Species Diversity **18**: 1–7
25 May 2013
DOI: 10.12782/sd.18.1.001

A New Lionfish of the Genus *Dendrochirus* (Scorpaenidae: Pteroinae) from the Tuamotu Archipelago, South Pacific Ocean

Mizuki Matsunuma[1,3] and Hiroyuki Motomura[2]

[1] *The United Graduate School of Agricultural Sciences, Kagoshima University, 1-21-24 Korimoto, Kagoshima 890-0065, Japan*
E-mail: k1139853@kadai.jp
[2] *The Kagoshima University Museum, 1-21-30 Korimoto, Kagoshima 890-0065, Japan*
E-mail: motomura@kaum.kagoshima-u.ac.jp
[3] *Corresponding author*

(Received 31 January 2013; Accepted 30 April 2013)

Dendrochirus tuamotuensis sp. nov. (Scorpaenidae: Pteroinae) is described on the basis of a single specimen collected off Makemo Atoll, Tuamotu Archipelago, South Pacific Ocean. The new species is uniquely characterized by having bilobed pectoral fins, those of its all congeners being rounded. The new species is similar to a Hawaiian endemic congener, *Dendrochirus barberi* (Steindachner, 1900), in having nine dorsal-fin soft rays, five anal-fin soft rays, relatively high counts (more than 18) of pectoral-fin rays, fewer than two tentacles on the snout tip, and no large, ocellated spot on the soft-rayed portion of the dorsal fin. However, the new species is clearly distinguished from *D. barberi* by having more pectoral-fin rays (19 in the former *vs* usually 18 in the latter), higher counts of spinous points on the suborbital ridge (14–16 *vs* 1–9) and pterotic spine (8 *vs* 1–5), a slightly shallower, narrower body [body depth and width 35.4% of SL and 18.6% of SL, respectively, *vs* 34.0–43.9 (mean 39.2)% of SL and 19.7–26.4 (22.7)% of SL], a slightly shorter, narrower head [head length and width, 37.6% of SL and 12.9% of SL, respectively, *vs* 40.3–45.7 (42.9)% of SL and 13.8–17.2 (15.4)% of SL], slightly smaller orbit diameter [12.9% of SL *vs* 13.1–16.0 (14.2)% of SL], and a slightly shorter postorbital length [15.3% of SL *vs* 16.4–20.6 (18.5)% of SL].

Key Words: *Dendrochirus tuamotuensis* sp. nov., lionfish, new species, French Polynesia, Makemo Atoll, pectoral fins.

Introduction

The Indo-Pacific lionfish genus *Dendrochirus* Swainson, 1839 is distinguished from the other genera of the scorpaenid subfamily Pteroinae by the following combination of characters: dorsal fin with 13 spines and anal fin with three spines; parietal spines not elevated and their bases strongly divergent posteriorly; mandible lacking ridges, spines, and overlying scales; and pectoral fin with branched rays (Eschmeyer and Randall 1975; Mandrytsa 2001; this study). Five species of *Dendrochirus* have been regarded as valid, *viz.*, *D. barberi* (Steindachner, 1900), *D. bellus* (Jordan and Hubbs, 1925), *D. biocellatus* (Fowler, 1938), *D. brachypterus* (Cuvier *in* Cuvier and Valenciennes, 1829), and *D. zebra* (Cuvier *in* Cuvier and Valenciennes, 1829) (Eschmeyer and Randall 1975; Poss 1999).

During a revisionary study of *Dendrochirus*, a single unidentified specimen was found in the collection of the Bishop Museum, Honolulu. Collected at a depth of 120 m off Makemo Atoll, Tuamotu Archipelago, French Polynesia, during radiobiological monitoring related to Mururoa Atoll in the same archipelago conducted by the Direction des Centres d'Expérimentation Nucléaire (Poupin 1996), it was subsequently identified as belonging to *Dendrochirus* on the basis of the above-mentioned diagnostic characters. This specimen is similar to a congener, *D. barbari*, in overall body appearance, but differs in pectoral-fin ray counts, several proportional measurements, the shape of the pectoral fin, and the head spine arrangement. No additional examples of this apparently new species were found elsewhere, although a large number of specimens were examined in museums worldwide. A formal description of the specimen is given below.

It is notable that Møller *et al.* (2004) described *Tuamotuichthys bispinosus* (Ophidiiformes: Bythitidae) as a new genus and species on the basis of a single specimen collected off Morane Atoll, Tuamotu Archipelago, during the same radiobiological monitoring cruise (J. Poupin, personal communication).

Materials and Methods

Measurements generally follow Motomura (2004a, b), but head width and maxillary depth follow Motomura *et al.* (2005b, 2006a) and Motomura *et al.* (2006b), respectively. As an additional feature, body depth at the anal-fin origin was measured at the level of the first anal-fin spine base.

Counts generally follow Motomura *et al.* (2005a–c) and Motomura and Johnson (2006), but pre-dorsal-fin scale counts follow Motomura *et al.* (2006b). The following counts are added here: oblique cheek scale rows—the number of rows of scales on the shortest line between the orbit

and the posteroventral corner of the cheek at the meeting point of the suborbital ridge and the preopercle's submarginal ridge; horizontal cheek scale rows—the number of rows of scales between the posterior margin of the orbit and the preopercle's submarginal ridge at mid-orbit level; vertical cheek scale rows—the number of rows of scales between the ventral margin of the orbit and the suborbital ridge at mid-orbit level. The last two soft rays of the dorsal and anal fins were counted as single rays, each pair being associated with a single pterygiophore. The formula for the configuration of the supraneural bones, anterior neural spines, and anterior dorsal fin pterygiophores follows Ahlstrom *et al.* (1976). Counts and measurements were generally made on the left side, except for pectoral-fin rays (counted on both sides). Vertebrae were counted from a radiograph.

The head spine terminology shown in Fig. 1 generally follows Randall and Eschmeyer (2002: fig. 1) and Motomura (2004b: fig. 1) with the following additions: the spine at the base of the uppermost preopercular spine is termed the supplemental preopercular spine (Eschmeyer 1965) and that on the lateral surface of the lacrimal bone is referred to as the lateral lacrimal spine (Motomura and Senou 2008: fig. 2; Motomura *et al.* 2011: fig. 1). The coronal spine is figured in Chen (1981: fig. 1). Standard length is abbreviated as SL.

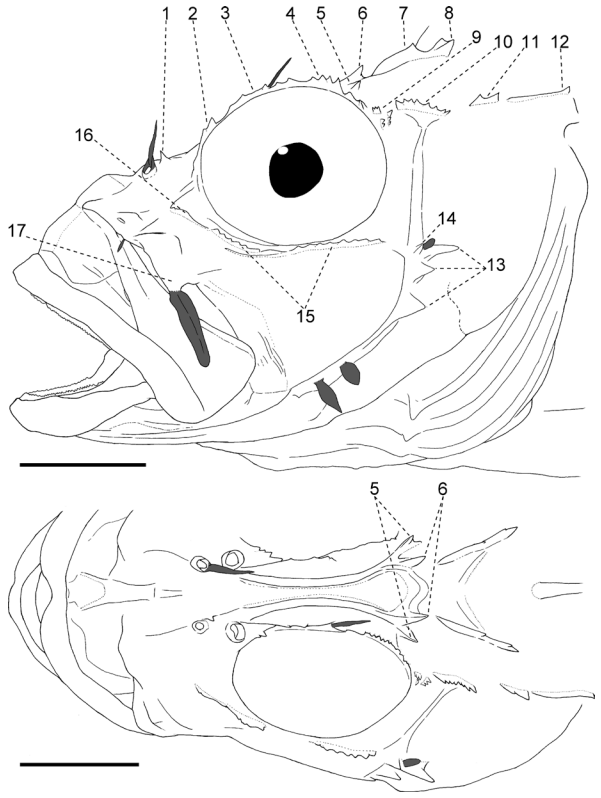

Fig. 1. Lateral (top) and dorsal (bottom) views of head of *Dendrochirus tuamotuensis* sp. nov. (BPBM 37140, 57.4 mm SL, holotype). Shaded areas indicate skin flaps. 1, nasal spine; 2, preocular spine; 3, supraocular spine; 4, postocular spine; 5, tympanic spine; 6, coronal spine; 7, parietal spine; 8, nuchal spine; 9, sphenotic spine; 10, pterotic spine; 11, lower posttemporal spine; 12, supracleithral spine; 13, preopercular spine; 14, supplemental preopercular spine; 15, suborbital ridge/spine; 16, lateral lacrimal ridge/spine; 17, posterior lacrimal spine. Scale bars 5 mm.

The holotype of *D. tuamotuensis* sp. nov. is deposited at the Bishop Museum, Honolulu (BPBM). Additional institutional abbreviations used in the present study are as follows: California Academy of Sciences, San Francisco (CAS); Field Museum of Natural History, Chicago (FMNH); Muséum National d'Histoire Naturelle, Paris (MNHN); Überseemuseum, Bremen (UMB); Museum Support Center, Smithsonian Institution National Museum of Natural History, Suitland (USNM).

Dendrochirus tuamotuensis sp. nov.
[New English name: Tuamotu's Dwarf Lionfish]
(Figs 1–4; Table 1)

Holotype. BPBM 37140, 57.4 mm SL, Makemo Atoll, Tuamotu Archipelago, French Polynesia, 16°34′12″S, 143°27′06″W, 120 m depth, trap, J. Poupin, 4 June 1990.

Diagnosis. A species of *Dendrochirus* with the following combination of characters: dorsal fin with 9 soft rays; anal fin with 5 soft rays; pectoral-fin rays 19; no barbel on tip of snout; profile of posterior margin of pectoral fin bilobed (notched at midpoint); body depth 35.4% of SL; body width 18.6% of SL; head length 37.6% of SL; head width 12.9% of SL; orbit diameter 12.9% of SL; postorbital length 15.3% of SL; suborbital ridge with 14–16 spines; pterotic with 8 spines; no large, ocellated spot on soft-rayed portion of dorsal fin.

Description. Morphometrics of the holotype are shown in Table 1. Characters included in the specific diagnosis are not repeated here. Dorsal fin with 13 spines; anal fin with 3 spines; pectoral fin with 19 (1 upper unbranched + 8 branched+10 lower unbranched) rays; pelvic fin with 1 spine and 5 soft rays. Pored lateral-line scales 24 (right side only, left side damaged); scales above lateral line 6, below 12; scale rows between sixth dorsal-fin spine base and lateral line 6; scale rows between last dorsal-fin spine base and lateral line 6; pre-dorsal-fin scale rows 3; oblique cheek scale rows 3; horizontal cheek scale rows 2; vertical cheek scale rows 0; gill rakers 15 [4 on upper limb+11 on lower limb (8 and 3 rakers on ceratohyal and hypobranchial, respectively)]. Branchiostegal rays 7. Formula for configuration of supraneural bones, anterior neural spines, and anterior dorsal pterygiophores //2+1/1/1/1/1/1/1/1/1+1/1/. Vertebrae 10+14=24.

Body oblong, moderately compressed anteriorly, more strongly compressed posteriorly; depth moderate, greater than length of longest dorsal-fin spine. One simple tentacle on posterior edge of low membranous tube associated with anterior nostril, its length distinctly greater than diameter of anterior nostril, its tip extending beyond posterior margin of posterior nostril when depressed posteriorly. One short, simple tentacle on supraocular. No skin flap on orbit; small skin flap on uppermost preopercular spine base; 2 small skin flaps on posterior margin of preopercular. One short tentacle on anterior portion of ventral margin of lacrimal. Relatively large skin flap on tip of posterior lacrimal spine, tip of flap not extending beyond profile of lower jaw when depressed ventrally (lateral view).

Table 1. Morphometrics, expressed as percentages of standard length, of *Dendrochirus tuamotuensis* sp. nov. and *D. barberi*. Means (in parentheses) include data for holotypes and paratypes.

	Dendrochirus tuamotuensis sp. nov.	*Dendrochirus barberi*					
	Holotype	Holotype of *P. barberi*	Holotype of *D. hudsoni* USNM	Paratypes of *D. hudsoni*	Holotype of *D. chloreus* USNM	Paratypes of *D. chloreus*	Non-types of *D. barberi*
	BPBM 37140	UMB 4562	50652	$n=2$	50701	$n=6$	$n=34$
SL (mm)	57.4	30.7	33.8	34.8–36.8	96.5	38.0–71.9	24.1–113.7
Body depth	35.4	39.4	41.1	37.4–39.4	38.8	34.9–42.6	34.0–43.9 (39.2)
Body depth at anal-fin origin	28.6	31.9	34.3	31.3–32.6	32.2	32.0–36.2	26.6–35.0 (32.6)
Body width	18.6	23.8	23.4	22.7–23.6	19.5	19.7–22.8	20.3–26.4 (22.7)
Head length	37.6	44.6	42.6	42.2–45.7	40.8	43.1–45.3	40.3–45.6 (42.9)
Head width	12.9	16.3	16.0	14.9	14.8	14.7–16.8	13.8–17.2 (15.4)
Snout length	11.1	12.7	10.4	—	10.9	10.4–11.8	9.9–13.3 (11.5)
Orbit diameter	12.9	15.0	14.5	14.1–14.7	13.8	13.5–15.8	13.1–16.0 (14.2)
Interorbital width at middle of eye	5.2	7.5	6.5	5.7–6.0	6.2	5.5–7.1	4.9–7.8 (6.2)
Interorbital width at preocular spine base	5.1	7.5	6.5	5.7–6.0	5.7	5.5–7.4	4.9–7.3 (5.9)
Upper-jaw length	19.7	19.2	19.8	18.4–19.0	19.8	18.8–20.8	18.7–21.9 (20.2)
Maxillary depth	7.5	6.8	6.2	6.3–6.9	7.6	6.8–7.4	6.0–8.1 (7.0)
Postorbital length	15.3	17.3	18.3	16.7–17.7	18.2	19.3–20.6	16.4–19.7 (18.5)
Distance between VMO[1] and suborbital ridge	0.5	0.7	0.3	0.8–0.9	1.1	0.5–1.4	0.3–1.5 (0.9)
Pre-dorsal-fin length	30.8	37.5	33.7	33.3–36.1	32.7	33.9–36.6	31.5–37.8 (34.4)
Pre-anal-fin length	70.6	70.0	71.3	70.7–72.3	75.1	67.4–73.4	67.2–75.8 (71.2)
Pre-pelvic-fin length	34.8	41.7	42.9	42.5–43.2	40.7	36.4–42.1	36.1–43.7 (39.8)
1st dorsal-fin spine length	20.6	—	—	15.8	15.0	17.9–18.7	11.7–19.2 (15.5)
2nd dorsal-fin spine length	25.3	—	—	22.7	21.8	23.2–31.1	17.6–27.1 (23.3)
3rd dorsal-fin spine length	26.5	—	29.0	25.3–25.8	23.3	26.9–28.2	21.7–30.7 (25.8)
4th dorsal-fin spine length	28.9	—	29.0	26.4	26.1	29.6–31.1	22.5–31.8 (27.4)
5th dorsal-fin spine length	30.0	—	31.4	27.3–28.8	—	30.6–34.3	23.3–32.4 (28.5)
6th dorsal-fin spine length	30.7	—	31.4	27.9–29.3	26.3	30.9–32.6	23.7–32.4 (28.2)
7th dorsal-fin spine length	30.1	27.7	29.6	26.9–27.0	26.1	30.1–30.6	24.8–32.0 (27.6)
8th dorsal-fin spine length	22.1	24.8	29.3	25.5–26.4	25.6	29.2–31.1	22.5–29.3 (26.4)
9th dorsal-fin spine length	24.0	20.5	26.3	22.3–22.7	22.9	26.3–29.4	19.3–29.6 (24.1)
10th dorsal-fin spine length	19.5	16.0	20.7	14.7–17.4	20.1	15.8–22.9	15.6–23.7 (19.7)
11th dorsal-fin spine length	15.2	10.7	11.8	13.0	15.2	11.1–16.5	10.6–18.3 (14.6)
12th dorsal-fin spine length	12.4	9.8	—	10.6–11.1	10.8	9.5–13.5	9.7–13.0 (11.2)
13th dorsal-fin spine length	18.5	16.9	—	16.8–18.4	14.7	18.5	13.7–20.0 (16.5)
1st dorsal-fin soft ray length	25.6	21.2	—	—	—	—	21.6–29.0 (24.6)
Longest dorsal-fin soft ray length	28.2	—	—	—	—	—	22.8–31.8 (27.0)
1st anal-fin spine length	10.6	11.7	11.5	10.3–11.7	10.6	11.5–12.3	8.7–13.9 (11.3)
2nd anal-fin spine length	17.4	19.2	20.4	17.8–19.8	18.0	21.2–23.9	16.5–23.5 (19.9)
3rd anal-fin spine length	19.2	21.5	19.8	18.7–20.1	16.5	19.5–23.4	15.7–22.0 (19.4)
1st anal-fin soft ray length	28.6	27.0	—	—	27.5	29.4–32.9	25.7–33.0 (29.5)
Longest anal-fin soft ray length	28.9	29.3	—	31.3	28.3	30.9–34.0	26.8–35.5 (30.9)
Pectoral-fin ray length	53.7	46.6	47.0	48.9–50.9	49.5	48.7–55.7	41.9–59.5 (50.4)
Pelvic-fin spine length	20.6	—	19.8	19.3–19.8	18.9	20.8–24.9	17.2–25.5 (20.9)
Longest pelvic-fin soft ray length	31.4	35.2	—	35.6–37.6	35.1	36.7–39.8	30.8–41.6 (36.5)
Caudal-fin length	37.6	—	35.8	37.9	33.5	37.1–42.0	32.3–43.9 (37.5)
Caudal-peduncle length	17.4	16.3	18.0	17.0–17.4	16.2	17.1–20.9	15.2–19.5 (17.4)
Caudal-peduncle depth	10.3	11.7	12.1	11.7–11.8	12.3	11.9–12.9	10.8–13.1 (12.1)

[1] Ventral margin of orbit.

Cycloid scales covering head, including cheek, preopercle, and opercle, but absent on snout, preocular, supraocular, postocular, interorbital canal, occiput, upper postorbital area, suborbital pit, maxilla, and mandible. Poorly developed ctenoid scales covering upper anterolateral body surface, cycloid scales covering remaining lateral body surface; scales not extending onto rays or membranes of median fins except basal caudal fin. Exposed cycloid scales covering pec-

toral-fin base and ventral surface of trunk, including interpelvic space.

Lateral line complete, weakly sloping downward. Sensory pores of cephalic lateralis opening at tips of spine-like tubes. Three sensory pores on underside of each dentary; 1 small pore on each side of symphysial knob.

Mouth moderately large, slightly oblique, forming angle of about 30° to horizontal axis of head and body; upper edge of posterior maxilla swollen laterally, forming low ridge and displaying poorly developed median lateral ridge; posterior margin of maxilla just reaching mid-orbit level. Symphyseal gap separating premaxillary teeth bands distinctly narrower than width of each band; upper jaw with band of small, slender, conical teeth; about 5 tooth rows at front of upper jaw; about 4 tooth rows at front of lower jaw; small teeth in 5 rows forming blunt V-shaped patch on vomer; no palatine teeth.

Dorsal profile of snout relatively steep, forming angle of about 40° to horizontal axis of head and body. Nasal spine with single small, upwardly directed spinous point distally; its length subequal to anterior nostril diameter. No median interorbital ridge. Interorbital ridges moderately developed, separated by narrow channel, diverging posteriorly, conjoined with origins of coronal spines (left side only). Interorbital space moderately deep, with about one-fifth of orbit extending above dorsal profile of head. Coronal spine small with a single spinous point; its length subequal to that of tympanic spine. Tympanic spine small, relatively flattened, with a single spinous point; no extra spine. Preocular with 2 (4 on right side) small spines on outer edge. Supraocular spine with 3 spinous points. Postocular spine on outer margin of postocular, with 8 spinous points; posterodorsal corner of postocular not expanded laterally. Transverse bump developed in front of occipital area (between bases of coronal spines), curved posteriorly in dorsal view. Parietal spine with 1 spinous point; base of parietal spine relatively long, diverging posteriorly, completely conjoined with base of nuchal spine; origin of parietal spine just behind of tip of coronal spine in dorsal view. Nuchal spine with 1 spinous point. Sphenotic with 8 (9 on right side) spines in 3 patches (2 short vertical ridges on right side), surrounding sensory canal. No postorbital spine or sensory canal. Pterotic spine serrated with 8 spinous points on relatively long base. Lower posttemporal spine with 2 (3 on right side) spinous points. No upper posttemporal spine. Spuracleithral spine with 1 spinous point on posterior end of long base.

No anterior lacrimal spine. Posterior lacrimal spine broad, plate-like, with 1 spinous point under skin. Lateral lacrimal ridge with 1 spine (2 on right side); ridge on dorsal articular process lacking spines (2 on right side). Suborbital ridge well serrated, spines aggregated into anterior [6 (8 on right side)] and posterior (8) groups; this ridge not conjoined with lateral lacrimal ridge. Suborbital pit shallow, poorly developed. Preopercular with 3 spines, uppermost spine longest, others both of similar shorter length, all spines directed posteriorly; upper and middle spines closer to each other than middle and lower spines; lowermost spine plate-like. One supplemental preopercular spine present. No exposed opercular spine.

Origin of first dorsal-fin spine above lower posttemporal spine; bases of first and second dorsal-fin spines closer to each other than those of subsequent adjacent spines; length of first spine 0.8 times that of second spine; sixth spine longest; lengths of fifth to seventh spines subequal; 12th spine shortest, its length 0.8 and 0.7 times those of antepenultimate and posteriormost spines, respectively; membrane of spinous portion of dorsal fin strongly incised. Dorsal-fin soft rays all branched; third ray longest, its length less than that of longest dorsal-fin spine; posteriormost ray branched, with extremely low membrane extending to caudal peduncle. Origin of first anal-fin spine just below base of last dorsal-fin spine; third spine longest; first spine 0.6 times longer than second and third spines. Anal-fin soft rays all branched; second ray longest, its length subequal to that of longest dorsal-fin soft ray; posterior branch of last soft ray not joined by membrane to caudal peduncle. Pectoral fin long, tip of longest ray extending beyond a vertical through base of last anal-fin soft ray, but not reaching caudal-fin base; fifth ray longest; lengths of rays decreasing from fifth to ninth or tenth ray and increasing again toward 13th ray; middle 8 rays each branched into two; lower unbranched rays weakly thickened. Pelvic-fin soft rays all branched; third ray longest, longer than upper jaw; last ray joined by membrane to abdomen for less than one-fourth of its length; tip of longest ray just reaching anterior margin of anus when depressed. Caudal fin with 4 procurrent, 2 segmented unbranched, and 4 segmented branched rays in dorsal series; 3 procurrent, 2 segmented unbranched, and 5 segmented branched rays in ventral series; and moderately rounded posterior margin of fin. Caudal peduncle moderately deep, its depth 0.6 times caudal-peduncle length.

Color of preserved specimen. See also Fig. 2. Head and body brownish-white without markings. Skin flap on uppermost preopercular spine base with brown pigmentation; other skin flaps and tentacles on head pale brownish-white. Eye blackish-blue, without radial markings. Dorsal fin membrane translucent; each fin spine with a small brown blotch on middle to upper portion; soft-rayed portion of dorsal fin with about 33 small brown spots on rays. Anal fin membrane translucent, soft-rayed portion with about 17 small brown spots on rays, expressed as short lines basally. Pectoral fin membrane transparent, with about 6 transverse broad, brown bands (almost lost from posterior half of fin, but clearly apparent on inner surface). Pelvic fin membrane translucent, with 5 broad, brown bands. Caudal fin membrane transparent, with 34 brown spots on rays, expressed as short bars basally. Color in life and in fresh condition unknown.

Distribution. The species is currently known only from Makemo Atoll, Tuamotu Archipelago, French Polynesia, the holotype having been collected at 120 m depth off the atoll.

Etymology. The specific name *tuamotuensis* is derived from the name of the type locality of the species, the Tuamotu Archipelago.

Remarks. Among the valid species of *Dendrochirus*, *D. tuamotuensis* sp. nov. is uniquely characterized by having bi-

Fig. 2. Holotype of *Dendrochirus tuamotuensis* sp. nov. (BPBM 37140, 57.4 mm SL).

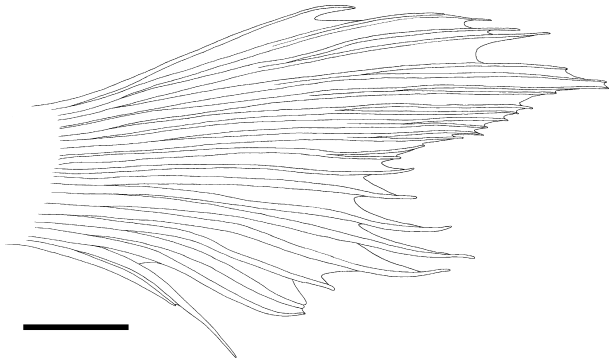

Fig. 3. Pectoral fin of *Dendrochirus tuamotuensis* sp. nov. (BPBM 37140, holotype, 57.4 mm SL). Scale bar 5 mm.

lobed pectoral fins (Fig. 3), those of the other species being rounded. Examinations of the available type specimens of the nominal species of *Dendrochirus* revealed *D. tuamotuensis* to be most similar to *Pterois barberi* Steindachner, 1900, *Dendrochirus hudsoni* Jordan and Evermann, 1903, and *Dendrochirus chloreus* Jenkins, 1903 in having nine dorsal-fin soft rays, five anal-fin soft rays, a relatively high count (more than 18) of pectoral-fin rays, fewer than two tentacles on the snout tip, and no large, ocellated spot on the soft-rayed portion of the dorsal fin. Two of these three nominal species, *D. hudsoni* and *D. chloreus*, were regarded as junior synonyms of *P. barberi* by Eschmeyer and Randall (1975) and Randall (2007); based on our examination, we concur.

Dendrochirus tuamotuensis is clearly distinguished from *D. barberi* in having more pectoral-fin rays [19 in *D. tuamotuensis vs* 17–18 (usually 18) in *D. barberi*], and higher counts of spinous points on the suborbital [14 (16 on right side) *vs* 1–9] and pterotic spines (8 *vs* 1–5). Furthermore, *D. tuamotuensis* differs from *D. barberi* in having a slightly shallower, narrower body [body depth and width 35.4% SL and 18.6% SL, respectively, *vs* 34.0–43.9 (mean 39.2)% SL and 19.7–26.4 (22.7)% SL], a slightly shorter, narrower head [head length and width, 37.6% SL and 12.9% SL, respectively, *vs* 40.3–45.7 (42.9)% SL and 13.8–17.2 (15.4)% SL], a slightly smaller orbit diameter [12.9% SL *vs* 13.1–16.0 (14.2)% SL] and a slightly shorter postorbital length [15.3% SL *vs* 16.4–20.6 (18.5)% SL] (Fig. 4; Table 1).

Comparative materials. *Dendrochirus barberi*: BPBM 24087, 6 specimens, 66.8–105.8 mm SL, northwest of Molokai Island, Hawaiian Islands, 21°15′N, 157°08′W, 124 m, shrimp trawl, National Marine Fisheries Service-Honolulu Laboratory, 11 November 1968; BPBM 24373, 2, 93.2–110.3 mm SL, northwest of Molokai Island, Hawaiian Islands, 21°15′N, 157°08′W, 124 m, shrimp trawl, National Marine Fisheries Service Honolulu Laboratory, 28 November 1968; CAS-SU 7467, 2 paratypes of *Dendrochirus chloreus*, 34.8–36.8 mm SL, Honolulu, Oahu Island, Hawaiian Islands, United States Fish Commission, 1901; CAS-SU 23294, 5 paratypes of *Dendrochirus hudsoni*, 35.0–54.8 mm SL, Honolulu, Oahu Island, Hawaiian Islands, RV *Albatross*, 1902; CAS-SU 23315, paratype of *D. hudsoni*, 71.9 mm, same data as CAS-SU 23294; FMNH 63582, 9, 24.1–88.1 mm SL, Kahuku, Oahu Island, Hawaiian Islands, L. Woods *et al.*, 21 April 1961; FMNH 63748, 3, 88.5–97.0 mm SL, Hawaiian Islands, John G. Shedd Aquarium, May 1937; MNHN 1975-981, 3 of 6, 33.8–102.8 mm SL, Kaneohe, Oahu Island, Hawaiian Islands, 21°30′N, 157°48′W, M. L. Bauchot *et al.*, October 1974; UMB 164, holotype of *Pterois barberi*, 30.7 mm SL, Honolulu to Cape Horn, "Captain Barber"; USNM 50652, holotype of *D. hudsoni*, 33.8 mm SL, Waikiki, Oahu Island, Hawaiian Islands, United States Bureau of Fisheries, 1901; USNM 50701, holotype of *D. chloreus*, 96.5 mm SL, Honolulu, Oahu Island, Hawaiian Islands, O. P. Jenkins, 1889; USNM 109333, 2, 59.7–63.3 mm SL, reef at Mokuleia, Waialua, Oahu Island, Hawaiian Islands, O. Degener, 1938; USNM 109367, 2, 83.3–100.9 mm SL, Honolulu, Oahu Island, Hawaiian Islands, J. Thompson, 4 October 1939; USNM 140497, 4, 46.9–63.6 mm SL, Waimea Bay, Oahu Island, Hawaiian Islands, L. Schultz and

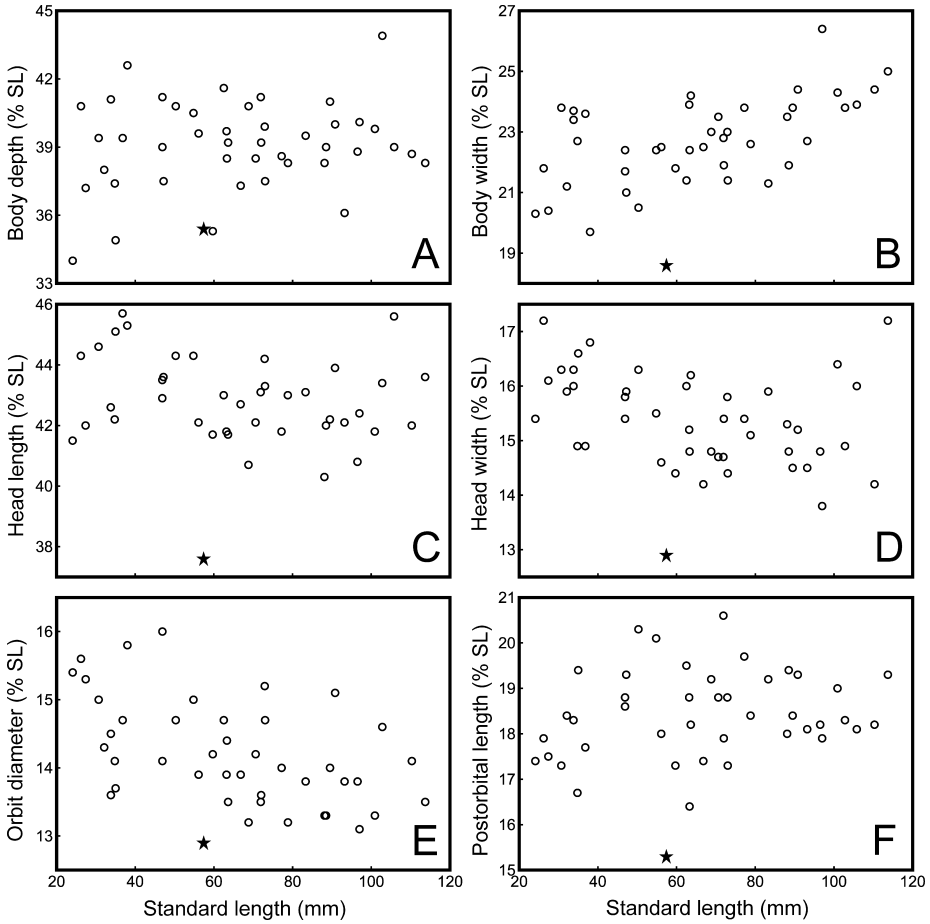

Fig. 4. Relationships of: A, body depth; B, body width; C, head length; D, head width; E, orbit diameter; F, postorbital length (all as % of standard length) to standard length (mm) in *Dendrochirus tuamotuensis* sp. nov. (star) and *D. barberi* (circles).

V. Brock, 31 August 1947; USNM 265959, 3, 62.5–113.7 mm SL, Honolulu, Oahu Island, Hawaiian Islands, D. S. Jordan, 1902. *Dendrochirus bellus*: FMNH 58783, holotype of *Brachirus bellus*, 62.2 mm SL, Misaki (Kanagawa Prefecture), Japan, K. Aoki. *Dendrochirus biocellatus*: USNM 98894, holotype of *Nemapterois biocellatus*, 62.5 mm SL, 0.7 mile (*ca.* 1.3 km) off Jolo Light, Philippines (6°04′20″N, 120°59′20″E), 22 fathoms (*ca.* 40.2 m), 14 February 1908. *Dendrochirus brachypterus*: MNHN 6565, holotype of *Pterois brachyptera*, 70.1 mm SL, locality unknown. *Dendrochirus zebra*: CAS-SU 8673, 2 paratypes of *Dendrochirus sausaulele* Jordan and Seale, 1906, 56.6–95.4 mm SL, Apia, Samoa, D. S. Jordan and V. L. Kellogg, 1902; MNHN 6624, 2 syntypes of *Pterois zebra*, 33.2–37.3 mm SL, Ambon, Indonesia, J. R. C. Quoy and J. P. Gaimard; MNHN 6627, syntype of *P. zebra*, 48.2 mm SL, Mauritius, M. Maillard; MNHN 6629, syntype of *P. zebra*, 80.1 mm SL, Mauritius, M. Mathieu; MNHN 6545, syntype of *P. zebra*, 60.2 mm SL, same data as MNHN 6629; USNM 51760, holotype (90.0 mm SL) and paratype (70.7 mm SL) of *D. sausaulele*, same data as CAS-SU 8673.

Acknowledgments

We are especially grateful to K. Swagel (FMNH), R. Causse (MNHN), P.-R. Becker (UMB), and J. T. Williams (USNM) for their hospitality during the first author's visits to their institutions. We are also grateful to A. Suzumoto (BPBM) and D. Catania (CAS) for specimen loans and for providing opportunities to examine specimens. We thank J. Poupin (Institut de Recherche de l'Ecole Navale, France) for providing sampling information on the holotype of *D. tuamotuensis*, T. Hashimoto (KAUM) for taking the radiograph, G. Hardy (Ngungru, New Zealand) for reading the manuscript and providing helpful comments, and anonymous referees for critical comments. This study was supported in part by grants awarded to the first author by the Fujiwara Natural History Foundation (Tokyo, Japan). This study was also supported in part by Grants-in-Aid for Scientific Research (B, 24370041 and C, 23580259) from the Japan Society for the Promotion of Science, Tokyo, Japan (JSPS), a Grant-in-Aid for Young Scientists (B, 19770067) from the Ministry of Education, Science, Sports and Culture, Tokyo, Japan, JSPS Asian Core Program "Establishment of Research and Education Network on Coastal Marine Science in Southeast Asia", JSPS International Training Program "Protect Diversity of Bioresources in the Tropical Area", and the Coastal Area Capability Enhancement in Southeast Asia Project of the Research Institute for Humanity and Nature, Kyoto, Japan.

References

Ahlstrom, E. H., Butler, J. L. and Sumida, B. Y. 1976. Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: kinds, distributions, and early life histories and observations on five of these from the northwest Atlantic. Bulletin of Marine Science 26: 285–402.

Chen, L.-C. 1981. Scorpaenid fishes of Taiwan. Quarterly Journal of the Taiwan Museum 34: 1–60.

Eschmeyer, W. N. 1965. Western Atlantic scorpionfishes of the genus *Scorpaena*, including four new species. Bulletin of Marine Science 15: 84–164.

Eschmeyer, W. N. and Randall, J. E. 1975. The scorpaenid fishes of the Hawaiian Islands, including new species and new records (Pisces: Scorpaenidae). Proceedings of the California Academy of Sciences (Series 4) 40: 265–333.

Mandrytsa, S. A. 2001. *Lateral Line System and Classification of Scorpaenoid Fishes (Scorpaeniformes: Scorpaenoidei)*. Perm State University Press, Perm, 393 pp. [In Russian]

Motomura, H. 2004a. New species of scorpionfish, *Scorpaena cocosensis* (Scorpaeniformes: Scorpaenidae) from the Cocos Islands, Costa Rica, eastern Pacific Ocean. Copeia 2004: 818–824.

Motomura, H. 2004b. Revision of the scorpionfish genus *Neosebastes* (Scorpaeniformes: Neosebastidae) with descriptions of five new species. Indo-Pacific Fishes 37: 1–75.

Motomura, H., Fricke, R. and Eschmeyer, W. N. 2005a. Redescription of a poorly known scorpionfish, *Scorpaena canariensis* (Sauvage), and a first record of *Pontinus leda* Eschmeyer from the Northern Hemisphere (Scorpaeniformes: Scorpaenidae). Stuttgarter Beiträge zur Naturkunde. Serie A, Biologie 674: 1–15.

Motomura, H. and Johnson, J. W. 2006. Validity of the poorly known scorpionfish, *Rhinopias eschmeyeri*, with redescriptions of *R. frondosa* and *R. aphanes* (Scorpaeniformes: Scorpaenidae). Copeia 2006: 500–515.

Motomura, H., Last, P. R. and Gomon, M. F. 2006a. A new species of the scorpionfish genus *Maxillicosta* from the southeast coast of Australia, with a redescription of *M. whitleyi* (Scorpaeniformes: Neosebastidae). Copeia 2006: 445–459.

Motomura, H., Last, P. R. and Yearsley, G. K. 2005b. *Scorpaena bulacephala*, a new species of scorpionfish (Scorpaeniformes: Scorpaenidae) from the northern Tasman Sea. Zootaxa 1043: 17–32.

Motomura, H., Last, P. R. and Yearsley, G. K. 2006b. New species of shallow water scorpionfish (Scorpaenidae: *Scorpaena*) from the central coast of Western Australia. Copeia 2006: 360–369.

Motomura, H., Paulin, C. D. and Stewart, A. L. 2005c. First records of *Scorpaena onaria* (Scorpaeniformes: Scorpaenidae) from the southwestern Pacific Ocean, and comparisons with the Northern Hemisphere population. New Zealand Journal of Marine and Freshwater Research 39: 865–880.

Motomura, H. and Senou, H. 2008. A new species of the scorpionfish genus *Scorpaena* (Scorpaenidae) from Izu Peninsula, Pacific coast of Japan. Journal of Fish Biology 72: 1761–1772.

Motomura, H., Struthers, C. D., McGrouther, M. A. and Stewart, A. L. 2011. Validity of *Scorpaena jacksoniensis* and a redescription of *S. cardinalis*, a senior synonym of *S. cookii* (Scorpaeniformes: Scorpaenidae). Ichthyological Research 58: 315–332.

Møller, P. R., Schwarzhans, W. and Nielsen, J. G. 2004. *Tuamotuichthys bispinosus*, a new genus and species from off Tuamotu Islands, South Pacific Ocean (Ophidiiformes, Bythitidae). Ichthyological Research 51: 146–152.

Poss, G. S. 1999. Scorpaenidae. Scorpionfishes (also, lionfishes, rockfishes, stingfishes, stonefishes, and waspfishes). Pp. 2291–2352. *In*: Carpenter, K. E. and Niem, V. H. (Eds) *FAO Species Identification Guide for Fisheries Purposes. The Living Marine Resources of the Western Central Pacific. Vol. 4. Bony Fishes Part 2 (Mugilidae to Carangidae)*. FAO, Rome.

Poupin, J. 1996. *Atlas des Crustacés Marins Profonds de Polynésie Française. Récoltes du Navire Marara, 1986/1996*. Service Mixte de Surveillance Radiologique et Biologique, Montlhéry, iv+59 pp.

Randall, J. E. 2007. *Reef and Shore Fishes of the Hawaiian Islands*. University of Hawai'i Sea Grant College Program, Honolulu, 546 pp.

Randall, J. E. and Eschmeyer, W. N. 2002. (dated 2001). Revision of the Indo-Pacific scorpionfish genus *Scorpaenopsis*, with descriptions of eight new species. Indo-Pacific Fishes 34: 1–79.