

First Reliable Record of the Yellow-dotted Butterflyfish, *Chaetodon selene* (Perciformes: Chaetodontidae) from Jwasarido Island, Korea

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ABSTRACT The Yellow-dotted butterflyfish, *Chaetodon selene* is newly reported from Korea based on a single juvenile specimen (28.6 mm SL) collected from rocky reef of the Jwasarido Island, southern Korea. The present specimen represents the first reliable record of *C. selene* from Korea supported by a voucher specimen. The specimen is characterized by having 12 spines of dorsal fin, and a dark lunate-shaped marking on posterior half of body as well as a vertical black bar crossing eye. A new Korean name, “No-rang-jeom-na-bi-go-gi”, is adopted for the species.

Key words: Chaetodontidae, *Chaetodon selene*, first record, Jwasarido Island, Korea

INTRODUCTION

The butterflyfishes (family Chaetodontidae) inhabit typically coral reef or rocky bottom at depths of less than 20 m, and occur in tropical and subtropical seas of the Indo-West Pacific (Allen, 1980; Burgess, 2003). The genus *Chaetodon* Linnaeus, 1758 is the most speciose including 87 species in the world (Fricke *et al.*, 2024) and, nine of which, *viz.*, *C. adiergastos* Seale, 1910, *C. auriga* Forsskål, 1775, *C. auripes* Jordan and Snyder, 1901, *C. lineolatus* Cuvier, 1831, *C. lunula* (Lacepède, 1802), *C. nippon* Steindachner and Döderlein, 1883, *C. speculum* Cuvier, 1831, *C. vagabundus* Linnaeus, 1758, and *C. wiebeli* Kaup, 1863, have been currently known in Korean waters (Lee and Kim, 2021; Lee *et al.*, 2021).

Species of the genus have been defined by having an incomplete lateral line ending below dorsal fin ray and X to XVI dorsal fin spines (Burgess, 1978; Allen, 1980; Heemstra, 1986).

During ichthyofaunal surveys of the Jwasarido Island in southern Korea, a single juvenile specimen of *Chaetodon* was collected from a rocky reef at a depth of 13 m and sub-

sequently identified as *Chaetodon selene* Bleeker, 1853, which is currently known from the Western Pacific Ocean from East Indies to Southern Japan (Allen, 1980). Although the species has previously been recorded from Korean waters by Myoung *et al.* (2015) based on an underwater photograph taken from the coastal waters of Jeju Island, no record of *C. selene* based on scientific specimen from Korean waters was made to date. Therefore, the present study represents the first reliable record of *C. selene* from Korea, and morphological characteristics of the species described in detail herein.

MATERIALS AND METHODS

The specimen was collected by using SCUBA gear with a hand net on July 14, 2021 in rocky reef at a depth 13 m from Jwasarido Island, Korea. The methods for taking counts and measurements were generally followed those of Hubbs *et al.* (2004) except for body depth, head length, snout length, pectoral fin length, and prepelvic fin length, which followed Burgess (1978). Counts of vertical fin rays and vertebrae were made using radiograph (Softex VIX-100, Japan). According to Burgess (1978), the last two soft rays of dorsal and anal fins when split at their base were counted as single ray and the pectoral fin elements were

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counted except the an uppermost short element. Standard length and head length were abbreviated as SL and HL, respectively. The curatorial procedures for collected specimen were followed Motomura and Ishikawa (2013). The specimen is deposited as voucher in the fish collection of Honam National Institute of Biological Resources, Korea (HNIBR-P).

TAXONOMIC ACCOUNTS

Chaetodon selene Bleeker, 1853

(New Korean name: No-rang-jeom-na-bi-go-gi)

(Fig. 1; Table 1)

Chaetodon selene Bleeker, 1853: 76 (type locality: Lawajong, Solor Island, Indonesia); Yasuda *et al.*, 1975: 97, figs. 1, 2 (Izu Peninsula, Japan); Burgess, 1978: 625, unnum. figs. (East Indies; Philippine Islands; southern Japan); Ida, 1984: 184, pl. 173-J (Sagami Bay, Japan); Steene, 1985: 42, figs. upper 57-57a (Ambon, Indonesia; Papua New Guinea); Pyle, 2001: 3250 (Indo-Malayan and western New Guinea, northward to the Ryukyu Islands); Shimada, 2013: 1000 (Japan); Myoung *et al.*, 2015: 149 unnum. fig. (Jejudo Island, Korea; underwater photograph); Chung *et al.*, 2023: 3, fig. 2f (South Ninepin Group, Hong Kong).

Material examined. HNIBR-P854, 28.2 mm SL, 13 m, Donghang-ri, Yokji-myeon, Tongyeong-si, Gyeongnam-do, Jwasarido Island, Korea, 34°33'24.34"N, 128°20'36.44"E, 14 July 2021, collected by H.G. Cho, hand net.

Diagnosis. A species of *Chaetodon* with a semilunar crescent-shaped black marking along base of dorsal fin crossing caudal peduncle, ending along base of anal fin at about its middle; a vertical dark band crossing eye; 3~4 rows of light dots ascending from upper edge of gill cover to dorsal fin base in adult; dorsal fin rays XII, 20~22; anal fin rays III, 18~19; pectoral fin rays 13~14; lateral line scales 31~36.

Description. Comparison of meristic counts are provided in Table 1. Dorsal fin rays XII 21; anal fin rays III, 18; pectoral fin rays 14; pelvic fin rays, I, 5; vertebrae 11 + 13 = 24; lateral line scales 30; scales above lateral line 5; scales below lateral line 13; gill rakers 3 + 14. Measurements in % SL: body depth 64.9; body width 20.6; head length 33.7; snout length 12.4; eye diameter 16.3; interorbital width 10.3; length of upper jaw 5.0; predorsal length 51.4; depth of caudal peduncle 11.3; length of caudal peduncle 1.6; length of spinous dorsal fin base 35.5; length of soft dorsal fin base 27.7; length of anal base 27.3; length of prepelvic fin 47.9; length of pectoral fin 25.9; length of pelvic fin 29.8; length of pelvic fin spine 19.1; length of first dorsal spine 8.9; length of second dorsal spine 16.0; length of third dorsal spine 22.7; length of fourth dorsal spine 24.8; length of first anal spine 12.8; length of second anal spine 16.7; length of third anal spine 16.0.

Measurements in % HL: eye diameter 43.2; snout length 36.8; length of upper jaw 14.7; interorbital width 30.5.

Body moderately deep, its depth 1.5 in SL, and compressed, its greatest width 3.2 in body depth. Snout slightly produced, its length 2.7 in head; dorsal contour of head from snout to nape concave, slightly convex above eye; eye diameter slightly longer than snout length, its length 2.1 in

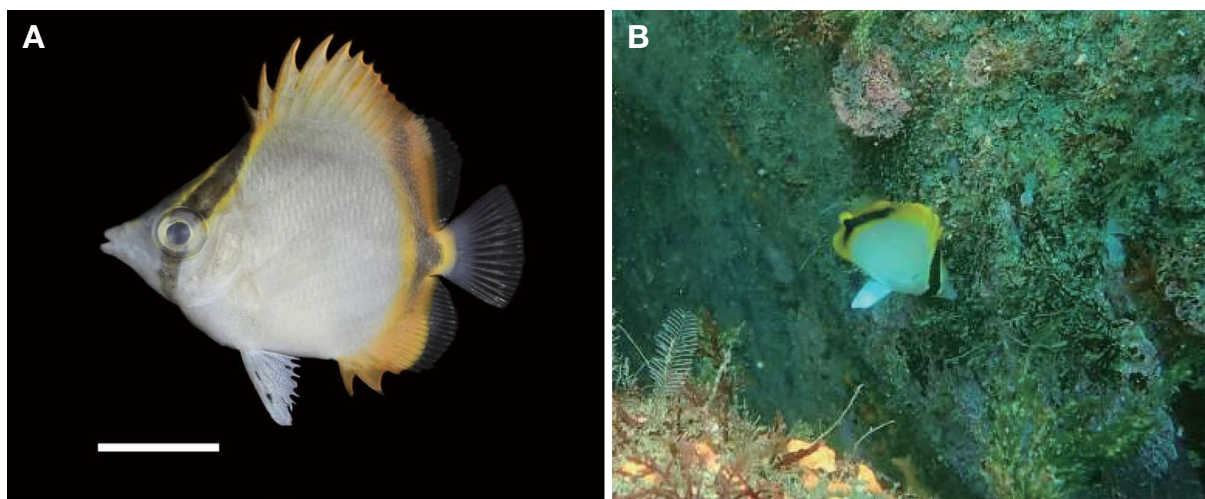


Fig. 1. (A) fresh specimen and (B) underwater photograph of *Chaetodon selene* (juvenile, HNIBR-P854, 28.2 mm SL) collected from Jawsarido Island, Korea. White bar is 10 mm.

Table 1. Comparison of diagnostic characters between *Chaetodon selene* and *C. vagabundus*

	<i>Chaetodon selene</i>				<i>Chaetodon vagabundus</i>	
	Present study	Bleeker (1853)*	Yasuda <i>et al.</i> (1975)	Burgess (1978)	Burgess (1978)	Lee and Kim (2021)
Standard length (mm)	28.2 (juvenile)	85~122 (n = 4)	49.0 (juvenile)	82~129 (n = 24)	37~121 (n = 40)	27.59 (juvenile)
Dorsal fin rays	XII, 21	XII, 22~23	XII, 21	XII, 20~22	XIII, 23~25	XIII, 24
Anal fin rays	III, 18	III, 18~20	III, 19	III, 18~19	III, 19~22	III, 21
Pectoral fin rays	14	14~15	16	13~14	14~16	14
Pelvic fin rays	1, 5	1, 5	1, 5	—	—	1, 5
Gill rakers	3 + 14	—	—	17~20	15~18	—
Lateral line scales	31	—	30	31~36	34~40	—
Lateral line pores	30	—	—	27~34	30~37	—
Teeth row	10~11	—	—	10~11	7~9	—
Vertebrae	24 (11 + 13)	—	24 (10 + 14)	24 (11 + 13)	24 (11 + 13)	—
Black blotch of soft dorsal fin	absent	—	absent	absent	absent or present (in juvenile)	present
Black band crossing caudal fin	absent	—	absent	absent	present or absent (in juvenile)	absent

*original description

HL; snout length 2.7 in HL; interorbital region narrow with 3.3 in HL. Mouth small, oblique, and slightly protractile; its posterior edge not extending a vertical at anterior margin of eye; teeth on jaws with 10~11 rows slender, slightly curved at their tips. Two paired nostrils closet, anterior to eye; anterior one with fleshy rim and posterior flap; posterior one oval. Gill membranes narrowly attaching to isthmus, vertically extending to upper edge of pectoral fin base; gill rakers short.

Dorsal fin continuous and unnotched; its origin vertically above posterior edge of opercle; first dorsal spine shortest, its length 11.3 in SL; fourth dorsal spine longest, its length 4.0 in SL; fifth spine slightly shorter than fourth spine; afterwards, spine length gradually become shorter; length of spinous dorsal fin base longer than that of soft dorsal fin base; outline of soft ray portion rounded. Origin of anal fin below seventh dorsal spine base. Pectoral fin moderate; second ray longest. Origin of pelvic fin below upper part of pectoral fin base; pelvic fin moderate; its tip reaching first spine of anal fin. Caudal fin slightly rounded.

Scales on body ctenoid; lateral line incomplete, steeply ascending from posterior edge of gill opening to base of eighth dorsal spine, then descending to last rays of dorsal fin.

Color when fresh. Ground color of head and body uniformly whitish with two broad blackish bands; anterior one as wide as pupil, originating from origin of dorsal fin origin, through eye to lower edge of preopercle, become narrow below eye, with marginal yellow bands above eye; posterior one extending from middle part of dorsal fin, passing along base of soft dorsal fin, crossing caudal peduncle, and ending on posterior of soft anal fin. Dorsal and anal fins yellowish orange; outermost membrane of soft dorsal and anal, pectoral, and caudal fins translucent. Pelvic fin white. Base of caudal fin yellow with a posteriormost thin black bar.

Color after preservation. Ground color of head and body change from whitish to ivory with two bands becoming light brownish. Dorsal and anal fins, base of caudal fins whitish.

Ecological note. The present specimen was observed from a small crevice on a rocky reef at a depth of 13 meters in Jwasarido Island, the southern coastal waters of Korea (Fig. 1B).

Distribution. Known in the Western Pacific from West New Guinea, Indonesia, Papua New Guinea, Taiwan, Hongkong, Japan, and Korea (Chung *et al.*, 2023; Froese and Pauly, 2024; this study). In Korean waters, the species is only known from the coastal waters of Jeju and Jwasarido Islands (Myoung *et al.*, 2015; this study).

Remarks. The present juvenile of butterflyfish collected from Jwasarido Island, Korea was conformed to *Chaetodon selene*, by having a combination of following characters: XII, 21 dorsal fin rays; III, 18 anal fin rays; 14 pectoral fin rays; 31 incomplete lateral line scales; 3 + 14 gill rakers on first gill arch; a black lunate-shaped band from base of soft dorsal fin to middle of anal fin; a vertical dark band through eye; pelvic fin white; narrow vertical bar on origin of caudal fin (Table 1; Fig. 1). It was also closely matched the diagnostic features given by original description (Bleeker, 1853) and subsequent study (Burgess, 1978) of the species.

Although the species has numerous oblique light stripes on lateral body (Burgess, 1978), the presence of oblique stripes on body in the juvenile specimen of *C. selene* collected from Korean waters was not confirmed. We considered such a difference as ontogenetic variation because oblique rows on the body seems to be appeared distinctly in adult more than 70 mm in SL (Yasuda *et al.*, 1975). In juvenile stage, *Chaetodon selene* is similar with *C. ocellatus* and *C. vagabundus* in having a unique color pattern i.e., two black bands on head and body. However, *C. selene* can easily be distinguished from *C. ocellatus* by color of pelvic fin (white vs. yellow for *C. ocellatus*) and from *C. vagabundus* by blotch on dorsal soft rays (absence vs. present for *C. vagabundus*) (Burgess, 1978; this study).

From the Korean waters, Myoung *et al.* (2015: 149) presented firstly *Chaetodon selene* from the coastal waters of Jeju Island based on two underwater photographs and proposed a tentative Korean name, “No-rang-jeom-na-bigo-gi” for the species. However, the species has not been registered as an indigenous species of Korea yet (MABIK, 2023; NIBR, 2023), due to absence of formal report using a scientific voucher specimen with detailed description. The present study, therefore, represents the first reliable record of *C. selene* from Korea. We adopt the above name suggested by Myoung *et al.* (2015) as the formal Korean name of the species.

Although both adult and juvenile of *C. selene* have been reported from Korean waters (Myoung *et al.*, 2015; this study), it is difficult to determine whether it reproduces in the Korean waters only based on two occurrence records of the species for the past decade. It seems to be incidentally transported from southern tropical region such as the Ryukyu islands, Japan by the Tsushima Warm Current, a branch of the Kuroshio Current, because the subtropical or tropical fishes have been frequently observed from Korean waters due to increase in water temperature of the seas around Korean waters (B.J. Kim, unpubl. data). In response to rising water temperatures (Han *et al.*, 2023),

intensive exploration on the distribution range of the subtropical or tropical fishes such as *C. selene* around southern islands in Korean waters will be necessary in terms of conservation biodiversity.

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REFERENCES

- Allen, G.R. 1980. Butterfly and angelfishes of the world. Volume II. English 1st ed. J. Wiley and Sons, N.Y., pp. 149-352.
- Bleeker, P. 1853. Bijdrage tot de kennis der ichthyologische fauna van Solor. *Natuurk. Tijdschr. Nedr.-Indië.*, 5: 67-96.
- Burgess, W.E. 1978. Butterflyfishes of the World. A monograph of the family Chaetodontidae. T.F.H. Publ., Neptune City, New Jersey, U.S.A., 832pp.
- Burgess, W.E. 2003. Chaetodontidae. In: Carpenter K.E. and Niem V.H. (eds.), *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Atlantic. Vol.3: Bony fishes part 2 (Opistognathidae to Molidae)*. Virginia, USA, pp. 1663-1672.
- Chung, A., G.C.L. See, S.Y. Lam, W.H. Yiu and S.K.H. Shea. 2023. Thirty-one new records of reef fish species for Hong Kong waters. *J. Mar. Biol. Ass. UK*, 103: 1-13. <https://doi.org/10.1017/S0025315423000036>.
- Cuvier, G. and A. Valenciennes. 1831. *Histoire naturelle des poissons*. F.G. Levrault, Paris, Vol. 7: i-xx-x + 531pp. <https://doi.org/10.5962/bhl.title.7339>.
- Forsskål, P. 1775. *Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quæ in itinere orientali observavit Petrus Forskål. Post mortem auctoris*. Carsten Niebuhr (ed.), *Adjuncta est materia medica Kahirina atque tabula maris rubri geographica, Hauniæ, 1775*, 164pp.
- Fricke, R., W.N. Eschmeyer and R. Van der Laan. 2024. *Eschmeyer's Catalog of Fishes: Genera, Species, References*. Available at <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (2 April 2024).
- Froese, R. and D. Pauly. 2024. *Fishbase*. World wide web electronic publication. <http://www.fishbase.org/> (02/2024).
- Han, I.S., J.S. Lee and H.K. Jung. 2023. Long-term pattern changes of sea surface temperature during summer and winter due to climate change in the Korea waters. *Fish. Aquat. Sci.*, 26: 639-648. <https://doi.org/10.47853/FAS.2023.e56>.
- Heemstra, P.C. 1986. Family No. 205: Chaetodontidae. In: Smith, M.M. and P.C. Heemstra (eds.), *Smiths' sea fishes*. Macmillan South Africa, Johannesburg, pp. 627-633.

- Hubbs, C.L., K.F. Lagler and F.R. Smith. 2004. Fishes of the Great Lakes Region. University of Michigan Press, Ann Arbor, U.S.A., xvii + 213pp.
- Ida, H. 1984. Family Chaetodontidae. In: Masuda, H., K. Amaoka, C. Araga, T. Uyeno and T. Yoshino (eds.), The fishes of the Japanese archipelago. Tokai Univ. Press, Tokyo, pp. 182-186.
- Jordan, D.S. and J.O. Snyder. 1901. A preliminary check list of the fishes of Japan. Annot. Zool. Jap., 3: 31-159.
- Kaup, J.J. 1863. Über einige Arten der Gattung *Chaetodon*. Ned. Tijdschr. Dierk., 1: 125-129.
- Lacepède, B.G.E. 1802. Histoire naturelle des poissons. Prasson, Paris, 4: i-xliv + 728pp.
- Lee, Y.J. and J.K. Kim. 2021. First record of *Chaetodon vagabundus* Linnaeus, 1758 (Pisces, Chaetodontidae) collected from Jeju Island, Korea. J. Korean Soc. Fish. Ocean Technol., 57: 127-133. (in Korean). <https://doi.org/10.3796/KSFOT.2021.57.2.127>.
- Lee, Y.J., Y.S. Song and J.K. Kim. 2021. First record of juvenile of the mirror butterflyfish, *Chaetodon speculum* Cuvier, 1831 (Perciformes: Chaetodontidae) collected from Pohang, Korea. J. Korean Soc. Fish. Ocean Technol., 57: 374-381. (in Korean). <https://doi.org/10.3796/KSFOT.2021.57.4.374>.
- Linnaeus, C. 1758. Systema Naturae, Ed. X. (Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata.). Holmiae. Vol. 1: ii + 824pp.
- MABIK (Marine Biodiversity Institute of Korea). 2023. National List of Marine Species. Namu, Seocheon, Korea, 147pp.
- Motomura, H. and S. Ishikawa. 2013. Fish collection building and procedures manual. English edition. Kagoshima Univ. Mus., Kagoshima and Res. Ins. for Hum. and Nat., Kyoto, Japan, 70pp.
- Myoung J.G., D.B. Koh and J.S. Kim. 2015. The sea fishes of Jeju, Korea. Jisungsa, Seoul, Korea, 295pp. (in Korean)
- NIBR (National Institute of Biological Resources). 2023. National List of Korea. National Institute of Biological Resources. Incheon, Korea, Accessed 30 Jan 2023, <http://kbr.go.kr/>.
- Pyle, R.L. 2001. Family Chaetodontidae. Butterflyfishes. In: Carpenter K.E. and V.H. Niem (eds.), FAO species identification guide for fishery purposes. The living marine re-sources of the Western Central Pacific. Vol. 5. Bony fishes part 3 (Menidae to Pomacentridae). FAO, Rome, Italy, pp. 3224-3238.
- Seale, A. 1910. Descriptions of four new species of fishes from Bantayan Island, Philippine Archipelago. Philippine J. Sci., 5: 115-119.
- Shimada, K. 2013. Chaetodontidae. In: Nakabo, T. (ed.), Fishes of Japan with pictorial keys to the species, 3rd ed. Tokai Univ. Press, Kanagawa, Japan, pp. 990-1004. (in Japanese)
- Steene, R.C. 1985. Butterfly and angelfishes of the world. Volume I. Australia, English 2nd ed. Aquarium Systems, Mentor, Ohio, 144pp.
- Steindachner, F. and L. Döderlein. 1883. Beiträge zur Kenntniss der Fische Japan's (II). Anz. Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Classe, 20: 123-125.
- Yasuda, F., H. Masuda and S. Takama. 1975. A butterfly fish, *Chaetodon selene*, from Izu Peninsula, Japan, with a note on juvenile. Japanese J. Ichtyol., 22: 97-98.

경남 통영시 좌사리도 연안에서 채집된 나비고기과 한국첫기록종, *Chaetodon selene*

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요 약 : 2021년 6월 경남 통영시 좌사리도의 암초 지역에서 채집된 나비고기과 유어 1개체(표준체장 28.6 mm)를 근거로 *Chaetodon selene*를 한국첫기록종으로 보고한다. 제주도 연안에서 수중사진만으로 소개된 바 있지만, 본 연구에서 확증표본을 근거로 그 형태적 특징을 상세하게 기술하였다. 신한국명으로 ‘노랑점나비고기’를 채택했으며, 등지느러미 극조가 12개이고, 몸의 후반부에 흑색 초승달 무늬와 눈을 가로지르는 흑색 세로줄무늬가 있는 것이 특징이다.

찾아보기 낱말 : 나비고기과, *Chaetodon selene*, 첫기록, 좌사리도, 한국