

Channa nox, a new channid fish lacking a pelvic fin from Guangxi, China

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Abstract A new species of channid fish, genus *Channa*, is described from 7 specimens collected from the vicinity of Hepu, Guangxi Province, southern China. The new species, *Channa nox*, is distinguished from all other channid species by the following combination of characters: absence of pelvic fins, small rounded head (22.1%–26.8% SL), narrow interorbital width (19.6%–26.7% HL), short snout length (3.6%–5.1% SL), predorsal and prepectoral lengths (26.9%–28.4% SL and 24.8%–28.3% SL, respectively), 47–51 dorsal fin rays, 31–33 anal fin rays, 55–63 lateral line scales, 5.5–6.5 scales above lateral line, 9–13 cheek scales, 53–55 total vertebrae, 1 or 2 scale(s) on each side of lower jaw undersurface, the black upper half of body with 8–11 irregular (often anteriorly pointed V-shaped) bands or blotches, a large white-rimmed black ocellus on caudal peduncle and sparse white spots on the dark brown body and dorsal and caudal fins, as well as the shape of the hyomandibular process of the suprabranchial organs. *Channa nox* is sympatrically distributed with its morphologically most similar congener, *C. asiatica*.

Key words Channidae · Guangxi · Hepu · China · New species

The snakeheads or fishes of the family Channidae are widely distributed in South, Southeast, and East Asia and in the west central part of Africa (Nelson, 1994). Channids are more diverse in Asia, 23 species, all included in the genus *Channa* Scopoli (see Musikasinthorn, 2000; Musikasinthorn and Taki, 2001), currently being considered as valid. From Africa, only 3 species are recognized, all being included in the genus *Parachanna* Teugels and Daget (see Bonou and Teugels, 1985; Teugels, 1992). Interestingly, some Asian channid species entirely lack pelvic fins.

From a field survey conducted by the first and third authors in Guangxi Province, China, in April and November, 1999, specimens of a darkish colored, pelvic fin-less channid species, which superficially resembled *C. asiatica* (Linnaeus), were collected. Upon subsequent examination, the specimens were found to represent an undescribed species, described herein as new.

Methods

Methods for counts, measurements, and nomenclature of the suprabranchial organ followed Musikasinthorn (1998). Fin rays were counted with a binocular microscope or taken

from radiographs. Vertebral counts, including the urostyle, were taken from radiographs. Principal component analysis (PCA) was performed from a correlation matrix of meristic counts for comparison with morphologically similar species. The suprabranchial organ was examined in two dissected specimens.

Channa nox sp. nov.

(Figs. 1–4)

Holotype. IOZCAS (Institute of Zoology, Chinese Academy of Sciences, China) 70028, 189.3 mm in standard length (SL), market at Hepu (Nanlijiang River basin), near Beihai City, Guangxi, China (21°42' N, 106°48' E), 16 November 1999, collected by C.-G. Zhang.

Paratypes. IOZCAS 69848 (1 specimen), 142.1 mm SL; IOZCAS 69849 (1), 159.3 mm SL (dissected for observation of suprabranchial organ); IOZCAS 70029 (1), 178.9 mm SL; IOZCAS 70030 (1), 197.6 mm SL; IOZCAS 70039 (1), 178.3 mm SL (dissected for observation of suprabranchial organ); IOZCAS 70042 (1), 185.7 mm SL, data as for the holotype, except IOZCAS 69848 and 69849, collected by K. Watanabe and C.-G. Zhang on 26 April 1999.

Diagnosis. A species of *Channa* distinguishable from all other channid species by the following combination of

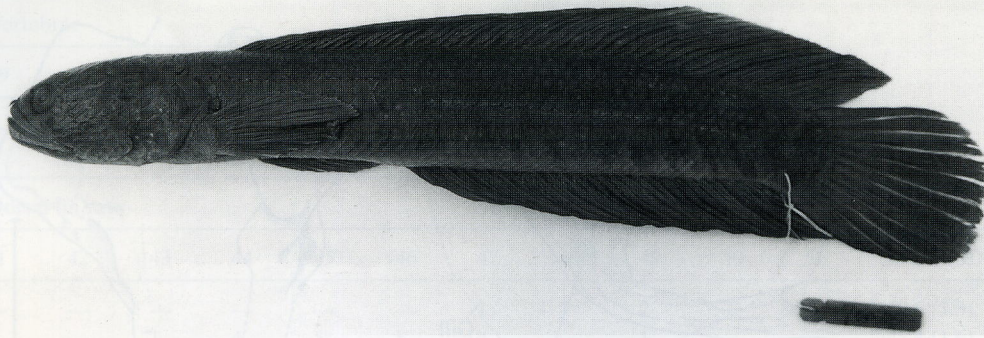


Fig. 1. *Channa nox* sp. nov., holotype, IOZCAS 70028, 189.3 mm SL, market at Hepu (Nanliujiang River basin), Guangxi, China. Bar 50 mm

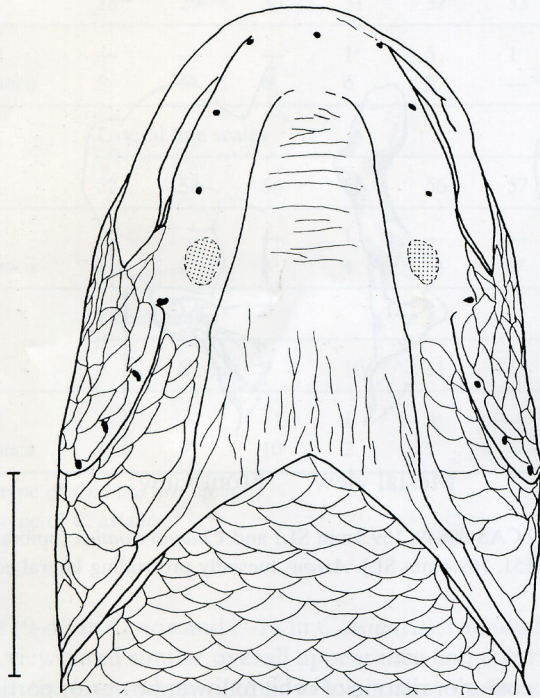


Fig. 2. Ventral view of head of *Channa nox* sp. nov. (paratype, IOZCAS 69848, 142.1 mm SL), showing a small scale on each side of the lower jaw (dotted regions) and cephalic sensory pores (in black). Bar 10 mm

characters: pelvic fin absent; 1 or 2 small to medium-sized scale(s) present on each side of lower jaw undersurface (Fig. 2); dorsal fin rays 47–51; anal fin rays 31–33; lateral line scales 55–63; scales above lateral line 5.5–6.5; cheek scales 9–13; total vertebrae 53–55; head small [head length (HL) 22.1%–26.8% SL]; predorsal length 26.9%–28.4% SL; prepectoral length 24.8%–28.3% SL; interorbital width 19.6%–26.7% HL, 4.3%–7.1% SL; snout length 16.5%–19.4% HL, 3.6%–5.1% SL; dorsal surface of body dark; 8–11 irregular (often anteriorly pointed V-shaped) black blotches or bands on upper half of body; a white-rimmed black ocellus on caudal peduncle; sparse white spots on body and dorsal and caudal fins; and hyomandibular process with the mid- to lower lateral edge mesially protruded (Fig. 3).

Description. Frequency distributions of counts and measurements are given in Tables 1 and 2, respectively. Data for paratypes are indicated in parentheses.

Dorsal fin rays 48 (47–51). Anal fin rays 31 (32–33). Pectoral fin rays 15 (15–17). Pelvic fin absent. Principal caudal fin rays 14 (12–15). Total vertebrae 53 (53–55), precaudal + caudal = 48 (47–49) + 5 (5–7). Cheek scales 11 (9–13). Lateral line scales (LLS) 58 (55–63). LLS dropping two rows following 21st (18th–22nd) anteriormost scales. Scale rows above lateral line 5.5 (5.5–6.5), below lateral line 12 (12–13.5). Circumpeduncular scales 31 (26–34). Predorsal scales 25 (21–25). Single or two scale(s) on each side of lower jaw undersurface (Fig. 2). Cephalic sensory pores single, without satellite openings (Fig. 2).

Body elongated [body depth 14.7 (13.8–16.8)% SL], cross section almost circular in anterior portion, somewhat compressed posteriorly. Body depth greatest at insertion of dorsal fin. Body width greatest at insertion of pectoral fin [11.6 (10.0–12.5)% SL]. Predorsal length relatively short [28.2 (26.9–28.4)% SL]. Outer margins of pectoral and caudal fins rounded.

Head small, short [26.9 (22.1–26.8)% SL] and rounded [head depth 50.0 (51.4–58.2)% HL; head width 59.0 (63.7–69.6)% HL]. Snout broad, short [17.7 (16.5–19.4 HL%); 4.5 (3.6–5.1)% SL], rounded, not pointed in dorsal view. Interorbital region narrow [26.3 (19.6–26.7)% HL] and somewhat swollen. Orbit not reaching dorsal contour of head in lateral view. Mouth large, upper jaw length 43.5 (41.8–50.3)% HL, maxilla extending beyond posterior margin of eye.

Dentition.—Many small conical teeth embedded in premaxilla, an additional series of 2–3 times larger conical teeth anteromedially on upper jaw (Fig. 4). Many variously sized conical teeth on prevomer and palatine, those on inner portion much larger. On dentary, many small sized conical teeth forming a row and patch on outer portion of each side, with 7 or 8 large conical teeth on inner portion of each side.

Morphology of suprabranchial organ.—Inner surface of suprabranchial chamber generally smooth (Fig. 3). Surface structure of epibranchial respiratory fold and hyomandibular process simplified. Epibranchial respiratory fold expanded laterally with a gill raker at ventromedial portion. Hyomandibular process expanded, dorsoventrally

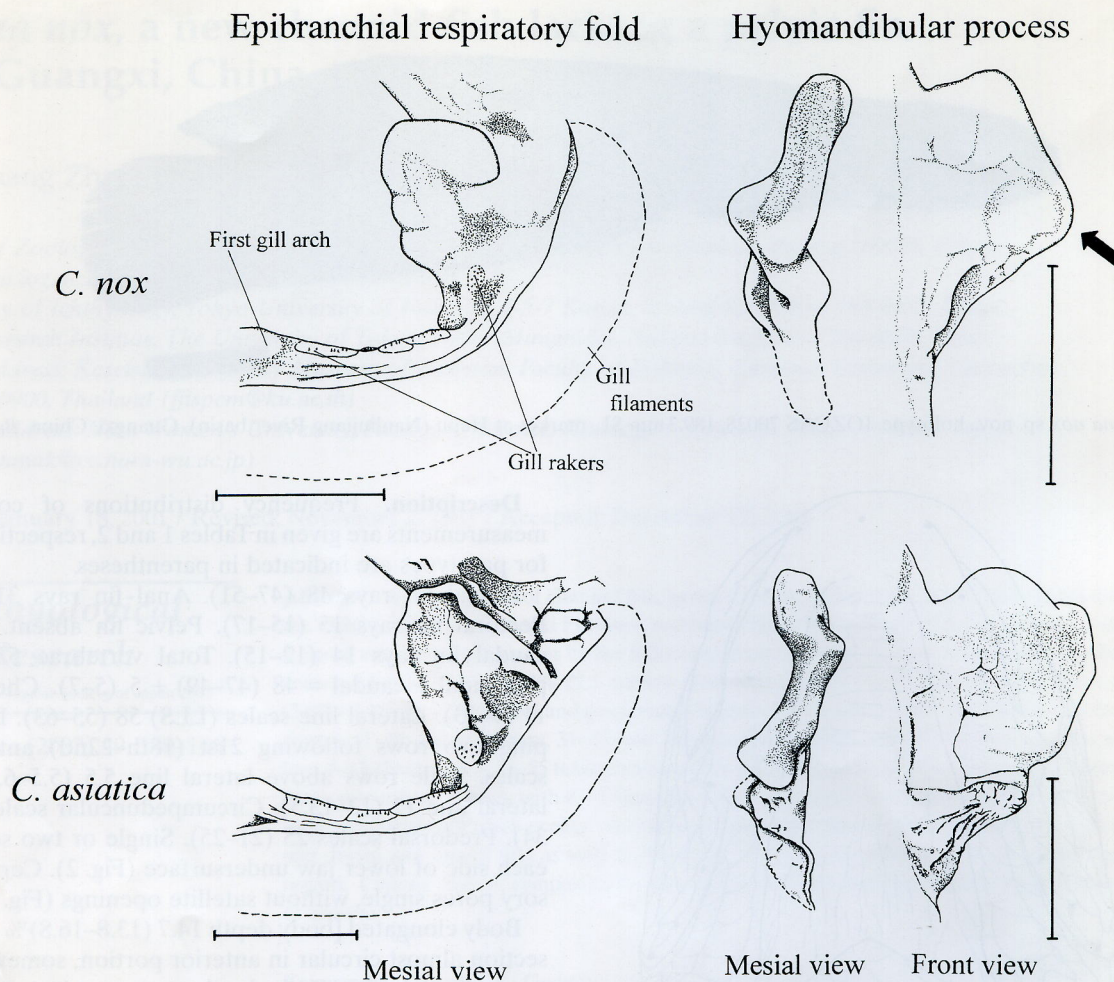


Fig. 3. Suprabranchial organs (right side) of *Channa nox* sp. nov. (paratype, IOZCAS 69849, 159.3 mm SL) and *Channa asiatica* (epibranchial respiratory fold, AMNH 79467, 142.4 mm SL; hyomandibular process, KUMF 3151, 169.4 mm SL). Arrow, mesially protruding lateral edge of hyomandibular process. Bars 5 mm

elongated with a dorsomedial notch, its mid- to lower lateral edge protruding mesially, tapering ventrally, and stalked almost at a right angle from inner surface of gill cover. Hyomandibular process almost completely supported by part of hyomandibular bone.

Coloration.—In alcohol: dorsal surface of body dark brown, ventral surface whitish to pale brown, somewhat reddish in some specimens. Several small white spots sparsely scattered on lateral surface of body. Eight to 11 irregular black bands on body, mostly restricted to upper half, posteriormost band anteriorly pointed (V-shaped). Ventral surface of body with obscure black bands extending to upper half of body (or without any markings in ventral view). A large ocellus with whitish rim on caudal peduncle (inconspicuous in some larger specimens). Dorsal fin dark brown to gray with a few white spots. Anal fin gray, grayish-brown to dusky white. Pectoral fin rays gray, membrane dusky white, base dark brown. Caudal fin rays grayish-brown, membrane dusky white with a few white spots. Dorsal surface of head dark brown to black, ventral side pale brown, somewhat reddish. A black band descending from

lower posterior margin of orbit to lower posterior portion of gill cover, bending upward just before edge. Gill membrane light brown with black margin. Anterior portion and gular region gray.

Fresh: similar to coloration in alcohol, but body surface uniformly dark brown, with small white spots scattered on body and fins more vivid.

Distribution. *Channa nox* is known only from the vicinity of Hepu (lower reach of Nanlijiang River, flowing into Beibu Gulf), Guangxi, southern China (Fig. 5).

Etymology. The specific name, *nox*, is a Latin noun (meaning “night”) referring to the dark body color of the new species.

Remarks. The discovery of *Channa nox* brings to four the number of pelvic fin-less channid species presently considered as valid: *C. asiatica*, *C. bleheri*, *C. orientalis*, and *C. nox*. *Channa nox* is morphologically most similar to *C. asiatica*, another pelvic fin-less, sympatrically distributed channid species, in having the following characters: 1 or 2 scales on each side of lower jaw (sometimes absent or rudimentary in *C. asiatica*); moderately high number of cheek

Table 1. Selected meristic counts of *Channa nox* sp. nov. and *Channa asiatica*

	Vertebrae							Mean (SD)	<i>n</i>
	49	50	51	52	53	54	55		
<i>C. nox</i>	—	—	—	—	3 ^a	1	2	53.8 (1.0)	6
<i>C. asiatica</i>	1	1	5	5 ^b	2	—	—	51.4 (1.1)	14

	Dorsal fin rays											Mean (SD)	<i>n</i>
	41	42	43	44	45	46	47	48	49	50	51		
<i>C. nox</i>	—	—	—	—	—	—	1	3 ^a	2	—	1	48.6 (1.3)	7
<i>C. asiatica</i>	1	—	1	4	5 ^b	8	4	—	1	—	—	45.4 (1.6)	24

	Anal fin rays						Mean (SD)	<i>n</i>
	28	29	30	31	32	33		
<i>C. nox</i>	—	—	—	1 ^a	5	1	32.0 (0.6)	7
<i>C. asiatica</i>	5	5 ^b	6	6	2	—	29.8 (1.3)	24

	Lateral line scales												Mean (SD)	<i>n</i>
	52	53	54	55	56	57	58	59	60	61	62	63		
<i>C. nox</i>	—	—	—	1	—	—	2 ^a	1	—	1	1	1	59.4 (2.8)	7
<i>C. asiatica</i>	1	2	3	4	—	8 ^b	2	3	—	1	—	—	56.3 (2.3)	24

	Cheek scales							Mean (SD)	<i>n</i>
	7	8	9	10	11	12	13		
<i>C. nox</i>	—	—	1	1	3 ^a	—	2	11.1 (1.5)	7
<i>C. asiatica</i>	1	9 ^b	10	2	1	—	—	8.7 (0.9)	23

^aHolotype of *Channa nox* sp. nov.^bHolotype of *C. asiatica*

scales (9–13 in *C. nox* and 7–11 in *C. asiatica*); rounded head in all views; and similar overall appearance and coloration, such as the large white-rimmed black ocellus on the caudal peduncle.

Channa nox is distinguished from *C. asiatica* in having more vertebrae (53–55 vs. 49–53), dorsal fin rays (47–51 vs. 41–47, rarely 49), anal fin rays (31–33 vs. 28–32), lateral line scales (55–63 vs. 52–61), and cheek scales (9–13 vs. 7–11) (see Table 1), in addition to shorter predorsal length (26.9–28.4 vs. 28.9–33.3) (Fig. 6) and snout (3.6%–5.1% SL vs. 4.7%–7.2% SL). Although the meristic counts of the two species overlap, PCA scores show a distinction between them (Fig. 7). *Channa nox* differs from *C. asiatica* also in coloration; the former, when fresh, has a uniformly dark brown body with sparsely scattered white spots, in contrast to the latter, which usually exhibits black bands and many white spots on the brownish body sides. Furthermore, the black vertical bands, which usually extend from the upper to lower halves of the body in *C. asiatica*, are obscure or do not extend to the lower half of body in *C. nox*. *Channa nox* and *C. asiatica* also differ in the shape of the suprabrachial organs, a character that is useful in distinguishing species of *Channa* in many cases (Musikasinthorn, in preparation).

The mid- to lower lateral edge of the hyomandibular process is clearly protruded mesially in *C. nox*, but not or significantly less so in *C. asiatica* (see Fig. 3).

Channa nox is easily distinguished from the other pelvic fin-less channid species, *C. bleheri* and *C. orientalis*, in having more cheek scales (9–13 vs. 4–6) and lateral line scales (55–63 vs. 39–46), a shorter head (22.1%–26.9% SL vs. 27.7%–35.1% SL), absence of 3–8 black vertical bands on the pectoral fin (vs. presence), and presence of a large whitish-rimmed black ocellus on the caudal peduncle (vs. absence).

Presently, *C. nox* is known only from the vicinity of Hepu, Guangxi, China, where is located within the distribution range of *C. asiatica* (Fig. 5). In fact, they can be found at the same local market in Hepu. *Channa asiatica* is known from the Yangtze River basin of central China, Taiwan, Hainan Island to the Red River basin of northern Vietnam (Zhu, 1995; Mai, 1978; present study). It is noteworthy that the distributions of both species are almost entirely restricted to relatively narrow regions, characterized by a humid rainforest climate (classified as Rainforest Division and Rainforest Regime Mountains sensu Bailey, 1996).

Table 2. Morphometric characters of *Channa nox* sp. nov. and *C. asiatica*

	<i>Channa nox</i>				<i>C. asiatica</i>			
	Holotype IOZCAS 70028	Paratype range	Mean (SD) ^a	n ^a	Holotype ZMUU Linn. 171	Range ^a	Mean (SD) ^a	n ^a
Standard length (mm)	189.3	142.1–197.6	175.9 (19.1)	7	169.2	83.1–193.4	147.6 (30.4)	25
In % of standard length								
Head length	26.9	22.1–26.8	25.0 (1.7)	7	25.2	25.2–30.9	27.9 (1.3)	25
Head depth	13.5	12.9–13.7	13.4 (0.3)	7	14.0	12.4–16.8	14.5 (1.0)	24
Head width	15.9	15.4–17.0	16.2 (0.6)	7	15.7	14.8–19.9	17.6 (1.3)	24
Body depth	14.7	13.8–16.8	15.5 (1.1)	7	17.1	11.9–19.9	16.8 (2.2)	24
Body width	11.6	10.0–12.5	11.4 (1.0)	7	10.1	8.1–15.0	11.6 (1.8)	24
Caudal peduncle length	7.4	7.3–8.5	7.5 (0.4)	7	8.3	6.8–9.8	8.0 (0.7)	24
Caudal peduncle depth	10.8	8.5–11.0	10.3 (0.9)	7	10.5	9.5–12.8	11.0 (0.8)	24
Predorsal length	28.2	26.9–28.4	27.6 (0.6)	7	30.3	28.9–33.3	30.5 (1.1)	24
Preanal length	48.9	47.9–50.5	49.4 (0.9)	7	51.7	47.8–54.3	50.8 (1.9)	22
Prepectoral length	27.8	24.8–28.3	26.7 (1.4)	7	28.8	27.1–31.6	29.2 (1.3)	22
Length of dorsal fin base	70.7	70.1–71.7	70.9 (0.5)	7	67.7	66.2–71.6	68.1 (1.4)	23
Length of anal fin base	47.6	44.8–46.5	46.1 (0.9)	7	45.8	41.3–48.9	45.1 (2.1)	23
Pectoral fin length	18.6	15.9–18.6	17.7 (1.1)	6	16.6	16.1–20.8	18.4 (1.3)	24
Head length (mm)	51.0	34.0–50.3	44.1 (7.0)	7	42.6	24.7–52.5	41.0 (7.4)	25
In % of head length								
Head depth	50.0	51.4–58.2	53.7 (3.3)	7	55.6	47.2–59.5	51.8 (3.0)	24
Head width	59.0	63.7–69.6	65.1 (3.4)	7	62.4	56.4–69.6	62.9 (3.6)	24
Snout length	17.7	16.5–19.4	18.1 (1.0)	7	21.1	17.1–24.3	20.2 (2.0)	24
Eye diameter	15.7	15.9–18.5	17.1 (1.1)	7	16.2	12.9–21.5	16.2 (1.7)	24
Preorbital head depth	29.4	27.9–32.9	29.8 (1.7)	7	28.4	26.8–33.6	30.4 (1.9)	23
Postorbital head depth	42.6	39.6–46.6	42.8 (2.6)	7	40.6	37.9–46.5	41.0 (2.2)	23
Postorbital head length	71.2	67.4–71.6	70.4 (1.6)	7	68.8	65.8–70.1	68.2 (1.2)	23
Interorbital width	26.3	19.6–26.7	25.1 (2.5)	7	30.8	24.9–31.4	28.1 (1.8)	24
Upper jaw length	43.5	41.8–50.3	44.4 (3.1)	7	46.0	38.3–47.1	43.8 (2.2)	24

^aIncluding holotype

Comparative materials. *Channa asiatica*, ZMUU (Uppsala Universitet, Zoologiska Museet, Sweden) Linn. 171 (1 specimen) (holotype), 169.2 mm SL; ZMB (Universität Humboldt, Museum für Naturkunde, Germany) 5411 (1) (holotype of *Channa ocellata*), 83.1 mm SL, China; CAS (California Academy of Sciences, U.S.A.) 107132 (1) (holotype of *Channa formosana*), 112.1 mm SL, Sowo or Suwata, Taiwan; ZUMT (Department of Zoology, University Museum, University of Tokyo, Tokyo, Japan) 21677 (1) (paratype of *Channa formosana*), 95.5 mm SL, Taiwan; MNHN (Muséum National d'Histoire Naturelle, France) A. 666 (2) (syntypes of *Channa sinensis*), 148.0 and 190.3 mm SL, China; AMNH (American Museum of Natural History, U.S.A.) 79467 (2), 134.6 and 142.4 mm SL (dissected for observation of suprabranchial organ), Guangzhou, Guangdong, China, August 1925; IOZCAS 70041 (1), 188.3 mm SL, Hepu, Guangxi, China, Nov. 1999; IOZCAS 67868 (1), 152.0 mm SL and 67869 (1), 142.8 mm SL, Debao, Guangxi, China; IOZCAS 61530 (1), 172.0 mm SL, Taihe, Jiangxi, China; KIZ (Kunming Institute of Zoology, China) 845014 (1), Nanning, Guangxi, China, April 1984; KIZ 845015 (1), 112.0 mm SL, Nanning Guangxi, China; KIZ 60233 (1), 139.9 mm SL, Nanpan R., China, 1960; KIZ 755012 (1), 119.6 mm SL, Nada, May, 1975; KIZ 854344 (1), 174.1 mm SL, KIZ 847136 (1), 193.4 mm SL, KIZ 854345 (1), 174.6 mm SL, KIZ 854342 (1), 168.2 mm SL, KIZ 847137 (1), 173.1 mm SL, KIZ 854346 (1), 143.0 mm SL, Kaiyuan, Yunnan, China; NSMT-P (National Science Museum, Tokyo, Japan) 27573 (1), 110.4 mm SL, Taiwan, 26 August 1975; KUMF (Kasetsart University Museum of

Fisheries, Kasetsart University, Bangkok) 3164 (1), 160.1 mm SL, Hainan Island, China; KUMF 3151 (1), 169.4 mm SL (dissected for observation of suprabranchial organ), Hong Kong, China. *C. bleheri*, ZFMK (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany) 16555 (holotype) (1), 105.0 mm SL, upper reaches of Dibru R., near Guujan, Assam, 12 and 13 Nov. 1987; ZFMK 16556 (paratype), 80.9 mm SL, data as for holotype; KUMF 3137 (8), 115.0–134.9 mm SL, streams in Medela Reserve Forest, Dibrugarh, Assam, India, 1–7 April 1998. *C. orientalis*, ZMB 5029 (6), 59.7–79.9 mm SL, Rumboddi, Ceylon, date unknown; USNM 332536 (1), 81.6 mm SL, tributary to Kuda Ganga, 3.3 miles east of Agalawatta on Road to Badureli Ya, Agalawatta District, Sri Lanka, 7 July 1969; KUMF 3134 (2), 70.6–75.6 mm SL, Kottawa, Galle, Sri Lanka, 7 July 1995; KUMF uncatalogued, (2), 88.0–89.8 mm SL, a small pond, Galle, Sri Lanka, Jan. 1998.

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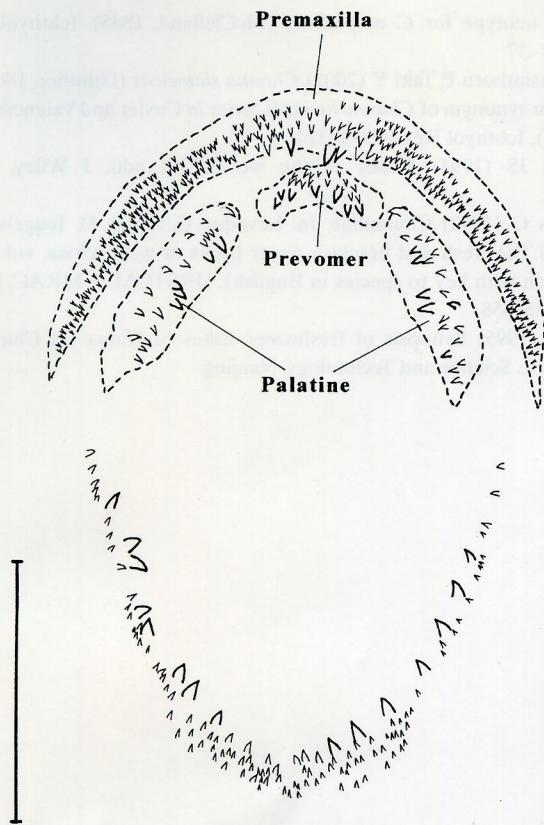


Fig. 4. Dentition of *Channa nox* sp. nov. (paratype, IOZCAS 70039, 178.3mm SL). Bar 10 mm

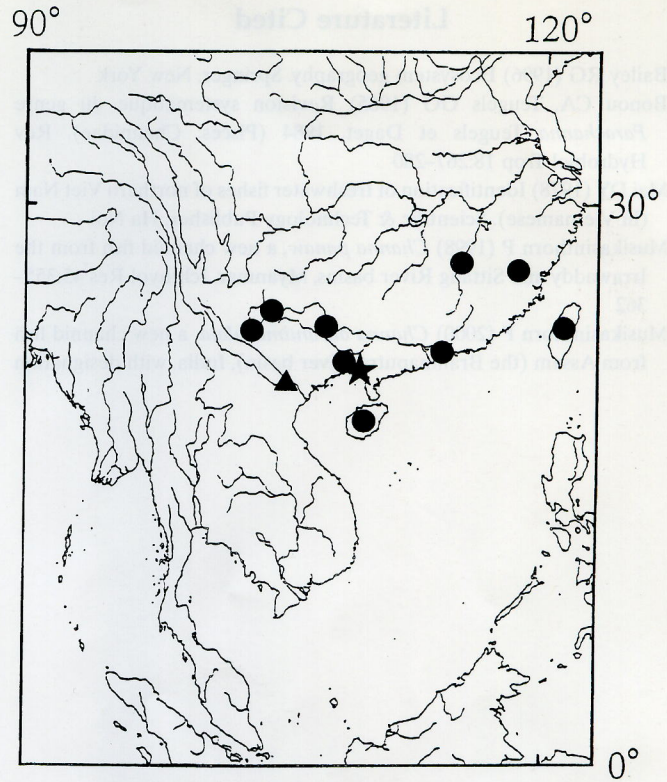


Fig. 5. Type locality of *Channa nox* sp. nov. (★) and localities of *C. asiatica* examined in the present study (●) and cited from Mai (1978) (▲)

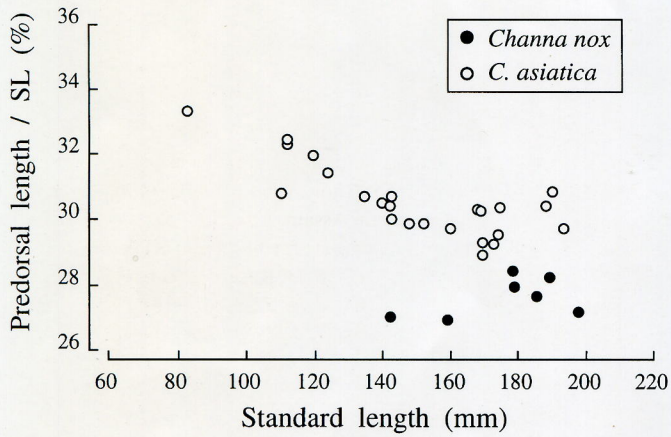


Fig. 6. Relationships between standard length (SL) and percentage of predorsal length to standard length in two channid species

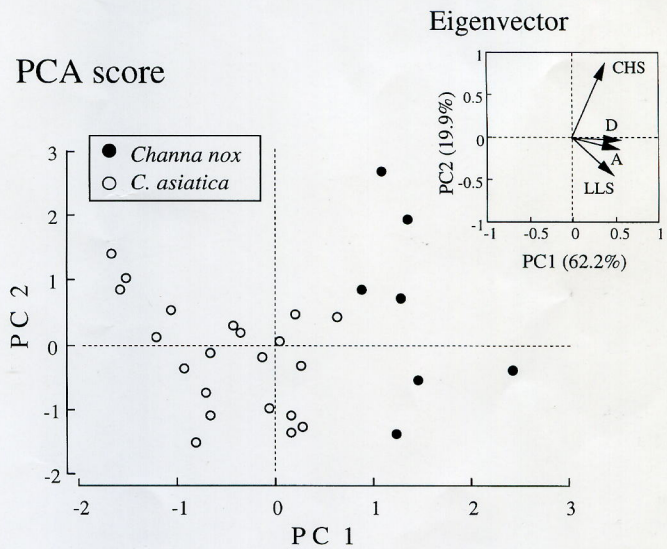


Fig. 7. Scores and eigenvectors of the first and second principal components (PC) for four meristic characters of *Channa nox* sp. nov. and *C. asiatica*. D, number of dorsal fin rays; A, anal fin rays; LLS, lateral line scales; CHS, cheek scales

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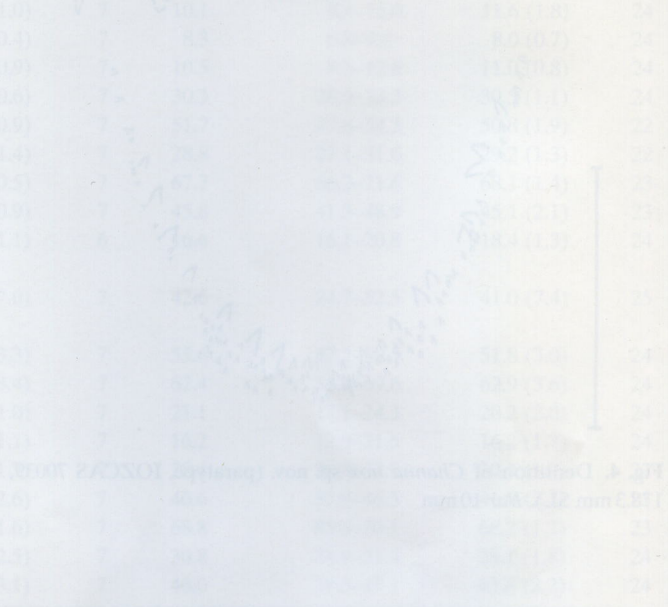


Fig. 1. Distribution of *Channa lucius* (●) and *Channa panaw* (■) in South and Central Asia. The distribution of *C. lucius* is shown in the northern part of India and Bangladesh, while *C. panaw* is shown in the southern part of India and Myanmar.

Fig. 2. Relationship between standard length (SL) and percentage of standard length (SL%) for two *Channa* species. The x-axis is labeled 'Standard length (mm)' and ranges from 0 to 200. The y-axis is labeled 'Percentage of standard length (%)' and ranges from 0 to 20. Two data series are plotted: *Channa lucius* (represented by circles) and *Channa panaw* (represented by squares). The plot shows a clear separation between the two species based on these morphological parameters.

Fig. 3. Relationship between standard length (SL) and percentage of standard length (SL%) for two *Channa* species. The x-axis is labeled 'Standard length (mm)' and ranges from 0 to 200. The y-axis is labeled 'Percentage of standard length (%)' and ranges from 0 to 20. Two data series are plotted: *Channa lucius* (represented by circles) and *Channa panaw* (represented by squares). The plot shows a clear separation between the two species based on these morphological parameters.