

# First Record of the Beady Pipefish, *Hippichthys penicillus* (Gasterosteiformes: Syngnathidae) from Namhaedo Island, Korea

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**ABSTRACT** The Indo-West Pacific pipefish, *Hippichthys penicillus* was newly recorded from Korean waters based on a single specimen (124.5 mm SL) collected from a lower reach of creek of the Namhaedo Island flowing into Dongdae Bay. It is separable from congeners in having a longer snout and unique configuration of principle body ridges including discontinuous superior trunk and tail ridges and straight lateral trunk ridge ending near anus. A new Korean name, “Huin-jeom-sil-go-gi”, is proposed for the species.

**Key words:** Syngnathidae, *Hippichthys penicillus*, first record, pipefish, Namhaedo Island

## INTRODUCTION

Dawson (1978, 1985) reviewed the pipefish genus *Hippichthys* Bleeker, 1849 and recognized five valid species from Indo-Pacific as follows: *H. spicifer* (Ruppell, 1838); *H. heptagonus* Bleeker, 1849; *H. cyanospilus* (Bleeker, 1854); *H. penicillus* (Cantor, 1849); *H. parvicarinatus* (Dawson, 1978). Subsequently, *H. albomaculosus* was added into the genus by Jenkins and Mailautoka (2010) as a new species from Fiji. Thus, up to date totally six species have been regarded as valid from the tropical Indo-West Pacific (Dawson, 1985; Kuitert, 2009; Jenkins and Mailautoka, 2010). According to Dawson (1985), the genus is distinctive from other pipefish genera in having the following combination of characters: 45~57 total rings with 12~17 trunk rings; 20~31 dorsal fin rays; discontinuous superior trunk and tail ridges; straight or ventrally deflected lateral trunk ridge near anal ring; confluent inferior trunk and tail ridges.

During an ichthyofaunal survey of Hallyeohaesang National Park, Korea, in May 2020, a single specimen of the genus *Hippichthys* was collected from a lower reach

of creek affected by tides in Namhaedo Island, located in Gyeongsangnamdo Province, Korea. It is identified as *H. penicillus* based on the diagnostics given by Dawson (1985) such as counts of all fin rays and bony rings encasing the body, and the distinctive pattern of principal body ridge.

It has been known that *H. penicillus* distributed in western Arabian Gulf, north central Indian Ocean, and eastward to Japan and Australia (Dawson, 1985; Kuitert, 2009). However, no formal report has been made in Korean waters to date, although Kim and Park (2002) presented erroneously a photograph of *H. penicillus* under the name of *Syngnathus schlegeli*.

## MATERIALS AND METHODS

Counts and proportional measurements followed those of Dawson (1977, 1985) and Matsunuma (2017). Anatomical terminology for principal body ridges was followed those of Dawson (1985). Head and standard lengths are abbreviated HL and SL, respectively. Curatorial procedures for the specimen followed Motomura and Ishikawa (2013). The specimen examined in the present study is deposited in the Marine Research Center, Korea National Park Service (KNPS).

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## TAXONOMIC ACCOUNTS

### Genus *Hippichthys* Bleeker, 1849

(New Korean name: Huin-jeom-sil-go-gi-sog)

*Hippichthys* Bleeker, 1849: 15 (type species: *Hippichthys heptagonus* Bleeker, 1849).

*Parasyngnathus* (as subgenus of *Syngnathus*) Duncker, 1915: 79 (type species: *Syngnathus argyrostictus* Kaup, 1856).

Superior trunk and tail ridges discontinuous; lateral trunk ridge straight or deflected ventrally at anal ring; inferior trunk and tail ridges continuous; median dorsal snout ridge low; dorsal fin rays 20~31; pectoral fin rays 13~18; anal fin rays 2~3; caudal fin rays 10; trunk rings 12~17; total rings 45~57; total subdorsal rings 4.25~7.25 (Dawson, 1985).

### *Hippichthys penicillus* (Cantor, 1849)

(New Korean name: Huin-jeom-sil-go-gi)

(Figs. 1, 2; Table 1)

*Syngnathus penicillus* Cantor, 1849: 1368 (type locality: Sea of Pinang, Malaya).

*Parasyngnathus penicillus*: Dawson, 1984: 75, fig. 6, pl. 1 (Arabian Gulf, Kuwait; Saudi Arabia; Gulf of Cutch, India; Andaman Sea and Gulf of Siam, Thailand; Borneo and Java, Indonesia; Philippines; Shanghai, China; Tanegashima, Kyushu, and Honshu Isl., Japan; Papua New Guinea; Australia).

*Parasyngnathus argyrostictus* (non Kaup): Dawson, 1981: 90, figs. 3, 4 (Percian Gulf); Araga, 1984: 86, pl. 76-I (Japan).

*Syngnathus schlegeli* (non Kaup): Kim and Park, 2002: 316, unnumbered fig. (in part, Korea).

*Hippichthys penicillus*: Dawson, 1985: 100, fig. 152 (based in part on *Parasyngnathus penicillus* of Dawson, 1984); Sato *et al.*, 2005: 27, fig. 1 (Urado Estuary, Kochi Prefecture, Japan); Kuitert, 2009: 278, unnumbered fig. (Moreton Bay, Australia; Kamo River, Kii peninsula, Ja-

pan); Senou, 2013: 621 (key to species, Japan); Nakae *et al.*, 2018: 205 (Amami-oshima Isl., Japan); Matsunuma *et al.*, 2019: 39 (Kyoto Prefecture, Japan); Soniyama *et al.*, 2020: 36 (Yamaguchi Prefecture, Japan).

**Material examined.** KNPS-P900, 124.5 mm SL, Seolcheon-myeon, Namhae-gun, Gyeongsangnam-do, Korea (34°55'56.60"N, 127°55'21.30"E), 24 May 2020, collected by H. G. Cho, hand net.

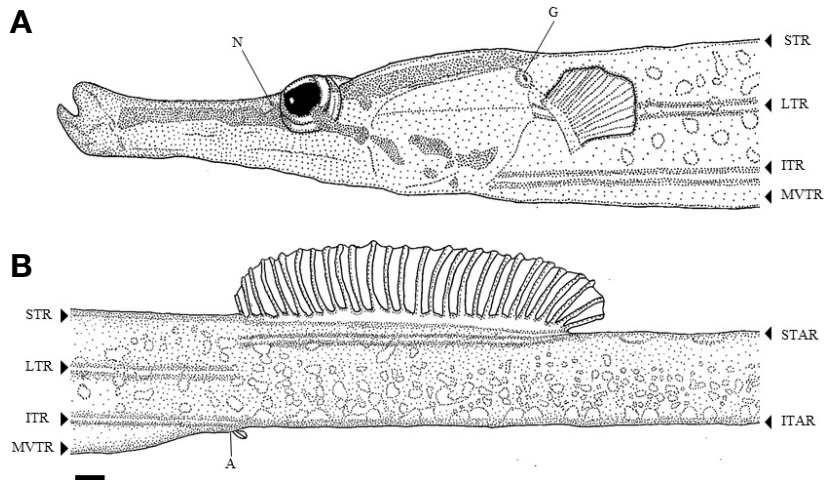
**Diagnosis.** A species of *Hippichthys* with straight lateral trunk ridge, ending near anal ring; snout length 1.5~2.2 in HL; dorsal fin rays 23~31; pectoral fin rays 14~18; anal fin rays 2~3; caudal fin rays 10; trunk rings 15~17; tail rings 35~42; total rings 50~58; total subdorsal rings 5.0~7.25 (Dawson, 1985).

**Description.** Dorsal fin rays 28; pectoral fin rays 15; anal fin rays 2; caudal fin rays 10; trunk rings 15; tail rings 39; total rings 54; total subdorsal rings 6.5. Proportion as % SL: trunk length 40.7; tail length 57.9; head length 12.8; body depth 4.3; snout length 6.0; trunk depth 4.5; anal ring depth 3.9; length of dorsal fin base 10.1; length of pectoral fin 1.9; length of pectoral fin base 1.4; orbital diameter 1.6; snout depth 1.4.

See Fig. 1 for general morphology and coloration when fresh and Fig. 2 for ridge condition. Body extremely elongate, covered with bony plates without spines and dermal flaps; principle body ridges distinct, not clearly elevated; trunk shorter than tail; 1st trunk ring bearing pectoral fin base. Origin of dorsal fin on nearly middle of between last trunk ring and 1st tail ring. Head small; snout somewhat long, its length 2.1 in HL. Median dorsal snout ridge low, continuous, extending posteriorly just in front of posterior margin of orbit without distinct serrations; lateral snout ridge, short. Interorbital narrow, depressed; supraorbital and supraopercular ridges, weakly elevated dorsally. Straight longitudinal opercular ridge, complete on nearly middle of opercle. Pectoral fin base protruding laterally, with two longitudinal ridges. Superior trunk and tail ridges discontinuous below hind of dorsal fin base. Lateral trunk and tail ridges discontinuous; posterior of lateral trunk ridge straight, ending near origin of dorsal fin. Inferior trunk and



Fig. 1. *Hippichthys penicillus*, KNPS-P900, 120.5 mm SL, female, from Namhaedo Island, Korea.



**Fig. 2.** Lateral views of head **A** and middle part of body **B** in *Hippichthys penicillus*, KNPS-P900, 120.5 mm SL, female, from Namhaedo Island, Korea. A: anus; G: gill opening; N: naris; ITAR: inferior tail ridge; ITR: inferior trunk ridge; LTR: lateral trunk ridge; MVTR: median ventral trunk ridge; STAR: superior tail ridge; STR: superior trunk ridge. Bar indicates 1 mm.

**Table 1.** Comparison of diagnostic characters of *Hippichthys penicillus* between the present study and previous works

	<i>Hippichthys penicillus</i>			
	Present study (n = 1)	Dawon (1984, 1985)* (n = 130)	Senou (2013)	Matsunuma <i>et al.</i> (2019) (n = 4)
Standard length (mm)	124.5	48~172	–	125.4~144.5
Dorsal fin rays	28	23~31	23~31	26~28
Pectoral fin rays	15	14~18	14~18	14~16
Anal fin rays	2	2~3	2~3	3
Caudal fin rays	10	10	10	10
Trunk rings	15	15~17	15~17	16
Tail rings	39	35~41	35~41	41~42
Total rings	54	50~57	–	57~58
Total subdorsal rings	6.5	5.0~7.25	–	5.5~6.5
In SL				
Trunk length	2.5	–	–	–
Tail length	1.4	–	–	–
Head length	7.8	5.6~8.0	–	7.3~8.8**
Body depth	23.5	–	–	19.3~23.8**
In HL				
Snout length	2.1	1.5~2.2	–	1.9~2.1**
Trunk depth	2.8	2.4~4.1	–	2.9~3.3**
Anal ring depth	3.8	3.7~6.2	–	–
Dorsal fin base length	1.3	1.3~2.0	–	1.3**
Pectoral fin length	6.6	6.4~9.5	–	5.4~6.2**
Pectoral fin base length	8.8	–	–	8.7~8.9**
Orbit diameter	5.5	–	–	–
In Snout length				
Snout depth	3.3	3.3~7.8	–	4.3~4.4**

\* including holotype (BMNH 1860.3.19.526) of *Syngnathus penicillus*.

\*\* recalculated from original data.

tail ridges confluent; median ventral trunk ridge prominent. Pectoral fin rounded. Anal fin small just behind anus. Caudal fin small, rounded.

**Coloration when fresh.** Head greenish brown dorsally, silvery white laterally, and yellowish green ventrally with a single dark lateral stripe from snout to superior supraopercular region, passing eye; ventral half of operculum with several brown markings. Ground color of body greenish brown with many dark edged white spots. Trunk yellowish green laterally and yellow ventrally. Tail reddish brown posteriorly; semicircular blotches on inferior tail ridges. Dorsal, anal, pectoral fins translucent. Caudal fin dark brown with white margin.

**Ecological notes.** The present specimen was collected from depths of less than 0.5 m in lower reach of creek where boulders and pebbles are sedimented over sandy mud bottom.

**Distribution.** Known from the Indo-West Pacific: Kuwait, Saudi Arabia, Australia, Korea, and Japan (Dawson, 1985; Kuitert, 2009; present study).

**Remarks.** Morphological characters of the present specimen were agreed well with those of *Hippichthys penicillus* defined by Dawson (1985), Senou (2013), and Matsunuma *et al.* (2019) in having the following characters: principle body ridges distinct, not clearly elevated; superior trunk and tail ridges discontinuous; posterior of lateral trunk ridge straight, ending near anal ring; inferior trunk ridge confluent with inferior tail ridge; median dorsal snout ridge low; 28 dorsal fin rays; 15 pectoral fin rays; 2 anal fin rays; 10 caudal fin rays; 15 trunk rings; 39 tail rings (Table 1; Fig. 2).

*Hippichthys penicillus* is not likely to be confused with all other Indo-Pacific congeners due to its unique configuration of principle body ridges (Fig. 2), except for *H. parivicarinatus* known as endemic species of Australia. Additionally, the former can be easily distinguished from the latter by having its relatively longer snout and lower snout depth [1.5~2.2 in HL and 3.3~7.8 in snout length, for *H. penicillus* (Dawson, 1985; this study) vs. 3.0~3.3, 1.5~1.9, respectively, for *H. parivicarinatus* (Dawson, 1985)].

The photograph under the name of *Syngnathus schlegeli* Kaup, 1856 presented by Kim and Park (2002) is referable to *H. penicillus* based on its unique body coloration and shorter body and snout. However, their description was partially agree with the general characters of *S. schlegeli* such as the number of fin ray and extremely long snout, except for color pattern of *H. penicillus* with white spots on body. Thus, the present specimen examined during this study is the first formal record of *H. penicillus* from Korean waters.

*H. penicillus* mainly inhabits estuaries in mangroves and seagrasses and enters lower reaches of streams and rivers affected by tides (Kuitert, 2009). In this study, the species was also found at the lower reach of a small stream affected by tide. Because the occurrence of *H. penicillus* was already known by Kim and Park (2002) prior to the present study, an intensive survey focused on the preferable habitats mentioned above will be shown the distributional range of the species more wider in Korea.

A new Korean name, “Huin-jeom-sil-go-gi”, meaning the having “white spot” (=Huin-jeom) is proposed for *H. penicillus*.

## ACKNOWLEDGEMENTS

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# 우리나라 남해도에서 채집된 실고기과 한국 첫기록종, *Hippichthys penicillus*

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**요 약** : 인도-서태평양산 실고기, *Hippichthys penicillus* 1개체 (표준체장 124.5 mm)가 우리나라 남해도의 동대만으로 유입되는 소하천 하구에서 처음 출현하였다. 본 종은 주둥이가 비교적 길며, 직선형의 몸통 측면 용기선이 꼬리 용기선과 연결되지 않고 항문 앞에서 끊기는 점 등에서 같은 속의 다른 종들과 구별된다. 본종의 신한국명으로 ‘흰점실고기’를 제안한다.

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**찾아보기 낱말** : 실고기과, *Hippichthys penicillus*, 첫기록, 실고기, 남해도