2012), *Bryconops* spp. (Sabino & Zuanon, 1998; Mérona *et al.*, 2001; Silva *et al.*, 2008), *Creagrutus* spp. (Ortaz *et al.*, 2006; Moraes *et al.*, 2013), *Hemigrammus* spp. (Sabino & Zuanon, 1998; Casatti *et al.*, 2003; Novakowski *et al.*, 2008; Ximenes *et al.*, 2011; Gonçalves *et al.*, 2013), *Hyphessobrycon* spp. (Casatti *et al.*, 2003; Graciolli *et al.*, 2003; Ximenes *et al.*, 2011), *Knodus moenkhausii* (Eigenmann & Kennedy 1903) (Ceneviva-Bastos & Casatti, 2007), *Moenkhausia* spp. (Hahn *et al.*, 1998; Esteves & Galetti, 1994; Casatti, 2002; Bennemann *et al.*, 2006; Santos *et al.*, 2009), *Piabina argentea* Reinhardt 1867 (Gomiero & Braga, 2008; Bonato *et al.*, 2012; Rondineli *et al.*, 2011) and *Jupiaba* spp. (Mendonça *et al.*, 2012; Zanata & Ohara, 2009).

As mentioned, most small characid species possess cylindrical teeth with few cusps, whereas few characids possess multicuspid and compressed teeth. Feeding habits in Characidae seem to be related to the number of tooth cusps: few cusps among omnivores and many cusps among algivores. According to Gibson (2015) fishes in both marine (*e.g.* Siganidae, Acanthuridae) and freshwater systems (*e.g.* haplochromine cichlids, characiforms) have evolved specialized, scoop-like, multicuspid teeth, for feeding primarily on algae. The similarity of these patterns to those described above for Characidae supports the hypothesis of a relationship between tooth morphology and feeding habit.

ADDITIONAL SPECIMENS EXAMINED

In addition to the comparative material examined listed in Pastana & Ohara (2016) the following species were examined: All from Brazil: *Acnodon senai*: MZUSP 102338 (one, 80·6 mm L_S). *Astyanax altiparanae*: MZUSP 111008 (three specimens, 80·1–100·2 mm L_S). *Bryconamericus iheringii*: MZUSP 111181 (nine specimens, 40·3–50·7 mm L_S). *Bryconamericus patriciae*: MZUSP 84302 (paratypes, 20 specimens, 38·5–53·5 mm L_S). *Bryconops alburnoides*: MZUSP 54456 (two specimens, 100·5–110·3 mm L_S). *Bryconops piracolina*: MZUSP 105731 (paratypes, five specimens, 32·9–40·1 mm L_S). *Creagrutus anary*: MZUSP 35604 (six specimens, 40·4–44·4 mm L_S). *Creagrutus menezesi*: MZUSP 4970 (59 specimens, 22·1–26·5 mm L_S). *Deuterodon iguape*: MZUSP 79496 (three specimens, 50·4–70·6 mm L_S). *Deuterodon rosae*: MZUSP 28718 (21 specimens, 43·4–92·1 mm L_S). *Iguanodectes rachovii*: MZUSP 112335 (22 specimens, 50·3–60·7 mm L_S). *Hemigrammus ataktos*: MZUSP 47864 (paratypes, 44 specimens, 13·2–35·2 mm L_S). *Hemigrammus parana*: MZUSP 95001 (paratypes, 30 specimens, 19·3–26·8 mm L_S). *Hemiodus sterni*: MZUSP 107441 (one, 110·5 mm L_S). *Hyphessobrycon kayabi*: MZUSP 112222 (paratypes, 20 specimens, 19·2–26·3 mm L_S). *Jupiaba kurua*: MZUSP 96857 (paratypes, 80 specimens, (51·9–86 mm L_S). *Knodus moenkhausii*: MZUSP 114922 (10 specimens, 30·5–50·3 mm L_S). *Laemolyta proxima*: MZUSP 21062 (four specimens, 81·4–91·4 mm L_S). *Moenkhausia aurantia:* MZUSP 59267 (four specimens, 20·5–30·2 mm L_S). *Mylesinus paraschomburgkii*: MZUSP 15890 (paratype, one specimens, 170·5 mm L_S). *Myxiops aphos*: MZUSP 81025 (paratypes, 24 specimens, 27·6–56·1 mm L_S). *Piabina argentea*: MZUSP 85897 (34 specimens, 13·7–66 mm L_S). *Piabucus melanostomus*: MZUSP 60005 (three specimens, 60·8–70·6 mm L_S). *Rhytiodus microlepis*: MZUSP 101268 (one specimens, 150.2 mm L_S). *Serrapinus zanatae*: MZUSP 5133 (paratypes, 30 specimens, 34·3–41 mm L_S). *Schizodon knerii*: MZUSP 39737 (four specimens, 170·2–250·4 mm L_S). *Tometes* sp.: MZUSP 111334 (one specimens, 50·2 mm L_S). *Utiaritichthys sennaebragai*: MZUSP 107928 (three specimens, 120·3–140·1 mm L_S).

The authors are grateful to A. Datovo, O. Oyakawa and M. Gianeti (MZUSP) for curatorial assistance. We thank M. Pastana (MZUSP) and S. Thomson (MZUSP) for valuable suggestions and corrections on the manuscript. The authors are grateful to O. Oyakawa, M. Pastana and T. Teixeira (MZUSP) for help and assistance during the fieldwork. Authors were supported by FAPESP (WMO: grant # 2013/22473–8; VPA: grant # 2014/11397–1) and VCE by CAPES. Part of the type series was collected during an expedition funded by thematic project 'South America Characiformes Inventory' (grant # 2011/50282–7).

References

Aranha, J. M. R., Takeuti, D. F. & Yoshimura, T. (1998). Habitat use and food partitioning of the fishes in the Mergulhão stream (coastal stream of Atlantic Forest, Brazil). *Revista de Biologia Tropical* **46,** 951–959.

Araújo, T. R. D., Ribeiro, A. C., Doria, C. R. C. & Torrente-Vilara, G. (2009). Composition and trophic structure of the ichthyofauna from a stream downriver from Santo Antônio falls in the Madeira River, Porto Velho, RO. *Biota Neotropica* **9,** 21–29. https://doi.org/10.1590/S1676-06032009000300001

Barreto, A. P. & Aranha, J. M. R. (2006). Diet of four species of characiforms in an Atlantic forest stream, Guaraquecaba, Paraná, Brazil. *Revista Brasileira de Zoologia* **23,** 779–788. https://doi.org/10.1590/S0101-81752006000300023

Bennemann, S. T., Gealh, A. M., Orsi, M. L. & de Souza, L. M. (2005). Occurrence and trophic ecology of four species of *Astyanax* (Characidae) in different rivers of the Tibagi River Basin, Parana, Brazil. *Iheringia, Série Zoologia* **95,** 247–254. https://doi.org/10.1590/S0073-47212005000300004

Bennemann, S. T., Casatti, L. & Oliveira, D. C. (2006). Alimentação de peixes: proposta para análise de itens registrados em conteúdos gástricos. *Biota Neotropica* **6,** 1–8. https://doi.org/10.1590/S1676-06032006000200013

Birindelli, J. L. O., Zanata, A. M., Sousa, L. M. & Netto-Ferreira, A. L. (2009). New species of *Jupiaba* Zanata (Characiformes: Characidae) from Serra do Cachimbo, with comments on the endemism of upper Rio Curuá, Rio Xingu basin, Brazil. *Neotropical Ichthyology* **7,** 11–18. https://doi.org/10.1590/S1679-62252009000100002

Bonato, K. O., Delaria, R. L. & Silva, J. C. (2012). Diet and trophic guilds of fish assemblages in two streams with different anthropic impacts in the northwest of Paraná, Brazil. *Zoologia* **29,** 27–38. https://doi.org/10.1590/S1984-46702012000100004

Brandão-Gonçalves, L., Lima-Junior, S. E. & Suarez, Y. R. (2009). Hábitos alimentares de *Bryconamericus stramineus* Eigenmann, 1908 (Characidae), em diferentes riachos da sub-bacia do Rio Guiraí, Mato Grosso do Sul, Brasil. *Biota Neotropica* **9,** 135–143. https://doi.org/10.1590/S1676-06032009000100016

Britski, H. A. & Akama, A. (2011). New species of *Trachycorystes* Bleeker, with comments on other species of the genus (Ostariophysi: Siluriformes: Auchenipteridae). *Neotropical Ichthyology* **9,** 273–279. https://doi.org/10.1590/S1679-62252011000200004

Camargo, M. & Giarrizzo, T. (2007). Fish, Marmelos conservation area (BX044), Madeira River basin, states of Amazonas and Rondônia, Brazil. *Check List* **3,** 291–296. https://doi.org/10.15560/3.4.291

Casatti, L. (2002). Alimentação dos peixes em um riacho do Parque Estadual Morro do Diabo, Bacia do Alto Rio Paraná, Sudeste do Brasil. *Biota Neotropica* **2,** 1–14. https://doi.org/10.1590/S1676-06032002000200012

Casatti, L., Mendes, H. F. & Ferreira, K. M. (2003). Aquatic macrophytes as feeding site for small fishes in the Rosana reservoir, Paranapanema River, southeastern Brazil. *Brazilian Journal of Biology* **63,** 213–222. https://doi.org/10.1590/S1519-69842003000200006

Casatti, L., Pérez-Mayorga, M. A., Carvalho, F. R., Brejão, G. L. & Costa, I. D. (2013). The stream fish fauna from the Rio Machado basin, Rondônia State, Brazil. *Check list* **9,** 1496–1504.

Ceneviva-Bastos, M. & Casatti, L. (2007). Oportunismo alimentar de *Knodus moenkhausii* (Teleostei, Characidae): uma espécie abundante em riachos do noroeste do Estado de São Paulo, Brasil. *Iheringia, Série Zoologia* **97,** 7–15. https://doi.org/10.1590/S0073-47212007000100002

Costa, I. D., Ohara, W. M. & Almeida, M. (2017). Fishes from the Jaru Biological Reserve, Machado River drainage, Madeira River basin, Rondônia State, northern Brazil. *Biota Neotropica* **17,** 1–9.

Dias, M. S., Cornu, J.-F., Oberdorff, T., Lasso, C. A. & Tedesco, P. A. (2013). Natural fragmentation in river networks as a driver of speciation for freshwater fishes. *Ecography* **36,** 683–689. https://doi.org/10. 1111/j. 1600-0587.2012.07724.x

Dingerkus, G. & Uhler, L. D. (1977). Enzyme clearing of alcian blue stained whole small vertebrates for demonstration of cartilage. *Stain Technology* **52,** 229–232. https://doi.org/10.3109/10520297709116780

Eigenmann, C. H. (1917). The American Characidae – I. *Memoirs of the Museum of Comparative Zoology* **43,** 1–102.

Esteves, K. E. & Galetti, P. M. (1994). Feeding ecology of *Moenkhausia intermedia* (Pisces, Characidae) in a small oxbow lake of Mogi-Guaçú River, São Paulo, Brazil. *Verhandlungen des Internationalen Verein Limnologie* **25,** 2198–2204.

Fink, W. L. & Weitzman, S. H. (1974). The so-called Cheirodontin fishes of central America with descriptions of two new species (Pisces: Characidae). *Smithsonian Contributions to Zoology* **172,** 1–46.

Gibson, S. Z. (2015). Evidence of a specialized feeding niche in a late Triassic ray-finned fish: evolution of multidenticulate teeth and benthic scraping in †*Hemicalypterus*. *The Science of Nature* **102,** 1–7. https://doi.org/10. 1007/s00114-015-1262-y

Gomiero, L. M. & Braga, F. M. S. (2008). Feeding habits of the ichthyofauna in a protected area in the state of São Paulo, southeastern Brazil. *Biota Neotropica* **8,** 1–8. https://doi.org/10.1590/S1676-06032008000100004

Gonçalves, A. F. G., Prudente, B. S., Filho, F. S. C. & Montag, L. F. A. (2013). Feeding ecology of dash-dot tetra *Hemigrammus bellottii* (Steindachner 1882) (Characiformes: Characidae) in the streams of the Urucu River basin, central Amazonia, Brazil. *Biota Neotropica* **13,** 141–147. https://doi.org/10.1590/S1676-06032013000300018

Graciolli, G. M., Azevedo, M. A. & Melo, F. A. G. (2003). Comparative study of the diet of Glandulocaudine and Tetragonopterinae (Ostariophysi: Characidae) in a small stream in southern Brazil. *Studies on Neotropical Fauna and Environment* **38,** 95–110. https://doi.org/10.1076/snfe.38.2.95.15932

Hahn, N. S. & Loureiro-Crippa, V. E. (2006). Estudo comparativo da dieta, hábitos alimentares e morfologia trófica de duas espécies simpátricas, de peixes de pequeno porte, associados à macrófitas aquáticas. *Acta Scientiarum Biological Sciences* **28,** 359–364. https://doi.org/10. 4025/actascibiolsci. 167

Hahn, N. S., Agostinho, A. A., Gomes, L. C. & Bini, L. M. (1998). Estrutura trófica da ictiofauna do reservatório de Itaipu (Paraná-Brasil) nos primeiros anos de sua formação. *Interciência* **23,** 299–307.

Ingenito, L. F. S., Lima, F. C. T. & Buckup, P. A. (2013). A new species of *Hyphessobrycon* Durbin (Characiformes: Characidae) from the Rio Juruena basin, Central Brazil, with notes on *H. loweae* Costa & Géry. *Neotropical Ichthyology* **11,** 33–44. https://doi.org/10.1590/S1679-62252013000100004

Kullander, S. O. (1995). Three new cichlid species from southern Amazonia: *Aequidens gercil-iae, A. epae* and *A. michaeli*. *Ichthyological Exploration of Freshwaters* **6,** 149–170.

Lima, F. C. T. & Flausino, N. Jr. (2016). *Hyphessobrycon vanzolinii*, a new species from Rio Tapajós, Amazon basin, Brazil (Characiformes: Characidae). *Aqua, International Journal of Ichthyology* **22,** 89–95.

Lima, F. C. T., Malabarba, L. R., Buckup, P. A., Pezzi da Silva, J. F., Vari, R. P., Harold, A., Benine, R. C., Oyakawa, O. T., Pavanelli, C. S., Menezes, N. A., Lucena, C. A. S., Reis, R. E., Langeani, F., Casatti, L., Bertaco, V. A., Moreira, C. R. & Lucinda, P. H. F. (2003). Genera Incertae Sedis – Characidae. *Check List of the Freshwater Fishes of South and Central America* (Reis, R. E., Kullander, S. O. & Ferraris, C. J., eds), pp. 106–169. Porto Alegre: Edipucrs.

Lima, F. C. T., Pires, T., Ohara, W. M., Jerep, F. C., Carvalho, F. R., Marinho, M. M. F. & Zuanon, J. (2013). Characidae. *Peixes do Rio Madeira*, Vol. I (Queiroz, L. J., Torrente-Vilara, G., Ohara, W. M., Pires, T. S., Zuanon, J. & Doria, C. R. C., eds), pp. 213–395. São Paulo: Dialeto.

Luiz, E. A., Agostinho, A. A., Gomes, L. C. & Hahn, N. S. (1998). Ecologia trófica de peixes em dois riachos da bacia do Rio Paraná. *Revista Brasileira de Biologia* **58,** 273–285.

Malabarba, L. R. & Weitzman, S. H. (2003). Description of a new genus with six new species from southern Brazil, Uruguay and Argentina, with a discussion of a putative characid clade (Teleostei: Characiformes: Characidae). *Comunicações do Museu de Ciências e Tecnologia da PUCRS, Serie Zoológica* **16,** 67–151.

Manna, L. R., Rezende, C. F. & Mazzoni, R. (2012). Plasticity in the diet of *Astyanax taeniatus* in a coastal stream from southeast Brazil. *Brazilian Journal of Biology* **72,** 919–928. https://doi.org/10.1590/S1519-69842012000500020

Mazzoni, R. & Rezende, C. F. (2003). Seasonal diet shift in a Tetragonopterinae (Osteichthyes, Characidae) from the Ubatiba river, RJ, Brazil. *Brazilian Journal of Biology* **63,** 69–74. https://doi.org/10.1590/S1519-69842003000100009

Mendonça, M. B., Montag, L. F. A., Oliveira-Raiol, R. D. & Wosiacki, W. B. (2012). Feeding ecology of two sympatric species of the genus *Jupiaba* (Characiformes: Characidae) in streams in the Urucu River basin, AM, Brazil. *Uakari* **8,** 59–67.

Mérona, B., Santos, G. M. & Almeida, R. G. (2001). Short term effects of Tucuruí dam (Amazonia, Brazil) on the trophic organization of fish communities. *Environmental Biology of Fishes* **60,** 375–392. https://doi.org/10.1023/A:1011033025706

Moraes, M., Rezende, C. F. & Mazzoni, R. (2013). Feeding ecology of stream-dwelling Characidae (Osteichthyes: Characiformes) from the upper Tocantins River, Brazil. *Zoologia* **30,** 645–651. https://doi.org/10.1590/S1984-46702013005000003

Novakowski, G. C., Hahn, N. S. & Fugi, R. (2008). Diet seasonality and food overlap of the fish assemblage in a pantanal pond. *Neotropical Ichthyology* **6,** 567–576. https://doi.org/10.1590/S1679-62252008000400004

Ohara, W. M. & Lima, F. C. T. (2015). *Hyphessobrycon lucenorum* (Characiformes: Characidae), a new species from the Rio Madeira basin, Rondônia State, Brazil. *Zootaxa* **3972,** 562–572. https://doi.org/10.11646/zootaxa.3972.4.7

Ohara, W. M., Lima, F. C. T. & Barros, F. S. (2017). *Hyphessobrycon petricolus*, a new species of tetra (Characiformes: Characidae) from the Rio Madeira basin, Mato Grosso, Brazil. *Zootaxa* **4221,** 242–250. https://doi.org/10.11646/zootaxa.4221.2.8

Ortaz, M., Von Bach, P. B. & Candia, R. (2006). Alimentación del pez insectívoro neotropical *Creagrutus bolivari* (Pisces: Characidae) según los métodos gráfico y de importancia relativa. *Revista de Biología Tropical* **54,** 1227–1239. https://doi.org/10.15517/rbt.v54i4.3100

Pastana, M. N. L. & Ohara, W. M. (2016). A new species of *Hyphessobrycon* Durbin (Characiformes: Characidae) from Rio Aripuanã, Rio Madeira basin, Brazil. *Zootaxa* **4161,** 1–5. https://doi.org/10.11646/zootaxa.4161.3.6

Pedroza, W. S., Ribeiro, F. R. V., Teixeira, T. F., Ohara, W. M. & Py-Daniel, L. H. R. (2012). Ichthyofaunal survey of stretches of the Guariba and Roosevelt rivers, in Guariba State Park and Guariba extractive reserve, Madeira River basin, Amazonas, Brazil. *Check list* **8,** 8–15.

Pelicice, F. M. & Agostinho, A. A. (2006). Feeding ecology of fishes associated with *Egeria* spp. patches in a tropical reservoir, Brazil. *Ecology of Freshwater Fish* **15,** 10–19. https://doi.org/10.1111/j.1600-0633.2005.00121.x

Perin, L., Shibatta, O. A. & Bernarde, P. S. (2007). Fish, Machado River basin, Cacoal urban area, state of Rondônia, Brazil. *Check List* **3,** 94–97.

Queiroz, L. J., Torrente-Vilara, G., Vieira, F. G., Ohara, W. M., Zuanon, J. & Doria, C. R. (2013*a*). Fishes of Cuniã Lake, Madeira River Basin, Brazil. *Check List* **9,** 540–548.

Queiroz, L. J., Torrente-Vilara, G., Ohara, W. M., Pires, T. H. S., Zuanon, J. & Doria, C. R. C. (2013*b*). *Peixes do Rio Madeira*. São Paulo: Dialeto Latin American Documentary.

Rapp Py-Daniel, L. H., Deus, C. P., Ribeiro, O. M. & Sousa, L. M. (2007). Peixes. *Biodiversidade do Médio Madeira: bases científicas para proposta de conservação* (Rapp Py-Daniel, L. H., Deus, C. P., Henriques, A. L., Pimpão, D. M. & Ribeiro, O. M., eds), pp. 89–125. Manaus: MMA/MCT.

Resende, E. .K. de; Pereira, R. A. C. & Almeida, V. L. L. (1998). Peixes herbívoros da Planície Inundável do Rio Miranda, Pantanal, Mato Grosso do Sul, Brasil. Embrapa-CPAP, Corumba. Boletim de Pesquisa 10. Available at https://core.ac.uk/download/pdf/15437097.pdf

Rondineli, G., Gomiero, L. M., Carmassi, A. L. & Braga, F. M. S. (2011). Diet of fishes in Passa Cinco stream, Corumbataí River subbasin, São Paulo state, Brazil. *Brazilian Journal of Biology* **71,** 157–167.

Sabino, J. & Zuanon, J. (1998). A stream fish assemblage in Central Amazonia: distribution, activity patterns and feeding behaviour. *Ichthyological Exploration of Freshwaters* **8,** 201–210.

Santos, C. L., Santos, I. A. & Silva, C. J. (2009). Ecologia trófica de peixes ocorrentes em bancos de macrófitas aquáticas na baia Caiçara, Pantanal Mato-Grossense. *Revista Brasileira de Biosciências* **7,** 473–476.

Santos, G. M. (1996). Impactos da hidrelétrica Samuel sobre as comunidades de peixes do rio Jamari (Rondônia, Brasil). *Acta Amazônica* **25,** 247–280.

Silva, C. C., Ferreira, E. J. G. & Deus, C. P. (2008). Diet of *Bryconops alburnoides* and *B. caudomaculatus* (Osteichthyes: Characiformes) in the region affected by Balbina Hydroelectric Dam (Amazon drainage, Brazil). *Neotropical Ichthyology* **6,** 237–242. https://doi.org/10.1590/S1679-62252008000200011

Taylor, W. R. & Van Dyke, G. C. (1985). Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybium* **9,** 107–119.

Teixeira, T. F., Lima, F. C. T. & Zuanon, J. (2014). A new *Hyphessobrycon* Durbin from the Rio Teles Pires, Rio Tapajós Basin, Mato Grosso state, Brazil (Characiformes: Characidae). *Copeia* **2013,** 612–621. https://doi.org/10.1643/CI-13-026

Teixeira, T. F., Netto-Ferreira, A. L., Birindelli, J. L. O. & Sousa, L. M. (2016). Two new species of *Hyphessobrycon* (Characiformes: Characidae) from the headwaters of the Tapajós and Xingu River basins, Pará, Brazil. *Journal of Fish Biology* **88,** 459–476. https://doi.org/10.1111/jfb.12803

Tencatt, L. F. C. & Ohara, W. M. (2016). A new long-snouted species of *Corydoras* Lacépède, 1803 (Teleostei: Callichthyidae) from the Rio Madeira basin. *Zootaxa* **4133,** 430–442. https://doi.org/10.11646/zootaxa.4144.3.9

Torrente-Vilara, G., Zuanon, J., Leprieur, F., Oberdorff, T. & Tedesco, P. A. (2011). Effect of natural rapids and waterfalls on fish assemblage structure in the Madeira River (Amazon Basin). *Ecology of Freshwater Fish* **20,** 588–597. https://doi.org/10.1111/j.1600-0633.2011.00508.x

Vieira, F. G., Matsuzaki, A. A., Barros, B. S. F., Ohara, W. M., Paixão, A. C., Torrente-Vilara, G., Zuanon, J. & Doria, C. R. C. (2016). *Catálogo de Peixes da Estação Ecológica de Cuniã*. Porto Velho: Edufro.

Vitule, J. R. S., Braga, M. R. & Aranha, J. M. R. (2008). Ontogenetic, spatial and temporal variations in the feeding ecology of *Deuterodon langei* Travassos 1957 (Teleostei: Characidae) in a Neotropical stream from the Atlantic rainforest, southern Brazil. *Neotropical Ichthyology* **6,** 211–222. https://doi.org/10.1590/S1679-62252008000200008

Weitzman, S. H. (1962). The osteology of *Brycon meeki*, a generalized characid fish, with an osteological definition of the family. *Stanford Ichthyological Bulletin* **8,** 1–77.

Weitzman, S. H. & Palmer, L. (1997). A new species of *Hyphessobrycon* (Teleostei: Characidae) from Neblina region of Venezuela and Brazil, with comments on the putative ′rosy tetra clade′. *Ichthyological Exploration of Freshwaters* **7,** 209–242.

Winemiller, K. O. (1992). Ecomorphology of freshwater fishes. *National Geographic Research & Exploration* **8,** 308–327.

Wootton, R. J. (1990). *Ecology of Teleost Fishes*. London: Chapman & Hall.

Ximenes, L. Q. L., Mateus, L. A. F. & Penha, J. M. F. (2011). Variação temporal e espacial na composição de guildas alimentares da ictiofauna em lagoas marginais do Rio Cuiabá, Pantanal Norte. *Biota Neotropica* **11,** 205–215. https://doi.org/10.1590/S1676-06032011000100022

Zanata, A. M. & Ohara, W. M. (2009). *Jupiaba citrina*, a new species from Rio Aripuanã, Rio Madeira basin, Amazonas and Mato Grosso states, Brazil (Characiformes: Characidae). *Neotropical Ichthyology* **7,** 513–518. https://doi.org/10.1590/S1679-62252009000400001

Zanata, A. M. & Akama, A. (2004). *Myxiops aphos*, a new characid genus and species (Characiformes: Characidae) from the Rio Lençóis, Bahia, Brazil. *Neotropical Ichthyology* **2,** 45–54. https://doi.org/10.1590/S1679-62252004000200001

Zanata, A. M. & Lima, F. C. T. (2005). New species of *Jupiaba* (Characiformes: Characidae) from Rio Tiquié, upper Rio Negro basin, Brazil. *Copeia* **2005,** 272–278. https://doi.org/10.1643/CI-04-155R1

Electronic References

Hahn, N. S., Fugi, R., Peretti, D., Russo, M. R. & Loureiro-Crippa, V. E. (2002). Estrutura trófica da ictiofauna da Planície de Inundação do alto do Rio Paraná. *A Planície de Inundação do Alto Rio Paraná* (Agostinho, A. A. & Thomaz, S. M., eds), pp. 131–135. Maringá: Programa PELD/CNPq Available at www.imasul.ms.gov.br/wp-content/uploads/sites/74/2015/06/2-A_Plan%C3%ADcie_de_Inunda%C3%A7%C3%A3o_do_Alto_Rio_Paran%C3%A1.pdf

IBGE (2009). *Manuais Técnicos em Geociências: Manual Técnico de Geomorfologia*. Rio de janeiro: Instituto Brasileiro de Geografia e Estatística. Availble at http://biblioteca.ibge.gov.br/visualizacao/livros/liv66620.pdf

IUCN (2014). Standards and Petitions Sub-Committee. Gland: International Union for the Conservation of Nature. Available at www.iucn.org/es/node/24834