

Notes on External Morphology of *Enedrias nebulosus* and *E. fangi* in Korean Waters^{*1,*2}

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Enedrias fangi, which was not yet recorded in Korean fishes fauna, is revealed in Korean coastal waters during the present research period. The external morphology of this species is compared with that of *E. nebulosus* ('bedorachi' in Korean name). Taking into consideration the morphological differences between two species and the Korean name of *E. nebulosus*, 'bedorachi', the authors propose 'heenbedorachi' meaning white gunnel as Korean name of this unrecorded species.

Introduction

Many kinds of blennies distribute in Korean waters, and *Enedrias* genus is the largest fish group among them. Though this genus is the most abundant and exploited among Korean blennies, very few researches have been carried out up to now.

Concerning the taxonomical studies on *Enedrias* since Jordan and Snyder (1902), many investigations (Wang and Wang, 1935; Matsubara, 1955; Makushok, 1958; Yatsu, 1980, 1981) have been recorded. These studies were however limited to Japan and its adjacent waters.

Three species of *Enedrias*: *E. nebulosus*, *E. crassispina* and *E. fangi*, have been known up to the present, but it seems that the taxonomical position of these species is still under confusion by the authors. While only one species, *E. nebulosus*, has been recorded in Korean fishes fauna (Chyung, 1977), two *Enedrias* species are found in Korean coastal waters during the

present study period. Thus, the differences of external morphology between two species are examined and compared.

Materials and Methods

Samples were directly collected from the commercial vessels in two regions. Thirty two specimens of *E. nebulosus* were caught on June 19, 1982 in Pusan adjacent waters by bottom trawl, and fifty individuals of *E. fangi* were sampled on November 8, 1982 in Kyungki bay in the Yellow Sea by stow net.

All samples are examined on meristic character, proportional body length and external form, e.g., color pattern and caudal fin form. The method of measurement was generally followed by Yatsu (1981). The measurement is made with sharp divider to 0.1 millimeter and defined as follows: total length, distance from the tip of the snout to the end of the caudal fin; standard length, from the tip of the snout to the end of the vertebral column; pre-anal length, from the

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Table 1. Comparison of the results of meristic character and measurement of the present study with those of Yatsu (1981)

Analysis	Present study						Yatsu(1981)			
	<i>E. fangi</i>			<i>E. nebulosus</i>			<i>E. nebulosus</i>			
	Range	$\bar{M} \pm S.D$	Range	$\bar{M} \pm S.D$	Range	$\bar{M} \pm S.D$	Range	$\bar{M} \pm S.D$	Range	
Material examined										
Collection locality		Kyungki bay		Pusan adjacent waters		China sea, Pusan		Japan waters		
Number of samples	50		32		8		42			
Length distribution (SL, mm)	98.0-127.5	112.2±6.7	146.0-209.0	169.4±13.3	126.8-155.7		116.8-290.2			
Meristic character										
DF	LXXI-LXXXVIII	LXXX±2.8	LXXIII-LXXXI	LXXVIII±1.9	LXXVII-LXXXI		LXXVI-LXXXIII			
AF	II-III, 37-48	43.3±1.7	II, 32-40	36.9±1.7	II, 40-45		II-III, 35-42			
CF	17-25	21.6±1.8	18-23	20.4±1.4	23-27		22-25			
Measurement(%)										
PAL/SL	45.9-55.4	50.6±1.6	51.4-56.3	53.0±8.8	50.2-53.9		51.9±1.3		52.2-67.1	55.4±2.6
BD/SL	9.2-12.5	10.8±0.8	13.1-15.3	14.0±0.6	12.5-13.2		12.9±0.2		11.2-15.3	13.2±0.9
HL/SL	11.8-14.5	13.3±0.9	10.7-13.3	11.8±0.5	12.2-14.1		13.2±0.7		10.7-14.0	11.8±0.7
ED/HL	22.2-38.1	26.8±2.4	15.1-19.2	17.2±1.2	18.1-23.5		21.2±1.8		14.1-19.2	17.3±1.4
PFL/HL	61.3-100.0	72.3±6.6	41.5-68.6	51.8±7.0	58.4-63.6		60.1±2.5		39.6-53.9	48.0±3.2
CFL/HL	63.5-98.0	75.0±5.4	57.1-73.0	61.7±4.2	56.7-66.5		62.3±2.9		51.3-69.5	61.8±4.7
CFH/CFL	30.4-53.9	46.2±4.2	56.5-91.3	73.5±7.8						
ED/BD	25.0-38.2	33.1±2.7	12.5-16.2	14.5±1.2						

\bar{M} , mean; S.D, standard deviation; DF, dorsal fin; AF, anal fin; CF, caudal fin; SL, standard length; PAL, pre-anal length; BD, body depth; HL, head length; ED, eye diameter; HL, head length; PFL, pectoral fin length; CFL, caudal fin length; CFH, caudal fin height

tip of the snout to the center of anus; head length, from the tip of the snout to the end of opacle; body depth, vertical distance from the center of anus to the dorsal fin; eye diameter, horizontal diameter of fleshy rim of the orbit; pectoral fin length, from the base to the end of pectoral fin; caudal fin length, from the caudal flexure to its posterior tip; caudal fin height, vertical distance between upper and lower caudal flexure. Each proportional body size is expressed in % to the standard length, head length, etc.

The meristic count is made on dorsal, anal and caudal fin. The external body form is observed from the samples stored in 10% neutral formalin.

Results and Discussion

The standard length distribution of samples analysed in this study varies from 98.0 mm to 127.5 mm (mean, 112.2 mm) for *E. fangi* and from 146.0 mm to 209.0 mm (mean, 169.4 mm) for *E. nebulosus*. The results expressed in % are shown on table 1.

With regard to meristic character two *Enedrias* species have similar results on the number of fin rays of dorsal and caudal fin. However, the numbers of strong spines and soft rays between two species are fairly different. Though all specimens of *E. nebulosus* have 2 strong spines on anal fin, one individual among 50 specimens of *E. fangi* has 3 strong spines. This observation is contrary with the result of Yatsu (1981) who has found 3 strong spines in the proportion of one to a forty specimens for *E. nebulosus*. In the case of soft rays of anal fin, *E. fangi* has more ones than the another species.

Concerning the proportional body measurement, *E. fangi* has clearly larger head, eye, pectoral fin and caudal fin than *E. nebulosus*. In contrary, body depth and pre-anal length of *E. nebulosus* are distinctly larger than those of *E. fangi*. On the proportion of the depth of caudal peduncle to caudal fin length, *E. fangi* is smaller than that of *E. nebulosus*.

With respect to body color, *E. fangi* is more clear and bright than *E. nebulosus*. The former has ca. 13 'II' shaped black patterns on dorsal fin and ca. 10 vertical dark stripes on anal fin. The designs of net form with bright and yellow body background of this species are more clear and regular than those of the latter. *E. nebulosus* has ca. 13 black triangular blotches on dorsal fin. Though the blotches in posterior part of body are equilateral triangle, those in anterior part are more or less irregular. This species has also the irregular mottled spots with blackish or brownish on body.

On the other hand, the caudal fins of two species are distinctly different. While *E. fangi* has transparent or white truncate form, that of *E. nebulosus* is round one with transparent margin. The proportion of this transparent margin to caudal fin length is ca. 20%.

Comparing the results of measurement and meristic character with those of Yatsu (1981), they are moderately similar (Table 1). A little difference between two results could be explained by the different sampling number and collection locality.

From the standpoint of stock size of two *Enedrias* species in Korean waters, it seems that *E. fangi* is more abundant than *E. nebulosus*, and the former and the latter seem to be more abundant in the Yellow Sea and the southern waters of Korea, respectively (personal opinion of authors).

Taking into consideration the Korean name of *E. nebulosus*, 'bedorachi', and more clear and bright body of *E. fangi* as compared with *E. nebulosus*, the authors propose 'heenbedorachi' meaning white gunnel as Korean name of *E. fangi*.

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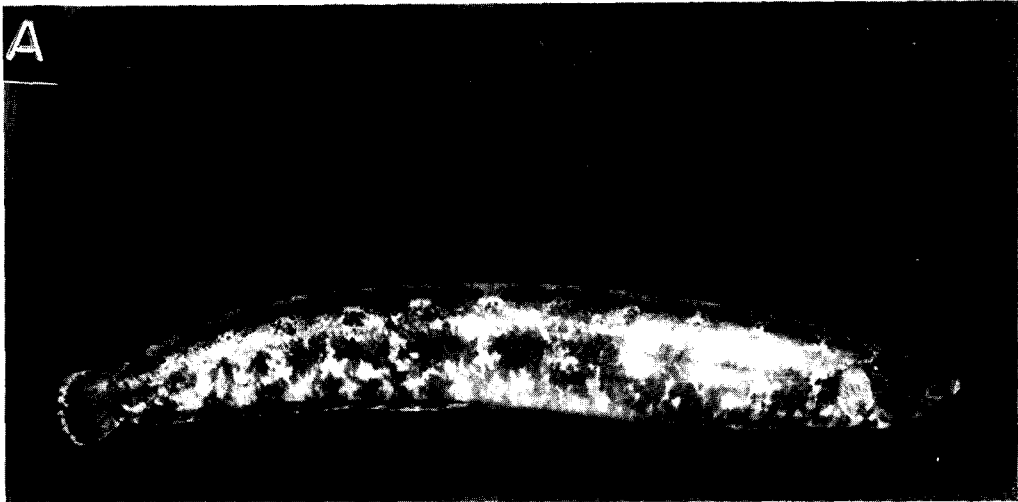


Plate I.

A: *Enedrias nebulosus* collected in Pusan (total length, 18.5 cm)

B: *Enedrias fangi* collected at Banwol in Kyungki bay (total length, 11.5 cm)

韓國産 *Enedrias nebulosus*와 *E. fangi*의 外部形態*1,*2

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韓國沿岸에는 여러 종류의 비도라치類(Blennoidea)가 分布하며 그 중 비도라치屬(*Enedrias*)은 가장 큰 무리를 형성하여 沿岸漁業資源으로서 중요한 부분을 차지하고 있다.

지금까지 한국 연안에서는 *Enedrias nebulosus*(비도라치)만이 記錄되어 있었으나 本 調査結果 *Enedrias fangi*도 分布함이 發見되었다. 따라서 이 두 種에 대한 外部形態를 調査 比較하였으며 *Enedrias fangi*의 韓國名을 ‘흰비도라치’로 提唱하는 바다.