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Report of a twospot cusk *Neobythites bimaculatus* from Japan with a rare ocellus pattern

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Abstract

A specimen of twospot cusk *Neobythites bimaculatus* (237 mm in standard length) was collected in September 2014 from near Okinawa Island, southern Japan. This ophidiid species usually has two distinct ocelli on the dorsal fin and none on the anal fin. In addition, minor ocellus patterns are also known; they include a faint third ocellus rarely on the dorsal fin and two faint ocelli on the anal fin of a smaller specimen (73 mm in standard length). The present specimen possesses both a faint third ocellus on the dorsal fin and a single faint ocellus on the anal fin. This ocellus pattern has not been seen in this species, hence we report it with a detailed description and a slight alteration to the diagnosis.

Key words : Ophidiiformes, Ophidiidae, Neobythitinae, Ocellus, Intraspecific variation

Introduction

The ophidiid genus *Neobythites* Goode and Bean, 1885, the largest of the family with 52 valid species, is known from all oceans of the world (Nielsen, 2002; Nielsen et al., 2009; Ohashi et al., 2012). Twenty-three of the 52 species have one or more ocelli on the dorsal and/or anal fin (Uiblein and Nielsen, 2005; Nielsen et al., 2009). The number, position and size of ocelli are important taxonomic characters, however, some variations have been reported (Uiblein and Nielsen, 2005). Hence, understanding the inter- and intra-specific variations of ocelli is important for the taxonomy of the genus.

Neobythites bimaculatus Nielsen, 1997 is distributed in the eastern Indian and western Pacific Oceans. Its dorsal fin has two distinct ocelli, while its anal fin has none, a condition that has been suggested as diagnostic for the species, although, minor patterns of a faint third dorsal ocellus and two anal ocelli have also been reported (Nielsen, 1997, 2002).

A specimen of *N. bimaculatus* collected in September 2014 near Okinawa Island, southern Japan, had both a faint third dorsal ocellus and a single anal ocellus (Fig. 1). This paper provides a detailed description of the specimen and slightly revises the diagnosis of the species.

Counts and measurements follow Ohashi et al. (2012). The specimen examined is deposited at the Okinawa Churaumi Foundation, Okinawa Island, Japan (OCF).

Neobythites bimaculatus Nielsen, 1997

(English name : Twospot cusk)

(Figs. 1–4)

Material for description. OCF-P 20141113–8, 237 mm standard length (SL), East China Sea, off Higashi-son, Kuni-gami, Okinawa Island, southern Japan (26°39.435'N, 128°27.977'E), 450 m depth, basket trap, 27 Sept. 2014, collected by Atsushi Kaneko (Okinawa Churaumi Aquarium).

Diagnosis. Pectoral-fin rays 26–28; abdominal vertebrae 12–13; preopercle with two spines; pelvic fin not reaching anus; two (rarely three) distinct ocelli on dorsal fin: anterior ocellus somewhat behind vertical through of anal-fin origin, posterior ocellus somewhat posterior to mid-point of dorsal fin; anal fin lacking ocelli (rarely one or two present): irregular mottling on body, but no vertical bands (Nielsen, 2002; Ohashi et al., 2015; this study).

Description. Major counts and measurements are as follows.

Counts : Dorsal-fin rays 103; 19th dorsal-fin ray above

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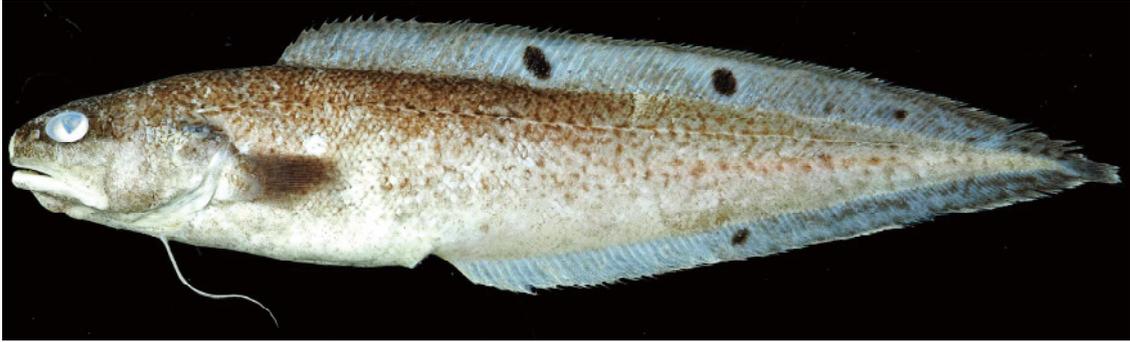


Fig. 1. *Neobythites bimaculatus*, OCF-P 20141113-8, 237 mm standard length, fresh coloration, from near Okinawa Island, Japan.

origin of anal fin ; anal-fin rays 88 ; caudal-fin rays 8 ; pectoral-fin rays 26 (left), 27 (right) ; pelvic-fin rays 2 ; vertebrae (abdominal + caudal) 13 + 47 ; 5th vertebra below origin of dorsal fin ; 15th vertebra above origin of anal fin ; branchiostegal rays 8 ; 11 developed gill rakers on first arch.

Measurements (% of SL) : Head 22.5 ; snout 4.8 ; upper jaw 11.0 ; eye 4.6 ; interorbital 4.2 ; postorbital 14.5 ; gill filament 2.4 ; predorsal 26.5 ; pectoral fin 12.0 ; pelvic fin 16.5 ; pelvic-fin origin to anal-fin origin 26.0 ; depth at anal-fin origin 16.5 ; preanal 41.5 ; snout to first dorsal ocellus 49.5 ; snout to second dorsal ocellus 67.0.

Body relatively compressed and elongated. Head somewhat long. Snout blunt. Two pairs of nostrils rounded : anterior nostril nearly at tip of snout ; posterior nostril immediately anterior to eye, slightly larger than anterior nostril. Eye elliptical, its diameter approximately equal to snout. Mouth subterminal and somewhat large ; posterior end of maxilla extending beyond posterior margin of eye. Supramaxilla oblong. Upper jaw slightly projecting beyond lower jaw. Both jaws with closely arranged teeth. Vomer with irregular granular teeth, exposed tooth patch sub-triangular (Fig. 2A). Palatine with thickened granular teeth, forming elongated tooth patch. Two median basibranchial tooth patches with small granular teeth, in form of exclamation mark (Fig. 2B) : anterior tooth patch relatively slender ; posterior patch elliptical, its length about one fifth of anterior patch. No paired basibranchial tooth patches. Preopercle robust ; its hind margin with two spines. Opercle strong, well forked posteriorly ; its posterior tips pointed. Both long comb-like and small nub-like rakers on outer side of first gill : former on distal portions of ceratobranchial and epibranchial ; latter on hypobranchial and proximal portions of ceratobranchial and epibranchial. Pseudobranchial consisting of six short filaments. Head and body with cycloid scales, but isthmus, posterior portion of gill membrane, axilla of pectoral fin and fins naked. Lateral line running along dorsal-fin base, originating immediately above upper end of gill opening and obscure on posterior ca. 1/5 of body. Pectoral fin somewhat small and slender ; its upper end below

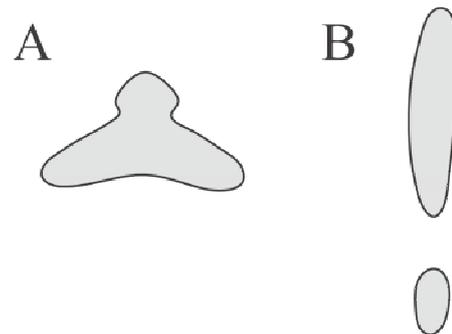


Fig. 2. Outline of vomerine (A) and basibranchial tooth patches (B) of *Neobythites bimaculatus*, OCF-P 20141113-8, 237 mm standard length.

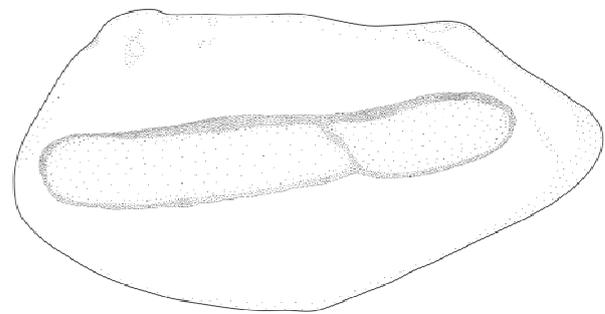


Fig. 3. Right sagittal otolith from *Neobythites bimaculatus*, OCF-P 20141113-8, 237 mm standard length. Bar indicates 5 mm.

horizontal midline of body. Pelvic fin filamentous inserted below hind margin of preopercle ; rays elongate, but not reaching anus. Dorsal-fin origin slightly posterior to vertical through pectoral-fin base. Anal-fin origin below base of 16th dorsal-fin ray. Both dorsal- and anal-fin bases long, connected with caudal fin by fin membrane posteriorly. Caudal fin slender. Anus immediately anterior to anal-fin origin.

Sagittal otolith (Fig. 3). Otolith horizontally elongated and depressed, its length 1.8 times its height. Anterior rim rounded, posteriorly somewhat pointed. Dorsal rim rela-

tively flat but slightly protruding anteriorly, ventrally rounded. Outer face strongly convex. Inner face with sulcus centrally, separated into two parts; anterior part about twice as long as posterior.

Color based on photograph of left side of fresh specimen (Fig. 1). Overall color of head and body creamy white. Head dark brown dorsally. Anterior half of body brownish dorsally; posterior half with irregular mottling dorsally. Dorsal fin whitish with brownish margin, irregular mottling and three ocelli; mottling more obvious posteriorly; first and second ocelli distinct and surrounded by contrasting white ring, covering 23rd–26th rays (somewhat posterior to vertical through anal-fin origin) and 43rd–46th rays (somewhat posterior to midpoint of dorsal-fin base) of dorsal fin, respectively; third ocellus smaller and surrounded by a faint ring on 70th–71st rays. Anal fin also whitish with brownish margin, irregular mottling and single ocellus; brownish margin and mottling obscure anteriorly; ocellus surrounded by pale ring smaller than anterior two ocelli of dorsal fin, but larger than third, covering 33rd–35th rays of anal fin. Pectoral and caudal fins dark brown. Pelvic fin white.

Color in preserved specimen (Fig. 4). After one and a half years of preservation, color of head and body very similar to fresh condition, but paler overall. Third dorsal and anal ocelli asymmetrical: third dorsal ocellus covering 70th–71st rays on left side slightly smaller than that on right side covering 68th–70th rays; anal ocellus covering 33rd–35th rays on left side, but absent on right side.

Distribution. Western Pacific (New Caledonia, South China Sea and Japan) and eastern Indian Ocean (Western Australia), at depths of 242–500 m (Nielsen, 2002; Ohashi et al., 2015).

Remarks. The present specimen is identified as a member of the ophidiid genus *Neobythites* because of its two pelvic-fin rays and two median tooth patches on the



Fig. 4. *Neobythites bimaculatus*, OCF-P 20141113-8, 237 mm standard length, preserved coloration of left (upper) and right (lower) sides of tail.

basibranchial and preopercle with a strong hind margin (Nielsen, 2002). It is identified as *N. bimaculatus* in having the following combination of characters: pectoral-fin rays 26–27; abdominal vertebrae 13; pelvic fin not reaching anus; no vertical bands; first dorsal ocellus somewhat posterior to anal-fin origin, second somewhat posterior to midpoint of dorsal-fin base (Nielsen, 2002; Ohashi et al., 2015). All counts and measurements of the specimen are consistent with the variation of *N. bimaculatus* provided by Nielsen (2002).

The third dorsal and anal ocelli are regarded as minor pattern variations for the species. The latter is a unique character previously observed only in the smallest specimen examined by Nielsen (1997) (73 mm SL), although that specimen had two ocelli on the anal fin. Ohashi et al. (2015) subsequently reported a smaller specimen of the species (40 mm SL) without anal ocelli, and considered the presence or absence of anal ocelli as not dependent on growth. The present large specimen (237 mm SL) with a single anal ocellus supports that view.

In several ocellus-bearing species of *Neobythites*, intraspecific variations such as size and position of dorsal and anal ocelli are attributable to various environmental factors (e.g., habitat, depth and sympatric congeners) (Uiblein and Nielsen, 2005). The sampling locality of the present specimen is very close to that of three specimens reported by Ohashi et al. (2015) (26°33–35'N, 127°43–44'E, 397–399 m depth). Those three specimens have the typical ocellus pattern (two dorsal ocelli only), which differs from that of the present specimen. Considering the asymmetric condition of the third dorsal and anal ocelli observed in the present specimen, it is reasonable to conclude that these ocellus patterns are unstable and are subject to individual variation.

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