

Short Communication

First specimen-based record of blackskin catfish *Clarias meladerma* Bleeker, 1846 (Siluriformes: Clariidae) from the Mekong River basin

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Members of the Old World catfish family Clariidae naturally occur in freshwater bodies throughout Africa and Asia (Ng, 1999; Teugels *et al.*, 2001; Ferraris, 2007; Ng & Kottelat, 2008, 2014; Ng *et al.*, 2011; Ng & Hadiaty, 2011; Nelson *et al.*, 2016). Clariid catfishes have a slender body with long-based dorsal and anal fins without an adipose fin, except for *Heterobranchus*, *Dinotopterus* and *Bathyclarias* species and *Clarias ngamensis* (with a short adipose fin), and they possess subtruncate and truncate, rounded caudal fins and four pairs of barbels (Rainboth, 1996; Anseume & Teugels, 1999; Ng, 1999, 2004; Skelton, 2001; Nelson *et al.*, 2016). They are commonly known as “walking catfish” or “air-breathing catfish” (Taki *et al.*, 2021) and have air-breathing organs that allow them to tolerate low-oxygen level environments and survive out of water for considerable time (Ng & Kottelat, 2014; Taki *et al.*, 2021).

The Clariidae is a diverse family containing at least 113 species in 16 genera (Ferraris, 2007; Ng & Hadiaty, 2011; Ng & Kottelat, 2008, 2014). Within the family, the genus *Clarias* comprises an estimated 56 species, including 20 species in Southeast Asia (Ng *et al.*, 2011; Kottelat, 2013; Ng & Kottelat, 2014) and is classified into two species complexes, the *C. nieuhofii* complex with an elongated body, and the *C. batrachus* complex with a rather shortened body (Ng *et al.*, 2011; Ng & Kottelat, 2014). Although eight species of *Clarias* have been reported from the Mekong River basin (Rainboth, 1996; Taki *et al.*, 2021), only four have been confirmed with voucher specimens (i.e., *C. batrachus*, *C. macrocephalus*, *C. serniosus* and introduced *C. gariiepinus*) (Ng & Kottelat, 2014; So *et al.*, 2018; Taki *et al.*, 2021). Blackskin catfish *C. meladerma* Bleeker, 1846 has been recorded from short drainages on the western face of the Cardamom Mountains in the coastal areas of the Koh Kong and Preah Sihanouk provinces in

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Cambodia, but not from the Cambodian Mekong River basin (So *et al.*, 2018; Taki *et al.*, 2021).

On 26 March 2021, seven individuals of *Clarias* (four medium-sized and three juvenile specimens) morphologically resembling *C. meladerma* were collected from a small forest stream in the Cambodian Mekong basin in Sesan District, Stung Treng Province (Fig. 1). This site is situated in the Ochralang watershed which drains into the Mekong River at Tboung Khla Village, Omresh Commune, Siem Bok District, Stung Treng Province. Following careful examination of the seven specimens, we identify these as *C. meladerma* and report these as the first record from the Mekong River basin in Cambodia.

Clarias meladerma Bleeker, 1846

Material examined: Four specimens from Sesan District (13.361021°N, 106.219737°E) were preserved in 95% ethanol and deposited in the fish collection room of the Faculty of Fisheries and Aquaculture, Royal University of Agriculture (RUAFI), Cambodia. These were RUAFI-F00001 (175 mm SL [standard length]), RUAFI-F00002 (170 mm SL), RUAFI-F00003 (136 mm SL) and RUAFI-F00004 (135 mm SL). Comparative materials for *C. meladerma* comprised four specimens from south and southwest Cambodia deposited in the specimen room of the Inland Fisheries Research & Development Institute (IFReDI), Fisheries Administration, Cambodia, as follows: IFReDI-P06012 (235 mm SL), collected 21 November 2011, 10.645278°N, 103.643889°E, Kbal Chhay Canal, Srai Cham, Prey Nob District, Preah Sihanouk Province; IFReDI-P06478 (208 mm SL) & IFReDI-P06486 (190 mm SL), collected 5 February 2012, 10.630556°N, 103.630806°E, Peanichkam Market, Preah Sihanouk Town, Preah Sihanouk Province; IFReDI-P06550 (205 mm SL), collected 1 June 2012, 11.416239°N, 103.267175°E, Chhay Preik Brong Waterfall, Trapeang Rong Commune, Koh Kong District, Koh Kong Province. Finally, two specimens of *C. macrocephalus* caught in arrow-shaped traps and deposited in RUAFI were also examined for comparative purposes: RUAFI-F00120 (20.5 mm SL), collected 29 October 2022 and RUAFI-F00400 (239 mm SL), collected 18 November 2022, 13.233880°N, 103.862000°E, flooded forest, Chong Khneas Commune, Tonle Sap Lake, Siem Reap Province. Meristic and morphometric data were taken following Ng (1999).

Diagnosis: *Clarias meladerma* is characterised by a short and extremely rounded occipital process, a shorter distance between the occipital process and the first dorsal fin (3.67–4.51 % SL), a long and distinctly serrated (14–17) anterior edge of the pectoral spine and a smooth posterior edge of the pectoral spine (Table 1). The specimens preserved in 95% ethanol are dark brown and do not

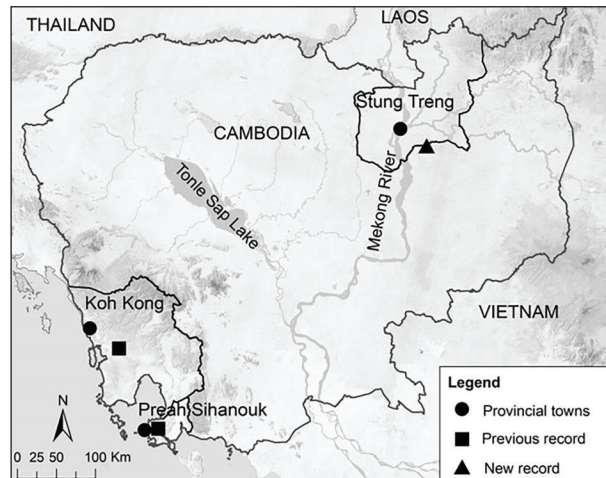


Fig. 1 Records of the blackskin catfish *Clarias meladerma* Bleeker, 1846 in Cambodia. Black squares are the past records in the Koh Kong and Preah Sihanouk provinces of So *et al.* (2018) and Taki *et al.* (2021), whereas the black triangle represents the first specimen-based record from the Mekong drainage in Sesan District, Stung Treng Province.

have small blotches on the sides of the body, head or fins. The number of dorsal fin-rays range from 66 to 68 whereas the number of anal fin-rays range from 55 to 56 (Fig. 2 & 3).

Description: Data on morphometric characters and meristic counts of the Mekong and Cardamom specimens is presented in Table 1. Additional characters include: head depressed, covered with hard bony plates that are firmly sutured. Eyes small, ovoid. Four pairs of barbels with thick fleshy bases that gradually taper toward tip. Frontal fontanelle is short and squat. Occipital fontanelle is small and oval-shaped. Occipital process is short and broadly rounded. Anterior margin of pectoral-fin spine with 14–18 strong serrae. Body dark brown, without dark blotches.

Habitat: Our four specimens of *C. meladerma* were collected from a small slowly-flowing stream in swampy forest. Juveniles of *C. meladerma* were also observed in a stream with slowly-flowing water and aquatic vegetation. The watershed drains into the Mekong River at Tboung Khla Village, Omresh Commune, Siem Bok District, Stung Treng Province. The species has also been reported from coastal streams draining the Cardamom Mountains in the Preah Sihanouk and Koh Kong provinces (So *et al.*, 2018; Taki *et al.*, 2021).

Remarks: Meristic and morphometric characters for specimens from the Mekong River basin agree closely with those of specimens from the Cardamom Moun-

Table 1 Morphometric and meristic data for specimens of *Clarias meladerma* Bleeker, 1846 from Cambodia.

Morphometric characters	Mekong River basin (n=4)		Cardamom Mountains (n=4)	
	Range	Mean \pm SD	Range	Mean \pm SD
Total length (mm)	157.0–202.0	178.50 \pm 23.30	222.0–270.0	241.50 \pm 20.29
Standard length (mm)	135.0–175.0	154.00 \pm 21.46	190.0–235.0	209.50 \pm 18.73
As % of standard length				
Predorsal length	26.83–28.68	27.56 \pm 0.80	26.73–28.40	27.81 \pm 0.79
Preanal length	47.75–50.70	48.68 \pm 1.36	46.36–50.73	47.78 \pm 2.02
Prepelvic length	40.86–43.98	42.46 \pm 1.28	39.08–42.99	40.95 \pm 2.07
Prepectoral length	18.49–21.02	19.92 \pm 1.09	18.40–19.71	19.04 \pm 0.58
Length of dorsal fin base	70.05–74.13	72.09 \pm 1.68	71.15–75.12	73.08 \pm 1.71
Anal fin base length	50.46–52.54	51.23 \pm 0.92	51.05–55.29	52.48 \pm 1.96
Pelvic fin length	7.10–8.63	8.01 \pm 0.65	7.65–9.05	8.40 \pm 0.63
Pectoral fin length	12.74–14.75	13.51 \pm 0.89	13.69–14.72	14.24 \pm 0.45
Pectoral spine length	8.88–11.15	10.00 \pm 1.00	9.15–13.33	11.45 \pm 2.12
Caudal fin length	15.01–16.24	15.86 \pm 0.57	13.36–15.24	14.34 \pm 0.90
Distance between occipital process & dorsal fin	3.67–4.51	4.17 \pm 0.41	2.90–3.75	3.36 \pm 0.35
Caudal peduncle depth	4.79–6.16	5.61 \pm 0.63	5.32–6.14	5.78 \pm 0.37
Body depth at anus	16.51–18.96	17.98 \pm 1.06	16.19–18.51	17.46 \pm 0.96
Head length	23.12–25.27	24.24 \pm 0.91	23.49–24.61	24.24 \pm 0.52
Head width	17.86–18.35	18.16 \pm 0.21	17.56–19.83	18.7 \pm 0.94
Head depth	13.26–15.01	14.37 \pm 0.77	10.90–12.18	11.66 \pm 0.62
As % of head length				
Snout length	26.40–28.58	27.84 \pm 0.98	28.16–31.41	29.77 \pm 1.34
Interorbital distance	44.15–46.09	45.18 \pm 1.05	45.10–47.09	46.31 \pm 0.86
Eye diameter	6.20–8.05	7.09 \pm 0.83	5.30–6.06	5.59 \pm 0.34
Nasal barbel length	83.87–100.78	92.14 \pm 6.95	86.09–114.72	99.6 \pm 12.42
Maxillary barbel length	127.41–155.70	144.57 \pm 13.27	140.33–172.34	158.48 \pm 14.89
Inner mandibular barbel length	105.36–117.33	110.92 \pm 6.29	74.50–130.81	112.13 \pm 26.34
Outer mandibular barbel length	77.71–93.54	86.56 \pm 7.53	77.96–95.74	87.46 \pm 8.36
Front fontanel length	14.20–23.28	18.92 \pm 3.94	12.18–19.56	15.42 \pm 3.11
Front fontanel width	7.91–11.13	9.62 \pm 1.61	8.20–11.54	9.21 \pm 1.57
Occipital fontanelle length	10.52–15.24	12.34 \pm 2.14	8.89–12.40	10.63 \pm 1.48
Occipital fontanelle width	6.63–14.03	9.47 \pm 3.19	5.47–6.73	6.35 \pm 0.59
Occipital process length	12.18–14.03	12.87 \pm 0.82	10.19–14.67	13.19 \pm 2.04
Occipital process width	50.16–58.25	54.21 \pm 3.41	50.39–52.01	51.44 \pm 0.72
Meristic counts				
Dorsal fin ray number	66–68	66.75 \pm 0.96	65–68	66.50 \pm 1.29
Pectoral fin ray number	7–8	7.50 \pm 0.58	8–9	8.75 \pm 0.50
Pelvic fin ray number	6–6	6 \pm 0.00	6–6	6.00 \pm 0.00
Anal fin ray number	55–56	55.25 \pm 0.50	55–60	57.25 \pm 2.22
Serrae number	14–17	15.75 \pm 1.26	18–18	18.00 \pm 0.00

Note: Morphometric data as well as total and standard lengths were measured to the nearest 0.01 mm.



Fig. 2 Dorsal views of *Clarias meladerma* Bleeker, 1846 from Stung Treng Province (RUAFI-F00002, upper panel) and the Cardamom Mountains (IFReDI-P06486, middle panel) and *C. macrocephalus* Günther, 1864 from Siem Reap Province (RUAFI-F00120, lower panel), Cambodia.

Fig. 3 Lateral views of *Clarias meladerma* Bleeker, 1846 from Stung Treng Province (RUAFI-F00002, upper panel) and the Cardamom Mountains (IFReDI-P06486, middle panel) and *C. macrocephalus* Günther, 1864 from Siem Reap Province (RUAFI-F00120, lower panel), Cambodia.



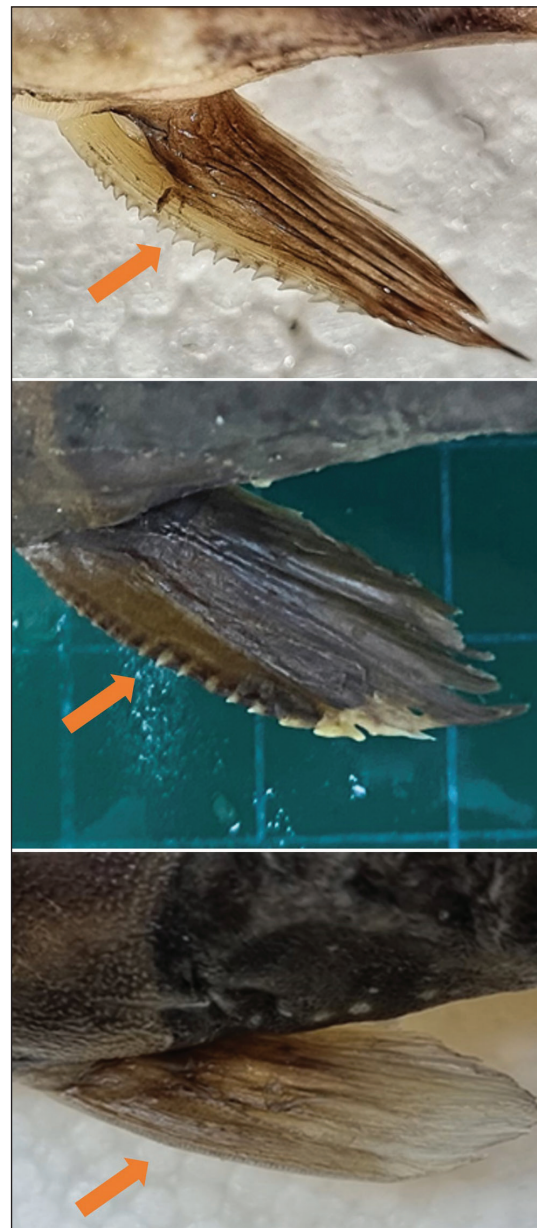


Fig. 4 Lateral view of *Clarias meladerma* Bleeker, 1846 (IFReDI-P06012) from the Cardamom Mountains, Cambodia.

tains (Fig. 3 & 4) and Sumatra (Ng & Kottelat, 2014: Fig. 3), except for the absence of dark blotches on body and head. Despite this difference in colouration, all other characters support our identification of the Mekong specimens as *C. meladerma*. Rainboth (1996) reported *C. meladerma* from the Mekong delta in Vietnam, but this was not a specimen-based record. It might be possible that our specimens represent *C. macrocephalus*, which is a morphologically similar species known from the Mekong River drainage that has a rounded occipital process like *C. meladerma*. However, this is precluded by the presence of a distinctly serrated (vs. smooth in *C. macrocephalus*) anterior edge of the pectoral spine in our specimens (Fig. 5).

Clarias meladerma was described from Indonesia and has been reported widely from mainland Southeast Asia, the Philippines and Phu Quoc Island (Rainboth, 1996; Ferraris, 2007; Vidthayanon, 2008; Vasil *et al.*, 2013; Ng & Kottelat, 2014). In previous studies, *C. meladerma* was recorded from the Mekong delta in Vietnam (Rainboth, 1996; Vidthayanon, 2008; Rainboth *et al.*, 2012) and from the Mekong River basin in Laos (Kottelat, 2000, 2001), but later studies based on specimen examination confirmed that *C. meladerma* was not found in the Mekong delta (Ng & Kottelat, 2014) and concluded that specimens were required to confirm its occurrence in the Mekong basin in Laos, Thailand, Cambodia and Vietnam (Taki *et al.*, 2021). According to Kottelat (2000, 2001), *C. meladerma* from Laos was based on a photographic record from the Mekong River basin in Boeng Kan Province, Thailand.

Fig. 5 Left pectoral spines of *Clarias meladerma* Bleeker, 1846 from Stung Treng Province (RUAFI-F00002, upper panel) and the Cardamom Mountains (IFReDI-P06486, middle panel) and *C. macrocephalus* Günther, 1864 from Siem Reap Province (RUAFI-F00120, lower panel), Cambodia.



Ng & Kottelat (2014) examined one photograph of an individual from Boeng Khong Long wetland in Boeng Kan Province and tentatively treated this as *C. meladerma* based on the serrated anterior edge of the pectoral spine, a caudal peduncle depth of about 5% and presence of black blotches on the body. In Cambodia, *C. meladerma* has been collected from the Cardamom Mountains outside of the Mekong basin (So *et al.*, 2018; Taki *et al.*, 2021). So *et al.* (2018) reported the occurrence of *C. meladerma* from the Tonle Sap Lake (within the Mekong basin), but did not retain voucher specimens or photographs from the survey. As such, the present study constitutes the first specimen-based confirmation of *C. meladerma* from the Cambodian Mekong drainage. Past records of *C. meladerma* from the drainage may have been misidentifications of *C. macrocephalus* due to the outward similarity of both species. As a result, future studies should incorporate morphological and molecular analyses to confirm the identification of potential specimens of *C. meladerma* from the Mekong River basin.

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