Record of *Iphiplateia whiteleggei* (Crustacea, Amphipoda, Phliantidae) from Hokkaido, Japan

By

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(With 4 Text-figures and 1 Table)

The present paper describes *Iphiplateia whiteleggei* Stebbing, 1899 (Crustacea, Amphipoda, Phliantidae) obtained from the Japan Sea coast of Hokkaido, northern Japan. Heretofore *I. whiteleggei* has been known confined to the South Pacific, and this is the first record of the present species from the Northern Hemisphere. The morphological characters of the present species in three remote localities are compared and the biological significance of the curiously flattened body of this amphipod is considered.

Abbreviations of legends. ds, dorsal view; vt, ventral view; post, posterior view; inn, inner view; out, outer view; R, right part; L, left part.

Description

Iphiplateia whiteleggei Stebbing, 1899

(Figs. 1-4)

Iphiplateia whiteleggei Stebbing, 1899, p. 415, pl. 34; 1906, p. 203, figs. 52-53; J.L. Barnard, 1981, p. 1216, figs. 1-3.
Iphiplateia sp. cf. *whiteleggi*[*sic*]: Mawatari *et al*, 1985, p. 8.
Iphiplateia sp.: Ishimaru, 1985, p. 102, fig. 2.

Material examined. 1 immature ♀, 3.5 mm (fully described), clung to *Sargassum confusum*, depth c.a. 0.6 m, subtidal, Tsukotan beach, Oshoro, Hokkaido, Japan (43°01′N, 140°49′E), 24-I-1983, Y. Hirano coll. —— 1 ♂, 3.8 mm, clung to a boulder, depth 5 m, Kabuto Rock, Oshoro, Hokkaido, 10-III-1984, H. Hoshikawa coll. —— 1 ovigerous ♀, 4.3 mm, clung to *Sargassum confusum*, depth c.a. 0.3 m, subtidal, Ebisu Rock, Oshoro, Hokkaido, 7-IX-1973, K. Kito coll. —— 1 juv, 2.8 mm, clung to *Sargassum confusum*, depth c.a.

0.3 m, subtidal, Ebisu Rock, Oshoro, Hokkaido, 26-VII-1974, K. Kito coll. —— 1 ovigerous ♀, 4.2 mm; 1 juv, 1.5 mm, clung to *Rhodomela larix*, depth 1 m, subtidal, Rumoi, Hokkaido (43°52′N, 141°35′E), 6-VIII-1985, Ishimaru coll. —— 2 ♀♀, 3.3, 4.5 mm, among *Sargassum* belt, intertidal, Kikonai, Hokkaido (41°34′N, 140°35′E), 28-IV-1983, Ishimaru coll.

Female: Body (Fig. 1-A) 3.5 mm, extremely flattened dorsoventrally, showing oval shape by help of distal margins of antenna 1, coxae 1-4, and articles 2 of pereopods 5-7; dorsum almost smooth, but dimly ridged along median line of pereonite 5 to pleonite 1; cuticle scattered with thick sensory hairs. Head (Fig. 1-B) quadrate, 1.8 times as wide as long. Eye located on ocular lobe, longitudinally elongate. Pleonites 2-3 and urosome flattened, connected with ventral face of posteriorly prolonged pleonite 1, flexed beneath pereon. Urosomite 1 and 2 (Fig. 4-D) quite dimly separated from each other; urosomites 2-3 and telson fused with each other.

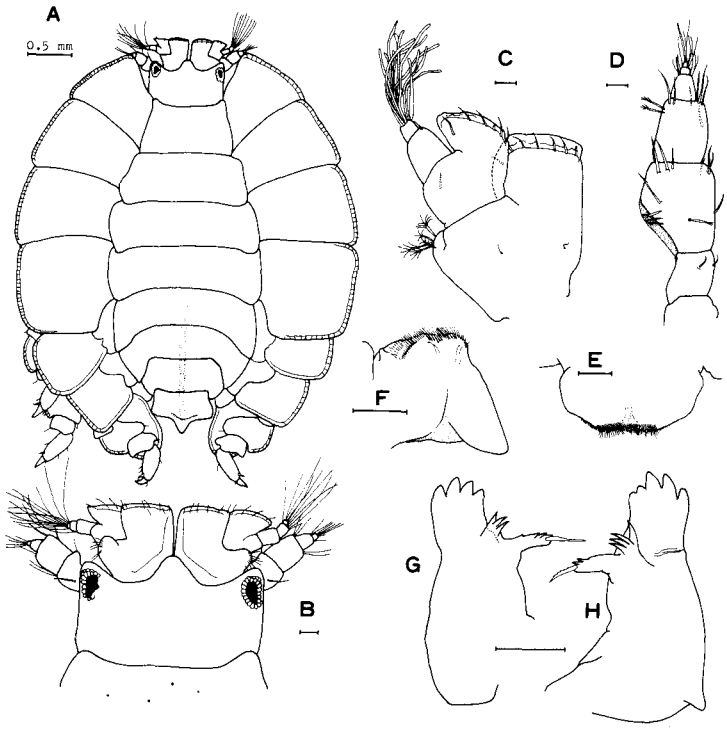

Fig. 1. *Iphiplateia whiteleggei*. Female: A, habitus; B, head; C, antenna 1 (R, vt); D, antenna 2 (R, vt); E, labrum; F, labium (vt); G, mandible (R, vt); H, mandible (L, vt). Bar scales 0.05 mm, if not mentioned.

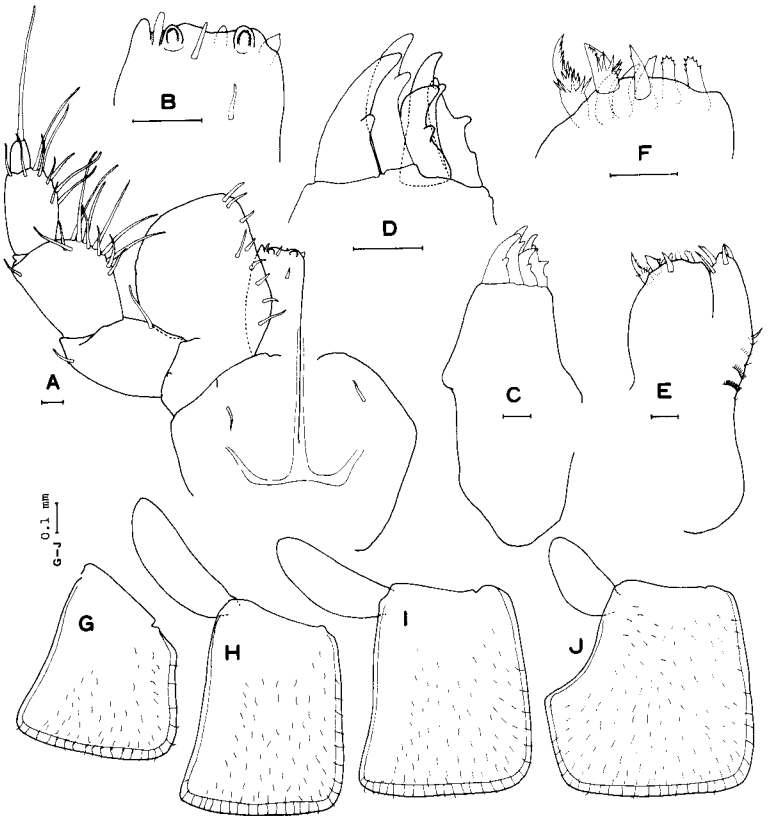

Fig. 2. *Iphiplateia whiteleggei*. Female: A, maxilliped (R, vt); B, inner plate of maxilliped (R, vt); C, maxilla 1 (R, vt); D, terminal spines of maxilla 1 (R, vt); E, maxilla 2 (L, vt); F, inner plate of maxilla 2 (L, vt); G-J, coxae 1-4 (R, out). Bar scales 0.02 mm, if not mentioned.

Antenna 1 (Fig. 1-B, C) triangular in overall appearance. Peduncular article 1 with small outer distal lobe and large quadrate inner lobe, the latter of which is very thin along distal margin. Peduncular article 2 half as long as article 1, with large triangular inner lobe which is very thin along distal margin. Flagellum half as long as peduncular article 3, biarticulate, with a long tuft of aesthetascs. *Antenna 2* (Fig. 1-D) issued from ventral face of head, about as long as antenna 1. Peduncular articles 1-2 fused with head as a low bulb. Peduncular article 4 twice as long as article 3, suddenly expanded distolaterally to reach widest width twice as wide as base, with lateral margin angular at the middle; proximal half of lateral margin with horizontally projecting dorsal flange. Remainder of antenna 2 tapering distally; flagellum half as long as article 5,

3-articulate.

Labrum (Fig. 1-E) wider than long, apically grooved and bristly. *Mandible* (Fig. 1-G, H): Molar represented by a narrow serrate process tipped with 1 terminal spine. Incisor 4- (right) and 5-dentate (left). Spine row consisting of 3 minutely serrulate spines elevated from body of mandible. Lacinia mobilis on left mandible, spine-like, smooth. *Labium* (Fig. 1-F) without inner lobe. *Maxilla 1* (Fig. 2-C): Palp and inner plate absent. Outer plate with a cusp midway along lateral margin, armed with crowded 5 terminal spines (Fig. 2-D), all of which have a middle tooth. *Maxilla 2* (Fig. 2-E) with both plates fused halfway. Inner plate (Fig. 2-F) twice as thick as outer, apically armed with 8 spine-teeth (2 thick and basally spiniferous spines medially, 1 simple spine ventrally at the middle, and 5 spine-teeth dorsally). Outer plate with 4 apical spines and 1 marginal spinule. *Maxilliped* (Fig. 2-A): Bases fused up to half of its length, with 1 facial setule. Inner plate about half as long as outer, quadrate, with 1 facial setule ventrally; apical margin (Fig. 2-B) slightly produced at outer edge, with 2 well sclerotized globular bulbs, 1 setules, and 3 spine-teeth. Outer plate semicircular, with setulose medial margin. Palp directed laterally, 4-articulate; articles 2 and 3 setose along medial margin distally; article 4 small, with 1 long terminal seta 4 times as long as article 4.

Coxae 1-4 (Fig. 2-G-J) successively subtly larger, with distal and posterior margins very thin and lined with setules. Coxa 1 quadrate but proximal margin bevelled. Coxae 2-3 similar, quadrate. Coxa 4 posteriorly excavate. Coxae 5-7 (Fig. 3-E-G) successively smaller, anterolobate.

Gills (Figs. 2-H-J, 3-E, F) on gnathopod 2 to pereopod 6; 1st to 3rd gills sausage-shaped, opaque in alcohol, successively smaller; 4th and 5th gills laminar, semitransparent in alcohol, evidently smaller than preceding ones.

Gnathopod 1 (Fig. 3-A): Article 2 slightly expanded distally. Article 5 with a row of spines obliquely near mediodistal margin anteriorly, covered with arcs of bristles behind the spine row. Article 6 slightly tapering, with a row of spines at the middle of medial face anteriorly, covered with arcs of bristles behind the spine row, armed with a spine behind article 7; palm absent. Article 7 punctuated on posterior face, with a strong nail. *Gnathopod 2* (Fig. 3-B) similar to gnathopod 1, except lack of arcs of bristles on articles 5-6, lack of spine row on article 6, and spine row of article 5 restricted only 2 spines. *Pereopods 3-4* (Fig. 3-C, D) similar. Article 4 anteriorly lobate. Article 5 oval, with 2 spines on distal edge anteriorly. Articles 6-7 similar to gnathopod 2. *Pereopods 5-6* (Fig. 3-E, F) similar. Article 2 with large posterior lobe; lobe about as long as wide, nearly quadrangular at posterodistal angle, marginally very thin and fringed with setules. Remainder of articles under posterior lobe of article 2. Article 4 expanded, distally produced at anterior and posterior distal edges, very thin along anterior margin. Article 5 slightly lobate anteriorly. Articles 6-7 similar to gnathopod 2 except their tumidity. *Pereopod 7* (Fig. 3-G): Posterior lobe of article 2 slightly shallower than those of preceding ones, bevelled proximally.

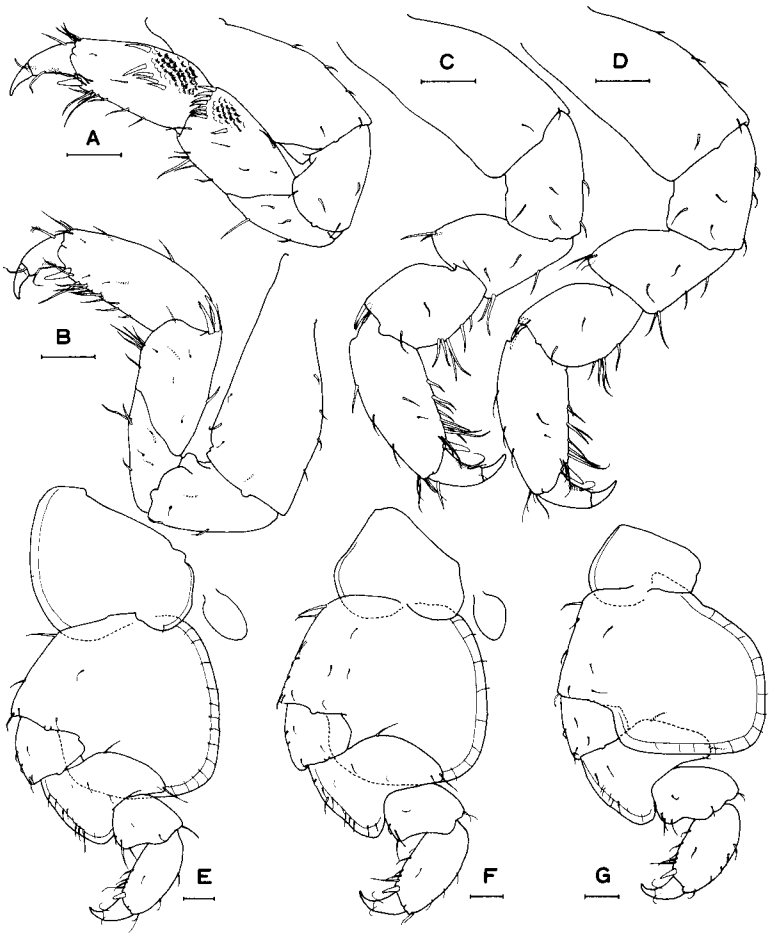

Fig. 3. *Iphiplateia whiteleggei*. Female: A, gnathopod 1 (R, inn); B, gnathopod 2 (L, out); C-G, pereopods 3-7 (R, inn). Bar scales 0.1 mm.

Remainder of articles over posterior lobe of article 2.

Pleopod 1 (Fig. 4-C): Peduncle longer than wide, not lobate, with 4 coupling spines. Rami subequal, fringed with densely plumose setae. *Pleopod 2* (Fig. 4-D): Peduncle lobate inward, with 5 coupling spines. *Pleopod 3* (Fig. 4-E): Peduncle short, strongly prolonged inward, with 2 coupling spines. Outer ramus expanded basally. Inner ramus minute, scarcely exceeding distal margin of peduncle, with 3 plumose setae.

Uropod 1 (Fig. 4-A) dorsoventrally flattened. Peduncle as long as outer ramus, with medial margin covered with row of comb-like cuticular processes.

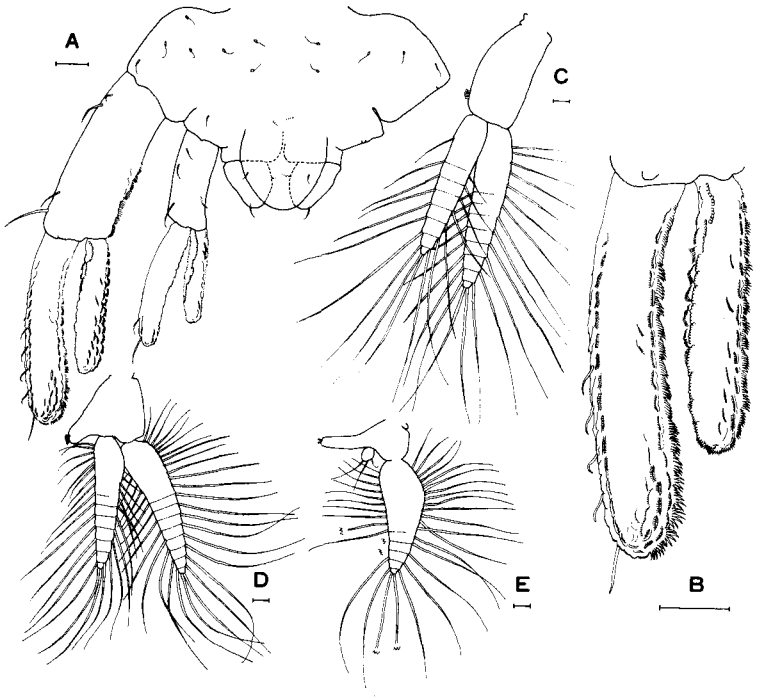

Fig. 4. *Iphiplateia whiteleggei*. Female: A, urosome (ds); B, rami of uropod 1 (L, ds); C-E, pleopods 1-3 (R, post). Bar scales 0.05 mm.

Outer ramus (Fig. 4-B) clavate, slightly curved inward, lined with a row of setules along lateral margin, lined with rows of strong comb-like structures along medial margin, covered with arcs of bristles on ventral face and submarginal area of dorsal face. Inner ramus (Fig. 4-B) three-quarters as long as outer; armature similar to outer, except rows of cuticular knobs along lateral margin and lack of marginal setules. *Uropod 2* (Fig. 4-A) smaller than and similar to uropod 1. Peduncle without row of combs. Outer ramus with a few lateral setules confined to apex. *Uropod 3* (Fig. 4-A) laminar, triangular-oval, lacking rami, with 1 terminal and 1 medial setule.

Telson (Fig. 4-A) oval, with a pair of lateral setules.

Ovigerous Female: *Oostegites* on gnathopod 2 to pereopod 5, adz-shaped, fringed with apically curled setae marginally.

Male: No difference from female can be seen.

Development. Most characters were stable as far as the 8 specimens examined

here are concerned, but the following three characters varied with the growth of the animals. The number of the marginal setae of the inner ramus of pleopod 3 was 0 in a juvenile specimen (body length = 1.5 mm), whereas 6 in an ovigerous female (4.3 mm). A similar tendency was recognized in the numbers of the spines on the articles 5 and 6 of gnathopod 1; the smallest juvenile specimen (1.5 mm) had 2 and 2 spines on the article 5 and 6 respectively, whereas a male specimen (3.8 mm) had the maximum numbers, 9 spines on the article 5 and 5 spines on the article 6. Another changeable character was the number of coupling spines on pleopods 1-3, whose minimum number was 2-3-2 in the juvenile (1.5 mm) and the maximum number 7-7-3 in the ovigerous female (4.3 mm).

Remarks. The genus *Iphiplateia* has been known to contain two member species, *viz*., *I. whiteleggei* Stebbing from East Australia (Stebbing, 1899, 1906) and New Guinea (J.L. Barnard, 1981), and *I. orientalis* Tzvetkova from the Possjet Bay, the Japan Sea coast of U.S.S.R. (Tzvetkova, 1976). This is the first record of *I. whiteleggei* from the Northern Hemisphere. The present material was apparently different from *I. orientalis* because the latter species has 1) the terminal armament of the inner plate of maxilla 2 being restricted only two but remarkably enlarged teeth, and 2) the oval-shaped article 2 of pereopod 7.

The distributional record of *I. whiteleggei* is restricted, known only from the type-locality of East Australia (Stebbing, 1899), New Guinea (J.L. Barnard,

Table 1. Comparison of three geographical forms of *Iphiplateia whiteleggei*. Characteristics of the Australian material are based on Stebbing (1899), the New Guinea material based on J.L. Barnard (1981). Shared conditions are bolded.

Characters/Localities	Japan	New Guinea	Australia
1. Head	quadrate	distally expanded	distally expanded ?
2. Eye	**small** **longitudinally elongate** **in ocular lobe**	large transversely elongate out of ocular lobe	**small** **longitudinally elongate** **in ocular lobe**
3. Pereonite 1	**without hump**	with hump	**without hump**
4. Pleonite 1	**acute**	obtuse	**acute**
5. Antenna 1: inner lobe of article 1	quadrate	rather quadrate	rounded
6. Antenna 2	robust	**slender**	**slender**
7. flagellum	**3-articulate**	**3-articulate**	2-articulate
8. article 5	quadrate	medium	oval
9. Coxa 1: proximal margin	**not**	**not**	posteriorly prolonged
10. Gnathopod 1: article 5	**short**	**short**	long
11. Pereopods 5-7: article 2	**wider than long**	longer than wide	**wider than long**

1981), and the Japan Sea coast of Japan (the present study). There are some morphological differences among the specimens from these three areas as shown in Table 1. Of the eleven characters enumerated, the structure of pereonite 1 may be unreliable. J.L. Barnard (1981) noted his New Guinea material of *I. whiteleggei* had a dorsal hump on pereonite 1, which was extended over the head. In my Japanese material, I also noticed one specimen showing a similar condition to what J.L. Barnard described and figured, but this hump-like structure soon proved to be merely a dorsal swelling of the arthrodial membrane swollen out between the head and the pereonite 1 over the head. This swelling was an artifact probably brought by fixation, as all other specimens examined did not bear such a structure at all. I suppose the dorsal hump of pereonite 1 in the New Guinea material would be also an artifact, because the figure of the hump is evidently bordered from the body of the pereonite 1 by a solid line, suggestive of the anterior border of the pereonite 1 (J.L. Barnard, 1981). The number of the flagellar articles of antenna 2 also may be unreliable, since the terminal (third) article is so small that Stebbing (1899) might have overlooked this minute structure in his Australian material. Even excluding the above two and other intergraded or unclear characters, however, remarkable differences lie among the three localities. Between the Australian and the New Guinea material there are differences in the structures of eyes, pleonite 1, coxa 1, the article 5 of gnathopod 1, and the articles 2 of pereopods 5–7. It may be possible that the New Guinea material would be raised to the specific or the subspecific rank in the future. Though the present material from northern Japan is rather similar to the Australian material, the Japanese material differs from the latter in a different way: the robustness of antenna 2, the shape of the article 5 of antenna 2, the shape of coxa 1, and the relative length of the article 5 of gnathopod 1.

Although the above discussion results in recognizing three geographical forms, I think the reexamination of the Australian material is indispensable before the formal recognition of these forms, so that the three forms are herein treated as informal subgroups under the single species, *I. whiteleggei*, provisionally.

The present species shows a very characteristic external appearance as detailed in the description. It is noticeable that two non-amphipod taxa are seemingly very similar to *Iphiplateia* amphipods in the overall appearance; these are the larval forms of coleopteran insects Psephenidae, and a flabelliferan isopod *Leptosphaeroma gottschei* Hirgendorf, 1885. The insects live in the narrow spaces under stones in freshwater streams where the water is shallow and swift (Pennak, 1978), and the isopod in the similar spaces of the intertidal zone (Nishimura, 1976; Ishimaru, personal observation). Both are highly adapted to the life in such narrow spaces as the undersides of stones, by tightly adhering to the lower surfaces of stones as if they were sucking disks. They are extraordinarily flattened, and oval in dorsal view. Their legs are hidden under the widely flaring margins which are frilled with curtains of setae. These curtains of the marginal setae probably serve to help the animals act in a suckerlike fashion. In *I. whiteleggei*

is seen another marginal structure, namely, the very thin flange composed of the distal margins of coxae 1-4, the posterior margins of the articles 2, and the anterior margins of the articles 4 of pereopods 5-7. Though knowledge about the habitat of *I. whiteleggei* is unfortunately scarce, this flange is to a great degree suggestive of their adhering function in the same manner as psephenid larvae and the *Leptosphaeroma* isopod do.

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