



A new species of gobiid fish *Lentipes niasensis* (Gobiidae: Sicydiinae) from Nias Island, Indonesia

TONISMAN HAREFA¹ & I-SHIUNG CHEN^{1,2*}

¹Institute of Marine Biology, National Taiwan Ocean University, Keelung, 202, 20224, Taiwan, ROC

✉ tonisharefa@gmail.com; <https://orcid.org/0000-0003-2308-8669>

²Center for Excellence of the Oceans, National Taiwan Ocean University, Keelung, 20224, Taiwan, ROC

*Corresponding author: ✉ iscfish@gmail.com; <https://orcid.org/0000-0002-4190-7720>

Abstract

A new species of goby of the subfamily Sicydiinae, *Lentipes niasensis*, is described from the stream of Humogo River, Nias Island, Indonesia. This species can be distinguished from all congeners by the following combination of features: (1) fin ray counts: D2 I/10; A I/10; P 17–18; D1 not connected to D2 in either sex. (2) squamation: LR 7–11; anterior half of body naked, lateral body scales present from 5–6th rays of second dorsal-fin to hypural, embedded in skin. (3) upper jaw teeth in male 14–19 and in female 33–38. (4) urogenital papilla in male slender and distally pointed, flanked by pair of associated fleshy lobes and not retractable into sheath-like groove. (5) distinctive colour pattern of male: upper lip greyish, red patches on the pectoral-fin base, on mid-body below origin of second dorsal-fin and at caudal peduncle.

Key words: *Lentipes*, new species, taxonomy, Nias Island, Indonesia

Introduction

Gobiid fishes of the genus *Lentipes* Gunther, 1861 are widely distributed in tropical and subtropical freshwater streams in the Indo-Pacific. They occur in the Andaman Islands, Australia, Indonesia, Japan, Taiwan, the Philippines, the Fiji Island, Papua New Guinea, Micronesia, the Solomon Islands, New Caledonia and the Hawaiian Islands (Maciolek 1977, Sakai & Nakamura 1979, Allen 2001, 2004; Watson *et al.* 2002, Chen 2004; Chen *et al.* 2007, Jenkins *et al.* 2008, Moore *et al.* 2008, Seeto & Baldwin 2010, Lynch *et al.* 2013, Keith *et al.* 2014, 2015, 2016, Maeda *et al.* 2021). Members of this genus are small amphidromous gobies that occur in swift-flowing freshwater hill creeks with rocky substrates (Way *et al.* 1998, Keith 2003, Keith *et al.* 2015, Keith & Mennesson 2019). They can be distinguished from other members of the gobiid subfamily Sicydiinae primarily by their unique dentition, having tricuspid premaxillary teeth and, 0–6 canine teeth in males, and by the shape of the urogenital papilla (Lynch *et al.* 2013, Keith *et al.* 2014).

There are currently 22 recognized species of *Lentipes*. Among them 9 species occur in Indonesia (Keith *et al.* 2014, 2015, Miesen *et al.* 2016, Fricke *et al.* 2022): *L. adelphizonus* Watson & Kottelat, 2006, *L. argenteus* Keith *et al.*, 2014, *L. crittersius* Watson & Allen, 1999, *L. dimetrodon* Watson & Allen, 1999, *L. ikeae* Keith *et al.*, 2014, *L. mekonggaensis* Keith *et al.*, 2014, *L. multiradiatus* Keith *et al.*, 2014, *L. watsoni* Allen, 1997, and *L. whittenorum* Watson & Kottelat, 1994.

Nias Island is located about 120 km off the western coast of the large island of Sumatra, Indonesia, in the Indian Ocean. Information on the diversity of inland water fishes from this island is very restricted, the only report so far being by Weber and de Beaufort (1915). A recent fish survey conducted by the first author on Nias Island has revealed an undescribed species of *Lentipes* there. The aim of this paper is to describe this gobiid fish as a new species.

Materials and methods

All fish specimens were collected by hand-net while snorkelling. The collected fish were initially preserved in 10% formalin then transferred to 70% alcohol for long term storage. Measurements were taken from the left side of the specimen to the nearest 0.1 mm using a dial caliper. Body length was recorded as standard length (SL). All morphological counts follow Miller (1988) and meristic counts follow Chen & Shao (1996) and Chen *et al.* (2007). The terminology of the cephalic sensory canals and free neuromast organs (sensory papillae) follow Wongrat & Miller (1991) based on Sanzo (1911). The fish length is given as standard length (SL). Teeth were counted to the left of the premaxillary symphysis. Holotype has been deposited in the Museum Zoologi Bogor, Cibinong, Indonesia (MZB) and paratypes have been deposited in the Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan (NTOUP). The following meristic abbreviations are used: A, anal-fin; C, caudal-fin; D1, first dorsal-fin, D2, second dorsal-fin; P, pectoral-fin; LR, lateral scales; TR: transverse scales; PreD, predorsal scales; VC, vertebral count.

Results

Family Gobiidae Cuvier, 1816

Subfamily Sicydiinae Gill, 1860

Genus *Lentipes* Gunther, 1861

Lentipes niasensis Harefa & Chen, new species

Figures 1–4; Tables 1–2

New English name: Heart-finned goby

Holotype. MZB25339, male (33.3 mm SL), Humogo River (1°11'30.1"N 97°38'31.8"E), tributary of Idanoi River, Gunungsitoli City, Nias Island, North Sumatera Province, Indonesia; coll. T. Harefa, 17 September 2019.

Paratypes. NTOUP-2019-09-147, 6 specimens (4 males, 2 females, 21.8–29.5 mm SL) same collection data as holotype.

Diagnosis. Distinguished from all congeners by the following combination of features: (1) fin ray counts: D2 I/10; A I/10; P 17–18; D1 not connected to D2 in either sex. (2) squamation: LR 7–11; anterior half of body naked, lateral scale present from 5–6th rays of second dorsal-fin to hypural, embedded in skin. (3) upper jaw teeth in male 14–19, in female 33–38. (4) urogenital papilla in male slender and distally pointed, flanked by pair of associated fleshy lobes and not retractable into sheath-like groove. (5) distinctive colour pattern: upper lip greyish, red patches on pectoral-fin base, on mid-body below origin of second dorsal-fin and at caudal peduncle.

Description: Morphometric data given in Table 1. Body elongated, subcylindrical anteriorly, somewhat compressed posteriorly. Head slightly depressed, snout not protruding. Upper lip thick and more prominent than lower lip. Mouth oblique and posterior end of maxilla extending to vertical through posterior margin of orbit. Anterior nasal opening on short tube and posterior nasal opening a round hole. Gill opening narrow, extending to lower margin of pectoral-fin base. Papillae present around belly and on side of body, starting vertically from anal-fin origin to posterior part of caudal peduncle. Vertebrae count 10+16=26. In male, upper jaw teeth distinctly tricuspid anteriorly (14–19) with recurved canine teeth posteriorly (3–4); in female upper jaw with tricuspid teeth from posterior to anterior (33–38) and no canine teeth. Lower jaw in both male and female usually with recurved canine teeth (5–7). Urogenital papillae in male slender and distally pointed with pair of associated fleshy lobes and not retractable into sheath-like groove (Fig. 4). In female, urogenital papilla somewhat rectangular, also not retractable into sheath-like groove (Fig 4).

Fins. D1 VI, D2 I/10, A I/10, P 17 (in 4 specimens)–18 (in 3 specimens), V I/5+I/5, C 16 (in 2 specimens)–17 (in 5 specimens). D1 rays not filamentous, all spinous rays about equal except 6th spinous ray shortest and rather distant, not connected to D2 basally. Gap between D1 and D2 of about same length as eye diameter in male and much larger in female. D2 without black spot. D2 and A positioned opposite each other, with origin of A directly below 2nd branched ray of D2. P large, its posterior tip not reaching to vertical through anus. Rear margin of C rounded.

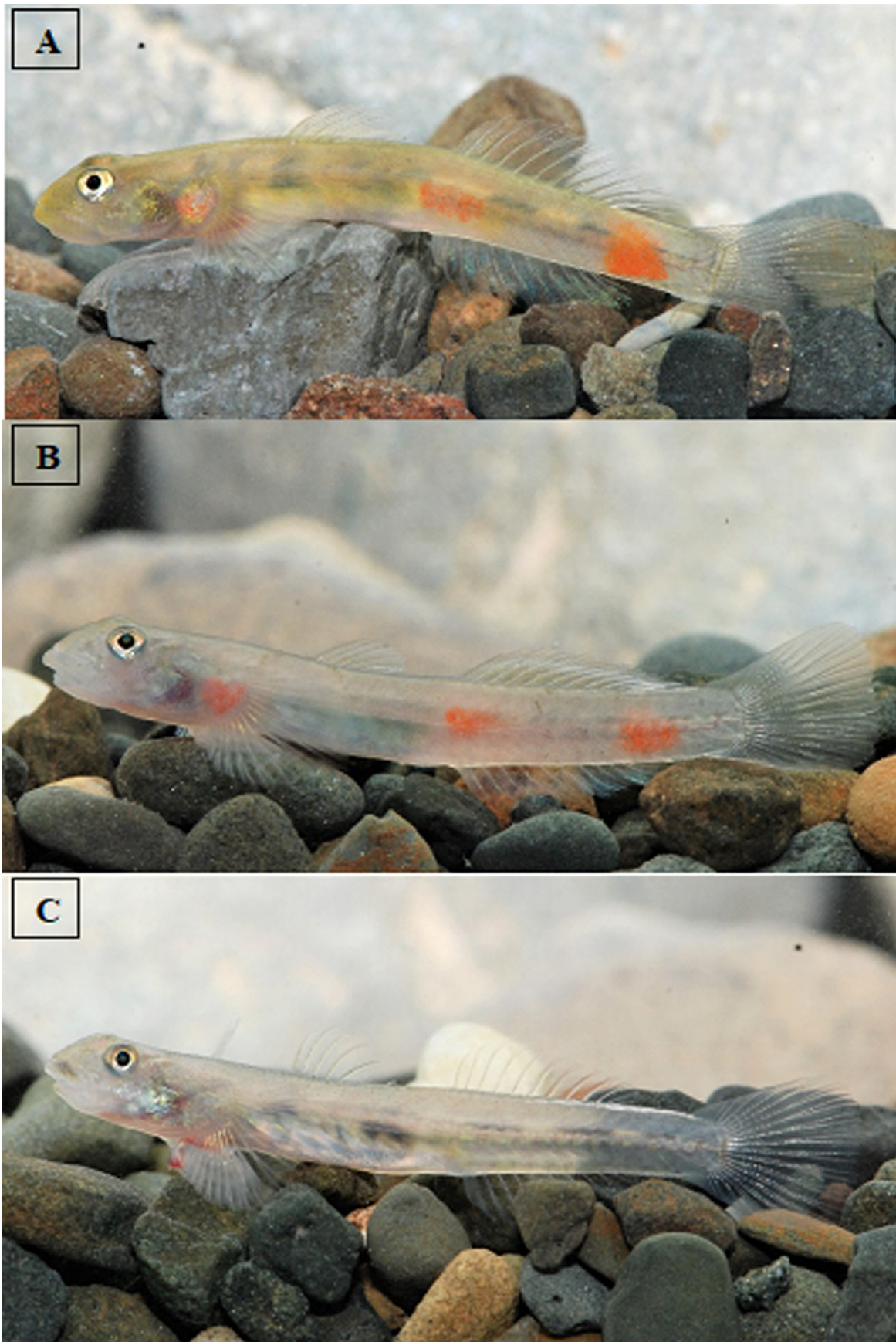


FIGURE 1. Photographs of freshly collected, living *Lentipes niasensis* n. sp (NTOU-P 2019-09-147, Paratypes) from Humogo River, Nias Island, North Sumatera Province, Indonesia. A. Male (26.0 mm SL); B. Male (22.8 mm SL); C. Female (25.9 mm SL) (Photographs by T. Harefa).



FIGURE 2. Alcohol-preserved specimens of *Lentipes niasensis* n. sp. A. MZB-25339, holotype, male (33.3 mm SL) B. NTOUP-2019-09-147-, Paratype, female (29.5 mm SL) (Photographies by T. Harefa).

TABLE 1. Morphometric measurements of *Lentipes niasensis* n. sp. from Nias Island.

Type accession number	MZB25339	NTOU-P 2019-09-147			
Type status	holotype	paratypes			
Sex	male	males (n=4)		females (n=2)	
Size (mm in SL)	33.3	22.8–26.3		21.8–29.5	
		Range	Mean	Range	Mean
% in SL					
Head length	25.7	22.6–25.4	23.8	22.8–25.7	24.6
Predorsal length	38.7	37.0–38.9	37.8	38.2–39.6	38.8
Snout to 2nd dorsal origin	58.7	57.0–58.8	57.8	58.6–62.5	60.6
Snout to anus	53.5	54.2–57.5	55.6	54.5–58.6	57.1
Snout to anal fin origin	58.9	58.6–60.4	59.6	59.5–62.7	61.7
Prepelvic length	25.6	21.9–25.3	23.9	22.1–23.4	22.7
Caudal peduncle length	17.8	15.2–16.8	15.9	14.9–17.1	16.0
Caudal peduncle depth	12.1	10.1–10.6	10.4	9.8–10.6	10.3
First dorsal fin base	14.6	12.9–13.6	13.2	12.2–15.2	13.2
Second dorsal fin base	24.7	22.8–24.9	23.7	22.9–25.6	23.9
Anal fin base	23.8	22.0–23.9	22.9	21.8–25.0	23.2
Caudal fin length	22.5	20.2–25.4	22.8	20.5–26.1	22.6

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TABLE 1. (Continued)

Type accession number	MZB25339	NTOU-P 2019-09-147			
Type status	holotype	paratypes			
Sex	male	males (n=4)		females (n=2)	
Size (mm in SL)	33.3	22.8–26.3		21.8–29.5	
		Range	Mean	Range	Mean
Pectoral fin length	20.3	19.3–21.6	20.1	18.5–21.6	20.0
Pelvic fin length	13.9	14.0–15.8	14.7	13.4–15.4	14.4
Body depth at pelvic fin origin	14.5	14.2–14.7	14.6	14.1–15.0	14.5
Body depth at anal fin origin	13.8	11.9–13.5	12.7	12.1–14.4	13.0
Body width at anal fin origin	13.3	12.9–13.9	13.4	10.8–14.1	12.7
Pelvic fin origin to anus	31.9	29.1–31.5	30.5	31.5–34.1	32.8
% in HL					
Snout length	38.3	34.4–39.1	36.8	29.8–40.5	35.9
Eye diameter	21.3	21.0–23.3	22.4	19.8–23.6	22.1
Postorbital length	55.1	46.2–51.1	48.3	45.6–54.9	50.6
Check depth	33.3	32.5–37.8	35.0	30.7–36.9	34.3
Head width in upper gill opening	54.7	55.0–63.2	58.3	49.7–61.9	54.9
Head width in maximum	76.2	77.5–83.7	81.3	68.4–85.4	76.1
Fleshy interorbital width	53.6	49.7–51.7	50.9	41.5–53.1	48.0
Bony interorbital width	25.7	17.8–27.0	22.8	17.6–25.1	21.7
Lower jaw length	37.3	32.2–40.2	36.4	23.1–39.2	30.5
% in caudal peduncle length					
Caudal peduncle depth	68.4	63.4–67.5	65.7	57.2–70.7	64.6

Scales. LR 7–11, PreD 0, TR 0. Lateral side of anterior half of body without scales. Body scales present from 5–6th rays of second dorsal-fin through hypural, embedded in skin, with small ctenoid scales dominant anteriorly and cycloid scale generally restricted on caudal peduncle area to hypural.

Head canals and pores. See Fig. 3. Nasal extension of anterior oculoscapular canal with pore σ located on dorsal side of snout between anterior nostrils. Interorbital region with paired pore λ anteriorly and single pore κ posteriorly. Paired pore α behind posterior edge of eye. Lateral canal section of posterior oculoscapular with pores ρ , θ and τ . Preopercle canal with two terminal pores γ and ε but lacking pore δ .

Head sensory papillae. Infraorbital papillae present as 5 short transverse rows. Row *c* present as transverse and longitudinal papillae. Row *d* present above edge of posterior part of mouth. Rows *e* and *i* closely arranged. Rows *ot*, *oi*, and *os* well separated on preopercle. Row *f* paired.

Colour in life. See Fig. 1. **Male**, body, snout and nape yellowish to translucent whitish. Upper lip yellowish to greyish. Opercle yellowish to beige with many tiny black dots. Pectoral-fin base reddish with red dots, these sometime merged into heart-shaped marking. Belly white to silver. Black spots on the lower side of body below first and second dorsal-fin. Two pale red blotches on mid-body, first at origin of second dorsal-fin and second at caudal peduncle. Dorsal-fin and anal-fin translucent with scattered black dots on membrane. Pectoral-fin and anal-fin translucent. Second dorsal-fin without round black spot in both sexes. **Female**, Body translucent. Snout yellowish. Upper lip grey. Opercle beige. Caudal peduncle with tiny black spots. Pectoral-fin base whitish. Dorsal-fin spine and rays with some tiny spots, membrane mostly clear. Caudal-fin whitish and membrane unpigmented. Pelvic-fin also without pigment.

Colour in preservative. See Fig. 2. **Male**, body slightly creamy yellow and head greyish with yellowish cheek. Black pigmentation present on operculum. Two dark brown cross-bands below each dorsal-fin. All original red coloration faded to yellowish. Dorsal- and anal-fin greyish with black spots. Caudal-fin whitish. **Female**, body mostly whitish. Pectoral-fin base whitish. Black pigmentation on operculum. All fins whitish.

TABLE 2. Morphological characters of 23 species of *Lentipes*. Blanks indicate indistinct states.

Species	D2 I/	A I/	P	LR	D1 connected to D2 in male	Black spot on D2 in male	Urogenital papillae in male	References
<i>L. niasensis</i> n.sp.	10	10	17–18	7–11	no	no	slender and distally pointed with associated fleshy lobes	Present study
<i>L. adelphizonus</i>	9–10	9–10	16–18	25–34	yes	yes	elongate finger-like projections	Watson & Kottelat 2006, Mukerji 1935
<i>L. andamanicus</i>	9	12	13	-	-	-	-	
<i>L. argenteus</i>	9–10	9–10	16–17	35–49	no	no	slender & pointed outwards without lobes	Keith <i>et al.</i> 2014
<i>L. armatus</i>	10	10	18–19	26–37	yes	yes	without projection and lobes	Maeda <i>et al.</i> 2021
<i>L. caroline</i>	10	10	16	7–13	yes	no	slender & pointed outwards without lobes	Lynch <i>et al.</i> 2013
<i>L. concolor</i>	10	10	15–18	-	-	-	without lobes	Gill 1860, Lynch <i>et al.</i> 2013, Watson <i>et al.</i> 2002.
<i>L. crittersius</i>	9	10	19	10	no	-	-	Watson & Allen 1999
<i>L. dimetrodon</i>	9	10	15–16	-	yes	no	-	Watson & Allen 1999
<i>L. ikeae</i>	9	9	16–17	23–35	no	yes	slender & pointed outwards without lobes	Keith <i>et al.</i> 2014
<i>L. kaeeae</i>	9–10	9–10	17–18	-	yes	yes	slender and distally pointed with associated fleshy lobes	Watson <i>et al.</i> 2002
<i>L. kolobangara</i>	10	9–10	17–18	28–32	no	yes	Slender & pointed out without lobes	Keith <i>et al.</i> 2016
<i>L. mekonggaensis</i>	10	10	19–20	28–33	no	yes	Slender & pointed outwards without lobes	Keith <i>et al.</i> 2014
<i>L. mindanaoensis</i>	10	7	16	29–30	yes	yes	without lobes	Chen 2004
<i>L. multiradiatus</i>	10	10	20	-	yes	yes	-	Allen 2001
<i>L. rubrofasciatus</i>	10	10	15–17	-	-	-	-	Mauge <i>et al.</i> 1992, Watson <i>et al.</i> 2002
<i>L. solomonensis</i>	9	9	16–17	8–10	yes	yes	slender and distally pointed with associated fleshy lobes	Jenkins <i>et al.</i> 2008
<i>L. venustus</i>	10	10	18–19	-	-	-	without lobes	Allen 2004
<i>L. watsoni</i>	10	10	16–17	-	no	yes	without lobes	Allen 1997
<i>L. whittendorum</i>	10	10	17–19	19	yes	yes	with associated fleshy lobes	Watson & Kottelat 1994, Watson <i>et al.</i> 2002
<i>L. kijimuna</i>	9–10	10	18–19	29–35	yes	yes	without projection and lobes	Maeda <i>et al.</i> 2021
<i>L. bunagaya</i>	10	10	18–19	30–32	no	yes	without projection and lobes	Maeda <i>et al.</i> 2021
<i>L. palawanirufus</i>	10	10	16–19	29–38	yes	yes	without projection and lobes	Maeda <i>et al.</i> 2021

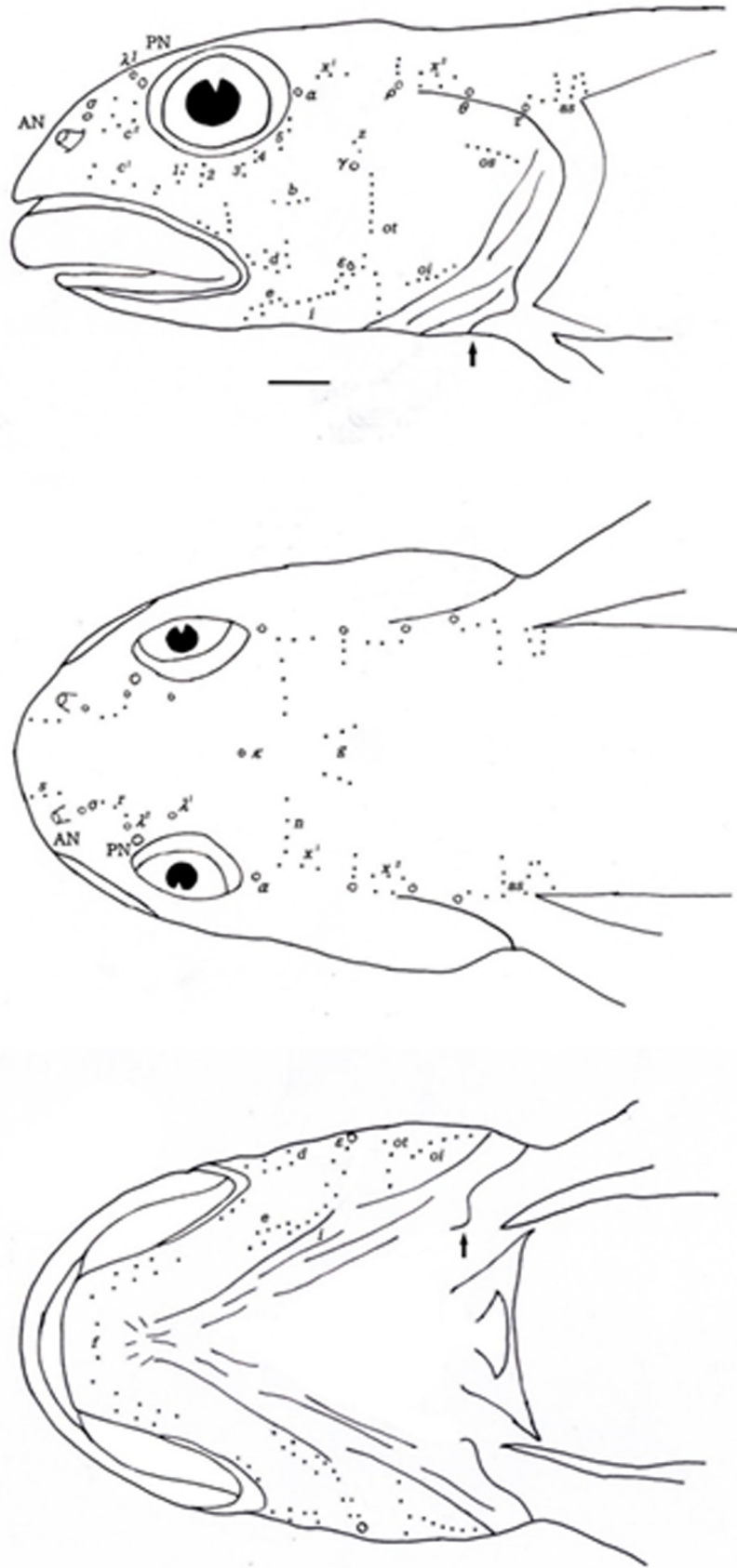


FIGURE 3. Head lateral-line system of *Lentipes niasensis* n. sp from Nias Island. MZB25339, holotype male, 33.3 mm SL (scale bar= 1 mm). AN, anterior nostril; PN, posterior nostril. The arrow denotes the position of the gill opening.

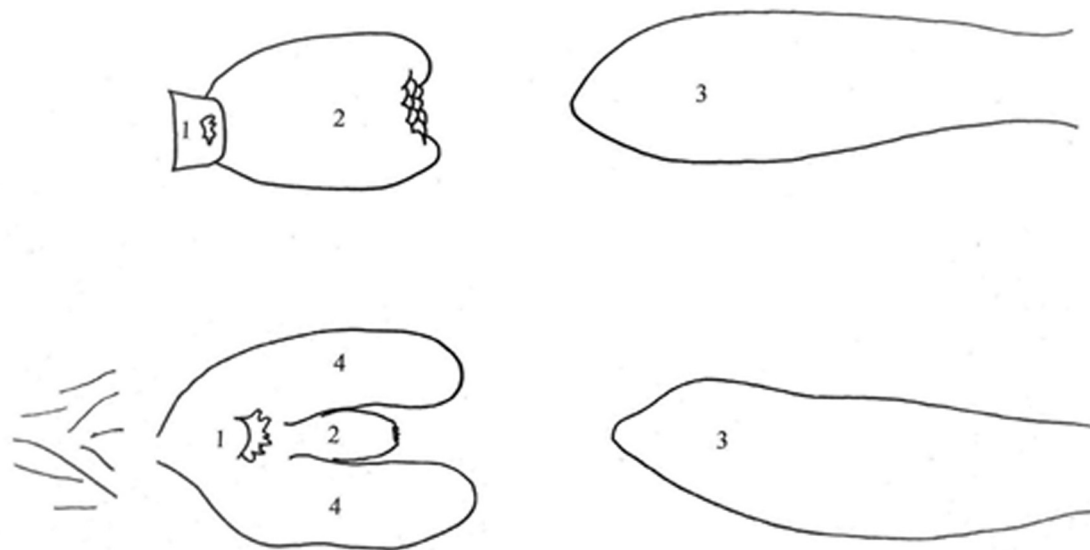


FIGURE 4. Diagrammatic sketches of urogenital papilla of *Lentipes niasensis* n. sp. from Nias Island. Up: female, Down: male. 1. anus, 2. urogenital papilla, 3. anal fin, 4. fleshy urogenital lobe.

Distribution and habitat. *Lentipes niasensis* is currently known only from the Humogo River, a tributary of the Idanoi River, in Gunungsitoli City, Nias Island, North Sumatera Province, Indonesia. The collection site featured a moderately swift current and rocky substratum. The new species appears to be rare compared to the sympatric *Sicyopus zosterophorus* Bleeker, 1856 and *Stiphodon* sp.

Etymology. The specific name *niasensis* is refer to Nias Island, Indonesia, where the new species collected.

Remarks. Some meristic and morphological characters of all members of the genus *Lentipes* are compared in Table 2. The gobiid fish *Raogobius andamanicus* Mukerji, 1935, has also been regarded by some authors as a member of genus *Lentipes* (Watson & Allen 1999, Kottelat 2013, Keith *et al.* 2015), and is therefore included in the table, but further study is necessary to clarify its status (Watson *et al.* 2001, Keith *et al.* 2015). With reference on Table 2, the present new species *L. niasensis* is distinguishable from *L. andamanicus* by its second dorsal-fin (10, vs. 9 rays), anal-fin with (10, vs. 12 rays), and pectoral-fin (17–18, vs. 13 rays). The new species, *L. niasensis* differs from this species as well as *L. adelphizonus* Watson & Kottelat, 2006, *L. armatus*, Sakai & Nakamura, 1979, *L. caroline* Lynch *et al.*, 2013, *L. dimetrodon* Watson & Allen, 1999, *L. mindanaoensis* Chen, 2004, *L. multiradiatus* Allen, 2001, *L. rubrofasciatus* Mauge *et al.*, 1992, *L. solomonensis* Jenkins *et al.*, 2008, *L. whittenorum* Watson & Kottelat, 1994, *L. kijimuna* Maeda *et al.*, 2021, *L. bunagaya* Maeda *et al.*, 2021, in not having D1 connected basally to D2 in the. It is also well distinguished from *L. ikeae*, *L. kaaea* Watson *et al.*, 2002, *L. kolobangara* Keith *et al.*, 2016, *L. mekonggaensis*, *L. watsoni*, *L. palawanirufus* Maeda *et al.*, 2021, by the absence of a round black spot on second dorsal-fin in male. *Lentipes niasensis* n. sp. is distinguishable from *L. concolor* Gill, 1860 and *L. venustus* Allen, 2004 by its possession of a pair of lobes associated with the urogenital papilla in males. Finally, *L. niasensis* apparently differs from *L. crittersius* in having more second dorsal-fin ray (10, vs. 9) and fewer pectoral-fin ray (17–18, vs. 19), but the original of *L. crittersius* was based entirely on the single female holotype (Watson & Allen 1999) and Keith *et al.* (2015) noted that additional specimens are required to ascertain its validity.

Lentipes niasensis n. sp. is most similar to *L. argenteus* from Padang, Sumatra Island, Western Indonesia, in many features. However, it differs from *L. argenteus* in having a pair of fleshy lobes flanking to the urogenital papilla in males (vs. lobes absent), pore γ (vs. absent) and no pore δ (vs. present and paired); the color pattern of the

male: upper lip greyish, red patch on pectoral-fin base, on body midline below origin of second dorsal-fin and at caudal peduncle (vs. upper lip slightly reddish and no red patches); fewer tricuspid teeth in the upper jaw of males (14–19. vs 17–22); fewer lateral scales (7–11. vs 35–49); a relatively longer head in female (22.8–25.7% SL. Vs. 21% SL); a relatively longer length from snout to anal fin origin in females (59.5–62.7% SL. Vs. 51–56% SL); and a relatively greater caudal peduncle depth in both sexes (10.1–10.6. vs. 7–9, in males. and 9.8–10.6% SL, vs. 7% SL, in females).

Comparative materials. *Lentipes mindanaoensis*: NMMB-P004821, holotype, 1 specimen (46.0 mm SL), small creeks with swift current in eastern part of Mindanao, Philippines, coll. Adonis P. Porpetcho, February 2003. *Lentipes armatus*: NTOU-P 2006-02-324, 1 specimen (34.3 mm SL), the upper tributary, Lan-Len River as branch of Kan-Kou River basin near southern tip of Taiwan, coll. I.S. Chen *et al.*, 10 September 2002; NTOU-P 2006-02-325, 3 specimens (35.5–36.3 mm SL), the upper tributary of Lan-Len River as branch of Kankou River Basin near southern tip of Taiwan, coll. I.S. Chen *et al.*, 08 February 2002; NTOU-P 2006-02-326, 2 specimens (31.5–35.6 mm SL), the upper reaches of Dong-Chin River of Lanyu (Orchid Island) off eastern coast, Taitung County, Taiwan, coll. C.C. Han *et al.*, 18 April 2002; NTOU-P 2006-02-327, 1 specimen (37.2 mm SL), the upper reaches of Dar-Niao River from the Hai-Ang Mountain Ridge, Taitung County, Taiwan, coll. C.C. Han, 30 November 2004.

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