A New Talitrid Genus and Species, Lowryella wadai, from Estuarine Reed Marshes of Western Japan (Crustacea: Amphipoda: Talitridae)

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(Received 19 May 2016; Accepted 4 October 2016)

A new genus and species of talitrid amphipod, Lowryella wadai, is described from estuarine reed marshes facing the Bungo Channel, western Japan. This genus belongs to the 4-dentate, cuspidactylate group of talitrids and is characterized by having: (1) a short and slender antenna 2, (2) a mediodistally lobate article 2 and reduced article 4 of the maxillipedal palp, (3) a deeply subchelate gnathopod 1 in both sexes, (4) a bulge on the basis and ischium of female gnathopod 1, (5) a marginally bare outer ramus of uropod 1, and (6) a telson lobe armed only with apical robust setae. Several genera including palustral talitrids display features in common with this new genus, but the character combination shown above distinctly separates Lowryella from them. Lowryella is the first stenotopic representative of the Talitridae from estuarine marshes in Japan.

Key Words: Crustacea, Amphipoda, Talitridae, Lowryella wadai, new genus, new species, estuary, reed marsh, Japan.

Introduction

Salt marshes and mangrove swamps harbor two groups of Talitridae [for the Atlantic coast of North America, see Bousfield and Heard (1986); for southern Tasmania, see Richardson and Mulcahy (1996)]. One group are the beach fleas sensu Bousfield (1982), which are generally eurytopic. They occupy a wide range of habitats, including marine supralittoral beaches, estuaries, and sometimes also inland forests. Orchestia Leach, 1813, Platorchestia Bousfield, 1982, and Tethorchestia Bousfield, 1984 are representative genera of this group (Bousfield and Heard 1986; Richardson and Mulcahy 1996), and perhaps also the cosmopolitan genus Floresorchestia Bousfield, 1984, judging from habitat information compiled by Lowry and Springthorpe (2015a). The other group, the palustral talitrids of Bousfield (1984), are more or less stenotopic, comprising genera that occur mostly in coastal marine and estuarine habitats (Bousfield and Heard 1986; Richardson and Mulcahy 1996). One of the palustral genera, Uhlorchestia Bousfield, 1984, is endemic to the Spartina marshes on the Atlantic coast of North America, and the remaining five genera occur in the Southern Hemisphere. According to the model of the early evolution and the subsequent adaptive radiation of the Talitridae advanced by Bousfield (1984), the palustral talitrids occupy an ancestral position in the whole group and the beach fleas are considered to be a derived group.

Quite recently Lowry and Springthorpe (2015b) described a new genus, Tropicorchestia, with two new species from salt marshes of tropical Australia. They referred to these amphipods as "marsh hoppers", suggesting a strong habitat preference of this genus for the marshes. Morphologically Tropicorchestia is closer to the beach fleas than to the palustral talitrids (see Lowry and Springthorpe 2015b). It seems reasonable to assume that estuarine marshes in the world's temperate to tropical zones have been invaded by the local talitrid fauna, which have given rise to more or less endemic estuarine forms.

Eurytopic beach fleas have been recorded from estuarine habitats in Japan (see below) but no stenotopic genera or species have been reported from such places to date (Biodiversity Center of Japan 2007). Recently we examined a few peculiar amphipod specimens collected from reed marshes at two river mouths in western Japan. They proved to be talitrids with a unique combination of features that prevents their assignment to any known genera. A new genus and new species are erected for them herein, as the first known stenotopic estuarine talitrid from Japan.

Materials and Methods

The specimens were collected from two localities on the western coast of Shikoku and the eastern coast of Kyushu (Fig. 1) during an extensive survey of the littoral environment (tidal flats) at 157 points all over Japan, which focused on "Valuable Wetlands in Japan" (Biodiversity Center of Japan 2007).
Diagnosis.

Type species. Lowryella wadai sp. nov. (monotypic)

Family Talitridae Rafinesque, 1815

Lowryella gen. nov.

[New Japanese name: Yoshihara-hamatobimushi zoku]

Gnathopod 1 deeply subchelate in both sexes (stronger in male); in male, merus, carpus, and propodus each with pel- lucid lobe, lateral surface of propodus with submarginal row of elongate robust setae; in female, posterodistal margins of basis and ischium each bearing small bulge with scabrous surface, propodus with broad pellicid lobe, lateral surface with submarginal row of elongate robust setae, palm slightly exceeding dactylus. Gnathopod 2 sexually dimorphic; in male, propodus large and powerfully subchelate, palmar margin almost straight, dactylus apically blunt; in female, basis broad and parallel-sided, merus with pellicid lobe, propodus mitten-shaped. Pereopods 3–7 cuspidactylate (bicuspidate), locking robust-setae on propodi well-developed, meri and carpi in female stouter than those of male. Dactylus of pereopod 4 not pinched. Coxa of pereopod 4 wider than deep. Posterior lobe of coxa on pereopod 6 smoothly curved anterovertrally. Propodus of pereopod 7 in male with tuft of setae mediodistally. Coxal gill of gnathopod 2 largest and lobed, that of pereopod 3 smallest, those of pe- reopods 5 and 6 same in size; coxal gills of pereopods 3–6 convoluted. Oostegites subovate, with simple-tipped setae.

Pleonite side plates lacking marginal pits. Pleopods well- developed, peduncles marginally bare or with a few robust setae. Peduncle of uropod 1 with distolateral robust seta shorter than subdistal seta; inner ramus with single row of marginal robust setae, outer ramus with bare margin. Rami of uropod 2 subequal in length, bearing 1 or 2 marginal rows of robust setae. Uropod 3 with broad peduncle; ramus short. Telson lobe armed only with groups of apical robust setae.

Etymology. The new genus is named in honor of Dr James K. Lowry, who has contributed much to the taxono- my of the Talitridae and other amphipod groups.

Remarks. This new genus displays the following mor- phological features: (1) large eyes, (2) a short and slender antenna 2 in both sexes, (3) a 4-dentate lacinia mobilis of the left mandible, (4) a mediodistally lobate article 2 and re- duced article 4 of the maxillipedal palp, (5) a deeply subche- late gnathopod 1 in both sexes, (6) a distinct pellicid lobe on the merus of male gnathopod 1, (7) a bulging basis and ischium of female gnathopod 1, (8) cuspidactylate pere- pods, (9) a non-pinched dactylus of pereopod 4, (10) a dis- tally setose propodus of male pereopod 7, (11) a small coxal gill of pereopod 6 (as large as that of pereopod 5), (12) a marginally bare outer ramus of uropod 1, and (13) only apical robust setae on the telson lobe. Among these, bulges on the basis and ischium of female gnathopod 1 and the small coxal gill of pereopod 6 are unique to this genus. Lowryella belongs to the 4-dentate, cuspidactylate talitri- ds (Bousfield 1984) and shows morphological similarities to one genus of salt-marsh talitrid, Tropicorchestia, and two land-hopper genera, Mizuhorchestia Morino, 2014 and Nipponorchestia Morino and Miyamoto, 2015. This new genus, however, can be distinguished by the combination of the character states summarized in Table 1.

The beach-flea genus Traskorchestia Bousfield, 1982 has the cuspidactylate pereopods 3–7 like those of Lowryella, but the former is distinguishable from the latter in having a
Lowryella wadai from Japan

Table 1. Character matrix of Lowryella gen. nov. and three related genera.

<table>
<thead>
<tr>
<th>Characters</th>
<th>Lowryella</th>
<th>Tropicorchestia</th>
<th>Mizuhorchestia</th>
<th>Nipponorchestia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mxpdp palp Art 2</td>
<td>Lobate</td>
<td>Lobate</td>
<td>Non-lobate</td>
<td>Lobate</td>
</tr>
<tr>
<td>F Gn 1 propodus</td>
<td>Deep-subchelate</td>
<td>Shallow-subchelate (or “parachelate”)</td>
<td>Deep-subchelate</td>
<td>Deep-subchelate</td>
</tr>
<tr>
<td>F Gn 1 basis and ischiium</td>
<td>Bulging</td>
<td>Non-bulging</td>
<td>Non-bulging</td>
<td>Non-bulging</td>
</tr>
<tr>
<td>M Gn 1 merus</td>
<td>With lobe</td>
<td>With lobe</td>
<td>With lobe</td>
<td>With or without lobe</td>
</tr>
<tr>
<td>Per 6 gill</td>
<td>Subequal to Per 5 gill</td>
<td>Not known</td>
<td>Twice larger than Per 5 gill</td>
<td>Twice larger than Per 5 gill</td>
</tr>
<tr>
<td>Distal setae on M Per 7 propodus</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Pl 1–3</td>
<td>Well-developed</td>
<td>Well-developed</td>
<td>Reduced</td>
<td>Reduced</td>
</tr>
<tr>
<td>Margin on Up–1 outer ramus</td>
<td>Bare</td>
<td>Bare</td>
<td>With 1 (rarely 2) robust seta</td>
<td>Bare</td>
</tr>
<tr>
<td>Robust setal clusters on T</td>
<td>Apical</td>
<td>Lateral and apical</td>
<td>Lateral and apical</td>
<td>Lateral and apical</td>
</tr>
</tbody>
</table>

Sources: Morino (2014); Lowry and Springthorpe (2015b); Morino and Miyamoto (2015a); this study. Abbreviations: Art, article; F, female; Gn, gnathopod; M, male; Mxpdp, maxillipeds; Per, pereopod; Pl, pleopods; T, telson lobe; Up, uropod.

Lowryella wadai sp. nov.
[New Japanese name: Yoshihara-hamatobimushi] (Figs 2–5)

Type material. Holotype (NSMT-Cr 24358), male 9.9 mm, Misho Bay (estuary of Sozu river, Phragmites marsh), Ainan-cho, Ehime Pref., 20 April 2004, K. Wada coll. Allotype (NSMT-Cr 24359), female 8.2 mm, same data as holotype. Paratypes: ovig. female (NSMT-Cr 24360), 6.5 mm, same data as holotype; male (NSMT-Cr 24361), 5.6 mm, same data as holotype; female (NSMT-Cr 24362), 7.8 mm, same data as holotype; 2 juveniles (NSMT-Cr 24363), same data as holotype; ovig. female (NSMT-Cr 24364), estuary of Kitagawa river (Phragmites marsh), Nobeoka city, Miyazaki Pref., 5 June 2004, K. Wada coll.

Description of male (Holotype, 9.9 mm). Eyes (Figs 2, 3A) large, longest diameter ca. half of head length, spherical in dorsolateral view, contiguous dorsally. Antenna 1 (Fig. 3B) with peduncular articles 1–3 subequal in length; flagellum with 4 articles. Antenna 2 (Figs 2, 3C) with peduncular article 5 subequal in length to articles 3 and 4 combined; flagellum with 10 articles.

Upper lip (Fig. 3D), lower lip (Fig. 3E), and maxillae 1and 2 (Fig. 3F, G) as described in generic diagnosis or illustrated in respective figures. Gnathopod 1 (Fig. 3L, M) with broad carpus and propodus; carpus ca. 1.3 times as long as propodus; propodus ca. 0.7 times as broad as long, with palmar margin transverse, far exceeding tip of dactylus; lateral surface of propodus with submarginal row of 5 setae. Gna-
Fig. 3. *Lowryella wadai* gen. et sp. nov. Male 9.9 mm (holotype, NSMT-Cr 24358), A–G, I, M, P; ovig. female 8.2 mm (allotype, NSMT-Cr 24359), H–K, N, O, Q, R. A, head; B, antenna 1; C, antenna 2; D, upper lip; E, lower lip; F, maxilla 1; G, maxilla 2; H, left mandible; I, distal part of right mandible; J, maxilliped; K, articles 3 and 4 of maxillipetal palp (ventral view); L, N, gnathopod 1; M, O, distal articles of gnathopod 1; P, Q, gnathopod 2; R, oostegite of gnathopod 2. Scale 1, 0.5 mm for N and Q; scale 2, 1 mm for B and C; scale 3, 1 mm for L, P, and R, 0.4 mm for O; scale 4, 2 mm for A, 0.5 mm for D–I, 0.2 mm for J, K, and M.
Fig. 4. *Lowryella wadai* gen. et sp. nov. Male 9.9 mm (holotype, NSMT-Cr 24358), A–K, O–S; ovig. female 8.2 mm (allotype, NSMT-Cr 24359), L–N. A, M, pereopod 3; C, E, G, pereopods 4–6; I, L, pereopod 7; B, D, F, H, J, distal parts of pereopods 3–7 (arrow in B points to locking robust-seta); K, enlarged serrate seta (distal half) on propodus of pereopod 7; N, oostegite of pereopod 5; O–S, coxal gills of gnathopod 2 and pereopods 3–6. Scale 1, 0.2 mm for B, D, F, H, and J; scale 2, 1 mm for A, C, E, G, and I; scale 3, 1 mm for L and M; scale 4, 1 mm for N–S, 0.1 mm for K.
thopod 2 (Fig. 3P) with posterior cusp of coxa indistinct, palmar margin of propodus subequal to posterior margin in length, distal corner of palm weakly angulate, posterior margin parallel to anterior margin; dactylus robust. Locking robust-setae on propodi of pereopods 3–7 well-developed (Fig. 4B [arrow], D, F, H; not illustrated in Fig. 4J). Pereopods 3 (Fig. 4A) and 4 (Fig. 4C) each with coxa bearing weak posterior cusp. Pereopod 4 slightly shorter than pereopod 3. Pereopods 5 (Fig. 4E) and 6 (Fig. 4G) each with basis strongly lobate posteroventrally. Meri and carpi of pereopods 5–7 broad, ca. twice as wide as width of respective propodi. Pereopod 7 (Fig. 4I) with basis not lobate posteroventrally; propodus with ca. 10 serrate setae mediodistally (Fig. 4J, K).

Pleonite side plates (Fig. 5A–C) weakly acuminate posteroventrally, each posterior margin with single tiny seta. Peduncles of pleopods 1–3 (Fig. 5D, F, G) each with 2 retinacula (Fig. 5E), margins bare or with a few setae; rami with 8–10 articles, as long as or slightly longer than respective peduncles.

Uropod 1 (Fig. 5H) with peduncle bearing 4 outer and 2 inner marginal robust setae; inner ramus with 3 dorsomarginal robust setae. Uropod 2 (Fig. 5I) with peduncle bearing 2 outer and 2 inner marginal robust setae; outer ramus with 1 marginal robust seta; inner ramus with 1 lateral and 2 dorsomarginal robust setae. Uropod 3 (Fig. 5J) with broad peduncle equipped with 4 robust setae on dorsal margin; ramus slightly shorter than peduncle, with 1 marginal and 5 apical robust setae. Telson (Fig. 5K) tapering distally, with suture in middle; each lobe with 2 subapical and 3 apical robust setae.

**Description of female (Allotype, 8.2 mm).** Mandibles (Fig. 3H, I) as in generic diagnosis. Article 4 of maxillipedal palp reduced (Fig. 3J, K), masked by marginal setae on dorsal side and discernible from ventral side. Gnathopod 1 (Fig. 3N, O) with basis and ischium each bearing small bulge with scabrous surface; merus and carpus lacking pellucid lobe; posterior margin of propodus slightly broadened distally, with scabrous surface; lateral surface of propodus with submarginal row of 5 setae; palmar margin transverse, slightly exceeding tip of dactylus. Gnathopod 2 (Fig. 3Q) with coxa bearing blunt posterior cusp, merus with distinct pellucid lobe. Pereopods more robust than those of male (see Fig. 4M and 4L for pereopods 3 and 7, respectively). Pereopod 7 with posteroverentral lobe on basis; propodus lacking setal tuft at distal end. Oostegites of gnathopod 2 and pereopods 3 and 4 subovate with ca. 30 simple-tipped setae (Fig. 3R for oostegite of gnathopod 2). Oostegite of pereopod 5 small, with 7 setae (Fig. 4N).

Egg number 17 (paratype, NSMT-Cr 24361, 8.0 mm).

**Etymology.** This species is named for Dr Keiji Wada, who has made great efforts in extensive surveys to elucidate the estuarine fauna in Japan, and who forwarded the present material to us for study.

**Distribution.** So far only known from estuarine *Phragmites* reed marshes at two localities (Shikoku and Kyushu) that face the Bungo Channel in western Japan (Fig. 1).

**Remarks.** In a smaller paratype female (NSMT-Cr
The allotype and paratypes display fewer articles in the antennal flagella than the holotype does: the number of articles of antennae 1 and 2 are three and eight (vs. four and 10 in the holotype), respectively. This is apparently correlated with body size (8.0–8.2 mm in the allo- and paratypes vs. 9.9 mm in the holotype).

An extensive survey of tidal flats at 157 localities all over Japan, ranging from Hokkaido to Kyushu and including the Ryukyu and the Ogasawara Archipelagos, so far has revealed the presence of *Platorchestia* spp., *Paciforchestia* spp. (now *Pyatakvestia* Morino and Miyamoto, 2015; see Morino and Miyamoto 2015b), and *Traskorchestia ochotensis* (Brandt, 1851) in such habitats (Biodiversity Center of Japan 2007). Among that survey’s samples, we discovered the present additional talitrid, *Lowryella wadai* gen. et sp. nov., at two adjacent localities in western Japan (Fig. 1). This may indicate a highly endemic distribution of this species, but the amphipod fauna of estuarine habitats in Japan, including reed marshes, has not so far received much attention. Further studies may expand the distributional range of this species or reveal related genera or species. Intensive sampling in selected estuarine reed marshes around western Japan may be one way of casting light on this subject.

**Acknowledgments**

We would like to express our hearty thanks to Professor Emeritus K. Wada of Nara Women’s University for giving us the chance to study these valuable talitrid amphipods. Our deep gratitude is also due to Dr J. K. Lowry for his continuous encouragement and careful reading of the manuscript, and also to Dr J. Aoki for suggesting the name of the new talitrid. Dr M. J. Grygier of Lake Biwa Museum kindly provided many helpful suggestions to an earlier draft to improve the English, to whom we wish to acknowledge our debt. Dr H. Komatsu of the National Museum of Nature and Science and Dr K. Kakui of Hokkaido University helped us in many ways in preparing this article and we greatly appreciate their support.

**References**


