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A new goatfish of the genus *Upeneus* (Mullidae) from Lombok, Indonesia and first verified record of *U. asymmetricus* for the Indian Ocean

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Abstract

Upeneus lombok **n. sp.** is described from two specimens collected off Lombok, Indonesia, at depths of 54–76 m, and one subadult specimen from the local fish market at Tanjung Luar, Lombok. Four specimens of *U. asymmetricus* were collected at the same fish market representing the first record of the species since its description from two Philippine Islands in 1954. These two species are compared in detail and with five congeneric species that all share a 7-spined dorsal fin and a high gill-raker count. *Upeneus lombok* **n. sp.** differs from all other congeners in having a short snout (snout length 9.0–9.6% SL) combined with a low anal fin (anal-fin height 12–13% SL in adults, 15% in single subadult). The newly recorded *U. asymmetricus* specimens differ from their types only slightly and all eight specimens together differ from all congeneric species in the combination of 7 dorsal spines, 12–14 pectoral fin rays, 26–28 total gill rakers, short pectoral fins (pectoral-fin length 18–21% SL) and short jaws (upper jaw length 8.7–11% SL). In both species the caudal-fin colour patterns of fresh fish are of diagnostic significance, the only exception being a close similarity between *Upeneus lombok* **n.sp.**, *U. saiab*, and *U. seychellensis*. Additional comparisons with 14 *Upeneus* species which overlap in distribution or occur in nearby areas are also made. Needs for further taxonomic exploration of the Indonesian-Philippine region and for enhanced attention to the economic and ecological importance of *Upeneus* species are discussed.

Key words: *Upeneus lombok* **n. sp.**, fresh colour, Indonesia-Philippine region, fish markets

Introduction

The goatfish genus *Upeneus* comprises 36 hitherto recognized species (Uiblein & Gledhill, 2015), many of which have been assembled in phenotypically distinct groups to facilitate taxonomic comparisons (Uiblein & Heemstra, 2010; Uiblein & Causse, 2013). One of these species groups, the "*japonicus*" group, consists of ten species which are characterized by 7 dorsal-fin spines (Uiblein & Gledhill, 2015): *Upeneus asymmetricus* Lachner, 1954 (Philippines), *U. australiae* Kim & Nakaya, 2002 (Australia, New Caledonia), *U. francisi* Randall & Guézé, 1992 (New Zealand, Norfolk Island), *U. guttatus* (Day, 1868) (Indo-West Pacific), *U. itoui* Yamashita, Golani & Motomura, 2011 (Japan), *U. japonicus* (Houttuyn, 1782) (West Pacific), *U. pori* Ben-Tuvia & Golani, 1989 (Western Indian Ocean, Eastern Mediterranean), *U. saiab* Uiblein & Lisher, 2013 (northern Mozambique), *U. seychellensis* Uiblein & Heemstra, 2011 (Seychelles Bank), and *U. torres* Uiblein & Gledhill, 2015 (northern Australia, Vanuatu). Four of these ten species have been described only recently (since 2011). There is need for further taxonomic research to fully reveal the diversity of the genus *Upeneus,* especially in the Eastern Indian Ocean and Western Pacific regions (Uiblein & Gouws, 2014; Uiblein & Gledhill, 2015).

The marine realm extending from western Indonesia (Eastern Indian Ocean) to the Philippines (Western Pacific) is part of a global hot spot of coastal marine biodiversity, the "Coral Triangle", which includes Malaysia, Papua New Guinea, the Solomon Islands, and Timor-Leste (Mora *et al*., 2003; Hoeksema 2007; Veron *et al*., 2009). While coastal fish diversity has been found to reach particular high levels in the Central Philippines (Carpenter &

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Springer, 2005), many other areas in the Coral Triangle region including those situated in the Eastern Indian Ocean part require further exploration (e.g. Allen & Erdmann, 2009; Veron *et al*., 2009; Erdmann & Mohan, 2013).

During a recent research project aimed at compiling information on species exploited by the Indonesian marine fisheries (White *et al*., 2013), numerous fish specimens were collected from southern Indonesia and deposited at the Australian National Fish Collection in Hobart, Australia. Among the goatfishes collected were several specimens of the genus *Upeneus* from the fish market at Tanjung Luar, Lombok, which could not be identified using available literature (e.g. Randall, 2001; Allen & Erdmann, 2012). Detailed studies by the senior author of these specimens, together with additional material from several fish collections including specimens from the Northern Territory Museum, Darwin, revealed a undescribed species and an unverified species record for the Indian Ocean.

Here we describe *Upeneus lombok* **n. sp.** and provide an account for the first verified record of *U. asymmetricus* for the Indian Ocean. Both species are compared in detail with morphologically most similar species, i.e. those species of the *U. japonicus* group which also have a high gill-raker count (>23 gill rakers). Additional comparisons include species which are presently known to occur in Indonesia, Philippines, or adjacent areas. The significance of these findings confirm a need for further exploration of the fish fauna of the Indonesian-Philippine region. The benefits of such improved knowledge for local fisheries and coastal management are discussed.

Material and methods

Standard length (SL) and a total of 40 morphometric and 10 meristic characters, as well as colour patterns were obtained from three specimens of the new species and eight specimens of *Upeneus asymmetricus.*These data were compared with data taken from 58 specimens of *Upeneus francisi*, *U. japonicus*, *U. pori*, *U. saiab* and *U. seychellensis*, all species of the *japonicus* group with a high gill-raker count and considerable similarity in body form.

Additional comparisons were made with the following 14 species which either overlap in distribution with *U. lombok* **n. sp.** and *U. asymmetricus* or occur in nearby areas (associated taxonomic group in parentheses): *U. australiae*, *U. guttatus* and *U. torres* (*japonicus* group species with low gill-raker count), *U. sulphureus* Cuvier, 1829, *U. moluccensis* (Bleeker, 1855), and *U. quadrilineatus* Cheng & Wang, 1963 (*moluccensis* group), *U. subvittatus* (Temminck & Schlegel, 1843) and *U. stenopsis* Uiblein & McGrouther, 2012 (both *stenopsis* group), *U. vittatus* (Forsskål, 1775) (*vittatus* group), *U. luzonius* Jordan & Seale, 1907, *U. margarethae* Uiblein & Heemstra, 2010, *U. sundaicus* (Bleeker, 1855) and *U. tragula* Richardson, 1846 (all *tragula* group), and the 'ungrouped' *U. nigromarginatus* Bos, 2014. For these comparisons mostly published data from the following accounts were used (compared species in parentheses): Uiblein & Heemstra, 2010 (*U. moluccensis*, *U. sulphureus*); Uiblein & Heemstra, 2011a (*U. seychellensis*); Uiblein & McGrouther, 2012 (*U. stenopsis*, *U. subvittatus*, *U. vittatus*); Uiblein & Lisher, 2013 (*U. saiab*, *U. pori*); Bos, 2014 (*U. nigromarginatus*); Uiblein & Gouws, 2014 (*U. luzonius*, *U. margarethae*, *U. sundaicus*, *U. tragula*); and Uiblein & Gledhill, 2015 (*U. australiae*, *U. guttatus*, *U. japonicus*, *U. torres*). Comparative data for *Upeneus francisi* and *U. quadrilineatus* are given in this study.

Methods for measuring and counting as well as the description of colour, based on fresh and preserved fish follow Uiblein & Gledhill (2015). In all comparisons attention was paid to the most diagnostic characters, taking sample size and intraspecific variation into consideration. As in Uiblein & Gledhill (2015), subadults (<65 mm SL) were distinguished from adults (≥65 mm SL) and morphometric characters compared separately for the two size groups. Species and population differences in morphometric characters were only accepted after examination of plots against SL to take allometric changes into account.

Institutional abbreviations follow Eschmeyer (2015).

Taxonomy

Genus *Upeneus* Cuvier, 1829

***Upeneus lombok* n. sp.**
Lombok goatfish
(Figs 1, 2; Table 1)

Holotype. NTM S.11341-002, 94 mm SL, Indonesia, Lombok, 08°48' S, 116°33' E, 54–60 m depth.

Paratypes. NTM S.11343-005, 86 mm SL, Indonesia, Lombok, Alas Strait, 08°50' S, 116°33' E, 56–76 m depth; MZB 22710 (Genetic accession number BW-A7686), 51 mm SL (subadult), Lombok, Tanjung Luar, fish market.

Diagnosis. Dorsal fins VII + 9; pectoral fins 14 or 15; gill rakers 7–8 + 20–21 = 27–29; measurements in % SL for adults (for subadult in parentheses): body depth at first dorsal-fin origin 21–23 (23); body depth at anus 19 (18); caudal-peduncle depth 9.2–9.3 (9.5); maximum head depth 19–20 (19); head depth through eye 14–15 (16); interorbital length 7.2–8.3 (7.8); head length 28–30 (29); snout length 9.2–9.6 (9.0); postorbital length 12 (12); orbit length 7.5–7.9 (8.4); upper jaw length 9.4–9.7 (9.8); barbel length 19–20 (17); caudal-peduncle length 21–23 (24); caudal-fin length 28–29 (29); anal-fin height 12–13 (15); pelvic-fin length 21–22 (20); pectoral-fin length 20–21 (21); first dorsal-fin height 19 (20); second dorsal-fin height 14 (16); subadult fresh colour: upper lobe of caudal fin with 3 red-brown oblique bars including 1 bar close to tip (5 bars in preserved adult); lower caudal-fin lobe covered on inner (dorsal) two-thirds with dark red-brown pigmentation, the distal-most (ventral) 3 rays mostly unpigmented or whitish; barbels white; body dorsally darkened and head entirely dark apart from silvery scale regions below and behind eyes; preserved fish dark brown, ventrally lighter; bars on upper caudal-fin lobe and lower lobe pigmentation not or only weakly retained in preserved fish.

Description. Morphometric data as ratios of SL for holotype, followed by data for adult and subadult paratype (both in square brackets with subadult in round brackets): body moderately deep, its depth at first dorsal-fin origin 4.7[4.3 (4.4)]; body depth at anal-fin origin 5.1[5.2 (5.4)]; head depth through eye 7.1[6.6 (6.3)]; head length 3.6[3.3 (3.5)], larger than maximum depth of body and subequal to caudal-fin length (3.5[3.4 (3.5)]); snout length 8.6 [8.2 (8.1)], shorter than postorbital length (11 [10 (11)]); orbit length 13[13 (12)], smaller than caudal-peduncle depth (11[11 (10)]); barbel length 5.3[5.1 (6.0)]; anal-fin height 8.1 [7.4 (6.6)], second dorsal-fin height 7.4[6.9 (6.1)]; pectoral-fin length 5.0[4.9 (4.8)], subequal to pelvic-fin length (4.8[4.6 (5.0)]).

Fresh colour (subadult paratype, Figure 1): dorsal half of body and postorbital region of head dark grey, ventral half of body pale; belly with several rose to red patches; head dark red-brown anteriorly and below eye to operculum, pale ventrally; barbels white; caudal-fin upper lobe with 3 red-brown oblique bars of about pupil width, 1 small bar close to fin tip and the other 2 proximal bars slightly bent, with hyaline bar interspaces slightly wider than bars; lower caudal-fin lobe covered to about two thirds by red-brown pigmentation at inner (dorsal) side, the ventral-most 3 rays at outer side whitish with some red-brown pigmentation along outermost fin margin proximally, close to fin base; dorsal fins with 2 red-brown horizontal stripes each, the more proximal stripe well-separated from body at first dorsal fin, while close to body at second dorsal fin; pectoral, pelvic, and dorsal fins hyaline.

Preserved colour. Holotype and adult paratype brown grey on dorsal two thirds of body and head and pale to white-silvery from below head to caudal-fin insertion; the pale pigmented area extends vertically to mid-body on operculum; subadult paratype dark brown on head and body; upper caudal-fin lobe bars: 5 oblique brown bars in holotype, the most distal bar close to tip and the 2 most proximal bars close to fin base and slightly bent, adult paratype with only faintly visible remains of 4 bars, and subadult paratype with 3 dark brown bars; lower caudal-fin lobe: in both adult types weakly light brown pigmented on inner (dorsal) two thirds of lobe, while pale along outermost 3 rays on ventral side of lobe, in subadult paratype lower lobe on inner (dorsal) two thirds brown pigmented, while mostly pale in ventral part along the 3 outermost fin rays, with dark pigmentation along outermost fin margin proximally, close to fin base; barbels uniformly brown in all three type specimens.

Distribution. Currently only known from Lombok, Indonesia, Eastern Indian Ocean.

Etymology. The name "*lombok*" is used as a noun in apposition and is derived from the type locality, Lombok, Indonesia.

Comparisons. *Upeneus lombok* **n. sp.** differs from all congeneric species in the following combination of characteristics: 7 dorsal-fin spines, 14–15 pectoral-fin rays, 27–29 total gill rakers (20–21 rakers on lower limb), snout length 9.0–9.6% SL and anal-fin height 12–13% SL in adults (15% in single subadult).

Upeneus lombok **n. sp.** differs from the other similar species of the *japonicus* group as follows (comparative

data in Table 1): from *U. asymmetricus* in shallower body at anal-fin origin, shorter snout, lower anal and second dorsal fins, and oblique bars on lower caudal fin absent vs. present; it differs from *U. francisi*, in fewer gill rakers, shallower body and head, shorter snout and jaws, lower anal and second dorsal fins, and shorter pectoral fins; it differs from *U. japonicus* in shorter snout, lower anal and dorsal fins, and lower caudal-fin lobe with a stripe on inner two thirds of fin vs. more entirely covered; it differs from *U. pori* in shallower body depth at anal-fin origin, shorter snout and jaws, lower anal and dorsal fins, narrower pectoral fin, and oblique bars on lower caudal-fin lobe absent vs. present; it differs from *U. saiab* in shorter snout and lower anal fin; and it differs from *U. seychellensis* in more gill rakers, shorter snout and jaws, and lower anal and second dorsal fins

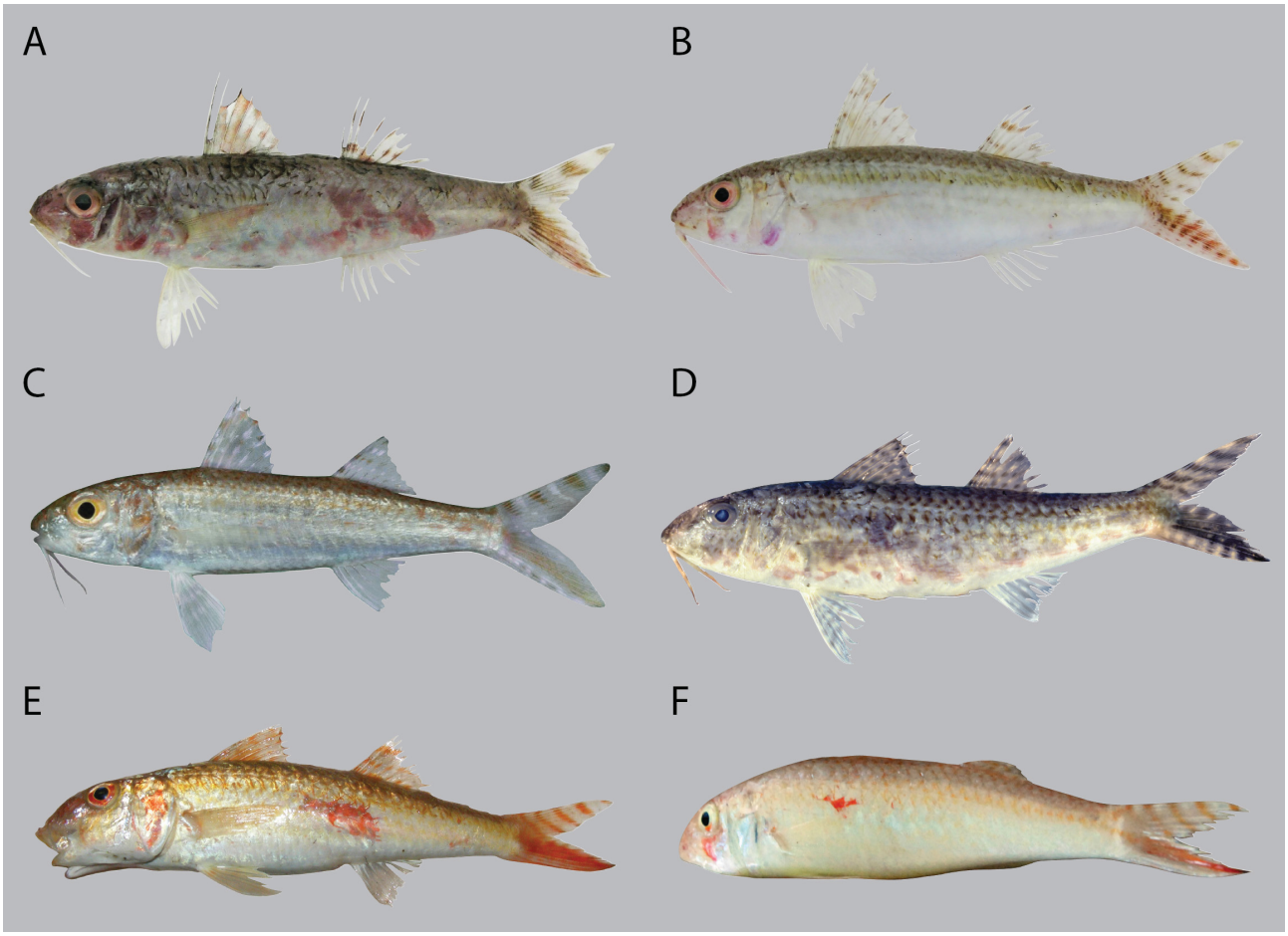

FIGURE 1 (A) *Upeneus lombok* **n. sp.**, paratype (MZB 22710), 51 mm SL, Lombok (W. T. White); (B) *U. asymmetricus* (CSIRO H 7417-02), 93 mm SL, Lombok (W. T. White); (C) *Upeneus francisi* (BPBM 34256), 56 mm SL, Norfolk Island (J. E. Randall); (D) *U. pori,* holotype (HUJ 13627), Eilat, Red Sea, 98 mm SL (D. Darom); (E) *U. saiab,* holotype (SAIAB 188298), 102 mm SL, Angoche, Mozambique (M. Lisher); (F) *Upeneus seychellensis*, paratype (SAIAB 84280), 102 mm SL, Seychelles Bank (O. Alvheim)

Furthermore, *Upeneus lombok* **n. sp.** differs from 14 other potentially co-occurring species as follows: from *U. australiae*, *U. guttatus*, and *U. torres* in more gill rakers (gill rakers on lower limb, 20–21 vs. 16–19; total gill rakers, 27–29 vs. 22–26), shorter snout length (9.2–9.6 vs. 9.8–13% SL), lower anal fin (anal-fin height 12–13 vs. 15–20% SL), and a red-brown stripe on inner (dorsal) two thirds of lower caudal-fin lobe vs. the lobe either almost entirely covered by an orange or red stripe (*U. torres*), or the lobe crossed by oblique bars at outside (ventrally) that connect to a stripe at inner side (dorsally) (*U. guttatus*), or the lobe crossed by brown or black oblique bars (*U. australiae*); it differs from *U. moluccensis*, *U. quadrilineatus*, and *U. sulphureus* in 7 vs. 8 dorsal-fin spines, fewer lateral-line scales (30–31 vs. 33–37), shallower body (body depth at first dorsal-fin origin 21–23 vs. 24–33% SL; body depth at anal-fin origin 19 vs. 20–27% SL), shorter jaws (upper-jaw length 9.4–9.7 vs. 10–13; lower-jaw length 8.6–9.3 vs. 10–13), and a red-brown stripe on inner (dorsal) two thirds of lobe vs. no stripe; it differs from *U. stenopsis*, *U. subvittatus*, and *U. vittatus* in 7 vs. 8 dorsal-fin spines, shallower head (maximum head depth 19–20 vs. 21–26% SL; head depth through eye 14–15 vs. 17–20% SL), shorter snout length (9.2–9.6 vs. 10–13% SL), lower anal fin (anal-fin height 12–13 vs. 14–18% SL), and no bars vs. dark oblique bars on lower caudal-fin lobe;

it differs from *U. luzonius*, *U. margarethae*, *U. sundaicus* and *U. tragula* in 7 vs. 8 dorsal-fin spines, more gill rakers (gill rakers on lower limb 20–21 vs. 13–18; total gill rakers 27–29 vs. 18–24), shorter snout (snout length 9.2–9.6 vs. 10–14% SL), lower anal fin (anal-fin height 12–13 vs. 14–18% SL), and a red-brown stripe on inner (dorsal) two thirds of lobe vs. no stripe (all four species) or a stripe with oblique bars on outermost (ventral) lobe margin (Western Indian Ocean *U. margarethae*); and it differs from *U. nigromarginatus* Bos, 2014 in 7 vs. 8 dorsal-fin spines, less lateral-line scales (30–31 vs. 36–37), shallower body (body depth at first dorsal-fin origin 21–23 vs. 31–35% SL; body depth at anal-fin origin 19 vs. 27–30% SL), shorter jaws (upper-jaw length 9.4–9.7 vs. 11–12% SL), lower anal fin (anal-fin height 12–13 vs. 16–17% SL), and a red-brown stripe on on inner (dorsal) two thirds of lobe vs. no stripe.

The single subadult paratype of *U. lombok* **n. sp.** deviates from the two adult types slightly in a few morphometric characters, e.g. a deeper head through eye, larger eyes, shorter barbels, and a higher second dorsal fin; it differs from subadults of *U. francisi* in body form in a similar way as indicated for the adults of both species (see further above). *Upeneus lombok* **n. sp.** attains 94 mm SL.

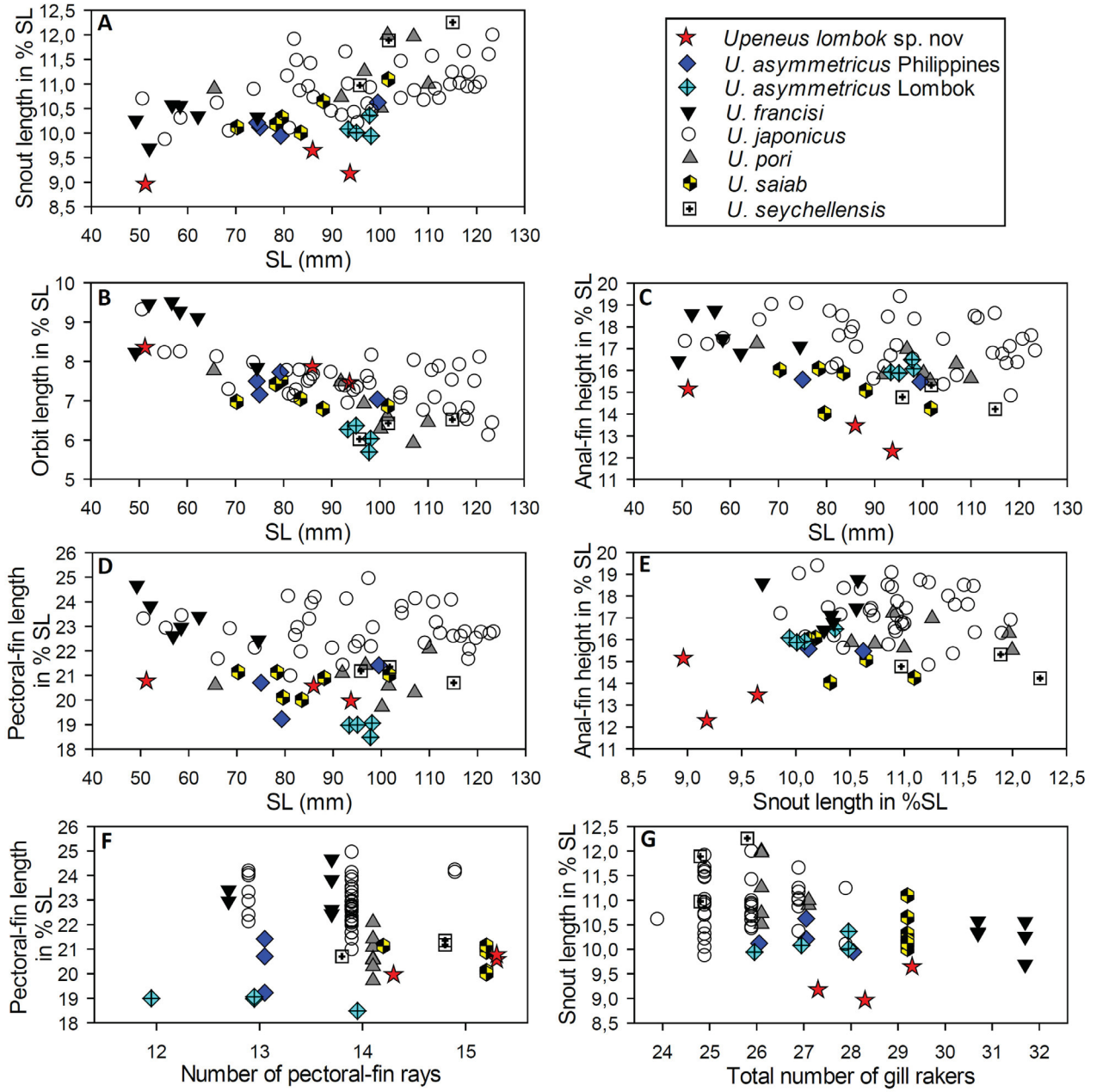

FIGURE 2. Relationships between SL and four body-form characters (A–D), between two body-form characters (E), and between a meristic and body-form character, respectively (F, G) in *Upeneus lombok* **n. sp.**, *U. asymmetricus*, and five other species of the *japonicus* group with high gill-raker counts. The two geographic groups of *U. asymmetricus* from the Philippines and Lombok are indicated.

Remarks. *Upeneus lombok* **n. sp.** is most similar to *U. saiab*, from which it differs in having a shorter snout and a lower anal fin (Figure 2 A, C, E). Both species are currently known only from a single locality in the Eastern Indian Ocean (Lombok) and the Western Indian Ocean (Angoche, Mozambique), respectively. The genetic relationship between the two species is unknown, as no tissue samples of *U. saiab* are currently available. One possible distinction in colour patterns that deserves further attention are the rose to red patches on belly of the new species which seem to be absent in *U. saiab*. These patches may however also be an artifact. A recent underwater photograph of a small *Upeneus* species from off Bali (Allen & Erdmann, 2012: 510) has a few pale red patches on the belly and a caudal-fin colour pattern very similar to *U. lombok* **n. sp.** This specimen, attributed to *U. sundaicus*, has a marked red bar through the eye to the ventral head margin, very similar to specimens of *U. pori* photographed under water (e.g. Ben-Tuvia & Golani 1989: 107; Randall 1995: 243). Furthermore, the Allen & Erdmann fish has yellow barbels; *Upeneus pori*, like *U. guttatus*, has white or yellow barbels in life (Uiblein & Heemstra, 2010).

The comparative material of *Upeneus francisi* studied here confirms the presence of this species from the Kermadec Islands where it had previously been recorded only once, based on a photograph (Randall & Guézé 1992).

***Upeneus asymmetricus* Lachner, 1954**
Asymmetrical goatfish
(Figs 1, 2; Tables 1–2)

Upeneus asymmetricus Lachner, 1954; Ben Tuvia & Golani, 1989; Kim & Nakaya, 2001; Uiblein & Lisher, 2013

Material examined (8 specimens, 74–100 mm SL): **Philippines**: USNM 154659, holotype, 75 mm, Pandanon Island, between Cebu and Bohol; USNM 154660, 2 paratypes, 74–79 mm, same locality; USNM 154661, paratype, 100 mm, off Western Samar, Catbalogan; **Indonesia, Eastern Indian Ocean:** CSIRO H 7417-02, 93 mm SL, Lombok, Tanjung Luar, fish market; CSIRO H 7417-01, 2 specimens, 97–98 mm SL, same locality; MZB 22711, 95 mm SL, same locality.

Diagnosis. Dorsal fins VII + 9; pectoral fins 12–14; gill rakers 7–8 + 19–21 = 26–28; measurements in % SL: body depth at first dorsal-fin origin 22–24; body depth at anus 20–22; caudal-peduncle depth 8.5–9.9; maximum head depth 19–20; head depth through eye 15–16; interorbital length 8.0–9.0; head length 26–29; snout length 9.9–11; postorbital length 11–13; orbit length 5.7–7.7; upper jaw length 8.7–11; barbel length 17–19; caudal-peduncle length 22–24; caudal-fin length 27–30; anal-fin height 15–16; pelvic-fin length 19–22; pectoral-fin length 18–21; first dorsal-fin height 19–21; second dorsal-fin height 15–17; upper lobe of caudal fin with 4–6 red-brown oblique bars including 1 bar on or close to tip; lower caudal-fin lobe crossed by 6–8 red-brown oblique bars, most prominent along middle of lobe and much weaker or absent on inner (dorsal) and outer (ventral) side of lobe, leaving the the outermost (ventral) 3 rays mostly unpigmented hyaline; barbels pale reddish; body and head dorsally grey-green darkened and white silvery below eys and along ventral mid-body and caudal peduncle, with a yellow-green mid-body stripe of about pupil width from behind eye to caudal-fin base, stripe accompanied by a series of ca. 10 dark grey dots below and behind first dorsal fin; behind second dorsal fin a saddle-like darkened area extending from mid-body stripe towards dorsal body margin; dorsal fins with 3 red-brown stripes, the lowest close to body, the distal-most close to tip; preserved fish dark brown dorsally and pale brown ventrally, bars on both upper and lower caudal-fin lobes retained.

Distribution. First record for the Indian Ocean and for Indonesia. Prior to this record, *Upeneus asymmetricus* was known only from Pandanon (east of Cebu) and western Samar, Philippines.

Comparisons *Upeneus asymmetricus* differs from all congeneric species in the following combination of characteristics: 7 dorsal-fin spines, 12–14 pectoral-fin rays, 26–28 total gill rakers (19–21 rakers on lower limb), body depth at anal-fin origin 20–22% SL, pectoral-fin length 18–21% SL, and lower caudal-fin lobe with 6–8 red-brown oblique bars crossing middle of lobe, the innermost (dorsal) part of lobe as well as the outermost (ventral) 3 rays mostly unpigmented.

Upeneus asymmetricus differs from the meristically most similar species of the *japonicus* group as follows (comparative data in Table 1): from *U. francisi*, in fewer gill rakers, smaller head, shorter dorsal-fin bases, lower anal fin, and shorter pectoral fin; it differs from *U. japonicus* in shorter barbels, shorter pectoral fins, lower first

dorsal fin, and lower caudal-fin lobe with oblique bars vs. no bars; it differs from *U. lombok* in deeper body at anal-fin origin, longer snout, higher anal and second dorsal fins, and oblique bars on lower caudal fin present vs. absent; it differs from *U. pori* in slightly shorter snout, slightly more pectoral-fin rays, presence of a dark saddle behind second dorsal fin in fresh fish, and in both fresh and preserved fish by presence of oblique bars vs. a stripe along middle of lower caudal-fin lobe and prominent bars along inner and outer lobe margin absent vs. present; it differs from *U. saiab* in having fewer gill rakers, deeper body, shorter head, presence of a dark saddle behind second dorsal fin vs. absence in fresh fish, and oblique red-brown bars along middle of lower caudal-fin lobe vs. a broad red stripe; and it differs from *U. seychellensis* in more developed gill rakers on lower limb, deeper body at anal-fin origin, wider interorbital, shorter snout, and oblique bars on lower caudal fin present vs. bars absent.

Furthermore, *Upeneus asymmetricus* differs from 14 other at least potentially co-occurring species as follows: from *U. australiae*, *U. guttatus*, and *U. torres* in more gill rakers (gill rakers on lower limb 19–21 vs. 16–19; total gill rakers 26–28 vs. 22–26), less body depth at dorsal-fin origin (22–24 vs. 18–23% SL), and oblique red-brown bars along middle of lower caudal-fin lobe vs. the lobe either almost entirely covered by an orange or red stripe (*U. torres*), or crossed by oblique bars at outside (ventrally) that connect to a stripe at inner side (dorsally) (*U. guttatus*), or fully crossed by brown or black oblique bars (*U. australiae*); it differs from *U. moluccensis*, *U. quadrilineatus*, and *U. sulphureus* in 7 vs. 8 dorsal-fin spines, fewer lateral-line scales (28–31 vs. 33–37), less body depth at first dorsal-fin origin (22–24 vs. 24–33% SL); shallower head (maximum head depth 19–20 vs. 20–25% SL; head depth through eye 15–16 vs. 16–20% SL), shorter pectoral-fin length (18–21 vs. 21–27% SL), and oblique bars on lower caudal-fin lobe vs. no bars; it differs from *U. stenopsis*, *U. subvittatus*, and *U. vittatus* in 7 vs. 8 dorsal-fin spines, shallower head (maximum head depth 19–20 vs. 21–26% SL; head depth through eye 15–16 vs. 17–20% SL), shorter head length (26–29 vs. 29–34% SL), shorter pectoral-fin length (18–21 vs. 21–26% SL), and oblique bars on middle of lower caudal-fin lobe vs. lobe entirely crossed by bars; it differs from *U. luzonius*, *U. margarethae*, *U. sundaicus* and *U. tragula* in 7 vs. 8 dorsal-fin spines, more gill rakers (gill rakers on lower limb 19–21 vs. 13–18; total gill rakers 26–28 vs. 18–24), and oblique bars on middle of lower caudal-fin lobe vs. either lobe entirely crossed by bars (*U. tragula*, *U. margarethae*), or bars covered by a broad red stripe (Western Indian Ocean *U. margarethae*), or no bars or stripe (*U. sundaicus*) (fresh colour of *U. luzonius* not known); and it differs from *U. nigromarginatus* in 7 vs. 8 dorsal-fin spines, fewer lateral-line scales (28–31 vs. 36–37), shallower body (body depth at first dorsal-fin origin 22–24 vs. 31–35% SL; body depth at anal-fin origin 20–22 vs. 27–30% SL), shorter upper-jaw length (8.7–11 vs. 11–12% SL), and oblique bars on lower caudal-fin lobe vs. no bars.

The four specimens of *U. asymmetricus* from Lombok differ from the four Philippine type specimens in having smaller eyes, shorter jaw, narrower snout, shorter barbels, longer caudal fin, and longer pectoral fins (Figure 2 B, D, Table 2). *Upeneus asymmetricus* attains 100 mm SL.

Remarks. *Upeneus asymmetricus* is most similar to *U. pori*, from which it differs mainly in lower caudal-fin lobe colour pattern. This colour pattern resembles *U. australiae*, which may lead to misidentifications, especially when body form and meristic character are not taken into account. Recent detailed taxonomic studies of a large number of specimens originally identified as *U. asymmetricus* from around Australia (see also Gloerfelt-Tarp & Kailola 1984; Sainsbury *et al*., 1985) were re-identified as *U. australiae* (Uiblein & Gledhill, 2015). *Upeneus asymmetricus* has also been cited from the South China Sea (Randall & Lim, 2000; Randall, 2001), but no verified record from that area exists. This species was not identified from a large sample of goatfishes from off Vietnam of which many were photographed fresh (the specimens are now curated at the HIFIRE collection, Institute of Marine Research, Bergen, Norway). Apart from the four types, this species was also not seen when examining a large number of collection material from the Coral Triangle area (lodged e.g. at CAS, RMNH, ZMUC, and USNM).

The intraspecific differences in several body-form characters between the two geographic groups of *U. asymmetricus* may indicate population divergence that would be worthy of further investigation when more comparative material, colour of fresh and/or live fish, and tissue samples become available. Geographic comparisons of fresh colour patterns were not possible, as the species description of *U. asymmetricus* by Lachner (1954) was based on preserved material only and no description of fresh colour of the type material was made.

TABLE 1. Measurements and counts of *Upeneus lombok* n. sp., *U. asymmetricus*, and five other species of the *japonicus* group with high gill-raker count; differences from *U. lombok* n.sp. indicated in bold. those from *U. asymmetricus* in italics.

	Upeneus lombok n.sp.			*U. asymmetricus*				*U. francisi*			
	Lombok			Philippines and Indonesia				Adult	4 subadults		
	HT	PT1	PT2	Min	Mean	Max	*n*	PT	Min	Mean	Max
SL (mm)	94	86	51	74	89.1	100	8	74	52	57.3	62
Body depth at first dorsal-fin origin	21	23	23	22	23.1	24	8	**24**	**23**	**23.2**	**24**
Body depth at anal-fin origin	*19*	*19*	18	**20**	**20.4**	**22**	8	**22**	19	19.2	20
Half body depth (from lateral line downwards) at first dorsal fin origin	18	20	-	19	19.3	20	8	20	19	19.5	20
Half body depth (from lateral line downwards) at anal fin origin	14	14	-	14	15.6	17	8	**17**	15	15.0	16
Caudal-peduncle depth	9.2	9.3	9.5	8.5	9.2	9.9	8	***10***	9.2	9.7	10
Caudal-peduncle width	3.8	4.2	3.5	3.7	4.3	5.0	8	***3.3***	**2.6**	**2.9**	**3.3**
Maximum head depth	19	20	19	19	19.7	20	8	***21***	**20**	**20.3**	**21**
Head depth across a vertical midline through eye	14	15	16	15	15.5	16	8	16	**17**	**17.5**	**18**
Suborbital depth	8.5	9.7	8.9	8.8	9.4	10	8	9.6	8.8	9.1	9.3
Interorbital length	7.2	8.3	7.8	8.0	8.6	9.0	8	*7.4*	8.0	8.2	8.4
Head length	28	30	29	26	27.1	29	8	*30*	**31**	**31.3**	**32**
Snout length	*9.2*	*9.6*	9.0	**9.9**	**10.2**	**11**	8	**10**	**9.7**	**10.3**	**11**
Postorbital length	12	12	12	11	11.4	13	8	12	11	12.1	13
Orbit length	7.5	7.9	8.4	5.7	6.7	7.7	8	*7.8*	9.1	9.3	9.5
Orbit depth	6.5	6.9	7.6	4.8	5.5	6.5	8	*7.1*	8.2	8.3	8.4
Upper-jaw length	9.4	9.7	9.8	8.7	9.6	11	8	**11**	**9.9**	**10.4**	**11**
Lower-jaw length	8.6	9.3	8.8	8.4	9.1	10	8	**10**	**9.1**	**9.6**	**10**
Snout width	8.0	7.8	6.6	7.6	8.2	9.3	8	**8.2**	**7.9**	**8.1**	**8.3**
Barbel length	19	20	17	17	17.9	19	8	19	17	16.8	17
Maximum barbel width	0.7	0.8	0.8	0.7	0.8	1.0	8	**1.0**	0.7	0.7	0.8
First pre-dorsal length	37	38	37	35	36.5	38	8	***40***	**38**	**38.8**	**40**
Second pre-dorsal length	64	66	62	62	64.3	66	8	66	64	65.1	66
Interdorsal distance	15	16	15	14	15.5	16	8	**14**	14	15.0	16

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TABLE 1. (Continued)

	Upeneus lombok n.sp.			*U. asymmetricus*				*U. francisi*			
	Lombok			Philippines and Indonesia				Adult	4 subadults		
	HT	PT1	PT2	Min	Mean	Max	*n*	PT	Min	Mean	Max
Caudal-peduncle length	23	21	24	22	23.2	24	8	23	23	23.9	25
Pre-anal length	65	67	66	62	64.2	68	8	65	65	66.4	68
Pre-pelvic length	30	32	32	31	32.3	34	8	**34**	**36**	**36.3**	**37**
Pre-pectoral length	29	31	30	29	29.7	31	8	***32***	**32**	**33.6**	**34**
Second dorsal-fin depth (second dorsal-fin origin to anal-fin origin)	20	20	19	19	20.7	22	8	*23*	19	19.8	20
Pelvic-fin depth (first dorsal-fin origin to pelvic-fin origin)	23	24	23	22	23.0	24	8	***25***	22	22.7	23
Pectoral-fin depth (first dorsal-fin origin to dorsal origin of pectoral fin)	16	16	14	14	15.5	17	8	**17**	14	14.5	15
Length of first dorsal-fin base	14	15	13	13	14.4	15	8	***17***	**14**	**14.8**	**15**
Length of second dorsal-fin base	13	14	13	12	12.8	14	8	***16***	13	13.6	14
Caudal-fin length (dorsal caudal-fin origin to upper caudal-lobe tip)	28	29	29	27	28.3	30	8	**30**	**30**	**29.9**	**30**
Length of anal-fin base	11	10	11	9.9	10.9	12	8	**12**	11	12.1	13
Anal-fin height	*12*	*13*	15	**15**	**15.9**	**16**	6	***17***	**17**	**17.9**	**19**
Pelvic-fin length	21	22	20	19	20.3	22	8	22	22	23.5	24
Pectoral-fin length	20	21	21	18	19.5	21	7	***22***	**23**	**23.2**	**24**
Pectoral-fin width (width of pectoral-fin base)	4.1	4.3	4.6	4.0	4.5	5.1	8	4.3	3.7	3.9	4.0
First dorsal-fin height	-	19	20	19	20.4	21	7	-	**22**	**22.9**	**24**
Second dorsal-fin height	*14*	*14*	16	**15**	**15.8**	**17**	6	**17**	**17**	**17.9**	**18**
Pectoral-fin rays	14	15	15	12	13.0	14	8	14	13	13.5	14
Rudimentary gill rakers on upper limb	3	3	1	1	2.6	4	8	*0*	1	1.0	1
Developed gill rakers on upper limb	4	5	7	3	4.6	7	8	*8*	8	8.3	9
Developed gill rakers on lower limb	15	15	18	15	16.3	17	8	***19***	**21**	**21.5**	**22**
Rudimentary gill rakers on lower limb	5	6	2	2	3.6	5	8	4	0	0.8	1
Total gill rakers on upper limb	7	8	8	7	7.3	8	8	8	9	9.3	10
Total gill rakers on lower limb	20	21	20	19	19.9	21	8	***23***	**22**	**22**	**23**
Total gill rakers	27	29	28	26	27.1	28	8	***31***	**31**	**31.5**	**32**
Scales along lateral line to caudal-fin base	31	30	-	28	29.1	31	8	-	28	29.3	30

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TABLE 1. (Continued)

	U. japonicus				*U. pori*				*U. saiab*				*U. seychellensis*			
	E Malaysia to Korea				Red Sea to Madagascar				Mozambique				Seychelles-Bank			
	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*
SL (mm)	66	99.4	123	37	66	96.1	110	7	70	83.6	102	6	96	104.2	115	3
Body depth at first dorsal-fin origin	21	23.5	25	37	21	23.0	24	7	21	22.0	24	6	20	21.2	22	3
Body depth at anal-fin origin	18	19.7	22	37	**20**	**20.5**	**22**	7	*17*	*18.4*	*19*	6	*18*	*18.2*	*19*	3
Half body depth (from lateral line downwards) at first dorsal fin origin	18	19.7	21	27	18	19.3	21	7	16	17.6	19	5	17	18.1	19	3
Half body depth (from lateral line downwards) at anal fin origin	14	16.0	18	26	14	15.4	16	7	13	14.2	15	6	14	14.2	15	3
Caudal-peduncle depth	8.0	9.6	11	37	9.1	9.5	9.8	7	8.7	8.9	9.2	6	9.2	9.4	9.6	3
Caudal-peduncle width	3.1	3.9	4.8	37	3.5	3.8	4.2	7	3.0	3.6	3.9	6	3.6	3.8	4.1	3
Maximum head depth	18	19.8	21	37	18	19.3	20	7	18	19.5	20	6	18	19.1	20	3
Head depth across a vertical midline through eye	15	15.9	17	37	15	15.5	16	7	15	16.0	17	6	15	15.7	17	3
Suborbital depth	8.2	9.4	10	37	8.9	9.4	9.9	7	8.4	9.5	11	6	9.2	9.8	10	3
Interorbital length	6.9	7.7	8.7	37	7.4	7.9	8.4	7	7.0	7.6	8.2	6	*6.7*	*7.1*	*7.7*	3
Head length	27	28.6	31	37	26	27.4	29	7	*29*	*29.6*	*30*	6	27	28.3	30	3
Snout length	**10**	**11.0**	**12**	37	***11***	***11.2***	***12***	7	**10**	**10.4**	**11**	6	***11***	***11.7***	***12***	3
Postorbital length	9.8	11.1	13	37	11	11.6	12	7	12	12.7	13	6	12	11.8	12	3
Orbit length	6.1	7.4	8.2	37	5.9	6.8	7.8	7	6.8	7.1	7.5	6	**6.0**	**6.3**	**6.5**	3
Orbit depth	5.2	6.4	7.2	37	5.1	6.1	7.7	7	6.2	6.6	7.0	6	**5.5**	**5.7**	**6.2**	3
Upper-jaw length	9.7	10.6	12	37	**10**	**10.7**	**12**	7	9.5	10.5	12	6	**11**	**11.0**	**11**	3
Lower-jaw length	9.2	10.1	11	37	**9.7**	**10.2**	**11**	7	8.9	9.7	11	6	**10**	**10.5**	**11**	3
Snout width	7.1	8.4	9.8	37	8.0	8.5	10	7	7.5	8.0	8.5	6	7.3	8.2	9.2	3
Barbel length	*18*	*21.1*	*23*	36	16	17.3	19	7	19	19.9	22	6	17	18.7	22	3
Maximum barbel width	0.6	0.8	1.0	36	0.6	0.7	0.9	7	0.9	0.9	1.0	6	0.7	0.8	0.8	3
First pre-dorsal length	34	36.1	39	37	34	36.0	37	7	37	37.4	38	6	37	38.0	39	3
Second pre-dorsal length	61	63.7	67	37	63	64.6	67	7	64	65.4	68	6	63	64.0	65	3
Interdorsal distance	14	15.6	18	37	13	14.6	16	6	14	14.9	16	6	12	14.1	16	3

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TABLE 1. (Continued)

	U. japonicus				*U. pori*				*U. saiab*				*U. seychellensis*			
	E Malaysia to Korea				Red Sea to Madagascar				Mozambique				Seychelles-Bank			
	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*
Caudal-peduncle length	21	23.2	25	37	22	22.9	24	7	22	23.0	24	6	**24**	**23.9**	**24**	3
Pre-anal length	61	65.1	69	37	60	63.9	67	7	65	66.1	67	6	65	66.6	68	3
Pre-pelvic length	30	32.5	35	37	28	30.6	32	7	32	33.3	35	6	30	31.7	33	3
Pre-pectoral length	29	31.0	33	37	28	29.3	30	7	*31*	*31.7*	*33*	6	28	29.9	32	3
Second dorsal-fin depth (second dorsal-fin origin to anal-fin origin)	18	20.4	22	37	20	21.0	22	7	*17*	*18.4*	*19*	6	**18**	**18.7**	**19**	3
Pelvic-fin depth (first dorsal-fin origin to pelvic-fin origin)	21	23.4	25	37	22	23.3	25	7	20	21.4	23	6	21	21.7	23	3
Pectoral-fin depth (first dorsal-fin origin to dorsal origin of pectoral fin)	14	16.2	18	37	16	16.4	17	7	14	14.7	16	6	16	16.6	17	3
Length of first dorsal-fin base	14	14.7	17	37	14	15.1	16	6	14	15.2	16	6	14	13.8	14	3
Length of second dorsal-fin base	12	13.4	15	37	13	13.6	15	7	13	13.9	15	6	12	12.5	13	3
Caudal-fin length (dorsal caudal-fin origin to upper caudal-lobe tip)	25	26.9	29	34	27	27.9	29	6	27	27.9	29	6	28	29.1	30	3
Length of anal-fin base	9.9	11.5	13	37	10	11.9	13	7	11	11.7	13	6	9.6	10.0	10	3
Anal-fin height	**15**	**17.3**	**19**	34	**16**	**16.2**	**17**	7	**14**	**15.2**	**16**	6	**14**	**14.8**	**15**	3
Pelvic-fin length	19	20.7	23	36	20	21.1	23	7	20	20.9	21	6	20	20.6	21	3
Pectoral-fin length	*21*	*22.9*	*25*	36	20	20.8	22	7	20	20.7	21	6	21	21.1	21	3
Pectoral-fin width (width of pectoral-fin base)	3.7	4.3	5.0	37	4.4	4.7	5.7	7	4.4	4.6	5.0	6	3.9	4.0	4.2	3
First dorsal-fin height	20	22.0	24	36	**20**	**21.0**	**22**	6	19	20.6	22	6	19	19.8	20	3
Second dorsal-fin height	15	17.4	19	34	**15**	**15.8**	**16**	6	14	15.5	16	6	**16**	**16.0**	**17**	3
Pectoral-fin rays	13	13.9	15	37	*14*	*14.0*	*14*	7	14	14.8	15	6	14	14.7	15	3
Rudimentary gill rakers on upper limb	2	3.2	5	37	0	1.1	2	7	1	2.2	3	6	4	4.3	5	3
Developed gill rakers on upper limb	2	3.6	5	37	5	6.3	7	7	5	6.0	7	6	2	2.7	3	3
Developed gill rakers on lower limb	11	13.7	17	37	14	15.9	18	7	15	16.5	17	6	**13**	**13.0**	**13**	3
Rudimentary gill rakers on lower limb	3	5.3	7	37	2	3.0	5	7	3	4.3	6	6	5	5.3	6	3
Total gill rakers on upper limb	6	6.8	8	37	7	7.4	8	7	8	8.2	9	6	7	7.0	7	3
Total gill rakers on lower limb	18	19.1	21	37	18	18.9	20	7	20	20.8	21	6	***18***	***18.3***	***19***	3
Total gill rakers	24	25.9	28	37	26	26.3	27	7	*29*	*29.0*	*29*	6	**25**	**25.3**	**26**	3
Scales along lateral line to caudal-fin base	29	29.3	30	17	29	29.1	30	7	29	29.3	30	4	29	29.7	31	3

TABLE 2. Morphometric and meristic characters in types and newly recorded specimens of *Upeneus asymmetricus*; data revealing the most important population distinctions are emphasized in bold.

	U. asymmetricus											
	Philippines (types)				Lombok				all			
	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*
SL (mm)	74	82.1	100	4	93	96.1	98	4	74	89.1	100	8
Body depth at first dorsal-fin origin	22	23.4	24	4	23	22.8	24	4	22	23.1	24	8
Body depth at anal-fin origin	20	20.8	22	4	20	19.9	20	4	20	20.4	22	8
Half body depth (from lateral line downwards) at first dorsal fin origin	19	19.5	20	4	19	19.2	20	4	19	19.3	20	8
Half body depth (from lateral line downwards) at anal fin origin	14	15.1	16	4	15	16.0	17	4	14	15.6	17	8
Caudal-peduncle depth	8.8	9.3	9.9	4	8.5	9.0	9.3	4	8.5	9.2	9.9	8
Caudal-peduncle width	3.7	4.1	4.8	4	3.9	4.5	5.0	4	3.7	4.3	5.0	8
Maximum head depth	20	20.1	20	4	19	19.3	20	4	19	19.7	20	8
Head depth across a vertical midline through eye	15	15.7	16	4	15	15.4	16	4	15	15.5	16	8
Suborbital depth	9.4	9.7	10	4	8.8	9.1	9.6	4	8.8	9.4	10	8
Interorbital length	8.0	8.6	9.0	4	8.2	8.6	9.0	4	8.0	8.6	9.0	8
Head length	27	27.7	29	4	26	26.5	28	4	26	27.1	29	8
Snout length	9.9	10.2	11	4	9.9	10.1	10	4	9.9	10.2	11	8
Postorbital length	11	11.5	13	4	11	11.3	12	4	11	11.4	13	8
Orbit length	7.0	7.4	7.7	4	**5.7**	**6.1**	**6.4**	4	5.7	6.7	7.7	8
Orbit depth	5.6	6.0	6.5	4	**4.8**	**5.0**	**5.3**	4	4.8	5.5	6.5	8
Upper-jaw length	9.6	10.2	11	4	**8.7**	**9.1**	**9.6**	4	8.7	9.6	11	8
Lower-jaw length	9.1	9.6	10	4	8.4	8.7	9.3	4	8.4	9.1	10	8
Snout width	8.1	8.8	9.3	4	**7.6**	**7.7**	**7.9**	4	7.6	8.2	9.3	8
Barbel length	18	18.6	19	4	**17**	**17.3**	**18**	4	17	17.9	19	8
Maximum barbel width	0.8	0.9	1.0	4	0.7	0.8	0.9	4	0.7	0.8	1.0	8
First pre-dorsal length	37	37.3	38	4	35	35.7	37	4	35	36.5	38	8
Second pre-dorsal length	64	64.9	66	4	62	63.7	64	4	62	64.3	66	8
Interdorsal distance	14	15.5	16	4	14	15.5	16	4	14	15.5	16	8

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TABLE 2. (Continued)

	U. asymmetricus											
	Philippines (types)				Lombok				all			
	Min	Mean	Max	*n*	Min	Mean	Max	*n*	Min	Mean	Max	*n*
Caudal-peduncle length	22	22.6	24	4	23	23.9	24	4	22	23.2	24	8
Pre-anal length	63	64.7	68	4	62	63.8	67	4	62	64.2	68	8
Pre-pelvic length	32	33.1	34	4	31	31.5	33	4	31	32.3	34	8
Pre-pectoral length	30	30.2	31	4	29	29.2	30	4	29	29.7	31	8
Second dorsal-fin depth (second dorsal-fin origin to anal-fin origin)	19	20.9	22	4	20	20.5	21	4	19	20.7	22	8
Pelvic-fin depth (first dorsal-fin origin to pelvic-fin origin)	22	23.1	24	4	22	22.9	23	4	22	23.0	24	8
Pectoral-fin depth (first dorsal-fin origin to dorsal origin of pectoral fin)	15	15.8	17	4	14	15.2	16	4	14	15.5	17	8
Length of first dorsal-fin base	13	14.1	15	4	14	14.6	15	4	13	14.4	15	8
Length of second dorsal-fin base	13	13.4	14	4	12	12.1	13	4	12	12.8	14	8
Caudal-fin length (dorsal caudal-fin origin to upper caudal-lobe tip)	27	27.2	27	4	**28**	**29.4**	**30**	4	27	28.3	30	8
Length of anal-fin base	10	10.9	12	4	9.9	10.9	12	4	9.9	10.9	12	8
Anal-fin height	15	15.5	16	2	16	16.1	16	4	15	15.9	16	6
Pelvic-fin length	20	20.3	21	4	19	20.2	22	4	19	20.3	22	8
Pectoral-fin length	19	20.4	21	3	**18**	**18.9**	**19**	4	18	19.5	21	7
Pectoral-fin width (width of pectoral-fin base)	4.1	4.8	5.1	4	4.0	4.1	4.2	4	4.0	4.5	5.1	8
First dorsal-fin height	20	20.3	20	3	19	20.5	21	4	19	20.4	21	7
Second dorsal-fin height	15	15.6	16	2	15	15.9	17	4	15	15.8	17	6
Pectoral-fin rays	13	13.0	13	4	12	13.0	14	4	12	13.0	14	8
Rudimentary gill rakers on upper limb	1	2.5	4	4	1	2.8	4	4	1	2.6	4	8
Developed gill rakers on upper limb	3	4.5	6	4	3	4.8	7	4	3	4.6	7	8
Developed gill rakers on lower limb	15	16.3	17	4	15	16.3	17	4	15	16.3	17	8
Rudimentary gill rakers on lower limb	2	3.8	5	4	2	3.5	4	4	2	3.6	5	8
Total gill rakers on upper limb	7	7.0	7	4	7	7.5	8	4	7	7.3	8	8
Total gill rakers on lower limb	19	20.0	21	4	19	19.8	21	4	19	19.9	21	8
Total gill rakers	26	27.0	28	4	26	27.3	28	4	26	27.1	28	8
Scales along lateral line to caudal-fin base	28	28.3	29	4	29	30.0	31	4	28	29.1	31	8

Discussion

The discovery of a new species and a new record of the genus *Upeneus* in a distinct area of the Indonesian-Philippine region do not come as a surprise, given that this genus has only recently received increased attention in taxonomic studies; comprehensive samples including photographs of fresh fish with voucher specimens have previously not been available. Whether these two species occur only in rather isolated habitat patches of a few islands, or whether they are more common and widely distributed in this [topographically and oceanographically] complex tropical region, has still to be discovered Further sampling efforts would certainly provide more information on the diversity, occurrence, and abundance of *Upeneus* species in this region. At least 11 additional species (*U. subvittatus*, *U. guttatus*, *U. luzonius*, *U. moluccensis*, *U. nigromarginatus*, *U. quadrilineatus*, *U. stenopsis*, *U. sulphureus*, *U. sundaicus*, *U. tragula*, and *U. vittatus*) are so far known from Indonesia and/or Philippines, but mostly only from a very few scattered localities.

One of the three types of *U. lombok* **n. sp.** and all currently known specimens of *U. asymmetricus* (apart from the types) were collected at a fish market at Tanjung Luar, Lombok. Discoveries of new species or species not previously recorded at a local fish market indicates that (1) those species or closely related and/or similar species must have some economic value and (2) there is obvious lack of taxonomic knowledge and information about local species, while such un- or misidentified species were being exploited. Goatfishes are regarded as economically important in many countries, and populations of several species are under considerable impact by local fisheries (Uiblein 2007; Nañola *et al*. 2011). Type material of five other recently described *Upeneus* species, *U. heemstra*, *U. indicus* Uiblein & Heemstra, 2010, *U. nigromarginatus*, *U. randalli* Uiblein & Heemstra, 2011, and *U. supravittatus* Uiblein & Heemstra, 2010, originate at least in part from local fish markets in four tropical or subtropical countries, Bahrain, Tanzania, India, and Philippines (Uiblein & Heemstra 2010; Uiblein & Heemstra 2011b; Bos 2014).

Apart from studying preserved material in fish collections, it is important to continue and even increase efforts to visit and sample fish markets. Thus, (1) taking advantage of goatfishes being exploited by local fishers, and (2) eventually assisting local fisheries officers to recognize species being fished, and supporting the gathering of fundamental biodiversity information and biological knowledge about targeted species, so as to establish proper management of that fishery (White *et al*. 2013). Improved taxonomic and biological knowledge of goatfishes would also support coastal ecosystem management initiatives, as species of this family have considerable ecological importance as keystone species in sand-associated coastal habitats and as indicators of habitat quality and environmental impact (Uiblein 2007).

Comparative material examined

Upeneus francisi (6 specimens, 49–74 mm SL, area): **Norfolk Island**: USNM 317286, 49 mm SL, paratype, Duncombe Bay, 29°05' S, 167°59' E, 18 m; AMS IB-5364, 74 mm SL, PT, off Kingston, 29°03' S 167°57' E; **Kermadec Islands**: AMS I.45817-003, 3, 58–62 mm SL, Raoul Island, 29°14'39" S 177°54'16" W, 20–23 m; AMS I.45824-006; 52 mm SL, Raoul Island, 29°16'57" S 177°57'10" W, 20–22 m

Upeneus quadrilineatus (6 specimens, 81–133 mm SL): **Java, Indonesia**: CSIRO H 7696-01, 81 mm, East Java, Pacitan, 08°13’ S, 111°04’ E; CSIRO 7697-01, 102 mm SL, Central Java, Cilacap, fish market; CSIRO H 7469-02, 133 mm SL, same locality; CSIRO H 7697-02, 2, 112–117 mm SL, same locality; CSIRO H 7469-03, 123 mm, same locality.

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