

First record of the arrowtail *Melanonus zugmayeri* (Gadiformes: Melanonidae) from Taiwan

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Abstract

A single, deep-sea gadiform fish, *Melanonus zugmayeri* Norman, 1930 (Melanonidae) specimen (194.9 mm standard length) was captured off southwestern Taiwan. This species had been hypothesized to have a circumtropical or subtropical distribution, but only a handful of records exist. Since it had never before been reported in Taiwan, the morphology and coloration pattern of this first collected Taiwanese specimen were described herein.

Keywords: biogeography, deep sea, ichthyology, *Melanonus gracilis*, new record

Introduction

The family Melanonidae, which belongs to the order Gadiformes, is a group of fish in which individuals are uniquely characterized by having 1) single, long-based dorsal fins (sometimes with deep notches), 2) large, prominent head pores, and 3) free neuromasts in short, longitudinal ridges that cover extensive areas of their heads; additionally, these fish lack chin barbels and light organs.

This family comprises only a single genus, *Melanonus* Günther, 1878, and two species: *Melanonus gracilis* Günther, 1878 and *Melanonus zugmayeri* Norman, 1930 (Cohen et al. 1990; Nelson 1994; Henriques et al. 2001). *M. gracilis* is known only from the southern hemisphere (Cohen 1990) while *M. zugmayeri* is a circumtropical/subtropical species that reaches 40°N or even further north (Cohen 1986a-b, 1990). It has been found

in a handful of localities in the Pacific Ocean, but never in Taiwan. During a recent ichthyofaunal study, though, a single specimen of *M. zugmayeri* was landed at Dong-gang fishing port in southern Taiwan. The morphology and fresh coloration of this specimen, the first Taiwanese record, are described herein.

Materials and methods

Counts and measurements essentially followed Henriques et al. (2001). Briefly, caudal peduncle depth was measured as the shallowest length at the caudal peduncle. Pre-dorsal-fin and pre-anal-fin lengths were measured from the snout tip to the fin origins. Dorsal- and anal-fin bases were measured from the origin to the posterior ends of the fins. Snout length was measured from the snout tip to the anterior-most point of the eyes. Orbit diameter was measured as the shortest length between the eyes. Upper jaw length was measured from the snout tip to the posterior-most point of the upper jaw. Measurements were made to the nearest 0.1 mm with needle-point calipers. Standard and head lengths have been abbreviated as SL and HL, respectively. The morphological description is based on the Taiwanese specimen alone, which has been deposited at the Kagoshima University Museum (KAUM; Japan).

Results

Family Melanonidae

Melanonus Günther, 1878

Melanonus zugmayeri Norman, 1930

黑頭鱈

Figures 1-2

Specimen examined.

KAUM-I. 125099, 194.9 mm SL, 37.0 mm HL, off Dong-gang (ca. 22°39'N, 120°24'E), Pingtung, Taiwan, 26 December 2018, obtained from fishermen (by-catch) at the Dong-gang fishing marina.

Description of the Taiwanese specimen

Counts: dorsal-fin rays 7+64; anal-fin rays 48; pectoral-fin rays 17; ventral-fin rays 7; gill rakers 3+7 (all knob-like). Measurements: body height 19.2% SL; HL 19.0% SL; caudal peduncle depth 3.2% SL; pre-dorsal-fin length 23.7% SL; dorsal-fin base 66.0% SL; pre-anal-fin length 51.4% SL; anal-fin base 48.0% SL; pectoral fin length 11.9% SL; ventral fin length 11.1% SL; snout length 33.4% HL; eye diameter 21.5% HL; orbit diameter 36.6% HL; upper jaw length 65.7% HL. Body slender and strongly compressed laterally; body depth greatest at dorsal-fin origin, gradually tapering posteriorly. Head weakly compressed laterally; dorsal outline of head well rounded; large, prominent pores



Fig 1. Fresh specimen of *Melanonus zugmayeri* from southern Taiwan (KAUM-I. 125099, 194.9 mm SL).



Fig 2. Lateral (upper) and antero-lateral (lower) views of the head of a *Scorpaenopsis orientalis* specimen from southern Taiwan (KAUM-I. 125099, 194.9 mm SL).

on head; free neuromasts in short longitudinal ridges cover extensive regions of head; eyes rounded, located at middle of snout tip and preopercular; mouth large, with posterior tip just below posterior edge of eye; four and five rows of sharp, pointed teeth at anterior region of upper and lower jaws, respectively; teeth on lower jaw longer than upper jaw; teeth on inner rows larger and sharper than outer rows; number of rows of teeth decreasing to three rows in posterior part of lower jaw; teeth gradually shortening posteriorly; outer rows of teeth on lower jaw extending outside lip. Three rows of teeth on palatines and vomer; inner row of teeth sharp. No barbels on chin. Body covered with large scales (most had been lost due to abrasion when fish was examined). Light organ absent.

Origin of dorsal fin slightly anterior to pectoral-fin base; dorsal-fin base long, its posterior-most point just above posterior-most point of anal-fin base; dorsal fin separate and between 7th and 8th rays; anterior seven rays longer than posterior rays; outline of dorsal fin notched from 8th to 16th rays. Origin of anal fin located near middle of body; rays on anterior part shorter than middle part. Pectoral fin pointed, its base slightly anterior to ventral-fin base; posterior tip just below base of 16th dorsal-fin ray. Ventral fin as long as pectoral fin.

Fresh coloration: body greyish with black markings where scales had rubbed

off; pale where skin was lost; head black and irises black.

Distribution.

Melanonus zugmayeri is known to inhabit the Indo-Pacific and Atlantic oceans (Cohen 1986a-b, 1990; Henriques et al. 2001), and it has also been recorded from 1) the southeastern region of the Okhotsk Sea (off the Pacific coast of northern Japan: Aomori Prefecture to Boso Peninsula), 2) the northwest of the Hawaiian Islands to the Hancock Seamount (Nakabo and Kai 2013), and 3) Taiwan (as of this study).

Remarks.

The taxonomy of the genus *Melanonus* has been confounded due to the few number of specimens previously reported. The diagnostic characters traditionally used, such as the number of pectoral fin rays and the existence (or not) of two separated dorsal fins, were not verified by Henriques et al. (2001), who compared 11 previous studies with two specimens of *M. zugmayeri* collected from Portugal. They suggested that the ranges of values presented for several meristic and morphometric characters overlap between species, even in the original description of *M. gracilis*. Although taxonomic confusion is still prevalent, the present species was tentatively identified as *M. zugmayeri* since *M. gracilis* is thought to only inhabit the southern

hemisphere. As stated above, the specimen described herein represents the first record of the Melanonidae family from Taiwan.

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