

## *Choerichthys hadiatyae*, a new species of pipefish (Syngnathidae) from the Fakfak Peninsula of West Papua Province, Indonesia

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### Keywords

Taxonomy, coral reef fishes, Indo-Pacific region.

### Abstract

A new species of syngnathid pipefish, *Choerichthys hadiatyae* is described from the Fakfak Peninsula of West Papua Province, Indonesia on the basis of a single female specimen, 34 mm SL collected from coral reef habitat in 2–15 m depth. It is distinguished from other members of the genus on the basis of a combination of features including 16 dorsal-fin rays, 11 pectoral rays, 15 trunk rings, 25 tail rings, and overall dark coloration with pronounced white bars ventrally on lower jaw and radiating from eye, and white spots and short bands along edge of gill opening. It also has a shorter head (7.0 in SL) and shorter snout (2.9 in head length) compared to congeners.

### Zusammenfassung

Die neue Art der Seenadeln (Syngnathidae) wird von der Halbinsel Fakfak, Provinz Westpapua, Indonesien, auf der Grundlage eines einzelnen weiblichen Exemplars mit 34 mm SL beschrieben, das im Korallenriff-Habitat in 2–15 m Tiefe gefangen worden war. Es unterscheidet sich von anderen Angehörigen der Gattung durch ein Bündel von Merkmalen, darunter 16 Rückenflossenstrahlen, 11 Brustflossenstrahlen, 15 Rumpfringe, 25 Schwanzringe sowie eine dunkle Gesamtfärbung mit deutlichen weißen Streifen bauchseitig am Unterkiefer und vom Auge ausstrahlend, außerdem weiße Flecken und kurze Streifen am Rand der Kiemenöffnung entlang. Auch ist der Kopf kürzer (7,0 von SL) und die Schnauze kürzer (2,9 von der Kopfgröße) als bei den anderen Angehörigen der Gattung.

### Sommario

Una nuova specie di pesce pipa, *Choerichthys hadiatyae* è descritta dalla penisola di Fakfak, Provincia di Papua Occidentale, Indonesia, sulla base di un singolo esemplare femmina di 34 mm SL raccolto nella barriera corallina a una profondità di 2-15 m. Si distingue dagli altri membri del genere sulla base di una combinazione di caratteri tra cui 16 raggi nella pinna dorsale, 11 raggi pettorali, 15 anelli del tronco, 25 anelli di coda e una colorazione completamente scura con pronunciate barre bianche disposte ventralmente sulla mascella inferiore e radianti dall'occhio e una serie di macchie bianche e corte bande lungo il bordo dell'apertura della branchia. Ha anche una testa più corta (7.0 in SL) e un muso più corto (2.9 in lunghezza della testa) rispetto ai congeneri.

### INTRODUCTION

The syngnathid genus *Choerichthys* Kaup 1856 was reviewed by Dawson (1976 and 1985). The genus is distinguished from other family members by a combination of features that include the presence of a tiny caudal fin (containing 10 rays), both superior and inferior trunk and tail ridges continuous, anal fin present (with 4 rays), lateral trunk ridge deflected ventrally near anal ring and continuous with inferior tail ridge, dorsal-fin origin on the trunk, distinct head and body ridges with entire to finely denticulate margins, scutella with or without longitudinal keels, and without dermal flaps. The group contains seven valid species, which are restricted to the tropical and warm-tem-

perate Indo-Pacific region: *C. brachysoma* (Bleeker 1855) from East Africa to Polynesia, *C. cinctus* (Gilbert 1905) from Indonesia to Samoa, *C. latispinosus* Dawson 1978 from Western Australia, *C. sculptus* (Günther 1870) from East Africa to Polynesia, *C. smithi* Dawson 1976 from South Africa, Mozambique and Madagascar, *C. suillus* Whitley 1951 from northern Australia, and *C. valenciennes* Kaup 1856, from the Red Sea and western Indian Ocean. The last-mentioned species was considered a synonym of *C. brachysoma* by Dawson (1985), though it was recognized as valid by Kuitert (2009). Moreover, preliminary genetic data (Ben Victor, personal communication 2019 based on BOLD CO1 sequences) indicates that Red Sea specimens are approximately 7% divergent from Pacific populations of *C. brachysoma* and therefore appear to represent a valid species.

The present paper describes the eighth known member of the genus that was collected during a Conservation International (CI) marine biodiversi-

ty survey of the Fakfak Peninsula of western New Guinea (West Papua Province, Indonesia) in March 2018. A single specimen was collected at Neksumar, a tiny islet situated about 9 km due north from the mainland town of Kokas, and situated firmly within the recently-designated Teluk Berau marine protected area (MPA). This location lies within the Bird's Head Seascape (Fig. 1), an area that has been intensely surveyed by CI beginning in 2001. Our observations and collections in this region indicate an extraordinary wealth of reef-associated fishes with 1,851 species recorded to date. Although only a single specimen of the new *Choeroichthys* was obtained, we do not hesitate to describe it due to its distinctive features that clearly differentiate it from congeners. Moreover, our observations and collections indicate that it is a rare, cryptic species with little prospects of obtaining additional specimens in the near future.

Although occupying a relatively small portion of the greater Bird's Head Peninsula, the Fakfak re-

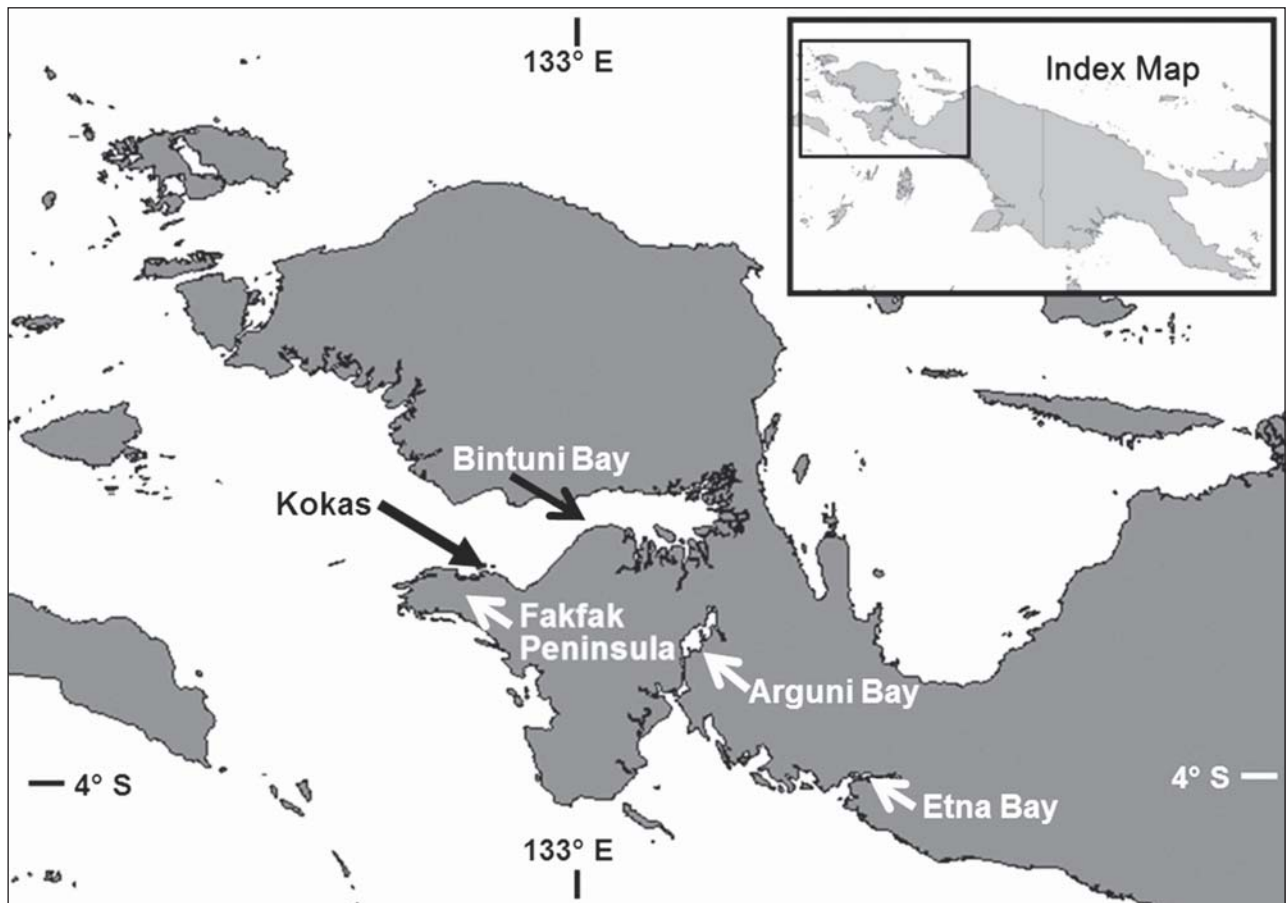


Fig. 1. Map of the Bird's Head Seascape of western New Guinea showing the location of the Kokas area, northern Fakfak Peninsula.

**Table I.** Comparison of meristic and morphological features of *Choeroichthys* (comparative data from Dawson 1985 & Kuitert 2009).

| Species                | Dorsalrays | Pectoralrays | Trunk rings | Tail rings | HL in SL | Snout In HL |
|------------------------|------------|--------------|-------------|------------|----------|-------------|
| <i>C. brachysoma</i>   | 18-26      | 18-23        | 14-18       | 17-20      | 4.1-5.9  | 1.8-2.4     |
| <i>C. cinctus</i>      | 22-26      | 20-23        | 15          | 20-22      | 3.4-3.9  | 1.7-1.9     |
| <i>C. hadiatyae</i>    | 16         | 11           | 15          | 25         | 7.0      | 2.9         |
| <i>C. latispinosus</i> | 22         | 20           | 19          | 20         | 4.2      | 2.1         |
| <i>C. sculptus</i>     | 27-34      | 28-23        | 18-21       | 21-25      | 4.9-7.1  | 2.0-2.5     |
| <i>C. smithi</i>       | 17-21      | 18-21        | 18-19       | 18-21      | 5.0-5.4  | 2.2-2.5     |
| <i>C. suillus</i>      | 22-24      | 19-21        | 18-19       | 18-20      | 5.2-6.3  | 1.8-2.0     |
| <i>C. valencienni</i>  | 21-24      | 20-22        | 15-17       | 18-20      | 4.1-5.9  | 1.8-2.4     |

gion includes some of the least-explored reefs of western New Guinea and is an apparent center of microendemism as discussed by Allen et al. (2019). Its coral reefs are isolated from the adjacent West Papuan mainland areas by Bintuni Bay in the north and Arguni and Etna bays in the south, which are characterized by considerable freshwater runoff and siltation and exceptionally large tidal fluctuations. Consequently, they are generally lacking coral reefs and likely form a barrier to planktonic dispersal of many reef organisms. At least nine other microendemics appear to be restricted to this area including *Manonichthys jamali* Allen & Erdmann 2007 (Pseudochromidae), *Chrysiptera girti* Allen & Erdmann 2008, *C. uswanasi* Allen, Erdmann & Cahyani 2018, *Pomacentrus bellipictus* Allen, Erdmann & Hidayat 2018, and *P. fakfakensis* Allen & Erdmann 2009 (Pomacentridae), *Paracheilinus nursalim* Allen & Erdmann 2008 (Labridae), *Eviota gunawanae* Greenfield et al. 2019 (Gobiidae), *Ecsenius springeri* Allen, Erdmann & Liu 2019 (Blenniidae), and an undescribed *Heteroconger* (Congridae). Impressively, all eight of these recently-described microendemic species have already been granted protected species status by the forward-looking Fakfak Regency government, who recognized these microendemics as being important local assets and a source of great pride to the Arguni, Pipig-Sekar and Wertuar traditional communities that own the reefs where these fishes were discovered.

## MATERIALS AND METHODS

Methods of counting and measuring, and terminology used for trunk and tail ridges follow those of Dawson (1985). Trunk rings are counted from

the ring bearing the pectoral fins to the ring bearing the anus. Tail rings begin with the first ring behind the anus to the penultimate ring, excluding the terminal element bearing the caudal fin. Standard length is the straight line distance from the tip of the lower jaw to the base of the caudal fin. Head length is the distance from the tip of the lower jaw to the rear margin of the opercle. Snout length is measured from the tip of the lower jaw to the anterior margin of the eye. Snout depth is the least vertical dimension of the snout. Body depth is the maximum depth, measured at the first trunk ring between the outer margins of the superior and median ventral trunk ridges, and body width is measured between the corresponding lateral trunk ridges of the first trunk ring. Eye diameter is measured horizontally. Predorsal length is measured from the tip of the lower jaw to the dorsal-fin origin. Preanal length is measured from the tip of the lower jaw to the anal opening. Prepectoral length is measured from the tip of the lower jaw to the base of the upper base of the pectoral fin.

The holotype is deposited at the Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia (MZB). The percentage of SL value is also included for each proportional measurement.

### *Choeroichthys hadiatyae*, n. sp.

Renny's Pipefish  
(Figs 2-4)

**Holotype:** MZB 25097, female, 34.3 mm SL, 2° 37.126' S, 132° 25.930' E, Neksumar Islet, about 9 km north of Kokas Village, Fakfak Peninsula, West Papua Province, Indonesia, 1-3 m, rotenone, M. V. Erdmann, 12 March 2018.

**Diagnosis:** A species of *Choeroichthys* without keels on scutella, dorsal-fin rays 16, pectoral fin-rays 11, body rings 15 + 25 = 40, subdorsal rings 3.75, snout relatively short, its length 2.8 in head length, snout depth 2.4 in snout length, head length 7.1 in SL, and colour generally dark brown with pronounced white bars ventrally on lower jaw and radiating from eye, and white spots and short bands along edge of gill opening.

**Description:** Dorsal-fin rays 15; anal-fin rays rays 4; pectoral rays 11; caudal rays 10. Trunk rings 15; tail rings 25; total rings 40; subdorsal rings 0.5 + 3.25; total subdorsal rings 3.75.

Head 7.0 in SL (14.3 % of SL). Median dorsal snout ridge entire, not strongly elevated, without bony knobs or spines. A low, inconspicuous opercular ridge; other head ridges low and indistinct. Snout length 2.9 in head length (5.0 % of SL). Snout depth 2.4 in snout length (2.1 % of SL). Eye diameter 4.1 in head length (3.4 % of SL).

Trunk and tail with conspicuous ridges and rings (Fig. 3). Superior trunk and tail ridges continuous. Inferior trunk ridge ends at last trunk ring. Lateral trunk ridge deflected near anal fin and continuous with ventral tail ridge. Head and body ridges distinct, their margins entire to finely denticulate. Dermal flaps absent.

Body depth 2.6 in HL (5.5 % of SL). Body width

3.2 in HL (4.5 % of SL). Dorsal-fin origin on trunk; dorsal-fin base not elevated. Dorsal-fin base length 1.8 in HL (8.2 % of SL). Predorsal length 2.2 in SL (45.0 % of SL). Preanal length 2.1 in SL (46.6 % of SL). Pectoral-fin length 4.9 in HL (2.9 % of SL). Prepectoral length 6.2 in SL (16.3 % of SL). Caudal-fin length 7.0 in HL (2.0 % of SL).

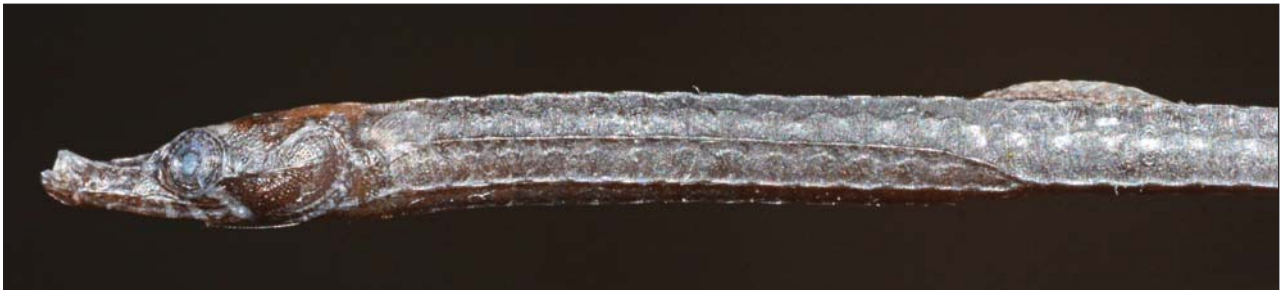
**Colour in alcohol** (Figs 2-4): Generally brown with dense covering of tiny white spots on lateral and ventral surfaces of body, and with row of larger white spots between each body ring along superior and inferior tail and trunk ridges; dorsal surface light brown on rear portion of head and light brown alternating with darker brown sections on remainder of dorsal body, and with small white patches along superior trunk and tail ridges at intervals of about 4-5 rings; head with conspicuous white markings (Fig. 4) consisting of irregular white spots and short bands including short bands on proximal portion of snout, four bands radiating from eye, and numerous bands and spots on edge of operculum; iris dark brown with numerous pale crossbands.

**Colour in life.** No photos taken, but similar to preserved coloration.

**Comparisons:** *Corythoichthys hadiatyae* is clearly distinguished from other members of the genus on the basis of a combination of features including



**Fig. 2.** *Choeroichthys hadiatyae* preserved holotype, 34.3 mm SL, Neksumar Islet, Fakfak Peninsula, West Papua Province, Indonesia. Photo by G. R. Allen.



**Fig. 3.** *Choeroichthys hadiatyae*, anterior half of preserved holotype, 34.3 mm SL, showing pattern of main trunk and tail ridges. Photo by G. R. Allen.

colour pattern and very low counts for the dorsal and pectoral fins. It also has a shorter head (7.0 in HL) than most congeners, which usually have HL in SL values of 3.4-6.3, except *C. sculptus* (4.9-7.1) and a shorter snout, 2.9 in HL, compared to the other species (1.7-2.5 in HL). Additionally, it possesses fewer trunk and more tail rings compared to most members of the genus. Salient meristic and morphological features for the species of *Choeroichthys* are presented in Table I and a key to the genus is provided below. Colour photographs of the other species were provided by Kuitert (2009).

**Distribution and habitat:** The new species is currently known only from the type locality situated on an offshore islet off the northern coast of Fakfak Peninsula, within the Teluk Berau MPA (Fig. 5). The mainland coast, which lies about 9 km to the south consists primarily of mangrove habitat, but the type locality and nearby islands are a mixture of mangroves and low-diversity coral reefs. The type locality is located on the edge of a 100 m pass between two islands and consists of a gently-sloping sand and rubble bottom that drops from the shallows (> 1 m depth) to about 15-20 m. The holo-



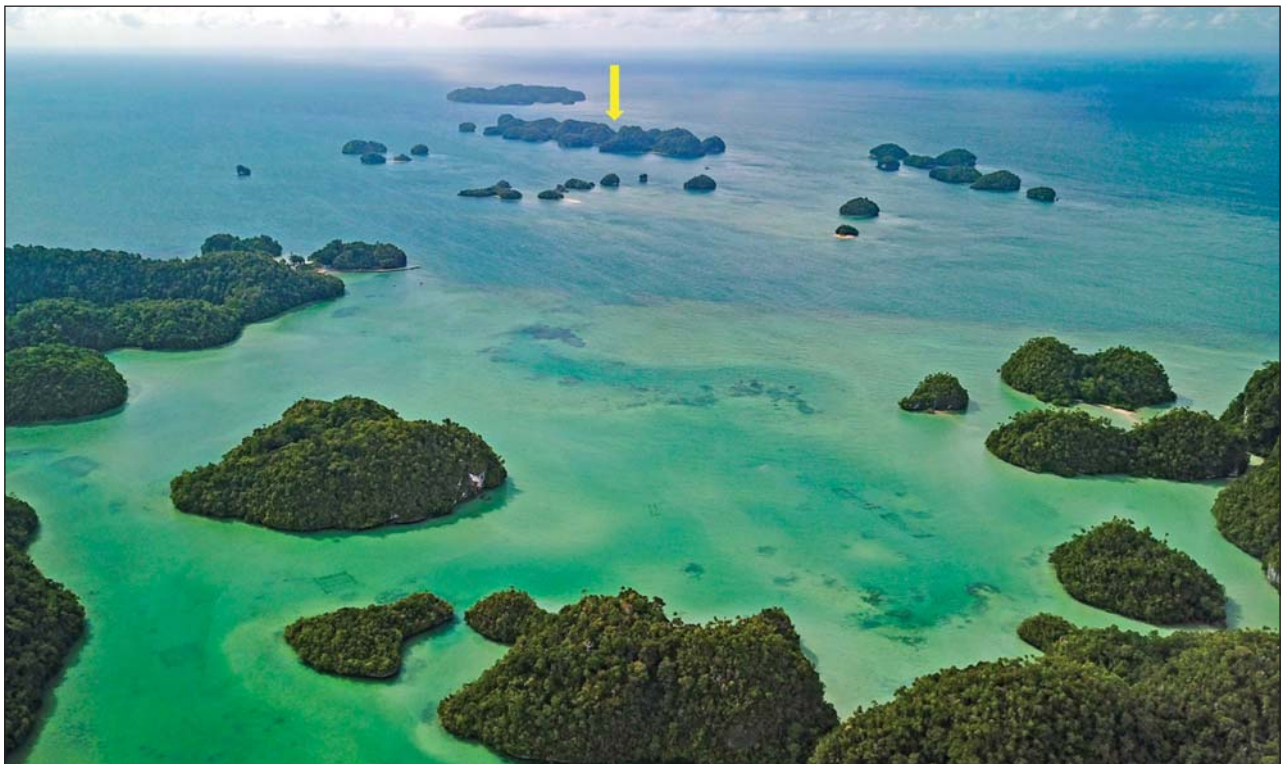
Fig. 4. *Choeroichthys hadiatyae*, head of preserved holotype, 34.3 mm SL, showing (from top), dorsal, lateral, and ventral views. Photo by G. R. Allen.

type was collected from the upper portion of the slope in about 1-3 m depth.

**Etymology:** The new species is named *hadiatyae* in honour of the late Dr. Renny K. Hadiaty, Curator of Fishes at the Indonesian Institute of Sciences' Museum Zoologicum Bogoriense in Cibinong, for her valuable contributions to our knowledge of Indonesian freshwater and marine fishes and in recognition of her long and distinguished career and productive ichthyological collaborations with the authors.

**Key to the species of *Choeroichthys*  
(modified from Dawson 1985)**

- 1a. Pectoral rays 18-23; dorsal rays 17-34; head length 3.4-7.1 (usually <6.5) in SL; snout length 1.7-2.5 in head; trunk rings 14-21; tail rings 17-25..... 2
- 1b. Pectoral rays 11; dorsal rays 16; head length 7.0 in SL; snout length 2.9 in head; trunk rings 15; tail rings 25 ..... *C. hadiatyae*, n. sp.
- 2a. Scutella without keels, dorsal-fin rays 17-26; subdorsal rings 3.75-6.0 ..... 3
- 2b. Scutella with keels, dorsal-fin rays 27-34; subdorsal rings 6.25-8.25..... *C. sculptus*
- 3a. Snout short, its depth <3 in snout length..... 4
- 3b. Snout longer, its depth 3.5 or more .....5
- 4a. Snout with spiny anterolateral ridge; dorsal fin plain ..... *C. latispinosus*
- 4b. Snout without spiny anterolateral ridge; dorsal fin bicolored, brown in front and pale behind. .... *C. smithi*
- 5a. Head length about 4.1-6.3 in SL; body without dark bars ..... 6
- 5b. Head length about 3.4-3.9 in SL; body with irregular dark bars ..... *C. cinctus*
- 6a. Trunk rings 14-18 (16 or fewer in 98% of specimens); total rings 31-36; trunk plain or with 1-2 lateral rows of dark spots..... 7
- 6b. Trunk rings 18-19; total rings 37-39; head and/or trunk often with irregular dark lines or stripes, infrequently with a few diffuse dark spots above lateral trunk ridge ..... *C. suillus*
- 7a. Side of body with narrow, undulating dark stripes and frequently with double row of white spots; Red Sea - W. Indian Ocean ..... *C. valencienni*
- 7b. Side of body without narrow, undulating dark stripes and double row of white spots; East Indian- W. Pacific Ocean ..... *C. brachysoma*



**Fig. 5.** Neksumar Islet (yellow arrow), type locality of *Choeroichthys hadiatyae*, one of several coastal islands off Kokas, Fakfak Peninsula, West Papua Province, Indonesia. Photo by M. V. Erdmann.

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ed with specimen processing and registration. Finally, we thank Ketut Sarjana Putra, Victor Nikijulw and the entire CI-Indonesia team for logistical support of the survey. Ben Victor kindly provided genetic information regarding the validity of *Choeroichthys valencienni*.

## REFERENCES

- DAWSON, C. E. 1976. Review of the Indo-Pacific pipefish genus *Choeroichthys* (Pisces: Syngnathidae), with descriptions of two new species. *Proceedings of the Biological Society of Washington* **89** (3): 39-65.
- DAWSON, C. E. 1985. *Indo-Pacific Pipefishes (Red Sea to the Americas)*. Gulf Coast Research Laboratory, Ocean Springs, Mississippi, 230 pp.
- KUITER, R. H. 2009. *Seahorses and their relatives*. Aquatic Photographics, Seaford, Australia, 333 pp.

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## ERRATA

The crab mentioned in the article “Eating out: the Australian pufferfish *Tetractenos hamiltoni* lunges or blows water at prey situated above water level”, published in *aqua*, International Journal of Ichthyology (vol. 25 no. 4) was mistakenly named as *Cyclograpsus audouinii* H. Milne Edwards, 1837. The correct name for the crab is *Parasesarma erythodactyla* (Hess, 1865).