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Lepusigobius, a new generic name proposed for *Gobiosoma pallida* Herre, 1934 (Gobiiformes: Gobiidae) from west Pacific with re-description of the species

TOSHIYUKI SUZUKI[1,4], HSIEN-EN LI[2,5#] & I-SHIUNG CHEN[2,3*]
[1]*Osaka Museum of Natural History, 1-23 Nagai Park, Higashi-sumiyoshi, Osaka 546-0034, Japan.*
[2]*Institute of Marine Biology, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
[3]*Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
[4] *trimma-toshiyuki@hop.ocn.ne.jp; https://orcid.org/0009-0004-2568-9227*
[5] *seanlee22@hotmail.com; https://orcid.org/0000-0002-5964-3292*
[#]*This author shares equal contribution to the first author*
[*]*Corresponding author: iscfish@gmail.com; https://orcid.org/0000-0002-4190-7720*

Abstract

In this study, after examining new additional materials and data collected from type materials, we designate a new gobiid genus, *Lepusigobius*, for *Gobiosoma pallida* Herre, 1934, a species that has a perplexing taxonomic history. *Lepusigobius* can be initially characterized by having a reduced transverse neuromast organ arrangement, a rabbit-like notched upper lip, and a dorsal pterygiophore formula of 3-12210. Other morphological diagnostic characters of *Lepusigobius* include the body moderately elongated, totally naked, pelvic fins with fully developed connecting membrane and frenum, and both dorsal fins connected basally. Descriptions of head lateral line system configurations and both fresh and preserved colourations are given, and a comprehensive comparison of *Lepusigobius* with other related genera are also provided herein.

Key words: *Gobiosoma pallida*, *Lepusigobius*, new genus, Gobiidae, Western Pacific

Introduction

The marine biogeographical region of the Indo-Pacific is a hotspot for ichthyofauna, especially for the megadiverse teleostean family Gobiidae, which contains approximately 190 genera and about 1400 species across the globe (Nelson *et al.* 2016). In species-rich taxa such as Gobiidae, the megadiversity resides not only in the external morphology but also in habitat choice and behaviour patterns, while most gobiids, more commonly known as gobies, are known to be benthic.

After years of intensive surveys and collections in the western Pacific, several specimens of peculiar and surprisingly miniature gobiids were collected and recorded from Okinawa-jima Island, Okinawa Group of the Ryukyu Islands, Japan. These gobies were found to inhabit sandy bottoms of tidal flats. After examinations of these specimens, we found out that these specimens were morphologically similar to the types of *Gobiosoma pallida* Herre, 1934; however, it seemed that they represent an undescribed genus that was distinctly different from the originally designated New World genus *Gobiosoma* Girard, 1858. Hence, we will designate a new genus for *G. pallida* with comparisons of other selected gobiid genera, providing a detailed diagnosis of newly collected materials. The species is also re-described herein based on these specimens, including the type series.

Materials and Methods

Specimens examined in this study are housed in the following institutions: California Academy of Sciences (CAS) and Osaka Museum of Natural History (OMNH). Samples of the examined non-type materials were collected with hand nets on the tidal flats. Measurements of every collected individual were carried out by electronic callipers and

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scales to the nearest 0.01mm under dissecting microscope following the methods of Miller (1988), Chen & Shao (1996), and Li & Chen (2024). Osteological characters were observed with radiographs and identified following Birdsong *et al.* (1988), naming system for cephalic sensory papillae and pore system followed Sanzo (1911) and Wongrat & Miller (1991). Comparisons with other genera are based solely on descriptions or specimens of their type species (Barnard 1937; Smith 1959; Akihito & Meguro 1974; Polunin & Lubbok 1977; Hoese & Randall 1982; Yoshino & Senou 1983; Chen *et al.* 1998; Chen & Fang 2003; Suzuki & Senou 2013; Akihito *et al.* 2013; Maeda *et al.* 2018; Larson 2022), neglecting intra-generic polymorphism. Abbreviations for meristic characters shown as follows: D1, first dorsal fin; D2, second dorsal fin; A, anal fin; P1, pectoral fin; P2, pelvic fin; AOC, anterior oculoscapular canal; POC, posterior oculoscapular canal; PopC, preopercular canal; V, vertebral counts; PreCV, precaudal vertebrae; CV, caudal vertebrae. SL, standard length.

Taxonomy

Lepusigobius gen. nov.

New Japanese name: Asagiri-haze zoku

Type species

Gobiosoma pallida Herre, 1934

Diagnosis

Lepusigobius **gen. nov.** can be distinguished from other gobiid genera by the following unique combination of characters: trunk moderately elongated; upper lip deeply clefted medially; anterior nostril openings tubular, without fleshy flaps; body totally scaleless; pelvic fins fused, forming an elongated cup, connecting frenum completely developed with scalloped posterior margin, median connecting membrane well-developed; cephalic sensory organs in reduced pattern (Fig. 1); sensory canal system reduced, anterior oculoscapular canal incomplete, interorbital pore λ singular, pore ω behind eye and terminal pore ρ absent, posterior oculoscapular canal and preopercle canal pores absent; sensory neuromast papillae patterns reduced, in transverse type pattern; a series of short papillae rows (rows *1–6*) radiating from orbit, rows *2–4* and *6* comprised by single papillae, row 5 interrupted (divided into *5s* and *5i*); row *b* interrupted, not reaching vertical point of posterior margin of orbit anteriorly; row *d* short, not reaching upper lip anteriorly and does not reach beyond preopercle posteriorly; rows *e* and *i* interrupted; row *ot* interrupted, upper tip not reaching the horizontal point of lower margin of orbit. Dorsal pterygiophore formula 3-12210; vertebrae 10 (precaudal)+16 (caudal)=26 (Fig. 2).

Etymology

The new generic name *Lepusigobius* is derived from *Lepus* (Leporidae rodent, commonly known as hares or wild rabbits) and *Gobius* (a gobiid genus), in reference to the distinct clefted upper lip of its species, the gender is masculine.

Comparisons

Lepusigobius **gen. nov.** is readily assignable to the subfamily Gobiinae (*sensu* Pezold 1993) by having singular interorbital pore λ, anterior oculoscapular canals fused at the interorbital region and vertebral count 10+16=26, and its unique dorsal pterygiophore formula (3-12210) (Birdsong *et al.* 1988; Pezold 1993). Although *Lepusigobius* resembles the New World genus *Gobiosoma* Girard, 1858 in the complete absence of scales and general external morphology, it differs in having six (*vs.* seven) first dorsal fin spines, 10+16=26 (*vs.* 11+16=27) vertebrae, and in lacking posterior oculoscapular and preopercular canals (*vs.* present).

Lepusigobius was previously confused with *Schismatogobius* de Beaufort, 1912 and *Cryptocentroides* Popta, 1922 (see species remarks for *Lepusigobius pallidus*). The total lack of any scales can be observed in both *Lepusigobius* and *Schismatogobius*, however the former can be distinguished from the latter by having singular pore λ (*vs.* pore λ absent) and higher counts of D2 (11–12 *vs.* 9) and anal fin rays (12 *vs.* 9). *Lepusigobius* shares little homology with *Cryptocentroides* except the two genera both has restricted gill opening.

The clefted upper lip of *Lepusigobius* is unique among all Indo-Pacific gobiine genera (Figs. 3–4). Its reduced, transversely arranged cephalic sensory papillae pattern resembles that of *Stonogobiops* Polunin & Lubbock, 1977.

Both genera lack posterior oculoscapular canals, but *Lepusigobius* differs in having paired sets of two papillae in neuromast row *f* (*vs.* paired rows of several papillae) and a completely naked body (*vs.* covered with cycloid scales).

Lepusigobius also shares with the western Pacific genus *Parkraemeria* Whitley, 1951 the presence of connection membrane between the dorsal fins and a reduced neuromast system, yet they differ markedly in detail. In *Lepusigobius*, the dorsal connection is basal, and evident only in males, whereas in *Parkraemeria* it is extensive, the second dorsal spine is absent, and the fins are confluent. Their neuromast patterns also differ, being transverse in *Lepusigobius* and longitudinal in *Parkraemeria*.

The slightly elongate body and relatively large eyes of *Lepusigobius* resemble those of several Indo-Pacific goby genera, including *Amblyeleotris* Bleeker, 1874, *Vanderhorstia* Smith, 1949, *Tomiyamichthys* Smith, 1956, *Flabelligobius* Smith, 1956, and *Ctenogobiops* Smith, 1959, and only *Amblyeleotris* shares a transverse neuromast pattern with *Lepusigobius*, but the two genera differ in several features: posterior oculoscapular and preopercular canals absent (*vs.* well developed); neuromast row f composed of paired sets of two papillae (*vs.* paired single papillae); gill opening extending from the upper pectoral-fin base to the vertical of row *os* (*vs.* to pore α); body completely naked (*vs.* covered with ctenoid and cycloid scales); dorsal fins basally connected (*vs.* well separated); and pelvic fins with complete frenum and median connecting membrane (*vs.* frenum absent, membrane present only basally). Comparative data were solely based upon the type species of each species; the data source and other details were summarized in Tables 2–3.

Smith (1955) ever described a new gobiid genus and species *Croilia mossambica* with an also slender body profile and highly connected dorsal fins. The species was found in estuarine areas and was only recorded from South Africa (Smith 1955; Smith 1959; Hoese 1986; Larson 2022). Based solely on its original description, *Lepusigobius* is similar to *Croilia* in general appearance but different from the latter in having a minute gill opening (*vs.* rather wide gill-opening, extending anteriorly to about the vertical of preopecle) and connections in dorsal fins (low connection between dorsal fins *vs.* both dorsal fins highly connected) although no any type information of head lateral-line system for *Croilia* has ever been reported.

Included species

Lepusigobius comprises a single species, *L. pallida*. The species is re-described below.

***Lepusigobius pallida* comb. nov.**

New Japanese name: Asagiri-haze

(Figs. 1–7; Tables 1–3)

Gobiosoma pallida Herre, 1934: 91 (type locality: Sitankai, Sulu Province, Philippines); Koumans 1940: 149.

Material Examined

Type material

Paratypes: CAS-SU 16962, 3 specimens, 15.8–17.2 mm SL, Si Tankay, Sibutu I. group, Tawi-Tawi Prov., Sulu Archipelago, Philippines, 27 Aug. 1931, coll. A.W. Herre.

Non-type material

OMNH-P34713, male, 1 (16.9 mm SL), Ukaji Beach, Okinawa-jima Island, Okinawa Group of Ryukyu Islands, Japan, 26°25′09″N, 127°44′45″E, 2 Aug. 2008; coll. K. Abe.

OMNH-P34714, female, 1 (17.5 mm SL), collected with OMNH-P34713.

OMNH-P34743, 3 (12.2–15.5 mm SL), same locality as OMNH-P34713, 29 Aug. 2008; coll. T. Suzuki, M. Suzuki & K. Abe.

OMNH-P34750, male, 1 (16.7 mm SL), collected with OMNH-P34743.

OMNH-P34751, male, 1 (15.0 mm SL), collected with OMNH-P34743.

OMNH-P34752, female, 1 (17.6 mm SL), collected with OMNH-P34743.

OMNH-P34753, female, 1 (16.1 mm SL), collected with OMNH-P34743.

OMNH-P34754, female, 1 (15.7 mm SL), collected with OMNH-P34743.

OMNH-P34755, female, 1 (16.0 mm SL), collected with OMNH-P34743.

OMNH-P34772, male, 1 (16.1 mm SL), collected with OMNH-P34743.

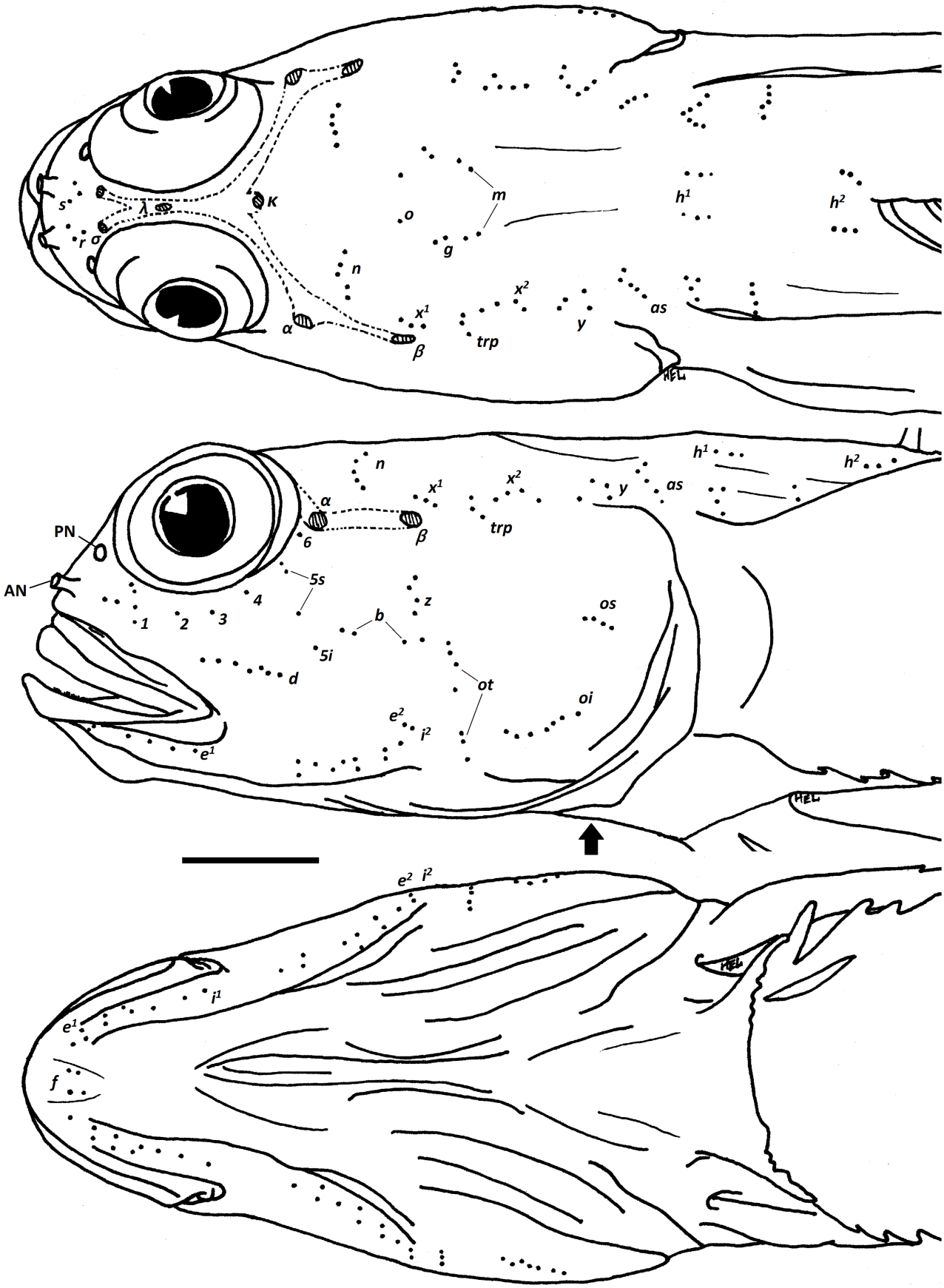

FIGURE 1. Head neuromast organ and sensory canal configurations of *Lepusigobius pallidus* (OMNH-P34753, 16.1 mm SL). Arrows indicate the anterior end of gill opening. Scale bar = 1 mm.

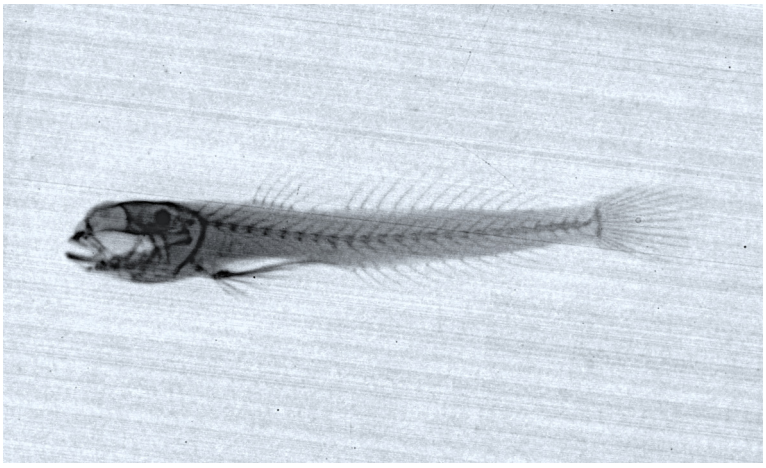

FIGURE 2. Radiograph of *Lepusigobius pallidus* (OMNH-P34713, 16.9 mm SL).

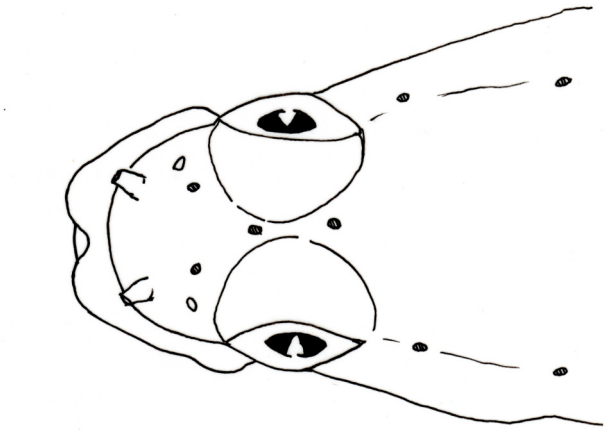

FIGURE 3. Drosal view of *Lepusigobius pallidus,* paratype, CAS-SU 16962, 17.2 mm SL,male, Sulu Archipelago, the Philippines; the outline sketch representing the deep notch of upper lip.

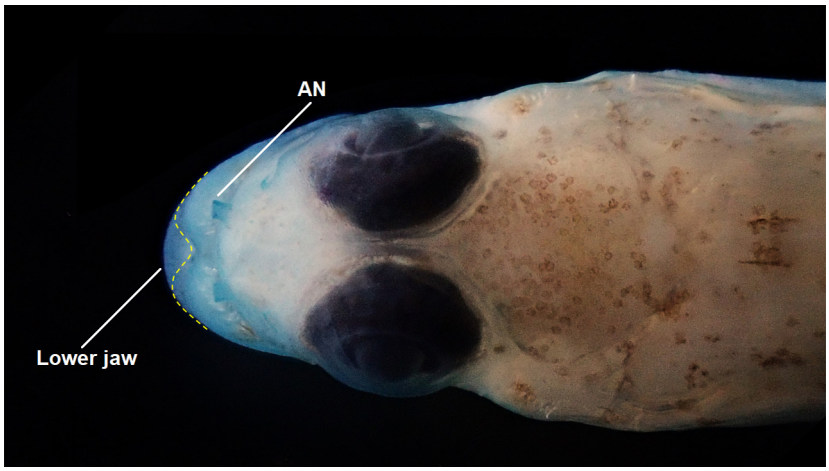

FIGURE 4. The snout of *Lepusigobius pallidus,* OMNH-P34754, 15.7 mm SL. Yellow dashed line indicates the anterior margin of the upper lip. Blue dye was applied to aid examination.

Diagnosis

See generic diagnosis.

Descriptions

In the following description, the counts of the three three paratypes are asterisked; frequency of each count is given in parentheses following the relevant count. Meristic counts and morphometric measurements are provided in Table 1. Body elongated, subcylindrical anteriorly and slightly compressed posteriorly. Head relatively large with a slightly bulbous lateral profile. Snout minute and short; eyes large, positioned dorso-laterally; interorbital space narrow. Mouth slightly oblique, reaching beneath the midpoint of the eye, without notable sexual differences in maxillary length; lower jaw slightly projecting beyond upper jaw; lips smooth; upper lip bearing a distinct median notch (Figs. 3–4).

TABLE 1. Morphometric measurements of *Lepusigobius pallidus* **comb. nov.** from Okinawa-jima Island, Japan. All values were rounded to the second decimal, mean value shown in brackets.

Species	*Lepusigobius pallidus* **comb. nov.**	
Sex	♂	♀
n	5	7
D	VI–I, 11–12	VI–I, 11–12
A	I, 12	I, 12
P_1	15	15
P_2	I, 5	I, 5
SL (mm)	12.16–16.89	15.33–17.57
Percent in standard length (%)		
Head length	21.72–31.35 (25.22)	23.24–26.00 (24.79)
Predorsal length	30.40–40.20 (34.83)	35.66–38.76 (36.32)
Snout to 2nd dorsal origin	45.04–56.34 (51.71)	52.75–55.14 (54.25)
Snout to anus	45.56–55.83 (51.00)	51.78–56.88 (53.90)
Snout to anal fin origin	47.87–59.48 (53.59)	55.72–59.14 (57.10)
Prepelvic length	24.57–35.63 (28.00)	26.52–31.03 (28.33)
Caudal peduncle length	8.16–10.98 (10.11)	9.68–10.93 (10.32)
Caudal peduncle depth	5.24–7.49 (6.42)	6.69–6.85 (6.76)
1st dorsal fin base	14.94–18.52 (16.58)	15.77–17.41 (16.63)
2nd dorsal fin base	29.94–36.42 (34.46)	31.05–33.88 (32.77)
Anal fin base	30.73–36.30 (33.85)	29.50–34.51 (32.30)
Caudal fin length	22.28–25.49 (23.99)	20.73–23.13 (21.96)
Pectoral fin length	17.12–21.87 (19.62)	18.14–24.46 (21.13)
Pelvic fin length	22.56–25.75 (24.23)	21.61–29.04 (24.60)
Body depth at pelvic fin base	12.90–15.46 (13.93)	13.54–17.34 (15.53)
Body depth at anal fin base	8.90–11.99 (10.36)	9.55–11.10 (10.39)
Body width at anal fin base	5.54–7.27 (6.20)	5.75–8.19 (7.01)
Pelvic fin origin to anus	20.76–26.67 (23.90)	24.75–27.36 (26.29)
Percent in head length (%)		
Head width in maximum	49.42–56.64 (53.74)	53.04–69.32 (59.33)
Posterior-most head width	31.88–41.33 (35.54)	36.75–45.77 (41.70)
Eye diameter	24.81–36.75 (29.86)	27.39–33.35 (31.57)
Bony interorbital width	2.06–3.53 (2.74)	2.47–3.26 (2.91)
Fleshy interorbital width	38.77–47.86 (41.53)	37.96–48.11 (42.38)
Snout length	13.44–19.50 (16.75)	16.67–20.95 (19.00)
Lower jaw length	28.14–41.18 (33.92)	29.61–37.81 (34.40)
Cheek depth	23.11–31.50 (28.80)	27.13–35.83 (32.35)
Postorbital length	52.06–67.97 (59.73)	50.02–66.02 (58.91)

TABLE 2. Comparison of the sensory canal and head neuromast organ of *Lepusigobius* with selected gobiid genera. Asterisks mark the characters that are uncertain in the type species but belong to most congeneric species.

Genus	*Lepusigobius* **gen. nov.**	*Amblyeleotris* Bleeker, 1874	*Schismatogobius* de Beaufort, 1912	*Cryptocentrioides* Popta, 1922	*Vanderhorstia* Smith, 1949	*Parkraemeria* Whitley, 1951	*Tomiyamichthys* Smith, 1956	*Flabelligobius* Smith, 1956	*Ctenogobiops* Smith, 1959	*Stonogobiops* Polunin & Lubbok, 1977
Type sp.	*Gobiosoma pallida* Herre, 1934	*Eleotris periophthalmus* Bleeker, 1853	*Schismatogobius bruynisi* de Beaufort, 1912	*Cryptocentroides dentatus* (=*Cryptocentroides insignis*) Popta, 1922	*Gobius delagoae* Barnard, 1937	*Parkraemeria ornata* Whitley, 1951	*Cryptocentrus oni* Tomiyama, 1936	*Flabelligobius fourmanoiri* Smith, 1956	*Ctenogobiops crocineus* Smith, 1959	*Stonogobiops dracula* Polunin & Lubbok, 1977
Sensory canal and pore										
AOC & pores	Present, σ, λ(s), κ(s), α, β	Present, σ, λ(s), κ(s), ω, α, β, ρ	Present, σ, κ(s), α	Present, σ, λ(s), κ(s), ω, α, β, ρ	Present, σ, λ(s), κ(s), ω, α, β, ρ*	Present, σ, κ(s), α	Present, σ, λ(s), κ(s), ω, α, ρ	Present, σ, λ(s), κ(s), ω, α, β, ρ	Present, σ, λ(s), κ(s), ω, α, β, ρ	Present, σ, λ(s), κ(s), ω, α
POC & pores	Absent	Present, θ, τ	Present, θ, τ	Present, θ, τ	Present, θ, τ*	Absent	Absent	Present, θ, τ	Present, θ, τ	Absent
Pop C & pores	Absent	Present, γ, δ, ε	Present, γ, ε	Present, γ, δ, ε	Present, γ, δ, ε*	Present, δ, ε	Present, γ, ε	Present, γ, δ, ε	Present, γ, δ, ε	Present, γ, δ
Neuromast organs										
Type	Transverse	Transverse	Longitudinal*	Longitudinal	Longitudinal	Longitudinal	Longitudinal	Longitudinal	Longitudinal	Transverse
Infraorbital row	6 short papillae rows radiating from orbit	6 short papillae rows radiating from orbit	Reaching beyond anterior edge of orbit*	Reaching beyond anterior edge of orbit	Reaching upper jaw downwardly	Reaching midpoint of orbit downwardly	Slightly reaching beyond midpoint of orbit	Reaching upper jaw with several transverse rows	Loosely arranged to horizontal point of pore γ	Four to five rows of papillae radiating from orbit
Row *b*	Not exceeding posterior margin of orbit	Not exceeding posterior margin of orbit anteriorly	Midway between orbit and edge of preopercle*	From vertical midline of orbit to midline of preopercle	A little exceeding posterior margin of orbit anteriorly*	Midway between orbit and edge of preopercle	From vertical midline of orbit to midline of preopercle	From vertical midline of orbit to midline of preopercle	Not reaching beyond midline of orbit	Extending posteriorly to upper edge of preopercle*

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TABLE 2. (Continued)

Genus	*Lepusigobius* **gen. nov.**	*Amblyeleotris* Bleeker, 1874	*Schismatogobius* de Beaufort, 1912	*Cryptocentrioides* Popta, 1922	*Vanderhorstia* Smith, 1949	*Parkraemeria* Whitley, 1951	*Tomiyamichthys* Smith, 1956	*Flabelligobius* Smith, 1956	*Ctenogobiops* Smith, 1959	*Stonogobiops* Polunin & Lubbok, 1977
Row *c*	Absent	Absent	Moderately long, terminus close to posterior end of row *b*	Not exceeding posterior margin of eye posteriorly	Moderately long, terminus close to anterior end of rows *a* and *b*	Interrupted, reaching anterior end of row b posteriorly	Short, not exceeding posterior margin of eye posteriorly	Posterior nostril to midline of preopercle with several additional transverse rows	Extending from pore α, not reaching beyond vertical point of rear edge of orbit*	Absent
Row *d*	Length shorter than eye diameter, not touching upper jaw anteriorly	Starting from upper jaw, extending beyond posterior margin of orbit	Extending from anterior nostril, ending beyond midpoint of preopercle*	Extending from anterior nostril, ending beyond midpoint of preopercle	Extending from upper jaw to vertical point of posterior margin of orbit*	Extending from upper jaw, length about eye diameter	Extending obliquely to midpoint of preopercle	Extending from upper jaw to midline of preopercle	Starting from upper jaw, extending to vertical point of posterior margin of orbit*	Intensely interrupted,
Row *f*	Paired longitudinal rows of two papillae	Paried single papillae	Paried single papillae*	Paried single papillae*	Paried single papillae*	Transverse row of single papillae	Transverse row of single papillae	Transverse row of single papillae	Paried single papillae	Paired rows of several papillae

TABLE 3. Comparison of the axial osteology and external morphology of *Lepusigobius* with selected gobiid genera. Asterisks mark the characters that are uncertain in the type species but belong to most congeneric species.

Genus	*Lepusigobius* **gen. nov.**	*Amblyeleotris* Bleeker, 1874	*Schismatogobius* de Beaufort, 1912	*Cryptocentrioides* Popta, 1922	*Vanderhorstia* Smith, 1949	*Parkraemeria* Whitley, 1951	*Tomiyamichthys* Smith, 1956	*Flabelligobius* Smith, 1956	*Ctenogobiops* Smith, 1959	*Stonogobiops* Polunin & Lubbok, 1977
Type sp.	*Gobiosoma pallida* Herre, 1934	*Eleotris periophthalmus* Bleeker, 1853	*Schismatogobius bruynisi* de Beaufort, 1912	*Cryptocentroides dentatus* (=*Cryptocentroides insignis*) Popta, 1922	*Gobius delagoae* Barnard, 1937	*Parkraemeria ornata* Whitley, 1951	*Cryptocentrus oni* Tomiyama, 1936	*Flabelligobius fourmanoiri* Smith, 1956	*Ctenogobiops crocineus* Smith, 1959	*Stonogobiops dracula* Polunin & Lubbok, 1977
Axial skeleton										
D1 pterygiophore	3-12201	3-22110	3-12210*	3-22110	3-22110*	3-22110	3-22110	3-22110	3-22110	3-22110*
PreCV+CV	10+16	10+16	10+16*	10+16	10+16*	10+16	10+16	10+16	10+16	10+16
External morphology										
Upper lip notch	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Squamation	Completely naked	Both cycloid and ctenoid scale	Completely naked	Both cycloid and ctenoid scale	All cycloid	Completely naked	All cycloid	All cycloid	Both cycloid and ctenoid scale	All cycloid
Predorsal squamation	Naked	Naked	Naked	Naked	Cycloid scales, midline naked	Naked	Naked	Naked	Naked	Cycloid scales, midline naked
Trunk squamation	Naked	Cycloid anteriorly, ctenoid at posterior 2/3*	Naked	Only cycloid anterior to D2 origin	All cycloid*	Naked	All cycloid	All cycloid*	Cycloid only on belly and below D2 origin	All cycloid

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TABLE 3. (Continued)

Genus	*Lepusigobius* **gen. nov.**	*Amblyeleotris* Bleeker, 1874	*Schismatogobius* de Beaufort, 1912	*Cryptocentrioides* Popta, 1922	*Vanderhorstia* Smith, 1949	*Parkraemeria* Whitley, 1951	*Tomiyamichthys* Smith, 1956	*Flabelligobius* Smith, 1956	*Ctenogobiops* Smith, 1959	*Stonogobiops* Polunin & Lubbok, 1977
Anterior extent of gill openings	Vertical position of row *os*	Vertical position of pore *α*	Vertical position of row *ot**	Just anterior to the pectoral girdle	Vertical position of posterior margin of orbit *	Vertical point of edge of preopercle	Vertical position of row *os*	Vertical point of edge of preopercle	Vertical point of orbit	Upper pectoral fin base to vertical position of pore *α*
D1 elongation	4th spine longest, filamentous in male	No elongation in both sexes*	No elongation in both sexes*	3rd spine elongated in male	5th spine elongated in male	No elongation in both sexes	3rd spine longest but not elongated in male	1st spine elongated and filamentous in male	2nd spine longest but not elongated in male	No elongation in both sexes
D1-D2 connection	Basally connected	Not connected	Not connected*	Not connected	Not connected	Significantly connected	Not connected	Not connected	Well separated	Well separated
D2	11–12	12	9	13	13	12–15	11	12	11	10
A	12	12	9	12	13	13–14	11	12	11	9
Pelvic fin frenum	Present, scalloped margin	Absent	Well developed	Well developed	Present, thin, smooth margin*	Well developed	Well developed	Well developed	Well developed	Well developed
Pelvic fin fusing	Well connected, forming a cup	Connected only at base of fifth ray	Well developed	Well developed	Well-connected*	Well connected, disc flat and oblong	Well-connected	Well-connected	Well-connected	Well-connected

Fins. D1. VI(15)*; D2. I, 11(11)*, 12(4)*; A. I, 12(15)*; P1. 15(15)*; P2. I, 5(15)*. Dorsal fins connected only at the fin base, with the connecting membrane more developed in males. The 4th D1 spine longest and filamentous in mature males. Base length of D2 equal to that of the anal fin. P1 moderately large, not reaching the vertical point of anus. P2 fused, with a fully developed and thin connecting membrane; frenum delicate with a scalloped margin (Fig. 5). Caudal fin oval, its length is approximately equal to head length (Table 3).

Squamation. Body completely naked.

Head lateral-line system

Canals. See generic diagnosis (Fig. 1).

Sensory papillae. See generic diagnosis (Fig. 1).

Axial Skeleton. See generic diagnosis (Fig. 2).

Colorations while fresh. (Fig. 6). Body overall translucent grey, densely speckled with numerous dark-brown dots, with many whitish diffuse cloud-like markings, and bearing 4–5 triangular, saddle-like caramel patches along the dorsum; belly and thoracic region whitish, sparsely marked with mottled brown spots. Mid-lateral surface with 4–5 brown blotches, each with a darker central spot. Intramuscular pigmentation light caramel. Head mottled with light brown and ochre spots and covered with numerous white specks; ventral surface white; inner branchiostegal membrane black. Iris orange, with the lower quarter dark brown. A short dark-brown streak extends from the lower margin of the eye to the maxilla, crossing both lips. D1 white, male with a dark-brown smear along the basal half of the 1st spine extending to the 4th spine; 4th to 6th dorsal fin rays edged with dark brown to orange, rarely with an oval blotch present at posterior 1/3. D2 white, bearing 2–3 curved brown lines on the anterior two-thirds, posterior quarter with a diffuse brownish smear. Anal fin grading from greyish white at the base to brown distally, with 3 dark-brown bands on the 4th, 7th, and 10th rays. P1 transparent, the fin base with several brown specks and a small black spot on the upper one-fifth. P2 overall greyish white. Caudal fin whitish with a weakly specked, almost transparent central area.

Colouration in preservatives (Fig. 7). Body ivory with numerous brown spots dorsally. Mid-lateral with 4–5 brown spots. Head weakly scattered with brown specks with a thin, short brown streak below eye. All fins transparent, both dorsal fins and anal fin with mottled brown spots. Anal fin base with 3–4 basal blotches. P1 base with a small brown spot.

Sexual dimorphism (Fig. 7). Urogenital papillae short, pointy in male, stout and blunt in female. The slightly bulbous lateral profile of head is more significant in female individuals. No significant elongation of dorsal fin spine or blotching patterns in female, while in males the 4th D1 fin spine bears filamentous elongation and some individuals possess an oval spot posteriorly at D1. P2 much more elongated in male, exceeding anus. For the pigmentations, the D1 blotch is only seen in some male individuals (1 out of 5), for females the D1 is only pigmented with 1–2 longitudinal smear, and the dark brown branchiostegal membrane pigmentation is only seen in male.

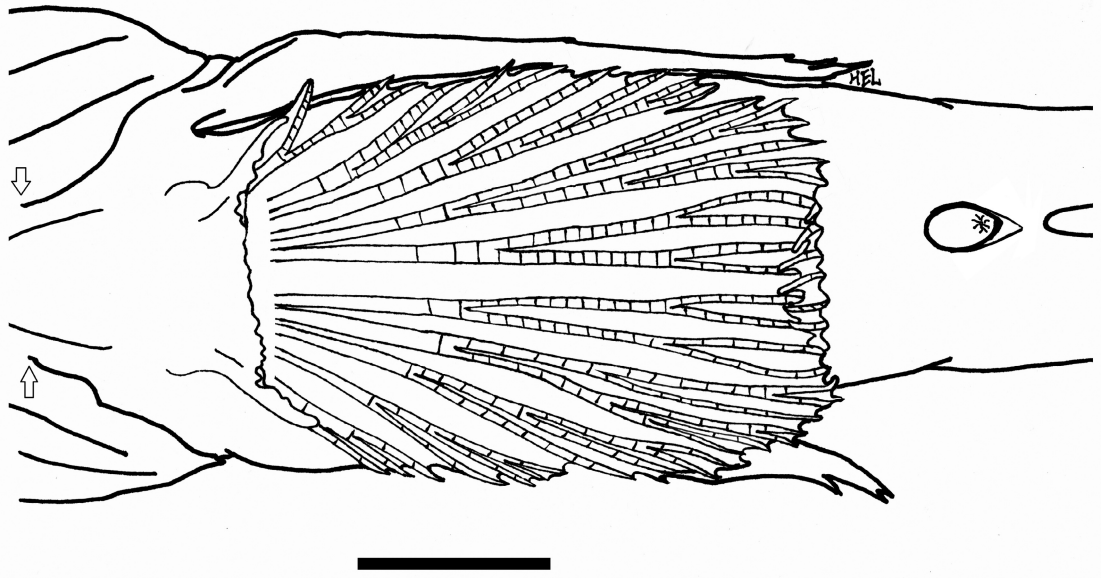

FIGURE 5. Pelvic fin of *Lepusigobius pallidus*, OMNH-P34753, 16.1 mm SL. Arrows indicate the anterior ends of gill opening. Scale bar = 1 mm.

FIGURE 6. Fresh coloration of *Lepusigobius pallidus*, OMNH-P34750, 16.1 mm SL.

FIGURE 7. Preserved colorations of *Lepusigobius pallidus*, male, OMNH-P34713, 16.9 mm SL and female, OMNH-P34754, 15.7 mm SL.

Distribution and habitat

Lepusigobius pallidus had previously been known only from the type locality at Sitankai, Sulu Province, Philippines, where the holotype and three paratypes were collected. Recently, twelve additional specimens were obtained from Okinawa-jima Island, Okinawa Group of the Ryukyu Islands, Japan. In Okinawa-jima, *Lepusigobius pallidus* inhabits small embayments receiving slight freshwater inflow, and is found on sandy bottoms of shallow tidal channels and shallow tide pools on tidal flats during low tide.

Remarks

The morphology of the Japanese specimens agrees well with the paratypes examined. Koumans (1940) had examined the type material of *Gobiosoma pallida* and stated the following: "Dr. Herre does not give a note about the

scales of this species. It is scaled with about 24 very deciduous cycloid scales, one row of scales on each myomere.". However, in our microscopic examination of the three paratypes and also based on the photos of the holotype (CAS-SU 28609) provided by the CAS Ichthyology Primary Types Imagebase, they lacked any body scales indeed.

After Herre's description (1934) of *Gobiosoma pallida*, subsequent authors had held different opinions upon the species' generic placements, leading into a long confusion of its generic identity. *Gobiosoma pallida* had been erroneously placed under *Schismatogobius* de Beaufort, 1912 by Herre's decision (Herre 1953) and later ever suggested as a junior synonym of *Cryptocentroides insignis* (Seale, 1910) commented by Kottelat (2013), and due to not only the abraded situation of infraorbital papillae pattern but also completely bleaching out of whole type series, it is very difficult to check the real generic status only on type material till first author firstly provided the very good condition of fresh specimen collection to re-verify them in detial again. Unresolved issues stemming from erroneous taxonomic decisions made in the absence of fresh or newly available material have subsequently accumulated into the present uncertainty upon the taxonomic identity of *G. pallida*.

Discussion

Due to the homology and the wide intrageneric diversity of gobiid species, it is necessary to establish a generic identification framework based upon the full description of every generic type, morphological-wise and phylogenetic-wise. In this study we established *Lepusigobius* **gen. nov.** to resolve the clumped taxonomic problems of *Gobiosoma pallida* from years of erroneous decisions. Due to the scarcity of fresh materials, we lack the ability to understand the true placement of *Lepusigobius* among all gobioid species through phylogenetic approaches, however its placement within Gobiinae (*sensu* Pezold 1993) is eminent with the head canal and canal pore arrangements examined. To better understand its phylogeny placement, a full description of the species' osteology is processing for further research (Li *et al.* in prep.), and the more field work effort is indeed rather necessary to realize the distribution range of current very interesting taxa.

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