

## A New Species of *Eudrella* (Crustacea, Cumacea) from the Seto Inland Sea of Japan

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**Abstract** A new species of the cumacean genus *Eudrella* (Leuconidae), is described from the central region of the Seto Inland Sea of Japan. Although female specimens of this species very closely resemble *Eudrella truncatula* (Bate, 1856) from the Atlantic coast and the Mediterranean Sea, male specimens are easily distinguished from *E. truncatula* in having only a single prominent tooth on the antero-lateral corner of the carapace, and a very long uropod endopod. In addition, the adult male antenna bears a short flagellum, which reaches to the anterior margin of the first or second abdominal segment and is a unique characteristic for the genus.

**Key words:** *Eudrella*, Cumacea, Crustacea, new species, Seto Inland Sea.

### Introduction

Since the first description by Norman (1867), more than 30 species of the genus *Eudrella* have been described, mainly from the continental shelf, in high latitudes, and abyssal depths of the Atlantic and Arctic regions. Knowledge of the genus in the Northwest Pacific and Indian Ocean is quite limited compared with that in the Atlantic region. Lomakina (1958) reported on species in the genus *Eudrella* in the USSR including some species from the Northwest Pacific. Hong & Park (1999) described two species from shallow waters of the Yellow Sea, *E. hwanghaensis* Hong & Park, 1999 and *E. pacifica* Hart, 1930, the latter of which is known from the North Pacific (Hart, 1930; Barnard & Given, 1961). In Japanese waters, Gamô (1967, 1968) described *Eudrella* sp., from Sagami and Suruga Bays. Recently, a deep-sea species, *E. ryukyuen-sis* Akiyama & Gamô, 2005, was described from the Okinawa Trough (Akiyama & Gamô, 2005). The present paper deals with *E. setoensis* sp. nov. from shallow waters in the Seto Inland Sea, a warm temperate area in the Northwest Pacific.

### Taxonomy

Order CUMACEA Krøyer, 1846

Family LEUCONIDAE Sars, 1878

Genus *Eudrella* Norman, 1867

*Eudrella setoensis* sp. nov.

(Figs. 1–4)

*Material examined.* Holotype—adult female (NSMT-Cr 16829) with marsupium, length 4.4 mm; allotype—adult male (NSMT-Cr 16830), length 3.6 mm; paratypes—9 adult females and 9 adult males (NSMT-Cr 16831); off Ushimado, the Seto Inland Sea of Japan, 34°36'N, 134°09'E, 5–6 m depth, muddy bottom (Fig. 1); 12 February 2001. Specimens were collected using a small epibenthic sledge, with a 21 cm mouth, equipped with a small nylon bag (250 μm nylon mesh). The type specimens are preserved in 70% ethanol and deposited in the National Science Museum, Tokyo (NSMT).

*Description.* Holotype—ovigerous female carrying 40 spherical embryos (Fig. 2, A, B, Fig. 3). Body slender, integument moderately calcified. Carapace (Fig. 2A, B) about 1/6 of total

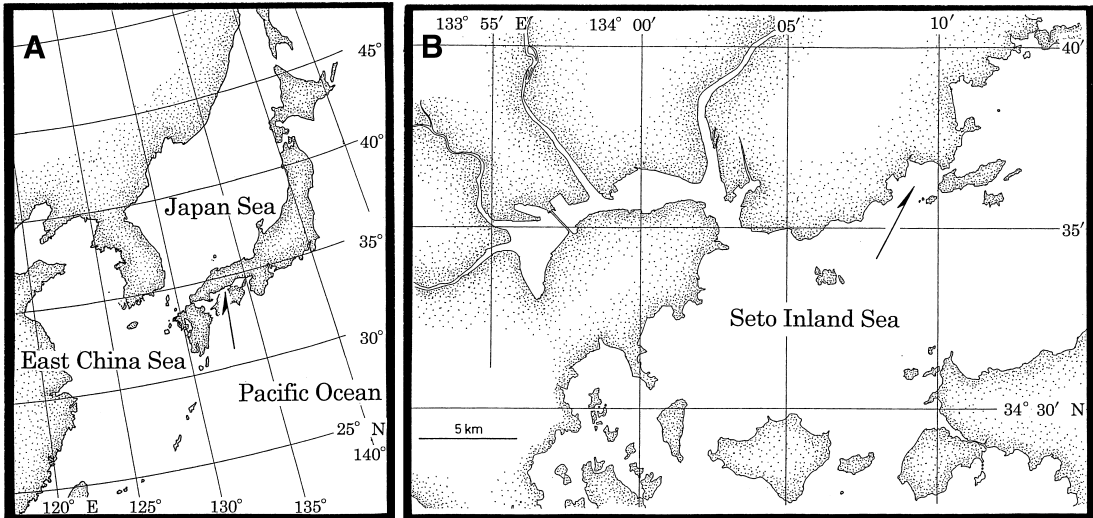


Fig. 1. Map of the sampling area of the present study in the Seto Inland Sea. A, Arrow indicates the Seto Inland Sea. B, Enlarged map of the Seto Inland Sea, with arrow showing the sampling site, just south of Ushimado, Okayama Prefecture.

body length, slightly longer than its greatest width, about 1.2 times as long as deep. Integument (Fig. 2D) covered with scale-like sculpture. Each side of carapace furnished with several long, stiff setae. Body covered with fine short hairs except for dorso-anterior margin of carapace which bears a group of hairs projecting forward. Upper and lower margins of antennal notch (Fig. 2, C) provided with 3 and 2 teeth, respectively. Minute round sinus present just below antennal notch. Lower margin of carapace with 9 small teeth.

Pereon (Fig. 2A, C) nearly twice as long as carapace; second and third free-thoracic segments very large, broad in dorsal view.

Pleon (Fig. 2A) slightly longer than half of total body length. Dorso-posterior margin of 5th segment lacking long setae.

Antennule (Fig. 3A) stout. Third segment of peduncle slightly shorter than 2nd, with 4 plumose setae on inner margin, 3 plumose setae, and terminal naked seta on outer margin. Main flagellum  $3/4$  as long as 2nd segment of peduncle, 3-segmented: First segment nearly twice as long as remaining segments together, bearing 2 naked setae on outer margin; 3rd segment with 2

aesthetascs on outer margin. Accessory flagellum subequal in length to 1st segment of main flagellum.

Antenna (Fig. 3B) with 3 plumose setae on basal region, which is typical for the genus.

Mandibles (Fig. 3C) broad and truncated at basal end, left mandible with a small cylindrical lacinia mobilis.

Maxillule and maxilla are typical for the genus (Fig. 3D, E).

First maxilliped (Fig. 3F) with 5 branchial lobules on inner border of coxa.

Basis of 2nd maxilliped (Fig. 3G),  $4/5$  as long as remaining segments combined, covered with fine hairs on lateral borders. Inner border of carpus furnished with several bare setae and 1 plumose seta.

Basis of 3rd maxilliped (Fig. 3H) subequal in length to remaining distal segments; its inner margin with 6 plumose setae; ventral surface with 4 plumose setae.

Basis of 1st pereopod (Fig. 3I) about  $3/4$  as long as combined length of remaining distal segments, furnished with 7 plumose setae on outer border. Dactylus slightly less than half as long as propodus, nearly half of carpus, bearing 9 termi-

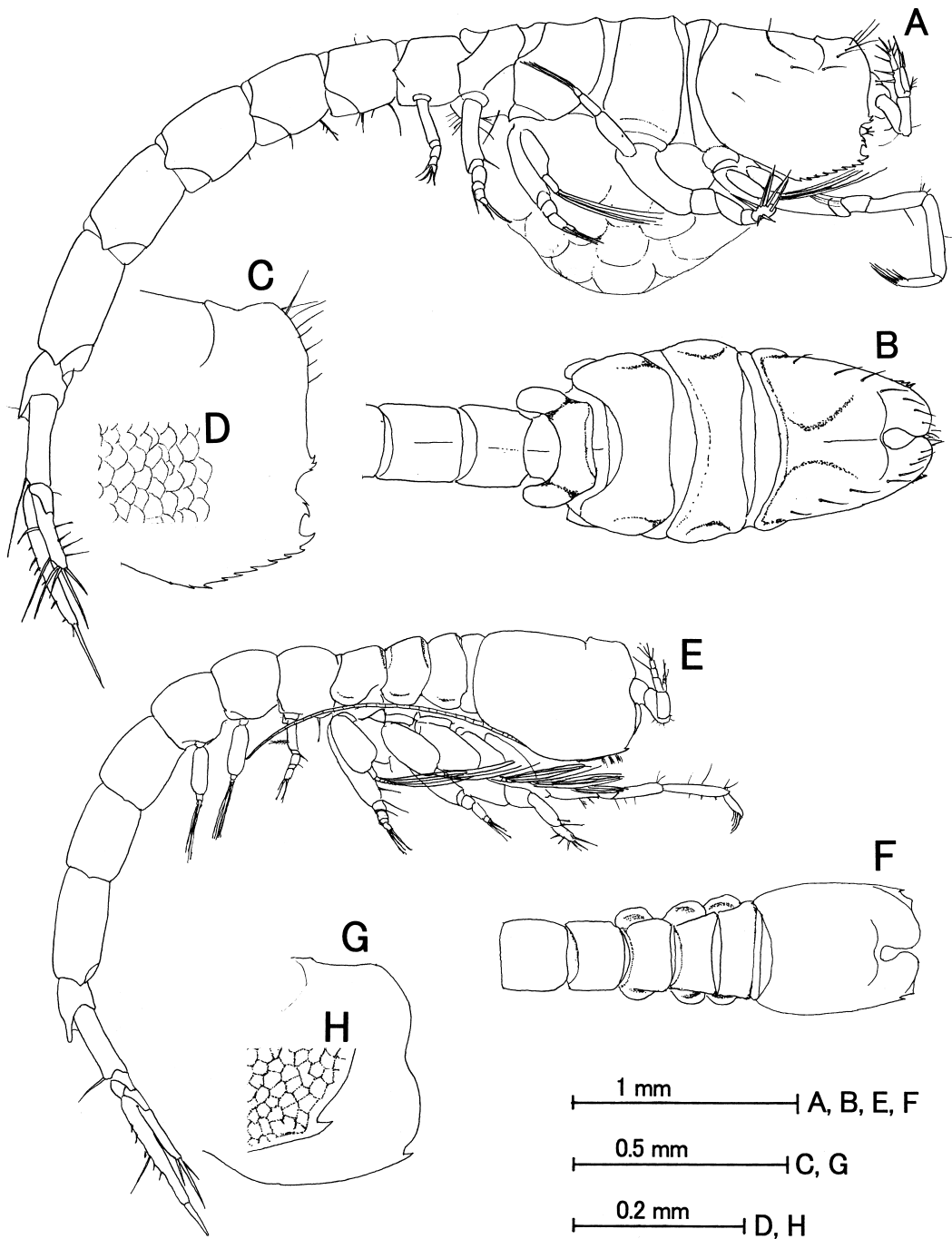
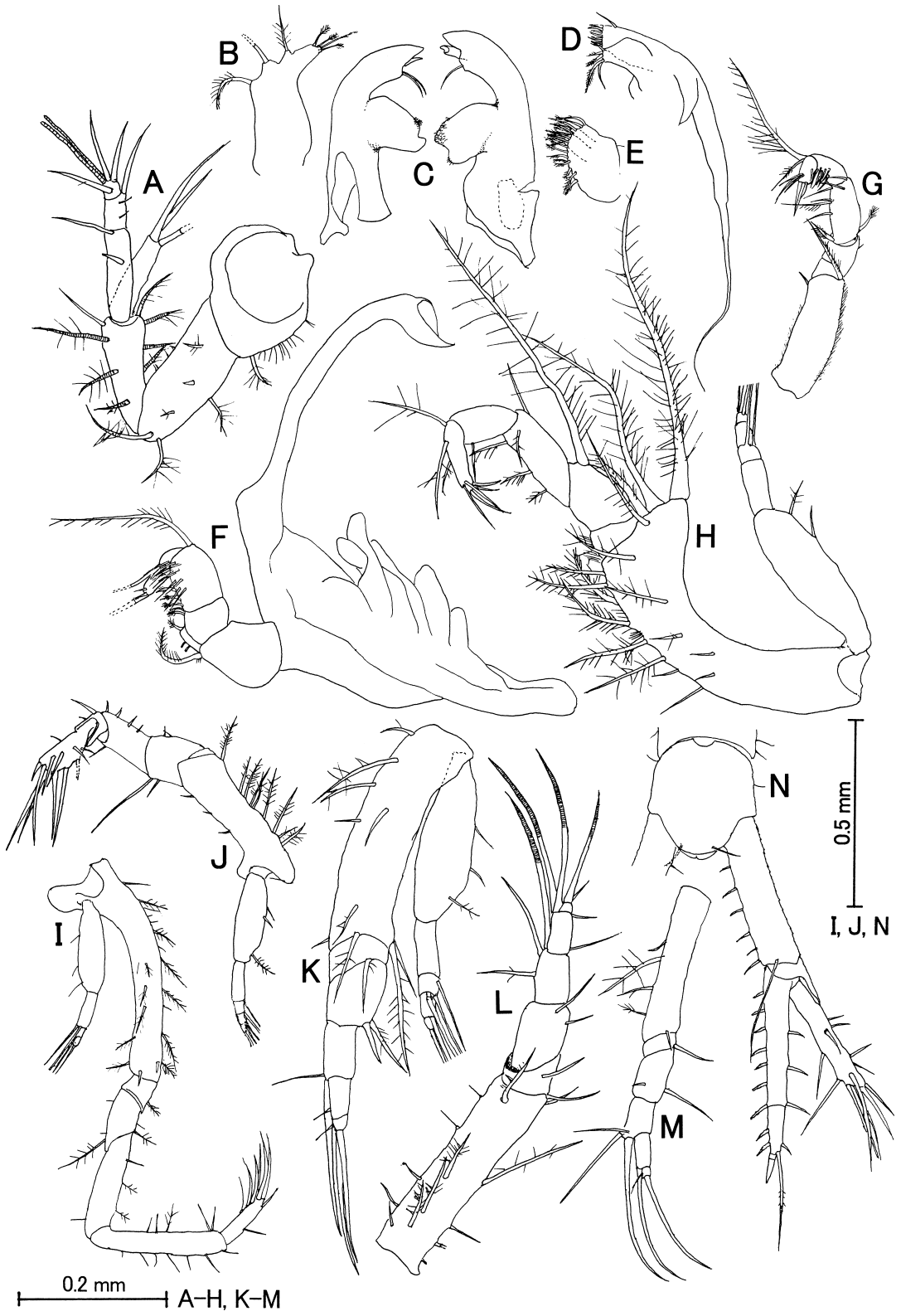


Fig. 2. *Eudrella setoensis* sp. nov., holotype ovigerous female (length 4.4 mm). A, lateral view; B, anterior portion of body, from above; C, anterior portion of carapace; D, texture of carapace surface. *Eudrella setoensis* sp. nov., allotype adult male (3.6 mm in length). E, lateral view; F, anterior portion of body, from above; G, anterior portion of carapace; H, texture of carapace surface.



nal setae.

Basis of 2nd pereopod (Fig. 3J) slightly shorter than remaining distal segments; its inner border with 7 plumose setae; dactylus slightly swollen, with 10 apical spines projected radially. Carpus subequal in length to merus.

Basis of the 3rd pereopod (Fig. 3K) slightly longer than remaining distal segments combined.

Basis of 4th pereopod (Fig. 3L), slightly longer than combined length of remaining distal segments, bearing 4 anteriorly projected plumose setae and long plumose seta on inner border.

Basis of 5th pereopod (Fig. 3M) as long as combined remaining distal segments; inner border with long plumose seta.

Peduncle of uropod (Fig. 3N)  $1\frac{1}{3}$  as long as last abdominal segment, bearing 6 spines on inner border. Endopod 2-segmented; 1st segment slightly shorter than peduncle, with 7 serrated spines on inner border, 3 spines on outer border. Second segment  $\frac{1}{3}$  the length of 1st segment bearing 2 spines on inner, single spine on outer borders, long outer terminal plumose seta and short stout terminal spine. Exopod as long as peduncle and 1st segment of endopod.

Allotype adult male (Fig. 2E, F, G, H, Fig. 4). Body slender (Fig. 2E); integument translucent, not well calcified except for last abdominal segment and uropods; body surface covered with minute scale-like sculptures (Fig. 2H). Carapace (Fig. 2E, F)  $\frac{1}{5}$  as long as total body length. Antennal notch obscure; lower margin of antero-lateral corner with minute tooth projecting forward (Fig. 2G).

Pereon (Fig. 2E, F) slender. Second to 4th segments equal in length; each segment narrower than carapace in dorsal view (Fig. 2F).

Pleon (Fig. 2E) slightly longer than half of total body length. First and 2nd abdominal segments with a pair of pleopods.

Antennule (Fig. 4A) stout. First segment of peduncle about  $\frac{1}{2}$  as long as 2nd segment, with

plumose setae, fine hairs on ventral surface. Third peduncular segment nearly  $\frac{2}{3}$  as long as the 2nd, which is about subequal to the 4-segmented main flagellum.

Basal segments of antenna (Fig. 4B) covered with numerous long hairs. Distal end of flagellum attaining to anterior border of 1st abdominal segment (Fig. 2E).

First maxillipeds with 5 branchial lobules (Fig. 4C)

Basis of 2nd maxillipeds  $\frac{6}{7}$  of the length of the combined remaining distal segments (Fig. 4D).

Basis of 3rd maxilliped (Fig. 4E), about  $1\frac{2}{3}$  as long as combined remaining segments, with 5 plumose setae on inner, 3 long setae on external distal border; its abdominal surface with 2 short plumose setae.

Basis of 1st pereopod (Fig. 4F) slightly shorter than  $\frac{3}{4}$  as long as combined length of remaining segments. Propodus  $\frac{1}{3}$  as long as carpus.

Basis of 2nd pereopod (Fig. 4G) nearly  $1\frac{1}{3}$  as long as remaining segments, furnished with 5 plumose setae on inner margin. Dactylus with 10 unequal subterminal, end spines.

Basis of 3rd pereopod (Fig. 4H)  $2\frac{1}{2}$  as long as combined length of remaining segments.

Basis of 4th pereopod (Fig. 4I) about  $2\frac{1}{3}$  as long as combined length of remaining segments, bearing 2 long plumose setae on external distal end.

Basis of 5th pereopod (Fig. 4J) about  $1\frac{1}{4}$  as long as combined length of remaining distal segments.

First pleopod normal type for the genus (Fig. 4K).

Uropod (Fig. 4L) very long, a little longer than  $\frac{1}{4}$  of total body length. Peduncle of uropod about  $\frac{1}{5}$  as long as last abdominal segment; its inner border with 12 serrated spines arranged in 2 rows. Endopod nearly twice as long as peduncle, 2-segmented: Inner border of 1st segment

Fig. 3. *Eudrella setoensis* sp. nov., holotype ovigerous female. A, antennule. B, antenna.; C, mandibles; D, maxillule; E, maxilla; F–H, first to third maxillipeds; I–M, first to fifth pereopods.; N, uropod with last abdominal segment.



with 11 unequal serrated spines arranged in 2 rows; outer border not setose; distal segment 1/4 as long as the 1st segment, with 3 spines on inner border and short terminal spine. Exopod about 1.25 times as long as peduncle, slightly longer than 3/4 of 1st segment of endopod, with 5 naked setae on inner border and 2 unequal terminal spines.

*Etymology.* The species name refers to the type locality, Seto Inland Sea.

*Remarks.* The present new species resembles *Eudrella truncatula* (Bate, 1856), which has been reported over a very wide geographic region of the North Atlantic (Sars, 1900; Stebbing, 1913; Calman, 1912; Fage, 1951; Bacescu, 1951; Lomakina, 1958). In particular, it is difficult to find morphological differences between the females of the two species, but the former is distinguishable from the latter by the following 3 points: (1) No hooked spine present on the basis and merus of the 3rd maxilliped; (2) terminal spine on the endopod of the uropod is not fused with the endopod; (3) 2–3 setae present on the dorsal surface of the exopod of the uropod.

Male specimens of the new species are distinguished from *E. truncatula* by the following points: (1) Antero-lateral corner of the carapace has only a single prominent tooth; (2) Endopod of uropod is very long, nearly twice as long as the peduncle; (3) Only a single seta on the dorsal surface of the exopod of the uropod, and (4) an especially shortened flagellum of the antenna which reaches to the anterior border of the 1st or the 2nd abdominal segment. Such a short flagellum on the antenna is unique among species in this genus. Although the latter feature does not match the diagnosis of the genus by Watling (1991), all other morphological characteristics warrant assignment of the present species to the genus *Eudrella*. The habitat of the present new species, a shallow inland sea in the warm temperate zone, is also unique for the genus because all of the known *Eudrella* species have been collect-

ed from open water. Salinity and water temperature around the sampling site were 31.8–32.7‰ and 8.3–27.7°C, respectively (from April 2000 to March 2001, Hayashi *et al.*, 2001).

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Fig. 4. *Eudrella setoensis* sp. nov., allotype adult male. A, antennule; B, antenna.; C–E, first to third maxillipeds; F–J, first to fifth pereopods; K, first pleopod; L, last abdominal segment with uropod.

English summary].

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