

# Occurrence and Additional Specimens of a Scorpionfish, *Idiastion pacificum* (Actinopterygii: Scorpaeniformes: Scorpaenidae), from the Central North Pacific

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Two specimens (124.0–148.6 mm standard length) of a scorpionfish, *Idiastion pacificum* Ishida and Amaoka, 1992, were collected from the central North Pacific, representing the first record of the species from this area. This finding extends the distributional range of *Idiastion pacificum*, which was previously known only from the Kyushu-Palau Ridge, western North Pacific. This study provides new morphological data and a color photograph of *I. pacificum* based on these two additional specimens, with a comparison to *Idiastion kyphos* Eschmeyer, 1965.

**Key Words:** Teleostei, Scorpaenidae, *Idiastion pacificum*, central North Pacific, new record.

## Introduction

The scorpaenid genus *Idiastion* Eschmeyer, 1965 was originally established as a member of the subfamily Scorpaeninae, on the basis of a single specimen of *Idiastion kyphos* Eschmeyer, 1965 from the Caribbean Sea. Subsequently, a second species of the genus, *Idiastion pacificum* Ishida and Amaoka, 1992, was described based on a single specimen from the Kyushu-Palau Ridge, western North Pacific. Recently a third species, *Idiastion hageyi* McCosker, 2008, was described based on a single specimen collected off Isla Fernandina, Galápagos Islands.

During a faunal study of the fishes in the central North Pacific, conducted from September to November, 2007, two specimens of a scorpionfish were collected from Koko Seamount, Emperor Seamounts, at 360–430 m depth. These specimens are identified here as *Idiastion pacificum*, which has not been reported on the basis of newly collected specimens since the original description. The present specimens represent the second record of the species, and the first from the central North Pacific. Herein we describe these two additional specimens.

## Materials and Methods

Counts generally follow Motomura *et al.* (2005a), except for the scales above and below the lateral line (Motomura *et al.* 2005b) and the predorsal scale counts (Motomura *et al.*

2006b). The last two soft rays of the dorsal and anal fins are counted as single rays, each pair being associated with a single pterygiophore. Counts of preopercular spines begin with the uppermost spine. Measurements generally follow Motomura (2004a, b), except for head width (Motomura *et al.* 2005b, 2006a) and maxillary depth (Motomura *et al.* 2006b). Terminology of head spines and structures 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 referred to as the supplemental preopercular spine (Eschmeyer 1965a); the spine on the lateral surface of the lachrymal bone is referred to as the lateral lachrymal spine (Motomura and Senou 2008: fig. 2); and the coronal and pretympenic (as an extra spine) spines are as figured in Chen (1981: fig. 1) and Motomura *et al.* (2004: fig. 14b) respectively. The terminology and formula of the supraneural bones follow Mabee (1988) and Ahlstrom *et al.* (1976) respectively. Cyanine blue was used to examine the scales on the head. Standard length is expressed as SL. The skeletal features and vertebrae were observed and counted, respectively, from radiographs. The sex and presence of a swimbladder were confirmed by dissection of the right side of the abdomen. The diagnosis of *I. pacificum* given here is based on the present two specimens from the central North Pacific and the holotype from the Kyushu-Palau Ridge (comparative material in this study).

Specimens examined in this study are deposited in the Laboratory of Marine Biology, Faculty of Science, Kochi University (BSKU), the California Academy of Sciences (CAS), the Grice Marine Laboratory (GMBL), and the Sei-

kai National Fisheries Research Institute (SNFR).

## Taxonomy

*Idiastion pacificum* Ishida and Amaoka, 1992

[Japanese name: Kakure-kasago]

[New English name: Flame humpback scorpionfish]

(Figs 1, 2A)

Scorpaeninae sp.: Kanayama 1982: 275 (Kyushu-Palau Ridge).

*Idiastion pacificum* Ishida and Amaoka, 1992: 357 (type locality: Kyushu-Palau Ridge, western North Pacific); Poss 1999: 2305 (listed, following Ishida and Amaoka (1992)); Nakabo 2002: 571 (key and figure, based on holotype).

**Material examined.** 2 specimens: SNFR 13482, 124.0 mm SL, female, Koko Seamount, central North Pacific, 35°34.00'N, 171°34.50'E–35°34.90'N, 171°38.60'E, 360 m depth, trawl, 5 Nov. 2007; SNFR 13522, 148.6 mm SL, male, Koko Seamount, central North Pacific, 35°39.00'N, 171°03.00'E–35°38.70'N, 171°03.00'E, 430 m depth, trawl, 28 Sep. 2007.

**Comparative materials.** *Idiastion pacificum*, BSKU 31153, holotype, 128.4 mm SL, Kyushu-Palau Ridge, western North Pacific, 26°11.5'N, 135°45.4'E–26°04.7'N, 135°50.4'E, 355–375 m depth, trawl, 16 Dec. 1979.

*Idiastion kyphos*, CAS 24401, 86.5 mm SL, off Angola, eastern South Atlantic, 19°18'S, 11°24'E, 229 m depth, trawl, 24 Mar. 1968; CAS 31886, 83.0 mm SL, Caribbean Sea, 12°11'N, 72°52'W, 550 m depth, trawl, 19 Nov. 1970; GMBL 2332, 66.2–79.0 mm SL (2 specimens), off Florida, western North Atlantic, 30°28'N, 79°51'W, 494 m depth, shrimp trawl, 19 Jan. 1972.

**Diagnosis.** A species of *Idiastion* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17–19; ctenoid scales in interorbital space; cycloid scales on belly; origin of first dorsal-fin spine slightly posterior to a vertical drawn through supracleithral spine base; posterior tip of pectoral fin not reaching anal-fin origin; head length 44.4–46.0% SL.

**Description.** Counts and proportional measurement given as percentages of SL in Table 1. Body relatively deep, slightly hump-backed in appearance, compressed posteriorly. Nape steep; anterior body profile strongly arched. Head large, its length greater than body depth. Eye large and oval. One or 2 rows of small papillae along outer margin of pupil. Slender tentacle present on posterodorsal edge of low membranous tube associated with anterior nostril; length of tentacle slightly greater than diameter of anterior nostril opening; no other distinct tentacles on head. Pectoral axil without skin flaps.

Scales covering dorsal and lateral surfaces of head and upper part of lateral surface of maxilla. Exposed ctenoid scales on lateral surface of trunk, scales becoming cycloid on abdomen. Small ctenoid scales present on maxilla and in interorbital space. Exposed cycloid scales on anteroventral

surface of body. Body scales extending onto basal fin rays or membranes of bases of dorsal, anal, pectoral, and caudal fins. Lateral line gently sloping downward from posterodorsal corner of opercle. Series of pored lateral-line scales complete (but incomplete in SNFR 13482 owing to loss of scales from body during capture). Pair of small pores just behind symphyseal knob of lower jaw in ventral view. Underside of dentary with 3 large sensory pores on each side.

Posterior margin of maxilla extending slightly beyond a vertical drawn through posterior margin of pupil. No distinct longitudinal ridge on lateral surface of maxilla. Jaws with villiform tooth bands. Width of symphyseal gap separating premaxillary teeth bands subequal to width of each band. Vomerine and palatine teeth villiform, forming V-shaped and elliptical tooth patches respectively.

Dorsal profile of snout steep, forming angle of about 40 degrees with respect to horizontal axis of head and body. Nasal spine simple, directed dorsally, base embedded in skin. Ascending process of premaxilla not intruding into interorbital space, with its posterior tip of process extending beyond level of anterior margin of posterior nostril in dorsal view. Median interorbital ridge absent. Interorbital ridges weakly developed and unbranched, separated by shallow channel. Interorbital space moderately shallow, with about one-fifth of orbit extending above dorsal profile of head. Preocular, supraocular, postocular, and tympanic spines simple (tips of preocular, supraocular, and postocular spines bifurcate in SNFR 13482). Minute, simple coronal spine present in SNFR 13522, absent in SNFR 13482. Interorbital and pretympanic spines absent. Occipital region nearly flat, with low ridges between tympanic and parietal spines. Parietal and nuchal spines simple, joined at base. Upper posttemporal spine absent. Lower posttemporal and supracleithral spines simple. Cleithral spine large, broad at base.

Lateral lachrymal spine present in SNFR 13522, absent in SNFR 13482. Anterior lachrymal spine broad, not pointed. Posterior lachrymal spine simple, triangular, directed ventroposteriorly. Five to 9 suborbital spines; an additional spine present below suborbital ridge, located along a vertical drawn through posterior margin of pupil. Space between ventral margin of eye and suborbital ridge narrow. Suborbital pit indistinct. Preopercle with 4 or 5 spines (on left and right sides, respectively in SNFR 13482 and SNFR 13552), former specimen lacking second preopercular spine; second opercular spine minute if present; uppermost spine largest with supplemental preopercular spine its base. Preopercle smooth above uppermost preopercular spine, lacking serrae or spine in that region. Upper opercular spine simple without median ridge. Lower opercular spine simple with low median ridge. Space between upper and lower opercular spines without ridges. Posterior tips of upper and lower opercular spines respectively short of and just reaching (or just short of in SNFR 13522) opercular margin.

Origin of first dorsal-fin spine slightly posterior to a vertical drawn through supracleithral spine base. Posterior margin of opercular membrane reaching vertical drawn through base of third dorsal-fin spine. Posterior tip of pectoral fin extending beyond anus but not reaching to origin of anal

Table 1. Counts and measurements of *Idiastion pacificum*.

	Holotype		
	BSKU 31153	SNFR 13482	SNFR 13522
Standard length (mm)	128.4	124.0	148.6
Counts:			
Dorsal-fin rays	XII, 9	XII, 9	XII, 9
Anal-fin rays	III, 5	III, 5	III, 5
Pelvic-fin rays	i+6+xi=18	i+7+ix=17	i+7+xi=19
Scale rows in longitudinal series	–	47	45
Pored lateral line scales	26	24	24
Scales above lateral line	–	8	8
Scales below lateral line	–	12	11
Predorsal-fin scale rows	–	12	11
Gill rakers	6+12=18	6+12=18	6+12=18
Branchiostegal rays	7	7	7
Total vertebrae	25	25	25
Measurements (% standard length)			
Head length	46.0	44.8	44.4
Body depth	37.2	35.7	35.6
Body width	21.7	18.2	18.7
Head width	23.4	22.7	21.7
Snout length	9.9	9.8	9.8
Orbital diameter	15.2	14.0	13.7
Interorbital width at midline of eye	3.7	5.2	4.4
Upper jaw length	22.6	21.1	21.4
Maxillary depth	6.9	6.9	6.2
Postorbital length	21.4	20.4	19.1
Predorsal-fin length	43.7	42.0	40.8
Preanal-fin length	70.4	71.0	73.4
Prepelvic-fin length	45.8	42.0	44.8
1st dorsal-fin spine length	5.4	6.0	6.7
2nd dorsal-fin spine length	Broken	10.2	9.6
3rd dorsal-fin spine length	Broken	14.4	14.0
4th dorsal-fin spine length	12.1	13.6	13.7
5th dorsal-fin spine length	11.1	12.0	12.6
6th dorsal-fin spine length	9.5	Broken	11.4
11th dorsal-fin spine length	5.2	5.8	5.3
12th dorsal-fin spine length	9.3	9.7	9.5
1st anal-fin spine length	7.1	8.1	8.8
2nd anal-fin spine length	13.9	15.0	15.1
3rd anal-fin spine length	11.8	11.5	12.9
Pectoral-fin length	29.2	26.9	27.8
Pelvic-fin spine length	12.3	13.5	12.7
Caudal-fin length	21.3	21.3	Broken
Caudal peduncle length	19.8	18.1	17.0
Caudal peduncle depth	8.8	8.8	8.9

fin. Origin of pelvic fin just below origin of pectoral fin. Posterior tip of depressed pelvic fin not reaching origin of anal fin. Origin of first anal-fin spine slightly posterior to a vertical drawn through last dorsal-fin spine.

Gill rakers relatively short and spinous, length of longest gill raker on lower limb of first gill arch approximately equal to or shorter than length of gill filament; slit present behind fourth gill arch. Formula for configuration of anterior neural spines and anterior dorsal pterygiophores

0//2+1/1/1/1/1/1/1/1/1+1/. Dorsal series of caudal-procurrent rays 6, ventral series 4 or 5. Swimbladder present.

*Color when fresh* (based on photograph of SNFR 13482: Fig. 1). Body reddish dorsally, becoming whitish ventrally, without any distinct black markings (except for black of eye). Two broad, dark red bands from eye to lower preopercular margin and middle of opercular margin. Four obscure saddle-like bands on dorsal body: first band above pectoral-



Fig. 1. *Idiastion pacificum*, 124.0 mm SL, SNFR 13482, fresh specimen, central North Pacific.

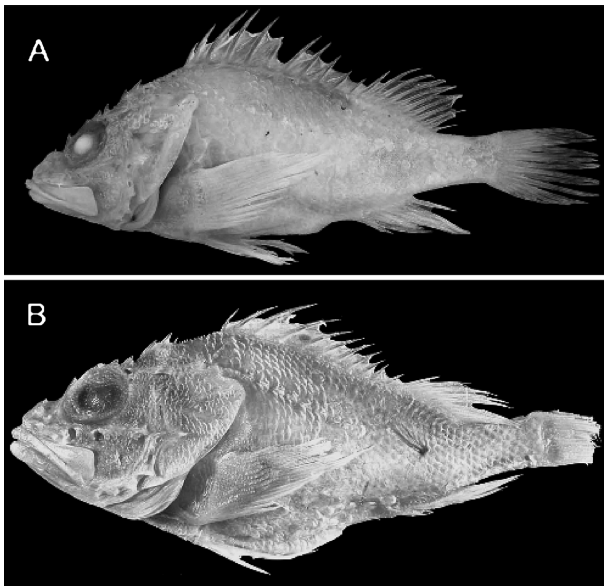


Fig. 2. Two species of the genus *Idiastion*. A, *Idiastion pacificum*, 124.0 mm SL, SNFR 13482, preserved specimen, central North Pacific; B, *Idiastion kyphos*, 83.0 mm SL, preserved specimen, CAS 31886, Caribbean Sea.

fin base, second below middle of spinous portion of dorsal fin, third below soft-rayed portion of dorsal fin, and fourth on caudal-fin base. Membranes of spinous portion of dorsal fin uniformly red. Membranes of soft-rayed portion of dorsal and anal fins and caudal fin transparent, their soft rays reddish. Pectoral fin reddish centrally, whitish marginally. Pelvic fin pinkish.

**Color in ethanol** (Fig. 2A). Head and body entirely pale yellow, with large number of scattered small melanophores on cheek, pectoral-fin base, lateral side of posterior body, and caudal-peduncle region.

**Distribution.** Currently known from the western North Pacific [Kyushu-Palau Ridge, at a depth of 355–375 m (Kanayama 1982; Ishida and Amaoka 1992)] and the Emperor Seamounts, central North Pacific (at depths between 350–430 m, present study).

**Remarks.** The present specimens from the central North Pacific agree with all diagnostic characters of *Idiastion pacificum* given by Ishida and Amaoka (1992) except for the presence of ctenoid scales on the maxilla. One of

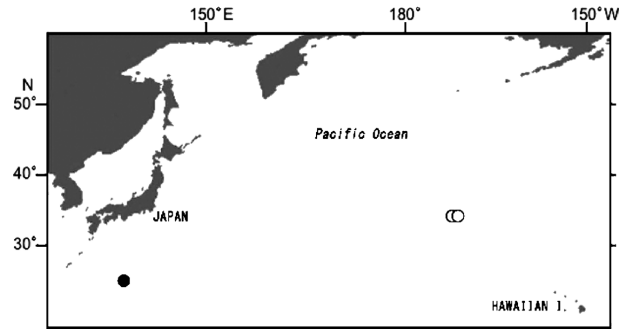


Fig. 3. Distributional records of the holotype (closed circle) and the specimens in the present study (open circles) of *Idiastion pacificum*.

the present specimens (SNFR 13522) and the holotype of *I. pacificum* have small ctenoid scales on the maxilla, whereas the other present specimen (SNFR 13482) lacks such scales. The scales on this area are deciduous, though, and SNFR 13522 and the holotype have only a few scales on the left and right sides of the maxilla. Therefore, we conclude that the lack of the scales on the maxilla in SNFR 13482 is due to loss during capture.

According to Ishida and Amaoka (1992), the longest dorsal-fin spine of the holotype of *I. pacificum* was the fourth. When, we reexamined the holotype, we noticed that the tip of the third spine was broken but that its length was the same as the data given in the original description. This indicates that the tip of the spine was broken before the type specimen was described. In the present two specimens, the fins are complete and the longest dorsal-fin spine in both instances is the third.

The fresh coloration of our specimens agrees with the color photograph of "*Scorpaenidae* sp." in Kanayama (1982), identified as *I. pacificum* in Ishida and Amaoka (1992). Unfortunately, that specimen [its catalog number was not shown by Kanayama (1982)] has not been rediscovered since Ishida and Amaoka (1992) noted that it was missing.

Dissection of the abdomen on the right side of the smaller present specimen of *I. pacificum* (124.0 mm SL, SNFR 13482) showed it to have mature ovaries full of relatively large eggs (ca. 0.4 mm diameter) at several developmental stages. Information on sexual maturity in the genus *Idiastion* is limited to the holotype with mature ova of *I. hageyi* (95 mm SL; McCosker 2008). In our examination of specimens of *I. kyphos*, both GMBL 2332 (66.2 and 79.0 mm SL) and CAS 31886 (83.0 mm SL) proved to have expanded ovaries full of relatively large eggs (ca. 0.4 mm diameter), and these observations represent the first confirmed information about sexual maturity in that species.

The present study revealed that *I. pacificum*, previously known only from Kyushu-Palau Ridge, is also distributed in the central North Pacific, approximately 3,500 km northeast of the type locality (Fig. 3). As for its congeners, *I. kyphos* is known from the Caribbean Sea and off Florida in the western North Atlantic, and also off Angola in the eastern South Atlantic, in depths of ca. 229–622 m (Eschmeyer 1969; An-



derson *et al.* 1975), and *I. hageyi* is known only from the Galápagos Islands at a depth of 522 m. Thus, the genus *Idiastion* is distributed in deep waters in temperate and tropical regions, with a reddish body color similar to that of many other deep-water species of scorpionfish (Eschmeyer 1965b; McCosker 2008: fig. 2).

**Comparison.** Ishida and Amaoka (1992) noted that *I. pacificum* could be distinguished from *I. kyphos* in having "ctenoid scales on nape and maxilla, and cycloid scales on isthmus, breast, anterior part of belly and membrane of anal, lower part of pectoral and pelvic fins", although they did not make a direct comparison of these species (Fig. 2). In this study, we compared the two species and confirmed that *I. kyphos* (Fig. 2B) also possesses ctenoid scales on the nape and maxilla and mixed cycloid and ctenoid scales on the isthmus, breast, and fin membranes. However, *I. pacificum* differs from *I. kyphos* in having cycloid scales on the ventral surface of the abdomen (vs ctenoid scales in *I. kyphos*) and in the origin of the first dorsal-fin spine, which is located slightly posterior to a vertical drawn through the supracleithral spine base (vs just above the supracleithral spine base in *I. kyphos*). Also, *I. pacificum* (124.0–148.6 mm SL) attains a larger size than *I. kyphos* does (105.4 mm maximum recorded SL; Anderson *et al.* 1975).

*Idiastion pacificum* is clearly distinguished from *I. hageyi* in having scales in the interorbital region (vs no scales there in *I. hageyi*), and in that the posterior tip of the pectoral fin does not reach the anal-fin origin (it exceeds the anal-fin origin in *I. hageyi*; McCosker 2008). Moreover, the relative length of the head of *I. pacificum* is remarkably shorter than that of *I. hageyi* (44.4–46.0% SL vs. 50.7% SL in *I. hageyi*; McCosker 2008).

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