# Taxonomic Studies of the Family Pleustidae (Crustacea, Amphipoda, Gammaridea) from Coastal Waters of Northern Japan. III. The Genus *Pleusirus*, with Notes on Body Aesthetascs

By

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(*With 5 Text-figures and 1 Table*)

As the third issue of the serial taxonomic work of the Japanese pleustid amphipods, *Pleusirus secorrus* J.L. Barnard, 1969 is redescribed based on the Japanese material. From the present examination, status of so far recognized two subspecies of the present species is discussed.

The details of the measurement of body parts and the provenance of materials were given in the first issue of this series (Ishimaru, 1984).

## Genus ***Pleusirus*** J.L. Barnard, 1969

*Pleusirus* J.L. Barnard, 1969, p. 204.

### ***Pleusirus secorrus*** J.L. Barnard, 1969

(Figs. 1-5)

*Pleusirus secorrus* J.L. Barnard, 1969, p. 204, figs. 56-57.

*Pleusirus seccorus* [*sic*] *asiaticus* Kudrjaschov and Tzvetkova, 1975, p. 1314, fig. 2A; Kudrjaschov, 1980, p. 87.

Material examined. 1 ov ♀, 4.7 mm ('a', fully described); 4 juv, 2.5, 2.8, 2.8, 3.2 mm: 0.5 m, among *Laminaria* belt, Oshoro, Hokkaido, 14-VI-1982, Ishimaru coll. —— 1 ov ♀, 4.5 mm ('b'): 0.5 m, among *Sargassum* belt, Oshoro, Hokkaido, 1-VIII-1982, Ishimaru coll. —— 1 juv, 3.9 mm: intertidal, among *Leathesia* and other algae scraped from the surface of boulders, Otsuchi, Iwate Pref., 14-VI-1983, H. Hoshikawa coll.

*Female* 'a'. Body (Fig. 1-A) 4.7 mm long, feeble and very weakly chitinized,

translucent; color white after a few days preservation in 5%-formalin. Head (Fig. 1-B) about as long as pereonites 2-3 combined. Rostrum large, with blunt apex. Lateral cephalic lobe moderately produced forward, circular. Cheek very tiny, with acute apex. Superior antennal sinus deep. Inferior antennal sinus small. Eye large, oval, with a black core surrounded by relatively thick band of transparent facets. Back (Fig. 1-A) smooth. Coxae 1-4 of medium depth, successively deeper. Epimeron 1 (Fig. 1-C) spatulate, with a few spines ventrally. Epimeron 2 straight at posterior margin, bearing a few spines ventrally, with a small blunt cusp at posteroventral corner. Epimeron 3 subquadrate, similar to epimeron 2, but with more sinuous posterior margin. Urosome (Fig. 1-A) shorter than pleonites 2-3 combined; urosomite 1 the longest, about as long as pleonite 3; urosomite 2 very short; urosomite 3 about half as long as urosomite 1. Body aesthetascs (Fig. 1-A, D, E) presest, short or long, filamentous, issued from pereonites 5-7 and pleonites 1-2.

*Antenna 1* (Fig. 2-A) about 40% as long as body. Peduncle very short. Peduncular article 1 robust. Peduncular article 2 short, about 40% as long as article 1, broader than long. Peduncular article 3 small, a little shorter and distinctly narrower than article 2. Primary flagellum thin, about 4 times longer than peduncle, 19-articulate; each article very elongate; first two articles apically furnished with two sets of armaments, one of which consists of setules and the other of setules and aesthetascs; each succeeding article alternately bearing two sets of setules or two sets equal to the first two articles. Accessory flagellum (Fig. 2-B) minute, scale-like, articulated from peduncle. *Antenna 2* (Fig. 2-C) about 80% as long as antenna 1. Gland cone very short to reach only basal part of peduncular article 3. Peduncular article 3 relatively large, somewhat expanded dorsodistally, armed with some spines on the expansion. Peduncular article 4 longer than article 3, furnished with a few spines and setae at the middle of dorsal face, and with many setae dorsally on distal margin. Peduncular article 5 small, thinner than and 80% as long as article 4. Flagellum twice longer than peduncle, 15-articulate; each article longer than wide, bearing two sets of apical setules.

*Labrum* (Fig. 1-F) subcircular, minutely and asymmetrically incised. *Mandible.* Body (Fig. 2-D) subquadrate, long; molar completely absent; both incisors with 7 denticles; lacinia mobilis on left mandible only, with 10 minute denticles; spine row of 4 spines. Palp thin, about twice longer than body, 3-articulate; article 1 long; article 2 twice longer than article 1, lined with a sparse row of setae along posterior margin; article 3 1.5 times longer than article 1, falcate, armed with 5 pectinate spines along posterior margin, bearing three long or short setae at apex, with outer face highly bristly. *Labium* (Fig. 1-G) typical to the family, without inner lobe; margin between both outer lobes horizontal. *Maxilla 1* (Fig. 2-G). Inner plate oval, without seta. Outer plate apically armed with a ventral and a dorsal row, each consisting of 4 and 5 pectinate spines. Palp biarticulate, extending beyond outer plate; proximal article without seta;

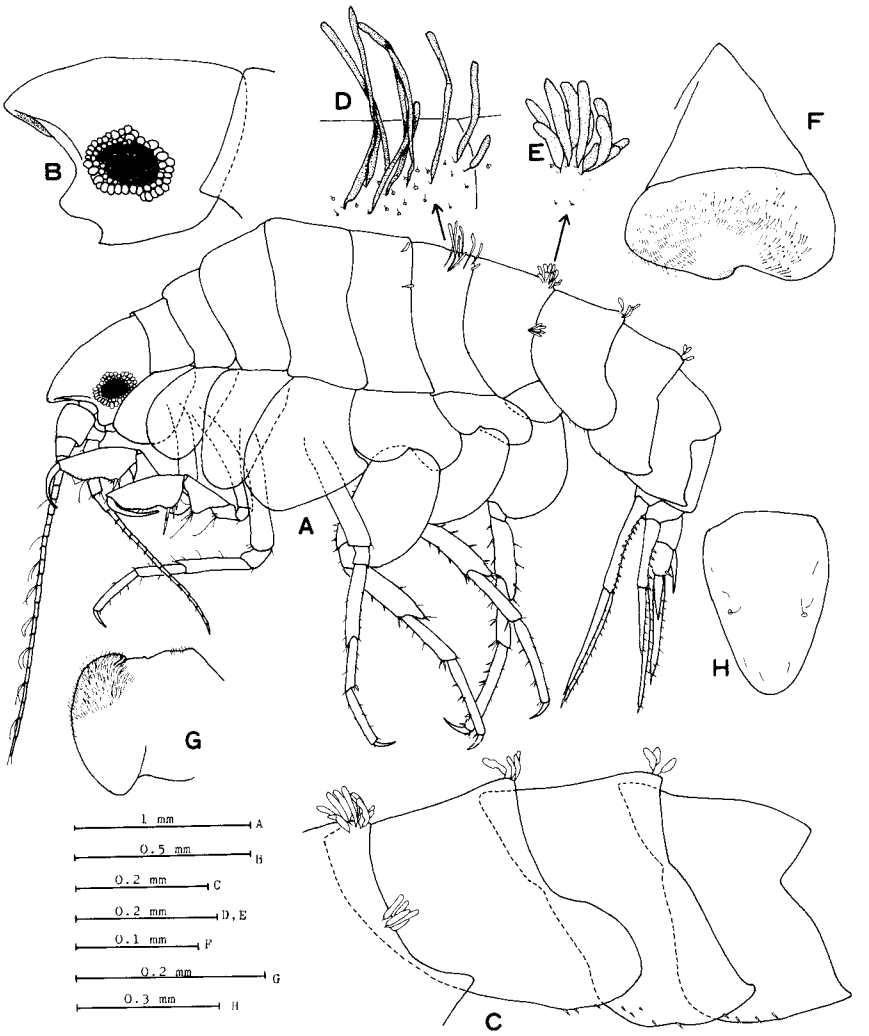


Fig. 1. *Pleusirus secorrus*. Female 'a'. A, habitus; B, head; C, epimera 1-3; D-E, body aesthetascs; F, labrum; G, labium (vr); H, telson (ds).

distal article thinner than outer plate, sparsely bristly, armed with 6 finely pectinate spines distally along inner margin, furnished with a setal row obliquely. *Maxilla 2* (Fig. 2-H). Inner plate oval, furnished with two setal rows apicomarginally, without long seta. Outer plate as thick as, and slightly extending beyond inner plate, furnished apicomarginally with two setal rows; both rows

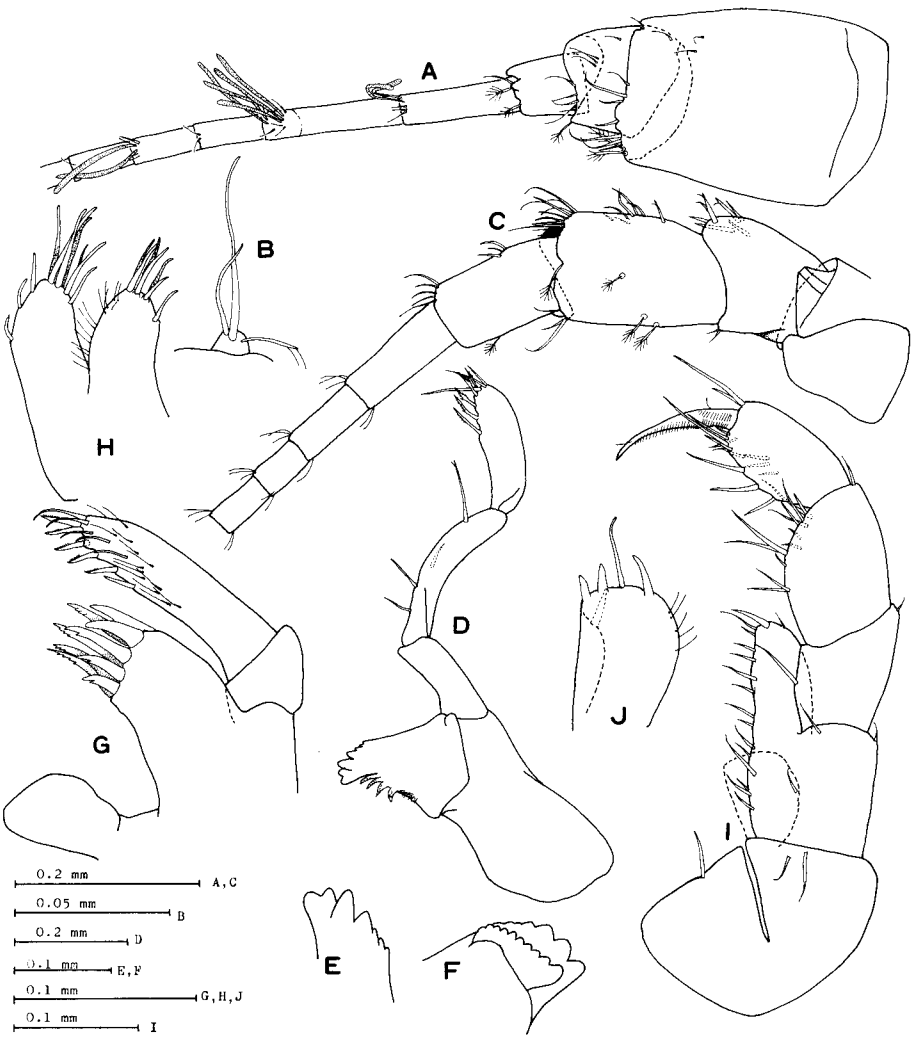


Fig. 2. *Pleusirus secorrus*. Female 'a'. A, antenna 1 (R, inn); B, accessory flagellum; C, antenna 2 (R, inn); D, mandible (R, inn); E, incisor (R, inn); F, incisor and lacinia mobilis (L, inn); G, maxilla 1 (L, vr); H, maxilla 2 (R, vr); I, maxilliped (L, vr); J, inner plate of maxilliped (L, vr).

consisting of setae equal in thickness. *Maxilliped* (Fig. 2-I). Distal margin of basis oblique, with a group of setae at the middle, subacute around distal portion; both bases ordinarily fused with each other to 40% of length. Inner plate (Fig. 2-J) not reaching base of palp, adz-shaped, armed with a spine at the middle of

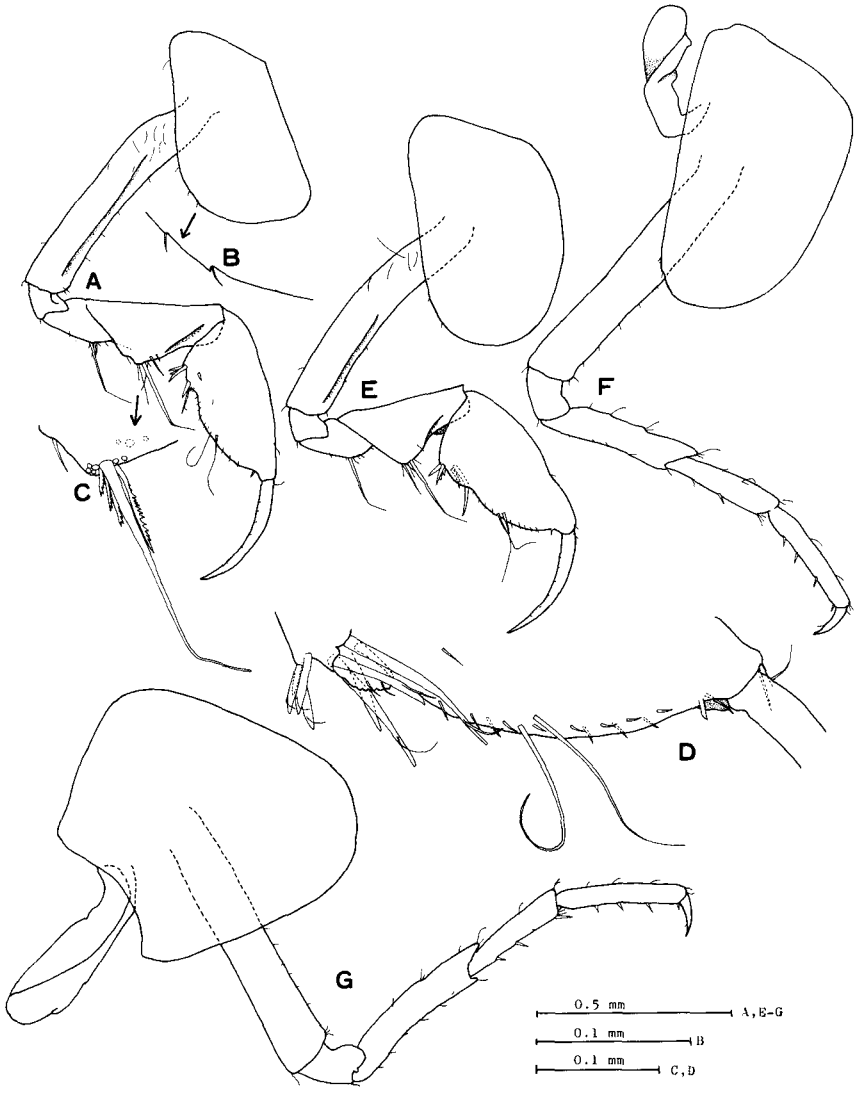


Fig. 3. *Pleusirus secorrus*. Female 'a'. A, gnathopod 1 (R, out); B, posteroventral corner of coxa 1; C, posterior lobe of article 5 of gnathopod 1 (so); D, palm of gnathopod 1 (R, out); E, gnathopod 2 (R, out); F-G, pereopods 3-4 (R, out).

inner margin; apex with a seta, a long spine and two stumpy spines. Ishium bearing a setule at distal edge of outer margin. Outer plate not reaching apex of palp article 1, furnished with a setal row along inner margin; a slender spine

arising from apex. Palp 4-articulate, ornamented with setae sparsely along inner margin; articles 1-2 with a setule respectively at distal edge of outer margin; article 3 not distally produced, without pectinate spines; article 4 falcate, as long as article 3; dorsal face of articles 3-4 highly bristly.

*Gnathopod 1* (Fig. 3-A) feeble. Coxa 1 slightly expanded distally, with round ventral margin, bearing a small indistinct notch at posteroventral corner (Fig. 3-B). Article 2 slender. Article 3 with distal lobe. Article 4 toothless, with a long seta at posterior margin. Article 5 elongate, eusirid-like in structure, with a broad triangular lobe bearing a long seta (Fig. 3-C) apically. Article 6 as

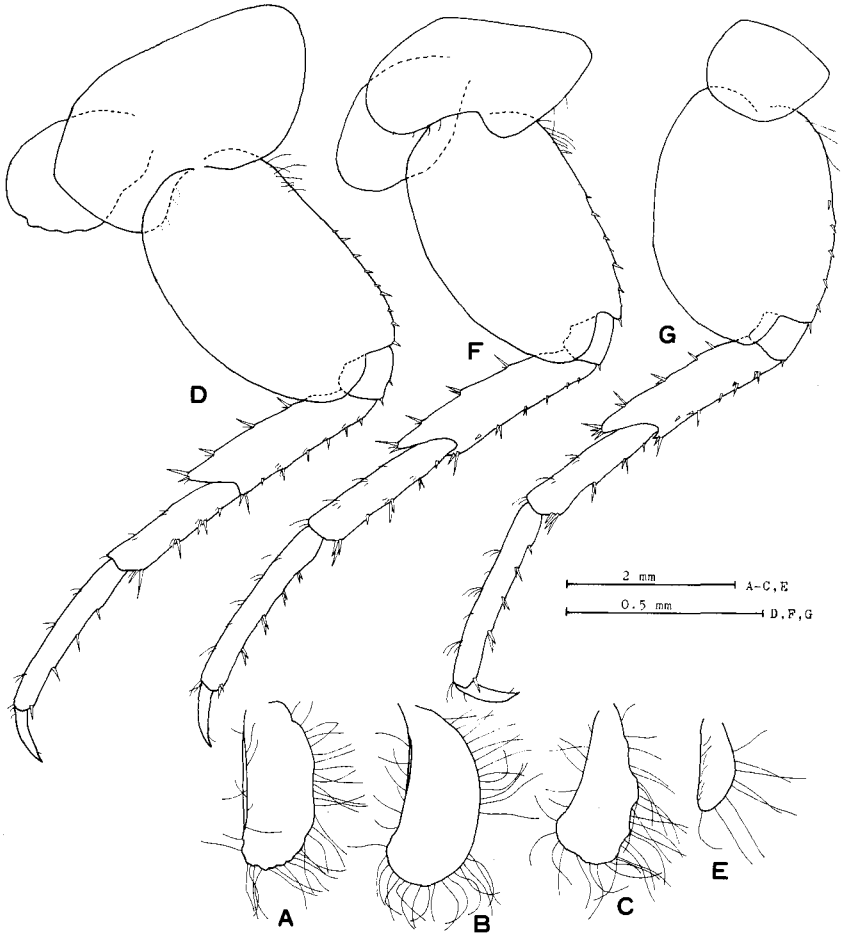


Fig. 4. *Pleusirus secorrus*. Female 'a'. A-C, oostegites of gnathopod 2 and pereopods 3-4 (R); D, pereopod 5 (R, out); E, oostegite of pereopod 5 (R); F-G, pereopods 6-7 (R, out).

long as articles 4-5 combined, attached to the produced apex of article 5, subchelate; palm (Fig. 3-D) about twice longer than posterior margin, delimited by two groups of spines; palmar margin without small cusp, slightly concave at the place just distal to the delimiting spines, almost smooth but minutely scalloped proximal to the concavity; a pair of long setae inset at the middle of palmar margin. Article 7 falcate, as long as palm, with a row of small hairs along inner margin. *Gnathopod 2* (Figs. 3-E, 4-A). Coxa 2 subcircular, a little deeper than coxa 1. Articles 2-7 of equal size and structure to those of gnathopod 1.

*Pereopod 3* (Figs. 3-F, 4-B) feeble. Coxa 3 with ventral margin gently rounded. Article 2 long and slender, as long as articles 3-5 combined. Article 4 narrow and long, extending anterodistally to reach some 20% length of article 5. Articles 5-6 subequal in length, lined with a row of spines along posterior margin. Other armaments consisting of setules. *Pereoped 4* (Figs. 3-G, 4-C). Coxa 4 subcircular, with narrow ventral margin, excavate; posterior angle of the excavation subacute, with round apex. *Pereopod 5* (Fig. 4-D, E). Coxa 5 bilobed; anterior lobe wider and slightly shallower than posterior one. Article 2 posteriorly lobate, oval, with spinose anterior and smooth posterior margin; posterior lobe extending distally not to reach distal margin of article 3. Article 4 narrow, lined with a row of spines along both anterior and posterior margins; posterior lobe reaching some 25% length of article 5. Articles 5-6 long, spinose along anterior margin. *Pereopods 6-7* (Fig. 4-F, G). Coxa 6 posterolobate; posterior lobe as deep as and wider than anterior one. Coxa 7 circular.

*Pleopods 1-3* broken.

*Uropod 1* (Fig. 5-D) the longest. Peduncle with a dense row of spines along outer ridge, armed with a large stout spine at distal end of outer ridge. Inner ramus 1.2 times longer than peduncle, lined with a row of spines along both inner and outer ridges, armed with two apical protrusions; a spine of medium length inset between both protrusions. Outer ramus 90% as long as inner. *Uropod 2* (Fig. 5-E) about 90% as long as uropod 1. Peduncle armed with a row of spines along outer ridge. Inner ramus 1.7 times longer than peduncle. Outer ramus 55% as long as inner. *Uropod 3* (Fig. 5-F) about 70% as long as uropod 1. Peduncle with a spine on outer ridge distally. Inner ramus 3.3 times longer than peduncle, with acute and non-spinose apex. Outer ramus about 40% as long as inner.

*Telson* (Fig. 1-H) triangular-oval, about 1.6 times longer than peduncle of uropod 3 *in situ* view (Fig. 1-A), about 1.5 times longer than wide, without apical setules; a pair of two penicillate hairs issued from the middle of lateral margins.

*Female* 'b'. Body 4.5 mm long.

*Pleopod 1* (Fig. 5-A). Peduncle densely furnished with a row of plumose setae along outer margin. Inner ramus 1.5 times longer than peduncle; outer ramus only a little shorter than inner; 8 articles on inner ramus and 9 on outer; proximal article long, furnished with several plumose setae marginally. *Pleopod*

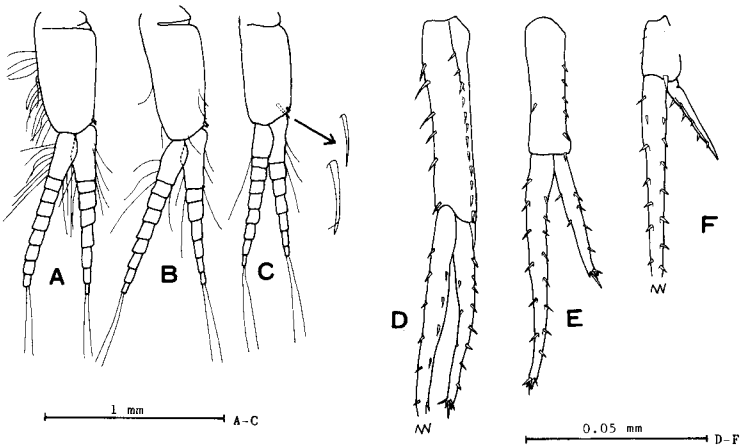


Fig. 5. *Pleusirus secorrus*. Female 'b'. A-C, pleopods 1-3 (R, ant). Female 'a'. D-F, uropods 1-3 (R, ds).

*2* (Fig. 5-B) as long as pleopod 1, with peduncle sparsely setose along outer margin. *Pleopod 3* (Fig. 5-C) about 90% as long as pleopod 1. Peduncle bearing a few plumose setae, with a long spine on posterior face near coupling spines.

*Remarks*. This is the only species of the genus *Pleusirus*, originally described from the intertidal zones around California (J.L. Barnard, 1969). Later, Kudrjaschov and Tzvetkova (1975) described a subspecies, *P. s. asiaticus*, from the coastal waters of southern Sakhalin.

According to Kudrjaschov and Tzvetkova (1975), *P. s. asiaticus* differs from *P. s. secorrus* in the following ten characters (corresponding conditions of *P. s. secorrus* in parentheses if necessary): 1-2) the shorter inner and outer plates of maxilliped; 3) absence of an apical spine in the outer plate of maxilliped; 4) absence of a lateral spine in the inner plate of maxilliped; 5) possession of a spinule at apex of the inner plate of maxilla 1; 6) absence of a penicillate hair at the ventrodistal angle of the peduncular article 1 of antenna 1; 7-8) absence of setules on both flagella of antennae 1-2; 9) absence of any armature on telson; 10) simple spines on the article 3 of mandibular palp (pectinate). Among these ten characters, however, the taxonomic value of the latter seven characters is ambiguous. The conditions of these characters are hardly recognizable unless a phase-contrast microscope is used for observation, because the animal has very weakly chitinized cuticle. Further, the figures of the original description of *P. s. asiaticus* lack details of these seven characters. The present specimens from Hokkaido, a neighboring island south of Sakhalin, well correspond to the Californian specimens (figured in J.L. Barnard, 1969), in these seven characters. I suspect that the conditions of the seven characters of *P. s. asiaticus* are due to the

Table 1. Comparison of four diagnostic characters among the three forms of *Pleusirus secorrus*: *P. s. secorrus* (California), *P. s. asiaticus* (southern Sakhalin) and specimens from northern Japan. Conditions of exotic materials were based on J.L. Barnard (1969) and Kudrjaschov and Tzvetkova (1975).

| Characters | California | southern Sakhalin | northern Japan |
|---|---|---|---|
| 1. inner plate of maxilliped | long | **short** | **short** |
| 2. outer plate of maxilliped | long | **short** | **short** |
| 3. inner plate of maxilla 1 | **without seta** | with seta | **without seta** |
| 4. body aesthetascs | **absent** | **absent** | present |

observational error.

Conditions of the remaining three characters, along with another remarkable character, the body aesthetascs, were compared among the three localities (Table 1). The Japanese specimens agree with the Sakhalin specimen in the conditions of the inner and the outer plate of maxilliped, but agree with the Californian specimen in that of the inner plate of maxilla 1. Remarkably, the Japanese material is different from both Californian and Sakhalin materials by possessing the body aesthetascs. Although I cannot decide whether or not *P. secorrus* is to be separated into two or more subspecies, I tentatively lump the above three forms under *P. secorrus* without dividing them into any subspecies until taxonomic significances of the four characters (Table 1) will be clarified correctly.

As mentioned above, the Japanese specimens of *P. secorrus* are noticeable in the possession of the aesthetasc-like structures arising from the dorsum, which I called the body aesthetascs. At first glance, they look like epibiotic protozoans, but they are the organs of the animal own. Usual aesthetascs have been known confined to the flagella of antennae in amphipods. As far as I know, only three species of Pleustidae bear aesthetascs on the parts other than the antennae. They are *Parapleustes tricuspis* Ishimaru (1984), *Pleusymtes mucidus* Ishimaru (1985), and the Japanese specimens of *Pleusirus secorrus* described above. The external morphology of the body aesthetascs of these three species is similar to that of the antennal aesthetasc, comprising a long and feeble shaft issued from the center of a basal cuticular concavity. The arrangement of body aesthetascs is constant in the specimens of the same species. Further, the arrangement is not different among the three species above. The body aesthetascs may function as chemoreceptors as the antennal aesthetascs do, or function as tactile sensory organs.

*Distribution*. Hitherto recorded from California, and southern Sakhalin, U.S.S.R. (as *P.s. asiaticus*).

## Summary

The Japanese material of *Pleusirus secorrus* J.L. Barnard, 1969, that was so far recorded from California and southern Sakhalin, was described. It differs from both Californian material and Sakhalin material (*P. s. asiaticus*) in the possession of the body aesthetascs. Although some previous authors treated Californian and Sakhalin materials under separate subspecies, the differences among those two forms and the present material seem to be too small to treat them subspecifically.

So-called aesthetascs are usually confined to antennae, and aesthetascs on the body surface are known only in three pleustid species, *viz.*, *Parapleustes tricuspis*, *Pleusymtes mucidus* and the present Japanese specimens of *Pleusirus secorrus*.

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