Zoological Studies **41**(4): 431-440 (2002)

Zoological Studies

Parupeneus insularis, a New Central Pacific Species of Goatfish (Perciformes: Mullidae) of the *P. trifasciatus* Complex

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(Accepted August 2, 2002)

John E. Randall and Robert F. Myers (2002) *Parupeneus insularis*, a new central Pacific species of goatfish (Perciformes: Mullidae) of the *P. trifasciatus* complex. *Zoological Studies* **41**(4): 431-440. Most recent authors have used the name *Parupeneus bifasciatus* (Lacepède) for a wide-ranging Indo-Pacific goatfish; however, Günther (1859), as 1st revisor, correctly placed *bifasciatus* in the synonymy of *trifasciatus* described by Lacepède on the same page. We herein divide *P. trifasciatus* into 3 species and restrict *P. trifasciatus* to the Indian Ocean. *Parupeneus crassilabris* (Cuvier) is recognized as valid for the eastern Indian Ocean and the western Pacific east to Fiji, Tonga, and the Caroline Islands; it differs from *trifasciatus* in color and in having shorter barbels. *Parupeneus insularis* is described as a new species from the Hawaiian Islands, French Polynesia, and Pitcairn Islands to the Marshall, Mariana, Phoenix, and Samoa Islands; it differs in color and in having a higher gill-raker count, 37-42 (modally 39), compared to 35-38 for the other 2 species, and it has shorter barbels than *P. crassilabris*. http://www.sinica.edu.tw/zool/zoolstud/41.4/431.pdf

Key words: Taxonomy, Mullidae, *Parupeneus trifasciatus* complex.

Lacepède (1801: 404) described 2 species of goatfishes, *Mullus bifasciatus* and *M. trifasciatus*, based on the manuscripts of Commerson and drawings made by Sonnerat for Commerson (Bauchot et al. 1985). No type locality was given for either species. Cuvier in Cuvier and Valenciennes (1829: 468) recognized both species and provided a type locality of Bourbon (= Réunion) for *bifasciatus*. Günther (1859: 407), however, correctly concluded that the 2 are the same species and placed *bifasciatus* in the synonymy of *trifasciatus*. In his *Fische der Südsee*, Günther (1874: 59, pl. 44, Fig. B) changed his mind and used *trifasciatus* for the species currently known as *Parupeneus multifasciatus* (Quoy and Gaimard) and adopted *bifasciatus* for the species he illustrated on plate 44, figure A (no locality given, but presumably from the South Pacific). He was followed by many authors. Bauchot et al. (1985) treated *bifasciatus* and *trifasciatus* as synonyms, thus correcting the mistake of Günther (1874), but followed current usage and made *bifasciatus* the senior synonym. However, we must abide by the decision of Günther (1859), the 1st revisor, and use *trifasciatus* for this species (William N. Eschmeyer, pers. comm.).

Parupeneus trifasciatus has long been regarded as wide-ranging in the Indo-Pacific region from the east coast of Africa to the Hawaiian and Pitcairn Is. The authors have long been aware of color variation in *trifasciatus* over this broad range. Individuals from the east coast of Africa to Christmas I. in the eastern Indian Ocean have 2 well-defined dark bars that narrow as they pass ventrally, usually nearly crossing the body, with occasional individuals having a 1/3, less distinct bar dorsally on the caudal peduncle (Fig. 1). Those from western Australia, southwestern Indonesia, and the western Pacific ranging into Oceania to New Caledonia, Fiji, Tonga, and the Caroline Is. have broader dark bars that extend at most only slightly below the midside of the body,

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the 1st more like a large oval spot; in addition, they have a large dark brown spot on the head behind and just enclosing the eye, and often a yellow spot or yellow edge on each body scale except ventrally (Figs. 2-4). The variant from the rest of Oceania to the Hawaiian Is., islands of French Polynesia, and the Pitcairn Is. has a very broad dark bar across the body between the 2nd dorsal and anal fins and extending onto the anterior caudal peduncle; the narrow anterior bar is only slightly darker than the body and head anterior to it, and the broad space between the 2 dark bars is distinctly pale, sometimes white (Figs. 5-8). The dark bars on all 3 color forms become less distinct with growth, and large adults from the 3 regions are not as easily differentiated.

We examined specimens identified as *P. trifasciatus* from the 3 major regions of its distribution to see if we could find any meristic or morphological differences that would correlate with the color differences. We discovered that the Indian Ocean population has shorter barbels than the western Pacific population, 1.65-1.9, compared to 1.45-1.6 in head length. The population for islands of the central Pacific differs in a higher count of gill rakers, 37-42 (modally 39), compared to 35-38 for the other 2 populations (Table 1); it also has shorter barbels than the western Pacific – eastern Indian Ocean population. We therefore concluded that each of these populations represents a distinct species.

Although the type locality of *Parupeneus trifasciatus* is not known, it was probably either Mauritius or Réunion, because Lacepède based his description on the material of Commerson. The Indian Ocean species therefore takes the name *trifasciatus*. Its distribution is shown in figure 9, east coast of Africa to Cocos-Keeling Is. (Allen and Smith-Vaniz, 1994: 12), Christmas I. (Allen and Steene, 1988: Fig. 193), and Bali (Kuiter, 1996: 86, Fig. C). Masuda and Kobayashi (1994: 177, figure 8) illustrated it from the Maldives, and Okamura and Amaoka (1997: 374, lower middle figure) from Mauritius. Ukkrit Satapoomin sent 2 underwater photographs from the Similan Is. in the Andaman Sea off Phuket, Thailand that are clearly *trifasciatus*. He has seen only this species of the complex in the Andaman Sea.

Parupeneus andrewsii Regan, 1909, type localilty Christmas I. in the eastern Indian Ocean, is a 2nd junior synonym of *P. trifasciatus*. The holotype (BMNH 1909.3.4.17, 230 mm SL) was examined by the 1st author at the Natural History Museum in London.

The eastern Indian Ocean - western Pacific species was first described as *Upeneus crassilabris* by Valenciennes in Cuvier and Valenciennes (1831: 523), with a type locality of New Guinea. The holotype, MNHN A.3504, 206 mm SL, was examined by the 1st author in the Muséum National d'Histoire Naturelle in Paris. This species occurs from the Indo-Malayan region north to southern Japan, south to the Great Barrier Reef, and east to Vanuatu, New Caledonia, Fiji, Tonga, Palau, and the Caroline Is.; in the Indian Ocean to the coast of Western Australia (Allen and Swainston 1988: Fig. 571), and at least to Bali in Indonesia (Gloerfelt-Tarp and Kailola 1984: 212, upper right Fig., 213, 343). Gerald R. Allen photographed *crassilabris* underwater at Bali; his photograph is reproduced here as figure 3; thus we can report both *trifasciatus* and *crassilabrus* at the same Indonesian island. Masuda and Kobayashi (1994: 177, Fig. 4) illustrated *crassilabris* from Hachicho-jima, Izu Is. Okamura and Amaoka (1997: 374) illustrated adults from Indonesia, Pohnpei, and Iridiomote I., and a juvenile from Iejima I.

Macleay (1884: 263) described *Upeneus semifasciatus* as a new species from Hood Bay, New Guinea; it has long been regarded as a synonym of *Parupeneus bifasciatus*. We here change its status to a junior synonym of *P. crassilabris*.

The 3rd species from the Ogasawara Is. and Mariana Is.; to the Hawaiian Is. in the north Pacific, and Niue, and the Samoa Is. to the Pitcairn Is. (square symbols of Fig. 9) in the south Pacific is undescribed. The principal objective of this paper is to provide its description.

MATERIALS AND METHODS

Type specimens were deposited in the Australian Museum, Sydney (AMS); Institute of Zoology, Academia Sinica, Taipei (ASIZP); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS; SU);

Table 1. Total gill rakers of species of *Parupeneus* of the *trifasciatus* complex

	35	36	37	38	39	40	41	42
P. trifasciatus		14	19	5				
P. crassilabris	4	14	21	15	1			
Fiji and Tonga		3	5	9	4	1		
P. insularis			2	11	19	10	4	1

Muséum National d'Histoire Naturelle, Paris (MNHN); National Science Museum, Tokyo (NSMT); Royal Ontario Museum, Toronto (ROM); and U.S. National Museum of Natural History, Washington, DC (USNM).

Lengths of specimens are given as standard length (SL), measured from the most anterior end of the upper lip to the base of the caudal fin (posterior end of the hypural plate); head length is measured from the same anterior point to the posterior end of the opercular flap; body depth is taken vertically from the base of the 1st dorsal spine where it emerges from the body (not the internal base); body width is the maximum width just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width; cheek depth is measured from the lower fleshy edge of the orbit vertically to the ventral margin of the preopercle; upper-jaw length is taken from the front of the upper lip to the posterior end of the maxilla; barbel length is the maximum straight length; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and rays of the dorsal and anal fins are measured from where they emerge from the body; caudal-fin length is the horizontal length from the posterior end of the hypural plate to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest soft ray. Lateral-line scale counts do not include the 2 or 3 pored scales on the caudal-fin base; pectoral-ray counts include the upper rudimentary ray; gill-raker counts include all rudiments.

Data in parentheses in the description refer to paratypes (when different from the holotype). Table 1 presents the total gill-raker counts of the 3 species of the *Parupeneus bifasciatus* complex. Table 2 consists of 30 measurements of type specimens as percentages of the standard length. Ratios of proportional measurements in the text of the diagnosis and description are rounded to the nearest 0.05.

Parupeneus insularis **sp. nov.**

(Tables 1, 2; Figs. 5-11)

Upeneus bifasciatus: Günther, 1874: 59, pl. 44, figure A (in part, Rarotonga and Savai´i; Jordan and Jordan 1922: 52 (Honolulu); Fowler, 1922: 83 (Hawaii); Fowler, 1925: 26, 33 (Honolulu, Samoa); Fowler and Bean, 1927: 14 (Tahiti): Fowler, 1928: 227 (Hawaiian Is., Guam, Marcus I. [=Minami Tori Shima], Samoa, Tahiti).

Upeneus trifasciatus: Seale, 1901: 72 (Guam).

Pseudupeneus bifasciatus: Jenkins, 1903: 456 (Hawaiian Is.); Bryan and Herre, 1903: 128 (Marcus I. = Minami Tori Shima); Jordan and Evermann, 1905: 258, fig. 107 (Hawaiian Is.); Seale, 1906: 51 (Rarotonga); Jordan and Seale, 1906: 274 (Western Samoa); Kendall and Goldsborough, 1911: 293 (Tahiti).

Pseudupeneus crassilabris: Jordan and Evermann, 1905: 259 (Johnston I.).

Upeneus indicus: Fowler and Ball, 1925: 16 (Wake Is.).

Upeneus crassilabris: Fowler, 1927: 16 (Jarvis I.).

Parupeneus bifasciatus: Schultz, 1943: 130 (Phoenix Is. and Samoa Is.); Lachner in Schultz and collaborators, 1960: 19 (in part, Mariana Is.). Gosline and Brock, 1960: 193, figure (Hawaiian Is.); Bagnis, Mazellier, Bennett and Christian, 1972: 264, figs. (Society Is., Tuamotu Archipelago, Marquesas Is.); Tinker, 1978: 232, lower figure (Hawaiian Is.); Randall, 1985: 24, fig. 57 (Hawaiian Is.); Hoover, 1993: 67, upper fig. (Hawaiian Is.); Randall, 1996: 92, lower fig. (Hawaiian Is.); Eichler and Myers (1997: 195, upper fig., from Guam).

Holotype: BPBM 6455, ♀, 196 mm, Hawaiian Is., Oahu, Moku Manu, W side off cave, 18.5 m, rotenone, J.E. Randall, E.S. Reese, G.S. Losey, and L. Harris, 30 Sept. 1968.

Paratypes: SU 8929, 4: 49.5-190 mm, Western Samoa, Upolu, Apia, D.S. Jordan and V.L. Kellogg, 1901; BPBM 15307, 2: 112-148 mm, Phoenix Is., Hull I., rotenone, W.A. Gosline, J.E. King, et al., 12 July 1950; BPBM 25685, 181 mm, Hawaiian Is., Oahu, Honolulu market, from Honolulu Laboratory, National Marine Fisheries Service, 14 Sept. 1951; AMS I.40985-001, 2: 112-114 mm, Johnston I., inner reef, rotenone, W.A. Gosline, V.E. Brock, and Y. Yamaguchi, 23 Feb. 1951; ASIZP 60950, 150 mm, Wake I., lagoon near Peale I., spear, J.E. Randall, 10 June 1953; CAS 59054, 3: 222-258 mm, Line Is., Palymra Atoll, N side of main channel, 1/2 mile NW of S tip of Sand Islet, 1-3 m, rotenone, E.S. Herald, R.R. Rofen et al., 14 Aug. 1954; CAS 59049, 74 mm, Tuamotu Archipelago, Makatea, W of phosphate dock, reef flat and surge channel, rotenone, J.E. Randall, 15 Mar. 1956; SU 50094, 116 mm, Wake I., Wilkes I., Kuku Pt., ocean reef, J. and P. Kauanui, 9 Oct. 1956; CAS 59046, 163 mm, Society Is., Moorea, Taotoi Pass, W side near lagoon, spear, J.E. Randall, 23 Mar. 1957; CAS 59044, 206 mm, Cook Is., Mangaia I., 21°54'30", 157°58'0"W, D.S. Marshall, 1958; BPBM 8988, 250 mm, Johnston I., outside reef about 200 m NE of small boat channel, coral reef, 6-9 m, rotenone, J.E. Randall, R. Bowers, and A.C. Banner, 26 July

1968; BPBM 7089, 6: 84-102.5 mm, Minami Tori Shima (Marcus I.), N end, surge channel, 0-2 m, rotenone, J.E. Randall and A.A. Zych, 30 Aug. 1968; NSMT-P 61976, 2: 203-236 mm, Pitcairn Is., Oeno Atoll, N side off small boat passage, coral reef and adjacent sand, 12-18.5 m, J.E. Randall and crew of *Westward*, 18 Dec. 1970; USNM 367312, 149 mm, Pitcairn I., S side off McCoy, coral reef, 23-26 m, rotenone, J.E. Randall, D.B. Cannoy, J.R. Haywood, J.D. Bryant, and S. Christian, 4 Jan. 1971; BPBM 17148, 208 mm, Pitcairn Is., Ducie Atoll, NW side of small boat passage, coral rock and patches of gravel and coarse sand, 0.3-1 m, rotenone, J.E. Randall, D.B. Cannoy, and S. Christian, 14 Jan. 1971; BPBM 17058, 2: 111-115 mm, Pitcairn Is., Henderson I., 1/2 mile S of NW corner of island, rocky shore in 0-1 m, rotenone, J.E. Randall, D.B. Cannoy, and J.D. Bryant, 17 Jan. 1971; MNHN 75-1063, 76 mm, Hawaiian Is., Oahu, Waikiki, Hawaii Institute of Marine Biology, 1975; BPBM 28794,194 mm, Marshall Is., Enewetak Atoll, Ananij I., ocean side, 5 m, spear, J.E. Randall, 2 Oct. 1982; ROM 72665, 225 mm, same data as preceding.

Nontype materials: SU 7624, 3: 138-188 mm, Hawaiian Is., Oahu, Honolulu, US Fish Commission, 1901; BPBM 1966, 184 mm, Cook Is., Rarotonga, A. Seale, Feb.-Mar., 1902 (first identified as *Pseudupeneus bifasciatus*); BPBM 2413, 71 mm, Minami Tori Shima (Marcus I.), W.A. Bryan, Aug., 1902; BPBM 4070, 220 mm, Wake I., Tanager Expedition, July 1923 (first identified as *Upeneus*

Table 2. Proportional measurements of type specimens of *Parupeneus insularis* expressed as percentages of the standard length

	Holotype	Paratypes							
	BPBM 6455	BPBM 17058	BPBM 15307	BPBM 25685	BPBM 28794	BPBM 17148	ROM 72665	BPBM 8988	CAS 59054
Standard length (mm)	196	115	148	181	194	208	225	250	258
Body depth	34.3	32.0	32.2	33.8	34.8	34.1	33.0	34.4	34.7
Body width	15.8	13.7	14.9	15.9	15.0	13.8	17.1	17.3	16.4
Head length	32.5	32.2	31.4	31.1	33.0	32.2	33.4	33.2	32.2
Snout length	18.8	16.5	16.9	17.6	18.1	18.8	18.5	19.0	18.8
Orbit diameter	6.0	7.7	6.3	6.1	6.1	5.9	6.1	5.8	5.5
Interorbital width	10.7	9.6	10.9	10.5	10.1	10.2	10.3	10.5	11.0
Cheek depth	14.0	13.2	12.9	13.7	14.0	14.6	14.5	15.2	15.7
Caudal-peduncle depth	12.3	12.2	12.8	13.3	13.6	12.5	12.8	12.0	13.5
Caudal-peduncle length	23.9	22.4	23.6	22.4	22.7	22.3	22.8	22.0	23.5
Upper-jaw length	12.7	12.5	12.0	12.4	13.3	13.0	13.7	14.9	13.7
Barbel length	19.8	18.3	18.2	19.1	18.6	20.1	21.4	22.4	18.6
Predorsal length	44.6	41.6	41.3	43.0	43.7	42.3	43.9	44.0	43.0
Preanal length	64.2	63.1	61.5	64.7	64.1	63.6	63.7	66.0	64.5
Prepelvic length	33.7	33.1	31.8	33.1	33.5	34.1	34.2	35.7	32.9
Base of 1st dorsal fin	21.2	21.0	19.6	21.3	21.3	20.3	20.8	19.4	19.8
Base of 2nd dorsal fin	18.4	17.0	18.2	18.5	17.8	17.6	18.7	18.4	18.2
First dorsal spine	2.2	2.3	2.5	2.7	2.2	2.6	2.6	2.1	2.0
Second dorsal spine	16.8	17.2	17.0	16.9	17.8	17.8	17.0	17.9	16.8
Third dorsal spine	21.4	20.8	21.4	21.5	21.6	21.8	22.8	22.2	22.9
Second dorsal ray	11.6	13.8	13.5	12.7	11.0	12.8	11.8	12.0	13.2
Eighth dorsal ray	9.7	10.0	11.5	10.7	9.8	10.5	9.8	10.7	12.4
Ninth dorsal ray	10.2	10.6	11.5	10.5	10.8	11.0	11.3	10.7	12.8
First anal spine	1.5	2.0	1.9	1.5	1.8	1.4	1.6	1.2	1.7
Second anal ray	12.7	13.9	14.2	14.2	12.8	14.3	12.5	12.8	14.2
Sixth anal ray	10.2	10.6	11.3	11.2	9.6	11.7	10.7	11.1	12.8
Seventh anal ray	10.2	10.5	11.2	10.9	10.5	11.6	11.1	11.2	13.2
Caudal-fin length	23.0	25.2	26.8	25.5	24.7	25.6	23.5	22.4	broken
Caudal concavity	13.0	14.0	13.5	14.1	13.3	13.6	13.2	12.3	—
Pectoral-fin length	24.2	24.3	23.0	22.9	24.4	24.0	23.0	24.7	23.2
Pelvic-fin length	24.5	26.8	26.6	27.7	24.7	26.5	24.9	25.0	26.2

indicus); BPBM 4072, 294 mm, Line Is., Jarvis I., Whipoorwill Expedition, 9 Aug. 1924 (first identified as *U. crassilabris*); BPBM 15167, 76 mm, Tuamotu Archipelago, Makatea, surge channel, rotenone, J.E. Randall, 15 Mar., 1956; CAS 59043, 169 mm, Society Is., Moorea, Papetoai Bay, rotenone, J.E. Randall, 30 Mar. 1956; CAS 59045, 164 mm, Society Is., Moorea, lagoon off Faatoai Village near entrance to Papetoai Bay, 2.5 m, spear, J.E. Randall, 2 Oct. 1956; SU 50100, 139.5 mm, Wake I., Wilkes I., shallow reef off Kuku Pt., J. and P. Kauanui, 9 May 1957; BPBM 7762, 240 mm, Line Is., Teraina (Washington I.), wreck at E end, 6 m, spear, J.E. Randall, 6 Nov. 1968; BPBM 16747, 129 mm, Pitcairn I., off Christian's Pt., 15 m, spear, J.E. Randall, 2 Jan. 1971; BPBM 11782, 211 mm, Marquesas Is., Fatu Hiva, point on N side of Hanauu Bay, 12 m, spear, J.E. Randall, 21 Apr. 1971; BPBM 12549, 70 mm, Marquesas Is., Nuku Hiva, Taiohae Bay, W side, inshore reef, 1-2 m, rotenone, J.E. Randall and J.D. Bryant, 10 May 1971.

Diagnosis: Dorsal rays VIII + 9; anal rays I,7; pectoral rays 15-17 (rarely 15 or 17); lateral-line scales 27-28; gill rakers 37-42 (modally 39); body depth 2.9-3.15 in standard length; dorsal profile of snout concave, its length 1.6-1.9 in head length; lips thick; barbels relatively short, 1.5-1.75 in head; last dorsal ray only slightly longer than preceding ray, shorter than 2nd ray, 2.7-3.2 in head; caudal fin forked, the posterior margin of lobes convex; gray to brown or red, the scale edges narrowly dark, with a dark brown bar on body below anterior half of 1st dorsal fin, not much darker than body anterior to bar; a 2nd broader dark bar below 2nd dorsal fin and extending onto anterior caudal peduncle; rest of caudal peduncle and broad zone between dark bars on body pale (often white); iris red. Largest specimen examined, 294 mm SL.

Description: Dorsal rays VIII + 9; anal rays I,7; pectoral rays 16 (3 of 38 specimens with 15, and 1 with 17), the upper 2 and lowermost unbranched; pelvic rays I,5; principal caudal rays 15, the median 13 branched; upper procurrent caudal rays of holotype 9, the lower procurrent rays 8; lateral-line scales 28 (27-28; total pored scales 30, with 2 or 3 posterior to end of hypural plate); scales above lateral line to origin of 1st dorsal fin 2.5; scales below lateral line to origin of anal fin 6.5; circumpeduncular scales 14; predorsal scales 13 (12-13); median prepelvic scales 7; gill rakers on 1st gill arch 8 + 29 (8-10 + 29-32); total gill rakers 37-42; pseudobranchial filaments 44 (24 in 84-mm paratype to 48 in 294-mm paratype); branchiostegal rays 3; vertebrae 10 + 14; supraneural (predorsal) bones 2.

Body moderately deep for the genus, the depth 2.9 (2.9-3.15) in SL; body width 2.2 (1.95-2.5) in depth; head length 3.1 (3.0-3.2) in SL; middle region of dorsal profile of snout with a distinct concavity; snout length 1.75 (1.7-1.95) in head length; orbit diameter 5.45 (4.2-5.9) in head; interorbital space strongly convex, the least width 3.05 (2.8-3.4) in head; depth of cheek 2.3 (2.2-2.45) in head; barbels proportionately longer with growth, 1.65 (1.5-1.75) in head; caudal-peduncle depth 2.65 (2.4-2.75) in head; caudal-peduncle length 1.35 (1.35-1.5) in head.

Mouth ventral and slightly oblique, the gape forming an angle of about 20° to horizontal axis of head and body; mouth small, the maxilla reaching a vertical 1 pupil diameter anterior to front edge of orbit, the upper-jaw length 2.55 (2.2-2.6) in head length; posterior end of maxilla thin, with a dorsoposterior lobe that fits into notch in preorbital when mouth fully closed; teeth bluntly conical, uniserial, and well-spaced in jaws, 20 in upper jaw of holotype (22 if counting teeth where expected in broad gaps), the teeth nearly equal in jaw; lower jaw with 30 teeth, the teeth progressivly smaller posteriorly; a broad gap without teeth at symphysis of lower jaw; no teeth on vomer or palatines. Tongue fused to floor of mouth. Lips fleshy.

Anterior nostril a small oval aperture an orbit diameter in front of edge of orbit, slightly above level of lower edge of orbit; posterior nostril a near-vertical slit in front of middle of eye. Longest gill raker on 1st gill arch slightly longer than longest gill filaments, 1/2 orbit diameter in holotype.

A strong spine posteriorly on opercle slightly below level of lower edge of orbit, projecting slightly downward, its tip usually not projecting beyond edge of opercular membrane; posterior free margin of preopercle extending dorsally to level of lower edge of orbit, the ventral margin reaching forward to below posterior edge of maxilla.

Scales finely ctenoid; scales dorsally on head reaching above anterior nostril; rest of snout naked with short rows of small sensory papillae on side of preorbital; maxilla with 2 scales, the anterior one very small and easily overlooked; fins naked except for a continuation of 2 or 3 vertical rows of scales like those of body onto base of caudal fin, and tiny scales extending about 3/4 distance to posterior margin of fin; a pointed axillary scale about 1/2 length of pelvic spine above base of each pelvic fin; a midventral scaly process of 2 broadly rounded scales at base of pelvic fins. Lateral line following dorsal contour of body; sen-

Fig. 1. Underwater photograph of *Parupeneus trifasciatus*, KwaZulu, Natal (J.E. Randall).

Fig. 2. Underwater photograph of *Parupeneus crassilabris* from Bali (G.R. Allen).

Fig. 3. Underwater photograph of *Parupeneus crassilabris* from Raine I., Great Barrier Reef (J.E. Randall).

Fig. 4. Underwater photograph of *Parupeneus crassilabris* from Fiji (R.F. Myers).

Fig. 5. Holotype of *Parupeneus insularis*, BPBM 6455, 196 mm SL, Oahu, Hawaiian Is. (J.E. Randall).

Fig. 6. Underwater photograph of an adult of *Parupeneus insularis*, Johnston I. (J.E. Randall).

Fig. 7. Underwater photograph of a subadult of *Parupeneus insularis*, Johnston I. (J.E. Randall).

Fig. 8. Underwater photograph of a juvenile of *Parupeneus insularis*, Maui, Hawaiian Is. (J.E. Randall).

sory canals on surface of each lateral-line scale finely and complexly branched.

Origin of dorsal fin above base of 4th lateral-line scale, the predorsal length 2.25 (2.25-2.4) in SL; 1st dorsal spine very short, 15.0 (11.5-17.5) in head; 2nd dorsal spine 1.95 (1.8-2.05) in head; 3rd dorsal spine usually longest, 1.5 (1.45-1.55) in head; 1st or 2nd dorsal soft rays longest (except for largest specimen in which the last ray is longest), 2.8 (2.25-2.85) in head; 9th dorsal soft ray usually slightly longer than 8th ray (equal on 1 paratype and shorter on another), 3.2 (2.7-3.1) in head; origin of anal fin below base of 3rd ray of 2nd dorsal fin, the preanal length 1.55 (1.5-1.6) in SL; 1st anal spine extremely small, 23.0 (16.0-29.5) in head; 1st or 2nd anal soft ray longest, 2.55 (2.2-2.65) in head; 7th anal soft ray about equal to 6th, 3.2 (2.8-3.15) in head (except for largest specimen, 2.05 in head); caudal fin forked, the posterior margins of lobes rounded, the fin length 1.4 (1.15-1.5) in head; caudal concavity 2.5 (2.25-2.5) in head; 3rd or 4th pectoral ray longest, 1.35 (1.3-1.5) in head; pelvic spine joined to 1st ray, its tip difficult to determine without dissection; 2nd pelvic soft ray longest, 1.35 (1.1-1.35) in head.

Color of holotype in alcohol: medium brown, the scale edges a little darker, with 2 faint broad darker bars on body, the 1st below anterior part of 1st dorsal fin, and the 2nd with its anterior edge below base of 3rd ray of 2nd dorsal fin, and its posterior edge a short distance behind rear base of fin, the bars fading by middle of body; barbels dark gray, shading to pale yellowish on about outer 1/3; fins pale yellowish, the median fins with a blackish margin.

Color of holotype when fresh (Fig. 5): red, shading to white ventrally except for pale red edges on scales; an indistinct dusky red bar below anterior 1/2 of dorsal fin, fading at upper edge of pectoral fin, most dark pigment on scale edges; anterior edge of bar not well differentiated due to blackish pigment on scales of nape and dorsally on head; a 2nd faint dusky red bar below 2nd dorsal fin posterior to base of 3rd ray and extending onto 2 scales of caudal peduncle posterior to fin, this bar not extending below lateral line (bar also mainly from blackish pigment on scale edges); iris red; lips nearly white, barbels dark gray, shading to pale yellowish on about outer 1/3; fins red, the pectorals paler than other fins, with a red bar at base, 2nd dorsal, anal, and caudal fins with blackish margins; 1st dorsal fin irregularly blackish at margin; 2 irregular dark-edged whitish lines faintly visible in outer part of 2nd dorsal fin; anal fin with a

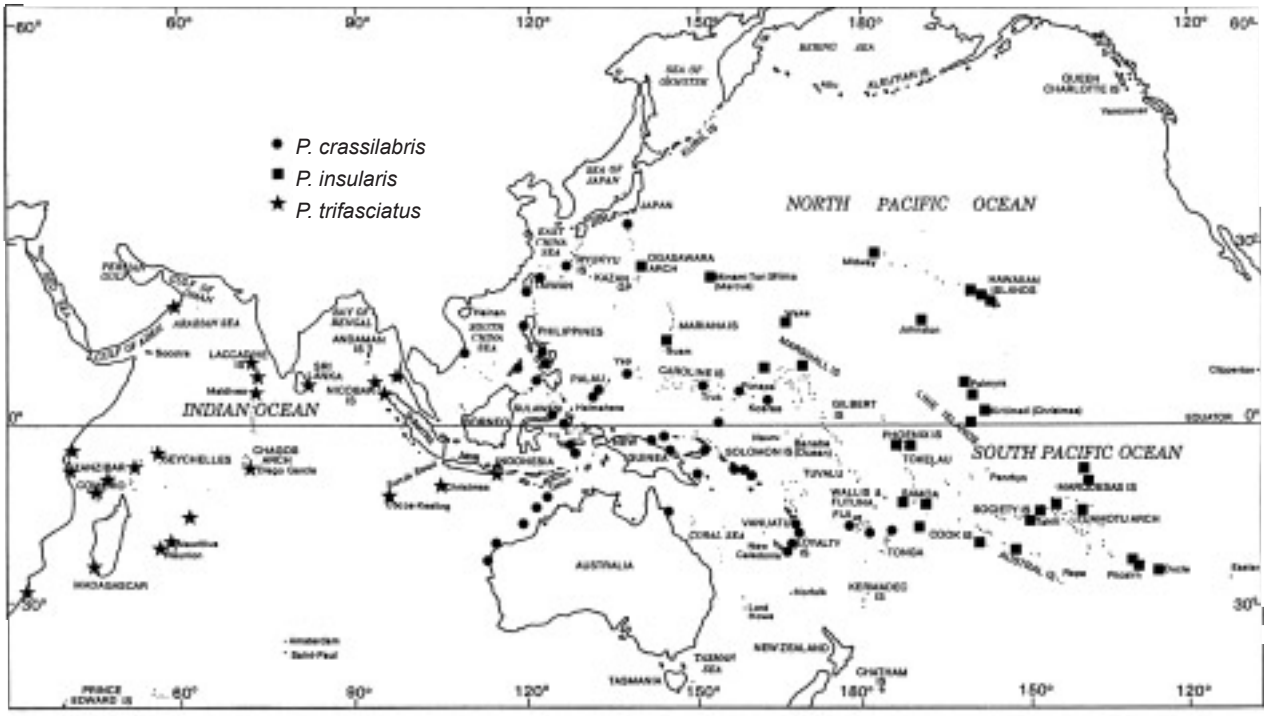

Fig. 9. Distributions of *Parupeneus crassilabris*, *P. insularis*, and *P. trifasciatus*.

few short irregular pale lines; caudal fin with scattered, very small, faint, pale spots; lateral edge of pelvic fins narrowly white.

Figure 6 depicts an adult of about 200 mm SL from shallow water at Johnston I. (hence with less red color than the holotype that was taken in 18.5 m). Note that the anterior dark bar has nearly merged with the dark purplish gray of the anterior body and postorbital head, and both bars extend ventrally across body; zone between and rest of caudal peduncle almost white; iris bright red.

Figures 7 and 8 are juveniles to show color variation, the former from Hawaii, and the latter from Johnston I., both photographed in 2-3 m.

Etymology: This species is named *Parupeneus insularis* from the Latin meaning of islands in reference to its occurrence only on oceanic islands of the Pacific. The other 2 species of the complex occur in continental waters as well as at islands.

Remarks: Fowler (1927) identified a specimen of this species, 294 mm SL, from Jarvis I., Line Is. as *Upeneus crassilabris*, reidentified here as *Parupeneus insularis*. It is the largest specimen we have examined, but it is not designated as a paratype because of its poor condition.

Fowler (1928) included the record by Seale (1901: 72) of *Upeneus trifasciatus* (Lacepède) from Guam in his synonymy of *U. bifasciatus*. We examined Seale's specimen (BPBM 81, 172 mm) and reidentified it as *Parupeneus ciliatus* (Lacepède).

Parupeneus insularis is easily distinguished from *P. trifasciatus* of the Indian Ocean by having a much broader and more diffuse 2nd dark bar on the body, and the body anterior to the 1st bar nearly as dark as the bar. The dark bars of *trifasciatus* are nearly black, and the 1st is sharply differentiated from the anterior body. Also, as shown in table 1, *trifasciatus* has fewer gill rakers, modally 37 compared to 39 for *insularis*.

The distinction between *Parupeneus insularis* and *P. crassilabris* is more important since these 2 species have adjacent distributions over a broad zone of the Pacific Ocean (Fig. 9). The 2 dark bars on the body of *crassilabris* do not extend much below the middle of the body, the 1st is narrower than that of *insularis*, often more like a large oval spot than a bar, and well differentiated; the 2nd bar does not extend posteriorly onto the caudal peduncle. There is a large black spot on the head of *crassilabris* behind and below the eye, nearly enclosing the eye, and the scales have a yellow edge or a yellow spot. The average gill-raker count of *insularis* is clearly higher than that of *crassilabris* (Table 1). Also *insularis* has shorter barbels (Fig. 10) and shorter last dorsal and anal rays, the last dorsal ray 10.2%-12.2% SL compared to 12.1%-15% in *crassilabrus*.

As may be seen in table 1, the population of *Parupeneus crassilabris* in Fiji and Tonga has modally 1 greater number of gill-rakers than elsewhere in the range of the species. In view of the typical *crassilabris* color pattern in Fiji and Tonga (Fig. 4) and the long barbels relative to those of *insularis*, we identify it as *crassilabris*.

All of the localities of *Parupeneus insularis* occur on the Pacific Plate. The locality for the island nation of Niue S of American Samoa was provided by Malcolm P. Francis who sent us an underwater photo of the species.

Kendall D. Clements sent us an underwater photograph he took of 5 individuals of *Parupeneus* at Niutao, Tuvalu (Fig. 11). One appears to be a subadult *P. crassilabris*, and the other 4 seem to be *P. insularis* adults. Specimens should be obtained to confirm these tentative identifications; we have not added the Tuvalu locality for either species on figure 9.

Meristic and measurement data for *Parupeneus crassilabris* were taken from specimens from Taiwan, Philippines, Viet Nam, Indonesia, Western Australia, New Guinea, New Britain, Palau, Solomon Is., Vanuatu, Fiji, Tonga, and the Caroline Is. Comparable data for *P. trifasciatus* were taken from specimens from Christmas I. (Indian Ocean), Cocos-Keeling Is., Chagos Archipelago, St. Brandon Shoals, Réunion, Mauritius, Aldabra, and Latham I., Tanzania. The specimens of both species were from the BPBM, CAS, ROM, and USNM collections.

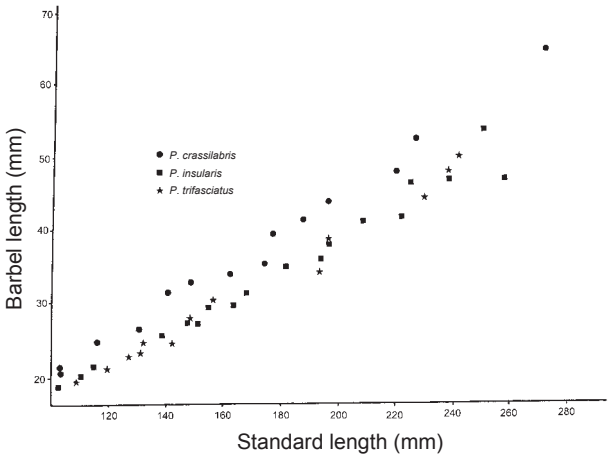

Fig. 10. Barbel length compared to standard length for *Parupeneus crassilabris*, *P. insularis*, and *P. trifasciatus.*

Parupeneus insularis occurs on coral reefs and adjacent habitats, generally in less than 30 m, but it has been recorded to 83 m (Chave and Mundy 1994: 387). Randall (1985: 24) examined the stomach contents of 12 of 17 specimens from the Hawaiian Is. that contained food; 44% by volume consisted of crabs, followed by shrimps, octopuses, mantis shrimps, amphipods and other crustaceans, fishes, and polychaetes.

Acknowledgments: We thank foremost Gerald R. Allen, Kendall D. Clements, Malcolm P. Francis, David W. Greenfield, Ukkrit Satapoomin, Jeffrey T. Williams, and Richard Winterbottom for providing photos of species of *Parupeneus* critical to our study. We are also grateful to David H. Catania and Jon D. Fong for a loan of specimens from the California Academy of Sciences, Richard Winterbottom and Marty Rouse from the Royal Ontario Museum, and David G. Smith, and Sandra Raredon from the National Museum of Natural History.

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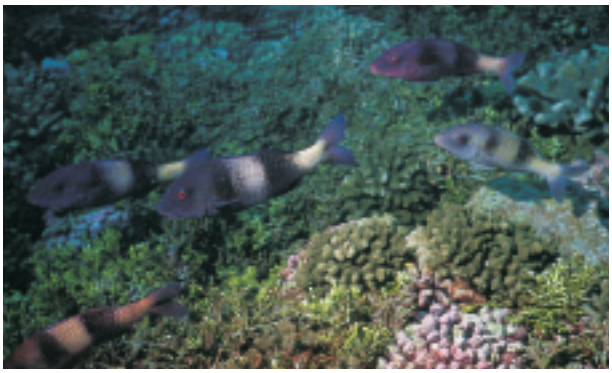

Fig. 11. Underwater photograph of 5 individuals of *Parupeneus* from Niutao, Tuvalu; the fish to the right appears to be *P. crassilabris*, and the others *P. insularis* (K.D. Clements).

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紅眼海鯡鯉(*Parupeneus insularis*)一種中太平洋產三帶海鯡鯉種群中的新種羊魚(鱸形目：羊魚科)

John E. Randall[1] Robert F. Myers[2]

目前學者大多將一種廣泛分布於印度太平洋海域的羊魚（鬚鯛）稱作雙帶海鯡鯉*Parupeneus bifasciatus* (Lacepède)，但第一位整理此科魚類的分類學者Günther (1859)在同頁的報告中正確地將該種歸於三帶海鯡鯉*P. trifasciatus* (Lacepède)中的同種異名。本文則將三帶海鯡鯉種群*P. trifasciatus* complex再分成為三種。其中真正的三帶海鯡鯉*P. trifasciatus*侷限在印度洋，厚唇海鯡鯉*P. crassilabris* (Curvier)分布於東印度洋及西太平洋至斐濟、東加、卡羅林島。牠與三帶海鯡鯉之差別在顏色及頦鬚較短。紅眼海鯡鯉*Parupeneus insularis* 則分布於夏威夷、法屬波里尼西亞、Pitcairn島到馬紹爾、馬里安那、鳳凰及薩摩亞群島。其特徵為體色不同，鯉耙數37-42(大多為39)，較其它兩種魚鰓耙之35-38為多，此外其頦鬚也較厚唇海鯡鯉更短。

關鍵詞：分類學，羊魚科（鬚鯛科），三帶海鯡鯉種群。

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