

# First record of *Mastacembelus notophthalmus* (Actinopterygii: Synbranchiformes: Mastacembelidae) for Belitung Island, Indonesia

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## Abstract

This study was conducted aiming to record for the first time the occurrence of *Mastacembelus notophthalmus* Roberts, 1989 in Belitung Island (Indonesia), and update the geographic distribution of this species. Although this species is categorized as LC according to the IUCN Red List, it is rarely reported in fish inventories, with few specimens sampled. Moreover, data on the geographic distribution, population size, and other population details of *M. notophthalmus* are scarce and insufficient to predict possible threats and propose appropriate conservation measures and policies. A single specimen of *Mastacembelus* was collected using a fish trap on 20 February 2023, in a swamp, located in the middle course of the Lenggang River, Belitung Island, Indonesia. This specimen was identified as *M. notophthalmus* and this finding constitutes the southernmost record for this species, expanding its geographic range. In addition, the new record site is about 700 km south-east of the nearest locality in Peninsular Malaysia, about 250 km south-east of the nearest locality in Bangka Island, about 600 km south-east of the nearest locality in Sumatra, and about 500 km south-west from the nearest locality in Borneo. Better ecological and biological data concerning distribution, habitat, and stressors is crucial to reassess the conservation status of *M. notophthalmus*, and possible future conservation measures and policies. Therefore, we emphasize here the urgency for more comprehensive and accurate data to facilitate conservation assessments and management in Indonesia.

## Keywords

distribution extension, freshwaters, life below water, native species, spiny eel

## Introduction

*Mastacembelus notophthalmus* Roberts, 1989 is a freshwater spiny eel species representing the family Mastacembelidae (see Kottelat 2013; Fricke et al. 2023). This species has an IUCN Red List (International Union for Conservation of Nature's Red List of Threatened Species) status of least concern (LC), usually occurring in large rivers, with clear or slightly turbid water and pebbles as substrate (Ahmad 2020). Like other species of the genus *Mastacembe-*

*lus* Scopoli, 1777, it is consumed as food by local fishers, therefore overexploitation is the main conservation threat to *M. notophthalmus* (see Britz 2007; Brown et al. 2010; Day et al. 2017). There are currently no active conservation measures in place for this species as there are broad ecological data deficiencies regarding geographic distribution, potential threats, and population dynamics. Current knowledge regarding geographic distribution is likely to be underestimated as very few specimens of this species are collected during general fish surveys (Ahmad 2020).

*Mastacembelus notophthalmus* is known to occur in the western portion of Peninsular Malaysia (Malaysia) (Roberts 1989; Shafiq et al. 2014; Ahmad 2020; Fricke et al. 2023); in the northern and central portions of Sumatra (Indonesia) (Roberts 1989; Ng et al. 2019; Ahmad 2020; Ng and Tan 2020; Fricke et al. 2023); and in the western portion of Borneo (Indonesia) (Roberts 1989; Kottelat et al. 1993). And recently, Hasan et al. (2023a) reported the species for Bangka Island (Indonesia). In addition, Hasan et al. (2023a) argued that it is possible that *M. notophthalmus* occurs in other islands close to the West Malaysia mainland, Sumatra, and Borneo.

This work records for the first time the occurrence of *M. notophthalmus* in Belitung Island (Indonesia). This record represents the southernmost record for this species, extending its geographical distribution further south, and recording its occurrence on one additional island. In addition, we provide here a detailed and updated map of the geographic distribution of *M. notophthalmus*.

## Methods

A single specimen of *Mastacembelus notophthalmus* (Fig. 1) was collected using a fish trap on 20 February 2023, in a swamp, located in the middle course of the Lenggang River, (02°57'14"S, 108°09'21"E), Lenggang Village, Gantung Sub-District, East Belitung District, Belitung Island, Indonesia (Figs. 2 and 3). The collection site is characterized by having slow water flow and abundant water plants on the river (Fig. 4). The specimen was preserved in formalin 10% (Hasan et al. 2019). It was deposited in the Ichthyological Collection of the Airlangga Natural History Museum (ANMH), Faculty of Fisheries and Marine Sciences, Universitas Airlangga, Surabaya, Indonesia.

The morphological inspection of the specimen followed Roberts (1989), complemented by photographs of the life specimen which were taken immediately after capture, aiming to document the coloration pattern in life.

## Results

### Family Mastacembelidae Swainson, 1839 Genus *Mastacembelus* Scopoli, 1777

#### *Mastacembelus notophthalmus* Roberts, 1989

(Fig. 1; Table 1)

**New records.** Belitung Island, East Belitung District, Indonesia; middle course of the Lenggang River; 02°57'14"S, 108°09'21"E; 20 February 2023; W. Kusumah leg.; caught with a fish trap; 1 ♂ (ANMH0007).

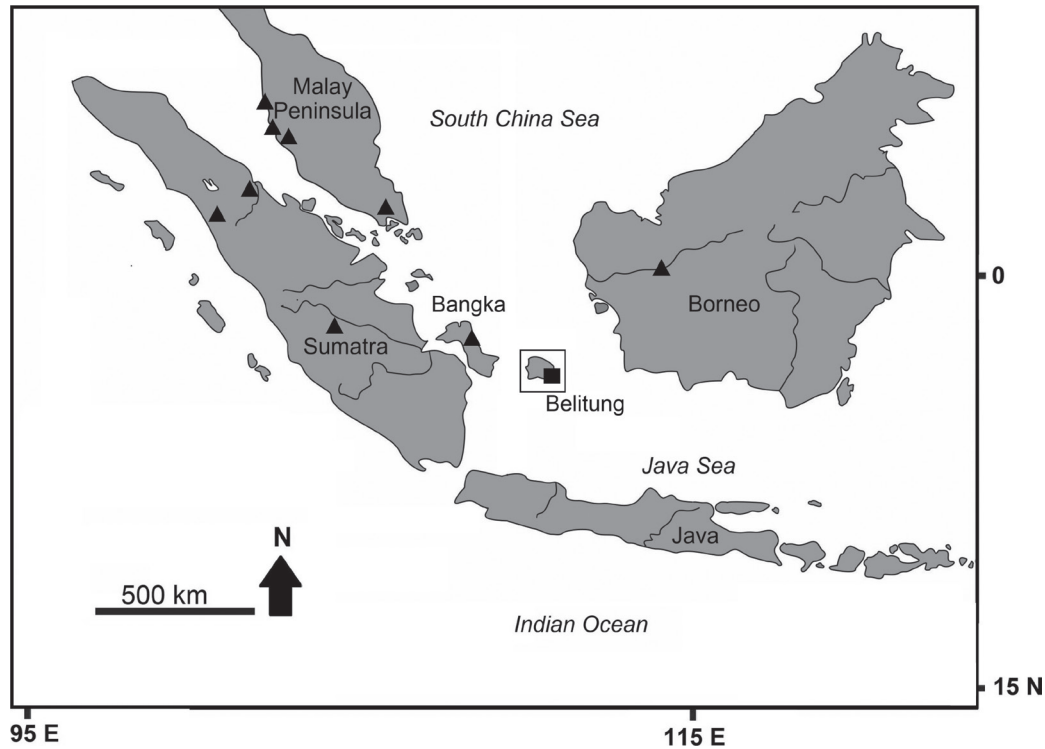
**Identification.** The specimen collected in the Lenggang River, Belitung Island (Indonesia), was identified as *Mastacembelus notophthalmus* (Fig. 1) based on characters proposed by Roberts (1989). The diagnostic features exhibited by the specimen include: (1) a dark vertical bar below eye; (2) dorsal region mostly dark brown with some yellowish irregular vermiculated marks; (3) ventral region yellowish with incomplete and inconspicuous dark brown horizontal stripe; and (4) caudal, dorsal, and anal fins yellowish with vertical dark brown bars (see Fig. 1).

**Table 1.** Meristic and morphometric characters of *Mastacembelus notophthalmus* from the Lenggang River, East Belitung District, Belitung Island (presently reported study; AMNH0007), and Malay Peninsula (Roberts 1989).

Meristic data	<i>Mastacembelus notophthalmus</i>	
	AMNH0007	Roberts 1989
Dorsal spines	37	37–39
Dorsal-fin rays	81	73–86
Anal-fin rays	82	69–85
Pectoral-fin rays	26	24–26
Caudal-fin rays	18	15–18
<b>Morphometric data; absolute value</b>		
Standard length, (SL) [mm]	410.5	248.0
<b>Morphometric data; relative values (in percent of SL)</b>		
Head length	1.48	—
Snout length	0.46	—
Predorsal length	6.69	—
Preanal length	6.57	—



**Figure 1.** Live specimen of *Mastacembelus notophthalmus* from the Lenggang River, East Belitung District, Belitung Island, Indonesia, 410.5 mm SL (AMNH0007) (photograph: W. Kusumah).



**Figure 2.** Map of the known distribution of *Mastacembelus notophthalmus*. The new record in Belitung Island, Indonesia (black square); published records (black triangles) are based on Roberts (1989), Kottelat et al. (1993), Ng et al. (2019); Ahmad (2020); Ng and Tan (2020), and Hasan et al. (2023a).



**Figure 3.** The presently reported collection site of *Mastacembelus notophthalmus* on the Lenggang River in East Belitung District, Bangka Island, Indonesia.



**Figure 4.** Collection site of the presently reported *Mastacembelus notophthalmus* (AMNH0007); slow water flow and abundant water plants on the river, Lenggang River, in East Belitung District, Belitung Island, Indonesia (photograph: W. Kusumah).

Meristic and morphometric characters of the *M. notophthalmus* specimen from Belitung Island are presented in Table 1. These meristic features also support the identification of the species as *M. notophthalmus*.

The specimen identified in the presently reported study as *M. notophthalmus* differs from other species of the genus *Mastacembelus* occurring in Indonesia and surroundings by the following features: the presence of a dark vertical bar below the eye (vs. absence in *Mastacembelus unicolor*

or Cuvier, 1832; *Mastacembelus erythrotaenia* Bleeker, 1850; and *Mastacembelus favus* Hora, 1923); number of dorsal spines (37) (vs. 34–35 in *M. unicolor*, 33–34 in *M. erythrotaenia*, and 33–35 in *M. favus*); number of dorsal-fin rays (81) (vs. 68–70 in *M. erythrotaenia*); number of anal-fin rays 82 (vs. 68–69 in *M. erythrotaenia*); number of pectoral-fin rays 26 (vs. 24–25 in *M. erythrotaenia*); and number of caudal-fin rays (18) (vs. 19–22 in *M. unicolor*, 14–15 in *M. erythrotaenia*, and 12–15 in *M. favus*).

## Discussion

The new record of *Mastacembelus notophthalmus* provided here for Belitung Island, specifically for the Lenggang River, Lenggang Village, Gantung Sub-District, East Belitung District, Belitung Island, Indonesia, is the southernmost record for this species, expanding its geographic distribution. In addition, the new record site is about 700 km south-east of the nearest locality in Peninsular Malaysia, about 250 km south-east of the nearest locality in Bangka Island, about 600 km south-east of the nearest locality in Sumatra, and about 500 km south-west from the nearest locality in Borneo. New records of freshwater fishes are essential contributions to the natural sciences (Hasan et al. 2022). They are necessary to support appropriate conservation-related decisions and environmental impact assessments (Hasan et al. 2023b; Nurjirana et al. 2022; Hasan et al. 2021). Therefore, this new record fills an important gap in the geographic distribution of the species, as well as registering an additional island for the species (Fig. 3).

It is important to emphasize that, despite being categorized as least concern (LC) according to the IUCN Red List, this species is rarely reported in fish inventories, with few specimens sampled (Ahmad 2020). Moreover, according to Ahmad (2020), data on the geographic distribution, population size, and other population details of *M. notophthalmus* are scarce and insufficient to predict possible threats and propose appropriate conservation measures and policies. Better ecological and biological data concerning distribution, habitat, and stressors is crucial to reassess the conservation status of *M. notophthalmus*, and possible future conservation measures and policies. Therefore, we emphasize here the urgency of obtaining more comprehensive and accurate data to facilitate conservation assessments and management in Indonesia.

Given these needs, and the recent reports documenting a far broader distribution for *M. notophthalmus* than historically considered (Hasan et al. 2023a), we provide some implementation recommendations to increase knowledge in the region. Traditional fish sampling using seine nets,

gill nets, dip nets, fyke nets, and fish traps evidently have a low detection probability for *Mastacembelus* spp., this is due to their thin, elongated body shapes allowing them to escape from nets, which utilize the most commonly used mesh sizes. If using traditional methods, we recommend using mesh sizes ranging from 20 to 50 mm or crayfish traps with fine mesh sizes to prevent escape (Çoban et al. 2021). Combining electro-fishing methods with molecular approaches, such as eDNA, and traditional net surveys would likely exponentially increase detection levels for uncommonly caught species. There is an active fishery for *Mastacembelus* spp. in Indonesia (Ahmad 2020), thus implementing a fisheries-dependent catch assessment survey would supplement fisheries independent data. This would serve a dual purpose as a biodiversity survey and generate vital information on the overall state of the fishery, allowing inference regarding population structure, size, and exploitation.

## Author contributions

Data curation: VH. Investigation: VH, LOV, JS, FPO. Methodology: VH, FPO. Resources: VH. Writing – original draft: VH, LOV, JS, FPO. Writing – review and editing: VH, LOV, JS, FPO.

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