

A new species of *Belobranchus* (Teleostei: Gobioidae: Eleotridae) from Indonesia

by

Philippe KEITH* (1), Renny K. HADIATY (2) & Clara LORD (1)

ABSTRACT. - A new species of *Belobranchus*, a freshwater Eleotridae, is described from streams of Indonesia. It differs from the other only species belonging to the genus by a combination of characters including the scales in transverse forward series (22-28 *versus* 27-35), in transverse back series (18-21 *versus* 20-23), in predorsal scales (16-23 *versus* 21-34), and the *in vivo* general colour pattern. Particularly the caudal fin is never spotted but generally translucent with some yellow or reddish zones.

RÉSUMÉ. - Une espèce nouvelle de *Belobranchus* (Teleostei : Gobioidae : Eleotridae) d'Indonésie.

Une espèce nouvelle de *Belobranchus*, un Eleotridae dulçaquicole, est décrite sur la base de spécimens collectés dans les rivières des îles de l'Indonésie. Elle diffère de l'autre espèce du genre par plusieurs caractères incluant le nombre d'écaillés en série prédorsale (16-23 *versus* 21-34), en série transversale postérieure (18-21 *versus* 20-23), en série transversale antérieure (22-28 *versus* 27-35) et par les couleurs *in vivo*, en particulier par une nageoire caudale jamais tachetée mais généralement hyaline avec des parties jaunes à rougeâtres.

Key words. - Eleotridae - *Belobranchus segura* - Papua - Indonesia - New species.

The Indonesian archipelago has one of the world's largest and most exciting fish faunas. Although forming a small portion of the overall fauna, the freshwater fish represent a highly unique community. Among them, the Gobioidae have species with an amphidromous life cycle (Keith, 2003; Keith *et al.*, 2008) adapted to the conditions in these distinctive freshwater habitats (Keith *et al.*, 2011). In the Pacific area, the Eleotridae family developed many endemic genus occurring in the lower to the middle reaches of rivers. One of them, *Belobranchus* Bleeker, 1857 was supposed to be monospecific (Koumans, 1953).

During the last ten years, the authors conducted extensive freshwater fish surveys throughout Pacific Islands from Indonesia to Vanuatu (Watson *et al.*, 2007). In Indonesia, collections of Eleotridae were mainly made throughout Halmahera and Papua. During these surveys a new species of *Belobranchus* was discovered.

The purpose of this paper is to provide a description of this new species.

MATERIAL AND METHODS

Methods follow Watson (1995). 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 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: MNHN (Muséum national d'Histoire naturelle, Paris, France) and MZB (Museum Zoologicum Bogoriense, Cibinong, Indonesia).

Abbreviations used in the descriptive account follow Keith *et al.* (2004): 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 inser-

(1) Muséum national d'Histoire naturelle, DMPA-UMR BOREA 7208, CP 026, 57, rue Cuvier, 75231 Paris CEDEX 05, France. [claralord@mnhn.fr]

(2) Indonesian Institute of Sciences (LIPI), Research Center for Biology, Zoology Division, MZB, Gedung Widiasatwaloka, Jl. Raya Jakarta Bogor Km. 46, Cibinong-Bogor 16911, Indonesia. [renny_hadiaty@yahoo.com]

* Corresponding author [keith@mnhn.fr]

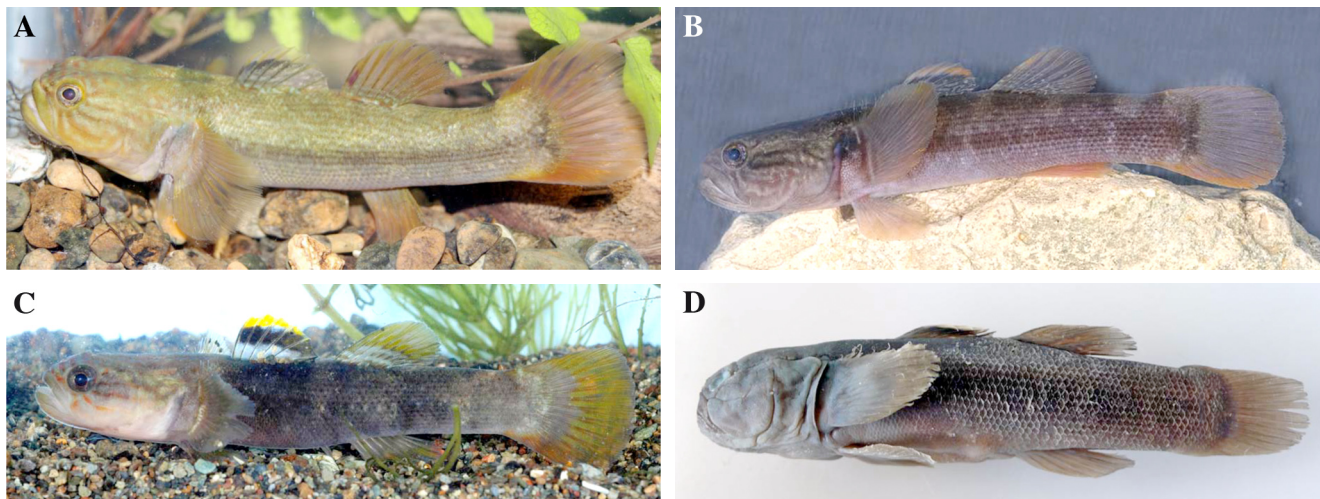


Figure 1. - **A:** *Belobranchus segura* n. sp., paratype, MZB 18684 (Photo R. Hadiaty). **B:** Paratype, MNHN 2011-0044 (Photo G. Ségura). **C:** Juvenile, Halmahera, Indonesia, Hadiaty, Wowor, Sopian coll. (Photo R. Hadiaty). **D:** Preserved specimen, MZB 18684 (Photo P. Keith)

tion 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.

In vivo coloration was observed on adults and juveniles.

Belobranchus segura n. sp.

(Figs 1-2, Tabs I-III)

Comparative material

Belobranchus segura n. sp. is compared to the only other known species of this genus *Belobranchus belobranchus* (Valenciennes, 1837). *B. quoyi* Bleeker, 1856 is an unneeded replacement name for *B. belobranchus* and share the same syntypes with this species (MNHN A-1569); it is considered as a synonym. *B. taeniopterus* Bleeker, 1856 is considered herein as a synonym of *B. belobranchus*.

Belobranchus belobranchus (Valenciennes, 1837). - Syntypes (5): MNHN A-1569, size range 94-123 mm SL. Manado, Celebes, Dumont d'Urville 1826-1829 Expedition (N.O. Astrolabe). MNHN 2007-0097, 2 males, 1 female, size range 32-65 mm SL. Pehavohori river, Peavot, Santo Island, Vanuatu, 21 Nov. 2006, Keith, Lord, Kalfatak and Gerbeaux coll. MNHN 2007-0112, 2 males, 1 female, size range 102-165 mm SL. Penaorou River, Santo Island, Vanuatu, 14 Nov. 2006, Keith, Lord, Kalfatak and Gerbeaux

coll. MNHN 2011-0046, 1 male, 1 female, size range 43-58 mm SL. Kumafa River camp, Papua Province, Indonesia, 15 Oct. 2010, Keith, Gaucher and Ségura coll.

Material examined

Thirteen specimens from streams of Papua Barat Province and Halmahera, Indonesia; size range 40-80 mm SL.

Holotype. - MZB 20786, male, 72 mm SL. Ake Jira, Leililef Waibulen, Halmahera, Indonesia, 26 Jan. 2010, Hadiaty, Wowor, Sopian coll.

Paratypes. - All from Indonesia: MZB 18684, 3 males, size range 64-72 mm SL. Ake Jira, Leililef Waibulen, Halmahera, 26 Jan. 2010, Hadiaty, Wowor and Sopian coll. MNHN 2011-0044, 1 male, 80 mm SL. Pouyau Creek, Papua Barat Province, 26 Oct. 2010, Keith, Ségura and Gaucher coll. MZB 18658, 2 males, size range 61-66 mm SL. Ake Kobe, Halmahera, 23 Jan. 2010, Hadiaty, Wowor and Sopian coll. MNHN 2011-0045, 2 males, size range 51-55 mm SL. Ake Kobe, Halmahera, 23 Jan. 2010, Hadiaty, Wowor and Sopian coll. MZB 18751, 2 females, size range 40-44 mm SL. Tributary of Ake Saki, Weda Tengah, Halmahera. 4 Feb. 2010, Hadiaty, Wowor and Sopian coll. MZB 18747, 1 female, 55 mm SL. Ake Saki, Weda Tengah, Halmahera Hadiaty, Wowor and Sopian coll. MZB 18820, 1 female, 44 mm SL. Ake Jira, Weda Tengah, Halmahera. 7 Feb. 2010, Hadiaty, Wowor and Sopian coll.

Diagnosis

The general colour pattern is red brown, with yellowish to orange second dorsal, anal, pectoral and caudal fins. The caudal fin is never spotted. The upper part of the first dorsal fin is orange; the middle and lower parts are mottled greyish

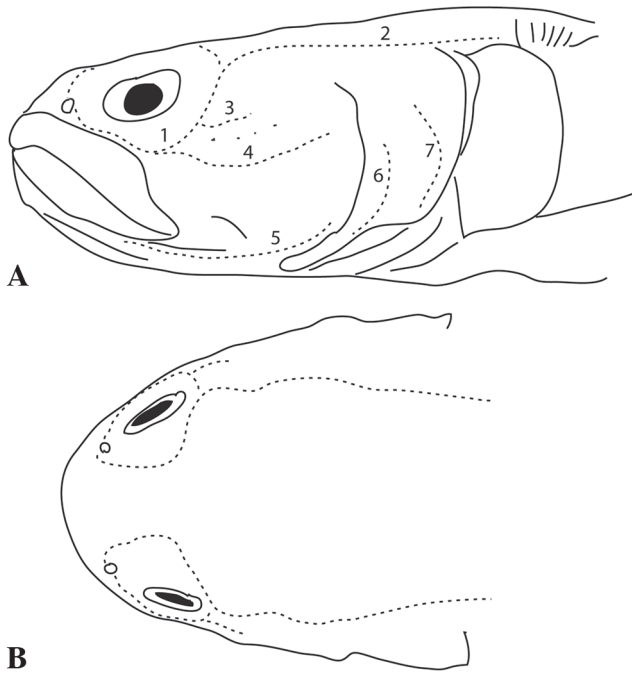


Figure 2. - Diagrammatic illustration of the head of *Belobranchus segura* showing cutaneous sensory papillae. **A**: Lateral view; **B**: Dorsal view.

to black. Scales in transverse forward series 22-28, in transverse back series 18-21 and in predorsal series 16-23.

Description

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

The body is elongate, anteriorly cylindrical and posteriorly slightly compressed. The nostrils are not tubulate. The head is depressed, the snout is convex. Dorsal fins VI-I,7 with no filamentous rays. The first dorsal fin is with second, third and fourth rays longer. Anal fin I,7 directly opposite to the second dorsal fin. The caudal fin is with 13 (13-15) branched rays and its posterior margin is rounded. Pectoral fins 21-24, with superior rays free of membrane and the posterior margin rounded. LS 59 (55-60), with ctenoid scales on flanks and caudal peduncle. Cycloid scales on top of head, on the base of pectoral fins and on the belly. The anterior part of head and throat are naked. Scales of nape are small. TRB 19 (18-21). TRF 26 (22-28). PD 20 (16-23), ZZ 19 (15-19). Vertebrae, without urostyle, 22(3), 23(4), 24(2). The first or first and second branchiostegal rays end anteriorly in a sharp, conical forward directed spine. The mouth is large. The lower jaw is prominent. Teeth are in several rows in front, with the outer row enlarged and in one row laterally. No pore on head.

Cephalic sensory papillae system well developed (Fig. 2): line 1 round the eye and composed on a single row of papillae; line 2 on the upper part of head (from line 1 to the base of the pectoral fin), composed of a straight long single row of papillae; line 3 composed of single row of papillae, joining line 1 posteriorly to the eye, short and slightly curved; line 4, on cheek, joining line 1 posteriorly to the eye, below line 3, long and composed of 1 row of papillae. Line 5, a single row of papillae, from below the mouth to the preopercle, long, straight and curve at the end; Lines 6 and 7, on opercle, short and curved.

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



Figure 3. - **A**: *Belobranchus belobranchus*, adult (70 mm SL), Ake Jira, Leililef Waibulen, Halmahera, Indonesia, Jan. 2010, Hadiaty, Wowor and Sopian coll. (Photo R. Hadiaty). **B**: Juvenile (40 mm SL), Santo, Vanuatu, Jul. 2005, Keith, Marquet, Kalfatak and Keith coll. (Photo P. Keith). **C**: Preserved specimen MNHN 2007-0097 (Photo P. Keith)

Table I. - Scale counts in *Belobranchus*.

	Lateral series								
	55	56	57	58	59	60	61	62	63
<i>Belobranchus segura</i> n. sp.	2	3	1	2	2	3			
<i>Belobranchus belobranchus</i>		1	1	3	2	3	1	1	1

	Predorsal midline series																		
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
<i>Belobranchus segura</i> n. sp.	1	1	1	-	1	1	1	3											
<i>Belobranchus belobranchus</i>						2	1	1	-	3	1	1	1	1	-	-	-	-	1

	Transverse backward series						Zigzag series					
	18	19	20	21	22	23	14	15	16	17	18	19
<i>Belobranchus segura</i> n. sp.	3	6	4	1				1	5	3	3	1
<i>Belobranchus belobranchus</i>			4	4	4	2	2	3	5	2	1	

	Transverse forward series													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
<i>Belobranchus segura</i> n. sp.	1	-	1	3	3	3	2							
<i>Belobranchus belobranchus</i>						2	2	2	2	2	-	1	1	1

Colour in life

Adult (Fig. 1A, B). - No sexual dichromatism. Background of body brownish to mahogany. Head greyish with brown stripes radiating from the eye to the snout, the top of the head and the cheeks, and fading on the nape and operculum. Eye outline brownish with a blue sheen. Large alternating dark and light brown stripes on the back. The flanks are mahogany and the belly is pinkish to white. The first dorsal fin is translucent with black zebra stripes and has a large orange distal stripe. The second dorsal fin is slightly pinkish with light black zebra stripes on the lower part and has orange markings at the tip of the first two rays. Black spot at the base of the pectoral fin with a blue tinge. Small white spot covering the pectoral fin base. Pectoral fin hyaline to pinkish with margins slightly orange. Pelvic fins hyaline to pinkish. Anal fin orange-pink. Caudal peduncle blackish and caudal fin pinkish slightly hyaline with orange upper and lower distal margins.

Juvenile (Fig. 1C). - Observed on all juveniles caught (30-40 mm SL). Head grey to greenish on the top and whitish on its lower part. 8-9 orange stripes radiating from the eye to the snout and the cheeks and fading on the nape and operculum. Eye outline black. Body overall blackish, greyish on the last third and on the caudal peduncle. Belly black with a slight red tinge. Pectoral fins greyish and translucent. First dorsal fin divided into three distinctive bands, which are translucent, black and bright yellow from base to edge. Second dorsal fin divided into two bands, translucent and

yellow from base to edge; the translucent zone shows blackish shadings on the rays in its centre and at the base of the yellow band. Anal fin also divided into a translucent and a yellow band from base to edge. Caudal fin translucent from the caudal peduncle to the centre of the fin; the rest, including the edge, is yellow with reddish zones on the edges and at the base of the yellow zone.

Colour in preservation

Background of body in adult brown with a purple tinge along the lateral line and on the back. Snout, lips, underneath the head and behind the cheek are grey. Eye white. Eye outline black. Lower part of the cheek and belly are beige. Black spot at the top of the pectoral fin base. Small white spots covering the pectoral fin base. Pectoral and pelvic fins are very light brown. Second dorsal fin is relatively translucent and has black zebra stripes on the first lower half. Anal fin whitish. Caudal peduncle with a slight purple tinge. Caudal fin greyish (Fig. 1D):-

Ecology

Belobranchus segura is a benthic species. It occurs in estuaries and lower parts of coastal streams, usually over rocky or gravel bottoms. It feeds on small shrimps and fish (based on gut contents examined for a few specimens). It seems to be amphidromous as some other species of the family or of Gobioidae (Keith, 2003; Keith et al., 2006; Lord et al., 2010). The species spawns in freshwater, the free

Table II. - Morphometrics in *Belobranchus* expressed to the nearest whole percent of standard length.

	Jaw length						Caudal peduncle depth					
	12	13	14	15	16	17	11	12	13	14	15	16
<i>Belobranchus segura</i> n. sp.	5	2	2	-	-	1			2	7	2	2
<i>Belobranchus belobranchus</i>		3	3	3	3	1	1	2	4	4	2	

	Caudal peduncle length							Body depth at second dorsal fin origin in males						
	22	23	24	25	26	27	28	16	17	18	19	20	21	22
<i>Belobranchus segura</i> n. sp.	1	6	2	2	1	1			2	2	1	2	1	2
<i>Belobranchus belobranchus</i>		2	4	2	1	1	3	1	3	2	1	1	1	

	Head length											
	26	27	28	29	30	31	32	33	34	35	36	
<i>Belobranchus segura</i> n. sp.	1	1	1	4	4	2						
<i>Belobranchus belobranchus</i>				1	3	2	4	-	1	1	1	

	Predorsal length									Preanal length												
	38	39	40	41	42	43	44	45	46	58	59	60	61	62	63	64	65	66	67	68	69	
<i>Belobranchus segura</i> n. sp.	1	4	2	3	3					1	-	-	1	2	4	1	2	1				
<i>Belobranchus belobranchus</i>			2	1	3	2	3	-	2				1	2	1	2	3	1	2	-	1	

Table III. - Fin lengths in *Belobranchus* expressed to the nearest whole percent of standard length.

	Second dorsal fin length									Anal fin length					
	19	20	21	22	23	24	25	26	27	20	21	22	23	24	25
<i>Belobranchus segura</i> n. sp.			2	3	-	4	1	2	1		4	2	2	3	2
<i>Belobranchus belobranchus</i>	2	3	4	2	2					3	5	3	2		

	Caudal fin length							
	18	19	20	21	22	23	24	25
<i>Belobranchus segura</i> n. sp.			1	-	4	1	1	2
<i>Belobranchus belobranchus</i>	2	-	3	2	4	1	-	1

embryos drift downstream to the sea where they undergo a planktonic phase, before returning to the rivers to grow and reproduce as *B. belobranchus* (Keith *et al.*, 2010).

Distribution

Belobranchus segura is currently known from the type locality in Halmahera, and Papua Barat Province, Indonesia (this paper), and Solomon islands (D. Hoese, com. pers.).

Etymology

The new species is dedicated to our friend Gilles Ségura for his extensive and enthusiastic work on freshwater fauna, and is defined as a noun in apposition.

Comparison

Belobranchus segura (Fig. 1A, B, C) differs from *Belobranchus belobranchus* (Fig. 3A, B) with the general *in vivo*

colour pattern. The new species is red brown, with yellowish to orange second dorsal, anal, pectoral and caudal fins; the caudal fin is never spotted. The upper part of its first dorsal fin is orange; the middle and lower parts are mottled greyish to black. *Belobranchus belobranchus* has many narrow dark horizontal lines on the sides (one per scale row), generally light brown bands alternating with dark brown midlateral stripes, and the caudal fin is always spotted, alternating white and brown bands. They differ also with the preserved pattern (Fig. 1D, 3C).

Belobranchus segura differs also from *Belobranchus belobranchus* by a combination of characters. It differs in having fewer scales in transverse forward series (22-28 *versus* 27-35), predorsal scales (16-23 *versus* 21-34) and transverse back series (18-21 *versus* 20-23); and in having shorter head length (26-31 *versus* 29-36 %SL) and predorsal length (38-42 *versus* 40-46 %SL).

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