

# Distributional range extension of a rare scorpionfish, *Hipposcorpaena filamentosa* (Actinopterygii, Scorpaeniformes, Scorpaenidae)

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## Abstract

The distributional range of *Hipposcorpaena filamentosa* Fowler, 1938, previously recorded only from the Philippines, Indonesia, and Papua New Guinea is extended to include South Africa and Australia, on the basis of two specimens (17.2–29.5 mm standard length) which are described in detail. In addition, the first underwater photograph of *H. filamentosa*, taken at Kashiwa-jima Island, Kochi, Japan, is included. The species is apparently widely distributed in the Indo-West Pacific.

## Keywords

Australia, description, Japan, morphology, new records, South Africa

## Introduction

The monotypic genus *Hipposcorpaena* (Scorpaenidae), represented by *Hipposcorpaena filamentosa* Fowler, 1938, was originally described based on a single specimen collected from the Philippines (Fowler 1938). Although the status of the genus has been questioned, with its relation to *Rhinopias* Gill, 1905 (Eschmeyer et al. 1973; Poss 1999), a review of *Hipposcorpaena* based on the holotype and two non-type specimens of *H. filamentosa* by Motomura and Senou (2005) reassured its validity. Since then, no additional specimens have been reported. However, two small scorpionfish specimens from the southwestern Indian Ocean and north-western Australia, found recently by HM in the collections of the South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB) and Museums Victoria, Mel-

bourne (NMV), respectively, are herein identified as *H. filamentosa*, as is an underwater photograph of a scorpionfish from Kashiwa-jima Island, Kochi, Japan. The specimens are described in detail and distributional records of *H. filamentosa*, previously known only from the type locality, Indonesia and Papua New Guinea, are reviewed.

## Methods

Counts and measurements followed Motomura and Senou (2005). The last two soft rays of the dorsal and anal fins were counted as single rays, each pair being associated with a single pterygiophore. Standard length is abbreviated as SL. The terminology of the head spines follows Randall and Eschmeyer (2001: fig. 1).

## Results

### Family Scorpaenidae Risso, 1827

### *Hipposcorpaena* Fowler, 1938

#### *Hipposcorpaena filamentosa* Fowler, 1938

[Standard English name (Australia): Filamentous Scorpionfish; new standard Japanese name: Itohiki-kasago]

Figs 1–3; Table 1

**Material examined.** 2 specimens. NMV A 29729-041, 29.5 mm SL, Ashmore Islands, Western Australia, 12°26'42"–58"S, 123°36'03"–35"E, 95 m, beam trawl, RV *Southern Surveyor*, 7 July 2007; SAIAB 57321, 17.2 mm SL, Aliwal Shoal off Scottburgh, KwaZulu-Natal, South Africa, 30°18'S, 30°48'E, 34–36 m, A. Bentley et al., 9 February 1998.

**Description.** Meristics and morphometrics of the specimens are shown in Table 1. Dorsal fin with 11 or 12 spines and 9 or 10 soft rays; all rays, except posteriormost, divided into 2 at base, unbranched; 1<sup>st</sup> spine length less than half that of 2<sup>nd</sup> spine; 2<sup>nd</sup> or 3<sup>rd</sup> spine longest, length much greater than upper-jaw length; 2<sup>nd</sup> to 10<sup>th</sup> (3<sup>rd</sup> to 10<sup>th</sup> in small specimen) spines progressively shorter; interspinous membranes of adjacent dorsal-fin spines reaching tips of posterior spines, except 2<sup>nd</sup>, 11<sup>th</sup>, and 12<sup>th</sup> (2<sup>nd</sup> and 11<sup>th</sup> in small specimen) spines; 5<sup>th</sup> ray longest (broken in small specimen); 5<sup>th</sup> to last soft rays progressively shortening; intersoft-rayed membrane reaching tips of posterior rays; posterior branch of last soft ray joined by membrane to caudal peduncle for less than half its length. Anal fin with 2 spines and 6 soft rays; all rays, except posteriormost, divided into 2 at base, unbranched; 1<sup>st</sup> spine 2.6 in 2<sup>nd</sup> spine; 1<sup>st</sup> to 4<sup>th</sup> soft rays progressively lengthening, 4<sup>th</sup> longer than longest dorsal-fin soft ray; 4<sup>th</sup> to 6<sup>th</sup> soft rays progressively shortening; posterior branch of last soft ray joined by membrane to caudal peduncle for less than one-sixth its length; membranes between rays weakly notched. Pectoral fin with 14 rays, all rays unbranched; 2<sup>nd</sup> to 7<sup>th</sup> rays progressively shortening (about equal length in small specimen); 9<sup>th</sup> ray longest, length slightly greater than head length; 9<sup>th</sup> to lowermost rays progressively shortening; membranes between 2<sup>nd</sup> and 7<sup>th</sup> rays reaching tip of each ray; membranes between 8<sup>th</sup> and lowermost rays strongly notched, membranes between 9<sup>th</sup> and lowermost rays extending to one-third to half (half to two-thirds in small specimen) length of each upper adjacent ray; lower 7 rays filamentous. Pelvic fin with 1 spine and 5 soft rays, 1<sup>st</sup> to 3<sup>rd</sup> soft rays branched, remaining rays unbranched; 2<sup>nd</sup> soft ray longest, longer than upper jaw length. Caudal fin with 14 rays, all unbranched; 8<sup>th</sup> (counted from above) ray longest, slightly greater (shorter in small specimen) than body depth.

Longitudinal scale rows 53 (not obvious in small specimen); pored lateral-line scales 22 (counted from right side in large specimen); scale rows between origin of last dorsal-fin spine and lateral line 8 (not obvious in small

**Table 1.** Morphometrics (expressed as percentages of standard length) of *Hipposcorpaena filamentosa*.

|  | This study   |           | Motomura and Senou (2005) |        |
|--|--------------|-----------|---------------------------|--------|
|  | South Africa | Australia | Philippines               |        |
|  | SAIAB        | NMVA      | KPM-NI                    | USNM   |
|  | 57321        | 29729-041 | 13005                     | 168183 |
| Standard length [mm]                                     | 17.2         | 29.5      | 35.2                      | 31.1   |
| Body depth   | 40.6         | 39.7      | 39.5                      | 41.2   |
| Body width   | 9.0          | 11.5      | 16.8                      | 13.5   |
| Head length  | 46.0         | 49.5      | 48.0                      | 46.9   |
| Snout length   | 20.0         | 23.9      | 24.1                      | 21.2   |
| Orbit diameter   | 9.2          | 9.8       | 9.9                       | 10.9   |
| Interorbital width <sup>a</sup>                          | 7.5          | 7.0       | 6.3                       | 6.4    |
| Interorbital width <sup>b</sup>                          | 9.3          | 9.9       | 9.1                       | 8.7    |
| Upper-jaw length   | 18.0         | 18.5      | 19.0                      | 18.0   |
| Postorbital length                                       | 19.1         | 16.4      | 17.0                      | 17.4   |
| Pre-dorsal-fin length                                    | 41.0         | 43.7      | 41.5                      | 39.9   |
| Pre-anal-fin length                                      | 67.0         | 70.4      | 71.6                      | 68.8   |
| Pre-pelvic-fin length                                    | 43.5         | 38.7      | 40.3                      | 38.6   |
| 1 <sup>st</sup> dorsal-fin spine length                  | 13.7         | 12.9      | 11.4                      | —      |
| 2 <sup>nd</sup> dorsal-fin spine length                  | 33.8         | 26.7      | 22.7                      | —      |
| 3 <sup>rd</sup> dorsal-fin spine length                  | 32.7         | 27.6      | 21.9                      | —      |
| 4 <sup>th</sup> dorsal-fin spine length                  | 29.3         | 23.9      | 18.5                      | 22.5   |
| 5 <sup>th</sup> dorsal-fin spine length                  | 27.0         | 19.9      | 15.1                      | 19.6   |
| 6 <sup>th</sup> dorsal-fin spine length                  | 22.5         | 17.1      | 13.6                      | —      |
| 7 <sup>th</sup> dorsal-fin spine length                  | 20.2         | 15.4      | 12.8                      | —      |
| 8 <sup>th</sup> dorsal-fin spine length                  | 16.8         | 12.9      | 11.1                      | 12.9   |
| 9 <sup>th</sup> dorsal-fin spine length                  | 10.6         | 9.7       | 8.5                       | 9.3    |
| 10 <sup>th</sup> dorsal-fin spine length                 | 7.8          | 4.9       | 5.4                       | 6.1    |
| 11 <sup>th</sup> dorsal-fin spine length                 | 17.5         | 5.6       | 5.1                       | 5.5    |
| 12 <sup>th</sup> dorsal-fin spine length                 | absent       | 15.6      | 13.9                      | 14.1   |
| 1 <sup>st</sup> dorsal-fin soft ray length               | 17.8         | 18.1      | 16.2                      | —      |
| 2 <sup>nd</sup> dorsal-fin soft ray length               | —            | 21.0      | 17.6                      | —      |
| 3 <sup>rd</sup> dorsal-fin soft ray length               | —            | 23.0      | 17.9                      | —      |
| 4 <sup>th</sup> dorsal-fin soft ray length               | —            | 24.0      | 19.3                      | —      |
| 5 <sup>th</sup> dorsal-fin soft ray length               | —            | 25.1      | 19.3                      | —      |
| 6 <sup>th</sup> dorsal-fin soft ray length               | 19.8         | 21.3      | 19.0                      | —      |
| 7 <sup>th</sup> dorsal-fin soft ray length               | 19.1         | 20.7      | 15.1                      | —      |
| 8 <sup>th</sup> dorsal-fin soft ray length               | 18.1         | 17.2      | 12.8                      | —      |
| 9 <sup>th</sup> dorsal-fin soft ray length <sup>c</sup>  | 15.5         | 14.1      | 10.2                      | —      |
| 9 <sup>th</sup> dorsal-fin soft ray length <sup>d</sup>  | absent       | 12.7      | 8.0                       | —      |
| 10 <sup>th</sup> dorsal-fin soft ray length <sup>c</sup> | 12.3         | absent    | absent                    | absent |
| 10 <sup>th</sup> dorsal-fin soft ray length <sup>d</sup> | 9.9          | absent    | absent                    | absent |
| 1 <sup>st</sup> anal-fin spine length                    | 6.7          | 4.4       | 4.3                       | —      |
| 2 <sup>nd</sup> anal-fin spine length                    | 16.9         | 10.7      | 10.2                      | —      |
| 1 <sup>st</sup> anal-fin soft ray length                 | 18.9         | 18.6      | 16.2                      | —      |
| 2 <sup>nd</sup> anal-fin soft ray length                 | 20.9         | 22.4      | 20.2                      | —      |
| 3 <sup>rd</sup> anal-fin soft ray length                 | 21.0         | 27.5      | 23.6                      | —      |
| 4 <sup>th</sup> anal-fin soft ray length                 | 21.3         | 28.7      | 24.1                      | —      |
| 5 <sup>th</sup> anal-fin soft ray length                 | 18.2         | 26.1      | 23.0                      | —      |
| 6 <sup>th</sup> anal-fin soft ray length <sup>c</sup>    | 16.6         | 20.9      | 19.3                      | —      |
| 6 <sup>th</sup> anal-fin soft ray length <sup>d</sup>    | 14.8         | 18.1      | 15.3                      | —      |
| Pectoral-fin ray length                                  | 49.5         | 51.1      | 49.4                      | 47.9   |
| Pelvic-fin spine length                                  | 25.2         | 14.6      | 14.5                      | —      |
| 1 <sup>st</sup> pelvic-fin soft ray length               | 25.4         | 21.9      | 19.3                      | —      |
| 2 <sup>nd</sup> pelvic-fin soft ray length               | 27.4         | 26.5      | 21.9                      | —      |
| 3 <sup>rd</sup> pelvic-fin soft ray length               | 24.6         | 26.4      | 21.6                      | —      |
| 4 <sup>th</sup> pelvic-fin soft ray length               | 19.1         | 20.9      | 18.5                      | —      |
| 5 <sup>th</sup> pelvic-fin soft ray length               | 17.0         | 17.9      | 14.2                      | —      |
| Caudal-fin length  | 34.8         | 43.4      | 40.9                      | —      |
| Caudal-peduncle length                                   | 14.9         | 14.6      | 14.5                      | 14.1   |
| Caudal-peduncle depth                                    | 9.4          | 9.9       | 9.7                       | 10.3   |

<sup>a</sup> at posterior end of preocular spine base, <sup>b</sup> at vertical midline of eye, <sup>c</sup> anterior element, <sup>d</sup> posterior element.

specimen). Gill rakers on upper limb 5 or 6, on lower limb 14–16, including 5 or 6 rakers on hypobranchial; gill rakers short, spinous, longest raker on 1<sup>st</sup> gill arch less than one-fourth length of longest gill filament; 4<sup>th</sup> gill slit closed by membrane.

Body and head strongly compressed, head width less than greatest body width. Body moderately deep, deepest at origin of 2<sup>nd</sup> dorsal-fin spine. Head large, length greater than body depth. Posterior lacrimal spine with rounded tentacle, length approximately equal to orbit diameter (slightly greater than pupil diameter in small specimen). Large tentacle on supraocular spine, its length greater than orbit diameter. Pair of tentacles projecting from anterior surface of lip at symphysis of upper jaw. Tentacle on posterior margin of anterior nostril, length less than posterior lacrimal tentacle. Small tentacle on cheek (absent in small specimen). Three to four tentacles along preopercular margin; lowermost largest, elliptical, length less than pupil diameter; uppermost slender, on uppermost preopercular spine (absent in large specimen). Two obvious tentacles on each side of ventral surface of mandible, 1<sup>st</sup> simple, long, slender, located between 1<sup>st</sup> and 2<sup>nd</sup> dentary pores; 2<sup>nd</sup> larger, on posterior margin of dentary. Few tentacles on lateral-line scales. Small elliptical fleshy tentacles on outer part of eye membrane. Few tiny tentacles on spinous portion of dorsal fin and 7 uppermost rays of pectoral fin (absent in large specimen).

Numerous small papillae covering head and body. Posterior nostril opening upward, diameter about equal to anterior nostril, not visible laterally. Two distinct sensory pores, 1<sup>st</sup> anterior to anterior nostril, 2<sup>nd</sup> between anterior and posterior nostrils (not obvious in small specimen). Underside of dentary with 3 small sensory pores on each side, small pore behind nodular portion of lower jaw on each side. No scales on surface of head, including opercle, interorbital space, and occipital pit. Body covered with small cycloid scales, not extending onto fins. Embedded scales covering pectoral-fin base (not obvious in small specimen). No scales on ventral body surface.

Mouth oblique, forming an angle of ca. 30 degrees to horizontal axis of head and body. Posterior margin of maxilla not reaching (just reaching in small specimen) vertical level of anterior margin of orbit. Lateral surface of maxilla smooth, without ridges. Lower jaw with thickened symphyseal portion fitting into shallow median depression of upper jaw when mouth completely closed. Width of symphyseal gap separating premaxillary teeth bands broader than width of each band. Upper and lower jaws with approximately equal-width bands of villiform teeth; majority of upper- and lower-jaw teeth of similar length. Vomer with narrow patch of villiform teeth. No teeth on palatine.

Dorsal profile of snout strongly curved, initially convex, thereafter deeply concave (steep anterior to orbit, but slightly concave behind ascending process of premaxilla in small specimen). Nasal spine simple, small, directed dorsoposteriorly (indistinct in small specimen). Posterior margin of ascending process of premaxilla not reaching vertical level of posterior nostril. Interorbital ridges present, low, beginning level with supraocular spine and ending at base of postocular spine. Interorbital space relatively narrow, deep (broader and shallower in small specimen), forming V-shape in anterior view. Preocular spine

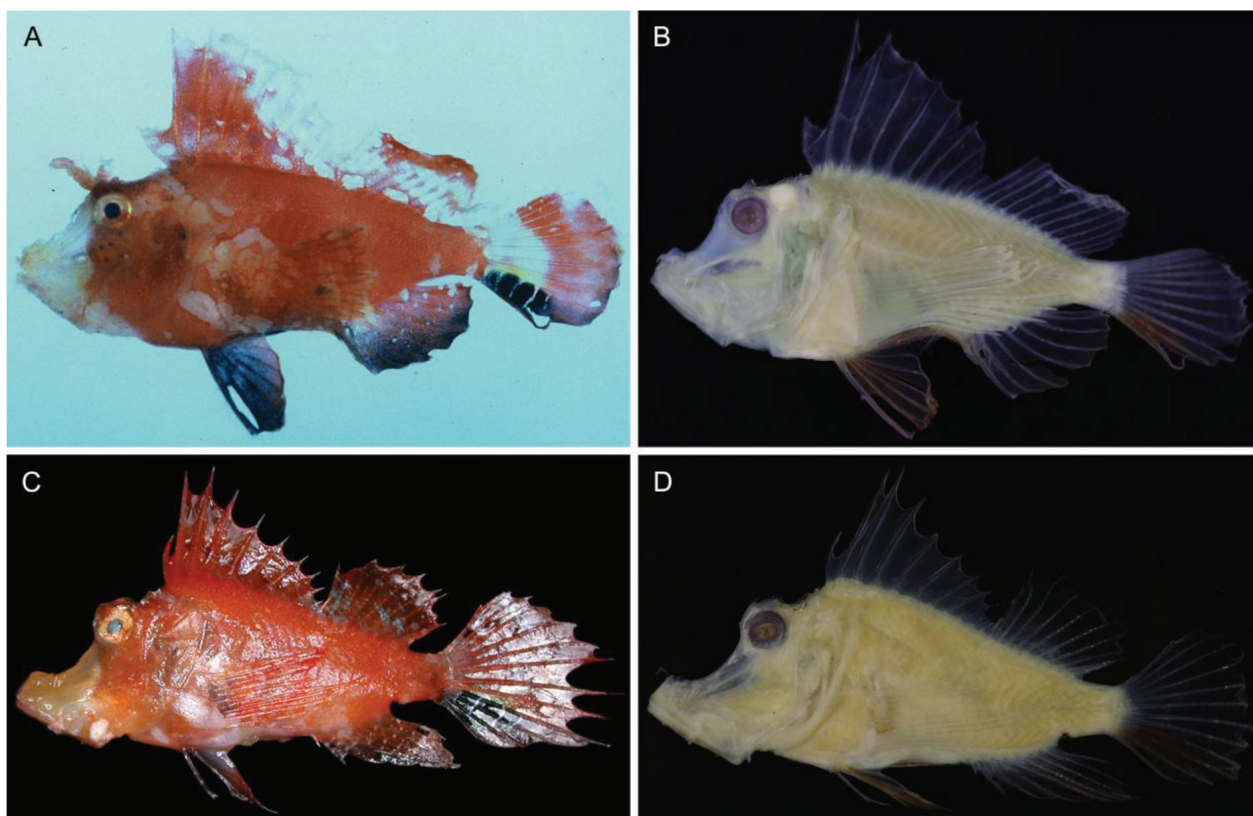
simple (not obvious in small specimen), directed upward, tip extending slightly beyond horizontal line through upper margin of pupil in lateral view. Supraocular spine simple, located considerably anterior to vertical midline of eye. Postocular spines simple, triangular in lateral view. Tympanic spine simple, small, directed upward. No coronal spines. Occipital pit shallow, behind distinct transverse ridge, curved posteriorly in dorsal view. Parietal and nuchal spines well developed, joined at base. Sphenotic with 1 small spine. Postorbital with 4 short, small, pointed spines (smooth without ridge or spines in small specimen). Pterotic spine simple, small, pointed, with narrow base, located just above uppermost end of preopercular ridge. Posttemporal spine simple, pointed, small, directed dorsoposteriorly; no upper posttemporal spine. Supracleithral spine simple, pointed.

Lateral surface of lacrimal with 5 low ridges radiating from center, but lacking spines; uppermost end of upwardly directed ridge with bump directly below posterior nostril; anterior end of forward ridge and lower end of downward ridge not projecting over upper lip. Suborbital ridge very low, with 4 small spines in large specimen (1<sup>st</sup> spine located above posterior margin of maxilla, 2<sup>nd</sup> just below anterior margin of orbit, 3<sup>rd</sup> and 4<sup>th</sup> adjoining, below posterior part of orbit); 3 spines in small specimen (1<sup>st</sup> spine just above tip of posterior lacrimal spine; 2<sup>nd</sup> and 3<sup>rd</sup> spines adjoining, below posterior part of orbit). Broad space between ventral margin of orbit and suborbital ridge. Suborbital pit shallow, front rimmed by an oblique low lacrimal ridge. Preopercle with 4 blunt spines; uppermost spine largest with low median ridge; 2<sup>nd</sup> with low median ridge; 3<sup>rd</sup> and 4<sup>th</sup> spines without median ridge. No supplemental preopercular spine. Upper and lower opercular spines simple, each with median ridge; lower spine almost horizontal.

Origin of 1<sup>st</sup> dorsal-fin spine above posttemporal spine base. Posterior margin of opercular membrane and upper end of pectoral-fin base extending slightly beyond vertical from base of 3<sup>rd</sup> dorsal-fin spine. Posterior tip of longest pectoral-fin ray extending beyond vertical from posterior end of anal-fin base. Origin of pelvic fin slightly anterior to base of pectoral fin; posterior tip of depressed pelvic fin extending slightly beyond anus (extending to 2<sup>nd</sup> anal-fin spine base in small specimen). Origin of 1<sup>st</sup> anal-fin spine slightly posterior to origin of last dorsal-fin spine.

**Color of fresh specimens** (Fig. 1A, C). Body red-brown with whitish blotches surrounding pectoral-fin base. Snout whitish, posterior half of head red with distinct small black or purplish spots below orbit. Dorsal fin red, posterior of spinous and soft ray portions with broad white band or whitish irregular markings or spots, basal area with 2–4 whitish spots (width slightly larger than pupil diameter). Pelvic fin blackish or reddish. Anal fin reddish basally, blackish distally. Caudal fin reddish posteriorly, whitish anteriorly, with black spots on lower rays (3 spots between 10<sup>th</sup> and 12<sup>th</sup> rays in large specimen, 4 on four lowermost rays in small specimen).





**Figure 1.** Photographs of *Hipposcorpaena filamentosa*. (A) fresh and (B) preserved specimens of SAIAB 57321, 17.2 mm SL, South Africa, and (C) fresh and (D) preserved specimens of NMV A 29729-041, 29.5 mm SL, Australia. Fresh South African and Australian specimen photos by P. Heemstra and M. Gomon, respectively and also available on the websites of [http://fishwatch.tri-pod.com/REPORTS/FW\\_final\\_2006\\_files/page0002.htm](http://fishwatch.tri-pod.com/REPORTS/FW_final_2006_files/page0002.htm) and <https://fishesofaustralia.net.au/home/species/2673>, respectively.



**Figure 2.** Underwater photograph of *Hipposcorpaena filamentosa*, taken at Kashiwa-jima Island, Kochi, Japan, at a depth of 45 m on 10 May 2007 (Photo by K. Matsuno).

**Color of preserved specimens** (Fig. 1B, D). Head and body uniformly pale yellowish. Dorsal fin translucent. Pelvic fin translucent brownish. Anal fin translucent with brownish margin. Caudal fin translucent, with obvious dark brown spots on lower basal region.

**Color in life.** In general, similar to color when fresh (see Allen and Erdmann 2012: 224, unnumbered fig.; this study: Fig. 2).

**Distribution.** *Hipposcorpaena filamentosa* is widely distributed in the Indo-West Pacific (Fig. 3), being recorded from South Africa (Aliwal Shoal off Scottburgh), Japan (Kashiwa-jima Island), and Australia (Ashmore Islands), as well as previously from the Philippines (Luzon, Mindanao, and Sulu islands) (Fowler 1938; Motomura and Senou 2005), Indonesia (Lembeh Strait and Bali), and Papua New Guinea (Milne Bay Province) (Allen and Erd-



**Figure 3.** Distributional records of *Hipposcorpaena filamentosa*, based on previous studies (circles) and this study (stars). Closed and open symbols indicate specimen- and underwater photograph-based records, respectively.

mann 2012). Previously reported from depths of 10–51 m (Fowler 1938; Motomura and Senou 2005; Allen and Erdmann 2012), the South African and Australian specimens were collected in depths of 34–36 m and 95 m, respectively, and the Japanese underwater photograph was taken at 45 m.

## Discussion

The specimens collected from South Africa and Australia (Fig. 1) were identified as *Hipposcorpaena filamentosa* on the basis of the following combination of characters, which agreed well (except for dorsal-fin ray number of the South African specimen) with the diagnostic features given for the species by Motomura and Senou (2005): dorsal fin with 12 spines and 9 soft rays; anal fin with 2 spines and 6 soft rays; all dorsal- and anal-fin soft rays (except the last ray of each fin which was divided into 2 at the base) and all pectoral- and caudal-fin rays unbranched; 14 pectoral-fin rays, the longest ray extending well beyond vertical through the posterior end of the anal-fin base, lower ca. 7 rays filamentous; head and body strongly compressed; body deep, depth 39.5%–41.2% of SL; no palatine teeth; body covered with cycloid scales; interorbital ridges and tympanic spine present; posttemporal spine simple, upper posttemporal spine absent; and distinct dark brown markings on the lower part of the caudal fin. In addition, an underwater photograph from Kashiwa-jima Island, Japan (Fig. 2) was also identified as *H. filamentosa*, the body appearance, including filamentous pectoral-fin rays and black markings on the lower part of the caudal fin of the individual, clearly matching the species description (see Motomura and Senou 2005: fig. 1; Allen and Erdmann 2012: 224, unnumbered fig.).

The South African specimen differed slightly from all other known specimens of *H. filamentosa* in having XI, 10 dorsal-fin rays (vs. XII, 9 in the latter). However, Allen and Erdmann (2012) reported a similar dorsal-fin ray configuration in underwater photographs of *H. filamentosa*

from Indonesia and Papua New Guinea. Accordingly, a variable number of dorsal-fin rays in *H. filamentosa* is considered to represent intraspecific variation only.

The South African specimen was a small subadult or juvenile (17.2 mm SL), with the occipital pit surface, teeth, maxilla, and most head spines relatively weak. In addition, the nasal and opercular spines were indistinct and difficult to observe. The snout profile (length and angle) differed between the former (Fig. 1A, B) and specimens from other localities (29.5–35.2 mm SL; Motomura and Senou 2005: fig. 1; this study: Fig. 1C, D), suggesting an ontogenetic change.

Although the snout colors of *H. filamentosa* (whitish with small blackish or purplish spots below the orbit) had been lost in the preserved specimens, such colors are consistent in living and fresh specimens (see Motomura and Senou 2005: fig. 1; Allen and Erdmann 2012: 224, unnumbered fig.; this study: Figs 1A, C, 2), and, in addition to black spots on the lower basal caudal fin, are strongly diagnostic of the species.

*Hipposcorpaena filamentosa* is very similar to species of *Rhinopias* in having the head and body strongly compressed, body depth 38%–54% of SL, body covered with cycloid scales, and no palatine teeth (Eschmeyer et al. 1973; Poss 1999). However, *Hipposcorpaena* is generically distinct from the latter in several aspects, including some meristics, head spination, and coloration. Detailed generic characters of *Hipposcorpaena* and comparisons with related genera were given by Motomura and Senou (2005).

The new standard Japanese name “Itohiki-kasago” is herein proposed for *H. filamentosa*, “itohiki” meaning “filament” in reference to the filamentous pectoral fin rays and “kasago” being the common Japanese name for scorpionfish.

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