

# Five new species of *Sicyopterus* (Gobioidei: Sicydiinae) from Papua New Guinea and Papua

by

Philippe KEITH\* (1), Gerald ALLEN (2), Clara LORD (3) & Renny HADIATY (4)

**ABSTRACT.** - Five new species of *Sicyopterus*, freshwater gobies, are described from streams of Papua New Guinea and Papua Province, Indonesia. They differ from other species belonging to the genus by a combination of characters including the upper lip morphology, the number of soft rays in the second dorsal fin, the scales in the lateral, predorsal, transverse back, transverse forward and zigzag series, sexual dimorphism, and live colours.

**RÉSUMÉ.** - Cinq espèces nouvelles de *Sicyopterus* (Gobioidei : Sicydiinae) de Papouasie Nouvelle-Guinée et de Papouasie.

Cinq espèces nouvelles de *Sicyopterus*, des gobies dulçaquicoles, sont décrites sur la base de spécimens collectés dans les rivières de Papouasie Nouvelle-Guinée et de la province de Papouasie (Indonésie). Elles diffèrent des autres espèces du genre par plusieurs caractères incluant la morphologie de la lèvre supérieure, le nombre de rayons mous à la seconde nageoire dorsale, le nombre d'écailles en ligne longitudinale, en série prédorsale, transverse postérieure, transverse antérieure et zigzag, le dimorphisme sexuel et les couleurs *in vivo*.

**Key words.** - Gobioidei - Sicydiinae - *Sicyopterus stiphodonoides* - *Sicyopterus ocellaris* - *Sicyopterus lengguru* - *Sicyopterus erythropterus* - *Sicyopterus calliochromus* - Papua New Guinea - Papua - New species.

The island of New Guinea harbours one of the world's largest and most exciting fish faunas. Approximately 2,500 species are currently known from the island, most of them inhabit surrounding coral reefs. Although forming a small portion of the overall fauna, the freshwater fishes represent a fascinating and highly unique community. Nearly three quarters of the species are found only on this island, and many are confined to a single lake or relatively small isolated catchments (Allen *et al.*, 2000; Allen *et al.*, 2008). Among them, the sub-family Sicydiinae (Gobioidei) harbours fascinating and colourful species with an amphidromous life cycle (Keith, 2003; Keith *et al.*, 2006) adapted to the conditions in these distinctive habitats.

In the Pacific area, *Sicyopterus* is the most diversified of the various sicydiine genera and it occurs in all catchment areas from the lower to the upper reaches of rivers (Lord *et al.*, 2010). It is distributed in the Indo-Pacific from the Western Indian Ocean to the Eastern Pacific (Keith *et al.*, 2005; Keith *et al.*, 2011).

The second author has conducted extensive freshwater fish surveys throughout New Guinea, beginning in 1978 and continuing to the present. Collections were made throughout the mainland, including 16 months of fieldwork at Papua

New Guinea and nine months on the Indonesia portion of the island (Papua and West Papua provinces). The first 12 years of this endeavour were summarized in Allen's (1991) *Field Guide to the Freshwater Fishes of New Guinea*. More recently, beginning in 1998, there has been a shift in focus to the major satellite islands, particularly the Raja Ampat Island (West Papua Province, Indonesia) and the D'Entrecasteaux, Louisiade, and other island groups of Milne Bay Province, Papua New Guinea. In addition to these surveys, Keith *et al.*, in October 2010, conducted inventories of fish occurring in freshwater streams and rivers on the Vogelkop Peninsula in Papua.

The purpose of this paper is to provide a description of five new species of *Sicyopterus* known from Papua New Guinea and Papua.

## MATERIAL AND METHODS

Methods follow Watson (1995) and Keith *et al.* (2004). All counts and measurements were taken from the right side. Measurements were taken with dial callipers and are expressed to the nearest tenth of a millimetre. Teeth were

(1) Muséum national d'Histoire naturelle, DMPA, CP026, 43 rue Cuvier, 75231 Paris CEDEX 05, France. [keith@mnhn.fr]

(2) Western Australian Museum, Locked Bag 49, Welshpool DC, Perth, Western Australia 6986, Australia.

(3) Atmosphere and Ocean Research Institute, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba, 277-8564, Japan. [claralord@gmail.com]

(4) LIPI, Zoology Division, MZB, Gedung Widyasatwaloka, Jl. Raya Jakarta Bogor km. 46, Cibinong- Bogor 16911, Indonesia. [renny.kurnia.hadiaty@lipi.go.id]

\* Corresponding author



Figure 1. - **A:** *Sicyopterus stiphodonoides*, n. sp., holotype, MZB 20007, male; Nantuke Creek, Papua New Guinea, 24 Aug. 2000; G.R. Allen coll. **B:** Paratype WAM P31746.004, female; Nantuke Creek, Papua New Guinea, 24 Aug. 2000; G.R. Allen coll.

consistently counted to the right of the symphysis.

Abbreviations used to represent institutions and collections cited follow Leviton *et al.* (1985) and Kottelat *et al.* (1993).

These are: AMS (Australian Museum of Sydney), BLIH (Biological Laboratory, Imperial Household, Tokyo, Japan) formerly LICPP, CAS (California Academy of Sciences, USA), MNHN (Muséum national d'Histoire naturelle, Paris, France), MZB (Museum Zoologicum Bogoriense, Bogor, Indonesia), NTM (Museum and Art Gallery of the Northern Territory, Darwin, Australia), RMNH (Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands), ROM (Royal Ontario Museum, Toronto, Canada), SMF (Senckenberg Museum, Frankfurt am Main, Germany), USNM (National Museum of Natural History, Smithsonian Institution, Washington, USA), WAM (Western Australian Museum, Perth, Australia), ZMA (Zoological Museum of the University of Amsterdam, The Netherlands).

Abbreviations for cephalic sensory pores follow Akihito (1986). Abbreviations used in the descriptive account follow Watson (1995) and Keith *et al.* (2004), with a few additions: A, anal fin; C, caudal fin (only branched rays are reported); D, dorsal fins; D1, first dorsal fin; D2, second dorsal fin; LS, scales in lateral series counted from upper pectoral base, or anteriormost scale along lateral midline, to central hypural base; P, pectoral fin; PD, predorsal midline counted from scale directly anterior to first dorsal fin insertion to the anteriormost scale; TRB, transverse series back, refers to scales counted from the first scale anterior to second dorsal fin, in a diagonal manner, posteriorly and ventrally to the anal fin base or ventralmost scale; TRF, transverse series forward refers to scales counted from the first scale anterior to second dorsal fin, in a diagonal manner, anteriorly and ventrally to the centre of belly 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.

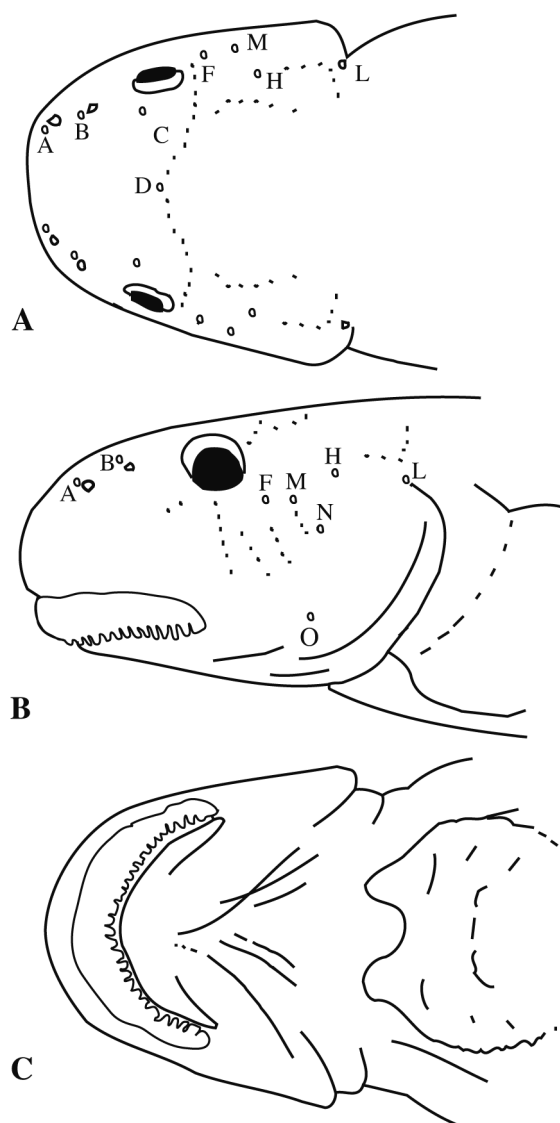


Figure 2. - Diagrammatic illustration of head in *Sicyopterus stiphodonoides* showing cephalic sensory pore system and cutaneous sensory papillae. **A:** Dorsal view; **B:** Lateral view; **C:** ventral view.

***Sicyopterus stiphodonoides* n. sp. Keith, Allen & Lord**

(Figs 1-3, Tabs I-IV)

**Comparative material**

*Sicyopterus stiphodonoides* n. sp. is compared to Pacific *Sicyopterus* species with papillae and without clefts on upper lip, and with a second dorsal fin with 1 spine and 10 segmented rays: *S. wichmanni* (Weber, 1894), *S. hageni* Popta, 1921 and *S. microcephalus* (Bleeker, 1854).

*Sicyopterus wichmanni* (Weber, 1894). - Lectotype: ZMA 111274, 53.7 mm SL. - Paralectotypes: ZMA 111275, size range 31.3-48.6 mm SL; ZMA 111276, size range 36-44.2 mm SL. River near Kupang, Timor Island, southern Malay Archipelago.

*Sicyopterus hageni* Popta, 1921. - Syntypes: SMF 6622-29, size range 55.1-65.2 mm SL. Sunda Islands, Indonesia.

*Sicyopterus microcephalus* (Bleeker, 1854). - Syntypes: RMNH 4768 (2 of 4 and 1 non-type), size range 80.2-84.5 mm SL). Tjibiliong, Banten Province, Java, Indonesia.

**Material examined**

6 specimens from streams of Papua Province, Indonesia, and Solomon islands, totalling four males and two females, size range 32.7-57.4 mm SL.

*Holotype*. - MZB 20007, male, 32.7 mm SL. Nantuke Creek, Papua Province, Indonesia, 02°27.103'S 140°29.174' E, 24 Aug. 2000; G.R. Allen coll.

*Paratypes*. - WAM P31746.004, female, 34.6 mm SL. Same data as holotype. MNHN 2011-0048, Male, 46.3 mm SL, Vila river, Solomon, 21 July 2010, D. Boseto coll. MNHN 2011-0049, 2 males, 1 female, size range 45-57.4 mm SL. Choiseul island, Tupiri river, Solomon, 8 Aug. 2008, D. Boseto coll.

**Diagnosis**

Upper lip with papillae and without cleft anteriorly and midlaterally. Second dorsal fin with 1 spine and 10 segmented rays. The general pattern of the female resembles that of a female *Stiphodon*, with a yellowish body background and a light dusky black band extending midlaterally from posterior of pectoral base and ending as a spot posterior to hypural base. Scales in lateral series 55-59, in transverse forward 14-16 and in predorsal 18-20.

**Description**

The scale counts are given in table I, morphometrics in table II and fin length in tables III and IV. Below, the holotype counts are given first, followed, in brackets if different,

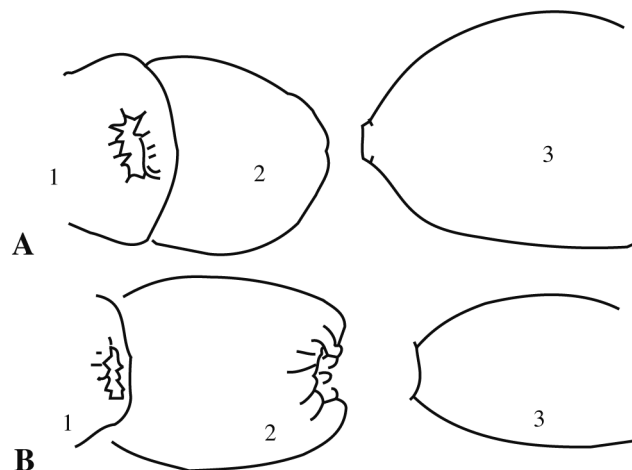


Figure 3. - Diagrammatic illustration of urogenital papilla in *Sicyopterus stiphodonoides* (ventral view): 1: anus, 2: urogenital papilla, 3: anal fin. **A:** Male; **B:** Female.

by the paratypes' counts.

Dorsal fins VI-I,10; the first dorsal fin has filamentous rays reaching one third of the second dorsal fin base, with the third and fourth rays longer. Anal fin I,10 directly opposite

Table I. - Scale counts in *Sicyopterus stiphodonoides* and related species.

	Lateral series															
	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	
<i>S. wichmanni</i>					1	3	4	-	1							
<i>S. hageni</i>					1	-	2	-	3	-	-	1	-	-	1	
<i>S. microcephalus</i>				1	-	-	-	1	-	1						
<i>S. stiphodonoides</i>	1	1	2	-	1	1										

	Predorsal midline series											
	16	17	18	19	20	21	22	23	24	25	26	27
<i>S. wichmanni</i>				1	3	3	-	1	1	1		
<i>S. hageni</i>					1	-	2	1	-	1	1	1
<i>S. microcephalus</i>								1	1	1		
<i>S. stiphodonoides</i>	1	-	1	-	1	1	1	1				

	Transverse backward series						Zigzag series					
	14	15	16	17	18	19	12	13	14	15	16	17
<i>S. wichmanni</i>	1	-	2	3	3	1		2	5	2	1	
<i>S. hageni</i>	1	1	3	1	2				2	3	2	1
<i>S. microcephalus</i>		1	1	1					1	-	2	
<i>S. stiphodonoides</i>	1	2	2	1			1	2	2	1		

	Transverse forward series													
	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<i>S. wichmanni</i>										2	-	4	3	1
<i>S. hageni</i>					2	1	2	-	1	1	1			
<i>S. microcephalus</i>						1	-	2						
<i>S. stiphodonoides</i>	1	-	1	1	1	1	1							

to the second dorsal fin. Caudal fin with 13-14 branched rays and posterior margin rounded. Pelvic disk with 1 spine and 5 branched rays on each side, fifth rays joined together over their entire length, a strong frenum between spines, disc adherent to belly between all 5 rays. Pectoral fins 20-21, posterior margin rounded. LS 55 (54-59), ctenoid scales on flanks and caudal peduncle. TRB 15 (14-17). TRF 14 (16-20). PD 18 (16-23), ZZ 14 (12-15). The belly is scaleless, extending from anus, almost to pelvic base. The upper jaw is with a single row of flexible tricuspid teeth, lateral cusps rounded, medial cusps shorter than lateral cusps and sharply pointed. The dentary is with a single straight row of conical teeth 5 (1) on each side, not curved and not meeting at symphysis. The anterior and posterior teeth are usually caniniform. The horizontal teeth correspond in position with upper jaw teeth. Upper lip with 14-15 papillae on each side and without clefts. The lower lip is mostly absent, rudimentary elements present as expanded and folded tissue posterior to lower jaw teeth. Cephalic sensory pore system A, B, C, D, F, H, L, M, N and O, pore D singular with all others paired, oculoscapular canal uninterrupted posterior to eye. The cutaneous sensory papillae are well developed on head (Fig. 2).

Males with a rounded/triangular urogenital papilla with distal tip rounded. The females have bulbous urogenital papilla with fimbriate projections around distal opening (Fig. 3).

**Colour in preservation**

Sexual dichromatism is developed. Males usually greyish to brownish on the head and the back. The flanks are yellowish to brownish with sometimes a slightly longitudinal brownish band from snout to hypural base. The snout is black. The belly is greyish to yellowish. The caudal fin is reddish or greyish with one distal black line on upper and lower parts. A black distinctive triangular marking exist on the ventral surface of head in some males, as a black blotch

Table II. - Morphometrics in *Sicyopterus stiphodonoides* and related species expressed to the nearest whole percent of standard length.

	Jaw length						Caudal peduncle depth					
	8	9	10	11	12	13	10	11	12	13	14	15
<i>S. wichmanni</i>	1	1	2	2	3	1		1	2	3	3	1
<i>S. hageni</i>			3	1	4				6	1		
<i>S. microcephalus</i>	1	2							1	2		
<i>S. stiphodonoides</i>		2	3	1			1	3	2			

	Caudal peduncle length							Head length									
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
<i>S. wichmanni</i>	1	3	-	1	2	1				3	-	1	1	2	1	1	1
<i>S. hageni</i>			1	3	2	2				1	3	2	2				
<i>S. microcephalus</i>				3				2	-	1							
<i>S. stiphodonoides</i>			1	1	2	1	1		1	1	3	1					

	Body depth at second dorsal fin origin in males					
	13	14	15	16	17	18
<i>S. wichmanni</i>				3		
<i>S. hageni</i>					1	1
<i>S. stiphodonoides</i>	1	1	-	1	1	

	Predorsal length									
	30	31	32	33	34	35	36	37	38	
<i>S. wichmanni</i>			1	2	2	1	1	2	1	
<i>S. hageni</i>	1	-	1	2	2	-	1	1		
<i>S. microcephalus</i>		2	1							
<i>S. stiphodonoides</i>		1	-	1	3	1				

	Preanal length											
	50	51	52	53	54	55	56	57	58	59	60	
<i>S. wichmanni</i>	1	1	-	1	-	2	2	-	-	1	2	
<i>S. hageni</i>			2	-	-	1	1	2	1	1		
<i>S. microcephalus</i>				1	-	1	-	-	-	1		
<i>S. stiphodonoides</i>		1	1	1	-	-	1	1	1			

on the middle of the body from the back to the middle of flank. The pectoral fins are greyish. The pelvic fins are whitish (Fig. 1a). The background of body of females is usually yellowish or brownish, with generally two longitudinal well-marked brownish bands, the first one extending midlaterally from snout to hypural base and ending as a spot posterior to hypural base, the second one extending from the head posterior to eye to the upper caudal rays. They look like female *Stiphodon*. The belly is blackish. The first and second dorsal fins and the caudal fin are hyalines and spotted. The anal fin and the pelvic disc are whitish to greyish. The pectoral fins are hyaline with a dusky line (Fig. 1b).

**Colour in life**

Live colouration is unknown.

Table III. - Fin lengths in males of *Sicyopterus stiphodonoides* and related species expressed to the nearest whole percent of standard length.

	Second dorsal fin length																							
	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	
<i>S. wichmanni</i>				1	1	-	-	1																
<i>S. hageni</i>																			1	-	-	-	1	
<i>S. stiphodonoides</i>	1	1	-	-	1	-	-	-	-	1														

	Anal fin length															
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
<i>S. wichmanni</i>	1	-	-	-	-	-	1	-	1							
<i>S. hageni</i>														1	-	1
<i>S. stiphodonoides</i>	1	-	-	-	1	-	1	1								

	Caudal fin length											
	21	22	23	24	25	26	27	28	29	30	31	32
<i>S. wichmanni</i>			1	-	-	-	1					
<i>S. hageni</i>								1	-	-	-	1
<i>S. stiphodonoides</i>	1	-	-	1	2							

Table IV. - Fin lengths in females of *Sicyopterus stiphodonoides* and related species expressed to the nearest whole percent of standard length.

	Second dorsal fin length												
	32	33	34	35	36	37	38	39	40	41	42	43	44
<i>S. wichmanni</i>				2	-	1	2	1					
<i>S. hageni</i>								1	-	1	2	-	2
<i>S. microcephalus</i>						2	-	-	-	-	-	-	1
<i>S. stiphodonoides</i>	1	-	-	-	-	1							

	Anal fin length											
	30	31	32	33	34	35	36	37	38	39	40	41
<i>S. wichmanni</i>	1	1	1	2	1							
<i>S. hageni</i>				1	-	4	1					
<i>S. microcephalus</i>							2	-	-	-	-	1
<i>S. stiphodonoides</i>	1	-	-	-	1							

	Caudal fin length									
	19	20	21	22	23	24	25	26	27	28
<i>S. wichmanni</i>	1	-	-	1	2	1	1			
<i>S. hageni</i>						1	-	2	2	1
<i>S. microcephalus</i>									2	1
<i>S. stiphodonoides</i>			1	-	-	-	1			

**Ecology**

The type locality, which is located about 26 km north-west of the city of Jayapura, was situated at an elevation of about 70 m, approximately 2 km upstream from the sea. The specimens were collected from a clear-water pool, about 10 m in diameter and depth to 3 m, situated at the base of a 15-m high waterfall. The stream was moderately fast flowing over mixed gravel, cobbles, rocks, and boulders in open canopy forest. A water temperature of 25.6°C was recorded. The new species was seen feeding by scraping algae from rock surfaces.

**Distribution**

*Sicyopterus stiphodonoides* is currently known from the type locality in northeastern Papua Province, Indonesia. It was part of a small community of other sicydiines that included *Sicyopterus lagocephalus* (Pallas, 1770), *Sicyopus*

*mystax* Watson & Allen, 1999, *Stiphodon birdsong* Watson, 1996, and *Stiphodon rutilaureus* Watson, 1996. It occurs also in Solomon islands.

**Etymology**

The name of the species is derived from *Stiphodon*, a Sicydiinae genus, and from the Greek εἶδος (oidos), “in the shape of”, in reference to its similar *Stiphodon* female pattern.

**Comparison**

*Sicyopterus stiphodonoides* differs from all other *Sicyopterus* with papillae and without clefts on the upper lip, and with a second dorsal fin with 1 spine and 10 segmented rays by a combination of characters. It differs from *S. wichmanni* in having fewer scales in transverse forward series (14-20 vs. 23-27) and lateral scales (54-59 vs. 58-62); from *S. hageni* in

Figure 4. - *Sicyopterus ocellaris*, n. sp., paratype, WAM P28190.006, male. Nuru River, 25 km SW of Madang on lac road. Papua New Guinea; 17 Oct. 1983; G.R. Allen and R. Steene coll.



having fewer scales in transverse forward series (14-20 vs. 18-24), lateral scales (54-59 vs. 58-68), and shorter second dorsal (36-45 vs. 54-58% SL) and anal (31-38 vs. 44-46% SL) fin lengths in male. It differs from *S. microcephalus* in

having fewer scales in transverse forward series (14-20 vs. 19-21) and predorsal scales (16-23 vs. 23-25).

***Sicyopterus ocellaris* n. sp. Keith, Allen & Lord**  
(Figs 4-6, Tabs V-VIII)

*Sicyopterus* sp. 1. - Allen, 1991: 195 (Nuru River, Papua New Guinea)

**Comparative material**

*Sicyopterus ocellaris* n. sp. is compared to Pacific *Sicyopterus* species with 3 clefts (one anteriorly and 2 midlaterally) on upper lip, with smooth lips and with a second dorsal fin with 1 spine and mainly 11 segmented rays: *Sicyopterus aiensis* Keith, Watson & Marquet 2004, *Sicyopterus lagocephalus* (Pallas, 1770), *Sicyopterus macrostetholepis* (Bleeker, 1853), *Sicyopterus ouwensi* Weber, 1913, *Sicyopterus lengguru* n. sp. (this paper) and *Sicyopterus cynocephalus* (Valenciennes, 1837).

*Sicyopterus aiensis* Keith, Watson & Marquet 2004. - Holotype: MNHN 2003-268, 83.9 mm SL. Creek Ai, Efate Island, Vanuatu. - Paratypes: BLIH uncat., size range 37.9-74.7 mm SL. Creek Ai, Efate Island, Vanuatu. MNHN 2003-269 to 274, size range 51.8-77 mm SL. Creek Ai, Efate Island, Vanuatu. ROM 73455, 94.7 mm SL. Téouma River, Efate Island, Vanuatu. ROM 73456, size range

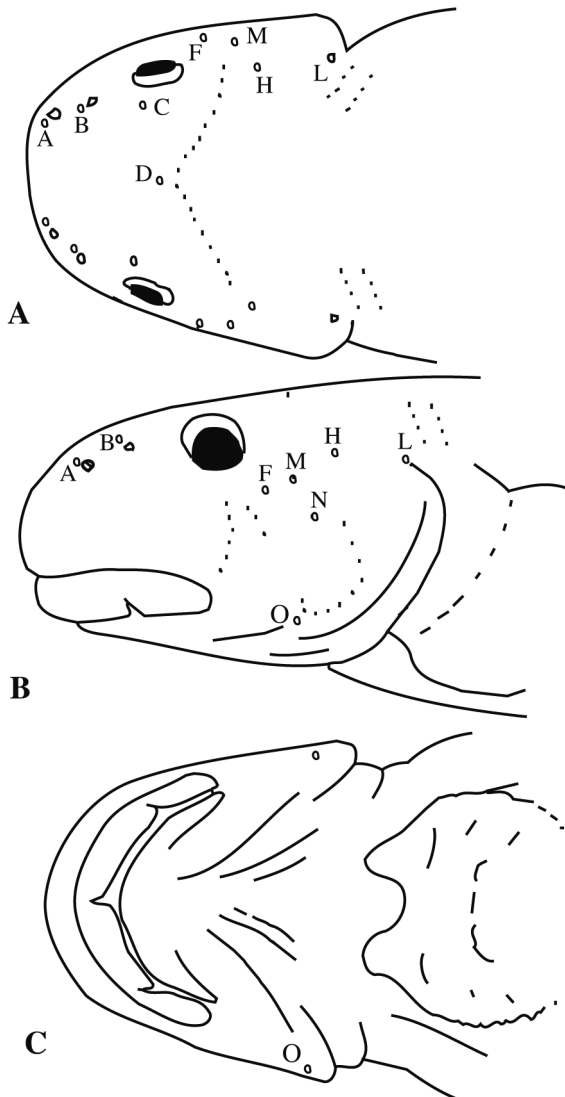


Figure 5. - Diagrammatic illustration of head in *Sicyopterus ocellaris* showing cephalic sensory pore system. **A:** Dorsal view; **B:** Lateral view; **C:** Ventral view.

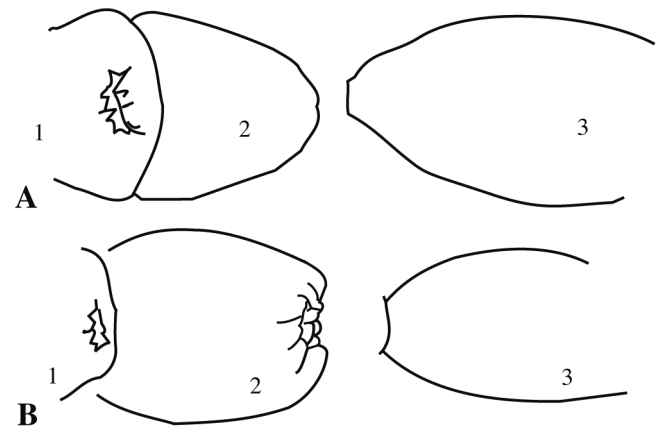


Figure 6. - Diagrammatic illustration of urogenital papilla in *Sicyopterus ocellaris* (ventral view): 1: anus, 2: urogenital papilla, 3: anal fin. **A:** Male; **B:** Female.

Table V. - Scale counts in *Sicyopterus* species with three clefts and smooth upper lip.

	Lateral series																										
	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
<i>S. aiensis</i>																		3	1	3	6	4	6	2	3	1	1
<i>S. lagocephalus</i>			4	5	14	51	77	84	63	29	5	3	2														
<i>S. ouwensi</i>													2	2	3	3	2	2									
<i>S. macrostetholepis</i>	1	1	1	1																							
<i>S. cynocephalus</i>													1	1	-	1	-	2	2	1	-	1					
<i>S. lengguru</i>													1	1													
<i>S. ocellaris</i>							1	-	2	2	2	1	1	1													

	Predorsal midline series																						
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
<i>S. aiensis</i>											1	-	-	3	2	3	5	2	2	5	3	1	3
<i>S. lagocephalus</i>	5	9	43	94	94	57	21	12	3	2													
<i>S. ouwensi</i>										2	1	1	2	3	3	1	-	1	1				
<i>S. macrostetholepis</i>			1	-	2	-	1																
<i>S. cynocephalus</i>										1	1	-	2	2	1	-	2						
<i>S. lengguru</i>								1	-	1													
<i>S. ocellaris</i>						1	2	-	1	1	1	1	-	-	1								

	Transverse backward series										
	13	14	15	16	17	18	19	20	21	22	23
<i>S. aiensis</i>						3	5	9	5	6	2
<i>S. lagocephalus</i>			15	87	155	76	5	1			
<i>S. ouwensi</i>			1	3	4	4	2				
<i>S. macrostetholepis</i>	2	2									
<i>S. cynocephalus</i>				2	5	6					
<i>S. lengguru</i>			1	1							
<i>S. ocellaris</i>			4	3	2	1					

	Transverse forward series															
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
<i>S. aiensis</i>									4	4	6	8	3	2	2	1
<i>S. lagocephalus</i>			18	18	73	139	81	19	6	1						
<i>S. ouwensi</i>						1		3	2	2	3	1	1			
<i>S. macrostetholepis</i>	2	2														
<i>S. cynocephalus</i>							1	1	3	2	1	1				
<i>S. lengguru</i>				1	1											
<i>S. ocellaris</i>			2	2	3	2		1								

	Zigzag series										
	11	12	13	14	15	16	17	18	19	20	21
<i>S. aiensis</i>						1	8	12	7	1	1
<i>S. lagocephalus</i>	1	3	24	155	91	58	4				
<i>S. ouwensi</i>						1	4	5	3	1	
<i>S. macrostetholepis</i>		2	2								
<i>S. cynocephalus</i>						1	3	4	-	1	
<i>S. lengguru</i>			1	1							
<i>S. ocellaris</i>					3	4	3				

66.6-77 mm SL. Bay Homo River, Pentecost Island, Vanuatu. ROM 73457, size range 48-84.6 mm SL. Vatmbilake River, Maewo Island, Vanuatu. SMF 29131, size range 62.6-108.2 mm SL. Bay

Homo River, Pentecost Island, Vanuatu. SMF 29132, size range 77.1-104.5 mm SL. Lombilitlit Stream, Pentecost Island, Vanuatu. SMF 29133, size range 43.4-62.7 mm SL. Upper Vatmbilake River,

Table VI. - Morphometrics in *Sicyopterus* with three clefts and smooth upper lip expressed to the nearest whole percent of standard length.

	Jaw length								Caudal peduncle depth									
	8	9	10	11	12	13	14	15	10	11	12	13	14	15	16	17	18	
<i>S. aiensis</i>					4	11	9	6			1	4	4	12	7	-	2	
<i>S. lagocephalus</i>	1	11	47	131	101	16			1	7	46	112	100	28	7	5	1	
<i>S. ouwensi</i>				3	4	5	2						5	3	4	1		
<i>S. macrostetholepis</i>				4							1	1	2					
<i>S. cynocephalus</i>				1	3	2	-	3				2	3	2	2			
<i>S. lengguru</i>					1	1							1	1				
<i>S. ocellaris</i>					1	1	6	2			3	5	1	1				

	Caudal peduncle length								
	10	11	12	13	14	15	16	17	18
<i>S. aiensis</i>					2	6	9	10	3
<i>S. lagocephalus</i>				5	45	110	98	17	5
<i>S. ouwensi</i>	2	2	1	4	3	1			
<i>S. macrostetholepis</i>	1	2	-	1					
<i>S. cynocephalus</i>				2	3	1	2	-	1
<i>S. lengguru</i>							1	1	
<i>S. ocellaris</i>		3	2	3	-	1			

	Body depth at second dorsal fin origin in males											
	14	15	16	17	18	19	20	21	22	23	24	25
<i>S. aiensis</i>				1	-	4	6	4	2	-	-	1
<i>S. lagocephalus</i>	1	4	14	29	53	26	17	1				
<i>S. ouwensi</i>						1	-	2	1	2		
<i>S. cynocephalus</i>						1	2	2				
<i>S. ocellaris</i>		1	-	2	3	1						

	Head length										Predorsal length										
	19	20	21	22	23	24	25	26	27	28	30	31	32	33	34	35	36	37	38	39	40
<i>S. aiensis</i>					3	6	10	7	4	1				1	1	4	9	5	8	1	1
<i>S. lagocephalus</i>			9	48	107	93	40	11	2				1	6	22	56	96	74	32	16	1
<i>S. ouwensi</i>				2	1	3	1	5	-	2				1	3	1	1	3	1	3	
<i>S. macrostetholepis</i>	3	1									1	-	-	2	1						
<i>S. cynocephalus</i>				1	4	3	1							3	1	-	1	2	2		
<i>S. lengguru</i>							1	1							1	-	1				
<i>S. ocellaris</i>				1	1	-	4	4						1	1	2	4	-	1	1	

	Prenatal length														
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
<i>S. aiensis</i>			3	1	4	4	5	4	5	5	2				
<i>S. lagocephalus</i>	1	1	5	6	25	40	52	48	42	36	26	16	4	1	1
<i>S. ouwensi</i>						3	2	4	-	3	1				
<i>S. macrostetholepis</i>					1	-	1	1	-	1					
<i>S. cynocephalus</i>						2	1	3	1	-	-	1	-	1	
<i>S. lengguru</i>								1	1						
<i>S. ocellaris</i>				1	1	-	2	2	-	1	-	1			

Maewo Island, Vanuatu.

*Sicyopterus macrostetholepis* (Bleeker, 1853). - Holotype RMNH 6188, and 3 other specimens, size range 54.3-68.4 mm SL. Western Sumatra, Indonesia.

*Sicyopterus ouwensi* Weber, 1913. - Syntypes: ZMA 112564-

65, size range 35.7-77.8 mm SL. Humbolt Bay and Mbai River, northern New Guinea. ZMA 111277, syntypes from *S. wichmanni*, size range 44-77.6 mm SL. Flores. MNHN 2011-0038, size range 74-91 mm SL. Kumafa, Papua. MNHN 2011-0039, size range 57.6-75.2 mm SL. Kayumera, Papua.



Table VII. - Fin lengths in males of *Sicyopterus* with three clefts and smooth upper lip expressed to the nearest whole percent of standard length.

	Second dorsal fin length														Anal fin length													
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	29	30	31	32	33	34	35	36	37	38	39	40	41	42
<i>S. aiensis</i>				1	4	1	1	1	2	2	2	-	-	1							3	2	4	4	-	3	1	1
<i>S. lagocephalus</i>	3	4	6	13	15	20	24	29	17	3	7	1	1		1	1	2	6	3	10	24	27	24	27	10	7	4	1
<i>S. ouwensi</i>				1	-	-	2	-	-	-	1	-	1	2							1	-	-	2	1	-	2	
<i>S. cynocephalus</i>		1	1	-	1	1												1	-	-	-	2	1					
<i>S. ocellaris</i>	1	1	-	1	1	1	1	1							1	1	1	1	-	1	1	1	1					

	Caudal fin length														
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
<i>S. aiensis</i>					2	3	7	2	2	2					
<i>S. lagocephalus</i>	3	4	12	28	26	28	18	8	8	1	5	2			
<i>S. ouwensi</i>				1	-	1	-	1	1	1	-	-	-	-	1
<i>S. cynocephalus</i>				1	-	2	-	-	1						
<i>S. ocellaris</i>				1	2	-	2	2							

Table VIII. - Fin lengths in females of *Sicyopterus* with three clefts and smooth upper lip expressed to the nearest whole percent of standard length.

	Second dorsal fin length											Anal fin length													
	33	34	35	36	37	38	39	40	41	42	43	44	26	27	28	29	30	31	32	33	34	35	36	37	38
<i>S. aiensis</i>					1	1	4	1	1	2	2							1	1	-	4	3	2	1	
<i>S. lagocephalus</i>			3	14	28	38	34	30	15	9	2	3		1	1	2	7	24	42	37	23	13	4		
<i>S. ouwensi</i>					1	1	-	1	-	1	1								2	-	-	1	2	1	
<i>S. macrostetholepis</i>	1	-	-	1	1	-	-	-	1				1	-	1	1	-	-	1						
<i>S. cynocephalus</i>							2	2	-	1									2	1	1	-	-	1	
<i>S. lengguru</i>												2							1	1					
<i>S. ocellaris</i>				1	-	-	1	-	-	1									1	1	-	-	1		

	Caudal fin length										
	19	20	21	22	23	24	25	26	27	28	29
<i>S. aiensis</i>					1	2	4	4	1		
<i>S. lagocephalus</i>	3	9	26	28	33	30	18	5	-	-	1
<i>S. ouwensi</i>		1	-	1	-	2	2	1			
<i>S. macrostetholepis</i>		1	-	-	1	1	-	1			
<i>S. cynocephalus</i>				1	-	2	1	1			
<i>S. lengguru</i>						1	-	1			
<i>S. ocellaris</i>				1	-	-	-	2			

*Sicyopterus cynocephalus* (Valenciennes, 1837). - Syntypes: MNHN A-1454, size range 75.5-86.8 mm SL. Manado, Sulawesi, Indonesia. MZB 18625, size range 44.2-67.2 mm SL. Wosea, Halmahera, Indonesia. MZB 18696, 58 mm SL. Akejira, Halmahera, Indonesia. MZB 18674, size range 44.4-63.6 mm SL. Kobe, Halmahera, Indonesia.

*Sicyopterus lengguru* n. sp. Keith, Lord & Hadiaty, this paper. Holotype MZB 20000, 87 mm SL. "Bichain" River, tributary of Lengguru (Tombona) stream, Papua Province, Indonesia. Paratype: MNHN 2011-0043, 90 mm SL. Same data as holotype.

Specimens examined of *Sicyopterus lagocephalus* are those cited by Watson *et al.* (2000) from the Pacific Ocean.

**Material examined**

Ten specimens from streams of Papua New Guinea, totaling 3 females, size range 36-38.3 mm SL, and 7 males, size range 30.5-41 mm SL.

*Holotype*. - WAM P.28190-011, male, 38.3 mm SL. Nuru River, about 34 km SW of Madang on Ramu Highway, 5°26'S 145°34'E. Papua New Guinea; 17 Oct. 1983; G.R. Allen and R. Steene coll.

*Paratypes*. - WAM P28190-006, 4 males, 2 females, size range 30.5-38.3 mm SL. Same data as holotype. MNHN-2011-0040, 2 males, 1 female, size range 37.5-41 mm SL. Same data as holotype.

### Diagnosis

A *Sicyopterus* with three clefts (one anteriorly and two midlaterally) on upper lip, with smooth lip and with a second dorsal fin with 1 spine and 11 segmented rays. A distinctive black spot at the posterior base of the first dorsal fin, including rays 4 to 6, both in males and females. Lateral scales usually 50-57, predorsal scales 16-25 and transverse forward scales 15-19.

### Description

Scale counts are given in table V, morphometrics in table VI and fin length in tables VII and VIII. Below, the holotype counts are given first, followed, in brackets if different, by the paratypes' counts.

Dorsal fins VI-I,11; the first dorsal fin has filamentous rays usually reaching half of the second dorsal fin base, with the second and third rays longer. Anal fin I,10 directly opposite to the second dorsal fin. Caudal fin with 13 (13-14) branched rays and posterior margin rounded. Pelvic disk with 1 spine and 5 branched rays on each side, fifth rays joined together over their entire length, a strong frenum between spines, disc adherent to belly between all 5 rays. Pectoral fins usually 19-21, posterior margin rounded. LS 54 (50-57), ctenoid scales on flanks and caudal peduncle. TRB 18 (16-19). TRF 19 (15-19). PD 17 (16-25), ZZ 17 (15-17). The belly is scaleless, extending from anus, almost to pelvic base. The upper jaw is with a single row of flexible tricuspid teeth, lateral cusps rounded, medial cusps shorter than lateral cusps and sharply pointed. The dentary is with a single straight row of conical teeth 5 (4-5) on each side, not curved and not meeting at symphysis; anterior and posterior teeth usually caniniform; horizontal teeth correspond in position with upper jaw teeth. Upper lip with 3 clefts (one anteriorly and 2 midlaterally). Upper lip smooth. Lower lip mostly absent, rudimentary elements present as expanded and folded tissue posterior to lower jaw teeth. Cephalic sensory pore system A, B, C, D, F, H, L, M, N and O, pore D singular with all others paired, oculoscapular canal uninterrupted posterior to eye. Cutaneous sensory papillae well developed on head (Fig. 5).

Males with a triangular urogenital papilla with distal tip rounded. Females with bulbous urogenital papilla with fimbriate projections around distal opening (Fig. 6).

### Colour in preservation

Sexual dichromatism is not developed. Body usually greyish to brownish sometimes with 5-7 dusky to brownish saddles on dorsum and caudal peduncle. The caudal fin is brownish or greyish with two longitudinal blackish lines and a brown expansion on the lower part. The pectoral fins are greyish. The pelvic fins and the belly are greyish to brownish. The first dorsal fin is greyish with a slightly dusky to distinctively black spot located at the posterior part, including rays 4 to 6. The second dorsal fin is greyish. The pectoral fins are usually dusky. The anal fin has a distal black margin (Fig. 4).

### Colour in life (from G. Allen field notes)

Generally grey, lighter ventrally with about 8 diffuse darker grey bars on side and black bar below eye; fins dusky greyish with broad whitish margins on pectorals and caudal fin; spinous dorsal fin with prominent black spot posteriorly; second dorsal and anal fins with blackish submarginal stripe.

### Ecology

The habitat consists of a fast-flowing, clear-water stream with numerous rapids and deeper (1-2 m) pools. The bottom is mainly cobbles and boulders with patches of gravel and no vegetation.

### Distribution

*Sicyopterus ocellaris* is currently known only from the Nuru River, northeastern Papua New Guinea. The type locality is situated at a bridge crossing of the Ramu Highway, about 34 km southwest of Madang, Papua New Guinea. It co-occurs with *Sicyopterus lagocephalus* (Pallas, 1770), *Stiphodon semoni* Weber, 1895, and other non-sicydiine gobioid fishes including *Awaous* sp., *Allomogurnda nesolepis* (Weber, 1907), and *Bunaka gyrinoides* (Bleeker, 1853).

Figure 7. - *Sicyopterus lengguru*, n. sp., Holotype MZB 20000, 87 mm SL. "Bichain" River, tributary of Lengguru (Tombona) stream, Papua Province, Indonesia. 18 Oct. 2010, P. Keith, G. Ségura, P. Gaucher coll.



### Etymology

The name of the species is derived from the Latin word meaning small eye in reference to the distinct small black spot on the first dorsal fin.

### Comparison

*Sicyopterus ocellaris* differs from all other *Sicyopterus* with 3 clefts on the upper lip, with a smooth upper lip and with a second dorsal fin with 1 spine and 11 segmented rays, in having a distinctive black spot at the posterior base of the first dorsal fin, including rays 4 to 6, both in males and females. Moreover, *S. ocellaris* differs from *S. aiensis*, *S. ouwensi* and *S. cynocephalus* in having fewer scales in lateral series (50-57 vs. 62-71/57-62/57-66), and transverse forward series (15-19 vs. 21-28/18-24/19-24). It differs from *S. macrostetholepis* in having more scales in lateral series (50-57 vs. 45-48), in predorsal midline (16-25 vs. 13-17), in transverse forward series (15-19 vs. 13-14) and in transverse back series (16-19 vs. 13-14). *Sicyopterus ocellaris* differs from *S. lagocephalus* in having more scales in zigzag series (15-17 vs. 11-17), a longer jaw length (12-15 vs. 8-13 %SL) and a shorter caudal peduncle length (11-15 vs. 13-18 %SL). Lastly, it differs from *Sicyopterus lengguru* n. sp. in having more scales in transverse back series (16-19 vs. 15-16), more scales in zigzag series (15-17 vs. 13-14), a shorter second dorsal fin length in females (36-42 vs. 44 %SL) and colour pattern.

### *Sicyopterus lengguru* n. sp. Keith, Lord & Hadiaty

(Figs 7-9, Tabs V-VIII)

### Comparative material

*Sicyopterus lengguru* n. sp. is compared to Pacific *Sicyopterus* species with 3 clefts (one anteriorly and 2 mid-laterally) on upper lip, with smooth upper lip and with a second dorsal fin with 1 spine and 11 segmented rays: *Sicyopterus aiensis* Keith, Watson & Marquet 2004, *Sicyopterus lagocephalus* (Pallas, 1770), *Sicyopterus macrostetholepis* (Bleeker, 1853), *Sicyopterus ouwensi* Weber, 1913, *Sicyopterus cynocephalus* (Valenciennes, 1837), and *Sicyopterus ocellaris* n. sp., this paper. For comparative material see *Sicyopterus ocellaris* n. sp.

### Material examined

Two specimens from tributary of Lengguru (Tombona) stream, Papua, totalling 2 females, size range 87- 90 mm SL.

**Holotype.** - MZB 20000, 87 mm SL. Bichain River, 03°42'18"S 134°04'41.4"E, tributary of Lengguru stream, Papua. 18 Oct. 2010, Keith, Ségura, Gaucher coll.

**Paratype.** - MNHN 2011-0043. Same data as holotype.

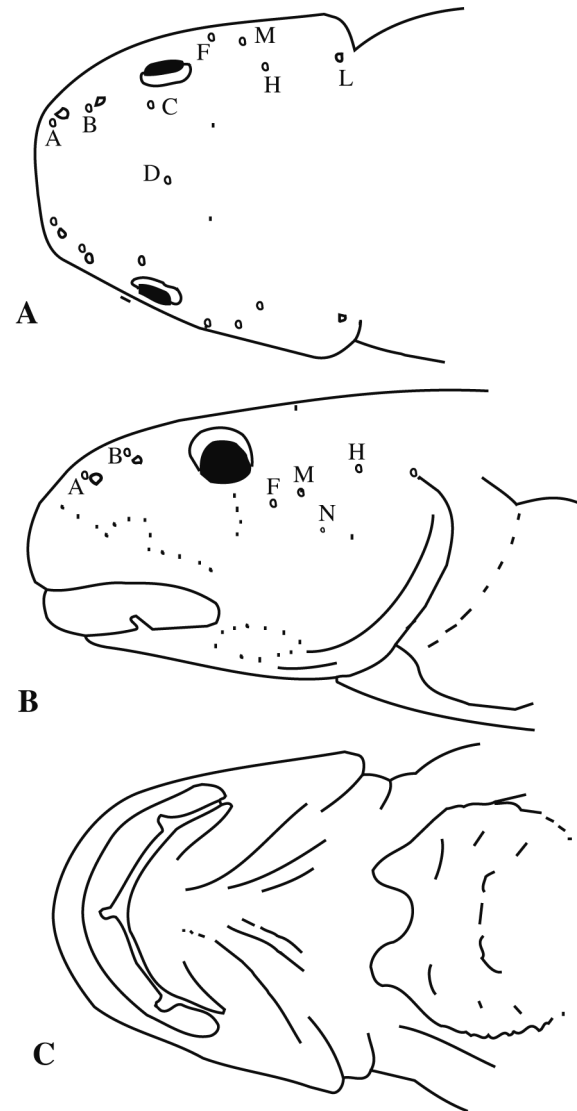


Figure 8. - Diagrammatic illustration of head in *Sicyopterus lengguru* showing cephalic sensory pore system. A: Dorsal view; B: Lateral view; C: Ventral view.

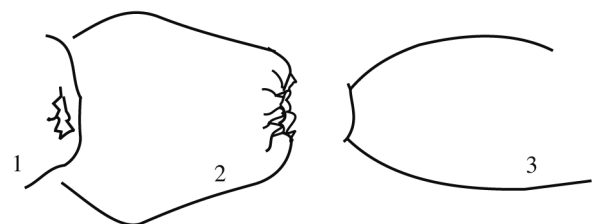


Figure 9. - Diagrammatic illustration of urogenital papilla in *Sicyopterus lengguru* (ventral view): 1: anus, 2: urogenital papilla, 3: anal fin.

### Diagnosis

A *Sicyopterus* with 3 clefts on upper lip, with smooth lips and with a second dorsal fin with 1 spine and 11 segmented

rays. A distinctive brownish spotted pattern on entire body and all fins with 3–4 blue spots on the back, on each side of the two dorsal fins and including further scales. Two bluish lines on caudal spotted fin. Second dorsal fin particularly long. Caudal fin with 14 rays and zigzag scales 13–14.

### Description

Scale counts are given in table V, morphometrics in table VI and fin length in tables VII and VIII. Below, the holotype counts are given first, followed, in brackets if different, by the paratype's counts.

Dorsal fins VI–I, 11; the first dorsal fin has the third and fourth rays lightly filamentous with the fourth longer and reaching the anterior part of the second dorsal fin base. Anal fin I, 10 directly opposite to the second dorsal fin. Caudal fin with 14 branched rays and posterior margin rounded. Pelvic disk with 1 spine and 5 branched rays on each side, fifth rays joined together over their entire length, a strong frenum between spines, disc adherent to belly between all 5 rays. Pectoral fin with 19 branched rays, posterior margin rounded. LS 57 (58), ctenoid scales on flanks and caudal peduncle. TRB 15 (16). TRF 17 (16). PD 20 (18), ZZ 14 (13). Belly entirely covered with cycloid scales, extending from anus, almost to pelvic base. The upper jaw is with a single row of flexible tricuspid teeth, lateral cusps rounded, medial cusps shorter than lateral cusps and sharply pointed. The dentary is with a single straight row of conical teeth (5) on each side, not curved and not meeting at symphysis; anterior and posterior teeth usually caniniform; horizontal teeth correspond in position with upper jaw teeth. Upper lip with 3 clefts (one anteriorly and 2 midlaterally). Upper lip smooth. Lower lip mostly absent, rudimentary elements present as expanded and folded tissue posterior to lower jaw teeth. Cephalic sensory pore system A, B, C, D, F, H, L, M, N (smaller); O missing, pore D singular with all others paired, oculoscapular canal uninterrupted posterior to eye. Cutaneous sensory papillae not well developed on head (Fig. 8). Females with bulbous urogenital papilla with fimbriate projections around distal opening (Fig. 9).

### Colour in preservation

Body with a distinctive dusky brownish spotted pattern with 3–4 white spots on the back, on each side of the two dorsal fins and including further scales. The caudal fin is spotted brownish to yellowish with two longitudinal blackish lines and a whitish expansion on the distal part. The caudal rays are black. The pectoral fins are dusky brownish. The pelvic fins and the belly are yellowish. The first and second dorsal fins are greyish to brownish with numerous aligned grey spots on spines. The anal fin has a distal white margin.

### Colour in life

A distinctive brownish spotted pattern on entire body and all fins. Cheeks and pectoral fin base greyish to bluish. 3–4 blue spots on the back, on each side of the two dorsal fins and including further scales. Sides of body posterior part, from base of second dorsal fin to caudal peduncle, have 3–4 indistinct dark brown saddle-like bands. Belly lighter brown than rest of body, almost beige. Dorsal fins and pectoral fins are brownish and spotted. Anal fin beige to brownish. Caudal fin brownish and spotted with two longitudinal black lines extending from the caudal peduncle to the distal part. Black, followed by bright blue lines on caudal fin superior and inferior margins (Fig. 7).

### Ecology

The substrate of the stream consisted in calcareous rocks with little to no gravel. It was fast flowing in open canopy forest. The stream was a 2 km long resurgence. A water temperature of 23°C was recorded. This species feeds by scraping algae from rock surfaces.

### Distribution

*Sicyopterus lengguru* is currently known only from the Type locality, Papua. It was a part of a small community that includes *S. lagocephalus* (Pallas, 1770), *Sicyopus discoridipinnis* Watson, 1995, *Sicyopus zosterophorum* (Bleeker, 1857) and *Rhyacichthys aspro* (Valenciennes, 1837).

### Etymology

The new species is dedicated to the “Lengguru” expedition, which permitted its discovery and is defined as a noun in apposition.

### Comparison

*Sicyopterus lengguru* differs from all other *Sicyopterus* with 3 clefts on the upper lip, with smooth lips and with a second dorsal fin with 1 spine and 11 segmented rays, in having a distinctive brownish spotted pattern on the entire body and all fins, with 3–4 blue spots on the back, on each side of the two dorsal fins and including further scales. Moreover, *S. lengguru* differs from *S. aiensis* and *S. cynocephalus* in having fewer scales in transverse forward series (16–17 vs. 21–28/19–24), in transverse back series (15–16 vs. 18–23/17–19), in lateral series (57–58 vs. 62–71/57–66), and in predorsal midline (18–20 vs. 21–33/20–27). It differs from *S. macrostetholepis* and *S. lagocephalus* in having more scales in lateral series (57–58 vs. 45–48/47–57) and in predorsal midline (18–20 vs. 13–17/11–20), from *S. macrostetholepis* in having more scales in transverse forward series (16–17 vs. 13–14) and in transverse back series (15–16 vs. 13–14). It differs from *S. ouwensi* in having fewer scales in transverse back series (15–16 vs. 16–20) and in transverse forward series (16–17 vs. 18–28) and in having fewer scales in zig-

zag series (13-14 vs. 16-20). Lastly, *S. lengguru* differs from *S. ocellaris* in having fewer scales in transverse back series (15-16 vs. 16-19), fewer scales in zigzag series (13-14 vs. 15-17) and a longer second dorsal fin length in females (44 vs. 36-42 %SL).

***Sicyopterus erythropterus* n. sp. Keith, Allen & Lord**  
(Figs 10-12, Tabs IX-XII)

**Comparative material**

*Sicyopterus erythropterus* n. sp. is compared to tropical *Sicyopterus* species with 3 clefts (one anteriorly and 2 mid-laterally) on upper lip, with smooth upper lip and with a second dorsal fin with 1 spine and 10 segmented rays: *Sicyopterus sarasini* Weber & de Beaufort, 1915 and *Sicyopterus micrurus* (Bleeker, 1853).

Specimens examined of *S. sarasini* are those cited by Watson et al. (2000).

*Sicyopterus micrurus* (Bleeker, 1853).- Holotype : RMNH 4666, 62 mm SL. Ambon Island, Moluccas Islands, Indonesia.

**Material examined**

Nine specimens from streams of western Papua Province, Indonesia, totalling 5 males, 4 females, size range 39.8-68 mm SL.

*Holotype*. - MZB 20008, male, 47 mm SL. Tirawiwa river, 132 km from mouth, 03°02.792'S 136°22.852'E, Papua; 4 Apr. 1998; G.R. Allen and S. Renyaan coll.

*Paratypes*. - WAM P31447.003, 3 males, 2 females, size range 41.8-68 mm SL. Same data as holotype. MNHN 2011-0041, 2 males, 1 female, size range 39.8-59 mm SL. Same data as holotype.

**Diagnosis**

A *Sicyopterus* with three clefts (one anteriorly and two midlaterally) on upper lip, with smooth lip and with a second dorsal fin with 1 spine and 10 segmented rays. The sexual dimorphism is well developed with males with fewer scales in LS (51-55 vs. 56-58) and PD (0-15 vs. 19-26) and less teeth in lower jaw (3-6 vs. 7-9) than females. A distinctive red pattern on the anal fin, more or less marked. Caudal fin branched rays 12-13.

**Description**

Scale counts are given in table IX, morphometrics in table X and fin length in tables XI and XII. Below, the holotype counts are given first, followed, in brackets if different, by the paratypes' counts.

Dorsal fins VI-I,10; the first dorsal fin has the third and fourth rays slightly filamentous, usually reaching, in males, one third of the second dorsal fin base, with the third ray longer; and just reaching the second dorsal fin in female.

Anal fin I,10 directly opposite to the second dorsal fin. Caudal fin with 12-13 branched rays and posterior margin rounded. Pelvic disk with 1 spine and 5 branched rays on each side, fifth rays joined together over their entire length, a strong frenum between spines, disc adherent to belly between all 5 rays. Pectoral fins usually 19-21, posterior margin rounded. LS sexually dimorphic 53 (51-55 for males vs. 56-58 for females), as PD scales 10 (0-15 for males vs. 19-26 for females). Ctenoid scales on flanks and caudal peduncle. TRB 20 (17-22). TRF 23 (17-23). ZZ 17 (15-18). Belly entirely covered with cycloid scales, extending from anus, almost to pelvic base. The upper jaw is with a single row of flexible tricuspid teeth, lateral cusps rounded, medial cusps shorter than lateral cusps and sharply pointed. The dentary is with a single straight row of conical teeth 5 (3-6 for males vs. 7-9 for females) on each side, not curved and not meeting at symphysis; anterior and posterior teeth usually caniniform; horizontal teeth correspond in position with upper jaw teeth. Upper lip with 3 clefts (one anteriorly and 2 midlaterally). Upper lip smooth. Lower lip mostly absent, rudimentary elements present as expanded and folded tissue posterior to lower jaw teeth. Cephalic sensory pore system A, B, C, D, F, H, L, M, N and O, pore D singular with all others paired, oculoscapular canal uninterrupted posterior to eye. Cutaneous sensory papillae well developed on head (Fig. 11).

Males with longer unpaired fins, and triangular urogenital papilla with distal tip rounded. Females with bulbous urogenital papilla with fimbriate projections around distal opening (Fig. 12).

**Colour in preservation**

The sexual dichromatism is not developed. Body usually greyish to brownish sometimes with 7-10 dusky to brownish saddles on dorsum and caudal peduncle. The caudal fin is brownish with two longitudinal blackish lines along superior and inferior margins. The pectoral fins are greyish. The pelvic fins and the belly are greyish to yellowish. The first dorsal and second dorsal fins are greyish.

**Colour in life**

Body dusky to greyish with a gold to metallic green shading on the flanks. Cheeks dusky to yellowish. Around 7-10 greyish saddle-like lateral bands present evenly spaced from the back of the nape to the caudal peduncle. Head greyish to yellowish with very light and discrete spotting under the eye and on tip of snout. Gold band extending from the back of the eye to the caudal peduncle along body midline, caudal peduncle is entirely gold. Under gold band, gold to metallic green shading, extending from pectoral fin base to caudal peduncle. Belly greyish to whitish. Dorsal fins hyaline to translucent. Pectoral fins hyaline. Caudal fin greyish to bluish with black bands, and a hint of bright blue, along

Figure 10. - *Sicyopterus erythropterus*, n. sp., paratype, WAM P31447.003, male. Tiawiwa river, 132 km from mouth. Papua Province, Indonesia; 4 Apr. 1998; G.R. Allen and S. Renyaan coll., with a detail of anal fin.

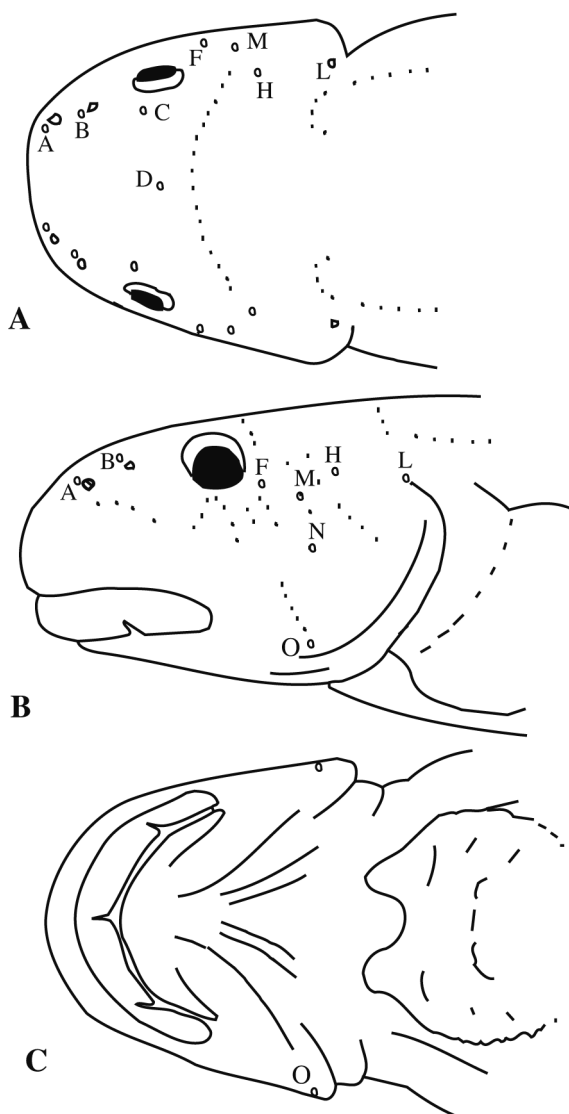


Figure 11. - Diagrammatic illustration of head in *Sicyopterus erythropterus* showing cephalic sensory pore system. **A:** Dorsal view; **B:** Lateral view; **C:** Ventral view.

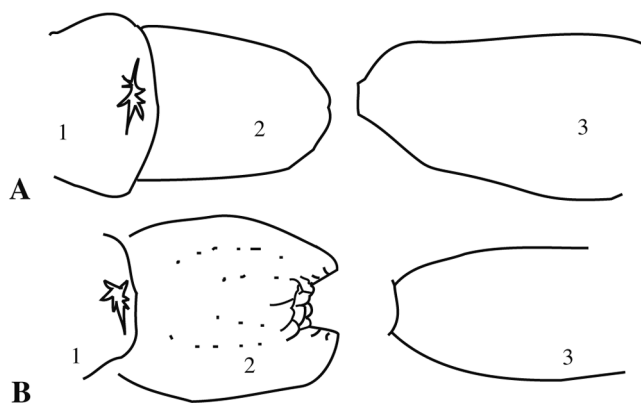


Figure 12. - Diagrammatic illustration of urogenital papilla in *Sicyopterus erythropterus* (ventral view): 1: anus, 2: urogenital papilla, 3: anal fin. **A:** Male; **B:** Female.

superior and inferior margins. Anal fin usually bright red (Fig. 10).

**Ecology**

The habitat consists of a broad (about 50 m wide), braided stream with a mainly gravel, cobbles, bedrock, and sand bottom. Type specimens were collected on a cobble bottom from a large pool, about 40 m in length with depths to 3 m. The water was clear with a slow to moderately-fast current; temperature and pH values of 30.7°C and 6.6 respectively were recorded. Most of the river channel was exposed to full sunlight except where shaded by trees on the edge of the stream.

**Distribution**

*Sicyopterus erythropterus* n. sp. is currently known only from the Tirawiwa River, a major tributary of the Wapoga River, which flows into the eastern side of Cenderawasih Bay, Papua Province, Indonesia. It co-occurs with *Sicyopterus calliochromus* n. sp. (this paper), and several other non-sicydiine gobioid fishes including *Awaous melanocephalus*

Table IX. - Scale counts in *Sicyopterus erythropterus* and related species.

			Lateral series																	
			48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
<i>S. sarasini</i>								1	1	2	1	-	1	2	4	2	4	4	3	1
<i>S. micrurus</i>	1																			
<i>S. erythropterus</i>						2	-	1	1	1	2	1	1							
			(males)						(females)											

			Predorsal midline series																											
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
<i>S. sarasini</i>											2	1	-	1	1	1	-	-	2	2	-	3	1	4	-	2	2	1	-	1
<i>S. micrurus</i>																			1											
<i>S. erythropterus</i>			1	-	-	1	-	-	-	-	-	-	1	-	1	-	-	1					1	-	-	-	-	1	-	2
			(males)												(females)															

			Transverse backward series								Zigzag series						
			15	16	17	18	19	20	21	22	12	13	14	15	16	17	18
<i>S. sarasini</i>			2	5	11	9					1	2	9	12	1		
<i>S. micrurus</i>	1														1		
<i>S. erythropterus</i>					3	3	-	2	-	1				1	3	3	2

			Transverse forward series																	
			14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
<i>S. sarasini</i>			1	1	-	-	-	-	1	-	1	1	2	4	7	4	4	-	-	1
<i>S. micrurus</i>				1																
<i>S. erythropterus</i>						1	1	1	2	2	1	1								

Table X. - Morphometrics in *Sicyopterus erythropterus* and related species expressed to the nearest whole percent of standard length.

			Jaw length								Caudal peduncle depth								Caudal peduncle length							
			9	10	11	12	13	14	15	16	10	11	12	13	14	15	16	11	12	13	14	15	16	17	18	
<i>S. sarasini</i>			1	12	8	3					4	2	10	7	2						3	6	7	3	6	
<i>S. micrurus</i>	1															1				1						
<i>S. erythropterus</i>						2	1	1	4	1		1	3	5				1	2	3	1	1	-	1		

			Body depth at second dorsal fin origin in males							Head length							
			13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<i>S. sarasini</i>			1	4	2	2	6	2		1	6	8	6	4			
<i>S. micrurus</i>									1		1						
<i>S. erythropterus</i>						1	-	3	1					3	5	1	

			Predorsal length										Preanal length											
			31	32	33	34	35	36	37	38	39	40	52	53	54	55	56	57	58	59	60	61	62	63
<i>S. sarasini</i>						2	5	8	6	1	1	2	3	1	3	4	5	4	2	-	-	2	1	
<i>S. micrurus</i>						1																		1
<i>S. erythropterus</i>						2	-	4	-	2	1					2	1	-	1	3	-	1		

(Bleeker, 1849), *Glossogobius bulmeri* Whitley, 1959, *Rhyacichthys aspro* (Valenciennes, 1837), and *Allomogurnda nesolepis* (Weber, 1907).

**Etymology**

The name of the species is derived from the Greek ερυθρός (eruthros) red, and πτερυξ (pteron), fin, to characterise its red anal fin.

Table XI. - Fin lengths in males of *Sicyopterus erythropterus* and related species expressed to the nearest whole percent of standard length.

	Second dorsal fin length																		
	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
<i>S. sarasini</i>		1	1	1	-	1	-	-	2	-	1	1	3	3	1	2	-	-	1
<i>S. micrurus</i>	1																		
<i>S. erythropterus</i>		1	-	1	1	1	-	-	1										

	Anal fin length																	
	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
<i>S. sarasini</i>						1	-	1	1	2	1	2	1	3	2	1	1	1
<i>S. micrurus</i>	1																	
<i>S. erythropterus</i>								1	1	2	-	1						

	Caudal fin length														
	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
<i>S. sarasini</i>			1	2	3	1	4	4	1	-	-	-	-	-	1
<i>S. micrurus</i>				-											
<i>S. erythropterus</i>	-1	-	-	1	2	-	1								

Table XII. - Fin lengths in females of *Sicyopterus erythropterus* and related species expressed to the nearest whole percent of standard length.

	Second dorsal fin length									
	32	33	34	35	36	37	38	39	40	41
<i>S. sarasini</i>	1	-	1	1	-	-	1	1	1	2
<i>S. erythropterus</i>	1	1	-	-	-	-	1	1		

	Anal fin length										
	27	28	29	30	31	32	33	34	35	36	37
<i>S. sarasini</i>	1	-	1	-	-	2	-	1	1	1	1
<i>S. erythropterus</i>	1	-	-	1	2						

	Caudal fin length						
	23	24	25	26	27	28	29
<i>S. sarasini</i>	3	3	2				
<i>S. erythropterus</i>		3	-	-	-	1	

**Comparison**

*Sicyopterus erythropterus* n. sp. differs from all other *Sicyopterus* with 3 clefts on the upper lip, with a smooth upper lip and with a second dorsal fin with 1 spine and 10 segmented rays, in having well developed sexual dimorphism consisting of males possessing fewer scales in LS and PD than females, and in having a distinctive red anal fin. Moreover, *S. erythropterus* differs from *S. micrurus* in having more scales in lateral series (51-58 vs. 48), in transverse forward series (17-23 vs. 15), in transverse back series (17-22 vs. 15), and a longer head length (25-27 %SL vs. 21). It differs from *S. sarasini* in having more scales in zigzag series (15-18 vs. 12-16), generally fewer scales in transverse forward series (17-23 vs. usually 14-31), a longer head length (25-27 %SL vs. 20-24) and live colours.

***Sicyopterus calliochromus* n. sp. Keith, Allen & Lord**  
(Figs 13-15, Tabs XIII-XVI)

**Comparative material**

*Sicyopterus calliochromus* n. sp. is compared to species with 2 lateral clefts on upper crenulated lip and a second

dorsal fin with 1 spine and 10 segmented rays: *Sicyopterus longifilis* de Beaufort, 1912.

*Sicyopterus longifilis* de Beaufort, 1912.- Syntypes: ZMA 112562, size range 36.7-74.5 mm SL. Upper course of Tubah River, western Ceram, Indonesia. WAM 31041-007, size range 48.4-62.5 mm SL. Yapen Island, Reifafeif river, Papua Province, Indonesia. WAM 31034-005, size range 66.7-70 mm SL. Yapen Island, Reifafeif River, Papua Province, Indonesia.

**Material examined**

9 specimens from streams of western Papua Province, Indonesia, totalling 7 males and 2 females, size range 47.1-58.2 mm SL.

*Holotype*. - MZB 20009, male, 55 mm SL. Tirawiwa river, 132 km from mouth, 03°02.792'S 136°22.852'E, Papua; 4 Apr. 1998; G.R. Allen and S. Renyaan coll.

*Paratypes*. - WAM P31447.004, 4 males, 1 female, 47.1-58.2 mm SL. Same data as holotype. MNHN 2011-0042, 2 males, 1 female, 50.3-55.6 mm SL. Same data as holotype.

**Diagnosis**

A *Sicyopterus* with only 2 lateral clefts on upper crenulated lip and a second dorsal fin with 1 spine and 10 seg-





Figure 13. - *Sicyopterus calliochromus*, n. sp., paratype, WAM P31447.004, male. Tiawiwa river, 132 km from mouth. Papua Province, Indonesia; 4 Apr. 1998; G.R. Allen and S. Renyaan coll.

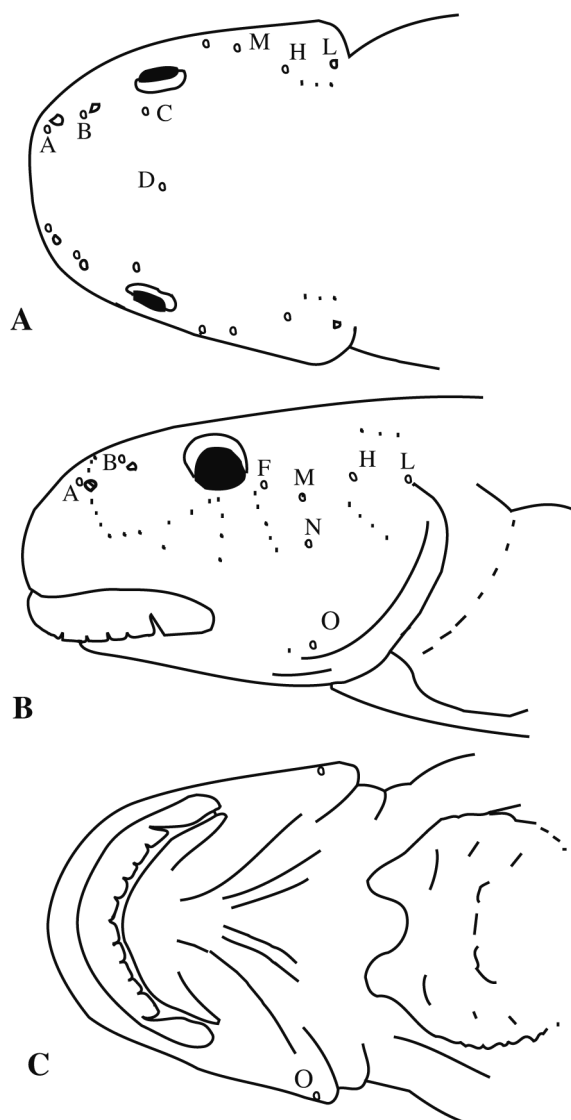


Figure 14. - Diagrammatic illustration of head in *Sicyopterus calliochromus* showing cephalic sensory pore system. A: Dorsal view; B: Lateral view; C: Ventral view.

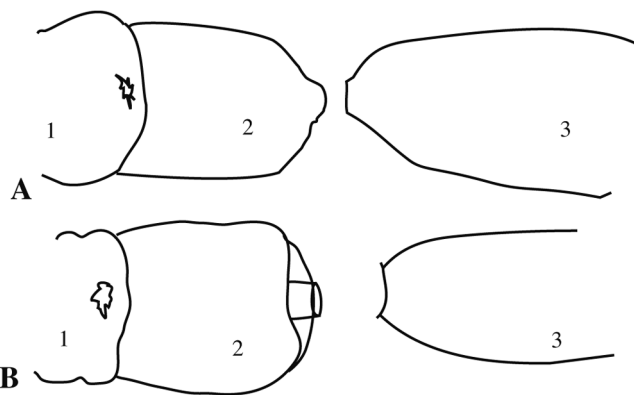


Figure 15. - Diagrammatic illustration of urogenital papilla in *Sicyopterus calliochromus* (ventral view): 1: anus, 2: urogenital papilla, 3: anal fin. A: Male; B: Female.

mented rays. A distinctive gold colour on entire body, both in males and females, with two ventral black bands from pectoral base to upper hypural, a black mask on the front of the head below the eyes and a black spot on the ventral part of the head. Females with bulbous urogenital papilla with fimbriate projections around a tubular ovipositor, which seems to be unique in *Sicyopterus* species. Fins particularly long both in males and females.

**Description**

Scale counts are given in table XIII, morphometrics in table XIV and fin length in tables XV and XVI. Below, the holotype counts are given first, followed, in brackets if different, by the paratypes' counts.

Dorsal fins VI-I,10; the first dorsal fin has the third and fourth rays strongly filamentous, without membrane, usually reaching, in males, the caudal peduncle and, in females, the half or more, of the second dorsal fin base. Anal fin I,10 directly opposite to the second dorsal fin. Caudal fin with 13 branched rays and posterior margin rounded. Pelvic disk with 1 spine and 5 branched rays on each side, fifth rays joined together over their entire length, a strong frenum between

Table XIII. - Scale counts in *Sicyopterus calliochromus* and related species.

		Lateral series									
		49	50	51	52	53	54	55	56	57	58
<i>S. longifilis</i>					2	-	2	1	1	5	1
<i>S. calliochromus</i>				2	2	1	1	1	2		

		Predorsal midline series											
		10	11	12	13	14	15	16	17	18	19	20	21
<i>S. longifilis</i>										4	3	2	2
<i>S. calliochromus</i>		1	-	2	-	2	2	1					

		Transverse backward series					Transverse forward series					Zigzag series							
		14	15	16	17	18	14	15	16	17	18	19	20	21	12	13	14	15	16
<i>S. longifilis</i>		1	4	4	1	1				1	3	3	2	2		1	6	3	1
<i>S. calliochromus</i>		1	3	3	2		1	1	4	2	1				1	3	5		

Table XIV. - Morphometrics in *Sicyopterus calliochromus* and related species expressed to the nearest whole percent of standard length.

		Jaw length				Caudal peduncle depth						Caudal peduncle length						Body depth at second dorsal fin origin in males				
		10	11	12	13	11	12	13	14	15	16	10	11	12	13	14	15	15	16	17	18	19
<i>S. longifilis</i>		1	6	2	1		1	5	3	1			1	2	1	2	2		2	3	1	
<i>S. calliochromus</i>		1	2	5	1	1	2	3	-	1	1	1	1	2	3	2	1	1	-	3	1	

		Head length						Predorsal length								Preanal length											
		20	21	22	23	24	25	30	31	32	33	34	35	36	37	48	49	50	51	52	53	54	55	56	57	58	59
<i>S. longifilis</i>		1	1	5	2	1	1	2	1	1	5	1	-	-	1			2	-	-	2	1	1	1	3		
<i>S. calliochromus</i>			1	2	2	4		1	1	-	2	2	-	1	1							1	1	2	2	2	1

Table XV. - Fin lengths in males of *Sicyopterus calliochromus* and related species expressed to the nearest whole percent of standard length.

		Second dorsal fin length										Anal fin length					Caudal fin length									
		42	43	44	45	46	47	48	49	50	51	38	39	40	41	42	24	25	26	27	28	29	30			
<i>S. longifilis</i>					2	2	-	1	-	-	1		2	2	-	2	1	1	2	-	-	1	1			
<i>S. calliochromus</i>		1	-	2	2	-	-	-	-	1		1	2	2	1			3	-	2	1					

Table XVI. - Fin lengths in females of *Sicyopterus calliochromus* and related species expressed to the nearest whole percent of standard length.

		Second dorsal fin length												Anal fin length												
		37	38	39	40	41	42	43	44	45	46	47	48	49	50	31	32	33	34	35	36	37	38	39	40	41
<i>S. longifilis</i>		1	1	1	1	2	1	1								1	1	-	-	-	-	1	2			
<i>S. calliochromus</i>							2	-	-	-	1	-	-	-	1							1	-	-	1	1

		Caudal fin length									
		23	24	25	26	27	28	29	30	31	
<i>S. longifilis</i>		1	-	1	1	2					
<i>S. calliochromus</i>								1	1	1	

spines, disc adherent to belly between all 5 rays. Pectoral fins 19-21, posterior margin rounded. LS 56 (51-56), ctenoid scales on flanks and caudal peduncle. TRB 17 (14-17). TRF 17 (14-18). PD usually 16 (10-16), ZZ 14 (12-14). Belly entirely covered with cycloid scales, extending from anus, almost to pelvic base. Upper jaw with a single row of

flexible tricuspid teeth, lateral cusps rounded, medial cusps shorter than lateral cusps and sharply pointed. Dentary with a single straight row of conical teeth 6 (4-7) on each side, not curved and not meeting at symphysis; anterior and posterior teeth usually caniniform; horizontal teeth correspond in position with upper jaw teeth. Upper crenulated lip and

with 2 lateral clefts. Lower lip mostly absent, rudimentary elements present as expanded and folded tissue posterior to lower jaw teeth. Cephalic sensory pore system A, B, C, D, F, H, L, M, N and O, pore D singular with all others paired, oculoscapular canal uninterrupted posterior to eye. Cutaneous sensory papillae well developed on head (Fig. 14). Fins particularly long both in males and females. First dorsal fin with filamentous second, third and fourth spine without membrane extending to caudal peduncle.

Males with a triangular urogenital papilla in appearance with distal tip rounded. Females with bulbous urogenital papilla with fimbriate projections around a tubular ovipositor, which seems to be unique in *Sicyopterus* species (Fig. 15).

### Colour in preservation

Sexual dichromatism not developed. Males usually brownish. Caudal fin greyish with a white distal margin. The upper white distal margin is underlined with a greyish line. Pelvic fins whitish to yellowish. First dorsal fin greyish with a slightly dark spot at the base of the first spine. Second dorsal fin greyish to brownish. Pectoral fin usually dusky with a distal whitish margin. Reproductive males and females with two ventral black bands from pectoral base to upper hypural, a black mask on the front of the head below the eyes and a black spot on the ventral part of the head.

### Colour in life

A distinctive gold colour on entire body, both in males and females. Head golden dorsally with black spots on top of head and nape. Black mask on the front of the head extending from the snout and upper lip to under the eye. The black mask continues into a band extending from under the eye to the posterior edge of operculum and pectoral base. Black mask interrupted under the eye, levelled with the pupil. Ventral part of head white with a centred black spot extending from the lower lip to pelvic fin base. Dorsal part of body gold with blackish spots, getting darker near caudal fin base. Body flanks completely golden, with shades of metallic green, from back of eye to hypural base. Belly completely white in the central part, between pelvic sucker and urogenital papillae. Two lateral ventral black bands from pectoral base to upper hypural, the black bands join posteriorly to urogenital papillae. Dorsal fins translucent. Caudal fin translucent with shades of blue and green and light blue to whitish line along superior and inferior margins. Pelvic fin is white. Pectoral fins with a large greenish to whitish distal margin. Centre of pectoral fin is black with a golden band in the middle (Fig. 13).

### Ecology

Information is provided above in the ecology section for *S. erythropterus* n. sp. The two species are found together in

the same habitat.

### Distribution

*Sicyopterus calliochromus* n. sp. is currently known only from the Tirawiwa River, a major tributary of the Wapoga River, which flows into the eastern side of Cenderawasih Bay, Papua Province, Indonesia. It co-occurs with *Sicyopterus erythropterus* n. sp. (this paper), and several other non-sicydiine gobioid fishes including *Awaous melanocephalus*, *Glossogobius bulmeri*, *Rhyacichthys aspro*, and *Allomogurnda nesolepis*.

### Etymology

The name of the species, *calliochromus*, is derived from the Greek *καλλιοζ* (*kallios*) the most beautiful, and *χρωμα* (*chrōma*), colour, to characterise its astonishing colour pattern.

### Comparison

*Sicyopterus calliochromus* n. sp. differs from *S. longifilis* with its distinctive gold and black band pattern and the female's bulbous urogenital papilla with fimbriate projections around a tubular ovipositor. Moreover, it differs in having fewer scales in predorsal midline (10-16 vs. 18-21) and in transverse forward series (14-18 vs. 17-21) and fewer branched rays in caudal fin (13 vs. 14-15).

**Acknowledgements.** - We are especially grateful for the Lengguru expedition to: Hasan Achmad, Head Regency of Kaimana; George Yaranga, Head of Dinas Perikanan dan Kelautan Kaimana, and his staff (Ike Damayanti, Napoleon Lemauk and Petrus Ruwe); Muhfizar, Director of Akademi Perikanan Sorong (APSOR) and the team of Vessel Airaha; Kadarusman (APSOR); Intanurfemi Bachandra, Fabian Ardianta & Amir Suruwaky (APSOR-BPSDMKP-KKP); Rudhy Gustiano, Endhay Kusnendar and Gelwyn Yusuf (Badan Penelitian dan Pengembangan Kelautan dan Perikanan-BALIT-BANG KP-KKP); Ruby V. Kusumah & Gigih S. Wibawa (Balai Riset Budidaya Ikan Hias-BRBIH Depok-KKP); Sofyan Sauri (Lembaga Ilmu Pengetahuan Indonesia-LIPI); Laurent et Bernard Pouyaud, Marc Legendre, Domenico Caruso, Jacques Slembrouck, Jean Christophe Avarre and Sumanta (IRD); Gilles Ségura (ISE), Philippe Gaucher (CNRS), Christophe Thebaud (Université Paul Sabatier) and all the scientific team; Chiefs of tribes and villagers in the region. We would thank Conservation International (CI) for facilitating the second author's collection of *Sicyopterus stiphodonoides*, *Sicyopterus erythropterus*, and *Sicyopterus calliochromus*. The following persons were especially helpful during the expeditions to Papua Province, Indonesia: Leeanne Alonso, Roni Bawoli, Paulus Boli, Burke Burnett, Mike Moore, Hendrite Ohee, Daniel Polhemus, Samuel Renyaan, Suer Suryadi, Jatna Suprianta, and Sylvester Tenege. The second author is also grateful to the Indonesian Institute of Sciences (LIPI), National Geographic Society, the Freeport Indonesia Company, and Universitas Cenderawasih for sponsoring/financing his studies of freshwater fishes. Finally, we thank the following: for the Solomon specimens D. Boseto, and for the loan of specimens: M. McGrouther (AMS), D. Catania (CAS), R. de Ruiter (RMNH), H. Zetzsche and F. Krupp (SMF), S. Morrison (WAM); R. Vonk and H. Praagman (ZMA), L. Parenti, J. Williams, L. Palmer, S. Raredon (USNM), H. Larson (NTM), P. Pruvost, R. Causse, Z. Gabsi, C. Ferrara, and for x-rays, M. Hauteceur (MNHN).

## REFERENCES

- AKIHITO P., 1986. - Some morphological characters considered to be important in gobiid phylogeny. *In: Indo-Pacific Fish Biology: Proc. 2<sup>th</sup> Int. Conf. on Indo-Pacific Fishes (Ichthyological Society of Japan, ed.)*, pp. 629-639. Tokyo.
- ALLEN G.R., 1991. - Field Guide to the Freshwater Fishes of New Guinea. Publication No. 9, 268 p. Madang, Papua New Guinea: Christensen Research Institute ed.
- ALLEN G.R., HORTLE K.G. & RENYAAN S.J., 2000. - Freshwater Fishes of the Timaka Region, New Guinea. 175 p. Freeport Indonesia.
- ALLEN G.R., STOREY A.W. & YARRAO M., 2008. - Freshwater Fishes of the Fly River, Papua New Guinea. 216 p. Ok Tedi Mining.
- KEITH P., 2003. - Biology and ecology of amphidromous Gobiidae in the Indo-pacific and the Caribbean regions. *J. Fish Biol.*, 63: 831-847.
- KEITH P., WATSON R.E. & MARQUET G., 2004. - *Sicyopterus aiensis*, a new species of freshwater goby from Vanuatu (Teleostei: Gobioidae). *Cybium*, 28(2): 111-118.
- KEITH P., GALEWSKI T., CATTANEO-BERREBI G., HOAR-EAU T. & BERREBI P., 2005. - Ubiquity of *Sicyopterus lagocephalus* (Teleostei: Gobioidae) and phylogeography of the genus *Sicyopterus* in the Indo-Pacific area inferred from mitochondrial cytochrome *b* gene. *Mol. Phyl. Evol.*, 37(3): 721-732.
- KEITH P., LORD C. & VIGNEUX E., 2006. - *In vivo* observations on postlarval development of freshwater gobies and eleotrids from French Polynesia and New Caledonia. *Ichthyol. Expl. Freshw.*, 17: 187-191.
- KEITH P., LORD C., LORION J., WATANABE S., TSUKAMOTO K., CRUAUD C., COULOUX A. & DETTAI A., 2011. - Phylogeny and biogeography of Sicydiinae (Teleostei: Gobioidae) inferred from mitochondrial and nuclear genes. *Mar. Biol.*, 158(2) : 311-326.
- KOTTELAT M., NIELSEN J. G. & NIJSSEN H., 1993. - Survey of Ichthyological Resources in European Museums and Collections. Societas Europaea Ichthyologorum. 23 p. Munich : Verlag Dr. Friedrich Pfeil.
- LEVITON A.E., GIBBS R.H., HEAL E. & DAWSON C.E., 1985. - Standards in herpetology and ichthyology: part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia*, 3: 802-832.
- LORD C., BRUN C., HAUTECOEUR M. & KEITH P., 2010. - Comparison of the duration of the marine larval phase estimated by otolith microstructural analysis of three amphidromous *Sicyopterus* species (Gobiidae: Sicydiinae) from Vanuatu and New Caledonia: insights on endemism. *Ecol. Freshw. Fish*, 19 : 26-38.
- WATSON R.E., 1995. - Gobies of the genus *Stiphodon* from French Polynesia, with descriptions of two new species (Teleostei: Gobiidae: Sicydiinae). *Ichthyol. Expl. Freshw.*, 6: 33-48.
- WATSON R.E., MARQUET G. & PÖLLABAUER C., 2000. - New Caledonia fish species of the genus *Sicyopterus* (Teleostei : Gobioidae : Sicydiinae). *J. Ichthyol. Aqua. Biol.*, 4(1): 5-34.