

## New record of the cucumberfish *Paraulopus oblongus* (Aulopiformes: Paraulopidae) from Southwestern Taiwan

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### Abstract

Fifteen specimens of the cucumberfish *Paraulopus oblongus* were caught by bottom trawlers off Southwestern Taiwan. This species can be distinguished from congeners by 1) 2.5 scales above and below the lateral line, 2) 10 dorsal fin rays (usually), and 3) relatively long pectoral fins. This represents the first record of this species, and only the second record from the *Paraulopus* genus, in Taiwan.

**Key words:** Ichthyology, Paraulopidae, *Paraulopus oblongus*, Taiwan taxonomy

### Introduction

The family Paraulopidae is monogeneric and features 14 extant species (Froese & Pauly, 2019). Historically, paraulopids, known as cucumberfishes, were grouped with the “greeneyes,” specifically the family Chlorophthalmidae and the genus *Chlorophthalmus*. Sato and Nakabo (2002) partitioned eight species into the family Paraulopidae (genus *Paraulopus*)

according to the following characters: 1) 2.5-4.5 scales above the lateral line; 2) lack of A: supramaxillae, B: outer tooth patches on the lower jaw, and C: luminous organs around the anus; 3) canine-like tongue teeth; 4) tapered caudal peduncles; 5) spots on dorsal side of the trunk, and some additional osteological characters. Most paraulopids are slender, cylindrical, and small, with standard lengths (SL) not exceeding 200 mm (the exceptions being

*Paraulopus balteatus* & *P. melanostomus*, which are both >300 mm; Froese & Pauly, 2019).

Cucumberfishes are benthic and mostly distributed in the Pacific Ocean (particularly the Australasian region), though some species have been found in the Indian Ocean. They normally dwell between 40 and 800 m (Froese & Pauly, 2019), though beyond this, little is known about these fish. In Taiwan only *P. brevirostris* has been recorded (Ng & Joung, 2020). Recently however, several unknown paraulopid species were caught inadvertently by bottom trawlers off the Southwestern coast of Taiwan, and they were ultimately identified as *P. oblongus* by their morphological characteristics.

### Materials and methods

The 15 paraulopid specimens caught off Southwestern Taiwan were obtained from local fishermen in the Donggang fish market (Pingtung, Taiwan) on January 22, 2021. Morphometric measurements and counts followed Sato and Nakabo (2003). SL (mm) and head length HL (mm) were used for proportional measurements (Tab. 1). References used for comparisons included Sato and Nakabo (2003) and Ng and Joung (2020). A specimen of *P. brevirostris* (EBFS 04001) from Ng and Joung (2020) was examined to enumerate pored lateral line scales, scales above and

below the lateral line, and pre-dorsal scales. After morphometric measurements and counts, specimens were preserved in 10% formalin in seawater and stored at the Department of Environmental Biology and Fisheries Science (EBFS) of National Taiwan Ocean University (Keelung, Taiwan; specimens EBFS04002–04016).

### Results

#### *Paraulopus oblongus* Kamohara, 1953

大鱗副仙女魚

Fig. 1, Tab. 1

**Materials examined.** 15 specimens (EBFS04002–04016; 56-64 mm SL), off Pingtung, Southwestern Taiwan, ca. 200 m depth (estimate made by fisherman who caught & provided sample), 22 January 2021.

**Description.** Body elongate, almost cylindrical. Nostrils at midpoint between snout tip and anterior margin of orbit; anterior and posterior nostrils identical in size. Eyes very large (diameter 8.77-12.07% SL), subcircular in shape, located dorso-laterally; interorbital region narrow (width 5.26-11.76% HL); postorbital length almost identical to orbital diameter. Maxilla reaching posterior position of midline of pupil; symphysis of lower jaw longer than upper jaw, slightly exposed in dorsal view; tongue broad posteriorly,

**Fig. 1.** Fresh coloration of *Paraulopus oblongus* (specimen EBFS 04002).



becomes gradually narrower anteriorly; anterior part of tongue truncated, with one or two rows of canine-like teeth (much larger than jaw teeth). Caudal peduncle tapering towards caudal fin. Upper part of dorsal fin convex; adipose fin extremely small and located on midpoint of anal fin base; pectoral fins long, reaching posterior end of dorsal fin base; pelvic fins somewhat shorter than pectoral fins (length 66.67-100 % of pectoral fin length); anal fin small, positioned closer to caudal fin than pelvic fin; caudal fin weakly forked.

**Coloration.** When fresh body color is

olive dorsally, with four to six parallel pairs of yellow elliptical spots. Dorso-lateral side color similar to dorsal side, with an inconspicuous lateral iridescent stripe. Mid-lateral side with three or four large black blotches and two or three small black blotches (alternating). Ventro-lateral and ventral surfaces pale grey. Dorsal and pelvic fins with indistinct, black, distal margin anteriorly. Pectoral fins transparent. Adipose fin dark. Anal fin base black. Caudal fin with a longitudinal black band on both upper and lower lobes. Eye yellow on the upper margin. When preserved body is pale green, with large, black

**Tab. 1.** Morphometric data of *Paraulopus oblongus* and *Paraulopus brevirostris* from Taiwan and Japan. Mean values are shown in parentheses. \*data from *P. brevirostris* measured in the present study. ^updated catalog number.

| Location                   | <i>Paraulopus oblongus</i> |                     | <i>P. oblongus</i>                     |                          | <i>P. brevirostris</i> |
|----------------------------|----------------------------|---------------------|--|--------------------------|------------------------|
|                            | Southwestern Taiwan        |                     | Tosa Bay, Japan                        |                          | Northeastern Taiwan    |
| Catalog number (s)         | EBFS 04002–04016           | BSKU1741 (holotype) | BSKU 1732–1735, 1738, 1740 (paratypes) | FAKU 76645, 76651, 76655 | EBFS 04001^            |
|                            | n=15                       | n=1                 | n=6                                    | n=3                      | n=1                    |
| Standard length (SL; mm)   | 56–64                      | 78.9                | 72.1–85.4                              | 68.8–75.8                | 100                    |
| <b>Measurements (% SL)</b> |                            |                     |  |                          |                        |
| Body depth                 | 13.79–17.74 (15.19)        | 14.1                | 12.0–13.7 (13.1)                       | 15.5–17.7 (16.5)         | 16                     |
| Body width                 | 12.07–17.19 (14.76)        | 14.8                | 13.4–16.3 (14.6)                       | 13.4–16.3 (14.6)         | 13                     |
| Pre-anus length            | 45.61–51.72 (47.65)        | 50.7                | 48.9–52.4 (50.2)                       | 47.5–51.2 (49.1)         | 50                     |
| Pre-dorsal length          | 36.84–43.75 (40.09)        | 39.2                | 38.1–40.4 (39.0)                       | 37.6–38.5 (38.2)         | 33                     |
| Pre-pectoral length        | 29.31–32.79 (30.75)        | 29.2                | 28.3–31.1 (29.1)                       | 26.8–29.4 (28.4)         | 27                     |
| Pre-pelvic length          | 35–49.18 (43.45)           | 41.8                | 41.3–42.5 (41.9)                       | 38.6–41.4 (40.3)         | 38                     |
| Dorsal fin base            | 10.34–20 (15.68)           | 11.3                | 10.0–11.7 (11.1)                       | 10.3–11.6 (10.9)         | 13                     |
| Anal fin base              | 3.45–8.06 (5.82)           | 5.1                 | 5.0–5.5 (5.3)                          | 4.8–5.9 (5.4)            | 7                      |
| Pectoral fin length        | 19.35–27.59 (23.61)        | 21.9                | 22.9–25.2 (23.9)                       | 24.1–26.1 (25.3)         | 19                     |
| Pelvic fin length          | 16.13–21.67 (18.75)        | 18.6                | 17.9–20.7 (18.9)                       | 20.1–20.8 (20.4)         | 29                     |
| Pelvic fin to anus         | 7.18–9.76 (8.18)           | 9.6                 | 8.4–10.4 (9.5)                         | 9.5–9.9 (9.7)            | 10                     |
| Anus to anal fin           | 20.97–25 (22.05)           | 24.2                | 23.2–26.0 (25.2)                       | 25.2–26.5 (25.9)         | 21                     |
| Interpelvic width          | 7.81–10.94 (8.82)          | 11.9                | 10.8–11.5 (11.1)                       | 10.9–18.6 (13.5)         | 9                      |
| Caudal peduncle length     | 17.74–22.41 (19.88)        | 21.4                | 19.9–21.5 (20.8)                       | 20.6–22.0 (21.1)         | 15                     |
| Caudal peduncle depth      | 3.23–5.17 (4.19)           | 5.1                 | 4.8–5.7 (5.1)                          | 5.0–5.7 (5.3)            | 6                      |
| Head length (HL)           | 26.23–32.76 (28.78)        | 28.6                | 27.1–29.0 (28.0)                       | 27.0–28.9 (28.1)         | 27                     |
| <b>In % of HL</b>          |                            |                     |  |                          |                        |
| Head depth                 | 41.18–55 (49.87)           | 51.3                | 46.7–52.2 (49.5)                       | 52.8–56.1 (54.2)         | 44.4                   |
| Head width                 | 42.11–56.25 (50.35)        | 55.8                | 51.7–55.2 (52.9)                       | 54.2–57.8 (56.1)         | 44.4                   |
| Snout length               | 21.05–26.67 (23.45)        | 24.3                | 21.4–24.4 (22.7)                       | 22.6–22.9 (22.8)         | 22.2                   |
| Orbit diameter             | 29.41–43.75 (37.28)        | 39.4                | 37.4–40.5 (38.9)                       | 38.0–39.7 (39.0)         | 37                     |
| Postorbital length         | 33.33–47.06 (39.91)        | 37.6                | 37.7–40.3 (38.8)                       | 37.9–38.7 (38.2)         | 44.4                   |
| Interorbital length        | 5.26–11.76 (6.50)          | 10.6                | 8.9–10.9 (9.8)                         | 9.4–10.9 (10.1)          | 8.5                    |
| Upper jaw length           | 33.33–58.82 (46.43)        | 43.8                | 41.4–45.3 (43.5)                       | 43.0–44.7 (43.7)         | 44.4                   |
| <b>Counts</b>              |                            |                     |  |                          |                        |
| Dorsal fin rays            | 10–11                      | 11                  | 10–11                                  | 10                       | 11                     |
| Anal fin rays              | 7–9                        | 8                   | 7–8                                    | 8                        | 9                      |
| Pectoral fin rays          | 17–19                      | 19                  | 18–20                                  | 19–20                    | 14                     |
| Pelvic fin rays            | 8–10                       | 8                   | 9                                      | 9                        | 9                      |
| Gill rakers                | 23–26                      | 24                  | 23–25                                  | 24–25                    | 18                     |
| Pored lateral line scales  | 40–42                      | 40                  | 40–41                                  | 40–42                    | 44*                    |
| Scales above lateral line  | 2.5                        | 2.5                 | 2.5                                    | 2.5                      | 3.5*                   |
| Scales below lateral line  | 2.5                        | 2.5                 | 2.5                                    | 2.5                      | 3.5*                   |
| Pre-dorsal scales          | 8–9                        | 8                   | 9                                      | 9                        | 11*                    |

blotches on the lateral surface only. Dorsal side spots indistinct. Caudal fin band color same as fresh. Eyes dark.

**Distribution.** Known from Tosa Bay, Japan (Sato & Nakabo, 2003), the South China Sea (Randall & Lim, 2000), Southern Indonesia (Gloerfelt-Tarp, 1984), and Southwestern Taiwan (present study) at depths <200 m (~200 m herein).

**Remarks.** *P. oblongus* can be distinguished from congeners by having a combination of 2.5 scales above and below the lateral line (5 rows in total), and 10 (rarely 11) dorsal fin rays. When considering other paraulopids in Taiwan, *P. oblongus* is quite similar to *P. brevirostris* in coloration; both are olive-colored with 1) yellow spots on their dorsal sides, 2) large and small black blotches on their lateral sides, and 3) longitudinal bands on their caudal fins. However, *P. oblongus* has a truncated tongue (vs. a thin & narrow tongue for *P. brevirostris*), longer pectoral fins (extended to the dorsal fin base vs. beyond the start of the pelvic fins), shorter pelvic fins (16.13-21.67 vs. 29% SL), more pectoral fin rays (17-19 vs. 14), more gill rakers (23-26 vs. 18) and fewer scales above and below lateral line (2.5 vs. 3.5). Additionally, *P. oblongus* is smaller: maximum recorded length=85 mm SL vs. 127 mm SL in *P. brevirostris* (Sato & Nakabo, 2003).

Our specimens show some

morphological differences with the Japanese type specimens. For instance, wide variation in pre-pelvic length, and dorsal and anal fin base lengths were found herein (Tab. 1). Such variation could be common for this species, though further sampling must be undertaken. The interorbital length is, on average, shorter than that of the Japanese specimens. Since our specimens are all smaller than the Japanese specimens, this difference is unsurprising.

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