

SCHISTURA CRYPTOFASCIATA, A NEW LOACH (CYPRINIFORMES: BALITORIDAE) FROM SALWEEN DRAINAGE IN YUNNAN, SOUTHWESTERN CHINA

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ABSTRACT. – *Schistura cryptofasciata* is distinguished from its congeners by following combination characters: lateral line complete; $8\frac{1}{2}$ branched dorsal-fin rays; 9+8 branched caudal-fin rays; no sexual dimorphism; 8-11 indistinct bars, wider than interspaces; caudal-peduncle length 14.1-16.5% standard length, 68.1-90.4% dorsal head length; anterior portion of body scaleless; air bladder entirely embedded in bony capsule; lateral head length 104-122% dorsal head length; lower jaw with a notch at symphysis; lower lip completely interrupted; interorbital width 1.9-2.2 times eye diameter; pelvic-fin origin ventral to dorsal-fin origin; anus 1.0-1.5 eye diameters in front of anal-fin origin; the widest part of black basal caudal bar is the midlateral, and then the upper and lower ends.

KEY WORDS. – *Schistura*, new species, Nanting River, Salween, Yunnan, China.

INTRODUCTION

The genus *Schistura* McClelland is a group of loach with numerous species. Zhu (1989) reviewed the species of *Schistura* in China; Kottelat (1990) reviewed the species in Thailand, Burma, Laos, Cambodia and southern Vietnam. Fishes are unable to recognize political borders (Kottelat, 1990: 10), so some species in this book also occur in China. About 21 nominal species and subspecies of *Schistura* are reported from China (Kottelat, 1990; Zhu, 1995; Liao & Luo, 1997; Chen, 1999). Based on records of Zhu (1989), Chu & Chen (1990) and Kottelat (1990), five nominal species occur in the Salween drainage of China: *S. meridionalis* (Zhu, 1982), *S. thai* (Fowler, 1934), *S. longa* (Zhu, 1982), *S. vinciguerrae* (Hora, 1935) and *S. nandingensis* (Zhu & Wang, 1985). Kottelat (1990) pointed out *S. vinciguerrae* in Salween drainage of China probably refers to *S. poculi* (Smith) and is confirmed by this study. Kottelat (1990) discussed and redescribed *S. thai* and demonstrated that there is no *S. thai* outside Chao Phraya basin. *Schistura thai* (Fowler) is considered to be synonym of *Schistura nicholsi* (Smith) (Kottelat, 1990). Kottelat (1990) also doubt the identification of *S. thai* from the Salween and Mekong basins in Yunnan by Zhu & Wang (1985).

After comparing specimens of “*S. thai*” from the Mekong River and the Nanting (=Nanding) River in China, also with Kottelat’s description (1990), we confirm that “*S. thai*” in the Mekong River of China is actually *Schistura kengtungensis* (Fowler, 1936); and we conclude that

specimens from the Nanting River represent an undescribed species.

MATERIALS AND METHODS

Counts and measurements follow Kottelat (1990). Examined specimens belong to the collection of Kunming Institute of Zoology (KIZ), Chinese Academy of Sciences and Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore.

TAXONOMY

***Schistura kengtungensis* (Fowler, 1936)**

(Fig. 1)

Nemacheilus kengtungensis Fowler, 1936: 509 (type locality: Loi Mwe, Keng Tung, Mekong basin, Burma).

Schistura kengtungensis - Kottelat, 1989: 12; 1990: 133-138 (Mekong basin, Burma; Mekong basin, Thailand; Mengla, Xishuangbanna, Yunnan, China); 2001: 109 (Nam Beng, Nam Tha & Nam Youan basins; Mekong basin in northern Thailand, Myanmar & Yunnan).

Schistura thai (non Fowler) - Zhu, 1989: 45-47 (Xishuangbanna and Nanlan River of Lancang County, Lancang Jiang basin, southern Yunnan; Yunxian County, Nanding River, a tributary of Salween).

Nemacheilus thai (non Fowler) - Yang, in Chu & Chen, 1990: 37-38 (Mengla & Menglian, lower Lancang Jiang, Yunnan, China).

Material examined. – 13 ex. (54.8-81.2 mm SL) (KIZ 96060197, 204, 212-213, 215, 221, 226, 228, 230, 232-233, 236, 240), Mengla, upper Mekong River, Xishuangbanna, Yunnan, China, Jun.1996; 12 ex. (56.5-99.0mm SL) (KIZ 20006001, 04-09, 11-12, 25-27), Caiyanghe Nature Reserve, Mekong drainage, Simao, Yunnan, China, Jun.2000.

Diagnosis. – Cheek inflated; lower jaw with a notch at symphysis; lower lip completely interrupted in the middle; lateral head length 109.6-125.5% dorsal head length; interorbital width 1.2-1.8 times eye diameter; lateral-line complete; 8-12 distinct bars, almost as wide as interspaces; an axial dark stripe along lateral-line and more prominent posterior of dorsal-fin origin or on caudal-peduncle in large individuals, and prominent through the lateral-line on small individuals; anterior portion of body below lateral-line and above belly with scales; air bladder entirely enclosed in bony capsule; 8½ branched dorsal-fin rays; 9+8 branched caudal-fin rays; no sexual dimorphism; pelvic-fin not reach, reach or surpass anus; pelvic-fin origin anterior of dorsal-fin origin; anus about two eye diameters anterior of anal-fin origin; black basal caudal bar complete, not reaching dorsal and ventral midline and without triangular continuations, the widest part of it is the midlateral, and then the upper and lower ends; caudal-peduncle length 12.7-16.4% standard length, 56.0-87.0% dorsal head length, 1.0-1.3 times its depth; caudal-peduncle depth 11.3-13.6% standard length, 52.5-71.3% dorsal head length.

Morphometric data are summarized in Table 1.

Remarks. – The specimens of this species in Yunnan have been identified as *Schistura thai* before this study. Kottelat (1990) doubt the identification of *S. thai* from the Salween and Mekong basins in Yunnan by Zhu & Wang (1985) and reported *S. kengtungensis* from Xishuangbanna of Yunnan after checking specimen of YU (Yunnan University). Based on this study, we agree that specimens of “*S. thai*” from Mekong basin in Yunnan are *S. kengtungensis*. Those

specimens of KIZ match quite well the description of *S. kengtungensis* by Kottelat (1990) except following: (1) snout rounded and blunt in Kottelat’s description vs. pointed and depressed in specimens of KIZ; (2) pelvic-fin nearly reach anus in the description vs. not reach, reach or surpass anus in specimens of KIZ; (3) in some specimens of *S. kengtungensis*, the bars are not sharply marked and are replaced on the sides by up to 8 longitudinally elongated blotches along course of lateral-line (Kottelat, 1990: 135), no such observed on specimens of KIZ; (4) black basal caudal bar wider at its dorsal and ventral one fourth in Kottelat’s description vs. the widest part of it is the midlateral, and then the upper and lower ends in specimens of KIZ.

***Schistura cryptofasciata*, new species**
(Figs. 1-3)

Schistura thai (non Fowler) - Zhu, 1989: 45-47 (in part, Nanding R., Yuxian County, Yunnan, China).

Nemacheilus thai (non Fowler) - Yang, in Chu & Chen, 1990: 37-38 (in part, Nanding R., Yunnan, China).

Material examined. – Holotype - (61.6 mm SL) (KIZ 20026453); Nanting River (23°58’N, 99°39’E, Alt. 690m), a tributary of the Salween River, Great Snow Mountain Township, Yongde Co., Lincang Prefecture, Yunnan Province, China, coll. X. Y. Chen, D. P. Kong & G. H. Cui, Jun.2002.

Paratypes – 8 ex. (40.5-92.6 mm SL) (KIZ 20026449, 54-55, 57, 20026561-64), collected with holotype; 4 ex. (77.1-79.9 mm SL) (KIZ 20026336, 37, 39); (76.1 mm SL) (ZRC), Baishitou (=white rock) River (24°04’10”N, 99°47’37”E, Alt. 792m), a tributary of the Nanting River, coll. X. Y. Chen, D. P. Kong & G. H. Cui, Jun.2002.

Diagnosis. – Snout blunt; lateral line complete; 8½ branched dorsal-fin rays; 9+8 branched caudal-fin rays; no sexual dimorphism; 8-11 indistinct bars, wider than interspaces; caudal-peduncle length 14.1-16.5% standard length, 68.1-90.4% HL; anterior portion of body scaleless; air bladder entirely embedded in bony capsule; lateral head length 105.0-121.9% head length; lower jaw with a notch at symphysis;

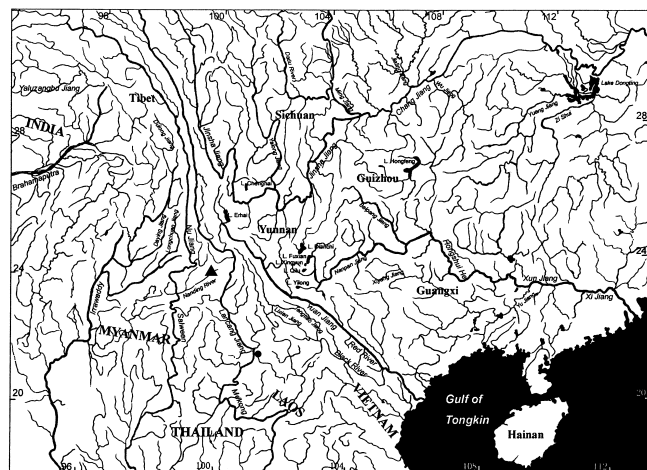


Fig. 1. Distribution of *Schistura cryptofasciata* and *Schistura kengtungensis* in Yunnan, China. ▲ *Schistura cryptofasciata*, ● *Schistura kengtungensis*.



Fig. 2. *Schistura cryptofasciata* holotype KIZ 20026453, 61.6 mm SL, Nanting R. (A) lateral and (B) dorsal views.

lower lip completely interrupted; interorbital width 1.9-2.2 times eye diameter; pelvic-fin origin ventral to dorsal-fin origin; anus 1.0-1.5 eye diameters anterior of anal-fin origin; the widest part of black basal caudal bar is the midlateral, and then the upper and lower ends.

Description. – Morphometric data are listed in Appendix 1 and summarized in Table 1.

Head depressed, snout broadly rounded and blunt, cheeks inflated. Dorsal head length and lateral head length larger than head width. Maximum head width much larger than head height at nape and larger than body width at dorsal-fin origin. Head longer than maximum length of pectoral, dorsal, pelvic, anal or caudal fins. Eyes near to the top of head and usually at the mid point of head, not visible from ventral view. Mouth subterminal, large and curved. Upper jaw with a processus dentiformis. Lower jaw with a notch at symphysis. Lips thick, with wrinkles and more prominent at the corners of mouth. Upper lip without an incision at symphysis. Lower lip completely interrupted in the middle. Three pairs of barbels. Inner rostral barbel reaches or surpasses corner of mouth, outer rostral barbel surpasses base of maxillary barbel, maxillary barbel surpasses hind edge of eye.

Body depth gradually becomes smaller from anterior to posterior. Nape with slight depression. Body rounded anteriorly, posterior portion of body and caudal-peduncle compressed. Dorsal-fin ray 3, 8¹/₂. Distal margin of dorsal fin convex. Last unbranched dorsal ray shorter than the first branched ray. Dorsal-fin much shorter than head length. Pectoral-fin ray 1, 10. Pectoral-fin origin ventral to posterior edge of opercle. Tip of pectoral-fin extends past midline between pectoral-fin origin and pelvic-fin origin. Pectoral-fin shorter than head length. Distal margin of pectoral-fin convex. Pelvic-fin ray 1, 7. Pelvic-fin origin ventral to dorsal-fin origin and closer to caudal-fin base than to snout tip. Pelvic-fin closer to anal-fin origin than pectoral-fin origin. Posterior end of pelvic-fin not reach or reach anus. Pelvic-fin much shorter than head length. Distal margin of pelvic-fin convex. Axillary pelvic lobe present. Anus 1-1.5 times

eye diameters to anal-fin origin. Anal papilla well developed. Branched anal fin rays 5¹/₂. Posterior profile of anal-fin slightly convex. Anal-fin closer to pelvic-fin origin than caudal-fin base. Caudal fin ray 9+8. Caudal-fin emarginated, upper lobe 1.1-1.4 times median ray, upper and lower lobes almost equal in length and shorter than head length. Caudal-peduncle length 1.0-1.4 times its depth. Caudal adipose keel low and reaching posterior end of caudal peduncle base.

Body smooth, scales present behind posterior end of dorsal-fin base, anterior part of body and belly scaleless. Lateral line complete. Tiny uncini on mouth, throat, barbel, dorsal and ventral surfaces of pectoral and pelvic fins, invisible without magnification. Air bladder entirely enclosed in bony capsule.

Size up to 92.6mm SL and 110.9mm total length.

Color pattern (fresh). – Dorsal and lateral sides of body above lateral line black, sides of body under lateral line bronze, ventral side bronze and slightly yellowish; dorsal back of head black, cheek and ventral side bronze; bars not visible on large individuals; upper lobe of caudal-fin red; pectoral, pelvic and anal fins yellow and with a black mark. Color pattern of small individuals in fresh is not recorded.

Color pattern (preserved in formalin). – Body yellowish brown, dorsal side slightly darker; dorsal portion of head black or with indistinct dots, cheek and ventral side lighter; bars not visible on large individuals; 9 oval saddles on dorsal midline, 8-9 vertical elongated bars along lateral line and one on caudal-peduncle base, last two bars connected with saddles on dorsal midline in juveniles. Bars wider than interspaces in large and median size individuals, almost as wide as interspaces in juveniles. Black blotch on last unbranched and first branched dorsal ray bases. Branched dorsal rays dark gray, and the distal one third more prominent. Pectoral, pelvic and anal-fins white and with black marks at midlength of rays. Black basal caudal bar continuous, the widest part of it is the midlateral, and then the upper and lower ends and which usually not reach dorsal and ventral midlines. Two irregular thin gray bars on caudal-fin.

Habitat. – This fish lives in streams with clear and swift current, rocky bottom. Other species of fishes that live in the same streams include: *Opsarius caudicellatus*, *Neolissochilus baoshanensis*, *Crossocheilus burmanicus*, *Glyptothorax cavia*, *Glyptothorax zainaensis*, *Glyptothorax dorsalis*, *Glyptothorax trilineatus*, *Oreoglanis* sp.

Distribution. – Nanting River drainage, which borders Yongde County and Gengma County, Yunnan, China, which drains into the upper Salween River.

Etymology. – From *crypto* (Greek), hidden, and *fasciata* (Latin), bar. Refers to obscured bars in large individuals. An adjective.

Remarks. – *Schistura cryptofasciata* is a member of the group of species with complete lateral line, 8¹/₂ branched dorsal rays,



Fig. 3. *Schistura cryptofasciata* paratype KIZ 20026459, 40.5 mm SL, Nanting R. (A) lateral and (B) dorsal views.

Table 1. Morphometric characters comparison between *Schistura cryptofasciata* and *S. kengtungensis*.

	<i>S. cryptofasciata</i>				<i>S. kengtungensis</i>			
	Minimum	Maximum	Average	SD	Minimum	Maximum	Average	SD
In percentage of Standard length								
Body depth	15.2	20.7	16.9	1.7	14.1	19.1	16.9	1.4
Dorsal head length	17.5	22.7	20.3	1.4	18.9	23.6	21.8	1.2
Lateral head length	20.8	24.4	22.4	1.1	20.7	27.3	25.7	1.7
Predorsal length	48.3	53.1	51.2	1.4	18.9	23.6	21.8	1.2
Preventral length	51.5	56.2	54.1	1.3	54.1	57.7	56.0	1.1
Preanal length	75.1	79.6	77.3	1.2	76.4	81.1	79.0	1.4
Caudal-peduncle length	14.1	16.5	15.4	0.8	12.7	16.4	14.1	1.0
Caudal-peduncle depth	11.6	14.7	13.0	0.9	11.3	13.6	12.7	0.7
In percentage of dorsal head length								
Caudal-peduncle length	68.1	90.4	76.3	6.2	56.0	87.0	65.0	7.8
Caudal-peduncle depth	58.2	71.9	64.1	3.3	52.5	71.3	58.3	4.9
In percentage of lateral head length								
Snout length	37.9	49.1	44.9	3.4	35.3	44.5	41.5	2.5
Eye diameter	13.7	17.9	15.7	1.1	13.5	18.3	16.2	1.4
Interorbital width	29.8	34.3	31.9	1.3	21.9	32.5	24.8	2.7
Dorsal-fin length	55.0	70.1	60.5	4.1	48.3	67.4	60.0	5.3
Anal-fin length	61.2	80.8	71.5	5.3	61.7	77.8	67.1	4.3
Pectoral-fin length	71.6	91.0	80.3	5.2	73.9	88.9	81.2	4.0
Pelvic-fin length	61.8	77.2	69.3	4.4	61.7	77.8	67.1	4.3
Caudal-fin length	74.2	97.1	84.8	7.4	80.8	100.0	89.6	6.4
Ratio								
Lateral head length/dorsal head length	1.1	1.2	1.1	0.0	1.1	1.3	1.2	0.0
Dorsal head length/head depth	1.4	1.7	1.5	0.1	1.5	1.8	1.7	0.1
Dorsal head length/head width	1.1	1.3	1.2	0.1	1.1	1.4	1.2	0.1
Pectoral fin length/distance between pectoral and pelvic origins(%)	50.3	72.4	57.7	6.6	60.5	77.8	68.5	4.6
Length of upper lobe/median ray of caudal fin	1.1	1.4	1.3	0.1	1.2	1.8	1.4	0.2
Head depth/depth at eyes	1.0	1.2	1.1	0.1	1.0	1.2	1.1	0.0
Head width/width at nares	1.2	1.4	1.3	0.1	1.2	1.5	1.4	0.1
Body width/width at anal-fin origin	1.4	1.7	1.5	0.1	1.5	2.2	1.9	0.2
Body depth/body width	1.0	1.3	1.2	0.1	1.0	1.4	1.3	0.1
Head width/body width	1.1	1.3	1.2	0.1	1.1	1.5	1.3	0.1
Interorbital width/eye diameter	1.9	2.2	2.0	0.1	1.2	1.8	1.5	0.2
Caudal-peduncle length/depth	1.0	1.4	1.2	0.1	1.0	1.3	1.1	0.1

9+8 branched caudal rays and no sexual dimorphism. It is most closely related to *S. reidi*, *S. nicholsi*, *S. similes*, *S. sexcauda*, *S. waltoni* and *S. kengtungensis* in morphology. They share following characters: caudal-peduncle 0.84-1.4 times longer than deep; its depth 12.7-15.4% standard length, 57-77% dorsal head length; posterior bars usually not dissociated into blotches; 7-14 bars; eye diameter 3.0-6.0% standard length, 15-26% dorsal head length, 1.5-2.3 times in interorbital width (Kottelat, 1990: 96-97).

Schistura cryptofasciata is similar to *S. reidi* by similar body shape, colour pattern and fin ray counts and can be distinguished from *S. reidi* by following characters: black basal caudal bar continuous vs. usually dissociated into a vertically elongated blotch at extremity of lateral line and a triangular blotch at upper extremity caudal fin base; 8-9 bars on body vs. 9-14; anterior part of body and belly scaleless vs. body entirely covered by scales except on belly in front of pelvic fins. *Schistura reidi* is known only from the Salween basin in Mae Hong Son Province of Thailand (Kottelat, 1990: 198).

Schistura cryptofasciata can be distinguished from *S. nicholsi* by following characters: black basal caudal bar not reaching dorsal and ventral midlines vs. reaching; forwards and backwards directed triangular pads at each extremity absent vs. present. *Schistura nicholsi* is only known from Chao Phraya basin.

Schistura cryptofasciata can be distinguished from *S. similis* by following characters: 8-9 indistinct bars vs. 7-8 very regular bars; caudal-peduncle length 14.1-16.5% standard length, 68.1-90.4% dorsal head length vs. 11.5-15.4% standard length, 53-74% dorsal head length; anterior body scaleless vs. anterior body covered with embedded scales; air bladder entirely embedded in bony capsule vs. air bladder with a large posterior chamber in abdominal cavity. *Schistura similis* is only known from the Mae Nam Moei (a tributary of the Salween River) basin in Thailand and Myanmar.

Besides the characters mentioned above, *S. cryptofasciata* also shares one additional character with *S. sexcauda*: lateral head length 104-122% dorsal head length. It can be

distinguished form *S. sexcauda* by following characters: pelvic-fin not reaching or reaching anus vs. always reaching; anus 1.0-1.5 eye diameters anterior of anal-fin origin vs. about 2 eye diameters; distal margin of dorsal-fin convex vs. straight; larger body size, up to 92.6 mm SL vs. 51 mm SL; lower jaw with a distinct notch in all individuals vs. a slight median notch only in the largest specimens. *Schistura sexcauda* is known from Mae Nam (Chao Phraya) and its tributary streams around the central plain of Thailand (Kottelat, 1990).

Schistura cryptofasciata can be distinguished from *S. waltoni* by following characters: caudal peduncle 1.04-1.39 times longer than deep, its length 14.1-16.5% standard length, 68.1-90.4% dorsal head length vs. 0.84-1.11 times longer than deep, its length 12.4-14.7% standard length, 58-71% dorsal head length; anus 1.0-1.5 eye diameters anterior of anal-fin origin vs. about 2.5; scales one areas behind posterior end of dorsal-fin base, anterior part of body and belly scaleless vs. body and belly entirely covered by embedded scales, except between pectoral-fins. *Schistura waltoni* widely distributes in the upper reaches of the three western branches of the Mae Nam: Mae Nam Ping, Mae Nam Wang and Mae Nam Yom of Thailand (Kottelat, 1990).

Schistura cryptofasciata is most similar to *S. kengtungensis* in morphometric characters (Table 1), with well developed anal papilla and similar maximum size, about 100mm SL. It can be distinguished from *S. kengtungensis* by following characters: snout blunt vs. pointed; pelvic-fin not reach or reach anus vs. not reach, reach or surpass anus; pelvic-fin origin ventral to dorsal-fin origin vs. anterior of dorsal-fin origin; bars indistinct vs. bars clear; bars wider than interspaces vs. almost equal to interspaces; interorbital width 1.9-2.2 times eye diameters vs. 1.2-1.8; in small specimens, the posterior bars almost the same as interspaces in width vs. thinner than; black basal caudal bar wider at the midlateral and then dorsal and ventral ends vs. wider at its dorsal and ventral one fourth. In some specimens of *S. kengtungensis*, the bars are not sharply marked. In some specimens of *S. kengtungensis*, the bars are not sharply marked and are replaced on the sides by up to 8 longitudinally elongated blotches along course of lateral line (Kottelat, 1990). This colour pattern was not observed in *S. cryptofasciata*. *Schistura kengtungensis* is known from the middle Mekong basin in northern and northeastern Thailand, Myanmar and Xishuangbanna (Kottelat, 1990). *Schistura cryptofasciata* is known from the Nanting River which drains into the Salween River.

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Appendix 1. Morphometric data of *Schistura cryptofasciata*.

Characters	KIZ 20026453	KIZ 20026564	KIZ 20026454	KIZ 2026449	KIZ 20026455	KIZ 20026339	KIZ 20026337	KIZ 20026340	KIZ 20026336	KIZ 20026563	KIZ 20026562	KIZ 20026561	Mim	Max	Average	SD
Standard length	61.6	71.0	92.6	82.5	83.6	79.0	79.9	76.1	77.1	85.5	70.0	73.3	61.6	92.6	77.7	8.2
Total length	73.3	86.4	110.9	97.3	97.0	92.7	94.7	89.5	90.7	101.2	84.6	86.4	73.3	110.9	92.1	9.4
In percentage of standard length																
Body depth	16.4	20.7	17.1	16.0	16.3	15.8	16.6	15.4	17.4	15.2	19.7	16.8	15.2	20.7	16.9	1.7
Dorsal head length	20.9	22.1	20.3	18.8	17.5	19.4	20.2	20.4	20.8	19.9	22.7	20.6	17.5	22.7	20.3	1.4
Lateral head length	22.7	24.4	22.8	20.8	21.3	21.3	21.8	22.3	23.2	22.2	23.9	22.0	20.8	24.4	22.4	1.1
Predorsal length	53.1	50.7	51.0	52.5	49.4	51.5	52.7	52.6	50.7	48.3	51.1	50.5	48.3	53.1	51.2	1.4
Prenasal length	78.2	75.1	76.6	77.1	76.4	76.5	78.2	77.3	79.6	77.5	77.9	77.6	75.1	79.6	77.3	1.2
Preventral length	53.9	54.8	51.5	54.2	52.4	53.5	54.9	54.5	56.2	53.9	54.3	55.4	51.5	56.2	54.1	1.3
Caudal-peduncle length	15.1	16.5	15.8	14.7	15.8	15.6	15.0	16.0	14.1	16.1	16.0	14.3	14.1	16.5	15.4	0.8
Caudal-peduncle depth	13.1	14.5	13.0	12.4	12.6	12.3	12.4	12.6	13.6	11.6	14.7	13.1	11.6	14.7	13.0	0.9
In percentage of dorsal head length																
Caudal-peduncle length	72.1	74.5	77.7	78.1	90.4	80.4	74.5	78.7	68.1	81.2	70.4	69.5	68.1	90.4	76.3	6.2
Caudal-peduncle depth	62.8	65.6	63.8	65.8	71.9	63.4	61.5	61.9	65.6	58.2	64.8	63.6	58.2	71.9	64.1	3.3
Lateral head length/dorsal head length	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	0.0
In percentage of lateral head length																
Snout length	45.0	46.2	37.9	41.3	40.4	45.2	44.8	48.8	45.8	46.3	47.9	49.1	37.9	49.1	44.9	3.4
Eye diameter	15.7	15.6	13.7	14.5	15.7	17.9	16.7	15.9	15.1	15.3	15.6	16.8	13.7	17.9	15.7	1.1
Interorbital width	34.3	32.4	30.3	32.0	29.8	33.3	32.2	31.8	33.0	31.1	31.1	31.7	29.8	34.3	31.9	1.3
Dorsal fin length	55.0	62.4	57.8	63.4	60.1	63.1	60.9	57.1	58.1	56.3	62.1	55.0	55.0	70.1	60.5	4.1
Anal fin length	68.6	75.1	66.4	77.9	61.2	72.0	70.7	69.4	71.5	69.5	80.8	75.2	61.2	80.8	71.5	5.3
Pectoral fin length	80.7	82.1	71.6	83.1	77.0	85.7	73.6	77.6	82.1	79.5	91.0	80.1	71.6	91.0	80.3	5.2
Pelvic fin length	68.6	71.1	66.4	74.4	61.8	73.8	66.1	65.3	69.8	67.4	77.2	70.2	61.8	77.2	69.3	4.4
Caudal fin length	87.9	90.8	87.2	97.1	74.2	80.4	79.3	77.6	78.2	82.1	95.8	87.6	74.2	97.1	84.8	7.4
Pectoral fin length/distance between pectoral and pelvic origins(%)	61.7	66.0	50.3	53.6	52.3	60.5	51.8	53.0	59.0	55.7	72.4	56.1	50.3	72.4	57.7	6.6
Distance from anus to anal fin origin/eye diameter	1.5	1.0	1.5	1.4	1.5	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.0	1.5	1.3	0.2
Dorsal head length/head depth	1.7	1.4	1.6	1.6	1.4	1.5	1.5	1.5	1.5	1.5	1.6	1.5	1.4	1.7	1.5	0.1
Dorsal head length/head width	1.3	1.1	1.1	1.2	1.1	1.1	1.2	1.2	1.1	1.2	1.2	1.2	1.1	1.3	1.2	0.1
Length of upper lobe/median ray of caudal fin	1.3	1.2	1.4	1.3	1.1	1.2	1.2	1.3	1.2	1.3	1.4	1.3	1.1	1.4	1.3	0.1
Head depth/depth at eyes	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.2	1.0	1.2	1.1	0.1
Head width/width at nares	1.4	1.2	1.3	1.3	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.4	1.3	0.1
Body width/width at anal fin origin	1.4	1.4	1.5	1.4	1.5	1.6	1.4	1.5	1.7	1.5	1.5	1.4	1.4	1.7	1.5	0.1
Body depth/body width	1.2	1.3	1.1	1.2	1.2	1.1	1.1	1.1	1.0	1.2	1.2	1.2	1.0	1.3	1.2	0.1
Head width/body width	1.2	1.2	1.2	1.1	1.1	1.3	1.2	1.2	1.1	1.3	1.1	1.2	1.1	1.3	1.2	0.1
Interorbital width/eye diameter	2.2	2.1	2.2	2.2	1.9	1.9	1.9	2.0	2.2	2.0	2.0	1.9	1.9	2.2	2.0	0.1
Caudal-peduncle length/depth	1.1	1.1	1.2	1.2	1.3	1.3	1.2	1.3	1.0	1.4	1.1	1.1	1.0	1.4	1.2	0.1