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## *Eviota pamae*, a new species of coral reef goby (Gobiidae) from Indonesian seas

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### Abstract

*Eviota pamae* is described from 42 specimens, 9.6-17.7 mm SL, collected at Kei Besar, Kei Islands, Maluku Province, Indonesia. It is closely related to *E. raja*, an allopatric species known only from the Raja Ampat Islands, off the western tip of New Guinea (West Papua Province, Indonesia). The two species differ in colour pattern details, including the presence of a single dark mark on the lower caudal-fin base of *E. pamae* compared to marks on both the upper and lower base in *E. raja*. The new species also differs in having a yellow rather than white mid-dorsal snout stripe and has a much-reduced blue marking on the lower cheek. Meristically, the two species differ in counts for segmented rays in the second dorsal fin (usually 8-9 in *E. pamae* and usually 10 in *E. raja*).

### Zusammenfassung

*Eviota pamae* wird anhand von 42 Exemplaren mit 9,6 bis 17,7 mm SL beschrieben, die bei Kei Besar, Kei-Inseln, Provinz Maluku, Indonesien gesammelt wurden. Die neue Art ist nahe verwandt mit *E. raja*, einer allopatrischen Art, die bisher nur von den Raja-Ampat-Inseln vor der westlichen Spitze Neuguineas (Provinz Westpapua, Indonesien) bekannt ist. Die Arten unterscheiden sich in Einzelheiten der Farbmuster - u.a. ein einzelnes dunkles Zeichen auf der unteren Schwanzflosse an der Basis bei *E. pamae*, bei *E. raja* hingegen sowohl auf der oberen als auch auf der unteren Schwanzflossenbasis. Die neue Art zeigt außerdem einen gelben, nicht einen weißen mitteldorsalen Schnauzenstreifen und nur ein stark reduziertes blaues Zeichen an der unteren Wange. Nach meristischen Kriterien unterscheiden sich die beiden Arten in der Zahl der gegliederten Flossenstrahlen in der zweiten Rückenflosse (normalerweise 8-9 bei *E. pamae* und 10 bei *E. raja*).

### Résumé

*Eviota pamae* est décrit sur base de 42 spécimens, 9,6-

17,7 mm de LS, collectés à Kei Besar, îles Kei, province de Maluku, Indonésie. Il est proche de *E. raja*, une espèce allopatrique connue seulement des îles de Raja Ampat, au large de l'extrémité ouest de la Nouvelle-Guinée (province de West Papua, Indonésie). Les deux espèces se distinguent par des détails du patron de coloration, comprenant la présence d'une seule marque noire sur la base inférieure de la caudale d'*E. pamae* contre des marques sur les bases supérieure et inférieure pour *E. raja*. La nouvelle espèce se démarque aussi par une ligne centrale dorsalement jaune plutôt que rouge sur le rostre et par un marquage bleu bien plus réduit sur la joue inférieure. Au niveau méristique, les deux espèces se distinguent par le nombre de rayons segmentés dans la seconde dorsale (généralement 8-9 pour *E. pamae* contre généralement 10 pour *E. raja*).

### Sommario

*Eviota pamae* è descritta sulla base di 42 esemplari, 9.6-17.7 mm SL raccolti a Kei Besar, Isole Kei, Provincia delle Molucche, Indonesia. E' molto vicina a *E. raja*, una specie allopatrica conosciuta solo dalle isole Raja Ampat, al largo della punta occidentale della Nuova Guinea (provincia di West Papua, Indonesia). Le due specie differiscono nei dettagli della colorazione, tra cui la presenza di un unico segno scuro alla base inferiore della pinna caudale di *E. pamae* rispetto a marcature sia sulla base inferiore e che sulla superiore in *E. raja*. La nuova specie si distingue anche per avere una striatura gialla anziché bianca sulla metà dorsale del muso e un'estremamente ridotta marcatura blu sulla guancia inferiore. Meristicamente, le due specie differiscono per il numero dei raggi segmentati nella seconda pinna dorsale (di solito 8-9 in *E. pamae* contro i 10 in *E. raja*).

### INTRODUCTION

The gobiid genus *Eviota* Jenkins 1903 contains tiny inconspicuous fishes inhabiting coral and

rocky reefs of the Indo-west and central Pacific regions. They are one of the most abundant groups on coral reefs, but due to their very small adult size (usually less than 3 cm TL), were overlooked by early researchers. For example, Koumans' (1953) treatment of the Indo-Australian Archipelago includes only six species. Recent coverage of this same region by Allen & Erdmann (2012) indicates at least 36 species. Indeed, as far as the number of species is concerned, *Eviota* and the similarly miniscule *Trimma* Jordan & Seale 1906 are in a class of their own among reef-dwelling gobiids. Numerous new discoveries in both genera have been reported over the past two decades, most of which are attributable to scuba-diving researchers. *Eviota* currently contains 73 valid species (Eschmeyer, 2013) and additional new discoveries are a certainty. The foundation of our knowledge of this group is largely attributable to the excellent reviews by Lachner and Karnella (1980), Karnella and Lachner (1981), and Jewett and Lachner (1983). More recently David Greenfield (California Academy of Sciences) and colleagues have pursued taxonomic studies of this group, resulting in the description of 20 species, mainly in the last five years: Greenfield (2009); Greenfield & Jewett (2011 & 2012); Greenfield & Suzuki, (2010, 2011, & 2012); Greenfield & Randall (1999, 2008, 2010a & b, & 2011); Greenfield & Allen (2012); and Greenfield & Winterbottom (2012).

Live colour patterns in particular (including eye colouration) are highly diagnostic for the members of this genus, although relatively few colour photographs of the many species have been published. Notable exceptions include Allen & Erdmann (2012), Randall (2005), Senou et al. (2004), and Kuitert & Tonzuka (2001), which collectively provide coverage of approximately 50 species. The present paper describes a brightly coloured species collected while scuba diving by W. M. Brooks and M. V. Erdmann during a brief visit by the authors to the Kei (often spelled Kai) Islands of southeastern Indonesia in February 2013. It was immediately recognized as a new taxon closely resembling *Eviota raja* Allen, 2001 from the Raja Ampat Islands of West Papua. Judging from our extensive collections and observations throughout the Moluccan Archipelago and West Papua, these species appear to be highly limited-range endemics (i.e. Kei Islands and Raja Ampat Islands) without close relatives at intervening locations.

## MATERIAL AND METHODS

For methods of counting and measuring, and terminology for head pore and papillae patterns, the reader is referred to the detailed explanations (accompanied by excellent diagrams) provided by Lachner and Karnella (1980). Counts and proportions appearing in parentheses apply to the paratypes if different from the holotype. Type specimens are deposited at the following institutions: California Academy of Sciences (CAS), San Francisco; Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia (MZB); United States National Museum, Washington, D.C. (USNM); and Western Australian Museum, Perth (WAM).

### *Eviota pamae*, n. sp. (Figs 1-3 and 5)

**Holotype.** MZB 21371, male, 17.7 mm SL, near northern tip of Kei Besar, 5°21.432'S, 133°10.232'E, Kei Islands, Maluku Province, Indonesia, 14-20 m, clove oil and hand net, W. M. Brooks & M. V. Erdmann, 24 January 2013.

**Paratypes (collected with holotype):** CAS 235375, 10 specimens, 9.6-16.2 mm SL; MZB 21372, 11 specimens, 11.7-15.4 mm SL; USNM 409949, 9 specimens, 12.1-14.5 mm SL; WAM P.33824-001, 10 specimens, 10.8-17.3 mm SL.

**Diagnosis:** Pectoral-fin rays unbranched; dorsal-fin spines filamentous in male, third spine longest; 7-8 longest caudal-fin rays filamentous in male; fifth pelvic-fin ray well developed, 55-70 % length of fourth ray (average 63 %); cephalic sensory pore system lacking the IT and the PITO pores, and the AITO pore single and very large; orange pink in life with bright yellow midlateral stripe, yellow mid-dorsal snout stripe, and single rounded dark spot on lower portion of caudal-fin base.

**Description:** Dorsal rays VI-I,9 (8-9, 27 of 30 with 9); anal rays I,8 (8-9, 29 of 30 with 8); pectoral rays 15 (14-15, 21 of 30 with 15), all unbranched; pelvic rays I,4; fourth ray of pelvic with 3 (1-3) branches, almost always 2 branches including one main branching and secondary branching near tip of one of the two branches; segments between consecutive branches of fourth pelvic-fin ray number 4-9, averaging 6.3; fifth pelvic ray about 60 (55-70, average 63) % length of fourth pelvic ray; interconnecting pelvic-fin membrane developed only near base; branched caudal-fin rays 11; segmented caudal-fin rays 17; lateral scale rows 24 (22-25, average 23.6); trans-

verse scale rows 7; breast with one or more embedded scales.

Cephalic pore system conforms to pattern 3 of Lachner and Karnella (1980); the anterior interorbital pore (AITO) is much enlarged; cutaneous papilla system conforms with pattern B of Lachner and Karnella (1980). All dorsal spines of adult male elongate, the longest (third) spine extending to about base of sixth or seventh soft ray of second dorsal.

**Sexual dimorphism:** Genital papilla in male not fimbriate, long and slender, slightly bilobed at tip, its maximum length extending to base of about anal-fin spine or first soft anal-fin ray; female papilla short, bulbous, with several finger-like pro-

jections at edge of opening, extending almost to anal spine. Male also differs from female in having filamentous dorsal spines and short, filamentous tips on the caudal-fin rays (Fig. 2).

Measurements (based on holotype and 15 paratypes, 13.8-17.7 mm SL) as percentage of the standard length (average indicated after range for paratypes): Head length 29.4 (27.2-31.9, 29.1); origin of first dorsal fin 33.9 (32.9-37.0, 34.8); origin of second dorsal fin 54.2 (52.9-56.3, 54.9); origin of anal fin 57.6 (55.6-60.9, 58.4); caudal-peduncle length 26.6 (25.1-28.5, 26.7); caudal-peduncle depth 15.8 (13.0-15.3, 14.1); body depth 22.0 (18.8-23.1, 21.0); eye diameter 9.0 (9.3-11.1, 10.1); snout length 5.6 (4.2-6.6, 5.3);



Fig. 1. Underwater photograph of *Eviota pamae*, male, about 17 mm SL, Kei Besar, Kei Islands, Indonesia. Photo by G. R. Allen.

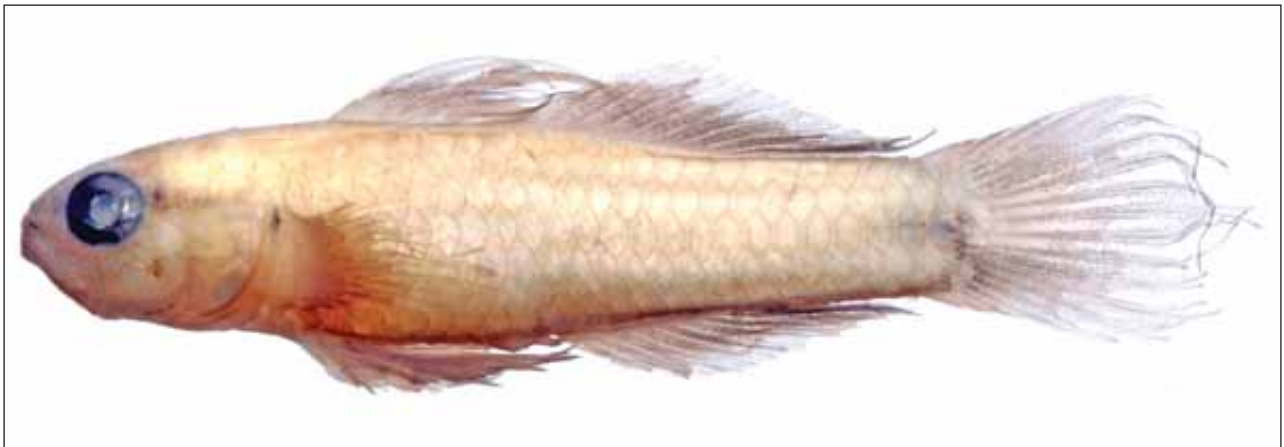


Fig. 2. *Eviota pamae*, preserved holotype (stained with cyanine blue to show scalation), 17.7 mm SL, Kei Islands, Indonesia. Photo by G. R. Allen.

pectoral-fin length 26.6 (25.4-30.5, 27.6); pelvic-fin length 32.2-26.8-34.1, 29.8).

Colour in life (Figs 1, 3 and 5): Generally orange pink with bright yellow, mid-lateral stripe from rear edge of eye to middle of caudal-fin base; yellow mid-lateral stripe widest (about two-thirds horizontal eye diameter) on anterior body where bordered dorsally by narrow pink stripe, terminal end at caudal-fin base slightly expanded and adjacent to small reddish brown spot; upper back (along dorsal fin base) and ventralmost portion of

head and body whitish to light grey; cheek and opercle mainly orange pink except for 1-2 small blue markings on lowermost portion, continuation of yellow mid-lateral stripe behind eye, and yellow mid-dorsal stripe from snout tip to interorbital region; lips dull yellow; dorsal portion of iris bright yellow and lowermost part blue with intervening broad, dark brown to blackish stripe through middle of eye; fins mainly translucent with light reddish brown rays, except membrane of second dorsal and anal fins often dusky grey.



**Fig. 3.** Underwater photograph of *Eviota pamae*, male (upper fish), about 17 mm SL, and two females, about 14-15 mm SL, Kei Besar, Kei Islands, Indonesia. Photo by G. R. Allen.



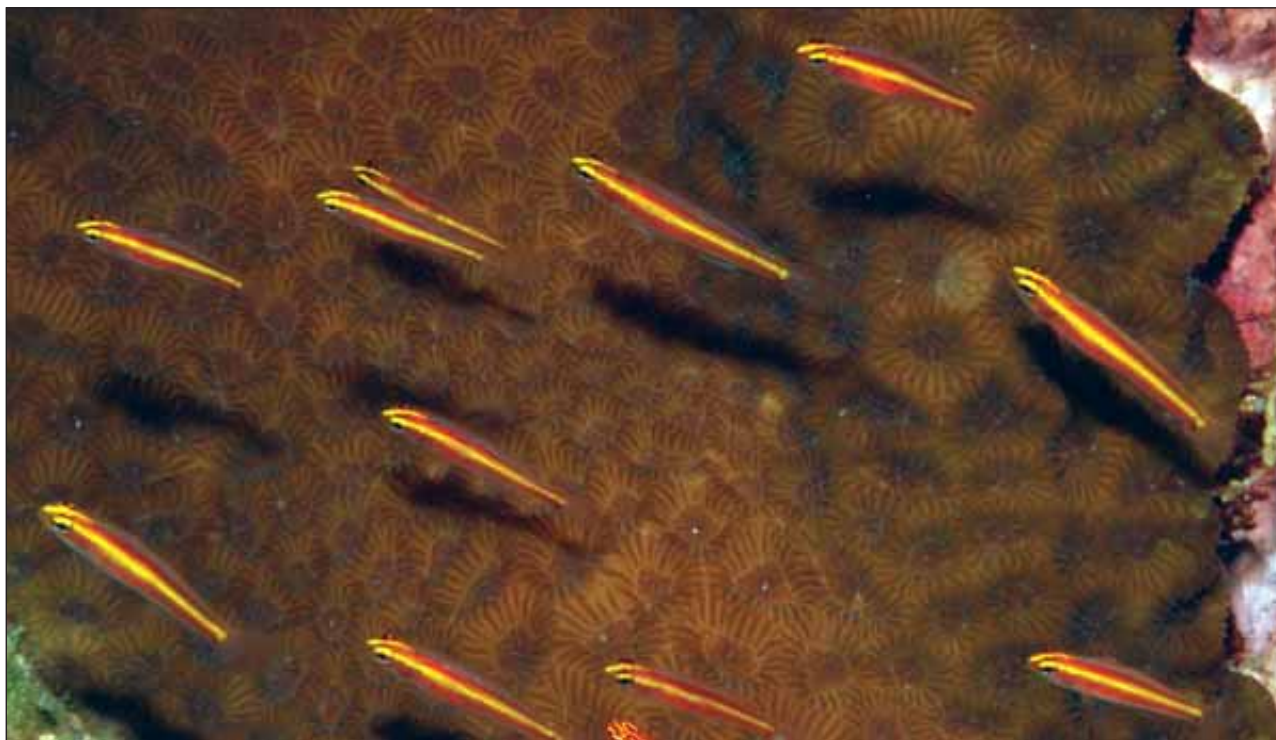
**Fig. 4.** Underwater photograph of *Eviota raja*, about 22 mm SL, Wayag Island, Raja Ampat Islands, Indonesia. Photo by G. R. Allen.

Colour in alcohol (Fig. 2): After only three months in preservative the specimens are uniformly yellowish white except for a trace of the dark spot on the lower caudal-fin base and a concentration of melanophores on the occipital region and just behind the eye.

**Remarks:** The new species belongs to the Group IV species group as defined by Lachner & Karnella (1980) and further discussed by Greenfield & Randall (2010a). It appears to be most closely allied to *E. raja* Allen (Fig. 4), which is endemic to the Raja Ampat Islands off the western tip of New Guinea (West Papua Province, Indonesia). The two species share similarities regarding general shape and colour, behaviour, habitat preference, and exhibit similar head pore and papillae patterns including a conspicuously enlarged AITO pore. Enlargement of the AITO pore is a condition that is not commonly found in *Eviota* and although this feature is shared by both species, preliminary evidence suggests that pore patterns and relative size of individual pores such as the AITO are not necessarily indicative of relationships among this large and complex genus (Greenfield & Randall 2010a, Tornabene et al. 2013). Despite these similarities they differ with regards to colour pattern details

(compare Figs 1 and 4), most notably the slightly darker reddish colouration of the body in *E. raja* and more brightly coloured yellow mid-lateral stripe in *E. pamae*, and the presence of a single, more or less round, dark marking on the lower caudal-fin base of *E. pamae* compared to vertically elongate marks on both the upper and lower base in *E. raja*. The new species also differs in having a yellow instead of silvery-white upper iris, a yellow rather than white mid-dorsal snout stripe, and has a much-reduced blue marking on the lower cheek. The two species differ in counts for segmented rays in the second dorsal fin (8-9 in *E. pamae* and usually 10 in *E. raja*). Finally, there appears to be a difference in maximum SL, with *E. raja* attaining about 23 mm SL compared to about 18 mm SL for *E. pamae*.

**Distribution:** The new species is known only from the Kei Islands of southeastern Indonesia. It was collected off the eastern side, near the northern tip of Kei Besar, the largest island in the group. It was common at depths between about 13 and 20 m, on sheltered reef slopes where it formed aggregations of up to 10-30 individuals (Fig. 5) among live and dead corals (predominantly tabulate acroporids), and in shady crevices.



**Fig. 5.** Underwater photograph of aggregation of *Eviota pamae*, about 13-16 mm SL, Kei Besar, Kei Islands, Indonesia. Photo by G. R. Allen.

**Etymology:** The species is named *pamae* in honour of Pamela Scott Rorke, the second author's wife and companion and an active diving member of the expedition that uncovered this beautiful new species.

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