

Chelon persicus, a New Species of Mullet (Perciformes: Mugilidae) from the Persian Gulf

ペルシャ湾から採集されたボラ科メナダ属の1新種

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ペルシャ湾から採集された7標本に基づき、新種 *Chelon persicus* を記載した。本種は以下の特徴により、容易に既知種から区別される。主上顎骨後方が鉤状に屈曲し、後端は閉口時に露出する。第2脊椎骨後方に1対の長い棘状神経間接突起がある。体は弱い櫛鱗に被われ、背鰭前方鱗の溝は不分岐である。胃の幽門部の筋肉はよく発達し、幽門垂は長短2葉に分離し、その数は3(短)+3(長)=6である。上唇前下縁に単尖頭の1次歯を備える。下唇は薄い縁状で前方へ向かう。脂鱗は痕跡的である。縦列鱗数は34~36(大部分が36)。鰓耙数は36~42+52~63=90~105。胸鰭には、基底部の銀色の半月形斑の他に特徴的な斑紋がない。

Abstract. *Chelon persicus* is described as a new species of mugilid fish from seven specimens collected in coastal waters of Qatar and Bahrain in the southwestern Persian Gulf. It is one of five species of the genus *Chelon* with both long and short unbranched pyloric caeca. It differs from all of these in having a pair of long, spine-like, neural postzygapophyses on the second vertebra. Other diagnostic characters: maxilla hooked downward at mouth corner; no adipose eyelid; scales weakly ctenoid, 34-36 in lateral series on body; predorsal scales with a single elongate groove; tiny monocuspid teeth on lower edge of upper lip; lower lip directed horizontally forward, the edge thin.

Key Words: *Chelon*, new species, Mugilidae, Persian Gulf

Chelon Röse, 1793 is the largest genus of the perciform fish family Mugilidae and the most difficult to classify. The species of this genus are found in European seas, along the western coast of Africa, and throughout the Indo-Pacific region.

Schultz (1946) revised the genera of the Mugilidae on worldwide base; he considered *Chelon* to be a valid genus on the basis of the morphology of the mouth including maxilla and teeth, and other characters such as the form of the adipose eyelid and scales. He regarded *Liza* Jordan et Swain, 1884, *Oedalechilus*

Fowler, 1904 and *Ellochelon* Whitley, 1930 as synonyms of the genus.

Thomson (1954) accepted Schultz' classification, in general, but stated that *Chelon* Röse is an unavailable name which is valid only from the time of Jordan and Evermann (1917). He regarded *Liza* as the valid name for the genus.

Trewavas and Ingham (1972) rejected Thomson's invalidation of *Chelon*. They pointed out that *Chelon* is an available name according to the International Code of Zoological Nomenclature of 1961, Art. 68d(i).

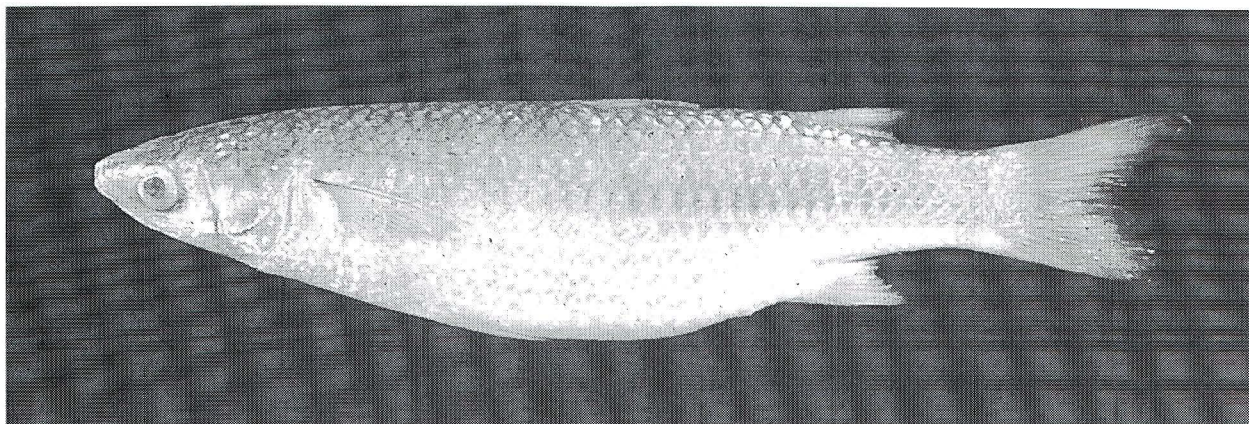


Fig. 1. *Chelon persicus*, KPM-NI0000380, holotype, 237.9 mm SL, Doha fish market.

Furthermore, they regarded both *Chelon* and *Liza* as valid. They characterized *Chelon* by having a thick upper lip bearing horny projections and/or ridges or papillae. They recognized the following four species in the genus: *C. labrosus* (Risso, 1826), *C. bispinosus* (Bowdich, 1825), *C. heterocheilos* (Bleeker, 1855) and *C. crenilabis* (Forsskål, 1775).

Senou (unpubl.) carried out a cladistic analysis of the interrelationships of this family regarding it as a perciform. He presented a new system of generic classification. *Chelon* is treated as a senior synonym of *Liza*. The first two of the four species of Trewavas and Ingham mentioned above were referred to *Chelon*, the last two to different genera.

In the present paper, we describe a distinct new species of *Chelon* (*sensu* Senou), which was recently collected from the coasts of Qatar and Bahrain, Persian Gulf.

Specimens of the new species are deposited in Bernice P. Bishop Museum, Honolulu (BPBM), Kanagawa Prefectural Museum of Natural History, Kanagawa (KPM-NI), and Department of Zoology, University Museum, University of Tokyo, Tokyo (ZUMT). Methods of counting and measuring follow Senou *et al.* (1987). The terminology of the jaw teeth follows Ebeling (1957). Osteological studies, including teeth, were made on one specimen (ZUMT 59485) stained in alizarin Red-S. Vertebrae and associated bones were examined with soft X-ray negatives. Lengths for specimens are given as standard length (SL).

Chelon persicus sp. nov.

(Figs. 1-4; Tables 1 and 2)

Holotype. KPM-NI0000380, ripe female, 237.9 mm, Doha fish market, Qatar, Persian Gulf, Dec. 24, 1989, coll. by S. Hara.

Paratypes. BPBM 21266-1 & -2, ripe female & ripe male, 248.8 & 247.3 mm, Bahrain fish market, Bahrain, Persian Gulf, Feb. 20, 1977, coll. by J. E. Randall, G. R. Allen and W. F. Smith-Vaniz; BPBM 29551, ripe male, 217.0 mm, Bahrain fish market, Bahrain, Persian Gulf, Nov. 19, 1983, coll. by J. E. Randall; ZUMT 59484, 200.6 mm, Doha fish market, Qatar, Persian Gulf, July 3, 1989, coll. by S. Hara; ZUMT 59485, 195.4 mm, July, 1989, coll. by S. Hara; ZUMT 59505, ripe female, 227.8 mm, same data as holotype.

Comparative materials.

C. saliens, 1 specimen, 144.0 mm. *C. richardsonii*, 5 specimens, 38.0-78.3 mm. *C. dumerili*, 3 specimens, 76.4-137.6 mm. *C. tricuspidens*, 2 specimens, 45.9 and 71.8 mm. *C. macrolepis*, 72 specimens, 129.7-281.7 mm.

Diagnosis.

Maxilla hooked downward at corner of mouth, its posterior tip reaching beyond corner of mouth and remaining exposed when mouth is closed; a pair of long, spine-like neural postzygapophyse on second vertebra; weak ctenoid scales on body; predorsal scales bearing a single elongate groove; stomach gizzard-like and biconical, bearing three short and three long, unbranched pyloric caeca; upper lip bearing monocuspid primary teeth on its inferior edge; lower lip forming a thin edge, directed horizontally forward; adipose eyelid little developed, present as thin membraneous tissue in posterior region of eye; lateral scale series 34-36 (mostly 36); gill rakers 36-42+52-63=90-105; pectoral-fin base silvery when fresh; no distinct dark marking on pectoral-fin base after preservation.

Description.

Counts and proportional measurements are shown

Table 1. Counts of type specimens of *Chelon persicus*

	Holotype	Paratypes					
	KPM-N10000380	ZUMT 59484	ZUMT 59485	ZUMT 59505	BPM 21266-1	BPM 21266-2	BPM 29551
Dorsal rays	IV-9	IV-9	IV-9	IV-9	IV-9	IV-9	IV-9
Pectoral rays	16	16	17	15	16	16	16
Pelvic rays	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5
Anal rays	III, 8	III, 9	III, 9	III, 9	III, 9	III, 9	III, 8
Branched caudal rays	6+6=12	6+6=12	6+6=12	6+6	6+6	6+6	6+6
Lateral scale series	36	36	36	36	36	34	35
Transverse scale rows	11	11	11	11	11	11	11
Cheek scale rows	4	4	4	4	4	4	4
Number of pyloric caeca	3(short)+3(long)	3(short)+3(long)	3(short)+3(long)	3(short)+3(long)	3(short)+3(long)	3(short)+3(long)	3(short)+3(long)
Vertebral counts	13+11=24	13+11=24	13+11=24	13+11=24	not examined	not examined	not examined
Number of gill rakers	38+52=90	37+53=90	36+56=92	38+55=93	42+63=105	broken	38+56=94

in Tables 1 and 2.

Body elongate, becoming strongly compressed toward tail. Back without a keel on midline.

Head small, moderately compressed. Interorbital space nearly flat or slightly convex in front view. Adipose eyelid rudimentary, existing as very thin membrane along posterior rim of eye. Maxilla hooked downward at corner of mouth, its posterior tip reaching beyond corner of mouth and remaining exposed when mouth closed. Connecting tissue between end of maxilla and corner of mouth scarcely visible when mouth closed.

Lachrymal serrate on lower and posterior edges, the serration of lower edge starting from anterior edge of

the corner of mouth. Lower edge of lachrymal emarginate at corner of mouth; posterior edge of lachrymal round or truncate, the upper end reaching anterior edge of eye.

Mouth terminal, with a prominent symphyseal knob at tip of lower jaw. Upper lip slightly thick, bearing a row of primary teeth on lower edge and some secondary teeth inside primary tooth row. Primary teeth minute and ciliform, invisible to the naked eye. Each tooth supported by well developed, bifurcate fibrous strands (Fig. 2). Lower lip without teeth forming thin edge, directed horizontally forward. Corner of mouth on a vertical through anterior nostril, or between nostrils.

Tongue with a longitudinal keel on the midline, the front view of tongue forming an obtuse angle. Tip of tongue free from mouth floor. Some small tooth patches present on the margin of tongue.

Ventral inner edges of right and left dentaries connected to each other by a relatively long midlongitudinal joint at symphysis. Free space formed by edges of both dentaries relatively wide just behind of symphysis, and width gradually narrowing toward posterior part of mandible. Angle of lower jaw 102.5 to 110.7 degrees.

Prevomer and pterygoids bearing some small teeth.

Gill opening extending to below center of pupil. Each gill raker with pointed tip, bearing two rows of minute cirri along edge. Longest raker at corner of gill arch, its length 2.3-2.6 in longest gill filament on lower arm.

Scales on body weakly ctenoid. Head covered with cycloid scales. Interorbital scales large anteriorly, reaching to or nearly to posterior nostrils. Lachrymal with small scales. Lateral surface of basal half of second and third dorsal spines with a row of minute scales. Outer surface of pectoral, inner surface of pelvic, 2nd According to Senou (unpubl.), only the following four species of *Chelon* have both long and short, unbranched

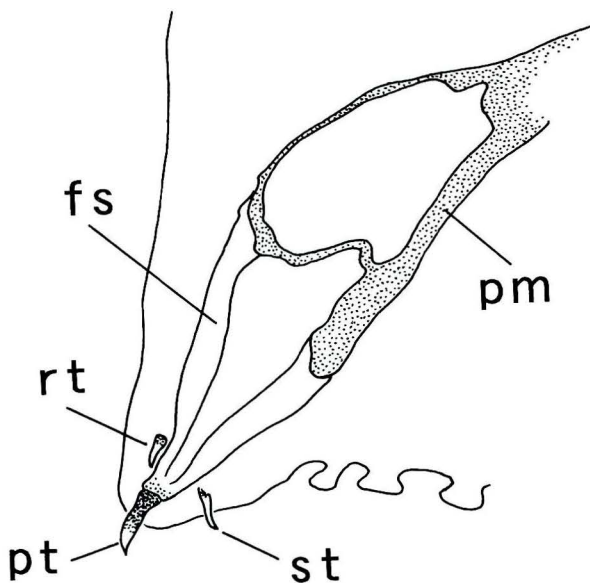


Fig. 2. A cross-section of upper lip of *Chelon persicus*, ZUMT59485, 195.4 mm SL. fs: fibrous strands; pm: premaxilla; pt: primary tooth; rt: replacement tooth to primary tooth; st: secondary tooth. Bar indicates 1 mm.

Table 2. Proportional measurements of type specimens of *Chelon persicus* expressed as percentages of the standard length

	Holotype		Paratypes				
	KPM-NI0000380	ZUMT 59484	ZUMT 59485	ZUMT 59505	BPBM 21266-1	BPBM 21266-2	BPBM 29551
Standard length (mm)	237.9	200.6	195.4	227.8	248.8	247.3	217.0
Total length	124.3	125.1	125.7	125.3	—	128.0	124.0
Fork length	114.9	116.0	116.0	115.0	114.9	116.5	115.4
Prefirst dorsal fin length	52.7	52.9	53.4	52.5	51.6	53.1	51.9
Presecond dorsal fin length	76.8	78.1	77.3	77.4	76.3	76.9	77.6
Prepelvic fin length	39.6	39.9	39.5	41.0	39.3	39.6	39.4
Preal anal fin length	76.9	75.6	75.9	79.5	76.0	73.6	76.8
Caudal peduncle length	19.0	17.0	18.6	16.9	18.3	19.0	19.2
Head length	23.2	24.2	23.8	23.4	23.0	23.2	23.1
Snout length	6.6	6.6	6.7	7.0	6.8	6.7	7.1
Postorbital length	12.0	12.7	12.3	12.1	12.0	12.0	11.4
Eye diameter	5.5	6.1	6.0	5.4	5.7	5.7	5.8
Postadipose eyelid length	2.5	2.7	2.1	2.7	4.8	2.2	2.4
Adipose eyelid gap	5.0	5.7	5.4	5.1	4.7	5.1	5.1
Interorbital width	8.2	8.1	8.3	8.4	8.8	9.0	8.5
Thickness at pectoral fins	15.3	15.0	15.4	15.3	15.0	14.4	15.4
Thickness at first dorsal fin	13.8	12.0	14.7	14.4	11.7	—	13.5
Thickness at second dorsal fin	9.3	8.4	10.0	9.7	8.7	9.6	8.7
Distance between anterior and posterior nostrils	0.9	0.9	1.1	1.0	0.8	1.2	0.7
Width of mouth	7.6	7.8	7.6	7.8	7.4	7.7	7.1
Thickness of upper lip	1.7	1.5	1.6	1.8	1.4	1.6	1.6
Lower jaw length	4.6	5.0	4.9	4.9	4.7	4.9	4.7
Depth at corner of mouth	5.7	6.2	5.7	6.4	6.4	6.8	6.5
Depth at eye	12.3	12.9	12.8	12.6	12.7	13.9	13.7
Depth at pectoral fin	19.7	19.0	19.1	19.4	20.9	—	21.8
Depth at first dorsal fin	26.6	23.9	23.9	25.6	27.0	—	27.9
Depth at anal fin	21.4	21.4	21.7	22.7	23.4	—	24.5
Caudal peduncle depth	11.1	11.0	11.5	11.9	11.4	11.9	12.0
Pectoral fin length	18.6	18.4	18.8	18.9	18.4	18.9	17.9
Axillary scale length	5.3	5.3	5.1	5.9	5.1	6.0	4.9
First dorsal spine length	14.7	14.2	15.0	14.3	—	13.7	12.1
Second dorsal spine length	13.9	13.3	15.1	13.9	12.5	12.9	11.5
Third dorsal spine length	11.6	11.4	13.5	12.5	11.3	10.7	10.6
Fourth dorsal spine length	4.7	5.1	7.6	5.4	6.4	6.1	4.6
Dorsal obbasal scale length	8.9	9.9	9.6	9.6	7.5	9.2	8.1
Second dorsal fin height	14.6	14.6	14.9	15.7	15.3	15.2	14.7
Second dorsal fin base length	7.7	8.4	8.0	7.9	8.0	8.7	7.6
Pelvic fin length	14.5	14.4	15.7	14.9	15.0	15.0	14.2
Pelvic obbasal scale length	8.0	8.8	8.4	8.5	6.3	8.4	6.4
Interpelvic flange length	8.7	9.7	9.4	9.5	8.0	9.3	8.5
Anal fin height	14.8	14.5	15.3	15.8	15.2	15.2	14.5
Anal fin base length	8.4	10.0	9.2	9.2	10.1	9.8	9.6

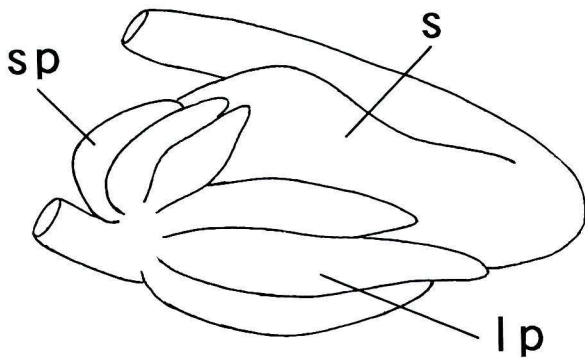


Fig. 3. Diagram showing stomach with long and short pyloric caeca of *Chelon persicus*. lp: long pyloric caeca; s: stomach; sp: short pyloric caeca.

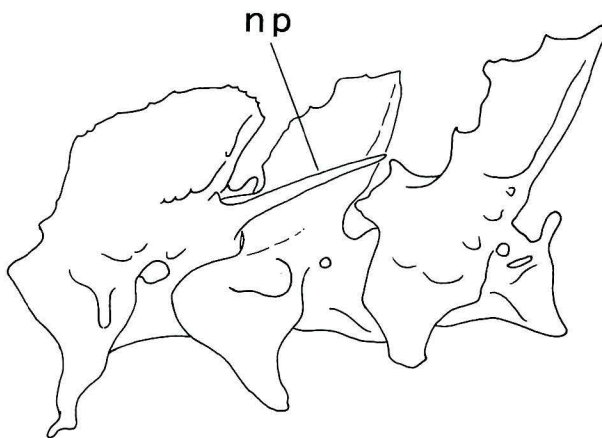


Fig. 4. Neural postzygapophyse (np) on second vertebra of *Chelon persicus*, ZUMT59485, 195.4 mm SL. Bar indicates 10 mm.

dorsal, anal and caudal fins covered with minute scales. Most of scales on body with a single elongate groove.

Stomach gizzard-like and biconical, bearing three short and three long, unbranched pyloric caeca (Fig. 3).

Three supraneural bones set between 2nd and 3rd, 4th and 5th, 6th and 7th vertebrae, respectively. First pterygiophore of spinous dorsal fin set between 7th and 8th vertebrae. A pair of long, spine-like neural postzygapophyse present on second vertebra (Fig. 4).

Color when fresh: Body dark greenish on back, silvery on side and ventrally. Predorsal scale with a dark edge. No dark stripes on body. Upper portion of iris orange. Spinous and soft dorsals gray, the latter with a dark margin. Pectoral fin somewhat darkish with a silvery half-moon mark on basal part. Caudal fin gray with a blackish posterior margin. Pelvic and anal fins whitish.

Distribution.

All specimens were collected from the coasts of Qatar and Bahrain, the south-western part of Persian Gulf. This species is the most abundant mullet in Qatar fish market; 0.5 to 1.5 tons per month are landed (Dr. Hara, pers. comm.). There is no record of the species from outside the Persian Gulf, and we know of no record from elsewhere in the Gulf.

Etymology.

The specific name "*persicus*" refers to the Persian Gulf where this species appears to be endemic.

Remarks.

According to Senou (unpubl.), only the following four species of *Chelon* have both long and short, unbranched pyloric caeca: *C. saliens* (Risso, 1810) from the Mediterranean; *C. dumerili* (Steindachner, 1870) from West Africa and South Africa; *C. richardsonii* (Smith, 1849) from South Africa; and *C. tricuspidens* (Smith, 1935) from South Africa.

C. persicus is fifth species bearing such pyloric caeca. However, this new species is different from the other four in having a pair of long, spine-like neural postzygapophyse on the second vertebra. In *C. saliens*, *C. dumerili* and *C. richardsonii*, the postzygapophyse is slightly compressed and hook-shaped. That of *C. tricuspidens* is short and spine-like.

C. saliens and *C. dumerili* are differentiated further by predorsal scales with multiple grooves (versus having single groove in *C. persicus*). *C. tricuspidens* and *C. richardsonii* have large incisor-like teeth arranging densely along the inferior edge of upper lip (versus minute, ciliiform teeth in *C. persicus*).

There are no differences among *C. persicus*, *C. dumerili* and *C. tricuspidens* in either the number or composition of short and long caeca. *C. saliens*, however, has 5 short caeca and 4 long caeca, and *C. richardsonii* has 4 short and 2 long caeca.

Trewavas and Ingham (1972) treated *Protomugil* Popov, 1930 as a subgenus of *Liza* (= *Chelon* in the present paper) on the basis of having both short and long pyloric caeca, and multiple grooves in the scales. They classified *L. saliens* and *L. dumerili* in this subgenus.

However, as mentioned above, *C. persicus*, *C. richardsonii* and *C. tricuspidens* also have short and long pyloric caeca, but there are no multiple grooves in their scales. Therefore, the subgenus *Protomugil* as diagnosed by Trewavas and Ingham is no tenable.

C. persicus is similar to *C. macrolepis* (Smith, 1849) from the Indo-Pacific in general external appearance when fresh. However, the following color character serves to distinguish the two: *C. persicus* has a silvery

half-moon marking on basal part of the pectoral fin whereas there is a golden transverse band on the basal part of the fin in *C. macrolepis*, this marking remaining as dark pigmentation after preservation; In addition, *C. persicus* has 34 to 36 scales in lateral series, mostly more than 34 (versus 30 to 34, mostly less than 34 for *C. macrolepis*); and interorbital scales reaching to posterior nostrils or not (versus reaching to anterior nostrils, often beyond them for *C. macrolepis*); The following measurements expressed as percentages of the SL are also differentiating (data for *C. persicus* given first): head length 23.0 to 24.2 % (versus 23.9 to 29.0); snout length 6.6 to 7.1 % (versus 7.1-8.6); eye diameter 5.4 to 6.1 % (versus 6.2 to 8.7); interorbital width 8.1 to 9.0 % (versus 9.6 to 11.9); thickness at pectoral fins 14.4 to 15.4 (versus 16.2 to 20.5); width of mouth 7.1 to 7.8 (versus 9.1 to 11.9).

Acknowledgments

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