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Lutjanus arakan, a new species of snapper (Teleostei: Lutjanidae) from the Bay of Bengal, Bangladesh, previously confused with *L. lemniscatus*

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Abstract

A new species of snapper, *Lutjanus arakan*, is described from 16 specimens, 104–320 mm SL, from the Bangladesh coast of the eastern Bay of Bengal region of the eastern Indian Ocean. It has also been photographed at Ngapali, southern Rakhine coast of Myanmar. *Lutjanus arakan* is similar to *L. lemniscatus* from the Indo-West Pacific with respect to juvenile coloration. However, it differs considerably in adult color pattern and, to some extent, in its narrower interorbital, more slender body shape, and a flatter snout-forehead profile. It possesses two dark-brown mid-lateral stripes on the upper half of the body, on both juveniles and adults: one from the upper end of the operculum to the end of the soft dorsal-fin base and upper caudal-fin base, and the other from upper middle of the operculum to the middle of the caudal-fin origin. In comparison, juvenile *L. lemniscatus* display a single, broad, dark, mid-lateral stripe from the eye to the caudal fin, preceded by a broad brown stripe from the snout tip to the eye, both of which disappear with growth as the color becomes mostly uniform grey-brown to silvery with yellow streaks. The ontogenetic changes in the color pattern of *L. lemniscatus* are presented and discussed along with a corrected count of pectoral-fin rays in the holotype. Comparisons of the mtDNA sequence of cytochrome c oxidase subunit 1 (CO1, the DNA barcode) for the *L. lunulatus* complex reveal minimum interspecific divergences ranging from about 4 to 5% between *L. arakan* and its closest congeners: *L. bitaeniatus*, *L. decussatus*, *L. papuensis*, *L. lemniscatus*, *L. lunulatus*, and *L. semicinctus*, all from the eastern Indian and western Pacific Oceans.

Key words: taxonomy, ichthyology, coral-reef fishes, shorefishes, fisheries, DNA barcoding, Myanmar

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Introduction

Fishes of the genus *Lutjanus* (Family: Lutjanidae), commonly known as snappers, are mainly distributed in tropical and subtropical seas (Allen et al. 2013, Heemstra & Heemstra 2022). Currently 71 species are recognized as valid worldwide (Fricke et al. 2025), out of which 46 are known from the Indo-West Pacific region. The revision of *Lutjanus* from the Indo-Pacific region initially listed 39 valid species (Allen 1985, Allen & Talbot 1985). Later on, three more species were resurrected from synonymy: *Lutjanus ophuysenii* (Bleeker, 1860) by Iwatsuki et al. (1993); *Lutjanus rufolineatus* (Valenciennes, 1830) by Allen (1995); and *Lutjanus octolineatus* (Cuvier, 1828) by Iwatsuki et al. (2016). Moreover, 4 additional species have been recently described: *Lutjanus indicus* Allen, White & Erdmann, 2013; *Lutjanus papuensis* Allen, White & Erdmann, 2013; *Lutjanus xanthopinnis* Iwatsuki, Tanaka & Allen, 2015; and *Lutjanus sapphirolineatus* Iwatsuki, Al-Mamry & Heemstra, 2016.

A number of lutjanid species are known to exhibit ontogenetic changes in coloration (Allen 1985). This includes species that possess a dark mid-lateral stripe in their younger life stages which disappears with growth (Allen 1985), e.g. *Lutjanus lemniscatus* (Valenciennes, 1828) and *Lutjanus bitaeniatus* (Valenciennes, 1830). *Lutjanus lemniscatus* is known to be distributed from the Persian Gulf (Eagderi et al. 2019) through the Arabian Sea and the Bay of Bengal and over to the western central Pacific (Allen 1985), while *L. bitaeniatus* is known only from eastern Indonesia and northwestern Australia (Allen 1985, Anderson & Allen 2001).

During recent field investigations in the northeastern Bay of Bengal region, the first author encountered a number of lutjanid specimens having darker mid-lateral stripes that had earlier been confused with *L. lemniscatus*. The present paper describes those as a new species of lutjanid based on 16 specimens from Zinjira Island (St. Martin's Island) within the Teknaf region of the northeastern Bay of Bengal, Bangladesh. It can be differentiated from congeners based on its distinctive pattern of horizontal stripes that are present on both juvenile and adults. Phylogenetic and species-delimitation analyses based on mtDNA cytochrome c oxidase subunit 1 (CO1) sequences add to the evidence that the species is distinct from other species of *Lutjanus*.

Materials and Methods

Specimens were obtained fresh at unloading from the boats of local fishermen,or through hand-line catches at Zinjira Island (St. Martin's Island), within the Teknaf region of Cox's Bazar District, southeastern Bangladesh between March 2014 and March 2023 (Fig. 1). Species identification largely followed an integrated approach comprising two independent processes: a morphological identification, following Allen (1985) and Allen & Erdmann (2012, 2024), and a DNA-barcode-based species identification where the mtDNA COI sequence is compared to all barcodes available in the Barcode of Life Database (BOLD). Rather than a simple match, sequences on BOLD are assigned to an algorithmically derived lineage, the BIN (Barcode Index Number), which compiles the records from various projects, including their submitted species identification, the sampling location, and often specimen photographs, as well as other available metadata. BINs typically contain multiple species identifications submitted by contributors with a wide range of taxonomic expertise, which are accepted by the database without editing. The BINs permit experts on the taxonomy of the group to assess all the available data and come up with a validated correct species identification. In the case of *Lutjanus*, the database has extensive coverage, often with large samples, that permits a thorough assessment of species and ranges (e.g. Allen et al. 2013, Iwatsuki et al. 2015).

For genetic analysis, a piece of muscle or pelvic-fin tissue was cut from selected specimens, and fixed and preserved in 95% ethanol until DNA extraction. Whole specimens were then fixed in 10% formalin, placed either in 10% formalin or 70% ethanol for permanent preservation, and deposited in the Fish Collections of the Institute of Marine Sciences, University of Chittagong, Bangladesh (CUMS); Fish Collections of the Department of Zoology, University of Dhaka, Bangladesh (DUZM); and the collection of the Marine Fisheries Survey Management Unit, Department of Fisheries, Bangladesh (MFSU) currently housed at Fisheries Training Institute, Chandpur, Bangladesh. Other collections or institutional codes follow Fricke et al. (2025).

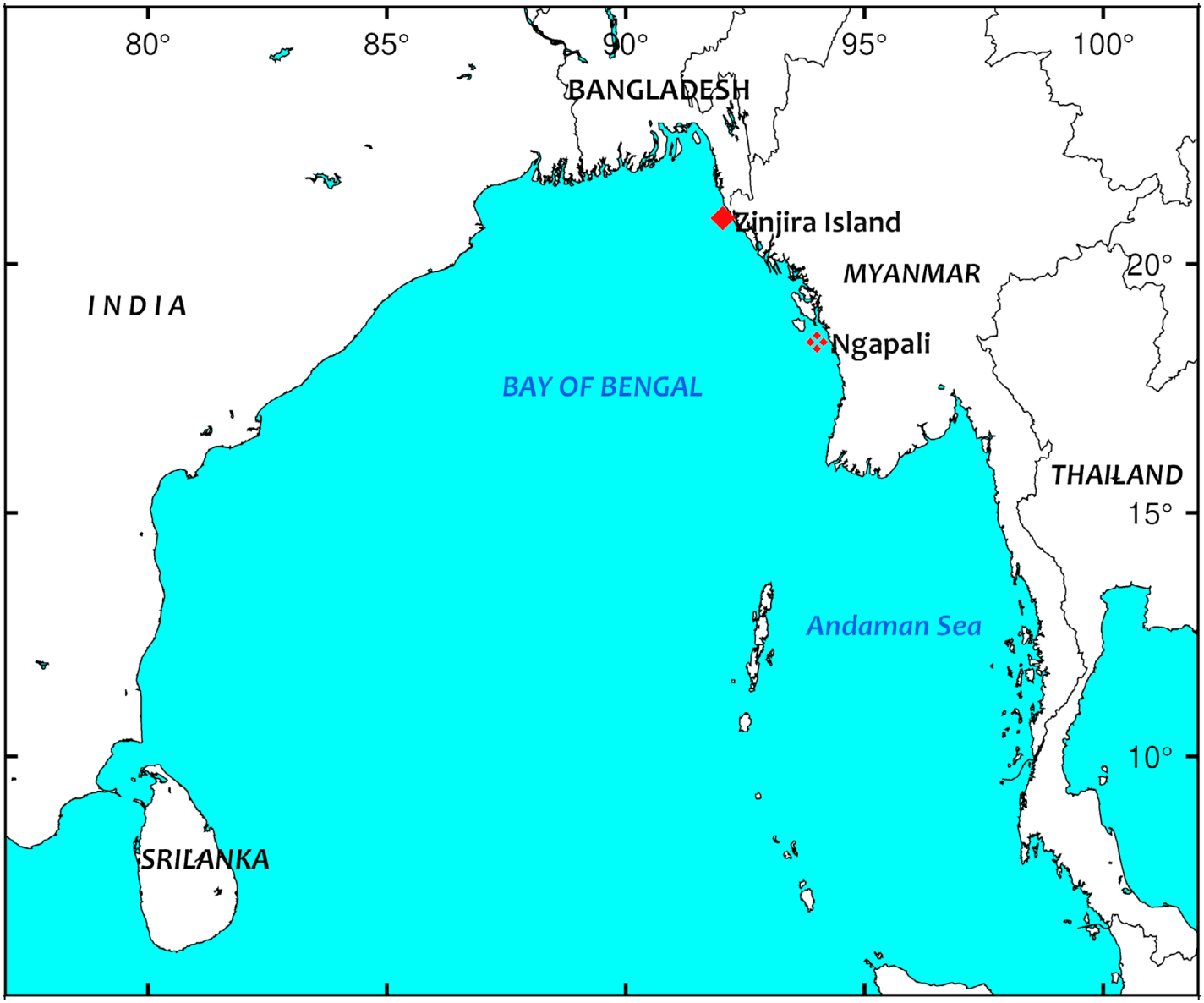

Figure 1. Sampling locations for the holotype and paratypes (diamond) and other records (4-dot) for *Lutjanus arakan* (Map source: seaturtle.org).

Morphometric measurements. Counts and measurements follow the methods of Allen (1985), Allen et al. (2013), and Iwatsuki et al. (2015). Counts and proportions appearing in parentheses apply to the range for the paratypes, if different from the holotype.

Pectoral-fin ray counts include the small uppermost element. Lateral-line scales include the tubed scales from the upper edge of the opercle to the caudal-fin base (up to the line of flexure of the hypural plate), excluding any smaller tubed scales extending onto the fin. Scale rows above the lateral line include the horizontal scale rows at the base of the mid-dorsal spines. Cheek scale rows include transverse scale rows, usually obliquely positioned. Gill-raker count includes both distinct rakers and low-lying rudiments; the number of distinct rakers, excluding rudiments, is given separately after the total count. Standard length and head length are abbreviated as SL and HL respectively. Body depth is the greatest vertical depth, usually at the level of the pelvic-fin origin; body width is the greatest width just behind the head at the level of the pectoral-fin base; head length is the distance from the snout tip to the posteriormost extension of the opercular membrane or flap; snout length is from the anteriormost extension of the upper lip to the anterior edge of the eye; eye diameter is the horizontal distance across the bony orbital cavity; interorbital width is the minimum bony width between the eyes; upper-jaw length is the distance from the snout tip to the rear margin of the maxilla; suborbital depth is the least distance between the upper margin of the maxilla and the lower edge of the eye; caudal-peduncle depth is the least depth at the caudal peduncle;

caudal-peduncle length is the horizontal distance between the caudal-fin base and a vertical line at the level of the base of the last anal-fin ray; caudal-fin length is the horizontal distance connecting vertical lines from the line of flexure of the hypural plate to the tip of the longest ray. Dorsal and anal-fin spine lengths are measured from their bony base, not from the point where they emerge from basal scaly sheath. Pectoral and pelvic-fin lengths are measured from the base of the first element to the tip of the longest ray.

Molecular methods. Total genomic DNA was isolated from tissues using the PureLink Genomic DNA Kit (Invitrogen, life technologies) following manufacturer's recommendations. The fragments of the COI gene were amplified by polymerase chain reaction (PCR) using the primers FishF1+FishF2 / FishR1 described by Ward et al. (2005). The PCR was conducted in 40 μL reaction volumes containing 20 μLMyTaqMaster mix, 0.6 μL each primer (10 μM), 0.8 μL Bovine Serum Albumin (2%), and 2μL template DNA. During the PCR reaction, initial denaturation was carried out at 92º C for 5 min followed by 35 cycles of strand denaturation at 92º C for 1 min, primer annealing at 52º C for 45 sec, primer extension at 72º C for 1.5 min, and final extension at 72º C for 5 min. Sequencing was performed by Macrogen Inc. (Seoul, South Korea; http://dna.macrogen.com). All nucleotide sequences are public both at BOLD and GenBank.

The phylogenetic analysis includes COI sequences for specimens of lutjanids from this study as well as those labeled in GenBank (accessed on 30 September 2025) as *L. bitaeniatus*; *Lutjanus decussatus* (Cuvier, 1828); *L. lemniscatus*; *Lutjanus lunulatus* Park, 1797; *L. papuensis*; and *Lutjanus semicinctus* Quoy & Gaimard, 1824; including those published by Wang et al. (2010, 2012), Allen et al. (2013), Abidah et al. (2018), Choi et al. (2020), Limmon et al. (2020), Ahmed et al. (2021), Huang et al. (2023), Bemish et al. (2023), and Habib et al. (2023). The Appendix Table lists the specimen data and GenBank accession numbers.

Phylogenetic reconstruction was conducted by maximum-likelihood estimation using the IQ-TREE web server (Trifinopoulos et al. 2016), an implementation specifically developed to increase the speed of analyses conducted on large datasets while supporting the use of a higher number of nucleotide-substitution models (Minh et al. 2020). The nucleotide-substitution models were selected using ModelFinder (Kalyaanamoorthy et al. 2017) according to the Bayesian information criterion (BIC; Schwarz 1978) TPM2+F+I+G4. Branch support was calculated using 1,000 bootstrap replicates (UFBoot) (Hoang et al. 2018).The consensus tree was drawn using FigTree v1.4.4 (http://tree.bio.ed.ac.uk/software/figtree/). *Symphorus nematophorus* (Bleeker, 1860) was used as the outgroup. Genetic distances between species or lineages were based on the Kimura-2 parameter (K2P) model (Kimura 1980) using MEGA. V 7.0 (Kumar et al. 2016). GenBank accession numbers of all CO1 sequences are provided in the associated text and figures. Species delimitation analysis was based on barcode gaps automatically identified by BOLD using the Refined Single Linkage (RESL) algorithm, which screens the whole DNA-barcode library (Ratnasingham & Hebert 2013).

Lutjanus arakan, n. sp.

Arakan Snapper
Bangla name: Arakan Lalmach, Daijja Rangachoir

urn:lsid:zoobank.org:act:6A8C3052-B0AE-467D-B51D-AF101C4AF520

mtDNA COI BIN BOLD:AEA9413 (https://doi.org/10.5883/BOLD:AEA9413)

Figures 2–6, Tables 2 & 3

Lutjanus lemniscatus (*non* Valenciennes) Saha et al. 2018: 244 (Table 2), 245 (Fig. 2, k–l) (St. Martin's Island, Bangladesh); Hossain et al. 2020: 288 (east coast of Bangladesh); Habib et al. 2022: 143 (Saint Martin's Island, Bangladesh); BFRI 2022: 313 (east coast of Bangladesh).

Lutjanus guilcheri (*non* Fourmanoir) Naznin et al. 2020: 255, 259, Plate A: 1 (Saint Martin's Island, Bangladesh).

Figure 2. *Lutjanus arakan*, MFSU F-5042, nearly fresh, 203 mm SL, Zinjira Island, Bangladesh (M.E. Hasan).

Holotype. MFSU F-5029, 250 mm SL, hand-line catch from off Zinjira Island (Saint Martin's Island), Bangladesh, Teknaf, northern Bay of Bengal, obtained on Zinjira Island, at fisheries landing site, 20.6325°, 92.3295°, M. Eusuf Hasan, 8 April 2021.

Paratypes. (n=15; all with same location & collector as holotype) CUMSF-2018.03.09.1, 104 mm SL, 9 March 2018; CUMS F-2018.11.18.1, 191 mm SL, 18 November 2018; CUMS F-2018.11.21.1–2, 178 & 187 mm SL, 21 November 2018; CUMS F-2018.11.24.1, 181 mm SL, 24 November 2018; MFSU F-5027, 320 mm SL, 13 January 2021; MFSU F-5028, 106 mm SL, 8 April 2021; MFSU F-5030, 140 mm SL, 19 April 2021; MFSU F-5031–5033,135–176 mm SL, 20 April 2021; MFSU F-5034–5035, 147 & 275 mm SL, 21 April 2021; DUZM F7001–7002, 157 & 160 mm SL, 18 May 2022; MFSU F-5044, 320 mm SL, Shrimp trawl around 20 m depth, approx. at 20.44 N, 92.27 E, 'RV *Meen Shandhani*', 21 January 2025.

Nontype Material. (all with same location & collector as holotype) CUMS F-2018.03.05.1, 195 mm SL, 9 March 2023; CUMS F-2018.03.06.1, 202 mm SL, 9 March 2023; MFSU F-5034, 147 mm SL, 21 April 2021; MFSU F-5039–5040, 214 & 270 mm SL, 8 March 2023; MFSU F-5041, 220 mm SL, 9 March 2023; MFSU F-5042, 203 mm SL, 10 March 2023.

Diagnosis. A species of *Lutjanus* with the following combination of characters: Dorsal-fin elements X, 14 (13–14); anal-fin elements III, 8; body depth 2.4–2.8 in SL; eye 3.7–4.8 in HL; interorbital 5.6–7.4 in HL; scale rows above lateral line rising obliquely toward dorsal profile; predorsal scales extend forward to middle of interorbital; preopercular notch and interopercular knob weakly developed; vomer with narrow, crescentic, V-shaped patch of granular teeth without a medial posterior extension; caudal fin slightly emarginate. Color in fresh or in life reddish brown, grey-brown, or olive-brown on head, back, and upper sides; lower sides and belly reddish brown or silvery pink in adults and brownish white in juveniles; dorsal, caudal, anal, and pelvic fins reddish brown, with a black spot at base of uppermost pectoral-fin rays; two dark-brown stripes on upper half of lateral body, first from upper end of operculum to posterior end of soft-dorsal-fin base, continuing to upper caudal-fin base; second stripe from behind upper middle operculum straight to mid-base of caudal fin, preceded by a squarish dark blotch on upper operculum.

Figure 3. *Lutjanus arakan*, adults with partly faded color: paratype, CUMS F-2018.11.18.1, 191 mm SL (top); MFSU F-5040, 270 mm SL, reversed (middle); largest known individual, ~360 mm SL, ~440 mm TL, ~1.5 kgs, not retained (bottom); all Zinjira Island, Teknaf, Bangladesh (M.E. Hasan).

Description. (see morphometrics in Table 1 and counts in Table 2) Dorsal-fin elements X,14 (13–14); anal-fin elements III,8; pectoral-fin rays 17 (one paratype with 16); lateral-line scales 48 (47–49); oblique scale rows above lateral line 7; horizontal scale rows below lateral line 15 (14–16); transverse scale rows on cheek 7; total gill rakers on first gill arch 7+10=17 (developed rakers, excluding rudiments, 2+7), range of gill-rakers 4–8 (4–6 rudiments) + 9–11 (0–3 rudiments), total gill rakers 15–19 (including rudiments), all counts not including 2 or 3 rough patches on surface of gill arch at anterior end of lower limb.

Body moderately elongate and laterally compressed; greatest body depth 2.6 (2.4–2.8) in SL and greatest body width 2.6 (2.3–2.6) in depth; head relatively short with a somewhat blunt snout profile, its length 2.7 (2.5–2.8) in SL; snout-forehead profile nearly straight or flat; (all in HL) snout 2.9 (2.8–3.2), eye 4.2 (3.7–4.8), bony interorbital 5.6 (5.6–7.4, subequal to suborbital depth), maxilla or upper jaw 2.4 (2.4–2.5), suborbital depth 5.6 (5.3–6.8), caudal-peduncle depth 2.9 (2.9–3.2, about twice suborbital), and caudal-peduncle length 2.1 (1.9–2.4),

Body, opercle, and preopercle with finely ctenoid scales; no scales on parietal, frontal, interorbital, snout, preorbital, lips, dentary, or rear edge of preopercle; predorsal scales extending to halfway between level of preopercular margin and level of posterior margin of orbit (Fig. 4); scale rows above lateral line rising obliquely toward dorsal profile; a pair of small elliptical nostrils on each side of snout with a fleshy rim on outer edge;

Figure 4. *Lutjanus arakan*, preserved holotype, MFSU F-5029, 250 mm SL (upper); preserved paratype, MFSU F-5035, 275 mm SL (lower); Zinjira Island, Teknaf, Bangladesh (M.E. Hasan).

Figure 5. *Lutjanus arakan*, preserved paratype, mouth and jaws, MFSU F-5035, 275 mm SL, Zinjira Island, Teknaf, Bangladesh (M.E. Hasan).

preopercular margin finely serrated, serrae increasing in size ventrally; preopercular notch and interopercular knob weakly developed; upper middle of opercular margin with a sharp, flattened, leathery projection and a blunt bony spine overlying its base; opercular, interopercular, and subopercular margins otherwise smooth.

Upper jaw with dagger-like canine tooth (about half of pupil diameter in length) on anterior jaw each side, with smaller canine before symphysis; large canine followed by a series of small, embedded caniniform teeth; lower jaw with 7–9 small canine teeth anteriorly on each side, increasing in size posteriorly; vomerine and palatine teeth fine and granular; vomerine in a narrow V-shaped patch, without a medial posterior extension; anterior middle part of tongue with a patch of fine granular teeth (Fig. 5).

Dorsal-fin outline incised, second dorsal-fin spine nearly twice length of first; fourth or fifth spines longest, remaining spines gradually decreasing in length; profile of soft dorsal fin relatively low and rounded, usually fourth soft dorsal ray longest; second anal-fin spine nearly twice length of first, and about equal to length of third. Lengths (in HL) of first dorsal-fin spine 8.3 (6.0–8.4), second 4.2 (3.7–4.6), third 3.4 (3.0–3.6), fifth 3.3 (2.9–3.6), tenth 4.1 (3.6–5.2), and longest soft dorsal-fin ray 2.7 (2.6–3.2); first anal-fin spine 9.3 (6.5–9.3), second 4.1 (3.3–4.7), third 4.7 (3.4–4.7), and longest soft anal-fin ray 2.7 (2.2–3.0). Pectoral fins pointed, not reaching level of anal-fin origin; pelvic fins relatively short, not reaching anus when depressed; caudal fin truncate or slightly emarginate. Lengths (in HL) of pectoral fin 1.3 (1.2–1.4), pelvic fin 1.9 (1.8–2.1), caudal fin 2.0 (1.6–2.0).

Color when fresh. (Figs. 2, 3 & 6) Head, back, and upper sides reddish brown in adults, grayish brown or olive brown in juveniles; lower sides and belly reddish brown or silvery pink in adults, brownish white in juveniles. Dorsal, caudal, anal, and pelvic fins reddish brown; outer margin of spinous dorsal fin darker; pectoral fin translucent reddish pink with a black spot at base of uppermost rays. Two dark-brown stripes on upper half of lateral body, first from upper end of operculum to posterior end of soft-dorsal-fin base, continuing to upper caudal-fin base; second stripe slightly broader than first, subequal to diameter of iris, from behind upper middle operculum straight to mid-base of caudal fin, preceded by a squarish dark blotch on upper operculum. On smaller fish, about 15 cm, two light-brown stripes on ventral body (faint or absent in larger adults), first from just above pectoral fin to caudal-fin base; second, usually fainter, from behind lower half of pectoral fin to posterior end of soft-anal-fin base; three orange stripes across snout and cheek (faint or absent in larger adults), upper from just below snout tip, touching lower rim of eye, to upper middle preopercle; middle stripe behind upper end of maxilla to lower opercle, continuing as first lower body stripe; lower stripe from middle of maxilla to middle of pectoral-fin base.

Color in preservative. (Figs. 4 & 5) Overall yellowish-to-brownish tan, including fins, with two darker horizontal stripes at middle and upper half of body, placement as described above; soft-dorsal, soft-anal and caudal-fin rays grey; a prominent black spot at base of uppermost pectoral-fin rays placed in the axil.

Figure 6. *Lutjanus arakan*, fresh juvenile paratype, CUMS F-2018.03.09.1, 104 mm SL (top); subadults: ~160 mm SL (middle); ~180 mm SL (bottom); all Zinjira Island, Teknaf, Bangladesh (M.E. Hasan).

TABLE 1

Proportional measurements as percentage of SL with range (and mean) for *Lutjanus arakan* and *L. lemniscatus*

	Lutjanus arakan		*Lutjanus lemniscatus*
	Holotype (MFSU F-5029)	Paratypes (n=15)	Holotype (MNHN 7146)
Standard length (mm)	**250**	**104–320**	**94**
Body depth	39	36–41 (38)	40
Body depth at first anal spine	33	31–36 (33)	37
Head length	37	36–39 (38)	39
Body width	15	14–16 (15)	15
Snout length	13	12–13 (13)	13
Orbit diameter	9	8–11 (9)	9
Dermal eye opening	7	7–9 (8)	8
Interorbital width	7	5–7 (6)	6
Interorbital width + membrane	8	7–9 (8)	---
Upper jaw length	15	15–16 (16)	16
Suborbital depth	7	6–7 (6)	6
Caudal peduncle depth	13	12–14 (13)	14
Caudal peduncle length	18	16–19 (18)	16
Predorsal length	42	39–43 (41)	43
Preanal length	70	69–72 (70)	72
Prepelvic length	41	40–43 (41)	40
Dorsal-fin base	51	47–52 (50)	50
Anal-fin base	15	14–16 (15)	16
Caudal-fin length (horizontal)	18	18–25 (23)	27
Pelvic-fin spine length	10	10–13 (12)	14
Pelvic-fin length	19	18–21 (20)	23
Pectoral-fin length	28	27–31 (29)	27
First dorsal-fin spine	4	4–6 (5)	6
Second dorsal-fin spine	9	8–10 (9)	12
Third dorsal-fin spine	11	10–13 (12)	13
Fourth dorsal-fin spine	11	11–13 (12)	13
Fifth dorsal-fin spine	11	10–13 (11)	14
Last dorsal fin spine	9	7–10 (9)	10
First soft dorsal-fin ray	10	9–14 (11)	12
Longest dorsal ray	14	11–14 (13)	13
First anal-fin spine	4	4–6 (5)	7
Second anal-fin spine	9	8–12 (10)	12
Third anal-fin spine	8	8–12 (10)	12
First anal-fin ray	12	12–15 (13)	15
Longest anal-fin ray	14	13–18 (15)	16

Figure 7. Street-market image from Teknaf, Bangladesh (M.E. Hasan) (top), and Ngapali, Southern Rakhine coast, Myanmar (M. Griffith) (bottom), showing *Lutjanus arakan* along with other lutjanids, lethrinids, sciaenids, and haemulids.

Size. *Lutjanus arakan* is a small to medium-sized snapper, currently known to attain at least about 36 cm SL and 44 cm TL and weighing around 1.5 kg (Fig. 3).

Etymology. The new species is named after the historical Arakan coast along the eastern Bay of Bengal (covering the present day southeast coast of Bangladesh and the Rakhine coast of Myanmar) from where it is currently known; the specific epithet is treated as a noun in apposition.

Distribution and habitat. *Lutjanus arakan* is currently known from the eastern Bay of Bengal, from Zinjira Island (St. Martin's Island) of Teknaf, Bangladesh in the north (the type locality), through to Ngapali, in the southern Rakhine (Arakan) coast of Myanmar, and presumably up to western Ayeyarwady Region in the south. There is no published record of corresponding snapper species from the Andaman Sea region so far (Iwatsuki & Satapoomin 2009). The species appears to be endemic to the eastern Bay of Bengal, excluding the Andaman Sea and the Andaman and Nicobar Islands.

The habitat of *L. arakan* consists of the (coral-associated) rocky reefs, mostly at about 3–20 m depth from where it is mostly fished. Juveniles usually occur in shallower waters (<5 m). However it is not known to occur in estuarine areas or in soft bottom trawling grounds. It is the most frequently caught snapper (lutjanid) regularly seen in hand-line catches and occasionally in bottom-set gill net catches around Zinjira Island, Bangladesh. Species co-occurring in catches are *Lutjanus indicus*, *Lutjanus johnii* (Bloch, 1792), *L. lunulatus*, *Lethrinus* sp., *Paranibea semiluctuosa* (Cuvier, 1830), and *Pomadasys guoraca* (Cuvier, 1830), among others (Fig. 7).

Comparison to *Lutjanus lemniscatus*. *Lutjanus arakan* has been confused with the young of *L. lemniscatus* since they share their basic striped color pattern. Specimens and photographs of *L. arakan* have been misidentified as *L. lemniscatus* (see Synonymy, and elsewhere). While the two species are sympatric within the new species' range in the eastern Bay of Bengal, *L. lemniscatus* has a vastly wider distribution in the Indo-Pacific, from the Gulf of Aden and Persian Gulf, east to the Philippines and New Guinea, northwards to Taiwan, and southwards to Western Australia and Queensland (Fricke et al. 2025; the holotype of *L. lemniscatus* is from Sri Lanka) (Fig. 8)

Small juveniles of *L. arakan* have not been identified, but likely closely resemble those of *L. lemniscatus*, with a simple, dark, midlateral stripe, reminiscent of the appearance of some apogonids (Fig. 9 top). At about 100 mm TL, juveniles of both species have two thin, reddish-brown, horizontal stripes on the lower half of the body extending from the snout tip to the caudal peduncle (Fig. 6 top & Fig. 9 middle & bottom). However, *L. arakan* differs in not having a dark stripe on the head between the eye and the snout tip and the body having two dark-brown mid-lateral stripes, the first running from the upper-middle operculum to the base of the caudal fin, with the width nearly equal to the pupil diameter, and the second stripe being slightly thinner and running from the upper end of the operculum to the end of the soft dorsal-fin base. In contrast, *L. lemniscatus* has a broad brown stripe on the head between the eye and the snout tip and the body has a black midlateral stripe, edged with white, almost as wide as the eye diameter, running from the eye to the base of the caudal fin (Fig. 9). The broad, black, mid-lateral stripe is even visible on the century-old preserved holotype (Fig. 8).

Figure 8. *Lutjanus lemniscatus*, preserved holotype of *Serranus lemniscatus*, MNHN IC-7146, 94 mm SL, Sri Lanka (courtesy J. Pfliger); note the broad, dark, mid-lateral stripe and two faint stripes below it.

Figure 9. *Lutjanus lemniscatus*, striped small juvenile, ~ 50 mm TL, resembling apogonids, Western Australia (R. Stuart-Smith) (top); juvenile, ~ 90 mm TL, Hong Kong (Allen To) (middle); juvenile, ~ 90 mm TL, Chennai, Tamil Nadu, India (A. Manoj) (bottom).

Figure 10. *Lutjanus lemniscatus*, fresh subadults: ~150 mm SL, Andaman Coast, Thailand (Luke Ovgard, via https://specieshunters.com/fotos.asp?soortid=8459) (top); ~170 mm SL, Khao Lak, Andaman Coast, Thailand (K.D. Wilson) (middle); CUMS F-2018.11.24.2, ~180 mm SL, Zinjira Island, Teknaf, Bangladesh (M.E. Hasan) (bottom).

Figure 11. *Lutjanus lemniscatus*, fresh adults, CUMS F-2019.01.29.2, 250 mm SL, Zinjira Island, Bangladesh (top) (M.E. Hasan); ~350 mm SL, Exmouth, Western Australia (middle) (Alex Hoschke); ~400 mm SL, HoChiMinh City, Vietnam (tissue 191115A) (bottom) (J.-D. Durand).

Figure 12. *Lutjanus lunulatus*, CUMS F-2018.03.09.2, 210 mm SL, Zinjira Island, Bangladesh (M.E. Hasan) (upper); *Lutjanus papuensis*, paratype, USNM 408444, 173 mm SL, Kedonganan fish market, Bali, Indonesia (W.T. White) (lower).

Lutjanus arakan notably retains the two dark horizontal stripes into the adult stage, at least up to about 27 cm SL (Figs. 2 & 3). In contrast, the mid-lateral stripe in small *L. lemniscatus* starts to fade away around 15–17 cm SL, and, after about 18 cm SL, there is no sign of the mid-lateral stripe and the body develops scattered yellow streaks (Fig. 10). Adults usually have a light reddish-grey body and a dark tail with a thin white margin (Fig. 11 & see Allen et al. 2013: Fig. 9), with some large individuals on trawling grounds, becoming uniformly reddish (Fig. 11). Fin coloration also differs, with *L. arakan* having reddish to reddish-brown pectoral, pelvic, and anal fins at all stages (Figs. 2, 3 & 6) vs. smaller adult *L. lemniscatus* having yellowish pectoral and pelvic fins, with a yellowish-orange anal fin becoming orange-red to red in large individuals (Figs. 10 & 11).

Figure 13. *Lutjanus decussatus*, ~250 mm TL, Tulamben Area, Bali, Indonesia (S. Johnson) (top); *Lutjanus semicinctus*, ~250 mm TL, Wakatobi, Indonesia (reversed) (W. Osborn) (middle); *Lutjanus semicinctus,* subadult, ~200 mm TL, Misool, Raja Ampat, Indonesia (S. Le Bris) (bottom).

Morphologically, *L. arakan* is mostly similar to *L. lemniscatus*, with the exception of a relatively narrower interorbital (5.6–7.4 vs. 4.9–5.2 in HL), a more slender body shape (2.4–2.8 vs. 2.3–2.5 in SL), and a nearly straight vs. slightly concave snout-forehead profile (*L. lemniscatus* data from Allen et al. 2013). Interestingly, the largest adult *L. lemniscatus* collected from trawling grounds can develop an unusual long snout and prominent hump behind the head (Fig. 11).

Comparison to the *L. lunulatus* species complex. *Lutjanus arakan* can be distinguished from both *L, lunulatus* of the eastern Indian and western Pacific Oceans and *L. papuensis* from Indonesia, Papua New Guinea, and Solomon Islands by having dark lateral stripes vs. none. Otherwise, those two species are reddish brown to reddish pink over most of the head, dorsal fin, and caudal fin, somewhat similar to the dorsal color in *L. arakan*. Additional features that separate *L. lunulatus* are the yellow lower body, pelvic, and anal fins, as well as a distinctive crescent-shaped black marking on the caudal fin (Fig. 12). *Lutjanus* papuensis further differs in being

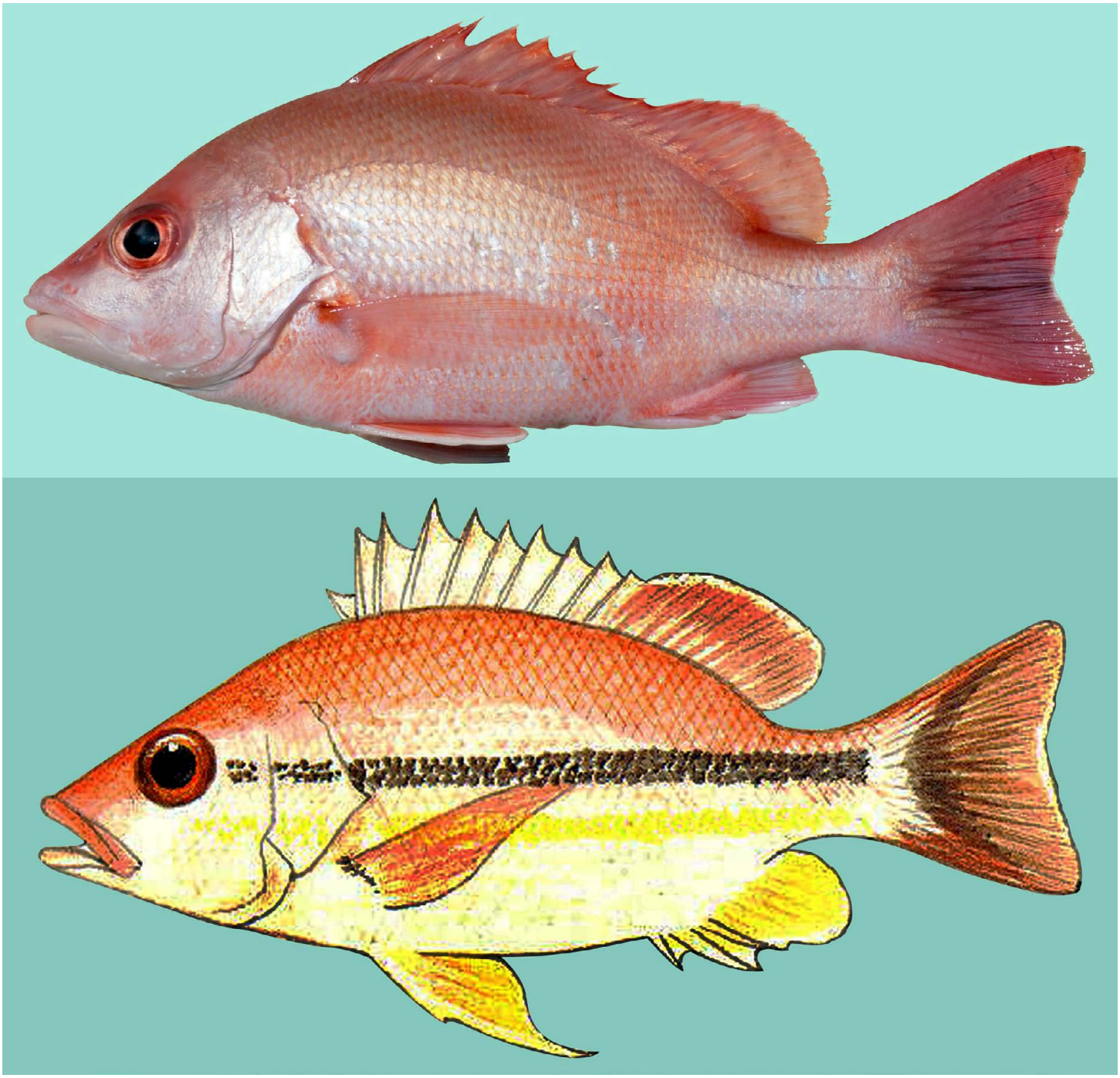

Figure 14. *Lutjanus bitaeniatus*, 180 mm SL, Bassett-Smith Shoal, northwest of Western Australia (C. Dowling) (upper); juvenile (FAO) (lower).

yellow-orange below the lateral line, having bright yellow anal and pelvic fins, and a dark-brown caudal fin with the outer third reddish pink (Fig. 12).

Lutjanus arakan shares the basic pattern of brown horizontal stripes on a pale body with *L. decussatus* (Cuvier 1828), from the eastern Indian and western Pacific Oceans, but *L. decussatus* differs in stripe number and shape, having 5 reddish-brown stripes along the full extent of the body, and the upper stripes form a distinctive checkerboard pattern, plus most of the caudal-fin base is covered by a large, rounded, black spot (Fig. 13). *Lutjanus*

Figure 15. *Lutjanus lemniscatus*, holotypes of junior synonyms: *Lutianus furvicaudatus*, ANSP 27596, 138 mm SL, Padang, Sumatra, Indonesia (A. Labadie) (top); *Mesoprion immaculatus*, MNHN IC-8201, 168 mm SL, Sumatra, Indonesia (J. Pfliger) (middle); *Mesoprion janthinuropterus*, RMNH.PISC.27706, 158 mm SL, Sulawesi, Indonesia (E. Dondorp).

TABLE 2

Comparisons of meristic counts for *Lutjanus arakan* and *L. lemniscatus*

	Lutjanus arakan		*Lutjanus lemniscatus*
	Holotype MFSU F-5029	Paratypes (n=15)	Holotype MNHN 7146
Dorsal-fin rays	X, 14	X, 13–14	X, 13
Anal-fin rays	III, 8	III, 8	III, 8
Pectoral-fin rays	17	17	17
Lateral-line scales	48	47–49	49
Scale rows on cheek	7	7	7
Oblique scale rows above lateral line	7	7	7
Horizontal scale rows below lateral line	15	15	15
Gill rakers, upper limb (rudiments)	2 (5)	4–8 (3–6)	8
Gill rakers, lower limb (rudiments)	7 (3)	9–11 (0–3)	14 (4)
Gill rakers, total (including rudiments)	17	15–19	18

semicinctus from the western central Pacific, clearly differs from both in having 7 brownish-black narrow bars or saddles on the upper half of the body extending halfway down the sides, as well as a large, diffuse, black blotch covering much of the caudal peduncle and anterior caudal fin; young *L. semicinctus* can also have faint horizontal stripes somewhat similar to other species (Fig. 13).

The new species can be distinguished from *L. bitaeniatus* from eastern Indonesia and northwestern Australia, by the presence of stripes in adults, *L. bitaeniatus* adults are mostly uniform reddish pink without stripes and juveniles can have have mid-lateral stripes, dark or yellow (Fig. 14). The two species have different depth preferences, with *L. bitaeniatus* so far known only from deep offshore trawling areas, at about 40–105 m depth (Allen et al. 2013).

Remarks on junior synonym types. The holotype of *Lutjanus furvicaudatus* Fowler, 1904 (ANSP 27596, 138 mm SL) from Padang, Sumatra, Indonesia (Fig. 15) has 7 scale rows between the dorsal-fin base and the lateral line, a relatively slender body, and a slightly concave snout-forehead profile. Fowler (1904) describes *L. furvicaudatus* as having "indistinct dusky-brown lines obliquely up from lateral line, and rather narrow. Below lateral line a number of indistinct horizontal lines, fading out below. These also extend on side of head and cheek…". He does not mention two dark horizontal stripes as in *L. arakan*, which has stripes up to at least about

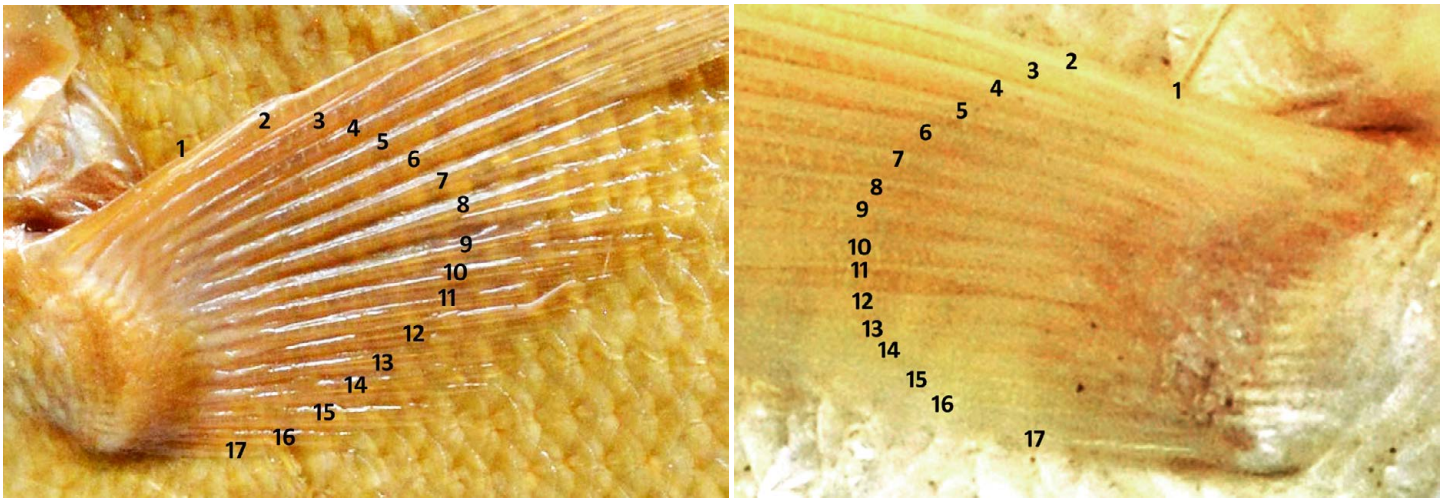

Figure 16. *Lutjanus lemniscatus*, pectoral fins with 17 rays, holotype, MNHN IC-7146, 94 mm SL, Sri Lanka (J. Pfliger) (left); *Lutjanus furvicaudatus*, holotype, ANSP 27596, 144 mm SL, Indonesia (A. Labadie) (right).

270 mm SL (Figs. 2–6 vs Fig. 10 in *L. lemniscatus*). We conclude that *L. furvicaudatus* was described based on a juvenile specimen of *L. lemniscatus*, with which it should be synonymized.

The holotype of *Mesoprion immaculatus* Cuvier, 1828 (MNHN IC 8201, 168 mm SL) from Sumatra, Indonesia and the holotype of *Mesoprion janthinuropterus* Bleeker, 1853 (RMNH.PISC.27706, 158 mm SL) from Sulawesi, Indonesia are also similar to *L. lemniscatus* in body shape and morphometrics. The two preserved specimens do not show any evidence of horizontal stripes (Fig. 15). We agree with Allen (1985) those are junior synonyms of *L. lemniscatus*.

Remarks on the pectoral-fin ray count of *L. lemniscatus*. There are inconsistencies in reported pectoral-fin ray counts from various sources for *L. lemniscatus*: ranging from 16 (Allen 1985, Anderson & Allen 2001, Iwatsuki & Satapoomin 2009, Allen & Erdman 2012) to19 (Heemstra & Heemstra 2022). The report of 19 fin rays by Heemstra & Heemstra (2022) appears to be a typographic error. However, reexamination of the holotype of *L. lemniscatus*, MNHN IC 7146 and the holotype of *L. furvicaudatus*, ANSP 27596 (Fig. 14A), reveals that the count actually is 17 in both cases (Fig. 16) and the count for the holotype of *M. immaculatus*, MNHN IC 8201, is 16. The count for *L. lemniscatus* should be considered 16 to 17.

Genetics of the *L. lunulatus* species complex. The mtDNA-COI-based phylogenetic tree revealed close affinities among the complex comprising *L. bitaeniatus*, *L. decussatus*, *L. lemniscatus*, *L. lunulatus*, *L. papuensis*, *L. semicinctus*, and the new species *L. arakan*, with lineages of each species clearly distinct (Fig. 17) and all interspecific sequence divergences ranging from about 4 to 5%. We label this the *L. lunulatus* complex based on that being the oldest described species. A similar pattern of close relations among these species was reported in Allen et al. (2013, Fig. 14; *L. semicinctus* not included) and in Frédérich & Santini (2017, Figs. 1 & 2; *L. lunulatus* and *L. semicinctus* not included).

Within the *L. lunulatus* complex, the tree positions *L. arakan* as sister to *L. lunulatus*, with relatively deep branching and moderately robust support (Fig. 17). Although *L. lunulatus* is the sister lineage, more distant lineages have somewhat lower percent differences, with three eastern Indian Ocean *Lutjanus* species, i.e., *L. bitaeniatus*, *L. decussatus* and *L. papuensis*, differing by 4.3, 4.6, and 4.5%, respectively, from *L. arakan*. However *L. lemniscatus*, *L. lunulatus*, and *L. semicinctus* showed slightly increased divergences with 5.3, 5.1 and 5.7% respectively from *L. arakan*. The close relationships among this complex compared to more distant *Lutjanus* species groups, especially shown in the 30 Indo-West Pacific species presented in a genetic-distance matrix in Allen et al. (2013), and compared to some other species complexes among the 9 species in Iwatsuki et al. (2015), and 11 species of western Atlantic species in Victor et al. (2009), indicates the species stemmed from a common ancestor, although additional genetic markers are necessary to appropriately investigate the evolutionary history of these species.

TABLE 3

Variation in mtDNA COI sequences of the 6 species of the *Lutjanus lunulatus* complex

K2P distances: minimum interspecific and maximum intraspecific distances (%)

	BOLD BIN	*L. arakan*	*L. bitaen*	*L. decuss*	*L. lemnis*	*L. lunul*	*L. papuen*	*L. semi*
***Lutjanus arakan*, n. sp.** (13)	BOLD:AEA9413	0.4						
Lutjanus bitaeniatus (5)	BOLD:AAE3159	4.3	0.0					
Lutjanus decussatus (32)	BOLD:AAF0336	4.6	3.7	0.2				
Lutjanus lemniscatus (40)	BOLD:AAB7014	5.3	4.1	5.0	0.4			
Lutjanus lunulatus (13)	BOLD:AAK6793	5.1	5.5	5.2	6.3	0.7		
Lutjanus papuensis (3)	BOLD:AAK6792	4.5	2.7	4.4	3.7	6.1	0.8	
Lutjanus semicinctus (9)	BOLD:ADF5202	5.7	4.4	3.4	6.0	6.7	5.0	0.1

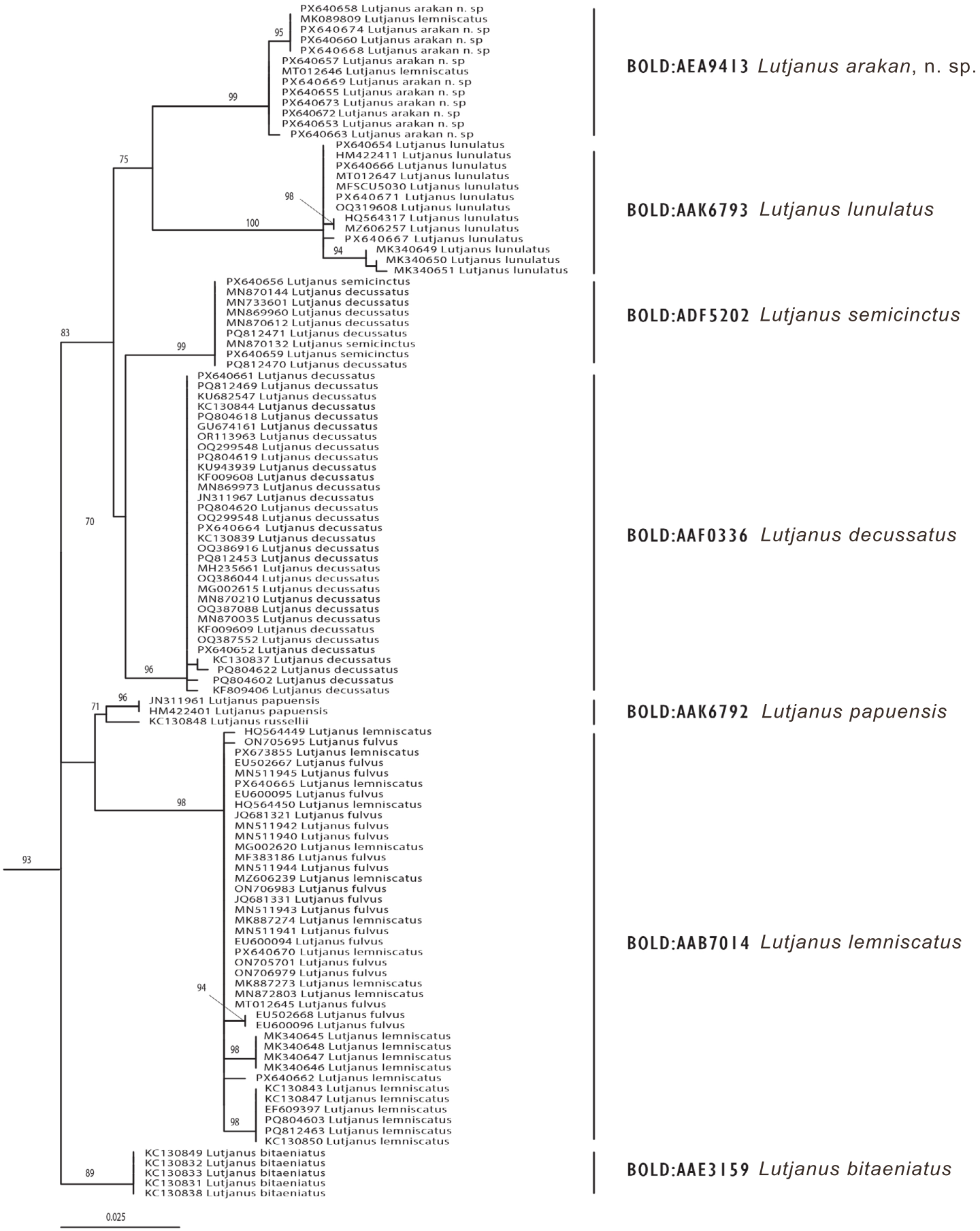

Figure 17. Maximum likelihood tree of mtDNA sequences of COI for the *L. lunulatus* species complex. GenBank accession numbers and species identifications are as listed in GenBank and databases, and include misidentifications, as discussed in text. Details of the sequences are listed in Appendix Table. Scale bar represents 2.5% distance.

Figure 18. *Lutjanus lemniscatus* (upper) frequently misidentified as *Lutjanus fulvus* (lower); note similar caudal-fin coloration and differences in body colors, pectoral, pelvic, and anal fins, and eye diameter. *L. lemniscatus,* ~250 mm SL, Lady Musgrave Island, Queensland (rayvran 22/iNaturalist) (upper); *L. fulvus*, ~250 mm SL, Kwajalein Atoll, Marshal Island (S. Johnson) (lower).

Errors in databases. Sequences or vouchers of *L. lemniscatus* are frequently mislabeled or misidentified in databases, especially in GenBank (see tree listings in Fig. 17), primarily being identified as *Lutjanus fulvus* (Bloch & Schneider, 1801), due to their similar coloration, and their shared caudal-fin appearance (Fig. 18). In GenBank at present, 19 of 40 COI sequences of *L. lemniscatus* are labeled *L. fulvus* (Fig. 17 & Appendix Table). The mistaken identity was first assigned by Wang et al. (2010) in a study of South China Sea snappers, and has subsequently been repeated by other authors. It explains their report of "unexpected high [genetic] similarities between three individuals of *L. fulvus* from the SCS (EU600094–EU600096) and one individual of *L. lemniscatus* from Queensland (EF609397)" in that study (p. 1028), clearly due to misidentification of the vouchers. Notably, the intraspecific variation in COI for *L. lemniscatus* is extremely low, 0.4%, over its vast Indo-Pacific range, from the Persian Gulf to the western Pacific. Another error in databases, three sequences labeled "*Bodianus neilii*" from Bangladesh (Habib et al. 2023) and Vembanad Lake, eastern Laccadive Sea, Kerala, India (Divya Premadarshan, pers. com.), forming a subclade in the tree, are excluded from our analysis due to their uncertain identity and incomplete voucher records (Kazi Ahsan Habib, pers. comm.).

Other material examined.

Lutjanus lunulatus: CUMS F-2018.03.05.1, 210 mm SL, 2018-03-05; CUMS F-2018.03.09.1, 210 mm SL, 2018-03-09; CUMS F-2018.11.19.1, 160 mm SL, 2018-11-19; CUMS F-2018.11.25.1, 150 mm SL, 2018-11-25. All hand-line catches from off Zinjira Island, northern Bay of Bengal, Bangladesh.

Lutjanus decussatus: CUMS F-2019.01.29.1, 200 mm SL, 2019-01-29; hand-line catch from off Zinjira Island, northern Bay of Bengal, Bangladesh.

Lutjanus lemniscatus: CUMS F-2018.11.24.2, 180 mm SL, 2018-11-24; CUMS F-2019.01.29.2, 250 mm SL, 2019-01-29; CUMS F-2019.01.30.1, 180 mm SL, 2019-01-30. All hand-line catch from off Zinjira Island, northern Bay of Bengal, Bangladesh. MNHN IC 7146 (holotype of *Serranus lemniscatus*), 94 mm SL, Sri Lanka; MNHN IC 8201 (holotype of *Mesoprion immaculatus*), 168 mm SL, Sumatra, Indonesia; ANSP 27596 (holotype of *Lutjanus furvicaudatus*), 138 mm SL, Padang, Sumatra, Indonesia; RMNH.PISC.27706 (holotype of *Lutjanus janthinuropterus*), 158 mm SL, Sulawesi, Indonesia.

Lutjanus semicinctus: FMNH 118512, 260 mm SL, Fana Island, Palau, Western Pacific, 2008-9-12.

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APPENDIX TABLE

Sequences of mtDNA COI gene for *Lutjanus* spp. used in this study with the assigned BOLD BIN

Species	Sequence ID	BIN	Collection Location	Author
Lutjanus arakan				
L. arakan	PX640674	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640669	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640668	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640660	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640663	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640657	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640655	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640663	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640673	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640653	BOLD:AEA9413	Bangladesh	This study
L. arakan	PX640672	BOLD:AEA9413	Bangladesh	This study
(L. lemniscatus)	MK089809	BOLD:AEA9413	Bangladesh	Habib et al. 2023
(L. lemniscatus)	MT012646	BOLD:AEA9413	Bangladesh	Ahmed et al. 2021
Lutjanus bitaeniatus				
L. bitaeniatus	KC130849	BOLD:AAE3159	Western Australia	Allen et al. 2013
L. bitaeniatus	KC130831–33 KC130838	BOLD:AAE3159	Western Australia	Allen et al. 2013
Lutjanus decussatus				
L. decussatus	GU674161 JN311967	BOLD:AAF0336	Indonesia	BOLD (W. White)
L. decussatus	KC130837 KC130839 KC130844	BOLD:AAF0336	Indonesia: Lombok	Allen et al. 2013
L. decussatus	KF009608–09	BOLD:AAF0336	Philippines	Yambot et al. (GB)
L. decussatus	KF809406	BOLD:AAF0336	Philippines	Norcio et al. (GB)
L. decussatus	KU682547	BOLD:AAF0336	Philippines	E.M. Cabana (GB)
L. decussatus	KU943939	BOLD:AAF0336	Taiwan	Chang et al. 2017
L. decussatus	MG002615	BOLD:AAF0336	Malaysia	Abidah et al. 2018
L. decussatus	MH235661	BOLD:AAF0336	Myanmar: Andaman	Segura-Garcia (GB)
L. decussatus	MN869973 MN870035 MN870210	BOLD:AAF0336	Indonesia: Ambon	Limmon et al. 2020
L. decussatus	OQ299548	BOLD:AAF0336	India: Andaman	F. Parveen (GB)
L. decussatus	OQ386044 OQ386916 OQ387088 OQ387552	BOLD:AAF0336	Philippines	Bemis et al. 2023
L. decussatus	OR113963	BOLD:AAF0336	Philippines	Huang et al. 2023

APPENDIX TABLE (cont.)

Sequences of mtDNA COI gene for *Lutjanus* spp. used in this study with the assigned BOLD BIN

Species	Sequence ID	BIN	Collection Location	Author
L. decussatus	PQ804618–20 PQ812453 PQ812469 PQ804602 PQ804622	BOLD:AAF0336	Indonesia: Kaimana	Toha et al. (GB)
L. decussatus	PX640664	BOLD:AAF0336	Bangladesh	This study
L. decussatus	PX640661 PX640652	BOLD:AAF0336	Micronesia	This study
Lutjanus lemniscatus				
L. lemniscatus	EF609397	BOLD:AAB7014	Australia: Queensland	Ward & Homes 2007
(L. fulvus)	EU502667–68	BOLD:AAB7014	China: SCS	Li & Liu (GB)
(L. fulvus)	EU600094–96	BOLD:AAB7014	China: SCS	Wang et al. 2010
L. lemniscatus	HQ564449–50	BOLD:AAB7014	Indonesia	BOLD (W. White)
(L. fulvus)	JQ681321	BOLD:AAB7014	China: SCS	Wang et al. 2012
(L. fulvus)	JQ681331	BOLD:AAB7014	China: SCS	Wang et al. 2012
L. lemniscatus	KC130843 KC130847 KC130850	BOLD:AAB7014	Australia: Queensland	Allen et al. 2013
(L. fulvus)	MF383186	BOLD:AAB7014	India	Rajisha et al. (GB)
L. lemniscatus	MG002620	BOLD:AAB7014	Malaysia	Abidah et al. 2018
L. lemniscatus	MK340645–48	BOLD:AAB7014	Bangladesh	Habib et al. 2023
L. lemniscatus	MK887273–74	BOLD:AAB7014	Iran	A Teimori (GB)
(L. fulvus)	MN511940–45	BOLD:AAB7014	Pakistan	SA Amir (GB)
L. lemniscatus	MN872803	BOLD:AAB7014	India: Odisha	Barik et al. (GB)
(L. fulvus)	MT012645	BOLD:AAB7014	Bangladesh/DUZM	Ahmed et al. 2020
L. lemniscatus	MZ606239	BOLD:AAB7014	India	Dani et al. (GB)
(L. fulvus)	ON705695 ON705701 ON706979 ON706983	BOLD:AAB7014	Pakistan: Balochistan	Kausar et al. (GB)
L. lemniscatus	PQ804603 PQ812463	BOLD:AAB7014	Indonesia: Fak-Fak	Toha et al. (GB)
L. lemniscatus	PX640662	BOLD:AAB7014	Vietnam	This study
L. lemniscatus	PX640670	BOLD:AAB7014	Bangladesh	This study
L. lemniscatus	PX640665	BOLD:AAB7014	Bangladesh	This study
L. lemniscatus	PX673855	BOLD:AAB7014	Bangladesh	This study
Lutjanus lunulatus				
L. lunulatus	HM422411	BOLD:AAK6793	Indonesia: Bali	BOLD (Puckridge)
L. lunulatus	HQ564317	BOLD:AAK6793	Indonesia: West Java	BOLD (W. White)
L. lunulatus	MK340649–51	BOLD:AAK6793	Bangladesh	Habib et al. 2023
L. lunulatus	MT012647	BOLD:AAK6793	Bangladesh	Ahmed et al. 2021
L. lunulatus	MZ606257	BOLD:AAK6793	India: Andaman?	Dani et al. (GB)
L. lunulatus	OQ319608	BOLD:AAK6793	India: Andaman	Parveen et al. (GB)
L. lunulatus	PX640654	BOLD:AAK6793	Bangladesh	This study
L. lunulatus	PX640666	BOLD:AAK6793	Bangladesh	This study
L. lunulatus	PX640671	BOLD:AAK6793	Bangladesh	This study
L. lunulatus	PX640667	BOLD:AAK6793	Bangladesh	This study

APPENDIX TABLE (cont.)

Sequences of mtDNA COI gene for *Lutjanus* spp. used in this study with the assigned BOLD BIN

Species	Sequence ID	BIN	Collection Location	Author
Lutjanus papuensis				
L. papuensis	JN311961	BOLD:AAK6792	Indonesia: Bali	BOLD (W. White)
L. papuensis	HM422401	BOLD:AAK6792	Indonesia: West Java	Allen et al. 2013
(L. russellii)	KC130848	BOLD:AAK6792	Indonesia: West Papua	Allen et al. 2013
Lutjanus semicinctus				
(L. decussatus)	MN733601	BOLD:ADF5202	Micronesia	Choi et al. 2020
(L. decussatus)	MN869960	BOLD:ADF5202	Indonesia: Ambon	Limmon et al. 2020
L. semicinctus	MN870132	BOLD:ADF5202	Indonesia: Ambon	Limmon et al. 2020
(L. decussatus)	MN870144 MN870612	BOLD:ADF5202	Indonesia: Ambon	Limmon et al. 2020
(L. decussatus)	PQ812470–71	BOLD:ADF5202	Indonesia: Kaimana	Toha et al. (GB)
L. semicinctus	PX640656 PX640659	BOLD:ADF5202	Micronesia	This study
Symphorus nematophorus **[Outgroup]**				
S. nematophorus	KC130829	BOLD:AAE2623	Australia: Cape Leveque	Allen et al. 2013
S. nematophorus	KU682555	BOLD:AAE2623	Philippines	E.M. Cabana (GB)