



## A new pearlfish, *Onuxodon albometeori* sp. nov. (Ophidiiformes: Carapidae), from Taiwan

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### Abstract

*Onuxodon albometeori* sp. nov. (Ophidiiformes: Carapidae) is described from a single specimen collected by commercial trawl off southwestern Taiwan. The new species is most similar to the Indo-Pacific species *Onuxodon fowleri* (Smith 1955), both possess a remarkably slender body, and higher precaudal vertebral counts and a longer pectoral fin, although the two latter features are even more extreme in the former. *Onuxodon albometeori* sp. nov. is further distinguished from *O. fowleri* by its lesser body depth, greater head width, higher counts of precaudal vertebrae, and uniformly whitish coloration only on the posterior part of the body.

**Key words:** *Onuxodon fowleri*, taxonomy, morphology, new species, symbiotic organism

### Introduction

The pearlfish family Carapidae is characterized by small translucent slender bodies and can easily escape notice due to the cryptic life style. The adults of most species live symbiotically or hide inside various invertebrates. The genus *Onuxodon* Smith 1955 comprises four nominal species, three of them are recognized as valid: *Onuxodon fowleri* (Smith 1955), *Onuxodon margaritiferae* (Rendahl 1921) and *Onuxodon parvibrachium* (Fowler 1927); all distributed in the Indo-Pacific region (Markle and Olney 1990). Adults of this genus are characterized by presence of a rocker bone, predorsal bone, numerous small distal radials supporting the pectoral-fin rays, and one to several large symphyseal fangs on the jaws. They lack pelvic fins, having elongate anal-fin radials, cardiform jaw teeth, a ventral patch of tunic ridges on the posterior swim bladder, and thoracic plates formed by expanded parapophyses. During an ichthyofaunal survey in the southwestern Taiwan, a specimen of *Onuxodon* with similar morphology as *Onuxodon fowleri* was obtained from the fish market. It was recognized as a hitherto unknown new species and is described herein.

### Methods and materials

Counts and measurements followed Markle & Olney (1990). All measurements were made on the left side using digital calipers and rounded to the nearest 0.1 mm. Total, standard and head lengths are abbreviated as TL, SL and HL, respectively; other characters are not abbreviated. Fin rays and vertebrae were counted from a radiograph. Fresh coloration was described from color photographs of the holotype. Preserved coloration was based on the holotype following fixation in 10% formalin for two weeks and preservation in 70% ethanol. Curatorial procedures for the present specimen followed Motomura & Ishikawa (2013). KAUM is the institutional code for Kagoshima University Museum, Kagoshima, Japan.

## Taxonomy

### *Onuxodon albometeori* sp. nov.

Figures 1–3

**Holotype.** KAUM–I. 115161, 107.6 mm TL, 105.5 mm SL, 12.6 mm HL, off Kaohsiung (ca. 22°43'N, 120°14'E), obtained at Ke-tzu-liao fish landing port, southwestern Taiwan, 10 May 2018, collected by commercial bottom trawl.

**Diagnosis.** A species of *Onuxodon* with the following combination of characters: precaudal vertebrae 23; body very elongated, its depth 56.9% HL and 6.7% TL at anal-fin origin; head width 40.0% HL; snout length 15.1% HL; body uniformly translucent whitish, without black pigmented tail.

**Description.** Dorsal-fin rays 136, 49 anterior to 30th vertebra and 0 anterior to vertical through anal-fin origin; anal-fin rays 135, 50 anterior to 30th vertebra and 2 anterior to vertical through dorsal-fin origin; pectoral-fin rays 13 (14 on right side); total vertebrae 75 (=23 precaudal + 52 caudal), 7 anterior to dorsal-fin origin, 6 anterior to anal-fin origin, 6 anterior to predorsal bone; developed gill rakers 3.

Morphometrics: head length 11.7% TL; body depth 6.7% TL; pre-dorsal-fin length 16.2% TL; pre-anal-fin length 13.9% TL; pre-anus length 13.2% TL. Body depth 56.9% HL; pre-dorsal-fin length 127.8% HL; pre-anal-fin length 118.0% HL; pre-anus length 112.1% HL; snout length 15.1% HL; eye diameter 17.4% HL; bony interorbital width 16.3 HL; upper-jaw length 49.6% HL; lower-jaw length 47.7% HL; pectoral-fin length 47.9% HL; head depth 53.9% HL; head width 40.0% HL.

Body very elongate, its depth greatest at gill opening, gradually becoming more shallow posteriorly. Body and head slightly compressed laterally, progressively more to tip of tail; caudal part much longer than body, snout to anus distance about 1/8 of total length.

Snout short, rounded. Eye large, circular, its diameter greater than snout length. Mouth slightly oblique, posterior end of upper lip well beyond posterior margin of eye. Villiform tooth band with small, numerous, conical teeth in 6–10 rows and 4–6 rows on upper and lower jaws, respectively, but not anteriorly on either jaw; a pair of single large, strong, curved fang-like teeth anteriorly on each jaw; tooth on vomer and palatines forming in 3 elongated, rounded patches.

Pectoral fins small, rounded, just behind gill opening; origin of dorsal fin slightly posterior to origin of anal fin; pelvic fin absent; dorsal and anal fins low, with very long bases; caudal fin very small.

Sagittal otolith triangular, as large as eye (Fig. 3); rocker bone positioned below 3rd vertebra; predorsal bone above 6th and 7th vertebrae; usually two proximal pterygiophores of dorsal and anal fins inserted between neural and haemal spines, respectively; anal-fin radials not elongate; numerous small distal radials supporting pectoral-fin rays; surface of posterior swim bladder smooth, lacking ventral patch of tunic ridges.

**Fresh coloration** (Figs. 1, 2). Body and head translucent whitish, without distinct pigmentation although faintly pinkish posteriorly; several areas of pink pigmentation on snout and anterior part of lower jaw; blackish pigments on brain and vertebrae visible through translucent skin; outer margins of dorsal and anal fins very faintly dusky posteriorly.

**Preserved coloration.** Head and body uniformly white; pigmentation on brain and posterior vertebral region visible through skin.

**Etymology.** The specific name, *albometeori*, combines the sense of “white” and “meteor” in Latin, in reference to the whitish coloration and very elongated, posteriorly shallowing body.



**FIGURE 1.** Holotype of *Onuxodon albometeori* sp. nov. from southwestern Taiwan, fresh condition, KAUM–I. 115161, 107.6 mm TL, 105.5 mm SL, 12.6 mm HL.



FIGURE 2. Head of holotype of *Onuxodon albometeori* sp. nov, fresh condition.

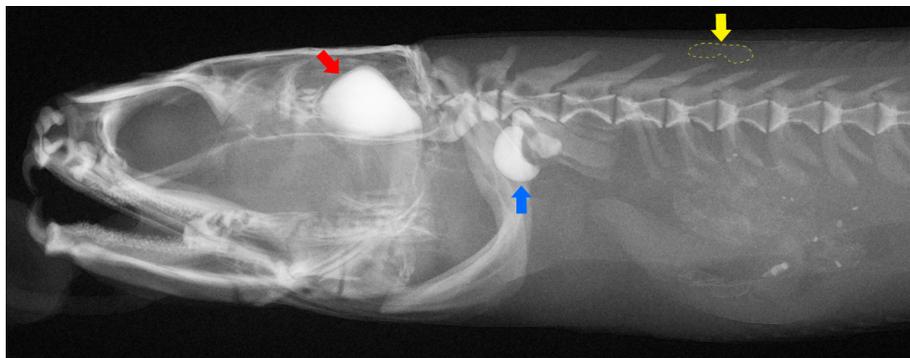


FIGURE 3. Radiograph of holotype of *Onuxodon albometeori* sp. nov. Red arrow: sagittal otolith; blue arrow: rocker bone; yellow arrow: predorsal bone (outline surrounded by yellow dotted line).

**Distribution.** *Onuxodon albometeori* sp. nov. is known only from the holotype collected in the southwestern Taiwan.

**Remarks.** *Onuxodon albometeori* sp. nov. shares the following characters with other congeners which distinguish the genus *Onuxodon* from other carapids: lack of pelvic fins and ventral patch of posterior tunic ridges on the swim bladder and presence of a rocker bone, predorsal bone, and single large, symphyseal fangs on each jaw. The new species resembles *O. fowleri*, which is widely distributed in the Indo-Pacific; both species have a slender body with higher vertebral counts than those two other congeners (Markle & Olney 1990). However, a comparison of *O. albometeori* with the data of lectotype of *O. fowleri* (BPBM 5001) given by Markle & Olney (1990) indicated clear differences in the following characters: precaudal vertebrae 23 in *O. albometeori* (vs. 20 in *O. fowleri*); body depth 56.9% HL (vs. 74.0% HL) and 6.7% TL (9.2% TL) at anal-fin origin; head width 40.0% HL (vs. 31.1% HL); snout length 86.8% of eye diameter (vs. 118.0% of eye diameter); upper-jaw length 49.6% HL (vs. 57.8% HL); pre-dorsal-fin length 137.8% HL (vs. 127.8% HL); pectoral-fin length 47.9% HL (vs. 37.8% HL). Some morphometric characters overlap with those of non-types (given to nearest 10%) given by Markle & Olney (1990), e.g. pre-dorsal-fin length 118.0% HL (cf. 110–140% HL in *O. fowleri*) and head width 40.0% HL (cf. 30–40% HL). These may suggest that some (but not all) characters vary with growth or simply reflect the condition of the specimens. Markle & Olney (1990, fig. 91) showed the relationship between total length and body depth in *O. fowleri*, but that of *O. albometeori* is obviously outside the range. In addition, the coloration of the two species clearly differed, *O. albometeori* lacking black pigment on tail, whereas *O. fowleri* has a completely pigmented tail.

*Onuxodon reedi* Smith, 1955 was originally described on the basis of a subadult specimen (70 mm TL) collected from South Africa, but Markle & Olney (1990) doubted the validity of the species. Markle (1999) subsequently indicated that *O. reedi* was a junior synonym of either *Onuxodon fowleri* or *O. parvibrachium*. The validity of *O. reedi*

is still questionable, the species being regarded as a junior synonym of species of *Onuxodon*. Some characters of *O. reedi* included in the original description were similar to those of *O. albometeor*, including a very slender body (depth 5% TL at anal-fin origin, cf. 6.6% TL in *O. albometeor*). However, Smith (1955) noted that the holotype of *O. reedi* had a strongly compressed head, its depth 2.5 times the width, clearly different from that of *O. albometeor* (1.3 times). In addition, the counts of pectoral-fin ray of the holotype of *O. reedi* (17) is distinctly differ from that of *O. albometeor* (13 or 14). While it is difficult to compare subadult characters with those of *O. albometeor*, their morphological differences combined with geographic dislocation strongly support recognition of the Taiwanese specimen as a new species.

Several reports of *O. fowleri* from the Indo-Pacific region have included photographs or drawings suitable for species identification (e.g. Heemstra 1995; Randall *et al.* 1997; Myers 1999; Amaoka & Yoseda 2005; Randall 2007; Allen & Erdmann 2012), all of them show a deep body and distinctly black tail, and well agree with the diagnostic characters of *O. fowleri*. Therefore, the proposed holotype of *O. albometeor* is considered to be the only known example of the new species. Because the specimen was retrieved from the floor of the fish landing port, the potential hosts of this symbiotic species remain unknown.

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