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Cyttopsis indica sp. nov., a new species of dory (Zeiformes: Parazenidae) from the Indian Ocean

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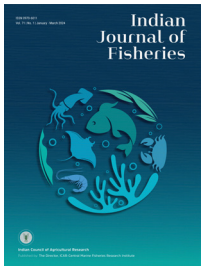

Abstract

A new species of dory fish of the genus *Cyttopsis* Gill, 1862 (Zeiformes: Parazenidae), *Cyttopsis indica* sp. nov., is described based on six specimens collected from deep waters off south-west India, caught at depths of 350–500 m along the continental slope of the eastern Lakshadweep Sea. The new species is distinguished from its congeners, *Cyttopsis rosea* (Lowe, 1843) and *Cyttopsis cypho* (Fowler, 1934), by a unique combination of meristic and morphometric characters, including the presence of 2 anal fin spines, caudal fin formula of 3+13+3 and a relatively high number of lateral line scales, a broader interorbital region, fewer number of lower gill rakers (1–2+5–7 *vs.* 1–2+8–10 in *C. rosea*), and a shorter post-orbital length (12.7–13.9% SL). *Cyttopsis indica* sp. nov. formed a distinct clade in the phylogenetic tree based on mitochondrial cytochrome c oxidase subunit I (COI) gene sequence and exhibited 4.6–11% genetic divergence from its congeners, providing molecular support for its recognition as a new species.

Introduction

Zeiformes (Teleostei) represent a phylogenetically ancient and morphologically distinctive group of marine teleosts distributed mostly in tropical and temperate waters, across the Atlantic, Indian, and Pacific oceans, with some species having restricted distributions (Tyler, 2003; Peters *et al.,* 2024; Banon *et al*., 2025). They are predominantly benthopelagic marine fishes that live near the seafloor at 50–1000 m depths. Most zeiform fishes are characterised by a laterally compressed body, a series of prominent buckler–like scutes along the ventral midline, and a large head, which makes them distinguishable from other teleost orders. The order currently consists of 6 families: Cyttidae, Grammicolepididae, Oreosomatidae, Parazenidae, Zeidae, and Zeniontidae with 16 genera and 34 species (Fricke *et al.,* 2026)

The zeiform fish family Parazenidae comprises two subfamilies: Cyttopsinae represented by the genera *Cyttopsis* Gill, 1862 and *Stethopristes* Gilbert, 1905, and subfamily Parazeninae having only one genus, *Parazen* Kamohara, 1935. The taxonomy and systematics of the family Parazenidae have been comprehensively reviewed by Heemstra (1980) and Tyler (2003). The genus *Cyttopsis* currently includes two valid species *viz*; Rosy dory, *Cyttopsis rosea* (Lowe, 1843), found in the Atlantic, and little dory, *Cyttopsis cypho* (Fowler, 1934), occurring in the western Pacific Ocean. Despite the wide geographic distribution, the diversity and species richness of *Cyttopsis* remain substantially understudied, as in other zeiform genera. Recent morphological and molecular studies of recently collected specimens suggest the presence of cryptic diversity within the family. Banon *et al*. (2025) undertook a detailed, integrated taxonomy assessment of the genus *Cyttopsis* and redescribed *C. rosea*, delimiting *C. rosea* to the Atlantic Ocean, suggesting cryptic speciation and hidden diversity within *Cyttopsis*.

During ichthyofaunal diversity surveys along the south-west coast of India, specimens

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of *Cyttopsis* sp. were collected from deep-sea fish landings, and despite their superficial similarity to known congeners, they exhibited distinct morphological and genetic differences. Based on these differences, they are herein described as a new species from the deep waters of eastern Lakshadweep Sea, off southern India.

Materials and methods

Specimens of *Cyttopsis* species were collected from commercial deep–sea trawl landings at Sakthikulangara Fisheries Harbour, Kollam, Kerala, (~8°53'N; 76°34'E), one of the major fishing harbours along the south-west coast of India (Fig. 1). The specimens were obtained from the landings of multi-day otter-trawl vessels operating at depths ranging from 350 to 500 m over the continental slope of the eastern Lakshadweep Sea. Collection was conducted during regular fisheries landing monitoring surveys carried out by the Marine Biodiversity and Environment Management Division (MBEMD) of ICAR–Central Marine Fisheries Research Institute (ICAR-CMFRI), Kochi. The specimens were transported to the laboratory of the MBEM Division at ICAR–CMFRI, Kochi, and preserved in 70% ethanol after conducting external morphological examinations. Prior to fixation, approximately 2–5 mg of white muscle tissue was excised from the dorsal musculature, anterior to the first dorsal fin of each specimen using sterile surgical scissors and forceps. The tissue samples were immediately preserved in 95–100% molecular–grade ethanol (absolute ethanol) in individually labelled 1.5 ml microcentrifuge tubes. The tissues were preserved at −20°C until DNA extraction for molecular identification.

Morphological analysis followed the methods of Mizumachi *et al.* (2022) and Banon *et al.,* (2025). Measurements excluding lip length are indicated by "character superscript asterisks (*) in the text and tables. Measurements were recorded to the nearest 0.1 mm using a Mitutoyo digital vernier calliper (Mitutoyo Corp., Japan; accuracy±0.01 mm). Vertebral counts were determined from X–ray radiographs. Comparative meristic and morphometric data for *C. rosea* were based on specimens from Atlantic Ocean (MHN USC 25228–1 to 25228–6; n=6; SL 63–124 mm), whereas comparative data for *C. cypho* were based on specimens from Japan (n=2), the Indo–West Pacific (n=7), as well as holotype and paratypes from the Philippines (Fowler, 1934) as reported by Banon *et al*. (2025) and Mizumachi *et al.* (2022). The holotype (GB.44.4.1.2) and 5 paratypes (GB.44.4.1.2.1–GB.44.4.1.2.5) of *Cyttopsis indica* sp. nov. are deposited in the Marine Biodiversity Museum of ICAR-Central Marine Fisheries Research Institue (ICAR-CMFRI), Kochi, India.

Genomic DNA extraction and amplification of the cytochrome c oxidase subunit I (COI) gene

Genomic DNA was extracted using the DNeasy® Blood andTissue Kit (QIAGEN), following the manufacturer's recommended protocol. The extracted DNA was assessed for quality before amplification. Partial mitochondrial cytochrome c oxidase subunit I (COI) gene (650 bp) was amplified by polymerase chain reaction (PCR) with the universal primer pair FishF1–5'–TCA ACC AAC CAC AAA GAC ATT GGC AC–3', FishR1–5'–TAG ACT TCT GGG TGG CCA AAG AAT CA–3' (Ward *et al*., 2005). PCR amplification was performed in a 25 µl reaction volume containing 12.5 µl DreamTaq Green PCR master mix (2×), 9.7 µl nuclease–free water, 0.4 µl of each primer (0.2 µM), and 2 µl of template DNA (approximately 50 ng). Amplification was carried out in a Bio–Rad T100 thermal cycler under the following cycling conditions: initial denaturation at 95°C for 5 min; 35 cycles of denaturation at 95°C for 30 s, annealing at 50°C for 30 s, and extension at 72°C for 45 s; followed by a final extension at 72°C for 7 min. The amplified PCR products were resolved on a 1.2% agarose gel prepared in 1×TBE buffer and electrophoresed at 90V. Following staining with ethidium bromide, bands were visualised under ultraviolet illumination using a gel documentation system to confirm successful amplification.

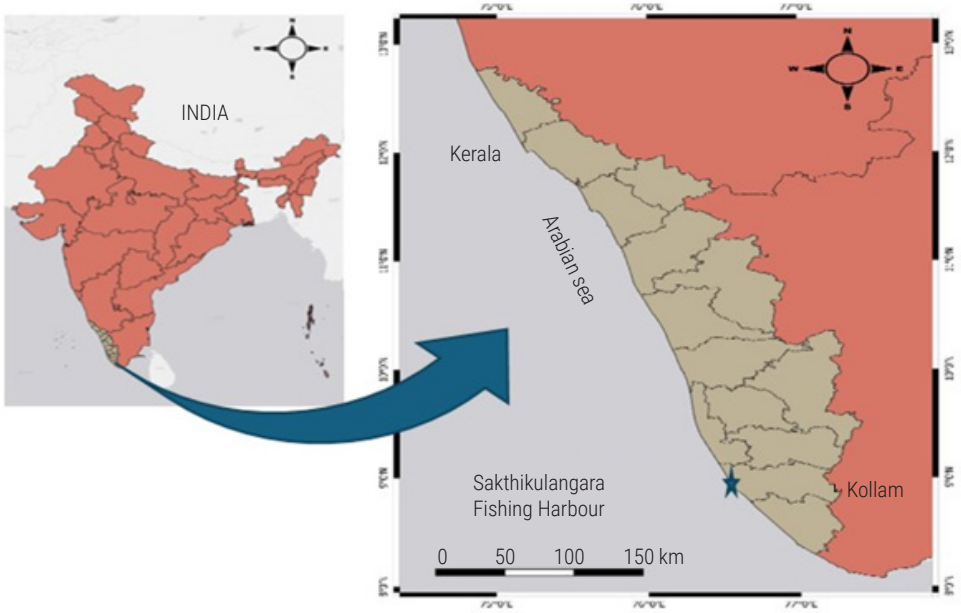

Fig. 1. Sampling location of *Cyttopsis indica* sp. Nov

Sequence alignment and analysis

NCBI retrieved partial COI sequences of species belonging to the family Parazenidae were used for the phylogenetic tree reconstruction. The Clustal W algorithm in MEGA 12 (Kumar *et al*., 2024) was employed for sequence alignment. The phylogenetic tree was constructed with Markov Chain Monte Carlo (MCMC) Bayesian inference (BI) using MrBayes 3.2.7 software (Ronquist *et al*., 2012) with 10,000 generations. The output was visualised in FigTree v1.4.3. The phylogenetic tree was rooted with the partial COI sequence of *Aphredoderus sayanus* belonging to the family Aphredoderidae (Banon *et al.,* 2025). The genetic distance was calculated using the Kimura 2P distance model (K2P) in MEGA 12 software (Kumar *et al*., 2024).

Results and discussion

Taxonomy

Cyttopsis indica sp. nov

Order: Zeiformes
Family: Parazenidae
Genus: *Cyttopsis* Gill, 1862
Cyttopsis indica sp. nov., Sreeja *et al*.
(Fig. 2–4; Table 1)

Synonymy

Zen scutatus (non Gilchrist & von Bonde, 1924) - Jones, 1969
Zen acutatus (non Gilchrist & von Bonde, 1924), error for scutatus - Silas, 1969)
Zen itea (non Jordan & Fowler, 1902)-Talwar, 1973
Zen scutatus- Jones & Kumaran (1980)

Proposed English common name: Indian dory

Holotype: CMFRI GB.44.4.1.2, 91.2 mm SL, collected from Sakthikulangara Fisheries Harbour, Kollam, Kerala, south-west India, by Aju K. R. from multi-day deep-sea otter-trawl landings, caught at 350 to 500 m depth, on 18 January 2026.

Paratype: 5 specimens - CMFRI GB.44.4.1.2.1, 107.5 mm SL; CMFRI GB.44.4.1.2.2, 124.8 mm SL, CMFRI GB.44.4.1.2.3, 107.5 mm SL; CMFRI GB.44.4.1.2.4, 113.1 mm SL; CMFRI GB.44.4.1.2.5, 114.7 mm SL. Collection details same as that of holotype.

Diagnosis

Cyttopsis indica sp. nov. is distinguished from its congeners by the presence of two anal fin spines, caudal fin ray formula of 3 + 13 + 3, higher number of lateral line scales, broader interorbital region, fewer lower limb gill rakers [1–2 + 5–7 (vs. 1–2 + 8–10 in *C. rosea*)], and a shorter post-orbital length (12.7–13.9% SL). It is further characterised by the following combination of characters: Dorsal fin rays D VII, 29; pectoral fin rays P 14; anal fin rays A II, 29; ventral fin rays 9; branchiostegal rays B 7, gill rakers GR 1–2+5–7, lateral line scales LL 68–78; dorsal scutes 26, anal scutes 27, vertebrae 32. Body deep, head and body highly compressed, and nearly oval. Body depth greater than head length and 1.8–2.1 in SL. Body uniformly pink without any spots or patterns. Single dorsal fin; pre-dorsal length 45.8–54.8% SL; orbit diameter 13.7–15.9% SL; snout length 17.6–25.3% SL. Pelvic fin 1.3–1.5 in HL.

Description

Meristic counts and morphometric measurements are presented in Table 1. Body deep, strongly compressed, and nearly oval in shape (Fig. 2) Body depth greater than head length, body depth 1.8–2.1 in SL. Head large and laterally compressed, head length 2.1–2.4 in SL (42–46.5% SL). Snout longer than orbit diameter, 40–56% HL. Nostrils situated in the midline of the orbit. Eyes large, circular, dorso–lateral in position, orbit diameter 30.4–36.3 % HL, 2.8–3.3 in HL, 13.7–15.9% SL; interorbital region slightly concave, interorbital width 5.3–7.8 in HL and 1.9–2.4 in orbit diameter; supraorbital ridges with spines, anterior spines bigger than posterior ones (Fig. 4a), post-orbital length 3.1–3.6 in HL.

Mouth large, terminal, oblique and greatly protrusible, symphysis of lower jaw with small spines (Fig 4b). Teeth villiform, arranged as a broad band in the upper jaw and a narrow band in the lower jaw. No teeth in palatines and vomer. Maxilla expanded posteriorly and exposed when mouth is closed, posterior maxillary depth 2.3-2.5 in orbit diameter. Upper jaw length 0.7-0.8 times the orbit diameter. Thoracic region broad and flattened. Gill opening wide, gill rakers short, blunt, tubercle-like, and with minute spinules (Fig. 4c).

Single dorsal fin, with VII spines, followed by 29 soft rays. Origin of dorsal fin nearly at middle of the body, pre-dorsal length 1.8-2.2 in SL. First dorsal spine shorter than orbit diameter, 4.1-6.3 in HL, 1.3-1.7 in length of third dorsal spine, 1.4-1.7 in second dorsal spine length. Second dorsal spine longest 3-4.3 in HL, Third dorsal spine 3.1-4.2 in HL; Last dorsal spine small, 10.3-20.9 in HL, 3.2-7.1 in second dorsal spine.

Fig. 2. *Cyttopsis indica* sp. nov., Holotype GB.44.4.1.2, 91.2 mm SL

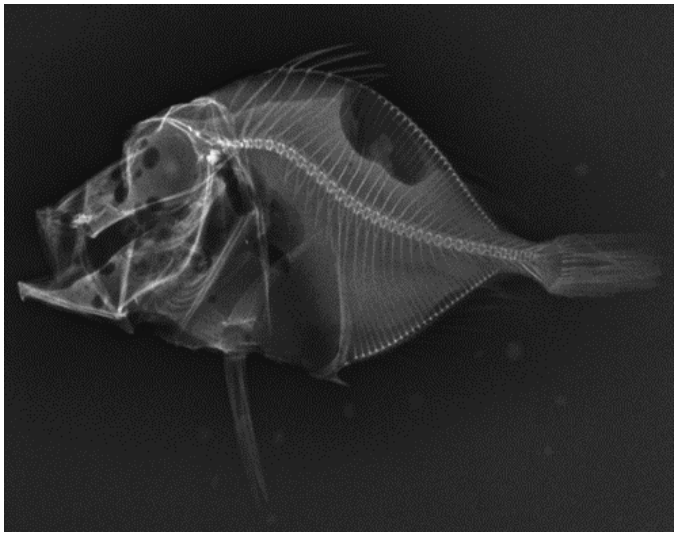

Fig. 3. Radiograph of *Cyttopsis indica* sp. nov., holotype GB.44.4.1.2

Table 1. Morphometric data of *Cyttopsis indica* sp. nov.

Character	*Cyttopsis indica* Holotype GB.44.4.1.2	*Cyttopsis indica* Paratype GB.44.4.1.2.1	*Cyttopsis indica* Paratype GB.44.4.1.2.2	*Cyttopsis indica* Paratype GB.44.4.1.2.3	*Cyttopsis indica* Paratype GB.44.4.1.2.4	*Cyttopsis indica* Paratype GB.44.4.1.2.5	*Cyttopsis indica* Range
Meristic counts							
Dorsal fin rays	VII+29	VII+29	VII+29	VII+29	VII+29	VII+29	VII+29
Anal fin rays	II+29	II+29	II+29	II+29	II+29	II+29	II+29
Pectoral fin rays	14	14	14	14	14	14	14
Ventral fin rays	9	9	9	9	9	9	9
Branchiostegal rays	7	7	7	7	7	7	7
Developed gillraker	1+5	1+6	2+6	2+6	2+7	1+7	1–2+5–7
Vertebrae	32	32	32	32	32	32	32
Scales in lateral line	68	72	77	73	78	75	68–78
Soft dorsal–fin base scutes	26	26	26	26	26	26	26
Soft anal–fin base scutes	27	27	27	27	27	27	27
Abdominal scutes	3+2 +4	3+2 +4	3+2 +4	3+2 +4	3+2 +4	3+2 +4	3+2+4
Caudal fin rays	3+13+3	3+13+3	3+13+3	3+13+3	3+13+3	3+13+3	3+13+3
Total length (mm)	109.5	127.2	151.7	125.4	134.1	137	109.5–151.7
Total length *(mm)	106.4	121.4	142.2	116.3	122.7	131.5	106.4–142.2
Standard length (mm)	91.2	107.5	124.8	107.5	113.1	114.7	91.2–124.8
Standard length *(mm)	86.3	101.1	116.5	97.0	97.4	108.1	86.3–116.5
As % SL							
Head length *	37.1	34.4	34	35.0	32.2	36.1	32.2–37.1
Head length	44.0	42.0	42.6	46.6	45.3	44.1	42.0–46.6
Head width	15.6	13.6	11.9	13.4	12.7	12.6	11.9–15.6
Head depth	49.7	39.7	43.1	45.6	43.5	47.7	39.7–49.7
Snout length *	9.2	8.7	10.5	9.0	9.8	8.9	8.7–10.5
Snout length	17.6	18.1	19.3	24.1	25.3	22.3	17.6–25.3
Post-orbital length	13	12.8	13.7	13.3	12.7	14	12.7–14
Orbit diameter	15.9	15.2	15.5	15	13.7	14.9	13.7–15.9
Eye diameter	12.5	11.9	13.1	13.0	12.4	13.6	11.9–13.6
Interorbital space	7.6	7.9	7.4	6.3	5.8	8	5.6–8
Pre-dorsal length	53.8	51.0	48.7	53.4	50.7	53.3	48.7–53.8
Pre-dorsal length *	46.9	43.4	40	41.9	37.7	45.3	37.7–46.9
Dorsal base fin length	51.1	53.4	50.7	48.7	46.4	51.3	46.4–53.4
Body depth at dorsal origin	53.6	52.5	48.8	48.4	46.8	54.5	46.8–54.5
Pre-anal length *	49.1	46.5	56.2	42.5	50	46.2	42.5–56.2
Pelvic fin length	32.2	28.3	31.9	30.5	31.5	31.3	28.3–32.2
Pectoral fin length	15.3	14.1	14.1	12.9	13.1	11.3	11.3–15.3
Interpelvic distance	12.4	10.2	10.3	10.9	9.0	10.6	9.0–12.4
Posterior maxilla depth	6.5	6.3	6.6	6.5	5.8	6.4	5.8–6.6
Length of maxilla	23.7	23.0	22.8	22.5	20.7	25.4	20.7–25.4
Upper jaw length	21.2	19.8	19.4	20.7	20.5	17.7	17.7–21.2
Lower jaw length	26.2	24.7	24.9	24.6	25.3	26.0	24.6–26.2
Caudal peduncle minimum height	6.2	6.3	5.5	5.5	5.3	5.4	5.3–6.3
Caudal peduncle length	13.0	10.8	10.3	10.3	10.9	13.1	10.3–13.1

*Excluding lip, following Mizumachi *et al*. (2022)

Dorsal spines smooth. Dorsal and anal fins with low scutes/bony plates and fins in a longitudinal groove. Scutes forming a distinct keel/ridge along the base of soft dorsal (26) and anal (27) fins. The distance between 4th and 5th abdominal scutes relatively wide, measuring 3.8-5.6 in orbit diameter (Fig. 4d); dorsal base length 1.8–2.2 in SL. Pectoral fin subequal to orbit diameter, 2.9–3.9 in HL, pectoral origin in the vertical line anterior to the dorsal origin. Pelvic fins abdominal, large and without spine, origin behind vertical to the pectoral bases, directly below the dorsal origin in vertical. Pelvic fin length, 3.1–3.5 in SL, 1.3–1.5 in HL, 28.3–32.2% SL. Pelvic fins branched, reaching to 2nd anal spine. Pelvic fins widely separated, inter-pelvic distance 1.3–1.5 in orbit diameter; anterior to pelvics flat and broad; two large keeled scutes with posteriorly directed spines.

Pre-anal distance 44.4–57.5% SL, anal fin origin below the 5th to 7th dorsal spine; anal fin spines short and fused with pterygiophores. Anal spines immovable (Fig. 4e). First anal spine 8.6–12 in HL, second 15.1–25.3 in HL. Caudal peduncle length 10.3–13% SL, 3.4–4.5 times in HL, peduncle depth 5.3–6.3 % SL. Caudal fin truncate. Lateral line single, originating at the upper end of the opercle, curving dorsally in a broad arc across the upper part of the body, reaching to base of the dorsal fin, then descending posteriorly towards the caudal fin base. Body covered with small, thin, deciduous cycloid scales; head and cheek naked.

Colour

Body colour in fresh specimen, uniformly rosy to silvery pink, slightly paler towards the ventral side. Pelvic fin membranes slightly reddish, dusky to black towards posterior tip. In preservation, the body colour becomes yellowish.

Distribution

Cyttopsis indica sp. nov. is currently known only from 150–550 m depths off south-west India. Records from the Maldives could be this species (Norman, 1939).

Etymology

The specific epithet *indica* refers to the type locality in the Indian Ocean, off the south-west coast of India.

Genetics

A total of 43 partial COI sequences (498 bp) representing 5 species including the outgroup, *Aphredoderus sayanus* (Table 2) were used for the phylogenetic reconstruction. Among the three species examined within the family Parazenidae (excluding *Stethopristes eos*, for which no partial COI sequence is currently available in GenBank deposition), *C. indica* sp. nov. formed a well supported distinct clade with its closest relative, *C. rosea* from the Atlantic and *C. cypho* from the Pacific in the Bayesian phylogenetic reconstruction (Fig. 5). These taxa formed distinct, reciprocally monophyletic lineages clearly indicating their separation as distinct species. Notably, COI gen sequences previously identified as *C. rosea* from the western Indian Ocean and south-eastern Arabian Sea (GenBank Accession Nos. KP244533.1–KP244539.1), showed 100% sequence similarity with *C. indica* sp. nov. sequences generated in the current study (GenBank Accession Nos. PZ276004–PZ276009) based on NCBI BLAST analysis. These results strongly suggest that the previously deposited northern Indian Ocean sequences have been misidentified and should be reassigned to *C. indica*.

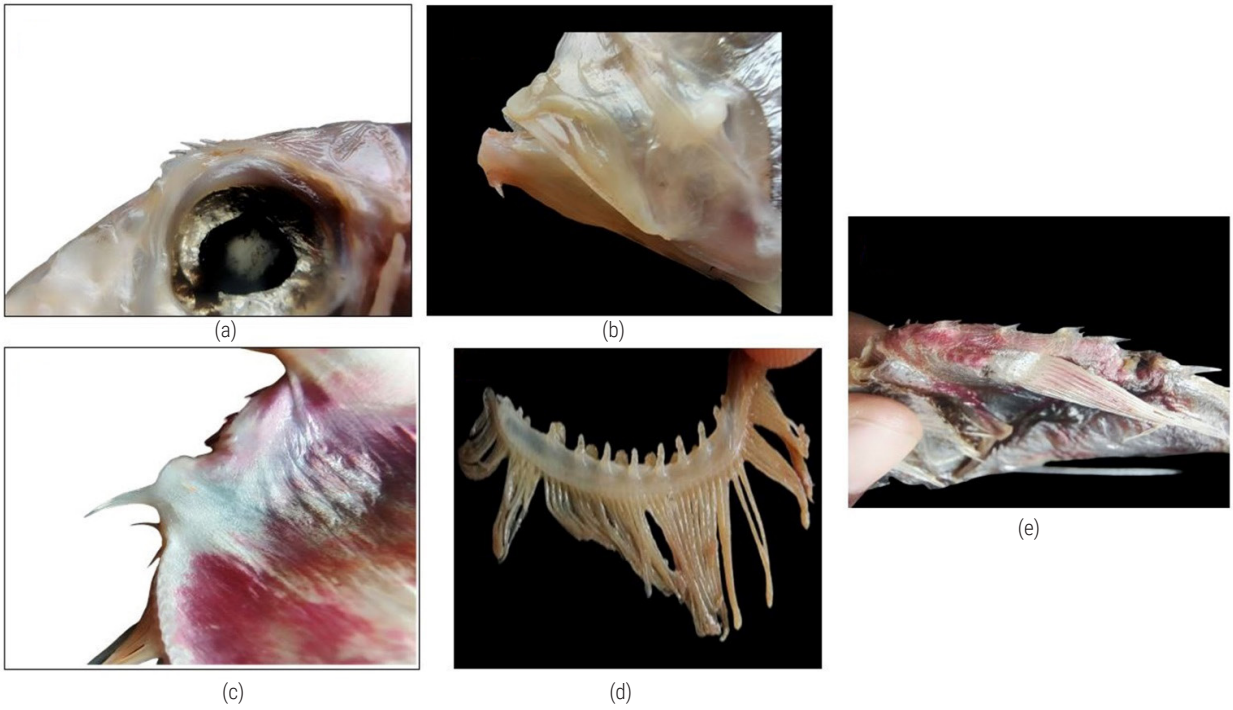

Fig. 4. Diagnostic morphological features of *Cyttopsis indica* sp. nov. (a) Spiny supraorbital ridge; (b) Small spines on the symphysis of the lower jaw; (c) Gill rakers; (d) Abdominal scutes and (e) Two anal fin spines. Photographs are of specimens collected from deep waters off south-west India

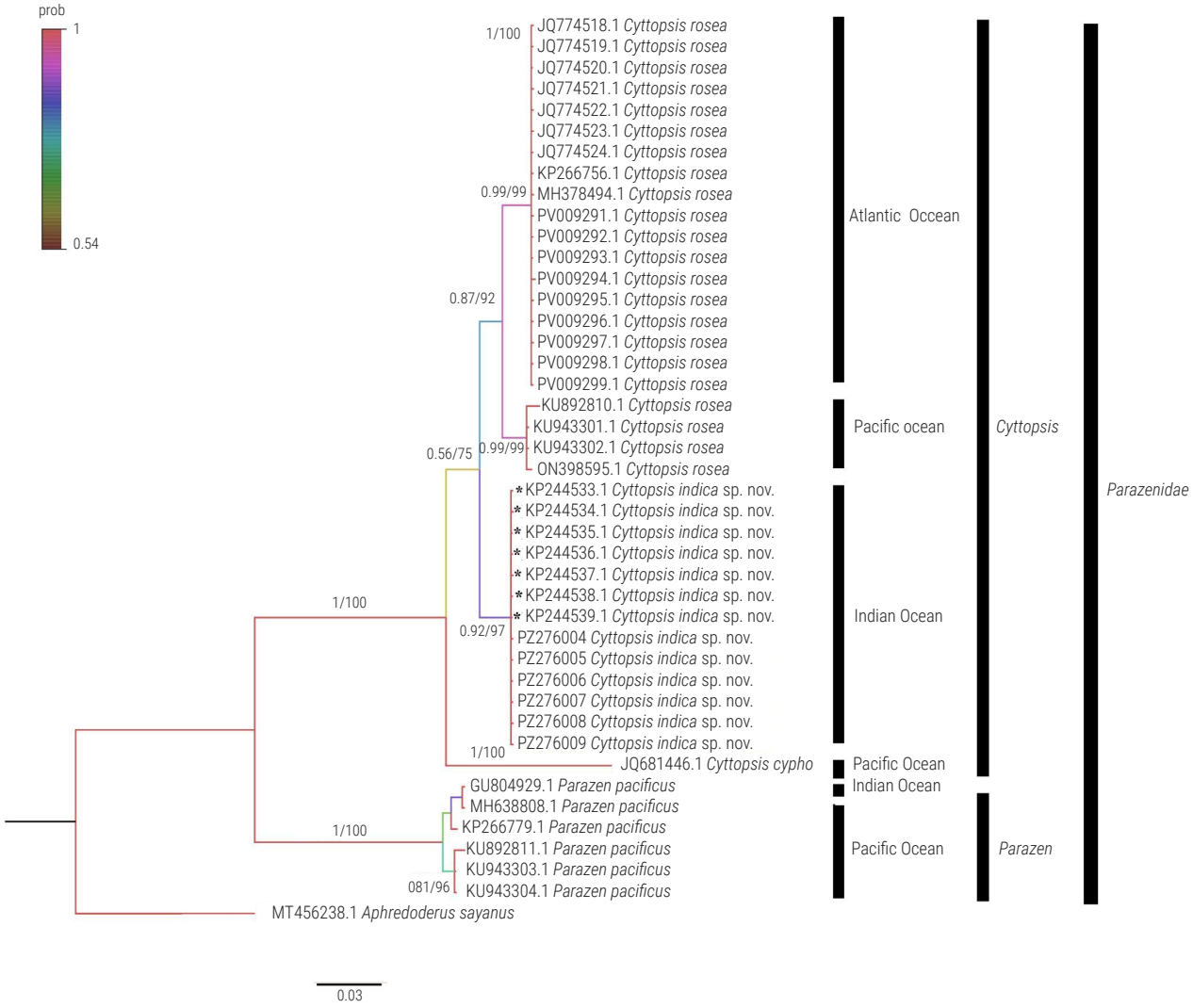

Fig. 5. Bayesian phylogenetic tree of five species based on partial COI sequences. Posterior probabilities (left) and bootstrap values (right) are shown at each node. Asterisks (*) denote sequences previously identified as *Cyttopsis rosea* and reassigned here to *Cyttopsis indica* sp. nov.

Genetic distance analyses further supported the delineation of *Cyttopsis indica* sp. nov. as a distinct species. The intraspecific genetic divergence within *C. indica* was negligible (0%), indicating genetic homogeneity among examined individuals, supporting their conspecific status (Table 3). In contrast, interspecific genetic distances between *C. indica* and its congeners were markedly higher, with a mean divergence of 10.25%, consistent with species level differentiation within the family. Specifically, the genetic distance between *C. indica* and *C. rosea* was 4.63%, while that between *C. indica* and *C. cypho* was 10.99% (Table 4). Previous studies have reported a minimum COI based genetic divergence of 9.88% among closely related taxa within Zeiformes (Ming, 2026), which supports the magnitude of divergence observed in the present study. Furthermore, DNA barcoding studies in fishes have shown that interspecific divergence values exceeding 2–3% are generally indicative of distinct species (Ward *et al*., 2008). Taken together, these results provide strong molecular evidence for recognising *C. indica* as a distinct species.

Integrative taxonomic approaches combining morphological and molecular evidence have proven effective in resolving taxonomic relationships within Zeiformes (Ward *et al*., 2008; Wang *et al*., 2012; Matusevich *et al*., 2024). In the present study, *C. rosea* sequences from the Atlantic and Pacific Oceans formed lineages distinct from the Indian Ocean clade, highlighting clear geographic structuring within the genus. The reports of *C. rosea* from the Pacific (GenBank Accession Nos. KU892810.1, KU943301.1, KU943302.1 and ON398595.1) need to be reinvestigated to clarify its taxonomic status.

The observed phylogenetic pattern suggests the existence of a species complex within *C. rosea*, characterised by genetically distinct but morphologically similar lineages. The present study formally resolves the status of the northern Indian Ocean *Cyttopsis* lineage as *C. indica*, supported by both molecular and morphological evidence. This finding aligns with earlier suggestions of putative undescribed Indo-Pacific species within this group (Banon *et al*., 2025). Comparable cases of geographically structured divergence

Table 2. Species included in the molecular phylogenetic analysis, their collection localities, and GenBank Accession Nos. for COI gene sequences.

No.	Species name	Location	Accession No.
1	*Cyttopsis rosea*	Atlantic Ocean	JQ774518.1
2	*Cyttopsis rosea*	Atlantic Ocean	JQ774519.1
3	*Cyttopsis rosea*	Atlantic Ocean	JQ774520.1
4	*Cyttopsis rosea*	Atlantic Ocean	JQ774521.1
5	*Cyttopsis rosea*	Atlantic Ocean	JQ774522.1
6	*Cyttopsis rosea*	Atlantic Ocean	JQ774523.1
7	*Cyttopsis rosea*	Atlantic Ocean	JQ774524.1
8	*Cyttopsis rosea*	Atlantic Ocean	KP266756.1
9	*Cyttopsis rosea*	Atlantic Ocean	MH378494.1
10	*Cyttopsis rosea*	Atlantic Ocean	PV009291.1
11	*Cyttopsis rosea*	Atlantic Ocean	PV009292.1
12	*Cyttopsis rosea*	Atlantic Ocean	PV009293.1
13	*Cyttopsis rosea*	Atlantic Ocean	PV009294.1
14	*Cyttopsis rosea*	Atlantic Ocean	PV009295.1
15	*Cyttopsis rosea*	Atlantic Ocean	PV009296.1
16	*Cyttopsis rosea*	Atlantic Ocean	PV009297.1
17	*Cyttopsis rosea*	Atlantic Ocean	PV009298.1
18	*Cyttopsis rosea*	Atlantic Ocean	PV009299.1
19	*Cyttopsis rosea*	Pacific Ocean	KU892810.1
20	*Cyttopsis rosea*	Pacific Ocean	KU943301.1
21	*Cyttopsis rosea*	Pacific Ocean	KU943302.1
22	*Cyttopsis rosea*	Pacific Ocean	ON398595.1
23	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244533.1
24	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244534.1
25	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244535.1
26	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244536.1
27	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244537.1
28	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244538.1
29	*Cyttopsis indica* sp.nov.	Indian Ocean	KP244539.1
30	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276004
31	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276005
32	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276006
33	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276007
34	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276008
35	*Cyttopsis indica* sp.nov.*	Indian Ocean	PZ276009
36	*Cyttopsis cypho*	Pacific Ocean	JQ681446.1
37	*Parazen pacificus*	Indian Ocean	GU804929.1
38	*Parazen pacificus*	Pacific Ocean	MH638808.1
39	*Parazen pacificus*	Pacific Ocean	KP266779.1
40	*Parazen pacificus*	Pacific Ocean	KU892811.1
41	*Parazen pacificus*	Pacific Ocean	KU943303.1
42	*Parazen pacificus*	Pacific Ocean	KU943304.1
43	*Aphredoderus sayanus*	Atlantic Ocean	MT456238.1

**Cyttopsis indica* sp. nov. sequences generated in the present study

Table 3. Intra-specific K2P genetic distance based on COI sequences

Species	Genetic distance	Standard error
Cyttopsis indica sp. nov	0	0
Cyttopsis rosea	0.0099	0.0025
Cyttopsis cypho	n/c	n/c
Parazen pacificus	0.0096	0.0030

n/c: no conspecific sequences available

have also been reported in other parazenid taxa, such as *Parazen pacificus*, where Atlantic and Pacific populations exhibit clear species-level differentiation (Kotlyar, 2001). Taken together, the genetic distinctiveness, phylogenetic placement, and geographic segregation of *C. indica,* strongly indicate that allopatric speciation has played a key role in its evolutionary divergence (Pyron *et al*., 2010).

Remarks

Genus *Cyttopsis* was established by Gill (1862) for the species *Zeus roseus* Lowe 1843. Althogh the genus was historically placed in the family Zeidae (or its type species assigned to the genus *Cyttus*), subsequent systematic studies have confirmed its placement within the family Parazenidae. Four nominal species have been known in this genus, of which only two are currently considered valid: *Cyttopsis rosea* (Lowe, 1843), originally described from off Madeira in the north-eastern Atlantic, and *C. cypho* (Fowler, 1934) described from off northern Mindanao Island, Philippines, in the western Pacific Ocean. The remaining two nominal species, *Cyttopsis itea* Jordan & Fowler, 1902, described from Suruga Bay, Japan, and *Paracyttopsis scutatus* Gilchrist & von Bonde, 1924, described from South Africa, are currently treated as junior synonyms of *Cyttopsis rosea* (Heemstra, 1980; Fricke *et al.,* 2026).

Cyttopsis indica sp. nov can be readily differentiated from *C. cypho* (Table 5), by a combination of meristic characters and colouration. The new species possesses a dorsal fin formula of VII + 29 and anal fin formula of II + 29, whereas *C. cypho* has a single anal spine (I) and 28–31 anal fin soft rays. *Cyttopsis indica* sp. nov. further differs in having 68–78 lateral line scales (*vs* 59–64 in *C. cypho)* and fewer gill rakers 1–2+5–7 (*vs* 1–2+8–11 in *C. cypho).* In addition, *Cyttopsis indica* sp. nov. lacks any body markings or spots, whereas *C. cypho* bears a conspicuous black spot, approximately equal to or slightly smaller than the orbit diameter on the posterior part of the body, below the 4th to 12th soft dorsal rays (Mizumachi *et al.,* 2022).

Cyttopsis indica sp.nov differs from *C. rosea* in having fewer number of gill rakers 1–2+5–7 (*vs.* 1–2+8–10 in *C. rosea*), a longer post-orbital region (12.7-13.9% SL *vs.* 6.5-8.3% SL), second dorsal spine the longest (*vs* third dorsal spine longest in *C. rosea*), a relatively narrower interorbit width (5.3-7.8 in HL *vs* 4.6-5.3 in HL in *C. rosea*), a higher interorbital width relative to orbit diameter (1.9-2.4 *vs* 1.5-1.9 in orbit diameter), and a shorter pelvic fin (1.3-1.5 in HL *vs* 1-1.3 in HL in *C.rosea*) (Banon *et al.,* 2025).

The discovery of *Cyttopsis indica* sp. nov. underscores the considerable taxonomic and biogeographic complexity that remains

Table 4. Inter–specific K2P genetic distance based on partial COI sequences between grouped species of Parazenidae (Inter–specific genetic distance on the left side and standard error on the right side of the diagonal)

	Cyttopsis indica sp. nov.	*Cyttopsis rosea* Pacific	*Cyttopsis cypho*	*Parazen pacificus*
Cyttopsis indica sp. nov.	0.0	0.0102	0.0158	0.0233
Cyttopsis rosea-Pacific	0.0463		0.0169	0.0231
Cyttopsis cypho	0.1099	0.1242		0.0268
Parazen pacificus	0.1990	0.1976	0.2494	

Table 5. Comparative diagnostic characters of *C. indica*, *C. rosea* and *C. cypho* (Mizumachi *et al.,* 2022; Banon *et al.,* 2025)

Meristic character	*C. indica*	*C. rosea*	*C. cypho*
Dorsal fin rays	VII+29	VII–IX + 27–29	VII + 27–30
Anal fin rays	II +29	I–II + 29–30	I + 28–30
Pectoral fin rays	14	13–14	14–15
Ventral fin rays	9	9	9
Branchiostegal rays	7	7	–
Developed gillraker	1–2+5–7	1–2 + 8–10	1–2 + 8–11
Vertebrae	32	32	30–31
Scales in lateral line	68–78	66–72	59–64
Soft dorsal–fin base scutes	26	25–28	27–29
Soft anal–fin base scutes	27	27–30	27–30
Abdominal scutes	3+2 +4		
Caudal fin rays	3+13+3	3–4 + 13 + 3–4	6+7–8
Total length (mm)	109.5–151.7	77–150	–
Standard length (mm)	91.2–124.8	63–124	51.6–71.8
As % SL			
Head length*	32.2–37.1	–	35.2–36.1
Head length	42.0–46.6	38.2–44.4	44.5–45.7
Snout length	17.6–25.3	16.3–19.8	22.5–25.6
Post-orbital length	12.7–14	6.5–8.3	–
Orbit diameter	13.7–15.9	–	14.9–16.1
Eye diameter	11.9–13.6	14–15.9	–
Interorbital space	5.6–8	8–9.1	6.5
Pre-dorsal length*	37.7–46.9	–	48.2–50.2
Pre-dorsal length	48.7–53.8	52.3–56.7	59.2–59.4
Dorsal base fin length	46.4–53.4	47.3–52.7	53.1–54.8
Third dorsal spine length	11–14	14.4–18.9	18.3
Body depth at dorsal origin	47–55	47.4–60.7	56.6–59.8
Pre-anal length	44.3–57.5	50.8–67.8	59.2–62.4
Anal base fin length	34.5–40.5	34.1–42.6	41.4–43.4
Pelvic fin length	28.3–32.2	31.2–46.2	33.8–40.7
Pectoral fin length	11.3–15.3	13–14.4	13.1–13.9
Pre-pectoral length	41–48.6	38.0–42.3	–
Pre-ventral length	28.6–45.3	35.5–41.3	–
Pelvic–anal distance (LPA2)	14–21	14–19.2	12.5–14.1
Pectoral–anal distance (LPA1)	23.2–30.5	30.1–35	29.4–33.4
Pectoral–pelvic distance (LPP)	20.2–24	19.0–20.2	23.6–24.7
Dorsal–pectoral distance (LDP1)	24–26	23.8–26.6	29.2–31.2
Dorsal–pelvic distance (LDP2)	46–53	46.3–51.2	55.2–57.5
Upper jaw length	17.7–21.2	17.7–20	19.9–20.8
Lower jaw length	24.6–26.2	22.6–24.6	22.9–23.7
Caudal peduncle minimum height	5.3–6.3	5.2–6	5.8–6.2
Caudal peduncle length	10.2–13	6.6–9	11.2–11.9

*Excluding lips (Mizumachi *et al.,* 2022)

to be resolved within the family Parazenidae and provides further evidence of cryptic diversity among deep-sea Zeiformes. Recent discoveries of several deep-sea fish species from the continental slope off the south-west coast of India further highlight the eastern Lakshadweep Sea and northern Indian Ocean as underexplored region for mesopelagic and bathyal ichthyofaunal diversity, emphasising the need for dedicated studies in the region.

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