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NOTES ON GEOGRAPHIC DISTRIBUTION

Southernmost record of *Stiphodon multisquamus* Wu & Ni, 1986 (Gobiiformes, Oxudercidae) from Dak Lak Province, Vietnam

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Abstract. *Stiphodon multisquamus* Wu & Ni, 1986 is a species of goby previously thought to be endemic to Hainan Island, southern China. Recently, it has been recorded from the southern Chinese mainland, southern Japan, and Da Nang, Central Vietnam. Here we report the southernmost record of this species from Dak Lak Province, Vietnam. This is a range extension of over 400 km into southern Vietnam. Updated maps showing the species distribution are also provided.

Key words. Geographic distribution, goby fish, range extension, taxonomy

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Introduction

The genus *Stiphodon* Weber, 1895 (Gobiiformes, Oxudercidae, Sicydiinae) is currently comprised of 34 species (Fricke et al. 2026). These species inhabit freshwater streams in tropical and subtropical river systems from Sri Lanka and the western coast of Sumatra, Indonesia, across the Indian Ocean to southern Japan, northeastern Australia, and French Polynesia in the Pacific (Wu and Ni 1986; Watson 1995; Ebner and Thuesen 2010; Maeda and Tan 2013; Maeda et al. 2015; Kunishima et al. 2021). *Stiphodon aureorostrum* Chen & Tan, 2005, originally described from Tioman Island, Malaysia, is now regarded as a junior synonym of *S. multisquamus* Wu & Ni, 1986. Wu (2008) first described the male morphology based only on one male specimen from southern Hainan in 1986. Thereafter, it has been recorded from Guangdong in southern China (Nip 2010), Okinawa-jima island, southern Japan (Maeda and Saeki 2013), and Da Nang, Central Vietnam (Maeda et al. 2015). Recently, we found a population of *S. multisquamus* in southernmost Vietnam. This find not only contributes valuable data to the science but also establishes a foundation for future research. The taxonomy of the genus *Stiphodon* remains poorly established (Maeda 2013; Maeda and Herminie 2015), and this is continues to be a challenging issue.

In the present study, we report of *S. multisquamus* in south-central Vietnam based on four specimens collected from the Ky Lo River, Dak Lak Province. This find represents a significant southward range extension of over 400 km for the species.

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Methods

Four specimens of *Stiphodon multisquamus* were collected by hand-net and cast-net (three males and one female) and deposited at Thu Dau Mot University (TDMU), Ho Chi Minh City, Vietnam. All counts and measurements were made from specimens preserved in 70% ethanol. Morphometric methods follow Miller (1988), and meristic methods follow Akihito et al. (1984), Chen and Shao (1996), and Chen et al. (1999a, 1999b). Meristic abbreviations are as follows: A = anal fin; C = caudal fin; D_1 = first dorsal fin; D_2 = second dorsal fin; LR = longitudinal scale rows; P_1 = pectoral fin; P_2 = pelvic fin; VC = vertebral count.

Measurements were made point-to-point, to the nearest 0.1 mm using dial callipers or dividers under a stereomicroscope and expressed as a percentage of standard length (SL). Tooth counts of the upper and lower jaws were taken from the right side of the symphysis, with dentition terms following Watson (2008). Previous *Stiphodon* occurrence records were downloaded from GBIF (2024), and the distribution map was prepared using R (R Core Team 2024) with the "sf" (Pebesma 2018) and "ggspatial" packages (Dunnington 2023).

Results

***Stiphodon multisquamus* Wu & Ni, 1986**
Figure 1, Table 1

New records (Figure 2). VIETNAM — **Dak Lak Province** • Dong Xuan District, Phu Mo Commune, Phu Giang village, Ky Lo River; 13°33′04.9″N, 108°48′45.5″E; 150 m alt.; 06.VIII.2025; Ty Minh Nguyen leg; 4 specimens, TDMU 250806.

Identification. Morphological analysis of the four specimens collected from Ky Lo River, Dak Lak Province, and comparison with the original description of *S. multisquamus* and data provided from Han River Da Nang by Maeda et al. (2015) shows that the specimens matched this species in all respects. Details are as follows.

The fish has an elongated body, with the anterior part of the head cylindrical and slightly compressed posteriorly. The head is slightly concave, with a round snout that protrudes beyond it. The anterior nostril is short and tubular. The mouth is inferior, with the upper jaw projecting outwards. The upper lip is thick and smooth. The premaxilla teeth number 43–66 fine and tricuspid, mandibular teeth are canine-like (the number of teeth ranges from 1 to 5 in males, and 2 in females), and dentary has 44–65 horizontal teeth. The genital papilla is rounded in males but rectangular and projects from

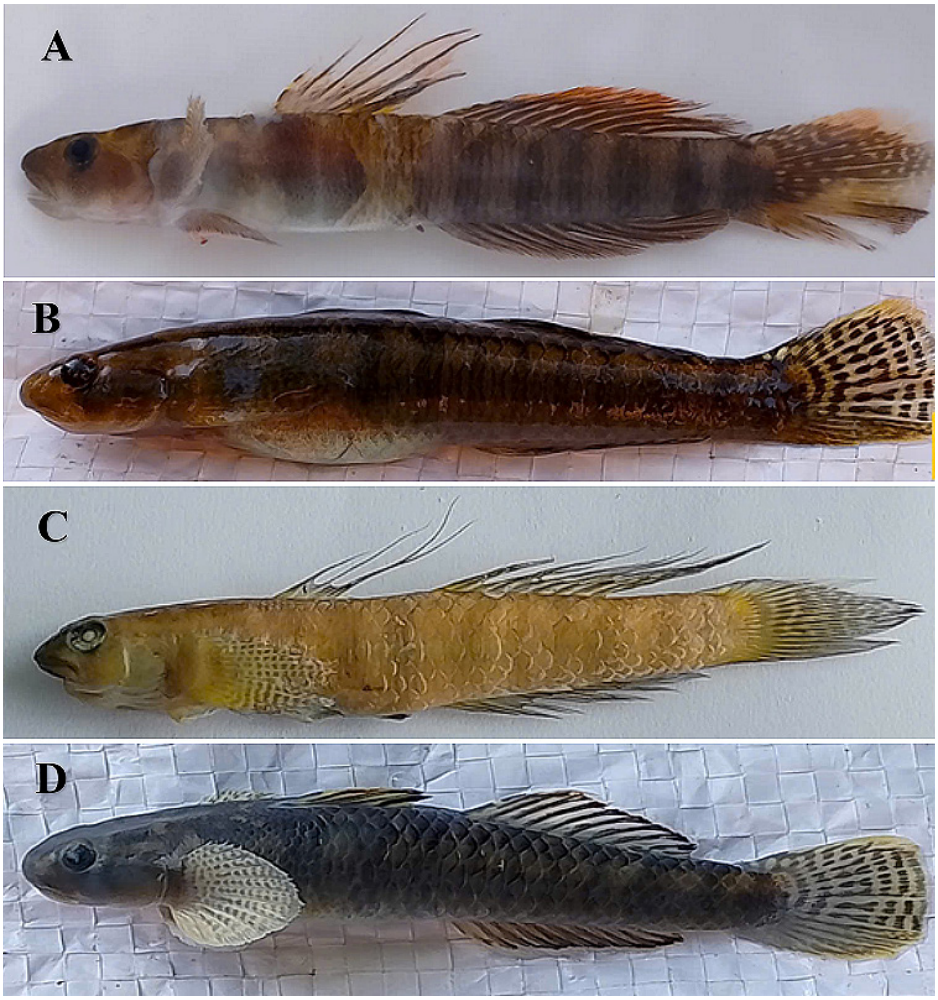

Figure 1. *Stiphodon multisquamus* from Dak Lak Province, Vietnam. **A, B.** Fresh catch. **C, D.** Preserved specimen (TDMU 250806). **A, C.** Male, 61.2 mm SL. **B, D.** female, 52.0 mm SL. All photographs by TMN.

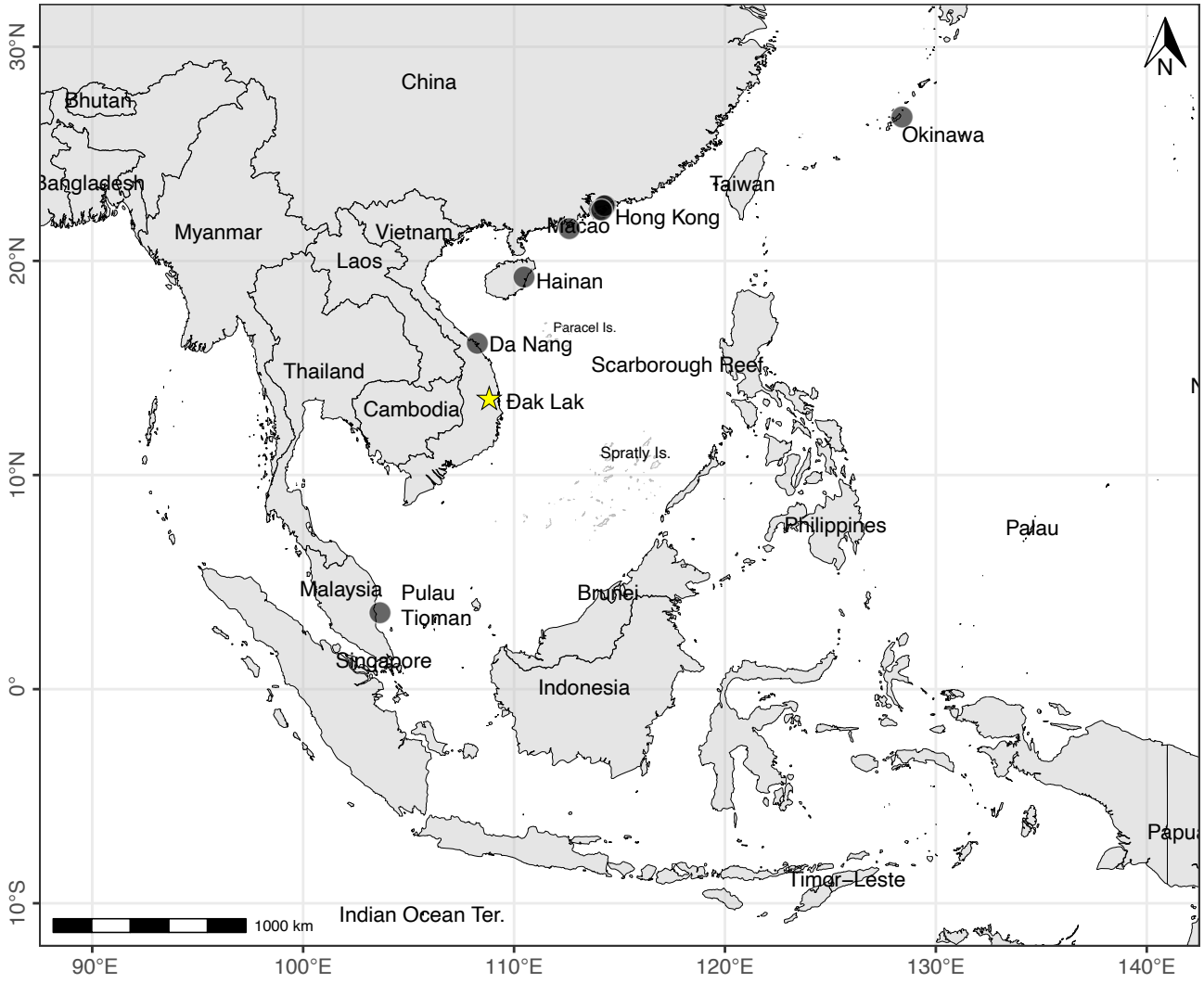

Figure 2. Distribution map of records of *Stiphodon multisquamus*. Yellow star indicates the new record from southcentral Vietnam. Black circles indicate previous records based on GBIF (2024).

the posterior margin in females. The first dorsal fin in males has 3 or 4 elongated rays, while it is short in females. The main meristic counts of the preserved specimens are as follows: dorsal fins D_1 VI; D_2 I, 9; anal fins I, 10; pectoral fins I, 15; pelvic fins I, 5; caudal fin with 13 branched and 17 segmented rays; scales in a longitudinal series 35–37; circumpeduncular scales15; and vertebrae 26. The percentage ratios of morphometric characters are presented in Table 1.

Colour in life. The colouration of male and female fish can change depending on the water conditions. Male fish are often more colourful than female fish, especially their fins.

In male fish (Figure 1A), the base of the back is dark, the sides are light brown, the belly is light grey, and the head and base of the pectoral fins are dark. The dorsal fin is pink. There are 9–11 black horizontal stripes on the trunk and caudal peduncle. The first spine of the dorsal fin is black. The caudal and pectoral fins have black-dotted bands.

In female fish (Figure 1B), the body base and head are cream or completely dark. The belly is light grey; the black stripe extends from the snout and upper lip to below the eye and to the middle of the pectoral fin base and extends to the posterior end of the caudal peduncle through the mid-lateral line. The caudal fin and pectoral fins have black-dotted bands. There are 9–11 black horizontal stripes on the trunk and caudal peduncle.

Habitat notes. This species is found in a small tributary of the Ky Lo River near Phu Giang village, La Hien Mountain, at 150 m above sea level, Phu Mo Commune, Dong Xuan District, Dak Lak Province, Vietnam. It occurs in shallow, slow-flowing water, at a depth of 20–50 cm, where the bottom material is gravel and boulders (Figure 3).

Table 1. Morphometrics of *Stiphodon multisquamus* from Ky Lo River, Province Dak Lak and Han River, Da Nang City, Vietnam, expressed as a percentage of standard length.

Morphometrics	Dak Lak Province		Da Nang City (Maeda et al. 2015)	
	Male (*n* = 3)	Female (*n* = 1)	Male (*n* = 22)	Female (*n* =22)
Standard length (mm)	44.2–61.2	52.0	31.9–64.0	29.8–51.9
Head length (mm)	24.6–25.8	23.0	21.9–24.5	21.3–23.7
% of standard length				
Postorbital length of head	10.5–13.1	11.0	9.2–11.9	9.7–11.4
Body depth at P_2 origin	12.1–15.8	14.4	12.3–16.1	12.3–14.0
Body depth at A origin	14.2–16.5	14.7	13.2–17.1	14.2–16.0
Depth at caudal peduncle	10.0–11.3	11.7	9.7–12.3	9.6–11.5
Predorsal length	34.2–36.1	35.5	32.6–35.7	33.4–36.5
Length of caudal peduncle from A base	19.2–22.1	20.0	17.8–20.4	17.2–19.3
Length of D_1 base	18.1–21.3	22.1	15.3–20.5	16.4–19.8
Interval between D_1 and D_2 bases	4.2–6.1	6.8	3.4–6.8	3.4–7.0
Length of D_2 base	24.5–26.3	24.5	24.4–26.9	22.1–25.7
Length of D_2	40.4–45.6	38.4	37.2–48.4	29.2–35.2
Length of A base	24.2–28	25.6	25.2–29.0	22.5–26.8
Length of longest spine of D_1	15.7–25.7	17.1	21.2–29.6	15.3–19.8
Length of A	33.0–44.5	29.1	36.9–42.4	22.5–26.8
Length of P_1	18.2–20.7	19.4	17.8–21.3	15.3–19.8
Length of C	22.1–26.5	25.0	23.6–28.1	19.8–23.3
Anus to A length	3.3–4.6	4.8	2.2–4.4	3.3–5.6
Preanal length	51.5–60.4	63.0	51.9–54.9	53.1–65.5
Eye diameter	5.2–6.0	6.1	4.5–6.0	4.5–6.4
Snout length	8.1–9.8	10.0	7.6–10.5	7.3–9.9

Remarks. The morphological analysis and description of the *Stiphodon* species, based on four specimens, are as follows: scales in a longitudinal series with 35–37 vs. 31–38, scales around the caudal peduncle (15), pectoral fin with 15 vs. 15 or 16 soft rays. Premaxillary teeth count (43–66), and a row of unicuspid, horizontal teeth enclosed in fleshy sheath with (44–65 vs. 44–67). Number of vertebrae 26.

Comparative material examined.

Stiphodon multisquamus Wu & Ni, 1986

VIETNAM • Ky Lo River, of which 3 ♂, TDMU.01, TDMU.02, TDMU.03; 1 ♀, TDMU.04. TDMU.01, TDMU.02, TDMU.03 (44.2–61.2 mm); TDMU.04 (52.0 mm SL). Their measurements are shown in Table 1.

Stiphodon aureorostrum (Chen & Tan, 2005)

MALAYSIA — **Pulau Tioman** • Sungai Keliling; 24.VI.1999; P. K. L. Ng et al, 1 ♂, 1 spec, ZRC 45410 • same locality; VI.1999; H. H. Tan, 1 ♀, 1 spec, ZRC 46414. ZRC 45410 (45.4 mm SL, paratype). ZRC 46414 (42.4 mm SL).

Stiphodon pelewensis (Herre, 1936)

MALAYSIA — **Pulau Tioman** • Babelthuap Island; 17.VIII.2008; 4 spec, OMNH-P 34791, 34792, 35269, 35270. OMNH-P 34791, 34792, 35269, 35270 (4 spec, 30.4–37.3 mm SL).

Stiphodon maculidorsalis (Maeda & H. H. Tan, 2013)

INDONESIA — **Sumatra** • IX.2004; 1 spec, MZB 17213 • same locality; 18.III. 2008; 4 spec, ZRC 51445 • same locality; 4 spec, ZRC 51822, same data as holotype • same locality; 22.I.2009; 3 spec, ZRC 51836. MZB 17213 (43.7 mm SL, holotype). ZRC 51445 (25.4–32.5 mm SL, 4 paratypes). ZRC 51822 (37.2–47.0 mm SL, 4 paratypes). ZRC 51836 (49.8–54.8 mm SL, 3 paratypes).

Stiphodon ornatus (Meinken, 1974)

INDONESIA — **Sumatra** • 1973; 1 spec, SMF 12493 • same locality; 4 spec, SMF 12494 • same locality; XI.1971; 1 spec, SMF 17932 • same locality; IX.2001; 11 spec, ZRC 46620. SMF 12493 (37.8 mm SL and 39.5 mm SL, 2 syntypes). SMF 12494 (4 spec, 25.0–42.9 mm SL). SMF 17932 (30.6 mm SL). ZRC 46620 (11 spec, 44.9–51.8 mm SL).

Stiphodon semoni (Weber, 1895)

INDONESIA — **Ambon** • 1893; 1 spec, ZMA 110.972 • same locality; 3 spec, ZMA 121.252, same data as lectotype — **Sumatra** • 18.III.2008; 1 spec, ZMA 121.254, same data as lectotype • same locality; 12 spec, ZRC 54112. ZMA 110.972 (29.0 mm SL, lectotype). ZMA 121.252 (27.0–28.6 mm SL, 3 paralectotypes). ZMA 121.254 (30.1 mm SL, paralectotype). ZRC 54112 (12 spec, 26.2–35.0 mm SL)

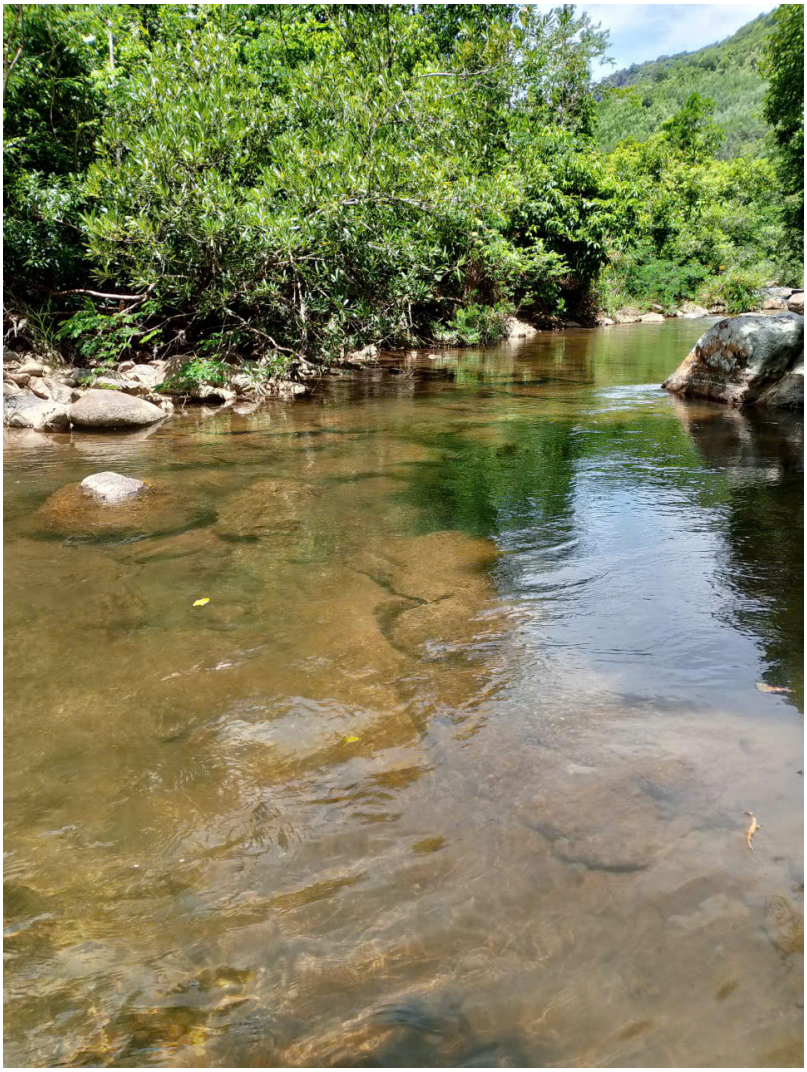

Figure 3. Sampling site of *Stiphodon multisquamus* in Ky Lo River, Phu Giang village, Phu Mo Commune, Dong Xuan District, Dak Lak Province, Vietnam.

Stiphodon atratus (Watson, 1996)
INDONESIA — **Waigeo Island** • IV.1990; 1 spec, SMF 27242 — **Papua** • 15.XI.1982; 2 spec, WAM P.27862-006. SMF 27242 (37.0 mm SL, holotype). WAM P.27862-006 (26.6 mm SL and 31.7 mm SL, 2 paratypes).

Stiphodon weberi (Watson, Allen & Kottelat, 1998)
INDONESIA — **Ambon** • 1893; 1 spec, ZMA 121.253 — **Yapen** • 10.VII.1995; 2 spec, WAM P.31038-002. ZMA 121.253 (35.8 mm SL, holotype). WAM P.31038-002 (23.9 mm and 25.2 mm SL, 2 paratypes).

Stiphodon carisa (Watson, 2008)
INDONESIA – **Sumatra** • 25.X.2005; 4 spec, MNHN 2006-1604, 2006-1605, 2006-1606, 2006-1607. MNHN 2006-1604, 2006-1605, 2006-1606, 2006-1607 (26.9–35.2 mm SL, 4 paratypes).

Stiphodon pulchellus (Herre, 1927)
PHILIPINES — **Negros** • 15.VI.1931; 1 spec, CAS-SU 26360 — **Culion** • 19.IV.1931; 9 spec, CAS-SU 26359 • same locality; 28.IV.1931; 1 spec, CAS-SU 26362. CAS-SU 26360 (50.5 mm SL, neotype). CAS-SU 26359 (9 spec, 45.5–59.9 mm SL). CAS-SU 26362 (55.2 mm SL).

Stiphodon martenstyni (Watson, 1998)
SRI LANKA **— Sabaragamuwa Province** • I.1981; 2 spec, SMF 27049, SMF 27049. SMF 27049, SMF 27049 (34.5 mm SL, holotype).

Stiphodon elegans (Steindachner, 1879)
FRENCH POLYNESIA — **Moorea** • 7.XII.2006; 11 spec, URM-P 45016–45018, 45020–45027. URM-P 45016–45018, 45020–45027 (11 spec, 27.2–40.2 mm SL).

Discussion

Four specimens of a *Stiphodon* species were collected from the Ky Lo River, Dak Lak Province (three males and one female). After careful morphological examination, we have confirmed these to be *S. multisquamus*, and our new record represents a range extension of over 400 km south from the nearest record of the species. Additionally, this new record represents a range extensions of this genus to south-central Vietnam, an area with a poorly described ichthyofauna. Our new record is also significant in that it suggests that south-central Vietnam is undersampled and requires further collecting. This study adds to the biodiversity data for the freshwater fish fauna of Vietnam, and although the descriptive data for *S. multisquamus* remain incomplete, future studies using molecular methods with additional specimens will be crucial, particularly if using the complete mitogenome data.

The new record highlights biogeographical and evolutionary corridors in Vietnam; it is not merely an increase in spatial distance, but suggests the historical existence of hydroecological corridors that facilitated species to overcome the unique geographical and climatic barriers of the Central Vietnam (Kottelat 1989).

The colonization of geographically separated new habitats demonstrates that *S. multisquamus* has a wide ecological range and high adaptability to varied local environments. This helps reduce intraspecific competition, optimizes the exploitation of natural resources, and reduces the risk from environmental changes (Dang et al. 2002). Geographic barriers and the isolation of river systems harbour high proportions of endemic fish species, and only individuals adapted to these new environmental conditions are selected to form distinct evolutionary units, eventually leading to the formation of geographical species (Kottelat 1989). This finding not only elucidates the functional role of the species within the biome structure of its distribution range but also raises an urgent requirement to reassess interregional conservation strategies. Such efforts are essential to maintain population connectivity and preserve fish biodiversity, specifically *S. multisquamus* within a fluctuating ecosystem.

We hope that the new data presented here can provide basic taxonomic knowledge for proper management and conservation of wild *Stiphodon* populations in Vietnam.

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Additional information

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

Author contributions

Conceptualization: TMN, TQH. Data curation: TNM. Formal analysis: TMN. Investigation: TMN. Methodology: TMN. Supervision: TNM. Visualization: TMN, XBNL. Writing–original draft: TMN. Project administration: TMN. Writing–review and editing: TMN, XBNL, TQH, HLTT.

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Data availability

All data that supports the findings of this study are available in the main text.

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