

Some Remarks on Eastern Asiatic Loaches of the Genus *Misgurnus* (*Cobitidae*)

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Dedicated to Dr. Shigeho TANAKA

Through the courtesy of Dr. P. BĂNĂRESCU (Bucharest), we have received a collection of Chinese and Japanese pond loaches of the genus *Misgurnus* for determination and taxonomic study. Our own observations were compared with those reported by NICHOLS (1943), BERG (1949), MORI (1952), CHING-Tai-Cheng (1949), OLIVA (1959), P.-W. FANG (1943), RENDAHL (1922), DYBOWSKI (1869), NICHOLS (1928), FOWLER & BEAN (1920), MORI, OKADA & NAKAMURA (1951), JORDAN, TANAKA & SNYDER (1913), MATSUBARA (1955). The determination of our loaches was made following the keys by NICHOLS (1943).

The taxonomy of Chinese loaches of this genus is difficult as shown by NICHOLS 1943, who recognizes finally the concept that three series or species are present: one northern and highland (*mohoity*), one central (*anguillicaudatus*), and one southern (*mizolepis*) in origin.

The loaches we obtained came from the following localities: China, Yang-tse-kiang (2 specimens), Nagasaki, Japan (1 specimen), Kyushu, Japan (10 specimens), Kagawa Prefecture, Shikoku, Japan (8 specimens), Hyôgo Prefecture, Hondo, Japan (11 specimens), altogether 32 specimens of loaches.

Method

We directed our attention especially to the features cited in keys of NICHOLS (1943). The length of body was measured from the tip of snout to the insertion of caudal fin rays. The body depth was measured vertically from the begin of dorsal fin. On the same place was measured the body width. The head length was measured from the tip of snout to the margin of opercle, without the width of branchiostegal membrane. The caudal peduncle length is the distance from the insertion of caudal fin rays along the body axis to the vertical erected from the anal fin hind base.

We followed chiefly the original descriptions of NICHOLS (1925, 1943), the paper of KIMURA (1934) being not accesible for us, the description of *Misgurnus mizolepis*

elongatus KIMURA was studied also from NICHOLS (1943). The structure of scales which, according to NICHOLS (1943), may be important for determination was not used by us. First, the diagnosis seems to be unclear, secondly, only the proportionate characters given in descriptions seem to be satisfactorily to precise determination. The status of embedding of scales into skin or the thickening of the skin is hardly recognizable in fixed specimens.

Descriptions

1. *Misgurnus anguillicaudatus anguillicaudatus* (CANTOR) 1842

Locality	Kagawa	Hyogo				ave.	NICHOLS (China)	RENDAHL (China)	RENDAHL (Japan)
No. of coll.	14	22	25	26	32				
Body length in mm.	78	75	75	77	89	78.8	130	92	82.2
Body depth in % of body length	12	13	13	12	12	12.4	13.3	13.9	12.3
Body width in % of body depth	61	60	60	61	57	59.8	56	—	—
Head length in % of body length	18	18	17	20	18	18.2	17.2	17	16.7
Caudal peduncle length in % of head length	93	93	77	80	93	87.2	77	—	—
Caudal peduncle length in % body length	17	17	13	16	16	15.8	—	15.5	15.6
Nr. of sp.						5	1	6	5

Dorsal fin origin equidistant from the base of caudal fin and gill cleft. The results obtained by us, NICHOLS (1925, 1943), RENDAHL (1922) are in agreement with those of FOWLER (1924). The specimens from the DYBOWSKI's collection, determined by OLIVA (1959) as *Misgurnus anguillicaudatus*, are not identical with this species, because their caudal peduncle is evidently longer than the head length. According to the published descriptions of both species it seems to us that the specimens of DYBOWSKI could be determined as *Misgurnus erikssoni* RENDAHL 1922.*

The coloration, judging from the formalin specimens, is identical with the description of NICHOLS (1943).

2. *Misgurnus anguillicaudatus tungting* NICHOLS (1925)

Dorsal fin origin equidistant from the base of caudal fin and the center of opercle. Our results are in agreement with NICHOLS (1925, 1943) except the body depth.

* NICHOLS (1925) regards this form as subspecies of *M. anguillicaudatus* only, NICHOLS (1943) keeps it as species, according to P.-W. FANG (1943) *Misgurnus erikssoni* RENDAHL 1922 = *Mesomisgurnus bipartitus* (SAUVAGE & Dabry de Thiersant) 1874. The genus *Mesomisgurnus* FANG (1935) is believed by NICHOLS (1943) to possess only a subgeneric rank.

Locality	Yang-tse-kiang			NICHOLS 1 sp.
No. of coll.	2	1	ave.	
Body length in mm.	53	64	58.5	89
Body depth in % of body length	13	12	12.5	13
Body width in % of body depth	61	62	61.5	50
Head length in % of body length	19	16	17.5	18
Caudal peduncle length in % of head length	75	100	87.5	84

But already GÜNTHER (1868) has pointed out the variability of body depth in this species. The coloration of formalin specimens is in coincidence with the descriptions of NICHOLS (1925, 1943) and especially with the picture Nr. 34 (type specimen) in NICHOLS (1928).

3. *Misgurnus mizolepis elongatus* KIMURA 1934

The origin of the dorsal fin equidistant from the base of caudal fin and the edge of preopercle. The average head length of specimens from Hyogo Prefecture, Kaga-wa Prefecture and Kyushu represents 16.1 p. c. of body length. NICHOLS (1943) found 14.8 p. c. According to the key by NICHOLS (1943) our specimens belong to the sub-species *Misgurnus mizolepis elongatus* KIMURA 1934, characterized among other sub-species of *Misgurnus mizolepis* by a larger body width (more than 50 p. c. of body

Locality	Hyogo								ave.
No. of coll.	30	31	27	23	29	24	28		
Body length in mm.	95	97	100	100	100	110	110		101.7
Body depth in % of body length	12	11	12	12	11	13	11		11.7
Body width in % of body depth	64	57	67	75	62	61	67		64.7
Head length in % of body length	16	16	17	17	16	16	17		16.4
Caudal peduncle length in % of head length	113	117	100	100	107	115	111		109

Locality	Kyushu											ave.
No. of coll.	5	7	8	9	12	6	11	4	13	10		
Body length in mm.	92	92	93	93	94	96	98	102	103	110		97.2
Body depth in % of body length	13	12	12	12	12	13	12	10	11	10		11.7
Body width in % of body depth	63	64	61	68	64	59	59	75	70	68		65.1
Head length in % of body length	16	15	16	16	16	16	15	17	17	16		16
Caudal peduncle length in % of head length	113	129	120	110	117	123	120	106	115	118		117.1

Locality	Kagawa							ave.
No. of coll.	18	15	19	16	20	21	17	
Body length in mm.	83	88	89	94	97	101	103	93.6
Body depth in % of body length	13	14	13	13	11	12	14	12.8
Body width in % of body depth	57	59	57	67	59	67	54	60
Head length in % of body length	16	17	16	15	16	16	16	16
Caudal peduncle length in % of head length	112	107	121	110	113	109	119	113

depth) and a body depth smaller than 13 p.c. of body length, which is in agreement with the results obtained by us. There is only a difference between our measurements concerning the equidistance of dorsal fin origin. According to NICHOLS (1943) dorsal origin is equidistant from the base of caudal fin and front of eye.

The upper body surface with small spots. In some specimens the dark spots are smaller and a dark pigmentation is visible on both body sides, only the belly is pale, without spots. In another specimens the dark spots are larger reach only to the middle part of sides, the lower flanks and the belly being pale and unspotted. The dark blackish spot on the front margin of the caudal base is faintly visible.

One specimen from Nagasaki, Hondo, 159 mm. of standard length possesses following proportionate characters: body depth 13 p.c. of body length, body width 68 p.c. of body depth, head length 15 p.c. of body length, caudal peduncle 152 p.c. of head length. Dorsal origin equidistant from the base of caudal fin and front of the eye. This specimen differs from all other specimens from Hyogo, Kyushu and Kagawa by its extremely long caudal peduncle. The position of the dorsal fin is typical for *Misgurnus mizolepis elongatus* according to NICHOLS (1943), which can be from the other side not observable in specimens from cited localities. The formalin specimen is brownish, without any markings, inclusive the dark spot on the upper caudal base.

Summary of results and discussion

The determination following NICHOLS's keys (1943) has brought following results: The specimens from Yang-tse-kiang (China) belong to *Misgurnus anguillicaudatus tungting*, one specimen from Nagasaki (Hondo, Japan) is believed to belong to *Misgurnus mizolepis elongatus*, similarly as specimens from Kyushu and Kagawa Prefecture (both in Japan). Four specimens from Hyogo and 1 sp. from Kagawa Prefecture were determined as *Misgurnus mizolepis elongatus* and *Misgurnus anguillicaudatus anguillicaudatus*.

It seems probable that the species *Misgurnus anguillicaudatus* can be divided in two groups, the one with a shorter, the other with a longer caudal peduncle. To the first group belong than *Misgurnus anguillicaudatus* with its subspecies *M. anguilli-*

caudatus anguillicaudatus and *Misgurnus anguillicaudatus tungting*. To the second one *Misgurnus erikssoni* RENDAHL 1922 and *Misgurnus mizolepis* with its subspecies *M. m. mizolepis* GÜNTHER 1888, *M. mizolepis grangeri* NICHOLS 1925, *M. mizolepis fukien* NICHOLS 1925, *M. mizolepis punctatus* OSHIMA 1926, *M. mizolepis hainan* NICHOLS et POPE 1927, *M. mizolepis unicolor* LIN 1932, *M. mizolepis elongatus* KIMURA 1934.

The intergrade between both groups is the species *M. mohoity* DYBOWSKI 1869, with its subspecies *M. mohoity yunnan* NICHOLS 1925 and *M. mohoity leopardus* NICHOLS 1925, *M. crossochilus* SAUVAGE 1878 has an unclear systematic position (see NICHOLS 1943) and according to FANG (1943) this species is identical with *M. anguillicaudatus*. The variability of *Misgurnus anguillicaudatus*, mentioned already by GÜNTHER (1868) seems to be very probable especially regarding the body depth, but the occurrence of dilatation of tail "by fatty layers along the upper and lower rudimentary caudal rays" thought by GÜNTHER (l. c.) as caused by different kinds of food is for NICHOLS (1943) a systematic character of the subgeneric rank.

The subspecific value of some forms will be probably revised in the future, when we keep the conception of BERG (1948). The occurrence of two subspecies on one locality seems impossible (e.g. *M. mizolepis punctatus* and *M. mizolepis hainan* both on the island of Hainan, *M. mizolepis unicolor* and *M. mizolepis hainan* in Heungchow, *M. mizolepis fukien* and *M. mizolepis punctatus* in Fukien). It is very remarkable to note that *M. mizolepis hainan* lives from Hainan to Heungchow (throughout the province Fukien) and *M. mizolepis punctatus* has approximately the same areal from the island of Hainan to the province of Fukien. We can then assume that in the same areal of Fukien according to data of NICHOLS (1943) three subspecies of *Misgurnus mizolepis* (*fukien*, *punctatus*, *hainan*) occur. This is in contradiction with the BERG's concept of the subspecies as a geographical unit.

References

- BERG, L. S. 1948, 1949. Ryby presnykh vod SSSR i sopredelnykh stran. i, 1948, ii, 1949, 4th edition, Ac. Sci. USSR, Moscow-Leningrad.
- DYBOWSKI, B. N. 1869. Vorläufige Mittheilungen über die Fischfauna des Ononflusses und des Ingoda in Trans baikalien. Verhandl. der k. k. zool.-bot. Gesellschaft in Wien, xix, 945-958, tab.
- FANG, P.-W. 1943. Sur certains types peu connus de Cyprinides des collections du Muséum de Paris (III). Bull. Mus. National d' Hist. Nat., 2e Série, xv, 399-405.
- 1949. Note sur les poissons des eaux douces du Yunnan, Chine, des collections du Muséum. Bull. Mus. Nat. d' Hist. Nat. Paris, 2e Série, xxi, 526-531.
- FOWLER, H. W. 1924. Some fishes collected by the third Asiatic expedition in China. Bull. Amer. Mus. Nat. Hist., 1 (7), 373-405.
- FOWLER, H. W. & BEAN, B. A. 1920. A small collection of fishes from Soochow, China, with descriptions of two new species. Proc. U.S. Nat. Mus., lviii, 307-321, Washington.
- GÜNTHER, A. 1868. Catalogue of the Physostomi...in the collection of the British Museum, vii, v-xx, 1-512, London.
- JORDAN, D. S., TANAKA, S. & SNYDER, J. O. 1913. A catalogue of the fishes of Japan. Journ. Coll. Sci. Imp. Univ. Tokyo, xxxiii, art. 1, 1-497, 396 figs.

- MATSUBARA, K. 1955. Fish morphology and hierarchy, I, i-xi, 1-789, II, i-v, 791-1605, III, plates 1-135.
- MORI, T. 1952. Check list of the fishes of Korea. Mem. Hyogo University of Agriculture, iii, Biol. Ser. No. 1, 1-228, Sasayama, Japan.
- MORI, T., OKADA, Y. & NAKAMURA, M. 1951. Freshwater fishes from Shansi Province, North China. Bull. of the Biogeographical Society of Japan, xv, No. 1, 23-29.
- NICHOLS, J. T. 1925. An analysis of Chinese loaches of the genus *Misgurnus*. Amer. Mus. Novitates, Nr. 169, 1-7.
- 1928. Chinses fresh water fishes in the American Museum of Natural History's Collection. Bull. Amer. Mus. Nat. Hist., lviii, Art. 1, 1-62.
- OLIVA, O. 1859. A note on *Misgurnus anguillicaudatus* (CANTOR 1842) (Osteichthyes: Cobitidae). Acta Universitatis Carolinae, Biologica, No. 3, 169-172, Prague.
- RENDAILL, H. 1922. Zwei neue Cobitiden aus der Mongolei. Arkiv för Zoologi, xv, No. 4, 1-6.
- TCHANG, T. L. & LIU, C. H. 1957. A preliminary survey of the fishes of the Min River with some notes on their distribution. Pp. 221-245, in Chinse, with English summary.