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NOTES ON FISHES OF THE GENUS *BRACHYGOBIUS*

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The gobies of the genus *Brachygobius* Bleeker inhabit both brackish and fresh waters of the Oriental region. All the species are small (rarely over 30 mm.) and banded with black and yellow. Material recently acquired by Chicago Natural History Museum from North Borneo contained fishes apparently belonging to a new form. This discovery led to a study of previously described species with the result that *B. aggregatus* Herre was found to be a composite species including a new one from Borneo. These two forms are described in this paper.

The generic diagnosis of *Brachygobius* given by Koumans (1953) contains several statements requiring modification. According to Koumans, predorsal and opercular scales are always present and the anal and second dorsal fins have from seven to ten branched rays. Actually, not all species have opercular scales. In some species predorsal scales may be present or absent, depending on size; in others the predorsals seem to occur on all individuals; in still others they are always absent. The anal and second dorsal usually have seven or eight branched rays, but in two species six is the common number.

In general, *Brachygobius* has a short heavy body, cylindrical anteriorly, compressed posteriorly. The head is flattened between the eyes, which are always larger than both the snout and the interorbital. The mouth is oblique, with a rather prominent lower jaw. The conical teeth are in two or three rows in each jaw. The sensory papillae of the head are arranged in longitudinal rows. The yellow and black coloration is characteristic of the entire genus.

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107

work of Mr. E. John Piffner, Staff Artist, Chicago Natural History Museum.

The following abbreviations are used: CNHM, Chicago Natural History Museum; USNM, United States National Museum.

The following specimens were examined: 8 paratypes of *B. xanthomelas* Herre (USNM 101226), 10 topotypes of *sua* Smith (USNM 119566), 9 topotypes of *aggregatus* Herre (CNHM 40444-52), 56 specimens of *doriae* Günther (CNHM 51677), and 34 Bornean fishes belonging to the two new species. No specimens of *xanthozona* Bleeker or *nunus* Hamilton were seen. A summary of counts is given in Table 1.

KEY TO THE GENUS *BRACHYGOBIUS* BLEEKER

- 1A. Mid-lateral scales about 50; four black bands; anal fin entirely black (Günther, 1861)..... *xanthozona* Bleeker
- 1B. Mid-lateral scales under 30; other characters various..... 2
- 2A. Two black bands reaching mid-ventral line *posterior* to base of anal fin... 3
- 2B. One black band reaching mid-ventral line behind anal fin..... 5
- 3A. A black head band passing through eye; anal with at least seven branched rays..... *nunus* Hamilton
- 3B. No black head band or head band touching posterior corner of orbit; anal with six branched rays..... 4
- 4A. No predorsals; anal band reaching mid-ventral line..... *aggregatus* Herre
- 4B. Seven or eight predorsals; anal band not reaching mid-ventral line.
kabiliensis, new sp.
- 5A. First black trunk band ending at dorsal origin; no predorsal or opercular scales; basal portion of first dorsal not black anteriorly... *xanthomelas* Herre
- 5B. First black trunk band overlapping at least anterior half of base of first dorsal; basal portion of first dorsal black anteriorly..... 6
- 6A. First black trunk band dorsally not extending forward of gill opening; black pigment of second dorsal on last three or four rays only; no predorsals; opercular scales present or absent..... *sua* Smith
- 6B. First black trunk band beginning opposite center of opercle; black pigment of second dorsal on all rays; opercular scales present; predorsals present or absent..... 7
- 7A. Entire first dorsal, except narrow margin, black; at least basal two-thirds of ventrals black; black of pectoral covering basal two-thirds of fin.
doriae Günther
- 7B. Last one or two rays of first dorsal colorless; at most basal halves of first three ventral rays black, usually black limited to interspinous membrane; black of pectoral covering less than half of fin..... *sabanus*, new sp.

Brachygobius nunus Hamilton

Gobius nunus Hamilton, 1822, Fishes of Ganges, p. 54—Ganges below Calcutta, India; Day, 1878, Fishes of India, p. 297; Hora, 1929, Mem. Indian Mus., 9, pl. 14, fig. 5.

39
14
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Brachygobius nunus (part) Koumans, 1941, Mem. Indian Mus., 13: 269; 1953, Fishes Indo-Austr. Arch., 10: 194.

Ctenogobius nunus Hora, 1934, Rec. Indian Mus., 36: 488.

Gobius alcockii Annandale, 1906, Jour. Asiat. Soc. Bengal (N.S.), 2: 201, fig. 1—Port Canning and Calcutta, India.

Ctenogobius alcockii Hora, 1923, Mem. Indian Mus., 5: 744.

Hora's publication (1929) of Hamilton's manuscript drawing of *nunus* and his subsequent notes (Hora, 1934) on the relationship of *alcockii* to *nunus* have clarified the identity of Hamilton's fish. Koumans' work (1941, 1953) has only clouded the picture by placing three distinct species in the synonymy of *nunus*.

From an examination of more than 100 of these little gobies, I conclude that, although intraspecific variation in color pattern does occur, it never has sufficient range to include the patterns of *nunus*, *doriae* Günther, *sua* Smith, and *xanthomelas* Herre. Grouping the specimens examined according to the color patterns associated with these names results in series that also differ in counts (see Table 1).

Hamilton's manuscript figure of *nunus* clearly shows four black bands on the body: a broad one in the pectoral region, a narrow one from the origin of the second dorsal to the fore part of the anal base, a second narrow one from just behind the second dorsal to behind the anal, and a third narrow one on the caudal base. Hamilton's description (1822) mentions a black band passing through the eye and a second on the opercle; these are also shown on the figure.

Brachygobius doriae Günther never has more than three black bands behind the head. The bands are usually wider than the light interspaces, whereas the reverse is true in *nunus*. Some individuals of *doriae* have a small black spot in front of the middle body stripe; otherwise there is little variation. Koumans (1941, 1953) has given the color pattern of *doriae* first in his descriptions of *nunus*, that of true *nunus* appearing only as a "variety." His figure (1953) agrees perfectly with the original description of *doriae* (Günther, 1868).

The known distribution of *nunus* includes India and Burma.

Brachygobius doriae Günther

Gobius doriae Günther, 1868, Ann. Mag. Nat. Hist., (4), 1: 265, pl. 12, fig. A—Sarawak.

Brachygobius doriae Bleeker, 1874, Arch. Néerl. Sci. Ex. Nat., 9: 315; Hardenberg, 1936, Treubia, 15: 252; Inger, 1955, Fieldiana, Zool., 37: 77.

Brachygobius nunus (part) Koumans, 1941, Mem. Indian Mus., 13: 269; 1953, Fishes Indo-Austr. Arch., 10: 194, fig. 48.

Brachygobius sua Smith

Thaigobiella sua H. M. Smith, 1931, Proc. U. S. Nat. Mus., 79: 35, fig. 17—
Bangkok, Thailand.

Brachygobius sua H. M. Smith, 1945, Bull. U. S. Nat. Mus., no. 118, p. 549.

Brachygobius nunus (part) Koumans, 1953, Fishes Indo-Austr. Arch., 10: 194.

This goby, grouped by Koumans with *doriae* and *nunus*, differs from the latter in having only three complete black bands on the body. One of the ten topotypes examined had a black spot dorsally on the caudal peduncle. The presence of three black bands recalls *doriae*, but the bands of *sua* are much narrower than those of *doriae*. Furthermore, black pigment is restricted to a small triangle at the posterior basal portions of the anal and second dorsal in *sua*, whereas in *doriae* the pigment almost completely covers these fins. Differences between *sua* and *doriae* in counts are shown in Table 1.

This form has been reported only from Thailand.

Brachygobius xanthomelas Herre

Brachygobius xanthomelas Herre, 1937, Bull. Raffles Mus., no. 13, p. 43, pl. 4
—Mawai District, Johore.

Brachygobius nunus (part) Koumans, 1941, Mem. Indian Mus., 13: 269; 1953,
Fishes Indo-Austr. Arch., 10: 194.

In addition to the points noted in the key, the color pattern of *xanthomelas* differs from that of *sua* in the amount of black on the second dorsal and pelvics. In *xanthomelas* the dark pigment forms a triangle extending transversely across that fin. The pelvics of *xanthomelas* have a small black spot, those of *sua* have none. The two also differ in the length of snout, that of *sua* being distinctly shorter. Differences between this goby and *doriae* and *nunus* are indicated by the key and Table 1.

As yet this fish is known only from the Malay Peninsula and Singapore.

Brachygobius kabiliensis, new species. Figure 19.

Holotype.—Chicago Natural History Museum no. 47991 from Kabili River, Sandakan District, East Coast Residency, North Borneo. Collected in mangrove swamp February 5–6, 1937, by A. W. Herre.

Paratypes.—CNHM 59623 (5) from the type locality; CNHM 44989 (2) from Mile 2, Sandakan, Sandakan District.

Description (data for holotype in parentheses).—Dorsal vi—i,6 (vi—i,6); pectoral 12–14 (14) (mean 13.4); ventral i,5 (i,5); anal

i,6-7 (i,6) (one fish with i,7); mid-lateral scales 22-23 (22) (mean 22.6); 7-8 predorsals (7); 7 scales in transverse series between origins of anal and second dorsal; standard length 11.5-15.5 mm. (14.0); head 2.76-2.87 (2.76).

Body robust, cylindrical anteriorly, compressed posteriorly; dorsal profile convex, rising gradually to origin of first dorsal; ventral profile convex, less arched than dorsal.

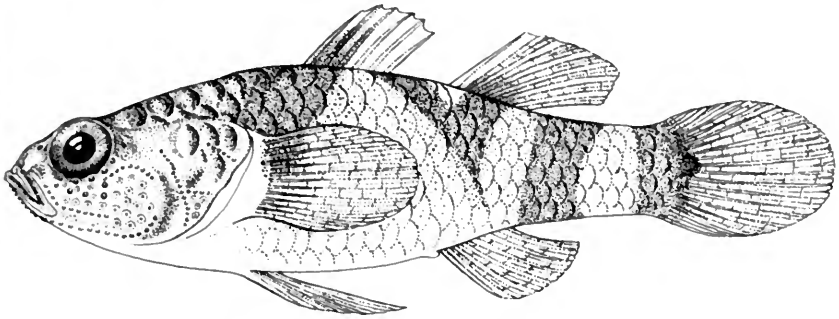


FIG. 19. Holotype (CNHM 47991) of *Brachygobius kabiliensis*, new species. Standard length 14.0 mm.

Head cylindrical, flattened between eyes; snout blunt; nostrils separated, anterior with short tube overhanging rostral groove, posterior at upper anterior corner of orbit and without tube; mouth oblique, lower jaw protruding a little; maxilla extending to below anterior border of eye; teeth conical, in two rows in both jaws; tongue truncate; eye 3.5 times in head, diameter longer than snout, shorter than opercular width; interorbital two-thirds of eye.

Sensory papillae in longitudinal rows, a suborbital row of relatively large, widely spaced papillae; three rows on cheek; upper cheek row angulated, running from below posterior margin of pupil to end of preopercle, and consisting of small papillae; middle cheek row of four large, widely spaced papillae, beginning below anterior margin of orbit and ending below posterior margin of orbit; lower cheek row of small papillae running forward from below end of orbit to preorbital, where it sends a short, oblique limb forward above maxilla; one large papilla between middle and upper cheek rows at end of former; a long row from chin following lower jaw and lower edge of cheek, curving up along posterior border of preopercle; a vertical row on opercle anteriorly, intersected in lower third by a short, longitudinal row; a short, oblique row on upper, posterior half of opercle.

Pectorals inserted in lower half of side; base vertical; fin rounded, extending a little beyond ventrals to vent; ventrals united, interspinous membrane well developed; fin narrowly missing anus; origin of first dorsal opposite center of ventrals or about two scales behind pectoral base; tip of depressed fin separated from second dorsal by half scale; origin of second dorsal opposite that of anal; margin rounded; bases of second dorsal and anal subequal, slightly longer than that of first dorsal; origin of anal immediately behind genital papilla; rays of second dorsal longer than those of anal or first dorsal; caudal damaged at tip, probably truncate or rounded.

Scales ctenoid; seven predorsals, first largest and beginning immediately behind orbits; opercles completely covered by large scales; head otherwise naked; fins without scales.

Color in life bright yellow with four black bands (Herre, 1940); in alcohol yellow fades to pale brown; snout dusky above; cheeks with scattered round spots; large first predorsal black; scales of opercle and nape with dark margins.

First black band beginning two scales before origin and extending back to base of second or third ray of first dorsal; ventral limit of band at mid-lateral line or at level of lower edge of pectoral; maximum width of band three scales, slightly less than eye diameter; band extends on to first dorsal occupying basal third or half of first three or four rays and included membrane.

Second band beginning at base of fifth or sixth ray of first dorsal and reaching back to fifth ray of second dorsal; separated ventrally from anal base by one or one and one-half scale rows; dorsally split by light saddle covering scale at base of first ray and scale before origin of second dorsal and paravertebral scale; maximum width of band equal to postorbital part of head; dorsally separated from first band by one or two scales; extending on to second dorsal, covering basal quarter or third of second to fifth rays.

Third band roughly vertical, separated by one to one and one-half scales from end of anal and second dorsal; posterior margin concave; band reaching mid-ventral line, three scales wide, subequal to eye diameter.

Fourth band at end of caudal peduncle; posterior margin convex, at origin of fin, except for distinct projection on one scale over the bases of those rays just above the center; width of band in center three scales.

Pectoral fin with narrow vertical black bar in basal fifth, bar narrower than pupil diameter; sometimes limited to a round spot; anal and ventral fins unmarked.

Remarks.—When *Brachygobius aggregatus* (type locality Dumaguete, Negros, Philippine Islands) was described, 67 specimens from the Kabili River, North Borneo, were listed as paratypes (Herre, 1940). The holotype and five paratypes of *kabiliensis* are part of that series.

According to Herre's description, *aggregatus* has no predorsals and from none to two opercular scales. Nine topotypes (CNHM 40444–52) agree on these points. This is in marked contrast, however, to the Kabili River fishes, which, as noted above, have predorsals from the orbit to the dorsal and completely scaled opercles.

The Negros and North Bornean fishes also differ in coloration. The first band in *aggregatus* starts anterior to the gill opening and covers the upper corner of the opercle; the mid-ventral line below the band is black. In *kabiliensis* the band begins behind the gill opening, never invades the opercle, and lacks a mid-ventral extension. The second black band reaches the anal base in *aggregatus* but fails to do so in *kabiliensis*.

The key and Table 1 bring out differences between *kabiliensis* and other species of *Brachygobius*.

Brachygobius sabanus, new species. Figure 20.

Holotype.—Chicago Natural History Museum no. 47990 from Lamag, Kinabatangan District, East Coast Residency, North Borneo. Collected June 18, 1949, by J. A. Tubb.

Paratypes.—CNHM 44987 (19) from the type locality; CNHM 44988 (5) from Abai, Sandakan District; CNHM 44990 (1) from Mintak, Kinabatangan District.

Description (data for holotype in parentheses).—Dorsal vi—i,7–8 (vi—i,7) (mean of branched rays 7.7); pectoral 15–16 (16) (mean 15.8); ventral i,5 (i,5); anal i,7–8 (i,7) (mean i,7.7); mid-lateral scales 24–27 (24) (mean 25.0); 0–2 predorsals (0); 9 scales in transverse series between origins of anal and second dorsal; standard length 11.5–26.5 mm. (16.0); head 2.46–2.72 (2.71).

Body moderate to robust, subcylindrical anteriorly, compressed posteriorly; dorsal profile convex, highest point at origin of first dorsal; ventral profile weakly convex or horizontal.

Head cylindrical, flattened between eyes; snout blunt; nostrils separated, anterior in short tube reaching gape, posterior at front border of orbit and without tube; mouth oblique, lower jaw prominent; maxilla reaching below anterior border of eye; teeth conical, in two rows in both jaws, occasionally inner row irregular, giving impression of a third row, teeth of outer rows slightly enlarged; tongue truncate; eye 3.5-4.0 in head, much longer than snout, only slightly greater than interorbital, less than opercular width.

Sensory papillae in longitudinal rows; a semicircular suborbital row of widely spaced, relatively large papillae; three rows across cheek; upper cheek row angulated, running from below center of orbit to end of preopercle, and consisting of small papillae; middle cheek row of rather large, widely spaced papillae, short, beginning just behind suborbital row; lower cheek row running forward from below posterior border of orbit to preorbital where it sends a short oblique limb forward above the maxilla; a long row beginning on chin, following curve of lower jaw and interopercle, then curving upward along posterior border of preopercle; a vertical row along anterior border of opercle intersected by a short horizontal row from rear border of opercle; a short horizontal or somewhat oblique row across middle of opercle.

Pectorals inserted in lower half of side, base vertical, fin rounded, extending a little beyond ventrals to level of genital papilla; ventrals united, interspinous membrane well-developed, fin reaching vent or base of genital papilla; origin of first dorsal one or two scales behind pectoral base, depressed fin reaching origin of second dorsal or separated from it by one scale; origin of second dorsal one or two scales in advance of anal origin, margin of fin rounded; bases of anal and second dorsal subequal, longer than base of first dorsal; origin of anal immediately behind genital papilla; anterior rays of second dorsal longer than those of anal or first dorsal; caudal bluntly rounded.

Scales ctenoid; opercles scaled in upper third; head otherwise naked; fins without scales.

Color in life probably black and lemon yellow; in alcohol pale brownish or yellowish with three complete blackish brown bands on body; two dark saddles usually present in the light interspaces.

Snout dusky; a broad dark band below eye beginning opposite anterior margin of pupil and covering cheek and preopercle, continuous dorsally with narrower band crossing top of head immediately behind interorbital; dorsally this band separated from first trunk band by yellow interspace subequal to eye; upper half of opercle dark.

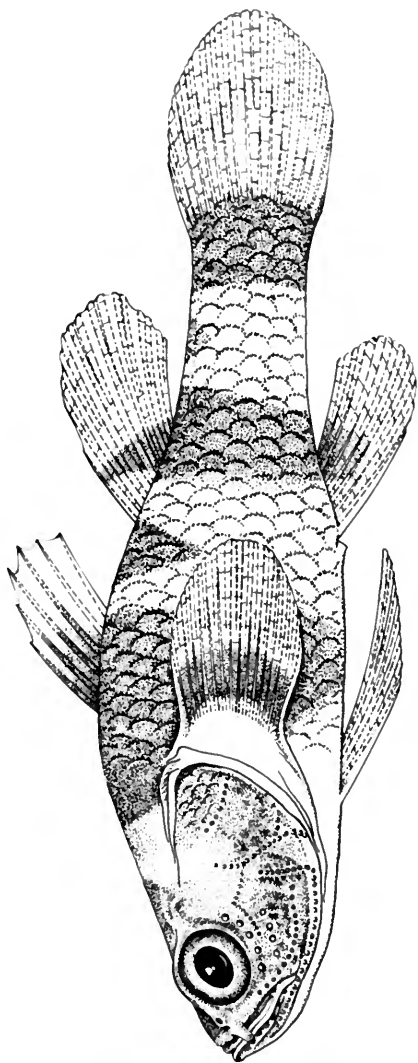


FIG. 20. Holotype (CNHM 47990) of *Brachygobius sabanus*, new species. Standard length 16.0 mm.

TABLE I

A summary of counts made on species of *Brachygobius* Bleeker
(Numbers in body of table refer to individuals)

	Second dorsal total rays				Anal total rays				Pectoral total rays						
	7	8	9	10	7	8	9	10	12	13	14	15	16	17	
<i>xanthomelas</i>		1	3				3				2	2			
<i>sua</i>			7			1	6					2	4		
<i>doriae</i>		12				11	1				1	2	5	4	
<i>sabanus</i>		5	10			5	10					3	11		
<i>aggregatus</i>	4					4			1	2	2				
<i>kabiliensis</i>	7					6	1		1	3	4				

	Mid-lateral scales								Predorsal scales		Opercular scales	
	21	22	23	24	25	26	27	28	Present	Absent	Present	Absent
<i>xanthomelas</i>						2	2			8		8
<i>sua</i>					1	1	3			8	4	5
<i>doriae</i>				1	1	4	5	1	*		*	
<i>sabanus</i>				5	6	3	1		4	9	14	
<i>aggregatus</i>	1	1	3							5		5
<i>kabiliensis</i>		3	4						8		8	

* All specimens over 13 mm. have predorsals; all specimens over 10.5 mm. have opercular scales.

First black band of trunk beginning opposite center of opercle or slightly more caudad, ending posteriorly opposite base of fourth or fifth ray of first dorsal; band reaches mid-ventral line in one-fifth of fishes from Lamag and in four-fifths of those from Abai; maximum width subequal to postorbital part of head.

Second band beginning at center of base of second dorsal and extending one or two scales behind fin; band reaches base of anal from third or fifth ray to one or two scales behind fin; width subequal to orbit.

Third band at caudal base; in mid-lateral line about two scales before caudal flexure.

First dorsal black in basal two-thirds to four-fifths except for last two colorless rays, the black continuous with first trunk band; second dorsal with black quadrilateral or triangular area reaching base of fin and second black band on posterior rays only, anterior rays colorless at base, a broad marginal, non-pigmented strip; anal with oblique black area beginning at base of posterior rays and extending forward to second ray; pectoral with vertical black band near base, varying

in width from pupil diameter to slightly less than width of eye; ventrals with few black spots on interspinous membrane, sometimes basal third of first three soft rays black.

Remarks.—*Brachygobius sabanus* differs from *doriae*, which it resembles most closely, in the averages of some counts, although there is considerable overlap (see Table 1). The former appears to have more dorsal and anal rays and fewer mid-lateral scales. But the distinction between the two is most striking in coloration. In addition to the points noted in the key, *sabanus* differs from *doriae* in the possession of the dark dorsal saddles. Very rarely a small black spot occurs dorsally in the light interspaces in *doriae*.

Differences between *sabanus* and other members of the genus are brought out by the key and Table 1.

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