



A new species of *Chaunax* (Lophiiformes: Chaunacidae) from the western South Pacific, with comment on *C. latipunctatus*

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Abstract

A new species of anglerfish, *Chaunax nudiventer*, is described on the basis of 35 specimens from the western South Pacific Ocean. It is characterized by large spots on the dorsal surface; a largely naked area on abdomen; a relatively short head and long tail, both reflected in the elongated body; slender and simple spines on body surface; numerous broad flaps on lateral side of body; and higher number of lateral line neuromasts: mainly 41–43 in lateral line proper, 4 in the upper peropercular series, and 16–17 in the pectoral series. Comments on a similar species, *C. latipunctatus* from the eastern South Pacific Ocean, is provided.

Key words: Taxonomy, anglerfish, *Chaunax nudiventer* n. sp., *Chaunax latipunctatus*, South Pacific Ocean

Introduction

The anglerfish genus *Chaunax* Lowe, 1846 currently comprises 12 valid species. Le Danois (1979) reviewed the family, recognizing one genus with six valid species, and described a new subspecies. Subsequent to her review, three additional species were described: *Chaunax latipunctatus* Le Danois, 1984, *C. tosaensis* Okamura and Oryu, 1984 (= *C. penicillatus* McCulloch, 1915), and *C. suttkusi* Caruso, 1989. Description of the last species was included in Caruso's (1989) review of the Atlantic chaunacids.

Over the past three decades, the Fisheries Agency of Japan conducted numerous fishery surveys of the tropical Pacific on which many deep-sea fishes were collected. The specimens from those surveys were deposited at Far Seas Fisheries Institute for about 30 years. Recently, those specimens were transferred to the National Science Museum, Tokyo (NSMT, now National Museum of Nature and Science) and made available to researchers (K. Matsuura, personal communication, 2009). Our examination of the Chaunacidae revealed five specimens collected from Fijian seamounts representing an undescribed *Chaunax* species. Thirty additional specimens from the New Caledonia region representing the same new species were found in the NMNZ and MNHN collections.

The new species is part of the newly established “*C. abei* species group”, that is characterized by three spines on each side of the lateral line neuromasts (Fig. 1A–B), spots on the dorsal surface, no filaments on the dorsal surface of head, and flap-like cirri on anterior and lateral body margins. The *C. abei* species group now includes, in addition to *C. nudiventer* sp. nov., *C. abei*, *C. breviradius*, *C. latipunctatus* and *C. suttkusi*, which were originally placed in the *C. fimbriatus* species group by Caruso (1989).

The new species described here differs from its congeners in having numerous large spots on the dorsal surface, a large naked area on the abdomen, a relatively slender body, and relatively high lateral line neuromast counts. Comments on a similar species, *C. latipunctatus*, based on specimens newly collected from near the type locality are provided.

Materials and methods

Standard length (SL), as used throughout, is measured from the symphysis of the upper jaws to the base of the caudal fin (posterior end of the hypural plate); pre-preopercular length, from the symphysis of upper jaws to the rear edge of preopercular bone; head length, from the symphysis of the upper jaws to the tip of the second neural spine; pre-gill opening, from the symphysis of upper jaws to anterior margin of the right gill opening; upper jaw length (=PM in Caruso, 1989) is measured from the symphysis of upper jaws to lower margin of the maxilla; illicial length, from the articulation of illicial pterygiophore to the tip of illicium; illicial trough length, from anterior to posterior margin of illicial trough; tail length measured in three lengths, one from urogenital papilla to the caudal fin base (tail length 1), one from the end of dorsal fin base to caudal fin base (tail length 2), and one from the end of anal fin base to the caudal fin base (tail length 3); caudal fin length, from the base of caudal fin to the posterior tip. Measurements in the text are measured to the nearest 1 mm.

Method for taking lateral line neuromast counts follows Caruso (1989). Terminology used in describing the angling apparatus follows Caruso (1989) and Le Danios (1979).

Materials used in this study are deposited in The Hokkaido University Museum, Hokkaido (HUMZ); Muséum national d'Histoire naturelle, Paris (MNHN); National Museum of New Zealand, Wellington (NMNZ); Department of Zoology, National Museum of Nature and Science, Tokyo (NSMT). Abbreviations for institution follow Fricke and Eschmeyer (2010, online version).

Chaunax nudiventer sp. nov.

New English name: Naked-belly Coffinfish

(Figs. 1A, 2A–C, 3, 4A–B; Tables 1–2)

Holotype. NSMT P95084 (271 mm), R/V Kaiyo-maru, trawl 22, 26°01.7'S, 179°02.3'W, South Fiji Ridge, 538–620 m, 16 Jan. 1977.

Paratypes. MNHN 2002–0178 (2 specimens, 54–120 mm) and MNHN 2002–0229 (1, 131), Campagne Biocal, sta. cp67, 24°91'S, 168°36'E, 500–510 m, 3 Sep. 1985. MNHN 2002–1642 (6, 85–166) and MNHN 2002–1649 (3, 113–129), 24°55'S, 168°21'E, New Caledonia, 500–610 m, 28 Oct. 1986. MNHN 2002–0207 (1, 59), Campagne Smib 4, sta. dw39, 24°93'S, 168°35'E, 560 m, 7 Mar. 1989. MNHN 2002–0228 (2, 48–155), Campagne Chalcal 2, sta. dw72, 24°90'S, 168°36'E, 527 m, 28 Oct. 1986. MNHN 2002–0240 (1 of 2, 127), Campagne Chalcal 2, sta. ch7, 29°91'S, 168°35'E, 494–590 m, 29 Oct. 1986. MNHN 2003–1542 (3), Campagne Lithist, sta. cp9, 24°86'S, 168°35'E, 518–540 m, 11 Aug. 1999. MNHN 2004–2593 (1, 60), Campagne Norfolk 2, sta. dw2080, 25°34'S, 168°30'E, 764–816 m, 27 Oct. 2003. MNHN 2004–2608 (2, 52–53), Campagne Norfolk 2, sta. cp2060, 24°65'S, 168°63'E, 282–600 m, 25 Oct. 2003. MNHN 2004–2657 (1, 54), Campagne Norfolk 2, sta. dw2074, 25°40'S, 168°31'E, 623–691 m, 27 Oct. 2003. MNHN 2004–2679 (5, 33–66), Campagne Norfolk 2, sta. cp2088, 24°96'S, 168°35'E, 627–1089 m, 28 Oct. 2003. MNHN 2004–2848 (1, 36), Campagne Norfolk 2, sta. cp2118, 23°36'S, 168°00'E, 383–393 m, 1 Nov. 2003. NMNZ P29205 (1, 188), 24°S, 168°E. NSMT P90583 (1, 198), NSMT P78819 (1, 262), NSMT P78820 (1, 243), and NMST P78821 (1, 201), collected with holotype.

Diagnosis. A species of the *C. abei* species group that differs from its congeners in having large spots on the dorsal surface (Fig. 2A–C); a largely naked area on abdomen (Fig. 3); a relatively short head (27.0–29.8% SL) and a relatively long tail (tail length 1=34.0–35.6% SL), reflected in the relatively elongated body; dermal spines on body surface all simple, relatively slender and elongated (Figs. 4A–B); and relatively high lateral line neuromast counts, 39–50 (mainly 41–43) in lateral line proper, 3–5 (mainly 4) in upper preopercular series, and 15–19 (mainly 16–17) in pectoral series, which is well extended beyond pectoral fin base.

Description. Head globular, skull slightly elevated posteriorly; trunk cylindrical, slightly compressed, tapering posteriorly; venter relatively flattened; skin loose and flaccid; interorbital space broad; eyes directed dorsolaterally, covered by a dermal membrane broadly connected to adjoining skin, forming a clear “window”; illicial trough oval shaped, located at anterior portion of interorbital space, about equal to eye diameter; two pairs of nostrils anterior to eyes; mouth relatively wide, terminal, its opening nearly vertical;

lower jaw slightly protruding beyond upper jaw; maxilla tapering above, broad below; symphyseal spine on lower jaw; teeth small, villiform, slightly curved on both jaws; teeth present on vomer, palatines and fifth ceratobranchial; oral cavity large; 11–12 rakers on second gill arch; gill filaments present on first, second and third gill arches.

TABLE 1. Morphometric values of *Chaunax nudiventer* **sp. nov.** and *C. latipunctatus*.

	<i>C. nudiventer</i> n. sp.			<i>C. latipunctatus</i>	
	Holotype	Holotype+Paratypes (n=15)	SD	Non-type (n=9)	SD
SL (mm)	271	110–271		95–132	
Morphometrics (% SL)		Range (Average)	SD	Range (Average)	SD
Head length	38.0	37.2–42.5 (39.1)	1.4	39.0–44.6 (41.3)	1.5
Pre–preopercular length	25.3	23.9–27.5 (26.0)	1.6	28.4–35.1 (30.3)	2.0
Pre–dorsal length	45.6	45.6–50.5 (48.2)	1.2	49.5–57.4 (52.0)	2.5
Illicial length	3.6	3.1–4.5 (3.9)	0.5	3.4–4.3 (3.9)	0.4
Illicial trough length	5.0	5.0–6.1 (5.3)	0.5	6.1–8.0 (7.2)	0.7
Pre–gill opening length	57.1	55.4–61.2 (58.5)	2.0	60.6–69.3 (64.0)	2.7
Upper jaw length	20.0	17.1–21.2 (18.9)	1.4	20.8–27.5 (22.8)	1.9
Caudal fin length	25.0	22.6–29.9 (27.2)	2.3	21.0–35.1 (28.1)	4.0
Tail length 1 (Post–anus)	33.3	31.9–35.7 (33.9)	1.4	28.9–37.6 (32.8)	2.9
Tail length 2 (Post–dorsal fin)	16.2	16.0–21.8 (18.3)	1.3	15.7–19.7 (17.5)	1.3
Tail length 3 (Post–anal fin)	19.1	18.0–22.3 (20.2)	1.1	13.0–16.7 (14.8)	1.3

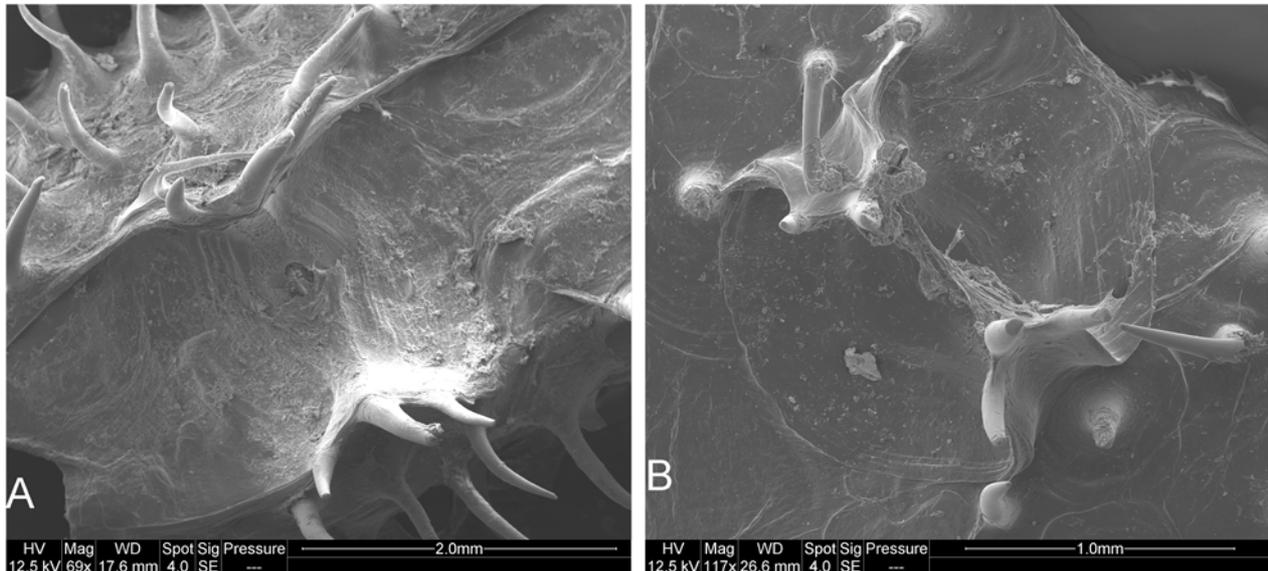


FIGURE 1. Scanning electron micrographs of dermal spines of lateral line neuromasts of two species in *Chaunax abei* species group. A. *C. nudiventer* **sp. nov.**, NSMT P95083, paratype, 198 mm SL, $\times 69$. B. *C. latipunctatus*, HUMZ 164453, 132 mm SL, $\times 117$.

Gill openings located at axil of pectoral elbow; pectoral fin attached at margin of lateral body and oriented horizontally; pectoral fin fan-shaped covered by thick skins, middle rays longest; pelvic fin much smaller than pectoral fin, located ventrolaterally; anterior pelvic fin ray longest, with thick membrane.

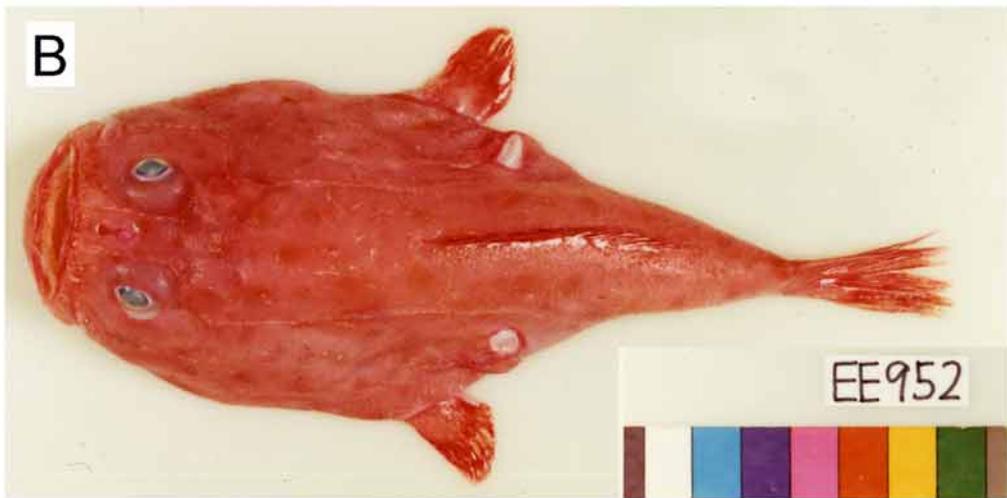


FIGURE 2. *Chaunax nudiventer* sp. nov.: A. NSMT P95084, holotype, 271 mm, preserved specimen, photo by K. Kuriwa. B. NSMT P78820, paratype, 243 mm SL, fresh specimen, provided by BSKU. C. MNHN 2002-1642, paratype, 124 mm SL, preserved specimen.

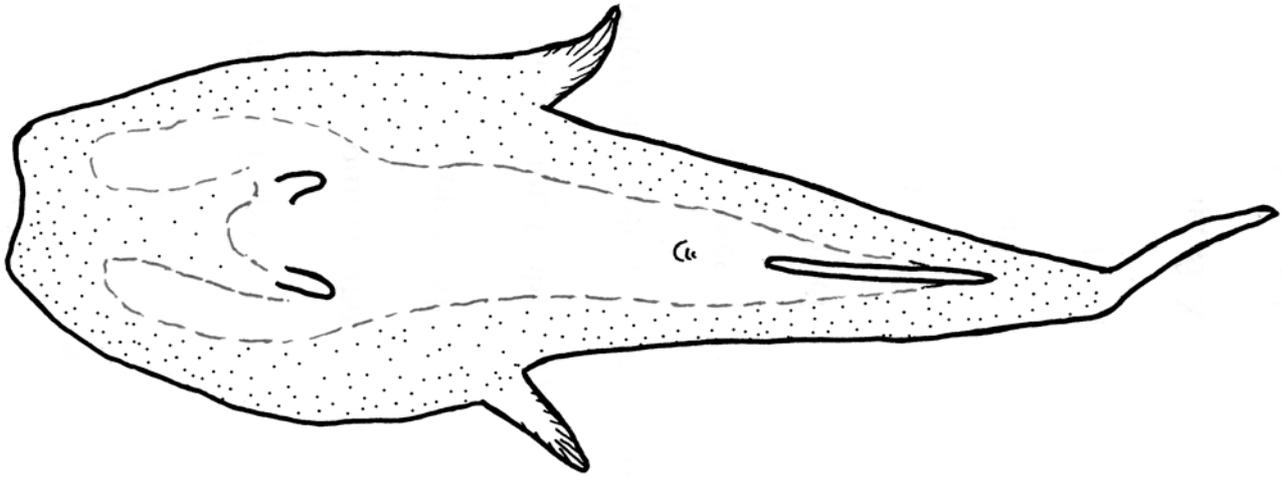


FIGURE 3. Ventral view of *C. nudiventer* sp. nov. demonstrates the naked area on abdomen.

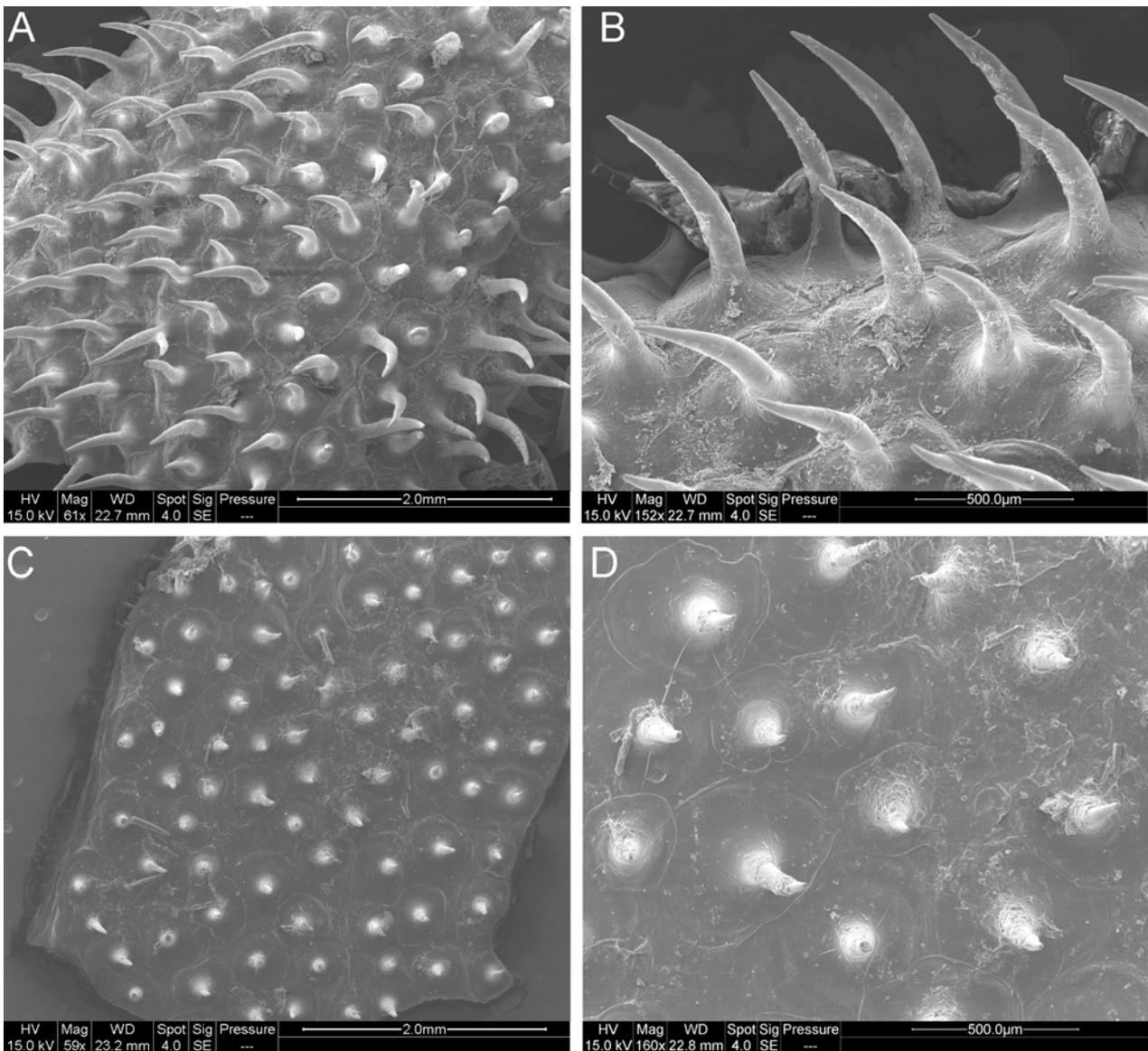


FIGURE 4. Scanning electron micrographs of dermal spines, taken from dorsal right eye area, of two species in *Chaunax abei* species group. A. *C. nudiventer* sp. nov., NSMT P95083, paratype, 198 mm SL, $\times 61$ and B. same skin, $\times 160$. C. *C. latipunctatus*, HUMZ 164453, 132 mm SL, $\times 59$ and D. same skin, $\times 196$.

Illicium anterior to eye; esca with a “medial tongue” (*sensu* Le Danios, 1979) bearing numerous cirri at anterior surface; second dorsal spine small, located at base of illicium and embedded under skin; third dorsal spine located at midpoint between mouth and origin of second dorsal fin, embedded under skin; second dorsal fin comprises 10–11 soft rays, its origin about opposite that of anus; first ray of second dorsal fin very short, sometimes covered by skin; posterior rays either simple or bifurcated; pectoral fin with 13–14 rays; anal fin with 6 fin rays, its origin below fifth dorsal fin ray, fin rays covered by thick skin, when depressed not reaching caudal fin base; caudal fin truncate or slightly rounded posteriorly, with 8 rays, outermost two rays unbranched, remainder branched; vertebrae 19 (6 paratypes examined), including the hypural plate.

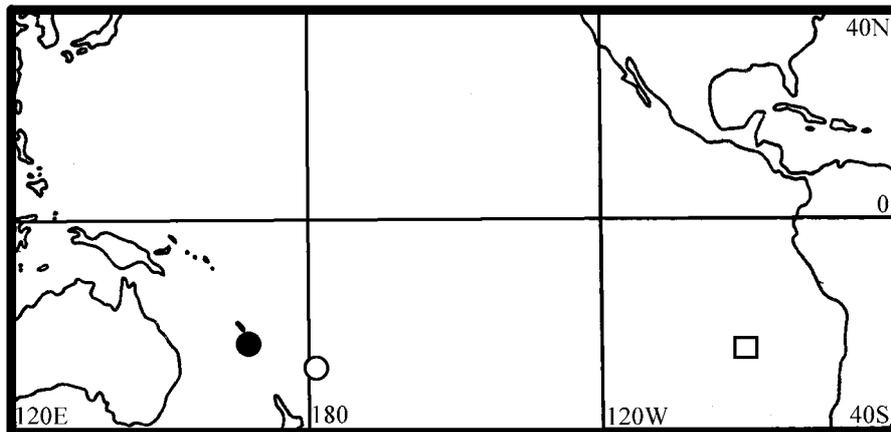


FIGURE 5. Distribution map of *Chaunax nudiventer* sp. nov. (circles) and *C. latipunctatus* (square). Open dot indicates type locality. One dot may represent more than one capture.

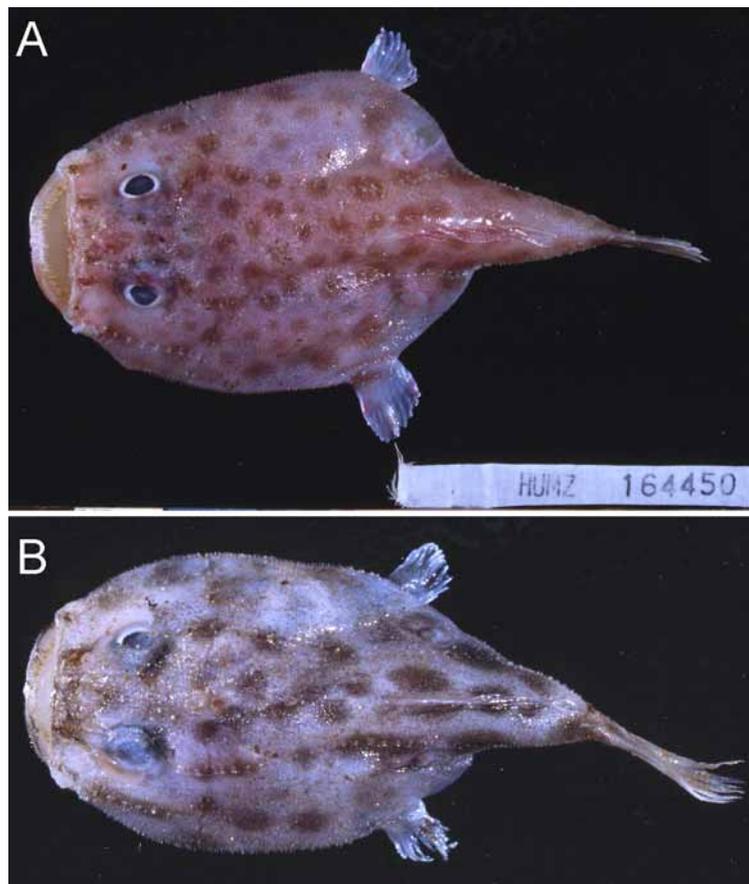


FIGURE 6. *Chaunax latipunctatus*. A. HUMZ164450, subadult, 101 mm SL. B. HUMZ 164454, juvenile, 67 mm SL. Provided by HUMZ.

Network of open sensory canals on body surface as described in Caruso (1989). Three simple spines on each side of neuromast (Fig. 1A). Lateral line neuromast counts for type series (Table 2): 10–12 (mainly 10–11) in supraorbital series (AB); 7–8 (mainly 7) in premaxillary series (AC); 3–5 (mainly 4) in upper preopercular series (BD); 2–4 (mainly 3) in lower preopercular series (DG); 5–7 (mainly 7) in infraorbital series (CD); 3–4 (mainly 3) in hyomandibular series (FG); 15–19 (mainly 16–17) in pectoral series (GH); and 39–50 (mainly 41–43) in lateral line proper (BI, including those on caudal fin).

Dermal spines needle-like, slightly recurved distally and relatively dense in arrangement (Fig. 4 A–B), covering entire body surface except for ventral surface, eye window, pectoral and pelvic fins, interradial membranes of dorsal and caudal fins, illicial trough, and gill openings. Ventral surface with a large naked area as shown in Fig. 3. Small flap-like appendages along chin and lateral body associated with lateral line; both jaws densely covered by short cirri.

Size up to 271 mm SL in type series.

Coloration. In fresh-caught specimen, dorsal surface uniformly bright red with numerous large deep-red spots; spots varying in shape and size, from about half of to equal to eye diameter (Fig. 2B). In preserved specimens, background uniformly creamy white with large gray spots on dorsal surface, shape and size as mentioned above (Fig. 2A–C), these spots may fade out with time; oral cavity pale, peritoneum black; appendages associated with lateral line bright white in some preserved specimens.

Distribution. Known from the type series collected in the western South Pacific (Fig. 5) at depths of 282–1089 m.

TABLE 2. Distribution of meristic values: pectoral fin ray count and lateral line neuromast counts, of *C. nudiventer* sp. nov. and *C. latipunctatus*. All specimens are counted on both sides, except for those that are damaged. The asterisk (*) means the value of holotype. Landmarks for lateral line neuromast counts as showed in Caruso (1989).

	P fin rays				AB								AC						
	n	13	14	15	n	10	11	12	13	14	15	16	n	6	7	8			
<i>C. nudiventer</i>	48	11	37*		48	14	32*	2					48		27	21*			
<i>C. latipunctatus</i>	54	6	36*	12	52			40*	8	3	–	1	40	1	19*	28			
	BD					CD				DG									
	n	2	3	4	5	n	5	6	7	8	n	2	3	4	5				
<i>C. nudiventer</i>	48		7	30	11*	48	2	18	28*		48	2	38*	8					
<i>C. latipunctatus</i>	56	5*	48	3		56		2	36*	18	56	1*	28	26	1				
	FG					GH													
	n	3	4	5	6	n	12	13	14	15	16	17	18	19					
<i>C. nudiventer</i>	48	46*	2			48				4	17	17*	7	3*					
<i>C. latipunctatus</i>	56		18*	36	2	56	1	11*	21	16	7								
	BI																		
	n	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
<i>C. nudiventer</i>	48							5	3	7	14*	9*	2	1	1	2	3	–	1
<i>C. latipunctatus</i>	54	1	2	5	10*	9	7	3	7	5	2	2	1	2					

Etymology. From the Latin *nudus* (naked) and *venter* (abdomen), in reference to the naked area on the abdomen in this species.

Remarks. *Chaunax nudiventer* is placed in the *C. abei* species group, having 3 spines on each side of lateral line neuromast (Fig. 1A), spots on dorsal surface, no filaments on dorsal surface of head, and flap-like cirri on lateral body. *Chaunax nudiventer* can be easily distinguished from its congeners except for *C.*

latipunctatus Le Danois, 1984 (see comments on this species below) in having a large naked area on its abdomen (Fig. 3) and relatively large dorsal spots, about half of to equal to eye diameter.

Two other specimens, ZMMU 21656 (80 mm SL) and USNM 394324 (36 mm SL), also have a naked area on their abdomen. However, the lateral line neuromast counts of pectoral series (11–12) and lateral line proper (34–36) are slightly less than those for the type series of *C. nudiventer*. Moreover, both specimens were collected from the western Indian Ocean. These two specimens may represent an undescribed species but more specimens are needed for further study.

Comments on *C. latipunctatus* Le Danois, 1984 (Figs. 6A–B). The type series of *C. latipunctatus* (holotype and one paratype) and 74 additional specimens were examined. Morphometric and meristic data are included in Table 1 and Table 2.

The collecting data of type series was originally entered as “Galápagos Is., Exped. Ikhtiander, 25°00’S, 88°27’W–99°26’W, 345–770 m, Oct. 1979”. According to the Russian vessel and station data provided by Sazonov and Iwamoto (1992), however, the type series of *Chaunax latipunctatus* was collected from Sala y Gomez Ridge by R/V Ikhtiander in the trawl number 50–57 of the 5th cruise during 24–31 Oct. 1979. The collecting data of these type series is revised accordingly: Holotype: MNHN 1984–0096 (86 mm SL), R/V Ikhtiander, Sala y Gomez Ridge, cr. 5, tr. 50–57, 25°00’W–25°46’S, 88°27’W–99°39’W, 345–770 m, 24–31, Oct. 1979. Paratype: MNHN 1984–0097 (1 specimen, 105 mm SL), same data as holotype.

The type series of *C. latipunctatus* and some HUMZ specimens all have scattered spines on the ventral surface. Other HUMZ specimens have a large ventral naked area similar to that of *C. nudiventer*. The spines on the ventral surface become fewer with body size in *C. latipunctatus*.

Chaunax latipunctatus belongs to the *C. abei* species group in having three spines on each side of lateral line neuromast (Fig. 1B) and is most similar to *C. nudiventer*, but differs in having dermal spines that are relatively short and apart (Figs. 4C–D); a relatively long head (28.4–35.1% vs. 37.2–42.5% SL); relatively long pre-gill opening length (60.6–69.3% vs. 55.4–61.2% SL); relatively long upper jaw (20.8–27.5% vs. 17.1–21.2% SL); and different lateral line neuromast counts: supraorbital series (AB) mainly 12 (vs. 11), upper preopercular (BD) mainly 4 (vs. 3), hyomandibular series (FG) mainly 4–5 (vs. 3), pectoral series (GH) mainly 13–15 (vs. 16–17), and lateral line proper (BI) 33–40 (vs. 39–50). Furthermore, *C. latipunctatus* appears to be restricted to the eastern South Pacific, whereas *C. nudiventer* is so far only known from the western South Pacific (Fig. 5). The bathymetric ranges are similar in both species.

It is notable that there are two females (104 mm SL and 132 mm SL) with large ovaries and free eggs probably approaching terminal stage, three females (73–97 mm SL) with large ovaries and immature eggs, and two males (95 mm SL and 118 mm SL) with large testes that measured more than 10% SL. The mature size of *C. latipunctatus* is about 90–100 mm SL, relatively small compared to all other species (Ho, unpublished data). In addition, all examined specimens do not exceed 135 mm SL. Thus, this species is considered to be a small species.

Materials examined for *Chaunax latipunctatus* (76 specimens, 57–135 mm SL): MNHN 1984–0096, holotype (1, 86). MNHN 1984–0097, paratype (1, 105). IOAN 2078 (10, 67–80), R/V Professor Shtokman, cr. 18, sta. 2018, 25°08’S, 99°27’W, 730–790 m, bottom trawl, 7 May 1987. IOAN 2079 (1, 69), R/V Professor Shtokman, cr. 18, sta. 1964, 24°56’S, 88°33’W, 580–564 m, bottom trawl, 30 Apr. 1987. IOAN 2080, IOAN 2081, IOAN 2082 (42, 57–120), R/V Professor Shtokman, cr. 18, 24°S–26°S, 88°W–100°W, 545–800 m, bottom trawl, Apr.–May 1987. IOAN 2083 (1, 65), R/V Professor Shtokman, cr. 18, sta. 1965, 24°59’S, 88°29’W, 545–562 m, bottom trawl, 30 Apr. 1987. HUMZ 164450 (1, male, 95); HUMZ 164451 (1, 109); HUMZ 164452 (1, male, 118); HUMZ 164453 (1, 135); HUMZ 164454 (1, 67); HUMZ 164470 (1, 72); HUMZ 164533 (1, 98); HUMZ 164534 (1, 92); HUMZ 164535 (1, 73); HUMZ 164536 (1, 62); HUMZ 164572 (1, 120); HUMZ 164573 (2, 80–89); HUMZ 164574 (1, 83); HUMZ 164575 (1, female, 85); HUMZ 164576 (1, female, 105); HUMZ 164770 (1, female, 73); HUMZ 164771 (1, male, 91); HUMZ 164772 (1, female, 97); HUMZ 166560 (1, 103); all collected from 25°30’S, 90°18’W, Sala y Gomez Ridge, 576–578 m, 18 Oct. 1999.

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