A new *Stiphodon* (Gobiidae) from Indonesia

by

Philippe KEITH* (1), Frédéric BUSSON (1), Sopian SAURI (2),
Nicolas HUBERT (2, 3) & Renny HADIATY (2)

Abstract. – A new species of *Stiphodon,* an amphidromous goby, is described from streams of three islands in Indonesia, Java, Bali and Lombok. It differs from other species of the genus by a combination of characters including 14-15 pectoral rays, a second dorsal fin with nine segmented rays, fewer scales in predorsal, transverse forward and transverse back series, and a diagnostic golden and black pattern in male.

Résumé. – Une espèce nouvelle de *Stiphodon* (Gobiidae) d'Indonésie.

Une espèce nouvelle de *Stiphodon*, un gobie amphidrome, est décrit à partir de matériel collecté à Java, Bali et Lombok (Indonésie). Il se distingue des autres espèces du genre par plusieurs caractères dont 14-15 rayons aux nageoires pectorales, une seconde nageoire dorsale avec neuf rayons segmentés, moins d'écailles en série prédorsale, transverse antérieure et transverse postérieure, ainsi que par la coloration noire dorée du mâle.

Received: 20 Apr. 2015
Accepted: 6 Jul. 2015
Editor: R. Causse

Key words
Gobiidae
Stiphodon aureofuscus
Indonesia
Freshwater
New species

The genus *Stiphodon* is unique among the Sicydiinae in having three anal pterygiophores anterior to the first haemal spine (Birdsong *et al*., 1988); in all the other genera belonging to the subfamily, there are only two such pterygiophores. *Stiphodon* possess tricuspid premaxillary teeth in both sexes. The ascending process on the premaxilla is narrow at the dorsal tip. The tongue is fused to the floor of the mouth. The pelvic disc is adherent to the belly between fifth rays only and there are 13-17 pectoral rays (Keith and Marquet, 2007; Keith and Lord, 2011a; Maeda *et al*., 2011). Taillebois *et al*. (2014) suggested, based on molecular evidence, that *Stiphodon* may be the sister group of all other Sicydiinae species.

Stiphodon currently contains nearly 30 species, and is distributed from southern Japan, Indonesia and Sri Lanka to New Caledonia and French Polynesia (Keith *et al*., 2002, 2011; Maeda, 2013; Keith and Hadiaty, 2015). Watson (1996), Watson and Chen (1998), Watson *et al*. (1998), Watson (2008) and Maeda and Tan (2013) reviewed *Stiphodon* from several areas, including Indonesia. The purpose of this paper is to provide a description of a new *Stiphodon* species recently collected from Java, Bali and Lombok.

METHODS

Measurements were taken with a dial calliper to the nearest tenth of a millimetre. All counts were taken from the right side. The size is given as standard length (SL). Teeth were counted to the right of the premaxillary symphysis. Abbreviations for institutions and collections cited follow http://www.asih.org/resources/standard-symbolic-codes-institutional-resource-collections-herpetology-ichthyology. Abbreviations for the cephalic sensory pore system follow Akihito (1986).

Scale and fin ray counts are reported as: A, anal fin elements (includes flexible spine and segmented rays); D, dorsal fins (D1, first dorsal fin spines; D2, second dorsal fin elements); P, pectoral fin rays; C, caudal fin rays (only branched rays are reported); LS, scales in lateral series counted from upper pectoral fin base, or anteriormost scale along lateral midline, to central hypural base; PD, predorsal midline scales counted from scale directly anterior to first dorsal fin insertion to the anteriormost scale; TRB, transverse series backward, refers to scales counted from the first scale anterior to second dorsal fin origin, in a diagonal manner, posteriorly and ventrally to the anal fin base or ventralmost scale; TRF,

(1) Muséum national d'Histoire naturelle, UMR 7208 (MNHN-CNRS-UPMC-IRD-UCBN), CP 026, 43, rue Cuvier, F-75231 Paris CEDEX 05, France. [busson@mnhn.fr]
(2) LIPI, Zoology Division, Museum Zoologicum Bogoriense (MZB), Gedung Widyasatwaloka, Jl. Raya Jakarta Bogor km. 46, Cibinong- Bogor 16911, Indonesia. [renny_hadiaty@yahoo.com]
(3) Institut de Recherche pour le Développement, UMR 5554 (UM2-CNRS-IRD). ISEM, Place Eugène Bataillon, CC 065, F-34095 Montpellier CEDEX 05, France. [nicolas.hubert@ird.fr]
* Corresponding author [keith@mnhn.fr]

transverse series forward, refers to scales counted from the first scale anterior to second dorsal fin origin, in a diagonal manner, anteriorly and ventrally to the centre of abdomen or ventralmost scale; ZZ, zigzag series, refers to scales on the narrowest region of the caudal peduncle counted from the dorsalmost scale to the ventralmost scale in a zigzag (alternating) manner.

***Stiphodon aureofuscus*, n. sp.**

(Figs 1-4; Tabs I-III)

Comparative material

The new species is compared in text and tables with species from neighbouring areas having 14-15 pectoral rays, 9 segmented rays in the second dorsal fin, and basic black colour in males. These are *Stiphodon pelewensis* Herre, 1936, *Stiphodon semoni* Weber, 1895, *Stiphodon carisa* Watson, 2008 and *Stiphodon ornatus* Meinken, 1974.

Stiphodon carisa Watson, 2008. – MZB 15194, holotype, female (33.8 mm SL), Sumatra, Lampung province, Way Ngarip, Indonesia; 25 Oct. 2005; Page *et al*. MNHN 2006-1604, paratype, male (35.0 mm SL), same data as holotype. MNHN 2006-1605, paratype, male (26.7 mm SL), same data as holotype. MNHN 2006-1606, paratype, female (32.8 mm SL), same data as holotype. MNHN 2006-1607, paratype, female (30.8 mm SL), same data as holotype. MZB 15195, paratypes, 12 males, 25 females (22.9-34.4 mm SL), same data as holotype.

Stiphodon ornatus Meinken, 1974. – SMF 12493, 2 males (37.2-39.3 mm SL), Barung Belantai, Sumatra, Indonesia. SMF 12494, 4 females (24.7-42.0 mm SL), Barung Belantai, Sumatra, Indonesia. CMK 597, 2 males, 1 female (28.4-36.1 mm SL), Teluk Bungus about 10 km south of Padang (16 km by road), Sumatra, Indonesia; 24 Apr. 1988; F. Schäffer *et al*. SMF 17932, female (30.4 mm SL); north of Padang, Sumatra, Indonesia; Nov. 1971.

Stiphodon pelewensis Herre, 1936. – MNHN 2004-2043, 3 females (25.6-35.9 mm SL), New Caledonia; 29 Oct. 1999; Keith *et al*. MNHN uncat., 8 males (28.6-40.9 mm SL), New Caledonia; 29 Oct. 1999; Keith *et al*. MNHN 2011-0132, 1 male, Gaua, Vanuatu; 21 Jul. 2005; Keith and Marquet. MNHN 2012-0498, 1 male, 4 females (33.7-41.0 mm SL), Pohnpei, 12 Mar. 2012; Keith *et al*. WAM P.26413-001, 2 females (28.8-30.5 mm SL), Beaumu Creek near Oro Bay, Papua New Guinea; 4 Oct. 1978; G.R. Allen. MZB uncatalogued, 2 females (20.8-37.3 mm SL), Maluku, Halmahera Island, Sungai Dodaga, Indonesia; Aug. 1994; D. Robb. MZB uncat., 2 females (29.3-32.9 mm SL), Maluku, Halmahera Island, Sungei Okitai, Indonesia; Aug. 1994; D. Robb. WAM P.27788-004, 1 male, 2 females (24.5-32.4 mm SL), small creek, 3 km south of Oro Bay, Papua New Guinea; 11 Sep. 1982;G.R. Allen. WAM P.27862-006, 1 male, 1 female (26.2-31.8 mm SL), Irian Jaya, Nabire River, 5 km south of Nabire, Indonesia; 15 Nov. 1982, G.R. Allen and H. Bleher. WAM P.29613-005, female (27.6 mm SL), Bogia, Papua New Guinea; 19 Oct. 1987; G.R. Allen and L.R. Parenti.

Figure 1. - *Stiphodon aureofuscus* n. sp., male, Lombok, Indonesia (Photo P. Keith).
Figure 2. - *Stiphodon aureofuscus* n. sp., female, Lombok, Indonesia (Photo P. Keith).

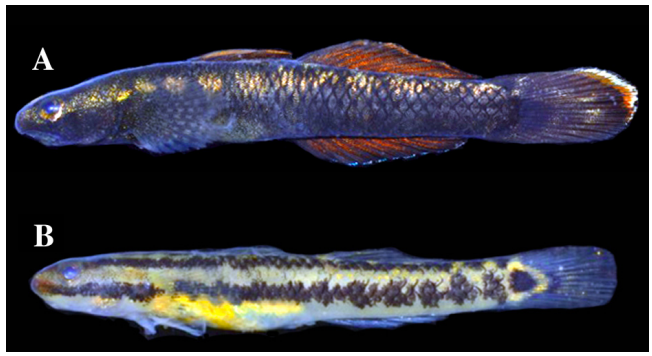

Figure 3. - *Stiphodon aureofuscus* n. sp. **A**: Paratype MNHN 2015-0099, male (BIF 2045); **B**: Paratype MZB 22727, female (BIF 2680); Bali, Indonesia (Photos N. Hubert).

Stiphodon semoni Weber, 1895. – ZMA 110.972, lectotype, male (28.9 mm SL), Moluccas Islands, Ambon, freshwater, Indonesia; 1893; R. Semon. MZB uncatalogued, 3 males, 3 females (27.6-34.3 mm SL) West Java, Kab Sukabumi, Citiis; Indonesia; BIF 1709 to 1714; 11 Dec. 2013; Hubert *et al*. MNHN uncat., 2 males, 2 females (25.2-35.0 mm SL), Choiseul, Solomon Islands;

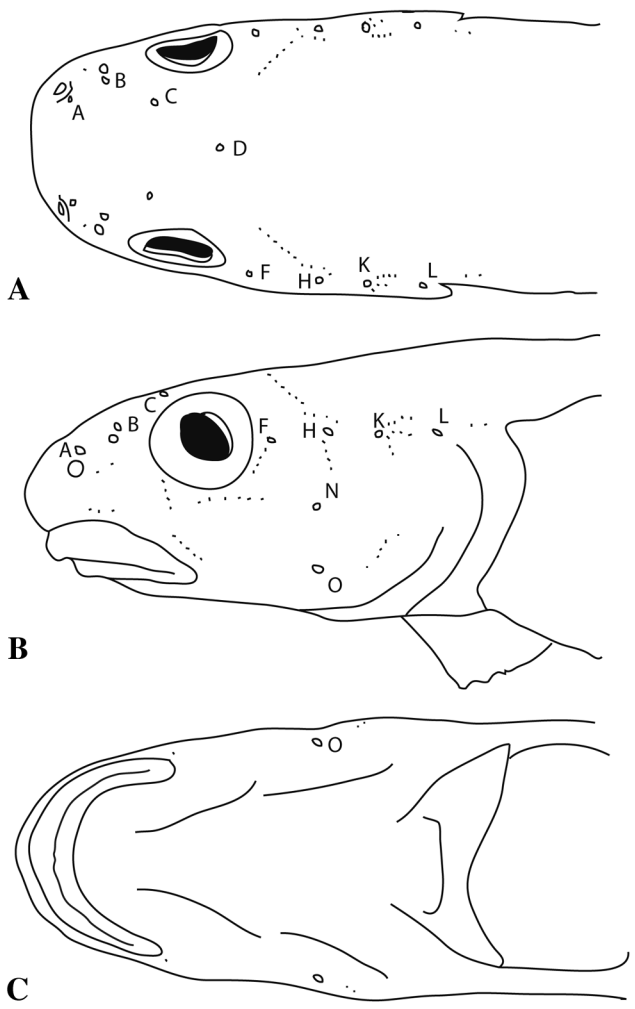

Figure 4. - Diagrammatic illustration of head in *Stiphodon aureofuscus* n. sp. (male) showing head pores and sensory papillae. **A**: Dorsal view; **B**: Lateral view; **C**: Ventral view.

Oct. 2014; Keith *et al*. WAM P.27403-007, 1 male, 2 females (28.5-31.2 mm SL), tributary stream of Burep River, 5 km northwest of Tikeling Village Papua New Guinea; 18 Nov. 1981; G.R. Allen. WAM P.27788-002, 1 male, 1 female (26.3-29.8 mm SL), small creek 3 km south of Oro Bay Papua New Guinea; 11 Sep. 1982; G.R. Allen. WAM P.27833-006, 4 females (21.76-23.9 mm SL), Mandi stream, 15 km southeast of Wewak, Papua New Guinea; 16 Oct. 1982; G.R. Allen and D. Coates. WAM P.27834-003, 3 males, 2 females (29.4-36.7 mm SL), Letak Creek, 25 km southeast of Wewak, elevation 350 m, Papua New Guinea; 17 Oct. 1982; G.R. Allen and D. Coates. WAM P.28190-007, 4 males, 3 females (23.2-27.7 mm SL), Nuru River, 25 km southwest of Lac, Madang Road, Papua New Guinea; 17 Oct. 1983; G.R. Allen and R. Steene.

Material examined

Five males and one female collected from Java and Bali (Indonesia) with a size range of 21.5-22.7 mm SL.

Holotype. – MZB 22726, male (25 mm SL), East Java, Kabupaten Blitar, Ngerjo, 113 m, Indonesia; 10 Apr. 2014; Hubert and Sauri coll., BIF 2046.

Paratypes. – MNHN 2015-0099, 2 males (24.2-26.4 mm SL), same data as holotype, BIF 2045 & 2047. MZB 22727, female (28 mm SL), West Bali, Kabupaten Buleleng, Aling aling waterfall 261 m, Indonesia; 21 Apr. 2014; Hubert *et al*. coll., BIF 2680. MZB 22728, male (26.5 mm SL), West Bali, Kabupaten Buleleng, Aling aling waterfall 261 m, Indonesia; 21 Apr. 2014; Hubert *et al*. coll., BIF 2717. MNHN 2015-0100, male (25 mm SL), West Bali, Kabupaten Buleleng, Aling aling waterfall 261 m, Indonesia; 21 Apr. 2014; Hubert *et al*. coll., BIF 2718.

Diagnosis

The new species is a small *Stiphodon* with 14-15 pectoral rays, 9 segmented rays in the second dorsal fin, no scales on predorsal in males, 6-8 scales in transverse forward series and 7-9 in transverse back series. The typical coloration of adult males is golden and black with red dorsal fins with a yellow upper margin; in females the anteriormost parts of the dorsal fins and the base of the caudal fin are red.

Description

Scale counts in *Stiphodon aureofuscus* n. sp. and related species are given in table II, number of premaxillary teeth in table I, and morphometrics in table III. Below, the holotype counts are given first followed in brackets, if different, by the paratype counts.

Dorsal fins VI-I,9; D1 separate from and smaller than D2; spines not elongate. Anal fin I,10 and directly opposite to second dorsal fin. Pectoral fin with 14-15 rays, uppermost rays extending beyond membrane but not appearing feathery or silky, lowermost 1 or 2 rays simple; fin oblong with posterior margin rounded. Caudal fin with 13 branched rays, posterior margin rounded. Pelvic disc always with 1 spine and 5 stout and heavily branched segmented rays. Fifth rays joined together in their entire length forming a strong adhesive disc; disc adherent to belly between fifth rays only; between spines a strong fleshy frenum.

Scales in lateral series 30(28-34), those on caudal peduncle and the flanks below D2 and part of D1 ctenoid, becoming cycloid below anterior part of first dorsal fin in males. Anteriormost scale along midline nearly reaching upper pectoral fin base.

Scales in transverse backward series 9(7-9). Scales in transverse forward series 8(6-8). Scales in zigzag series 8(7-10). No scales in predorsal midline in male. Head, breast, nape and belly are without scales.

Premaxillary teeth 35-40, fine and tricuspid, tridentiform with central cusp longer than lateral cusp. Dentary symphyseal teeth in males 1-3 (female 0), conical to caniniform, stronger and larger than other teeth.

Table I. - Premaxillary teeth in *Stiphodon aureofuscus* n. sp. and related species.

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
S. aureofuscus									1	–	2	1	1	1																	
S. carisa																1	2	–	1	1	1	3	4	5	4	6	5	4	2	2	2
S. pelewensis	1	–	1	1	1	2	3	4	4	4	3	2	1	1	1																
S. ornatus		1	–	–	1	–	–	1	3	–	–	1	2	–	1																
S. semoni										1	1	2	3	2	3	2	2	2	2	1	2	2	–	1	2	–	1	–	1		

Table II. - Scale counts in *Stiphodon aureofuscus* n. sp. and related species.

Scales in lateral series	27	28	29	30	31	32	33	34	35	36	37	38
S. aureofuscus		1	–	2	–	1	1	1				
S. carisa	2	8	9	10	5	4	3	1				
S. pelewensis					1	–	2	4	8	8	4	2
S. ornatus							1	5	4			
S. semoni	1	1	3	4	5	5	3	3	3	2		

Scales in predorsal midline series	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
♂♂ *S. aureofuscus*	5																
♀♀ *S. aureofuscus*				1													
♂♂ *S. carisa*							3	3	4	2	1	1					
♀♀ *S. carisa*											3	7	8	4	3	2	1
♂♂ *S. pelewensis*									1	1	2	2	3	3			
♀♀ *S. pelewensis*										1	1	2	4	5	3	–	1
♂♂ *S. ornatus*												1	1	1	1		
♀♀ *S. ornatus*													1	2	2	1	
♂♂ *S. semoni*			1	1	3	4	3	2	1								
♀♀ *S. semoni*					1	1	2	2	2	2	1	1	1	1	–	–	1

Scales in transverse forward series	6	7	8	9	10	11	12	13	14	15	16	17
S. aureofuscus	2	1	3									
S. carisa								1	6	23	11	1
S. pelewensis								1	6	13	7	2
S. ornatus								1	3	2	2	
S. semoni						2	2	5	6	8	7	

Scales in transverse backward series	7	8	9	10	11
S. aureofuscus	2	1	3		
S. carisa				27	15
S. pelewensis				15	14
S. ornatus			2	8	
S. semoni			18	12	

Cephalic sensory pore system A, B, C, D, F, H, K, L, N and O; pore D single; all others are paired (Fig. 4). Oculoscapular canal separated into anterior and posterior canals between pores H and K. Cutaneous sensory papillae developed over lateral surface of head.

Urogenital papilla in males is rectangular or somewhat rounded; rectangular in female with larger projections at the corners.

Colour of preserved specimens

Male. – Background of body entirely black or greyish. Belly entirely blackish to dark grey. Background of head, chin and preopercle black or greyish. Pectoral fins translucent and rays with regularly spaced black spots. Dorsal fins dark with a lighter upper margin. Anal fin dark with a thin light margin. Caudal fin entirely black with a lighter distal margin.

Female. – Background of body and head mostly cream to light tan. Blackish midlateral band originates at snout, extending medially over cheek and opercle and terminating at hypural base as a large black spot. Belly whitish. Pectoral fins usually clear.

Table III. - Morphometric values for *Stiphodon aureofuscus* n. sp. and related species expressed to the nearest whole percent of standard length.

Predorsal length	30	31	32	33	34	35	36	37	38	39
S. aureofuscus	1	–	–	2	–	2	1			
S. carisa				1	4	5	19	10	2	1
S. pelewensis			1	1	5	13	6	3		
S. ornatus				1	3	2	2	1	1	
S. semoni	1	-	2	3	5	7	5	5	2	

Preanal length	47	48	49	50	51	52	53	54	55	56	57	58	59	60
S. aureofuscus						1	1	–	1	–	–	2	1	
S. carisa						1	3	6	8	10	6	6	1	1
S. pelewensis						1	4	5	7	6	3	2	1	
S. ornatus					2	1	1	3	1	1	–	1		
S. semoni	1	1	1	1	2	2	3	5	3	4	3	3	2	

Head length	20	21	22	23	24	25	26
S. aureofuscus	1	–	1	3	–	1	
S. carisa		2	12	13	12	2	1
S. pelewensis		7	10	8	3	1	
S. ornatus	2	2	3	2	1		
S. semoni	2	4	8	7	6	3	

Jaw length	6	7	8	9	10	11	12
S. aureofuscus			2	1	2	1	
S. carisa			2	9	20	7	2
S. pelewensis			3	11	10	4	1
S. ornatus	1	1	5	2	1		
S. semoni		1	7	11	10	1	

Caudal peduncle length	15	16	17	18	19	20	21	22	23	24	25
S. aureofuscus	3	1	1								
S. carisa					2	6	7	14	9	3	1
S. pelewensis							1	6	7	8	7
S. ornatus				1	1	1	1	3	2	1	
S. semoni						4	6	8	8	3	1

Caudal peduncle depth	8	9	10	11	12	13
S. aureofuscus	1	1	3	1		
S. carisa			25	16	1	
S. pelewensis		1	14	13	1	
S. ornatus			3	5	1	1
S. semoni		5	14	9	2	

Body depth at second dorsal origin in males	11	12	13	14	15	16
S. aureofuscus		1	3	1		
S. carisa				3	8	3
S. pelewensis			3	5	4	
S. ornatus			1	2	1	
S. semoni	1	3	12	13		

Second dorsal fin length	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
♂♂ *S. aureofuscus*							1	–	–	1	1	1	1								
♀♀ *S. aureofuscus*								1													
♂♂ *S. carisa*													1	–	1	2	1	4	2	2	1
♀♀ *S. carisa*		1	–	2	6	8	8	1	1	–	1										
♂♂ *S. pelewensis*						1	–	1	–	1	2	1	1	1	1	1	–	1			
♀♀ *S. pelewensis*			1	2	4	6	3	1													
♂♂ *S. ornatus*												1	1	–	–	–	–	1	–	–	1
♀♀ *S. ornatus*				2	–	–	2	2	1												
♂♂ *S. semoni*						1	1	1	2	1	3	1	3	2	1						
♀♀ *S. semoni*	1	2	2	3	3	3	1														

Colour in life

Male (Figs 1-3). – Background of body mostly black, sometimes slightly golden, with some scales along and around midline of dorsum purple to brownish, or with some bright gold scales all along dorsum. Belly entirely blackish to dark grey. Background of head, chin and preopercle black. Pectoral fins translucent and rays with regularly spaced black spots. Dorsal fins dark red to dark orange with a lighter upper margin (yellowish to orange). Anal fin dark red to dark orange with a distal blue line. Caudal fin black with a red

Table III. Continued.

Anal fin length	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
♂♂ *S. aureofuscus*						2	–	–	–	–	1	–	–	–	–	2			
♀♀ *S. aureofuscus*	1																		
♂♂ *S. carisa*												1	–	1	6	5	–	1	
♀♀ *S. carisa*	1	1	2	2	5	5	4	3	2	1	2								
♂♂ *S. pelewensis*							1	–	1	1	1	1	2	2	1	1	–	1	
♀♀ *S. pelewensis*				3	4	4	7	3											
♂♂ *S. ornatus*															1	1	1	–	1
♀♀ *S. ornatus*								2	2	1	1								
♂♂ *S. semoni*						1	1	1	1	2	2	3	2						
♀♀ *S. semoni*		1	1	2	3	3	3	2											

Caudal fin length	20	21	22	23	24	25	26	27	28	29	30
♂♂ *S. aureofuscus*						1	–	–	2	1	1
♀♀ *S. aureofuscus*					1						
♂♂ *S. carisa*				1	–	1	3	4	2	2	1
♀♀ *S. carisa*	2	2	6	10	6	2					
♂♂ *S. pelewensis*			1	2	4	2	2	1			
♀♀ *S. pelewensis*	2	3	4	5	3						
♂♂ *S. ornatus*								1	2	–	1
♀♀ *S. ornatus*	1	–	–	–	2	2	–	–	–	1	
♂♂ *S. semoni*	1	1	2	2	3	3	2	2	1	2	
♀♀ *S. semoni*	1	4	5	3	2						

submarginal line surrounded distally by yellow, or with an oval black spot at the caudal base, surrounded by a brownish half circle.

Female (Fig. 2). – Background of body and head mostly cream to light tan. Blackish midlateral band originates at snout, extending medially over cheek and opercle and terminating at caudal base as a black spot. Belly whitish. Posteriorly, on upper pectoral fin base, a black spot. Anteriormost parts of the dorsal fins and the base of the caudal fin red. Dorsal fin spines and rays with few black spots. Pectoral fins usually clear or finely spotted; caudal fin with some small oval black spots at the base.

Comparison

Stiphodon aureofuscus n. sp. differs from *S. carisa*, *S. pelewensis, S. ornatus* and *S. semoni* in having no predorsal scales in males *versus* 2-14, fewer scales in transverse forward series 6-8 *vs*. 11-17 and in transverse back series 7-9 *versus* 9-11.

Distribution

Currently known only from Java, Bali and Lombok (Indonesia).

Ecology

Like other Sicydiinae, *Stiphodon aureofuscus* n. sp. was found in a clear, high gradient stream with rocky bottom. It lives on the bottom of the river, perching on rocks, between 100 and 400 m in altitude. It is assumed to be amphidromous (Keith, 2003; Keith and Lord, 2011b).

Etymology

The name of the species is derived from *aureo*, golden, and *fuscus*, black, and refers to the colour pattern of the males.

Acknowledgments. –We wish to thank Jean-Paul Toutain, Jean-François Agnèse and Domenico Caruso for their support. We also thank Bambang Dwisusilo, Sumanta and Daisy Wowor for their help during the field sampling. Part of the present study was funded by the MNHN (UMR 7208 BOREA), the Institut de Recherche pour le Développement (UMR ISEM), the Indonesian Institute of Sciences (LIPI), the French Ichtyological Society (SFI) and the Fondation de France. This study has been approved by the Indonesian Ministry of Research and field sampling has been conducted according to the research permits 097/SIP/FRP/SM/IV/2014 for Philippe Keith, and the research permit 41/EXT/SIP/FRP/SM/VIII/2014 for Nicolas Hubert. We wish to thank MENRISTEK staffs as well as Mohammad Irham and Rosichon Ubaidillah (LIPI) and Witjaksono (Research Center for Biology-LIPI) for the research permits and supporting letters.

Finally, we thank for the loan of specimens, pictures or X rays: S. Morrison (WAM), F. Krupp (SMF), R. Vonk and H. Praagman (ZMA), P. Pruvost, R. Causse, Z. Gabsi, C. Ferrara, M. Hautecoeur (MNHN), and M. Kottelat. This is publication ISEM 2015-065 SUD.

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