A New Species of *Podocerus* (Amphipoda: Podoceridae) from the Carapace of a Loggerhead Sea Turtle in Japan

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With Text-figures 1–3

Abstract A new species of podocerid amphipod, *Podocerus umigame*, has been collected from the carapace of a loggerhead sea turtle, *Caretta caretta*, at Shirahama, Wakayama, Japan. This new species is very similar to *P. cheloniae* (Stebbing, 1888) and *P. chelonophilus* (Chevreux and Guerne, 1888), which have been collected from sea turtles in the Atlantic and the Mediterranean, but it is distinguishable by the ornamentation of the telson, the spination of the inner ramus of uropods 1 and 2, and the form of a tooth on male gnathopod 2.

Although there are many reports on the biology of sea turtles in Japan (e.g. Nishimura, 1967; Uchida, 1982), the epibionts of their carapaces have rarely been reported (Hiro, 1936, on cirripeds). The loggerhead sea turtle, *Caretta caretta* (L.) lands on sandy beaches around the Seto Marine Biological Laboratory in order to lay its eggs. When I encountered one of these beached sea turtles, to which green algae (*Cladophora* sp.) and barnacles (*Chelonibia testudinaria* (L.)) were attached, I noticed small crustaceans moving among the algae. Using froceps, I collected several species of amphipods and tanaidaceans mixed with hydroids (?*Obelia dichotoma* (L.)). The most abundant species were *Caprella andreae* Mayer and a new species of *Podocerus*. In this report I describe this new species.

Abbreviations used in the figures. A, antenna; G, gnathopod; GL, gill; L, left; LL, lower lip; MD, mandible; MX, maxilla; MXP, maxilliped; OP, outer plate; OST, oostegite; PA, palp; PL, pleopod; PR, Poreopod; R, right; T, telson; U, uropod; UL, upper lip; f, female; m, male.

Podocerus umigame n. sp.

(Figs 1–3)

(Japanese name: umigame doronomi, new)

Material examined. Holotype (SMBL Type No. 373): male, 9.1 mm. Paratypes (SMBL Type No. 374): allotype, ovigerous female, 8.5 mm; "m2", male, 9.3 mm; "m3", male, 4.8 mm; "f2", mature female, 8.0 mm; "f3", immature female, 5.3 mm. All the specimens designated as the type series were collected on 14 July 1990 from the carapace of a loggerhead sea turtle, *Caretta caretta*, which landed on the beach in front of the Aquarium of the Seto Marine Biological Laboratory (33° 41'N, 135°20'E). Besides the type series, about 80 additional specimens were collected in the same sample. The type series is deposited in the Seto Marine Biological Laboratory.

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Description of holotype.

Body (Fig. 1): Head with distinct rostrum; lateral cephalic lobe slightly produced, with blunt apex; post-antennal sinus broadly incised. Eyes large, round,

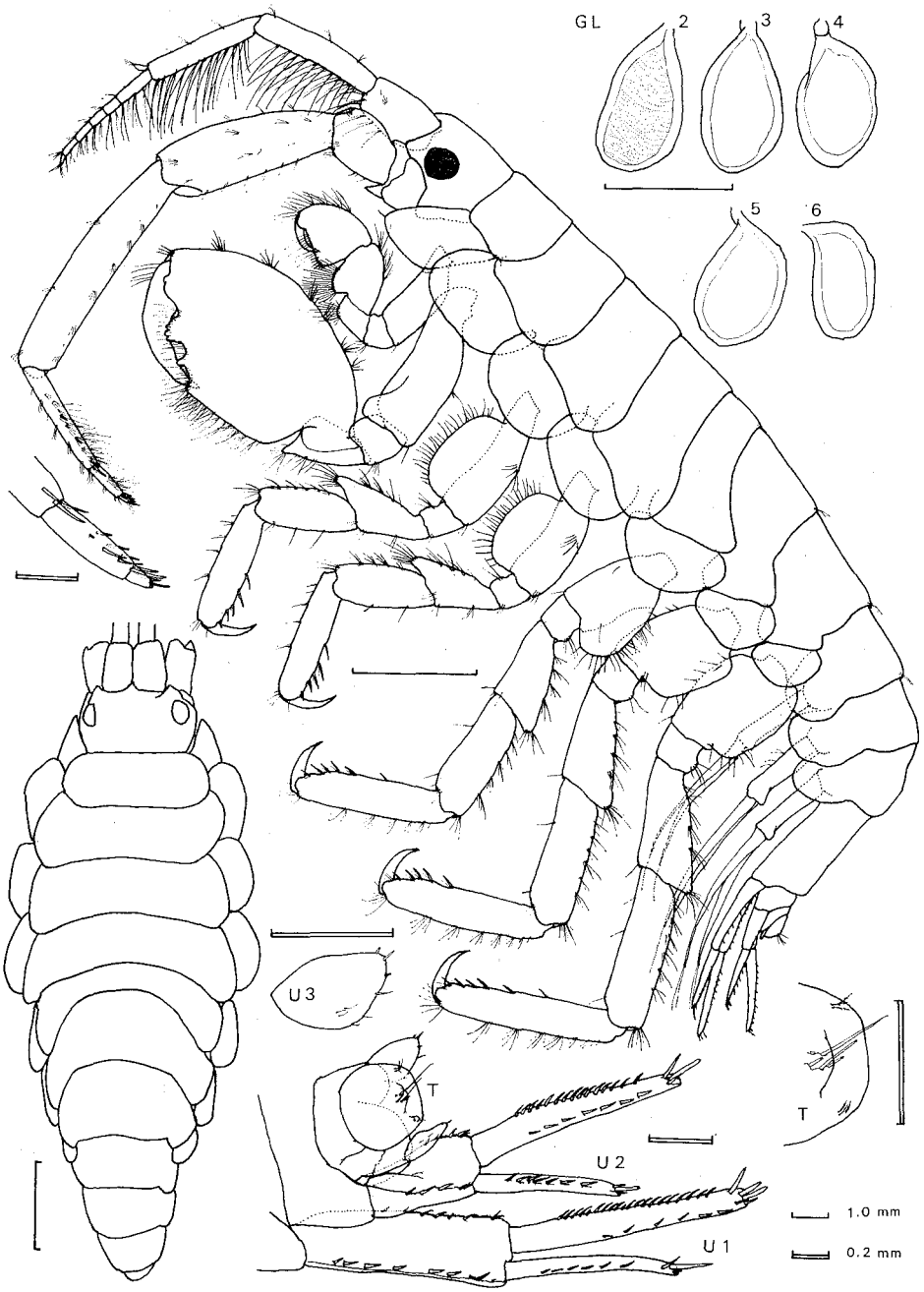

Fig. 1. *Podocerus umigame* n. sp. Holotype, male, 9.1 mm.

produced laterally. Dorsal surface of body smooth, without carinae, only with minute setae on dorsal posterior margin of pereosomites 5–7 and pleosomite 1. Pereonal segment 5 relatively short compared with other segments. Epimeral plates 1–3

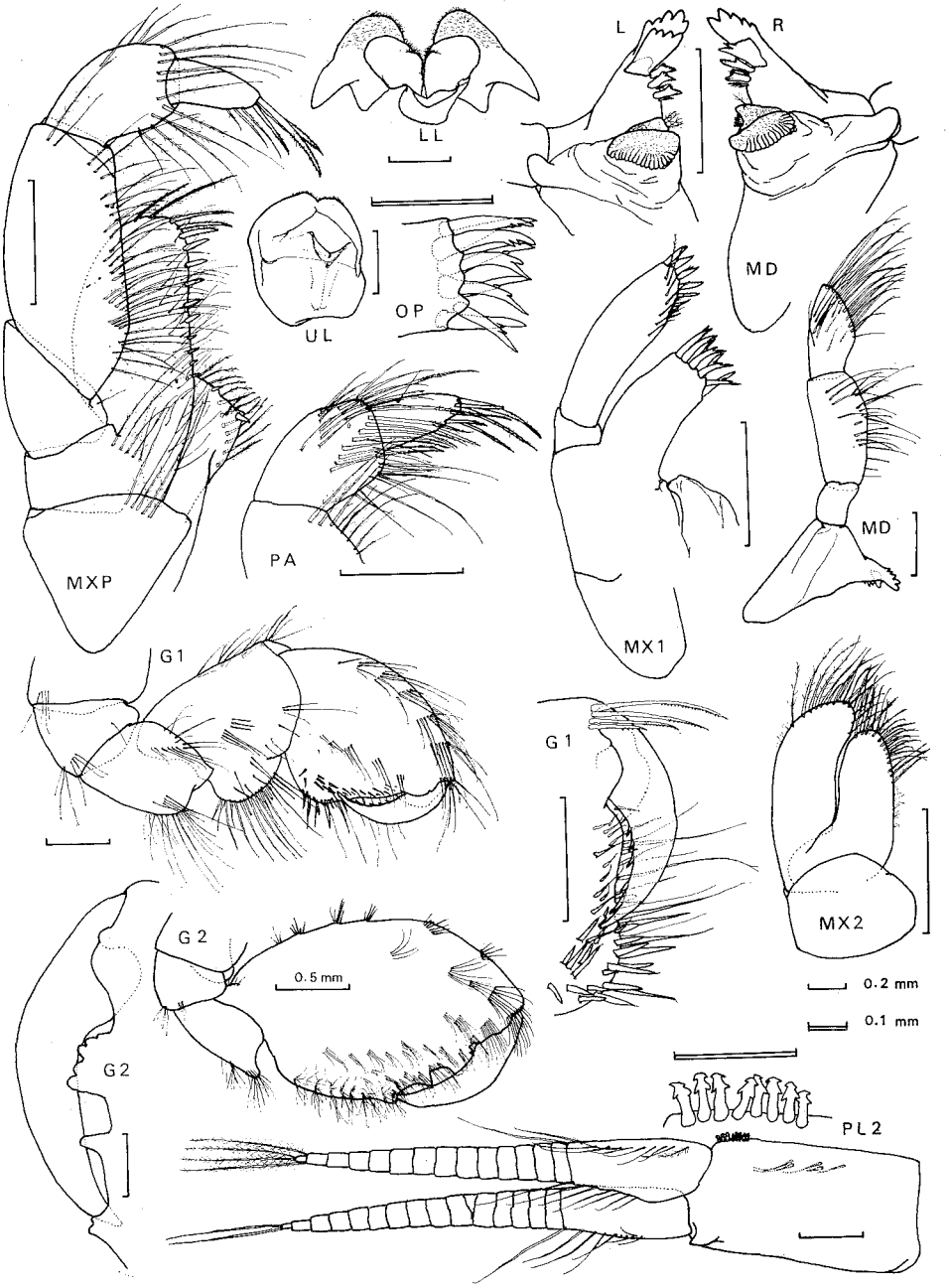

Fig. 2. *Podocerus umigame* n. sp. Holotype, male, 9.1 m.

round, without ornamentation.

Antennae: Antenna 1 with many long pectinate setae along ventral margin and sparse short setae on dorsal margin; main flagellum with 6 articles; accessory flagellum with single article. Antenna 2 long and robust, with sparse bunches of short facial setae; antennal gland cone of article 2 pointed apically; article 3 bulging, with round laterodistal lobe and with setae on inner surface; articles 4 and 5 robust, with short setae; flagellum consisting of 3 articles, with many long setae intermixed with thin spines along ventral margin; first article longer than second and third together.

Upper lip (Fig. 2–UL) medially incised along ventral margin. Lower lip (Fig. 2–LL) setulose on medial to ventral part, with well developed inner lobe.

Mandible (Fig. 2–MD): Incisor 5–dentate; right lacinia mobilis with thin apex bearing two minute denticles; left lacinia mobilis 4–dentate; accessory blades composed of pectinate spines and minute pinnate setae; molar process well developed, with one pinnate molar seta, triangular scaly bulge bearing minute pinnate setae under cutting surface, and longitudinal ridge extending to basal part of palp; cutting surface of molar dentate posteriorly. Palp 3–articulate; first article short, without setae; second article with setae on lateral surface and along ventral margin; third article obliquely truncate, with long setae along apical margin and also with facial setae.

Maxilla 1 (Fig. 2–MX1): Inner plate unrecognizable; outer plate (Fig. 2–OP) with 9 bi- or tri-dentate spines. Palp biarticulate; first article very short, without setae; second article with same structure of apical margin in right and left appendages, namely slender subterminal spines on ventral surface and pectinate tooth-like spines along apical margin.

Maxilla 2 (Fig. 2–MX2): Both plates with two rows of terminal and medial setae, some of them pinnate.

Maxilliped (Fig. 2–MXP): Inner plate with one stout spine at mediodistal corner, three small spines along terminal margin, and row of plumose setae along medial and terminal margins of dorsal surface. Outer plate with slender facial setae on ventral surface, row of tooth-like spines along medial margin, and long plumose spines along apical margin; these spines successively increasing in length toward apex. Palp 4–articulate with pinnate setae on ventral surface and along medial margin; articulation between articles 1 and 2 oblique; article 3 setose on dorsal surface; article 4 with robust pectinate spines on apex and subapical part of medial margin.

Coxa 1 produced anterodistally, with one seta; coxa 2 with one seta at anterodistal corner; coxae 2–7 subquadrate, round ventrally, not lobate, progressively decreasing in size posteriorly. Coxae 1–4 slightly overlapping. Coxal gills 2–6 (Fig. 1–GL) round, simple; gill 6 smaller than gills 2–5.

Gnathopod 1 (Fig. 2–G1): Article 2 with group of setae at posterodistal corner: article 3 short, with setae at posterodistal corner and one seta on inner surface; article 4 quadrate, with setae on posterodistal margin and on inner sruface; article 5 triangular, bulging posteriorly, with setae along posterior and anterior margins and

on inner surface; article 6 with groups of setae on dorsal margin and inner surface; palm distinctly defined, with many spines arranged to accommodate dactyl; dactyl shorter than palm, dentate along medial margin.

Gnathopod 2 (Fig. 2–G2): Article 2 with round lobe at anterodistal corner and short setae at posterodistal corner; article 3 short; article 4 short, bluntly pointed posterodistally; articulation between articles 5 and 6 indistinct, only recognizable by slightly incised line and group of setae; article 6 without distinct spines, with pinnate setae along posterior margin and on inner surface, and bunches of stout setae along anterior margin; palm tuberculate, with three teeth; tooth at palmar corner bearing two lobes, middle tooth with simple, blunt apex, tooth closest to dactyl bearing 5 lobes; dactyl stout, its tip fitting into the palmar corner tooth.

Pereopods 3 and 4 similar to each other, not glandular; article 2 broadly expanded anteriorly, with many setae along anterior margin and group of setae on posterior margin; article 3 short, with setae on anterior margin; article 4 produced anterodistally; articles 4–5 with groups of setae along anterior margin and sparse setae along posterior margin; article 6 with groups of setae along anterior margin and row of strong spines on distal half of posterior margin; dactyl elongate, acute apically, with one pinnate seta and minute facial setae.

Pereopods 5–7 opposed on antero-posterior axis to pereopods 3–4, similar to one another, except article 2; article 2 of pereopod 5 expanded posterodistally, with many setae along posterior margin; article 2 of pereopods 6 and 7 quadrate, with several setae along anteroproximal and posterodistal margins. Article 3 of pereopods 5–7 short, with setae on posterior margin; article 4 slightly produced posterodistally; articles 4 and 5 with groups of setae along posterior margin and sparse setae on anterior margin; article 6 with groups of setae along posterior margin and row of strong spines on distal half of anterior margin; dactyl as in pereopods 3 and 4.

Pleopods 1–3 (Fig. 2–PL2): Pleopods 1–3 similar to each other; peduncle with triangular process at apex of lateral surface; peduncle of pleopods 1 and 3 without setae; peduncle of pleopod 2 with several setae on anterior surface. Number of coupling spines 8, 8 and 9 on pleopods 1–3, respectively. Each article of both rami with two apical pinnate setae; basal article also with marginal pinnate setae.

Uropods 1 and 2 (Figs 1–U1, U2) similar to each other; peduncle with row of spines along medial and lateral margins, without distal peduncular tooth; medial margin of peduncle minutely serrate; outer ramus shorter than inner, with row of spines along lateral margin; inner ramus with row of spines along lateral margin and row of comb-like spines along medial margin.

Uropod 3 (Fig. 1–U3) without rami, tapered apically, with some minute setae along medial margin and on dorsal surface.

Telson (Fig. 1–T) trapezoidal; subapical part produced dorsally, with 5 long setae; laterodistal corners each with 3 minute pinnate setae.

Female.

Smaller and broader than male. Antenna 2 (Fig. 3–fA2) with long pectinate

setae on ventral margin like antenna 1.

Gnathopod 1 (Fig. 3–fG1): Articles 2–4 as in male; article 5 longer than in male; article 6 triangular; palm not so spinose as in male, with long, thin pectinate spines and minute setae; dactyl fitting against palm.

Gnathopod 2 (Fig. 3–fG2): Smaller than in male; article 4 broadly produced; articulation between articles 5 and 6 distinct; article 5 triangular, with setae on anterior and posterodistal margins; article 6 ovoid, with sparse setae on inner surface;

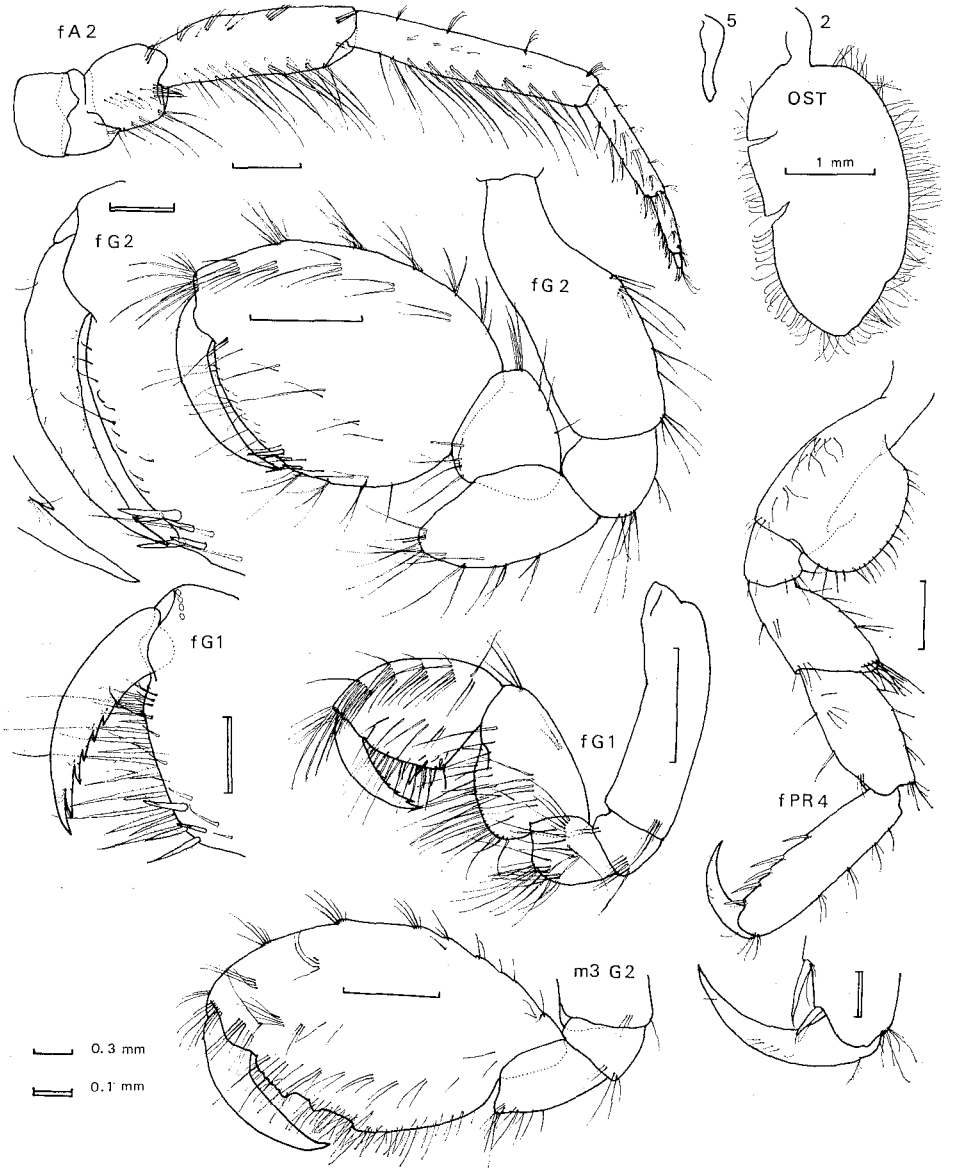

Fig. 3. *Podocerus umigame* n. sp. Female, 8.5 mm; "m3", male, 4.8 mm.

palmar margin oblique, with rows of minute setae; palmar conrer with 3 strong spines on inner surface and 2 spines on outer surface. Dactyl bearing minute marginal setae; apex elongate; subapical part with acute triangular process bearing minute setae.

Pereopods 3–4 (Fig. 3–fPR4) shorter than those of male, with several groups of setae on posterior margin of article 2.

Oostegites 2–4 (Fig. 3–OST) wide, bearing many short, simple, marginal setae; oostegite 5 vestigial, without setae.

Etymology. The specific name of this new species is the Japanese name for sea turtles; noun in apposition.

Remarks. Almost all of the authors who have treated the genus *Podocerus* have mentioned the difficulty of identifying species of this genus, owing to the intraspecific variability of characters and the poor descriptions of early species. For example, Nagata (1960) could not identify his specimens of this genus and reported them as *Podocerus* sp.; later Nagata (1965) identified them with *P. inconspicuus* (Stebbing, 1888), which has, so far, been the sole species of *Podocerus* reported from Japanese waters. In spite of the general taxonomic difficulty of *Podocerus*, *P. umigame* is distinctive in the anteriorly expanded article 2 of pereopods 3 and 4 and is easily distinguishable from most species of *Podocerus*.

There are two other species with an anteriorly expanded article 2 of pereopods 3 and 4: *P. cheloniae* (Stebbing, 1888) and *P. chelonophilus* (Chevreux and Guerne, 1888). The former species was obtained from a sea turtle, *Chelonia* (=*Eretmochelys*) *imbricata* (L.), in the Atlantic, and the latter also from a sea turtle, *Thalassochelys* (=*Caretta*) *caretta* (L.), in the Atlantic and the Mediterranean (Chevreux, 1900; Chevreux and Fage, 1925). Chevreux (1900) considered *P. cheloniae* to be a junior synonym of *P. chelonophilus*; however, other authors have treated these two species as different and independent species. According to the keys of Stebbing (1906) and Barnard (1962), *P. cheloniae* is distinguishable from other species in lacking carinae or processes on the dorsal side of the body and in having an oval, anteriorly expanded article 2 of pereopods 3 and 4. However, they both overlooked the fact that these characteristics also apply to *P. chelonophilus*. A distinction between these two species is more difficult to make than is generally accepted. Stebbing's original description was based upon a single specimen, "perhaps not adult" (about 6.5 mm in length), which Chevreux (1900) considered to be an immature female. It has few sexually dimorphic characters. On the other hand, Chevreux described both sexes of *P. chelonophilus* in a series of papers, but his figures are not detailed, and are misleading due to his old style of drawing. At present, these two species are only distinguishable by the spination of the inner ramus of uropods 1 and 2.

Although I am in doubt about whether *P. cheloniae* might be a juvenile of the present new species, and whether the latter is merely a geographic variety of *P. chelonophilus*, I present herewith these three nominal species as distinct, because some of the confusion in *Podocerus* has been caused by reporting species with slight dif-

ferences under the same name and/or by lumping distinct species under the assumption that intraspecific variability exists. *Podocerus umigame* differs from *P. cheloniae* in the ornamentation of uropods 1 and 2 and the telson. In *P. cheloniae* the uropods 1 and 2 bear sparse spines along the medial margin and the telson bears two stout setae. The new species differs from *P. chelonophilus* in the telson and the morphology of male gnathopod 2. In *P. chelonohilus* the telson bears two setae. These two species both have three palmar teeth on male gnathopod 2, but *P. chelonophilus* has a bi-lobed tuberculate tooth on the proximal part of palm, while the new species has a 5–lobed tooth in the corresponding place.

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