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## Redescription of Redlip Mullet *Chelon haematocheilus* (Pisces: Mugilidae) with a Key to Mugilid Fishes in Taiwan

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### ABSTRACT

Morphometry, meristics and coloration of redlip mullet *Chelon haematocheilus* collected in the western Taiwan were examined. Systematics of the mugilid fishes in Taiwan is also revised.

**Key words:** *Chelon haematocheilus*, Mugilidae, Systematics

### INTRODUCTION

Redlip mullet *Chelon haematocheilus* (Temminck and Schlegel, 1845) (Mugiliformes: Mugilidae) is a common species in the north-western Pacific inshore waters, widely distributed from Japan in the north, through Korea, to the coast of China in the south (Anonymous, 1992; Nelson, 1994). *Liza haematocheila* is a synonym of this species (Senou, 1993).

In Taiwan, Liu and Shen (1991b, 1993) studied the lepidology and lateral-line canal system of mugilid fishes. Among them, only two specimens of young *Liza haematocheila* collected from Japan were analyzed. Shao *et al.* (1993) and Liu (1993) first recorded the species in Taiwan, but they did not describe the fish in detail. Su (1997) established a key to identify this species from five juvenile specimens. These reports indicate that the description on the redlip mullet is incomplete, because the available specimens are limited. This study aims to redescribe the redlip mullet collected from the natural environment in Taiwan.

### MATERIALS AND METHODS

Twenty redlip mullets were collected by a

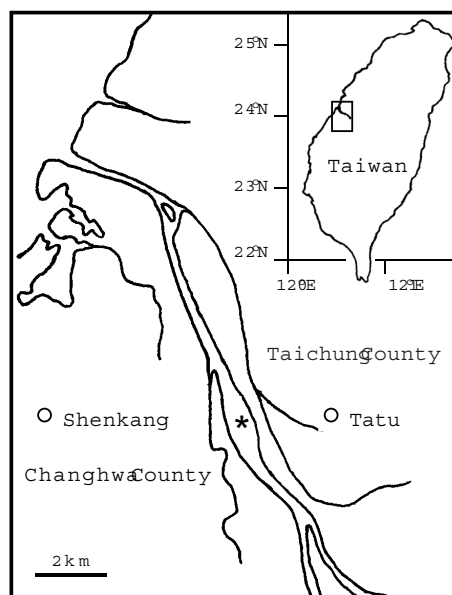
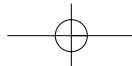


Figure 1. Sampling site (\*) of redlip mullet *Chelon haematocheilus* in Tatuhsi Creek in the west-central Taiwan.

trammel net (50 m long, 1 m wide, 3 layers with mesh sizes of 7.5, 15, and 7.5 cm, respectively) on 25 July 1998 in Tatuhsi Creek located between Taichung and Changhua Counties in west-central Taiwan (Fig. 1). Five morphomet-

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Figure 2. *Chelon haematocheilus*, 296 mm SL.

Table 1. Morphometric and meristic characters of redlip mullet *Chelon haematocheilus* (n = 20).

Characters	Range	Mean±SD
<b>Morphometric</b>		
Total length (mm)	283.0-398.0	351.8±30.0
Fork length (mm)	273.0-384.0	335.4±29.1
Standard length (mm)	239.0-338.0	294.7±25.9
Head length (mm)	57.0-79.3	70.8±5.9
Head width (mm)	39.0-56.8	49.3±5.0
<b>Meristic</b>		
Lateral line scale	33-39	
Transverse scale	13-14	
Dorsal fin	IV+8-9	
Pectoral fin	15-18	
Pelvic fin	I, 5	
Anal fin	III, 8-9	
Caudal fin	14	

ric characters were measured along the longitudinal axis of the fish: i.e., total length (TL), fork length (FL), standard length (SL), head length (HL), and head width (HW); seven meristic characters were counted: i.e., lateral line scale (LS), transverse scale (TrS), dorsal fin (D), pectoral fin (P1), pelvic fin (P2), anal fin (A), and caudal fin (C); and coloration of the fish was also examined. The criteria of the measurements and counts follow Liu and Shen (1991a). Specimens were deposited in the Museum of the Department of Zoology, National Taiwan Univ., Taipei, Taiwan.

#### DESCRIPTION

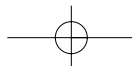
*Chelon haematocheilus* (Temminck and Schlegel, 1845)  
(Fig. 2; Table 1)

*Mugil haematocheilus*: Temminck and Schlegel, 1845: 135, pl. 72-2 (Japan).

*Liza menada*: Tanaka, 1916: 394 (Japan).

*Liza haematocheila*: Kamohara, 1971: 19, pl. 19-1 (Japan); Masuda *et al.*, 1984: 119, pl. 104-H (Japan); Anonymous, 1992: 62 (China); Liu, 1993: 84 (Taiwan).

*Chelon haematocheilus*: Senou, 1993: 845 (Japan).



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Table 2. Checklist of mugilid fishes in Taiwan.

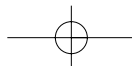
Scientific name	Chinese name
Superorder Acanthopterygii	棘鱗首目
Series Mugilomorpha	鯔形系
Order Mugiliformes	鯔目
Family Mugilidae	鯔科
<i>Chelon affinis</i> (Günther, 1861)	前鱗■
<i>C. alata</i> (Steindachner, 1892)	竹筒■
<i>C. dussumieri</i> (Valenciennes, 1836)	粗鱗■
<i>C. haematocheilus</i> (Temminck and Schlegel, 1845)	紅眼■
<i>C. macrolepis</i> (Smith, 1846)	大鱗■
<i>C. subviridis</i> (Valenciennes, 1836)	白■
<i>Crenimugil crenilabis</i> (Forsskål, 1775)	粒唇鯔
<i>Ellochelon vaigiensis</i> (Quoy and Gaimard, 1824)	黃鱗■
<i>Moolgarda cunnesius</i> (Valenciennes, 1836)	長鱗凡鯔
<i>M. formosae</i> (Oshima, 1922)	臺灣凡鯔
<i>M. seheli</i> (Forsskål, 1775)	協里凡鯔
<i>Mugil cephalus</i> Linnaeus, 1758	烏魚
<i>Oedalechilus labiosus</i> (Valenciennes, 1836)	瘤唇鯔

**Diagnosis:** D. IV+8-9; P1. 15-18; P2. I, 5; A. III, 8-9; C. 14; LS. 33-39; TrS. 13-14; Head length 22.5-25.2, head width 16.0-17.8 in percent of standard length. Head depressed with distended hyomandibular. Posterior tip of maxillary curving down below tip of premaxillary, and exposed when mouth closed; both lips thin, without papillae or plicate fringes. Adipose eyelid obsolescent. Pectoral axillary scales smaller than those on dorsal and pelvic. No keel found on back. Fresh specimen grayish brown in color on dorsal part, white on both lateral sides and on belly. All fins brownish in color except pelvic and anal fins, which are pale white. Pectoral base colorless and without pigments. Caudal fin black along margin. First ten of 12 rows of lateral striates obviously blackish. Ctenoid scales appearing with black margin in exposed area. A slight golden segment found on upper part of iris. Formalin-preserved specimens became gray in dorsal, pale yellowish on belly. Brownish turned into grayish and pale white into creamy white on all fins. No prominent markings found.

## DISCUSSION

The systematics and phylogeny of mugilid fishes have been reexamined in recent years. Senou (1988) established a new generic classification by cladistic analysis. He regarded *Chelon* Röse, 1793 and *Moolgarda* Whitley, 1945 as senior synonyms of *Liza* Jordan and Swain, 1884 and *Valamugil* Smith, 1948, respectively. And *Ellochelon* Whitley, 1930 is a valid genus on renaming *Liza vaigiensis* (Senou, 1993, 1997; Senou *et al.*, 1996). Stiassny (1993) suggested that mugilid fishes are a sister group of the atherinomorph assemblage. Nelson (1994) therefore moved them from the Perciformes to the Mugiliformes. Thus, we revised the classification of the mugilid fishes in Taiwan as shown in table 2.

Classifications of the Mugilidae have been frequently revised in Taiwan. The mugilid fishes in Taiwan were first described by Oshima who recorded only 11 species (1919 and 1922a, b). Then, Chen (1954 and 1969) increased the number to 13 species. Chen and Yu (1986)



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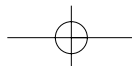
updated the count to 16 species, and Shen (1984) revised it down to 14 species. Thereafter, Liu and Shen (1991a) made an extensive collection and revised the mugilid fishes to comprise 10 species (Shen, 1993). Recently, Shao *et al.* (1993) and Liu (1993) added two new records, *Liza haematocheila* (now as *Chelon haematocheilus*) and *Valamugil seheli*. Chen *et al.* (1997) rediscovered *Liza vaigiensis* (now as *Ellochelon vaigiensis*). Therefore, at present, there are 13 species of mugilid fishes recognized in Taiwan. A key to the genera and species of mugilid fishes is given as follows:

**Key to genera and species of Mugilidae in Taiwan**

- 1a. Pectoral fin black, caudal fin emarginated to truncated and yellowish .....(*Ellochelon*) *Ellochelon vaigiensis*
- 1b. Pectoral fin not black, caudal fin forked and not yellowish .....2
- 2a. Upper pectoral base with a blue blotch (*Mugil*) .....*Mugil cephalus*
- 2b. Upper pectoral base without a blue blotch.....3
- 3a. Pectoral fin base with a dark blue spot on upper end.....4
- 3b. Pectoral fin base without a dark blue spot on upper end (*Chelon*) .....5
- 4a. Lips with papillae.....6
- 4b. Lips without papillae (*Moolgarda*).....11
- 5a. Pectoral fin base with black pigments.....7
- 5b. Pectoral fin base without black pigments .....8
- 6a. Pectoral fin with axillary scale; upper lip thin with a high symphyisial knob .....(*Crenimugil*)*Crenimugil crenilabis*
- 6b. Pectoral fin without axillary scale; upper lip thick with low double symphyisial knob .....(*Oedalechilus*) *Oedalechilus labios*
- 7a. Pectoral fin base with gold pigments.....*Chelon macrolepis*
- 7b. Pectoral fin base without gold pigments.....*Chelon alata*
- 8a. Back with keel.....*Chelon affinis*
- 8b. Back without keel .....9
- 9a. Lateral line scales equal or more than 33 .....*Chelon haematocheilus*
- 9b. Lateral line scales less than 33.....10
- 10a. Lateral line scales 28-29; adipose eyelid obsolescent .....*Chelon dussumieri*
- 10b. Lateral line scales 30-32; adipose eyelid developed .....*Chelon subviridis*
- 11a. Adipose eyelid developed.....12
- 11b. Adipose eyelid obsolescent or absent .....*Moolgarda seheli*
- 12a. Lower lip with teeth .....*Moolgarda cunnesius*
- 12b. Lower lip without teeth .....*Moolgarda formosae*

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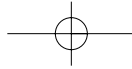
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## REFERENCES

- Anonymous (1992) *Atlas of the sea fishes of China in living colour*. Vol. I. Shanghai Scientific and Technical Publ., Shanghai, 62 pp. (in Chinese)
- Chen, J. T. F. (1954) *Fishes of Taiwan*. Taiwan Bank, Taipei, pp. 41-43. (in Chinese)
- Chen, J. T. F. (1969) *A synopsis of the vertebrates of Taiwan*. Revised ed. Vol. I, Commercial Books, Taipei, pp. 291-294. (in Chinese)
- Chen, J. T. F. and M. J. Yu (1986) *A synopsis of the vertebrates of Taiwan*. Revised and enlarged ed. Vol. II, Commercial Books, Taipei, pp. 651-655. (in Chinese)
- Chen, M. H., C. W. Chang and S. C. Shen (1997) Redescription of *Liza vaigiensis* (Quoy & Gaimard, 1824) (Pisces: Mugilidae) from the southwestern waters of Taiwan. *Acta Zoolog. Taiwan*. 8(1): 15-18.
- Kamohara, T. (1971) *Coloured illustrations of the fishes of Japan*. Vol. I. Hoikusha Publ., Osaka, pp. 18-19. (in Japanese)
- Liu, C. H. (1993) Distribution and habits of mugilid fishes. *Aqualife* 55: 82-85. (in Chinese)
- Liu, C. H. and S. C. Shen (1991a) A revision of the mugilid fishes from Taiwan. *Bull. Inst. Zool. Acad. Sin.* 30(4): 273-288.
- Liu, C. H. and S. C. Shen (1991b) Lepidology of the mugilid fishes. *J. Taiwan Mus.* 44(2): 321-357.
- Liu, C. H. and S. C. Shen (1993) The lateral-line canal system in the mugilid fishes (Perciformes: Mugilidae). *Acta Zoolog. Taiwan*. 4(1): 21-31.
- Masuda, H., K. Amaoka, C. Araga, T. Uyeno and T. Yoshino (1984) *The fishes of the Japanese Archipelago*. Tokai Univ. Press, Tokyo, pp. 119-121. (in Japanese)
- Nelson, J. S. (1994) *Fishes of the world*. J. Wiley, Edmonton, pp. 252-255.
- Oshima, M. (1919) Contribution to the study of the freshwater fishes of the island of Formosa. *Ann. Carneg. Mus.* 12: 268-275.
- Oshima, M. (1922a) A review of the fishes of the family Mugilidae found in the waters of Formosa. *Ann. Carneg. Mus.* 13: 240-259.
- Oshima, M. (1922b) The mugilid fishes of Formosa. *Mag. Taiwan Fish* 82: 23-36.
- Senou, H. (1988) Phylogenetic interrelationships of the mullets (Pisces: Mugilidae). Ph. D. dissertation, Tokyo Univ., Tokyo, 172 pp. (in Japanese)
- Senou, H. (1993) Mugilidae. In *Fishes of Japan with pictorial keys to the species*. T. Nakabo, ed. Tokai Univ. Press, Tokyo, pp. 843-846. (in Japanese)
- Senou, H. (1997) Redescription of a mullet, *Chelon melinopterus* (Perciformes: Mugilidae). *Bull. Kanagawa Prefect. Mus.* 26: 51-55.
- Senou, H., J. E. Randall and M. Okiyama (1996) *Chelon persicus*, a new species of mullet (Perciformes: Mugilidae) from the Persian Gulf. *Bull. Kanagawa Prefect. Mus.* 25: 73-78.
- Shao, K. T., J. P. Chen, P. H. Kao and C. Y. Wu (1993) Fish fauna and their geographical distribution along the western coast of Taiwan. *Acta Zoolog. Taiwan*. 4(2): 113-140.
- Shen, S. C. (1984) *Synopsis of fishes of Taiwan*. Southern Materials Center, Taipei, pp. 342-344. (in Chinese)
- Shen, S. C. (1993) *Fishes of Taiwan*. Dept. of Zoology, Taiwan Univ., Taipei, pp. 437-441. (in Chinese)
- Stiassny, M. L. J. (1993) What are grey mullets? *Bull. Mar. Sci.* 52(1): 197-219.
- Su, D. C. (1997) Identification of larvae and juveniles of *Liza* species in the waters off southwestern Taiwan. Master thesis, Sun-Yat-Sen Univ., Kaohsiung, 90 pp. (in Chinese)



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Tanaka, S. (1916) Two new species of Japanese fishes. *Zool. Mag.* 28(336): 394-395. (in Japanese)

Temminck, C. J. and H. Schlegel (1845) Pisces. Part VIII. In *Fauna Japonica*. P. F. de Siebold, ed. Lugduni, Batavorum, pp. 134-135.