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Occurrence of *Microdesmus bahianus* and *M. longipinnis* (Teleostei: Microdesmidae) larvae and juveniles in estuaries of the State of Pernambuco, Brazil

ABSTRACT

Microdesmidae includes five gobioid genera of small, slender, burrowing fish found along the coast of tropical seas and estuaries. *Microdesmus* is distributed in the eastern Pacific, and the eastern and western Atlantic, being the most speciose genus, with 16 species. *M. bahianus* and *M. longipinnis* have been reported off the Brazilian states of Bahia, Alagoas, Pernambuco and Espírito Santo. Monthly ichthyoplankton samples were taken with a 0.5 mm plankton net. Larvae and juveniles were collected in the estuaries of Jaguaribe, Itapessoca, and Formoso along the coast of Pernambuco between June 2000 and October 2002. Fifteen specimens of *M. longipinnis* were collected; 12 from Formoso (18.3-60.0 mm SL); 2 in Jaguaribe (18.4 and 19.2 mm SL); and one in Itapessoca (21.1 mm). A single 13.9 mm SL *M. bahianus* was caught in Jaguaribe in April 2001 and represents the first record for Pernambuco and the northern most distribution of the species along the Brazilian coast.

Key words: Gobioidae, distribution, early life stages, ichthyoplankton

Ocorrência de larvas e juvenis de *Microdesmus bahianus* e *M. longipinnis* (Teleostei: Microdesmidae) em estuários do Estado de Pernambuco, Brasil

RESUMO

Microdesmidae inclui cinco gêneros de peixes gobiódeos, pequenos, alongados, bentônicos e escavadores, encontrados próximo à costa, em mares e estuários tropicais. *Microdesmus* se distribui no Pacífico oriental e Atlântico oriental e ocidental, sendo o gênero com maior número de espécies (16), havendo registro de *M. bahianus* e *M. longipinnis* nos estados da Bahia, Alagoas, Pernambuco e Espírito Santo. Coletas mensais de ictioplâncton, com rede de plâncton de 0,5 mm, foram realizadas nos estuários de Jaguaribe e Itapessoca, litoral norte, e Formoso, litoral sul de Pernambuco, entre junho/2000 e outubro/2002. Capturaram-se 15 exemplares de *M. longipinnis*, dos quais 12 em Formoso, com comprimento padrão entre 18,3 e 60,0 mm, nos meses de janeiro, abril, maio, agosto e setembro/2001; 2 em Jaguaribe (18,4 e 19,2 mm), em março e abril/2001 e um em Itapessoca (21,1 mm), em junho/2002. Um único exemplar de *M. bahianus*, com 13,9 mm, foi coletado em Jaguaribe, em abril/2001, representando o primeiro registro da espécie em Pernambuco e o ponto mais setentrional na costa brasileira.

Palavras-chave: Gobioidae, distribuição, estágios iniciais de vida, ictioplâncton

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INTRODUCTION

The Microdesmidae (*sensu stricto*, of Dawson, 1974) includes five genera – *Cerdale*, *Microdesmus*, *Clarkichthys*, *Gunnellichthys* and *Paragunnellichthys* – of small, slender, benthic, burrowing gobioid fish found in waters near tropical sea coasts and estuaries (Thacker, 2000). Just the first two genera have had occurrences registered in Brazil (Menezes et al., 2003).

Microdesmus has the largest number of species (16) and is the most broadly distributed microdesmid, occupying tropical waters of both the eastern and western Atlantic, as well as the eastern Pacific (Thacker, 2000).

There are few records of the occurrence of *Microdesmus* in Brazil. Material in scientific collections throughout the country is scarce. Scarcity is common to species of this Family due to difficulties in capturing them as a result of their particular ecology (Thacker, 2000). After its subsidence from the planktonic phase, individuals take up residence in holes and substrate interstices, and are only sampled efficiently with rotenone. Most of the species live in depths of less than 3 m in tide pools, estuaries and both the sandy and muddy substrates of mangroves. Larvae, however, drift freely in open waters and are collected more easily than adults (Smith & Thacker, 2000).

Microdesmus bahianus and *M. longipinnis* are the only species recorded for Brazil. Dawson (1973) described *M. bahianus* from specimens collected at Arembepe in the state of Bahia, which has also been collected in other locations of Bahia (Lopes et al., 1998, 1999; SIBIP/NEODAT III, 2008), as well as the states of Alagoas (Moura et al., 1999) and Espírito Santo (Zamprogno, 1989). *M. longipinnis* is found in the western Atlantic, as well as in the tropical eastern Atlantic. In Brazil, it has only been recorded in the states of Pernambuco and Alagoas (Eskinazi, 1972; SIBIP/NEODAT III, 2008).

In the present work, the occurrence of *M. longipinnis* is recorded in different estuaries along the state of Pernambuco, along with the first record of *M. bahianus* in the state.

MATERIAL AND METHODS

Monthly collections of ichthyoplankton were carried out at sampling stations distributed in different regions of three estuarine areas along the coast of the state of Pernambuco: along the north coast, at a total of eight stations were sampled in the estuarine complex of Itapessoca (Lat. 07° 40' S, Long. 034° 51' W); in the estuary of the Jaguaribe River (Lat. 07° 44' S, Long. 034° 50' W), six stations were located around the island of Itamaracá; and along the south shore ten stations in the estuarine complex of the Formoso River (Lat. 08° 41' S, Long. 035° 7' W) (Figure 1).

Collections were accomplished through horizontal superficial towing a 0.5 mm conical-cylindrical mesh plankton net at both rising and ebbing tides, and during both daytime and nighttime hours. Salinity *in situ* measurements were made with a portable salinity meter before sampling at all stations.

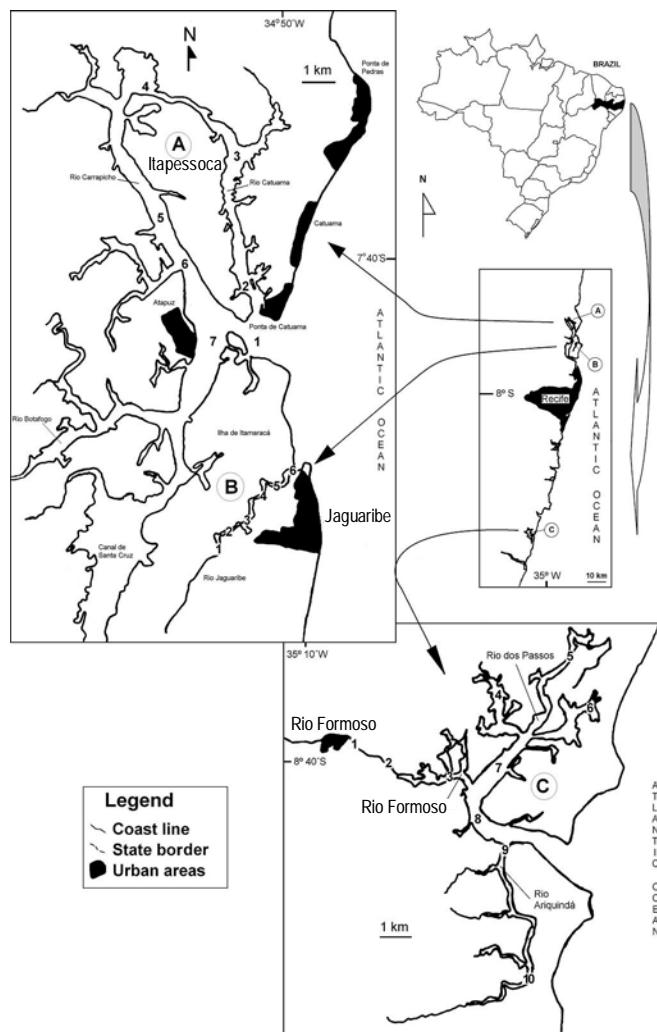


Figure 1. Coast of the State of Pernambuco, northeastern Brazil, including detailed map of the different estuaries: A. Itapessoca (upper left), B. Jaguaribe (upper middle), and C. Rio Formoso (lower right)

Figura 1. Costa do Estado de Pernambuco, nordeste do Brasil, incluindo mapa detalhado dos diferentes estuários: A. Itapessoca (esquerdo superior), B. Jaguaribe (meio superior), e C. Rio Formoso (centro inferior)

Samples were carried out between June 2000 and July 2001 in Jaguaribe; between December 2000 and December 2001 in Formoso; and between September 2001 and October 2002 in Itapessoca.

Collected material was fixed in 4% formaldehyde, larvae and juvenile fish sorted from the different plankton organisms, and later identified to Microdesmidae based on procedures described by Smith & Thacker (2000). Meristic characters, including the number of fin rays, and external morphological aspects, including standard length (SL), head length (HL), predorsal length (PDL) and pre-anal length (PAL) were used in the identification. Start of the anal fin is expressed as its vertical insertion position relative to ray numbers in the dorsal fin. All specimens were deposited at the fish collections from the Museu de Zoologia of the Universidade de São Paulo (MZUSP) and Universidade Federal da Paraíba (UFPB), as detailed in Table 1.

RESULTS AND DISCUSSION

A total of 16 specimens of Microdesmidae were collected in the present study. All belong to *Microdesmus*, including one specimen of *M. bahianus* and fifteen of *M. longipinnis*. Information on the collection sites are presented in Table 1, and morphometric and meristic data of the specimens are displayed in Table 2.

Dawson (1973) considered the occurrence of *M. bahianus* in the State of Bahia as the first and southern most record of the microdesmids in the Western Atlantic. Eskinazi (1972), however, had already recorded the occurrence of *M. longipinnis* along the Pernambuco coast, which should be effectively considered the first record of the family in Brazil.

Despite the elapsed 30 years, the number of studies developed, and the available information on the coastal ichthyofauna along different stretches of the Brazilian coastline, the number of records on species of Microdesmidae has not increased proportionately. Among these, Rosa et al. (1997) cited the occurrence of *Microdesmus* sp. in

the State of Paraíba, but according to the authors, the material collected was a single alevine that was not possible to identify.

Microdesmids, as the name itself indicates, are small, slender fish with cryptic habits. According to available data, they do not exhibit high densities within the sites where they occur. As emphasized by Smith & Thacker (2000), the capture of adults is difficult, which reinforces the importance of information gathered from the capture of larvae and juveniles in ichthyoplankton studies.

The specimen of *M. bahianus* was caught at the Jaguaribe Estuary in April 2001 with a salinity of 37.2. It exhibited a standard length (SL) of 13.9 mm, a dorsal fin (DF) with 42 rays and an anal fin (AF) with 26 rays. The insertion of the anal fin coincided with the vertical between dorsal fin rays 16 and 17.

Among the *M. longipinnis* specimens, 12 were collected at the Formoso River Estuary – 8 specimens in January 2001 and additional specimens in the months of April, May, August and September 2001, and varied between 18.3 and 60.0

Table 1. Sampling information for Microdesmidae individuals collected in Estuaries of Pernambuco State, northeastern Brazil. Station number and location is indicated in Figure 1

Tabela 1. Informações sobre a amostragem dos indivíduos de Microdesmidae coletados em estuários do Estado de Pernambuco, nordeste do Brasil. Número da estação e localização indicados na Figura 1

Estuary	Date	Tide	Period*	Nr.	Salinity	Species	Station number	Material
Jaguaribe	23-Apr-01	E	N	1	37.2	<i>M. bahianus</i>	5	UFPB 5922
Jaguaribe	05-Mar-01	E	N	1	33.8	<i>M. longipinnis</i>	4	UFPB 5923
Jaguaribe	23-Apr-01	E	N	1	45.3	<i>M. longipinnis</i>	3	MZUSP 84474
Itapessoca	14-Jun-02	E	N	1	21.3	<i>M. longipinnis</i>	4	UFPB 5924
Formoso	28-Jan-01	E	N	1	33.4	<i>M. longipinnis</i>	4	UFPB 5929
Formoso	28-Apr-01	R	D	7	7.6	<i>M. longipinnis</i>	1	MZUSP 84473
Formoso	29-Apr-01	R	N	1	24.3	<i>M. longipinnis</i>	9	UFPB 5925
Formoso	12-May-01	R	D	1	3.3	<i>M. longipinnis</i>	1	UFPB 5927
Formoso	23-Aug-01	R	N	1	-	<i>M. longipinnis</i>	10	UFPB 5926
Formoso	25-Sep-01	R	N	1	-	<i>M. longipinnis</i>	2	UFPB 5928

*Period: night (N), day (D) - Tide: rising (R), ebbing (E)

Table 2. Morphometric and meristic data for Microdesmidae individuals collected in Estuaries of Pernambuco State, northeastern Brazil

Tabela 2. Dados morfológicos e merísticos dos indivíduos de Microdesmidae coletados em estuários do Estado de Pernambuco, nordeste do Brasil

Species	Estuary	Morphometric data*				Meristic counts					Dorsal/Anal Insertion (fin element position in Dorsal)
		SL (mm)	HL (mm)	PAL (mm)	PDL (mm)	Dorsal	Anal	Pelvic	Pectoral	Caudal	
<i>M. bahianus</i>	Jaguaribe	13.9	2.6	8.2	4.4	42	26	3	10	15	16-17
<i>M. longipinnis</i>	Jaguaribe	18.4	3.0	10.5	3.9	73	46	3	12	15	27-28
"	Jaguaribe	19.2	3.0	11.0	3.9	73	44	3	12	15	27-28
"	Itapessoca	21.1	3.2	12.2	4.1	73	44	3	12	15	27-28
"	Formoso	18.3	2.8	10.6	3.8	70	44	3	12	15	29-30
"	Formoso	19.6	3.1	11.6	4.1	70	44	4	12	15	27-28
"	Formoso	20.2	2.8	12.4	3.6	76	40	3	12	15	38-39
"	Formoso	20.8	3.0	12.9	3.8	70	42	3	-	14	31-32
"	Formoso	21.3	3.0	12.8	3.8	76	42	-	12	14	37-38
"	Formoso	21.8	2.0	13.4	3.8	76	41	-	12	15	37-38
"	Formoso	22.8	3.1	14.0	3.9	73	40	3	12	15	40-41
"	Formoso	23.2	3.1	14.2	4.0	79	42	3	13	15	40-41
"	Formoso	23.2	3.1	14.2	4.1	70	38	3	13	14	37-38
"	Formoso	23.5	3.2	14.9	4.2	70	36	3	12	16	27-28
"	Formoso	29.7	3.5	18.0	4.5	79	44	3	12	15	37-38
"	Formoso	60	4.6	34.2	7.4	76	40	3	12	15	40-41

*Morphometrics: SL (standard length), HL (head length), PAL (pre-anal length), PDL (pre-dorsal length)

mm SL. Two were collected at Jaguaribe in March and April 2001 with 19.2 and 18.4 mm SL, respectively. One specimen with a SL of 21.1 mm was collected at Itapessoca in June 2002.

Smith & Thacker (2000) mention the following sizes for the material they examined on the two species: *M. bahianus* – larvae and cultivated juveniles (12.0 to 18.5 mm) and adults (17.1 to 64.8 mm) – and *M. longipinnis* – larvae and cultivated juveniles (10.8 to 35 mm) and juveniles to adults (17.0 to 191 mm). The size of subsidence cited is 15 mm and around 23 mm, respectively, for *M. bahianus* and *M. longipinnis*. *M. longipinnis* specimens collected at estuaries in Pernambuco range from 18.3 to 60 mm, and correspond to late-stage larvae and juveniles. The single *M. bahianus* specimen, with 13.9 mm, can be considered in the larval stage. According to Dawson (1962), *M. longipinnis* can reach a larger size – 257 mm SL; whereas the *M. bahianus* holotype (64.8 mm SL) seems to be the largest known specimen of the species.

The specimens from Formoso were collected at the innermost station of the Formoso River with salinities between 3.3 and 7.6, as well as at intermediary and external stations with salinities between 24.3 and 33.4. The specimens from Jaguaribe were collected at the intermediary stations of the estuary with salinities of 33.8 and 35, respectively. A single specimen was collected at Itapessoca with a salinity of 21.3.

M. longipinnis inhabited a larger range of environments, from practically limnetic to euhaline habitats. *M. bahianus* was collected in higher salinity at a station strongly influenced by intrusion of sea water.

The number of DF elements among all the *M. longipinnis* specimens varied between 70 and 79, while the number of AF rays varied between 36 and 46. The insert position of the anal fin in relation to the dorsal fin varied among the specimens, forming two distinct groups: those with anal-fin insertion situated between dorsal elements 27-32 (7 specimens); and those between elements 37-41 (8 specimens), as displayed in Table 2. This may be related to differences between population, since all individuals of the latter group came from Rio Formoso estuary, and the latter from Itapessoca and Jaguaribe Estuaries (Table 1).

M. longipinnis is the most broadly distributed microdesmid in the Atlantic. Its meristic characteristics exhibit both intra-populational and inter-populational variations (Smith & Thacker, 2000). The variation in the number of dorsal and anal fin rays observed in the specimens examined range from 62 to 80 for the DF, and 36 to 52 for the AF, as mentioned by Smith & Thacker (2000). However, the relation between the dorsal elements and the anal origin at our study exhibited a greater variation than that observed by Dawson (1962), who recorded variations between the elements 27-28, 28-29 and 29-30, with a larger percentage in the intermediary band. Thus, such a characteristic does not seem to be as consistent as the author suggested, and was not useful in the identification of the species, since it may differ among spatially separated populations.

CONCLUSIONS

This work broadens the record on the occurrence of microdesmids in northeast Brazil, and registers its presence in the State of Pernambuco. *M. bahianus* is for the first time registered in the state and constitutes the northernmost record for the region.

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