

Five newly recorded fish species from seagrass beds of Kenting and Dongsha Atoll

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Abstract

This study reports five newly recorded fish species from the seagrass beds of Kenting (southern Taiwan) and Dongsha Atoll (South China Sea) based on underwater photographs. *Ostorhinchus hartzfeldii* (Apogonidae) and *Cryptocentrus multicinctus* (Gobiidae) were recorded for the first time at Dongsha Atoll, and *Cryptocentrus sericus* (Gobiidae), *Gnatholepis yoshinoi* (Gobiidae), and *Solenostomus halimeda* (Solenostomidae) were newly recorded from Kenting. Brief descriptions and ecological notes of each species are provided.

Key words: Dongsha Atoll, ichthyology, Kenting, marine ecology, new record, Taiwan

Introduction

Waters around the western Pacific Ocean nation of Taiwan currently feature 3,121 species of fish (Shao, 2018), with coral reef ecosystems of Kenting, southern Taiwan and Dongsha Atoll harboring 1,154 (Chen et al., 2010; 2013) and 700 (Chen et al., 2005; 2011; Soong, 2012), respectively. Seagrasses are marine plants which often form beds or meadows

in sandy bottom areas near sheltered coral reef habitats, though much less is known about the biodiversity of fish inhabiting such seagrass ecosystems. Some previous studies found about 100 and 134 fish species in seagrass beds of Kenting (Lee, 2009) and Dongsha Atoll (Lin & Hsiao, 2010; 2011), respectively, though this is likely to be a gross underestimate that will only increase as

more studies are undertaken.

As evidence for this, five newly recorded fish species were spotted and photographed from seagrass beds of Kenting National Park and Dongsha Atoll (Pratas Islands) herein, and descriptions have been included for all.

Methods

SCUBA divers equipped with underwater cameras surveyed seagrass beds or neighboring areas of Kenting National Park and Dongsha Atoll (Fig 1.), and images of rare fish species were captured. Fish were identified based on comparison to images in the following references: Allen & Erdmann (2012) and Nakabo (2013).

Results

Family Apogonidae

Ostorhinchus hartzfeldii (Bleeker, 1853)

哈氏鹦天竺鯛

Image examined. Image of one juvenile: total length (TL) ca. 5 cm, Dongsha Island, 2 m, South China Sea, 16 June 2011 (Fig. 2).

Description. Body oblong and slightly compressed. Eyes large, mouth small, terminal. Two dorsal fins, each transparent. Body dark brown with three or four thin, silverish-white stripes, an upper stripe continuing from front of snout through the dorsal margin and ending on the upper caudal peduncle. Pairs of eye-stripes continuing posteriorly onto side of body. Block spot on middle of caudal fin base. Adult body light brown, with stripe patterns similar to juveniles except pairs of eye-stripes do not continue posteriorly onto side of body. All fins transparent.

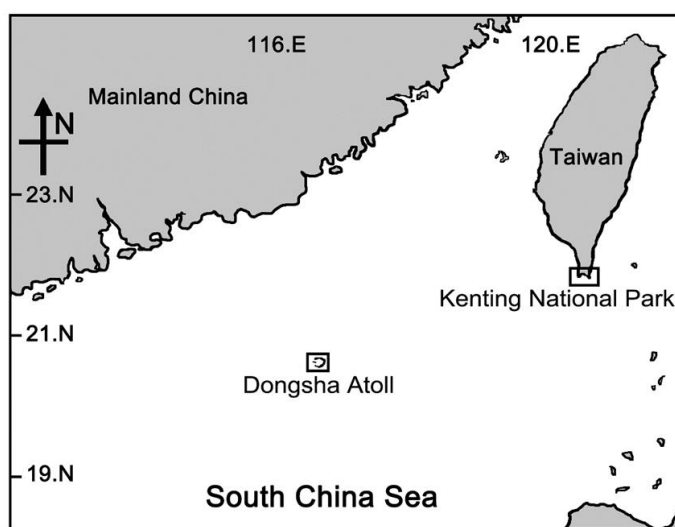


Fig 1. Map of the localities (squares) of the fish discussed herein.

Distribution. Indo-Pacific: Northwestern Australia through Indonesia, Philippines, Borneo, and Palau (Allen & Erdmann 2012). This is the first record in the South China Sea.

Ecology note. Occurs in inshore habitats such as sheltered reef flats and shallow lagoons. Juveniles were found in seagrass beds about 1-3 m depth around Dongsha Atoll. Usually in loose aggregations.

Family Gobiidae

Cryptocentrus multinctus (Allen & Randall, 2011)

多紋絲蝦虎

Image examined. Image of one adult: TL ca. 10 cm, Dongsha Atoll, 2 m, South China Sea, 24 April 2018 (Fig. 3).

Description. Body moderately elongated and cylindrical, head compressed, and snout short. Eyes in upper position, interorbital space very narrow; mouth large, terminal, and oblique. Two dorsal fins. Dorsal spines progressively longer to fourth. Caudal fin lanceolate. Body olive gray, with about five oblique, blue lines and a spot on the side of the head. Several unique bars with narrow, bright-white margins on side of body. Brownish blotches present from snout through eyes to the dorsal side, with scattered



Fig 2. *Ostorhinchus hartzfeldii* Bleeker, 1853, Juvenile. TL ca. 5 cm. Dongsha Atoll, 2 m, South China Sea, Photograph by Chen-Lu Lee.

small blue spots on the body. All fins slightly transparent, with greenish-white fin rays.

Distribution. Distributed across Palau, Indonesia, Marshall Islands, and Papua New Guinea (Allen & Randall, 2011). This South China Sea record is the northernmost.

Ecological notes. Occurs in inshore habitats. Mostly found in shallow seagrass beds within atolls.

Benthic dwelling and prefers silty sand bottoms. Usually associated with burrowing alpheid shrimps (Fig. 3).

Family Gobiidae

Cryptocentrus sericus (Herre, 1932)

絲蝦虎

Image examined. Images of two adult individuals: first with TL ca. 7 cm, dark form, Houbihu, 10 m, Kenting National Park, Taiwan, 24 July 2015 (Fig. 4a); second with TL ca. 10 cm, yellowish form, Houbihu, 15 m, Kenting National Park, Taiwan, 2 July 2015 (Fig. 4b)

Description. Body moderately elongated and cylindrical. Head compressed, snout short. Eyes in upper position, with very narrow interorbital space. Mouth large, terminal, and oblique. Two dorsal fins, the



Fig 3. *Cryptocentrus multicinctus* Allen & Randall, 2011, with a burrowed alpheid shrimp. TL ca. 10 cm. Dongsha Atoll, 2 m, South China Sea, Photograph by Chen-Lu Lee.



Fig 4. *Cryptocentrus sericus* Herre, 1932, (a) Adult, dark form. TL ca. 7 cm. Houbihu, 12 m, Kenting National Park, Taiwan, photograph by Chen-Yun Lee; (b) Adult, yellow form. TL ca. 10 cm. Houbihu, 15m, Kenting National Park, Taiwan, photograph by Chen-Lu Lee.

first being obliquely square-shaped. Variable coloration ranging from yellow to dark brown. Diffuse bars on side of body; a pair of large, distinct, dark-brown streaks above rear corner of the mouth and a second pair on gill cover (usually fainter yellow); blue streaks on pelvic, anal, and caudal fins. The yellowish form has blue spots on head, vague bars across top of head and back. The dark form has similar markings but a predominantly dark brown body with several pale saddles across the back. Both color forms have distinctly oblique brown stripes on the first dorsal fin, which can be used to distinguish this species from other *Cryptocentrus* species.

Distribution. Wildly dispersed throughout the East Indian Ocean to the Western Pacific: Andaman Sea to Papua New Guinea and Palau; north to Yaeyama Islands and throughout the East Indian Ocean region (Allen & Erdmann, 2012). This is the first record from Taiwan.

Ecological notes. Benthic-dwelling species that prefers silty sand bottoms. Usually associated with burrowing alpheid shrimps.

Family Solenostomidae

Solenostomus halimeda (Orr, Fritzsche & Randall, 2002)

仙掌刺刀魚

Image examined. Image of two individuals: first individual-TL ca. 7 cm, He-Jie, 20 m, Kenting National Park, Taiwan, 9 March 2013 (Fig. 5a); second individual-

TL ca. 5 cm, He-Jie, 23 m, Kenting National Park, Taiwan, 26 February 2017 (Fig. 5b).

Description. Body elongated, compressed, and encased by segmented bony plates. Snout narrow and elongated. Head large. Dorsal, pelvic, and caudal fins short and either truncated or slightly rounded; all fin lengths increase proportionately with standard length. Caudal fin length short, less than 20% SL. Fin membranes complete. Pelvic fin extending to anal fin origin. Body color greyish to dark green; some white mottling scattered on body and pinkish hairy filaments covering skin.

Distribution. Indo-Pacific: from Maldives, Western Australia, and Indonesia to the Marshall Islands (Orr et al., 2002). This represents the first record from Taiwan. This species is also found at Dongsha Atoll (authors' personal observations), though no photograph was taken.

Ecological notes. Found in *Halophila decipiens* meadows on sandy bottoms with coral rubble in about 20 m depth at Kenting. However, they can also be found in shallow intertidal seagrass meadows (0.5-1 m depth) at Dongsha Atoll. They are usually hiding within or around calcified algae such as *Halimeda* spp. and *Galaxaura* spp. This species has supposedly been photographed by Taiwanese divers previously, but it is likely to have been misidentified as *Solenostomus cyanopterus*, which has a more elongated caudal fin (35-52% of SL; Orr et al., 2002).

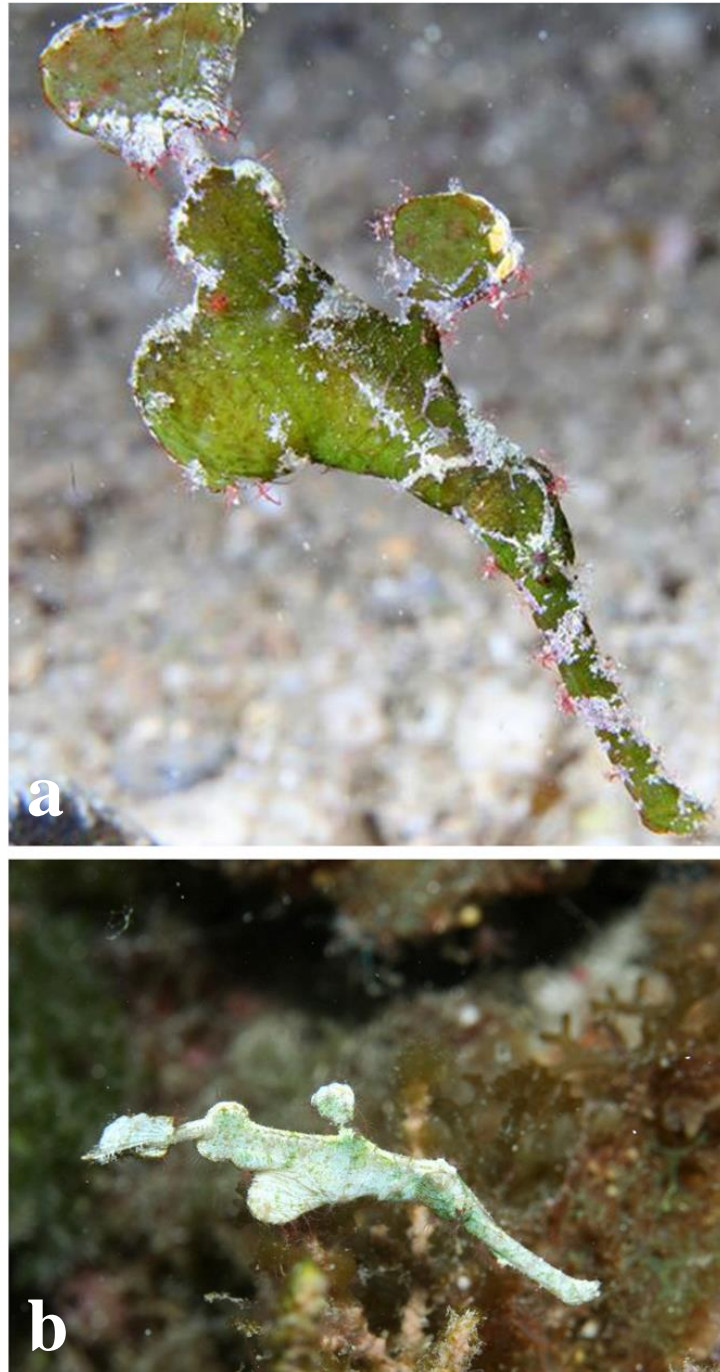


Fig 5. *Solenostomus halimeda* Orr, Fritzsche & Randall, 2002. (a) TL ca. 7 cm. He-Jie (20 m), Kenting National Park, Taiwan, Photograph by Chih-Hung Pan; (b) TL ca. 5 cm. He-Jie (23 m), Kenting National Park, Taiwan, Photograph by Chen-Lu Lee.

Family Gobiidae

***Gnatholepis yoshinoi* (Suzuki & Randall, 2009)**

吉野領鱗蝦虎

Image examined. Image of one adult male: TL ca. 5 cm, Houbihu, 9 m, Kenting National Park, Taiwan, 2 July 2015 (Fig. 6).

Description. Body elongated and cylindrical, head compressed, and snout short. Eyes in upper position. Mouth relatively small and terminal. Two dorsal fins: the first relatively tall and pointed, with the third spine being the longest. Distinct white flap present at end of lower lip.

Body light brownish gray, with about five dark, brown blotches on side of body. Black line below eye and extending to the interorbital zone. Several light, white or

orange spots dorsally scattered on body. Several dark spots on second dorsal fin. Distinctive black blotch on membrane behind first spine of first dorsal fin and one or more smaller black spots on membrane between second and third spines. This color pattern on the first dorsal fin can distinguish this species from other *Gnatholepis* species (Larson & Buckle, 2012; Nakabo, 2013).

Distribution. Currently known only from Mabul, Sabah, Malaysia and the Ryukyu Islands of Japan (Suzuki & Randall, 2009). This is the first record from Taiwan.

Ecological notes. Benthic dwelling species, usually found in silty or muddy bottom areas. Also found in seagrass meadows (*H. decipiens* or *Halophila ovalis*).



Fig. 6. *Gnatholepis yoshinoi* Suzuki & Randall, 2009, Adult male, TL ca. 5 cm. Houbihu, 9 m, Kenting National Park, Taiwan, Photograph by Chen-Lu Lee.

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References

- Allen, G.R. & J.E. Randall. 2011. Two new species of shrimp-associated gobies (Gobiidae: *Cryptocentrus*) from the Western Pacific. *Marine Biology Research*, 7(6):554-564.
- Allen, G.R. & M.V. Erdmann. 2012. Reef fishes of the East Indies. Vol I-III. Tropical Reef Research, Perth, Australia.
- Chen, J.P., R.W. Kuo & J. H. Haung. 2013. Fifteen new additional fishes from Kenting National Park. Abstract of the 5th Cross-Strait Coral Reef Conference.
- Chen, J.P., K.T. Shao, R.Q. Jan, R.W. Kuo & J.Y. Chen. 2010. Marine fishes in Kenting National Park. Kenting National Park Headquarters. (in Chinese)
- Chen, J.P., J.J. Li, J.H. Haung, L.S Fang & K.T. Shao. 2005. A study on fish fauna from Dongsha Atoll (Pratas Island) in 2004. *Platax*, 1:1-24.
- Chen, J.P., R.Q. Jan, J.H. Haung, R.W. Kuo & K.T. Shao. 2011. Fishes of Dongsha Atoll in South China Sea. Marine National Park Headquarters. (in Chinese)
- Larson, H.K. & D.J. Buckle. 2012. A revision of the goby genus *Gnatholepis* Bleeker (Teleostei, Gobiidae, Gobionellinae), with description of a new species. *Zootaxa*, 3529:1-69.
- Lee, C.L. 2009. Temporal and spatial changes of fish assemblages and fish stomach content in two seagrass beds (*Thalassia hemprichii* and *Halodule uninervis*) at Dakwan, Kenting National Park. (in Chinese)
- Lin, H.J. & S.C. Hsiao. 2010. Phenology and production of seagrass and macroalgae of Dongsha Island. Marine National Park Headquarters Research report. (in Chinese)
- Lin, H.J. & S.C. Hsiao. 2011. Biota researches and keystone assessment of Dongsha Island. Marine National Park Headquarters Research report. (in Chinese)
- Nakabo, T. (Ed.) 2013. Fishes of Japan with Pictorial Keys to the Species (3rd edition). Tokai University Press, Tokyo, Japan.
- Orr, J.W., R.A. Fritzsche & J.E. Randall. 2002. *Solenostomus halimeda*, a new species of ghost pipefish (Teleostei: Gasterosteiformes) from the Indo-Pacific, with a revised key to the known species of the family Solenostomidae. *Aqua, Journal of Ichthyology and Aquatic Biology*, 5(3):99-108.
- Shao, K.T. 2018. Taiwan Fish Database. <http://fishdb.sinica.edu.tw/> (2018/8/20)
- Soong, K.Y., J.P. Chen, J.S. Chang, L.L. Liu & Y. Su. 2012. Biodiversity and habitat composition of North reef flat, Dongsha Atoll. Marine National Park Headquarters Research report. (in Chinese)
- Suzuki, T. & J.E. Randall. 2009. *Gnatholepis yoshinoi*, a new gobiid fish from Okinawa, Japan. *Bulletin of the National Museum of Nature and Science, Ser. A*, 35(2):1-6.