

Description of the Post Larva of Star Pipefish, *Halicampus punctatus* (Syngnathidae, Gasterosteiformes) First Found in the Southwestern East Sea, Korea

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Abstract – Larval specimens of *Halicampus punctatus* were collected off Ulsan and Uljin in December 2002 (three specimens) and off Ulsan in December 2003 (one specimen). These specimens are characterized by the following morphological characteristics: rings, 14 + 35 = 49; subdorsal rings, 1 + 3 = 4; dorsal fin rays, 19 – 20; pectoral fin rays, 14 – 15; anal fin rays, 9; head length (HL), 5.8 – 6.7 in the standard length; snout length, 1.9 in HL; snout depth, 3.7 – 5.2 in snout length. The number of caudal fin rays 9 is less than those of the other species in the same genus 10. Wide stripe bands composed of small pigments are shown in the trunk and the tail. Melanophores are not found in the dorsal fin, the pectoral fin, and the anal fin except the caudal fin. The supraoccipital crest is on the head. The frontal ridge is on the dorsal side of front trunk. The blanched ridges on the opercular are fused with a main ridge like a tree branch. A few branched ridges that are small and narrow on the trunk and the tail are fused with the main ridges. We report these specimens as the first record in Korea and name them ‘Byeol-sil-go-ki’¹⁾ in Korean.

Key words – Syngnathidae, *Halicampus punctatus*, first Korean record

1. Introduction

There are 215 species in 52 genera of Syngnathidae around the world (Nelson 1994). Members of this family live from boreal regions to southern cold waters and are abundant in the subtropical/tropical areas (Dawson and

Allen 1978; Dawson *et al.* 1979). Syngnathidae are classified into genera and species based on characteristics such as the configuration of principal body ridges, the presence or absence of the dorsal, pectoral, anal, and caudal fins, the count of body and subdorsal rings, the presence, degree of development or absence of some head ridges and/or dermal flaps, and the snout length ratio etc. (Dawson 1986). Until now, eleven species in six genera of the family syngnathidae have been reported in Korea (Yi *et al.* 2000; Kim *et al.* 2005).

We collected the larval specimens of *Halicampus punctatus* (Kamohara 1952) from the southwestern East Sea, for the first time in Korea. These specimens agree closely with the description of the holotype of *H. punctatus* (Kamohara 1952; Takata and Sasaki 2001), which is characterized by no dermal flaps, the snout length longer than the distance between the posterior margin of the eye and the middle of the pectoral fin base, the tail excluding the caudal fin longer than the trunk, the inferior trunk and tail ridges not continuous, and the superior trunk and tail ridges not continuous. In addition, the characteristics such as the subdorsal rings below the dorsal fin base humped, and the dorsal, pectoral, anal, and caudal fin rays agree with the descriptions of *H. punctatus* by Kamohara (1952) and Takata and Sasaki (2001). Therefore, we identify the larval specimens to be *H. punctatus* (Kamohara 1952). The specimens are deposited in the Korea Ocean Research and Development Institute (KORDI), Korea (KILAB 00118, 00119, 00120, 00121).

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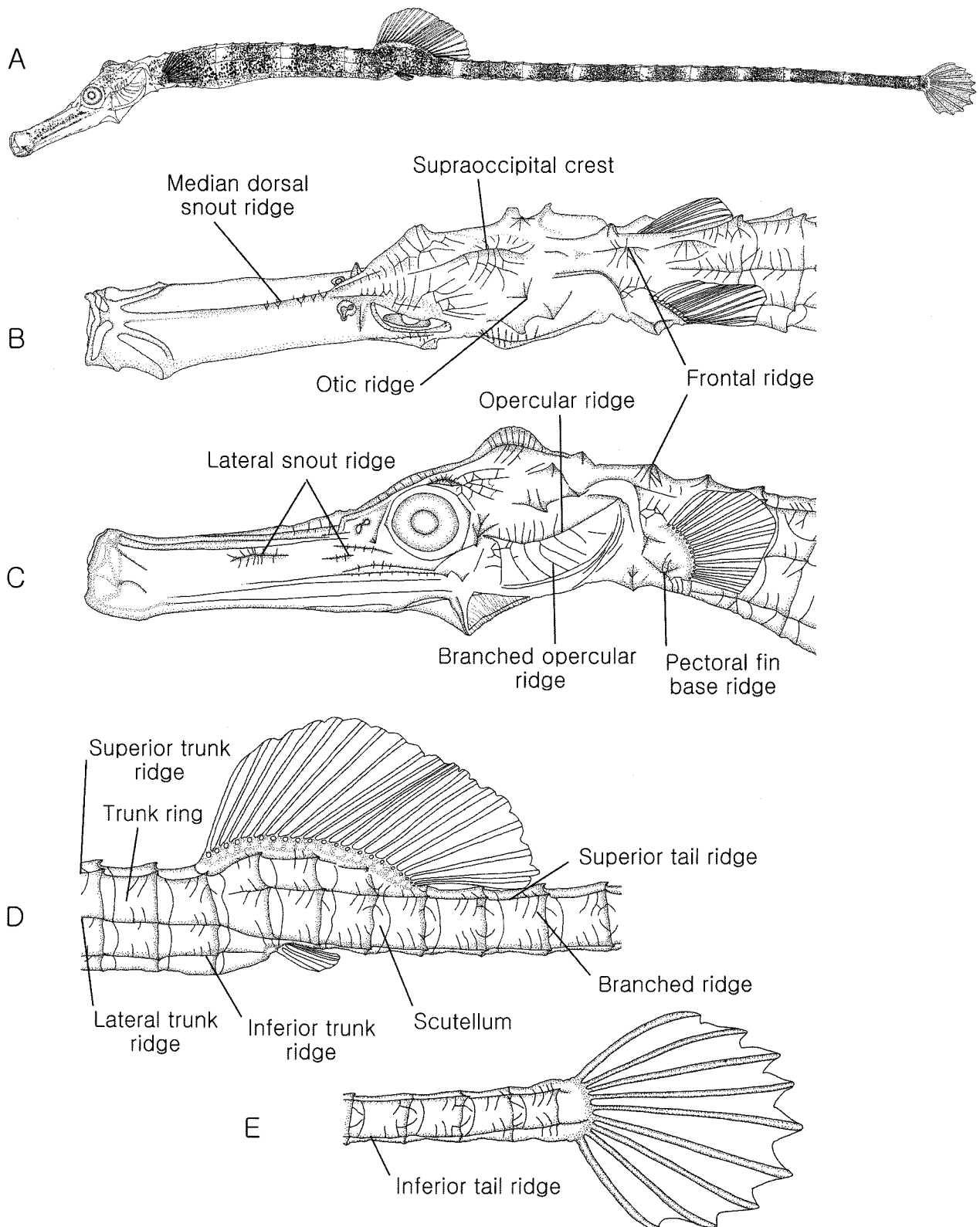


Fig. 1. *Halicampus punctatus* from the southwestern East Sea, Korea: KILAB 00119. A, The pigmentation pattern in the lateral aspect; B, Dorsal aspect of the head and the trunk; C, Lateral aspect of the head and the trunk; D, Lateral aspect of the body with the dorsal and the anal fins; E, Lateral aspect of posterior the tail with the caudal fin.

Table 1. The counts and measurements of *Halicampus punctatus*

	Holotype*	Non-holotype**	This study (4***)
Rings	14 + 35 = 49	14 + 33-35 = 47-49	14 + 34-35 = 48-49
Subdorsal rings	0.25 + 3.5 = 3.75	0.75-1.24 + 2.25-3 = 3.5-4	1 + 3 = 4
Dorsal fin rays	20	20-21	19-20
Pectoral fin rays	14	14-15, usually 14	14-15
Anal fin rays	4	3-4	3-4
Caudal fin rays	9	9	9
Head length in SL	8.3	7.2-8.9	5.8-6.7
Snout length in HL	1.8	1.8-2.1	1.9
Snout depth in snout length	7.7	5.7-9.1	3.7-5.2
Standard length (mm)	160.9	115.4-149.9	32.6-44.4
Developing stage	Adult	Adult	Larva

HL, Head Length; SL, Standard Length

*Kamohara 1952; **Takata and Sasaki 2000; ***Number of specimens

***Halicampus punctatus* (Kamohara), 1952**

(New Korean name: Byeol-sil-go-ki)

(Fig. 1, Table 1)

Yozia punctata Kamohara 1952: 1, fig. 2 (type locality: Mimase Fish Market, Kotchi City, Shikoku, Japan)*Trachyrhamphus punctatus*: Matsubara 1955: 428 (new generic assignment)*Halicampus punctatus*: Araga 1984: 87, pl. 76-Q (Japan)**2. Materials Examined**

The surveys were carried out with the Research Vessel Onuri, and Eardo of KORDI in the southwestern East Sea, Korea. The samples were collected with the Isaacs Kidd midwater trawl (IKMT; 8.76 m² mouth area with 0.417 mm mesh size) off Uljin (35°30'N, 129°42'E; one specimen) and Ulsan (35°18'N, 129°43'N; 35°11'N, 129°53'E; two specimens) in December 3 and 4 2002 and off Ulsan (35°13'N, 129°36'E; one specimen) in December 3 2003. The IKMT was towed obliquely from the surface to the depth of 300 m for circa 20 minutes. These samples were preserved in a neutralized formalin solution (7%) on the vessel and then transported to the laboratory. After examination of their morphological characteristics, the specimens were preserved in ethyl alcohol (95%).

3. Description

The general morphology and pigmentation pattern is shown in Fig. 1A. The larval specimens are extremely slender.

The head is small and the snout is very elongated. The body is pigmented with 13 broad stripe bands. Each of the stripe bands are to be found every three to four body rings. Small melanophores are lightly distributed on the dorsal side of the head and the snout. No melanophores are developed on the pectoral, dorsal, and anal fins except the caudal fin which is pigmented lightly.

These specimens are characterized by the following morphological characteristics: rings, 14 + 35 = 49; subdorsal rings, 1 + 3 = 4; dorsal fin rays, 19 – 20; pectoral fin rays, 14 – 15; anal fin rays, 9; head length (HL), 5.8 – 6.7 in the standard length; snout length, 1.9 in HL; snout depth, 3.7 – 5.2 in the snout length (Table 1).

A median middle snout ridge that is serrated weakly is very low and is separated into two ridges in front of the nose, which expand to the anterior eyes. In the lateral snout and below the eye, a few ridges are very low and slightly notched. The dorsal rim of the orbital is slightly elevated laterally. One crest is in the supraoccipital region which is slightly elevated upward and weakly serrated. The frontal ridge is on the dorsal of the front trunk, which is located behind the supraoccipital crest and composed of three segments. The opercular ridges are low and fused with the middle ridge. The middle ridge is angled dorsally and extends close to the gill opening. The three otic ridges are slightly high in the height and short in the length. The two ridges of the pectoral fin base are slightly elevated laterally. The ventral ridge is longer and more distinct than its upper ridge (Fig. 1B, C).

The superior trunk and tail ridges are disconnected

below the dorsal fin base. The lateral trunk ridge is bended down on the subdorsal rings. The lateral trunk ridges are fused with the inferior tail ridge under the dorsal fin. The superior tail ridge is present. The inferior trunk ridge ends at the anal ring. All main ridges on the trunk and the tail are fused with a few branched ridges which are small and narrow. The scutea separating all body and trunk ridges are well developed (Fig. 1D, E).

4. Discussion

These specimens are easily distinguished from the genus of *Maroubra*, *Syngnathus*, *Cosmocampus*, *Hippichthys*, *Corythoichthys*, *Trachyrhamphus*, *Microphis*, *Doryrhamphus*, and *Micrognathus* in the family syngnathidae based on the morphological characteristics such as the ratio of the trunk length to the tail length, the ratio of the snout length to between the posterior margin of the eye and the middle of the pectoral fin base, the absence or presence of the ridge in the dorsal ridge, the number of dorsal fin rays, the subdorsal rings, the body rings and so on (Senou 2002). In the genus *Halicampus*, the ten caudal fin rays is one of the common characteristics to identify the genus from the other genera (Dawson 1985; Senou 2002). But the species, *H. punctatus* are all characterized by the nine caudal fin rays (the holotype, 16 nonholotypes and our specimens: Takata and Sasaki 2001; Table 1). This characteristic is an important key to differentiate this species from the other species in the genus *Halicampus*.

Most of the counts and measurements in the larval specimens are identical to those of the holotype and nonholotype specimens of *H. punctatus*. These characteristics include the number of body rings, the number of subdorsal rings, the number of dorsal, pectoral, anal, and caudal fin rays, and the snout length in the head length (Table 1). But there are a few differences in the measurements between the our larval specimens and the adult specimens of the holotype and nonholotypes in *H. punctatus*, which include the presence otic ridges, the branched ridges in the opercular, trunk, and tail, the head length ratio in the standard length, the snout depth ratio in the snout length, and the pattern of pigmentation (Fig. 1; Table 1).

During development from the larva to the adult, the following changes seem to occur in *H. punctatus*. The otic ridges, the branched small and low ridges on the opercular, trunk, and tail in the larval stage disappear in

the adult stage. The head length in the standard length and the snout depth in the snout length of larval specimens become longer in the adult stage. But the inverted “U-shaped” dark marks on each ring of the trunk in the adult stage (Takata and Sasaki 2001) are not present in the larval stage (Fig. 1).

In the southwestern East Sea, *H. punctatus* larvae are sampled off Ulsan and Uljin of Korea with the IKMT, which are the first records in Korea. Until now, this species have been known to be distributed off Japan which includes Tosa Bay (Takata and Sasaki 2001), Seto Inland Sea (Mizokami 1963), the province of Echigo including Sado Island (Honma 1959) and Okinawa Island (Dawson 1985). But Takata and Sasaki (2001) think that the Okinawa Island specimens labeled on Haneji River specimens are questionable because of the absence of additional records from that region (either marine or freshwater). The province of Echigo including Sado Island is located in the mid eastern part of the East Sea, where adult specimens of *H. punctatus* have appeared (Honma 1959). The sampling sites for the larvae of *H. punctatus* in the present study are close by each other in the southwestern East Sea; and also, the specimens appeared twice. Based on the collecting information on the larval and adult specimens in the East Sea, we suppose that the adult of *H. punctatus* will be found in the southern East Sea, Korea.

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References

- Araga, C. 1984. Family Syngnathidae. p. 84-89. In: *The fishes of the Japanese Archipelago*, eds. by H. Masuda, K. Amaoka, C. Araga, T. Uyeno, and T. Yoshino. Tokai Univ. Press, Tokyo.
- Dawson, C.E. 1985. Indo-Pacific pipefishes (Red Sea to the Americas). Gulf Coast Research Laboratory, Ocean Springs, Mississippi. 230 p.
- Dawson, C.E. 1986. Syngnathidae, seahorses and pipefishes. p.

- 445-458. In: *Smiths' Sea Fishes*. ed. by M.M. Smith, and P.C. Heemstra. Springer-Verlag, New York.
- Dawson, C.E. and G.R. Allen. 1978. Synopsis of the "finless" pipefish genera (*Penetopteryx*, *Apterygocampus* and *Enchelyocampus* gen nov). *Rec. W. Aust. Mus.*, **6**(4), 319-411, 7 figs.
- Dawson, C.E., F. Yasuda, and C. Imai. 1979. Elongate dermal appendages in species of *Yozia* (Syngnathidae) with remarks on *Trachyrhamphus*. *Japanese J. Ichthyol.*, **25**(4), 244-250.
- Honma, Y. 1959. Further additions to "A list of the fishes collected in the Province of Echigo, including Sado Island" (VI). *Japanese J. Ichthyol.*, **7**, 139-144.
- Kamohara, T. 1952. Additions to the offshore bottomfishes of Prov. Tosa, Japan, with descriptions of two new species. *Res. Rep. Kochi Univ.*, **1**, 1-3.
- Kim, I.S., Y. Choi, C.L. Lee, Y.J. Lee, B.J. Kim, and J.H. Kim. 2005. Illustrated book of Korean Fishes. Kyo-Hak Publishing Co. 615 p.
- Matsubara, K. 1955. Fish morphology and hierarchy. Vol. 1-3. Ishizaki Shoten, Tokyo. 1605 p. + 135 pls. (in Japanese)
- Mizokami, A. 1963. On the pipefish, *Trachyrhamphus punctatus* (Kamohara), new to the fish-fauna of the Inland Sea of Seto. *Japanese J. Ichthyol.*, **10**, 28-30. (in Japanese)
- Nelson, J.S. 1994. *Fishes of the World*. 3rd ed. John Wiley and Sons, Toronto. 600 p.
- Senou, H. 2002. Syngnathidae, pipefishes and seahorses. p. 520-536, 1506-1510. In: *Fishes of Japan with Pictorial Keys to the Species*. ed. by T. Nakabo. Tokai Univ. Press, Tokyo.
- Takata, Y. and K. Sasaki. 2001. A Japanese pipefish, *Halicampus punctatus* (Kamohara): redescription and biological notes (Syngnathidae, Gasterosteiformes). *Ichthyol. Res.*, **48**, 315-318.
- Yi, S.K., Y.U. Kim, J.G. Myoung, and J.M. Kim. 2000. Dictionary of Korean Fish Names. KORDI. 222 p.