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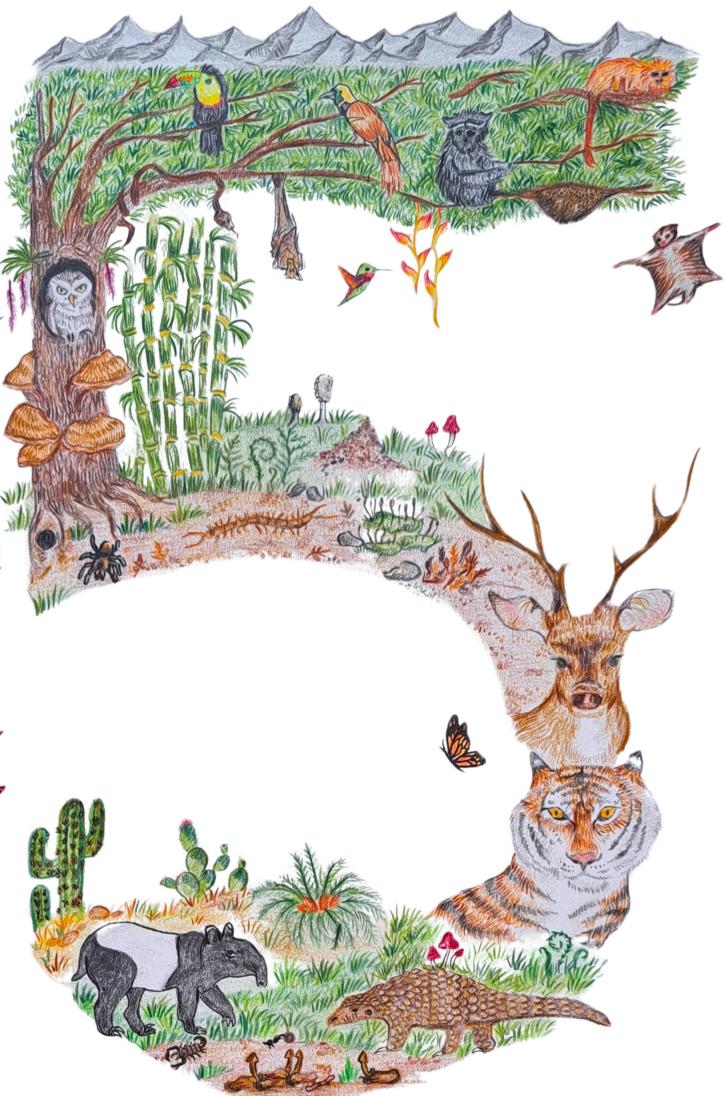
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43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

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Cover: The breathtakingly beautiful Silver Jubilee cover of JoTT is done in color pencils and ink by the 13-year old darling, Elakshi Mahika Molur.



Records of three gobioid fishes (Actinopterygii: Gobiiformes: Gobiidae) from the Gujarat coast, India

Piyush Vadher¹ , Hitesh Kardani² , Prakash Bambhaniya³  & Imtiyaz Beleem⁴ 

^{1,2,3} Fisheries Research Station, Junagadh Agricultural University, Sikka, Jamnagar, Gujarat 361140, India.

⁴ Estonian Marine Institute, University of Tartu, Mäealuse 14, Tallinn, Estonia 12618.

¹ vadherpiyush4@gmail.com, ² hiteshkardani@gmail.com (corresponding author),

³ prakashbambhaniya72@gmail.com, ⁴ imtiyazbeleem@gmail.com

Abstract: We report for the first time three gobioid fishes: *Amblygobius semicinctus* (Bennett, 1833), *Istigobius diadema* (Steindachner, 1876), and *Yongeichthys nebulosus* (Forskål, 1775) from the Gujarat coast of India. We present short descriptions with species diagnostic characters, habitat and present distributions.

Keywords: Coral reef, first record, gobies, Gulf of Kachchh, lower intertidal zone.

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Author details: PIYUSH VADHER is working as senior research fellow in Fisheries Research Station, KU, Sikka. He has been involved in the research since 2014. He has been engaged in the survey, breeding and larval rearing of Molluscan, Crustacean, Ichthyofaunal and Plankton culture. HITESH KARDANI is working as assistant professor in Fisheries Research Station, KU, Sikka. He is involved in teaching and research since 2005. His area of interest is Plankton, Molluscan, Crustacean and Ichthyofaunal diversity. He has been engaged in captive breeding of marine molluscan and their conservation by sea ranching of their larvae. IMTIYAZ BELEEM holds the position of research fellow at the Estonian Marine Institute, University of Tartu, Estonia, within the Department of Marine System. His current focus involves studying alien species and marine fauna within the Baltic Sea. PRAKASH BAMBHANIYA is working as junior research fellow in Fisheries Research Station, KU, Sikka. He has been involved in the research since 2016. He has been engaged in the survey, breeding and larval rearing of Molluscan and Plankton culture.

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UNIVERSITY OF TARTU
Estonian Marine Institute



INTRODUCTION

Gobiidae (Cuvier, 1816) is a large and geographically widespread fish family encompassing 171 genera/subgenera and 1,401 species/subspecies (Scharpf & Lazara 2023). Gobioids are mostly small to medium-sized (up to 30 cm, usually less than 10 cm) bottom-dwelling cryptic fishes found in tropical to temperate marine, freshwater and brackish water ecosystems (Murugan & Namboothri 2012; Parenti 2021). They live in sheltered areas such as sandy areas, coral reefs, aquatic weeds, rubbles, and rock crevices (Murdy & Hoese 2002; Thacker & Roje 2011; Parenti 2021). They feed on various invertebrates such as polychaetes, crustaceans, mollusks, sponges and insects, plus algae and plankton (Parenti 2021). A few species are associated with different organisms such as coral, sponges, shrimp and other fishes (Murdy & Hoese 2002; Herler et al. 2009). Gobiidae comprises 190 species belonging to 71 genera, distributed in India (Gopi & Mishra 2015), of which about 75% (143 species belonging to 28 genera) have been recorded from the Andaman & Nicobar Islands (Rajan & Mishra 2018). Several authors reported gobioid fishes (17 species; 13 genera) in Gujarat waters (Soni & George 1986; Barman et al. 2000; Bhatt et al. 2009; Shukla 2014; Bhakta et al. 2018, 2021; Thakkar et al. 2018; Kumar et al. 2022). In the present study, we report the occurrence of three gobioid fish from the Gujarat coast for the first time. As a result, a total of 20 species from 16 genera have been recorded from Gujarat to date (Table 1).

MATERIALS AND METHODS

The present study was conducted at the Sikka coast (22.458°N , 69.801°E) in the Gulf of Kachchh, Gujarat. The lower intertidal area of the Sikka coast consists of a sandy-rocky substratum and several tide pools surrounded by dead and living coral reefs and pebbles. Live specimens were collected by scoop net from the lower intertidal area of the Sikka coast. The collected specimens were transferred to the laboratory of the Fisheries Research Station, Junagadh Agricultural University, Sikka. Fish was narcotized using menthol and clove oil for photography, fin formula, and meristic characteristics.

Individual specimens were observed and measured for various morphometric parameters, including total length, standard length, body depth, head length, orbit diameter, inter orbital width, caudal peduncle depth, predorsal length, prepelvic length, preanal length, base of first and second dorsal fin, pectoral, pelvic and

caudal fin length. Additionally, scales and fin rays were carefully examined for meristic counts, contributing to a comprehensive understanding of the fish's morphological profile. Special attention was given to variations in pigmentation and the presence of unique markings.

In meristic counts specific attention was directed towards the quantification of fin rays as a crucial morphological gobioid parameter. Fin rays were counted using the standardized procedure of Murdy (1989) and Gut et al. (2020). The counting process initiated from the anterior region of each fin and proceeded posteriorly, ensuring consistency across all specimens. To enhance precision, a magnifying glass was employed for smaller gobies, facilitating a meticulous examination of the individual rays. Fin ray counts were recorded for both the left and right sides of each fin, and any variations or anomalies were duly documented. Taxonomical identification was carried out through the standard taxonomic literature of Koumans (1941), Herre (1945), and Winterbottom & Emery (1986). The specimens were preserved in formaldehyde solution and deposited in the Museum of Fisheries Research Station, Junagadh Agricultural University, Sikka. The size of the specimen is indicated by the total length (TL) measured from the snout to the end of the caudal fin and the standard length (SL) measured from the snout to the base of the caudal fin (Table 2).

RESULTS

Phylum: Chordata Haeckel, 1874

Class: Actinopterygii Klein, 1885

Order: Gobiiformes Günther, 1880

Family: Gobiidae Cuvier, 1816

Genus: *Amblygobius* Bleeker, 1874

***Amblygobius semicinctus* (Bennett, 1833) (Image 1a)**

Gobius semicinctus Bennett, 1833, Proc. Zool. Soc. Lond., 1: 32 [type locality: Mauritius].

Amblygobius semicinctus Parenti, 2021, Iran. J. Ichthyol., 8 (Suppl. 1): 90.

Materials examined: FRSCVG-09, 04 specimens, unsexed; SL: 70–94 mm; Sikka reef, Gulf of Kachchh, Gujarat, coll. Sidik Mepani, 17.v.2022.

Diagnosis: Dorsal fin rays VI, 15; anal fin rays I, 15; pectoral fin rays 19; caudal fin rays 16–17; pelvic fin rays 6. Dorsal spine - VI, 2nd, 3rd, 4th and 5th dorsal spine prolonged and filamentous which reaches up to the base of 1st to 5th ray of second dorsal fin; pelvic

fin with spine and joined with a frenum with five soft rays at both distal end; Lateral series scale 52–53 and lateral transverse scale rows 19–20; cycloid scales present on head and nape while ctenoid scales found at distally; predorsal scale 23–25, prepelvic and pectoral base scaled; gill rakers 0+7; gill opening restricted and opening extending to below a posterior third of opercle; snout obtusely rounded; mouth terminal, inclined dorsally; upper jaw with multiple rows of conical teeth; two enlarged canines on sides, approximately one-third of distance towards the cleft of mouth. Anterior nostril tubular and marked with dark pigment, posterior nostril pore-like. Colour is highly variable. Body is typically greyish brown or dark brown on the dorsal side, grading to yellow-brown on the ventral side, and the ventral half of the head has little blue-green dots and short lines. On the upper part of the body, there are typically 4 or 5 narrow black bars, a double band of dark brown colour running from the front of the nose to the eye, and three parallel rows of dark-edged orange dots on the nape. Cream-colored chest and pectoral bases with tiny yellow-brown spots. Three visible black spots on the second dorsal fin. Two black spots on the caudal fin. A black patch is visible on the caudal peduncle.

Habitat: The species is commonly found on the sandy bottom, dead coral crevices and tide pools.

Distribution: Eastern Africa and Scyphellus to Andaman Sea (Allen & Erdmann 2012); western Indian Ocean (Parenti 2021).

India: Andaman & Nicobar Islands (Ramakrishna et al. 2010). Presently this species is reported for the first time from the Gulf of Kachchh, Gujarat, India.

Remarks: Taxonomical characteristics of the present specimen examined agree well with the detailed description of Winterbottom & Emery (1986). *Amblygobius semicinctus* resembles its closely related congeners *Amblygobius albimaculatus* (Rüppell, 1830) but it is immediately distinguished in having a black spot on the upper hypural/caudal fin region and other details (Lachner & Gomon 1974).

Genus: *Istigobius* Whitley, 1932

Istigobius diadema (Steindachner, 1876) (Image 1b)

Gobius diadema Steindachner, 1876, *Sitzungsber. Akad. Wiss. Wien*, 74: 232 [type locality: Hong Kong, South China Sea].

Ctenogobius perspicillatus Herre, 1945, *Copeia*, 1: 5 [type locality: Vizagapatnam, Andhra Pradesh, India].

Istigobius diadema Parenti, 2021, *Iran. J. Ichthyol.*, 8(Suppl. 1): 187.

Materials examined: FRSCVG-02, 04 specimens,

unsexed; SL: 46 – 80 mm; Sikka reef, Gulf of Kachchh, Gujarat, coll. Sidik Mepani, 18.v.2022.

Diagnosis: Dorsal fin rays VI, 11–12; anal fin rays 10–11; pectoral fin rays 18–19; caudal fin rays 16–17; pelvic fin rays 5. Cheeks and operculum scaleless, lateral series scale 31–32 and lateral transverse scale rows 10–11, mouth inferior with a rounded overhanging snout. The body moderately elongated and upper half of sides pale grey to brownish colour pattern that fades to white on the lower half; presence of a bold dark black line running from rear edge of eye to above base of the pectoral fin; a dark spot mottled on anal, pelvic as well as lower part of caudal fin; fully united pelvic fins, presence of well-developed frenum; caudal fin rounded, gill opening not extending anteriorly to a vertical through pre-opercular margin, sensory canals and pores present on the head. Scale ctenoid except for breast, operculum and pectoral fin base, a pair of short sensory papillae just behind chin, a dark stripe connecting both the eyes anteriorly.

Habitat: It is sand-dwelling and reef-associated fish, generally found in a sandy area surrounded by live and dead coral colonies.

Distribution: India to northern Australia, north to Hong Kong (Parenti 2021).

India: Goa (Sreekanth et al. 2015, 2018); Tamil Nadu (Kumar et al. 2015; Moulitharan et al. 2021); Andhra Pradesh (Herre 1945); Andaman & Nicobar Islands (Devi & Chakkavarthy 2010). Presently, this species is reported for the first time from the Gulf of Kachchh, Gujarat, India.

Remarks: The taxonomical characters of the present specimen examined agree well with the detailed description of Herre (1945). *Istigobius diadema* closely resembles *Istigobius goldmanni* (Bleeker, 1852) but it is differentiated in a greater number of predorsal scales (17 vs. 7–9 in *I. goldmanni*); lesser first dorsal fin rays (6 vs. 7 in *I. goldmanni*) and having a uniquely thick, single black stripe on post-orbital to the point of the shoulder adjacent to dorsal fin origin on both sides of the head (Bleeker 1852; Bray 2023).

Genus: *Yongeichthys* Whitley, 1932

Yongeichthys nebulosus (Forsskål, 1775) (Image 1c)

Gobius nebulosus Forsskål, 1775, *Descr. Animalium*, 24, x [type locality: Jeddah, Saudi Arabia, Red Sea].

Gobius brevifilis Valenciennes in Cuvier & Valenciennes, 1837, *Hist. Nat. Poiss.*, 12: 90. [type locality: Puducherry, India].

Yongeichthys nebulosus Parenti, 2021, *Iran. J. Ichthyol.*, 8(Suppl. 1): 257.

Materials examined: FRSCVG-08, 04 specimens,



Image 1. a—*Amblygobius semicinctus* (Bennett, 1833) | b—*Istigobius diadema* (Steindachner, 1876) | c—*Yongeichthys nebulosus* (Forskål, 1775). © Fisheries Research Station, Junagadh Agricultural University, Sikka.

Table 1. Checklist of gobioid fishes recorded in Gujarat water.

	Genus	Species	References (Gujarat water)
Family: Gobiidae			
1	<i>Odontamblyopus</i>	<i>Odontamblyopus rubicundus</i> (Hamilton, 1822)	Shukla 2014
2	<i>Taenioides</i>	<i>Taenioides anguillaris</i> (Linnaeus, 1758)	Shukla 2014
3	<i>Trypauchen</i>	<i>Trypauchen vagina</i> (Bloch & Schneider, 1801)	Thakkar et al. 2018
4	<i>Acentrogobius</i>	<i>Acentrogobius andhraensis</i> (Herre, 1944)	Barman et al. 2000
5	<i>Amblygobius</i>	<i>Amblygobius semicinctus</i> (Bennett, 1833)	Present study
6	<i>Glossogobius</i>	<i>Glossogobius giuris</i> (Hamilton, 1822)	Barman et al. 2000
7	<i>Gobiopsis</i>	<i>Gobiopsis canalis</i> Lachner & McKinney, 1978	Kumar et al. 2022
8	<i>Istigobius</i>	<i>Istigobius diadema</i> (Steindachner, 1876)	Present study
9	<i>Parachaeturichthys</i>	<i>Parachaeturichthys polynema</i> (Bleeker, 1853)	Kumar et al. 2022
10	<i>Yongeichthys</i>	<i>Yongeichthys nebulosus</i> (Forsskål, 1775)	Present study
11	<i>Apocryptes</i>	<i>Apocryptes bato</i> (Hamilton, 1822)	Shukla 2014
12	<i>Boleophthalmus</i>	<i>Boleophthalmus boddarti</i> (Pallas, 1770)	Barman et al. 2000
13		<i>Boleophthalmus dussumieri</i> Valenciennes, 1837	Soni & George 1986; Shukla 2014
14	<i>Periophthalmodon</i>	<i>Periophthalmodon schlosseri</i> (Pallas, 1770)	Bhakta et al. 2018
15		<i>Periophthalmodon septemradiatus</i> (Hamilton, 1822)	Bhatt et al. 2009
16	<i>Periophthalmus</i>	<i>Periophthalmus barbarus</i> (Linnaeus, 1766)	Barman et al. 2000
17		<i>Periophthalmus waltoni</i> Koumans, 1941	Shukla 2014; Bhakta et al. 2021
18	<i>Pseudapocryptes</i>	<i>Pseudapocryptes elongatus</i> (Cuvier, 1816)	Bhakta et al. 2018
19	<i>Scartelaos</i>	<i>Scartelaos cantoris</i> (Day, 1871)	Barman et al. 2000
20		<i>Scartelaos histophorus</i> (Valenciennes, 1837)	Barman et al. 2000; Shukla 2014

unsexed; SL: 60–70 mm; Sikka reef, Gulf of Kachchh, Gujarat, coll. Piyush Vadher, 18.iv.2022.

Diagnosis: Dorsal fin rays VI, I, 9–10; anal fin rays I, 9–10; pectoral fin rays I, 18; caudal fin rays 16; pelvic fin rays I, 5. Body elongate and compressed. Head rounded, lower jaw longer than broad, mouth small aligned with anterior margin of the eye. Head and nape smooth above but a strip of rudimentary scales runs forward to the orbit. Cheek with two rows of sensory papillae on the lateral side below the eye. Maxillary reaches about the middle of the orbit. Jaws equal. Teeth in several

rows, the outer row slightly larger than the inner rows. Tongue emarginated, free at the tip. Head and cheek are naked. Scales smaller on anterior than posterior region. Lateral series scale 31–32 and lateral transverse scale rows 11–12; seven rows of rudimentary scales found on front dorsal fin. Second and third dorsal spines elongate, second spine longer; ventral fins united with well developed basal membrane, tips not reaching vent. Caudal fin rounded.

Habitat: It is commonly found in the sandy-muddy bottom near coral reefs.

Distribution: Red Sea, Western Indian Ocean to Society Islands, Australia, New Caledonia (Parenti 2021).

India:12 Andhra Pradesh (Koumans 1941 as *Ctenogobius criniger*; Ray et al. 2022); Odisha (Roy et al. 2019); Puducherry (Cuvier & Valenciennes 1837 as *Gobius brevifilis*); Tamil Nadu (Koumans 1941 as *Ctenogobius criniger*; Mogalekar et al. 2018); Kerala (Koumans 1941 as *Ctenogobius criniger*); Andaman & Nicobar Islands (Koumans 1941 as *Ctenogobius criniger*). The present report forms its first record from the Gulf of Kachchh, Gujarat, India.

Remarks: Taxonomical characteristics of the present specimen examined well agreed with the detailed description of Koumans (1941). *Yongeichthys nebulosus* (Forsskål, 1775) is identical to *Yongeichthys tuticornis* (Fowler, 1925) but immediately distinguished by head size. *Yongeichthys tuticornis* has a larger head compared to *Y. nebulosus* (3.0 vs 3.3–3.6 in SL) and lower numbers of lateral scales (28–30 vs 30–32) (Roy et al. 2019).

CONCLUSION

This study report provides the diversity and distribution of three gobioid species for the first time from Gujarat water. A total of 20 species from 16 genera were reported in Gujarat waters (Table 1). *Amblygobius semicinctus* (Bennett, 1833) was recorded for the first time from the Indian mainland, *Yongeichthys nebulosus* (Forsskål, 1775) and *Istigobius diadema* (Steindachner, 1876) were recorded for the first time from Gujarat coast. These species were mostly observed burrowing near live or dead coral reefs, tide pools and rock crevices. Maximum numbers of species were reported from the Gulf of Kachchh compared to other coastal and sea areas. Surveys of unexplored areas of the Gulf of Khambhat and the Saurashtra coast are recommended in order to obtain a more comprehensive picture of species diversity.

Table 2. Morphometric measurements of new gobioid fishes collected from the Gulf of Kachchh, Gujarat.

	Characters	<i>Amblygobius semicinctus</i> (n = 4)		<i>Istigobius diadema</i> (n = 4)		<i>Yongeichthys nebulosus</i> (n = 4)	
		Value (mean ± SD)	Range	Value (mean ± SD)	Range	Value (mean ± SD)	Range
1	Total length (mm)	108 ± 6.03	90–118	82.25 ± 6.03	57–99	78.5 ± 6.03	72–85
2	Standard length (mm)	85 ± 4.99	70–94	66.5 ± 4.99	46–80	64.75 ± 4.99	60–70
3	Body depth (mm)	24.25 ± 1.5	21–29	15.25 ± 1.5	10–18	15.75 ± 1.5	14–17
4	Head length (mm)	23 ± 1.5	20–24	19 ± 1.5	13–23	19.25 ± 1.5	18–21
5	Orbit diameter (mm)	6 ± 0.5	5–7	5.75 ± 0.5	4–7	6.25 ± 0.5	6–7
6	Inter-orbital width (mm)	6.75 ± 0.25	6–8	8.5 ± 0.25	5–10	2.125 ± 0.25	2–2.5
7	Caudal peduncle depth (mm)	13.5 ± 0.95	11–15	9 ± 0.95	6–11	8.25 ± 0.95	7–9
8	Pre-dorsal length (mm)	28.5 ± 1.5	23–32	22.5 ± 1.5	17–26	22.75 ± 1.5	21–24
9	Pre-pelvic length (mm)	23.5 ± 1.73	21–28	23.5 ± 1.73	17–28	22.5 ± 1.73	21–24
10	Pre-anal length (mm)	48.5 ± 2.06	43–52	38.25 ± 2.06	28–46	39.75 ± 2.06	38–42
11	Base of first dorsal fin (mm)	15 ± 0.81	12–17	9 ± 0.81	7–10	9 ± 0.81	8–10
12	Base of second dorsal fin (mm)	24.5 ± 1	19–28	18.5 ± 1	14–22	15.5 ± 1	14–16
13	Base of anal fin (mm)	24.75 ± 0.57	19–29	15.5 ± 0.57	13–17	13.5 ± 0.57	13–14
14	Pectoral fin length (mm)	24.5 ± 0	18–29	15.25 ± 0	10–18	15 ± 0	15–15
15	Pelvic fin length (mm)	16.25 ± 0.57	13–18	13 ± 0.57	9–16	13.5 ± 0.57	13–14
16	Caudal fin length (mm)	22.5 ± 1.57	19–24	16 ± 1.57	11–18	14.25 ± 1.57	13–15

*n = number of individuals

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