



## **Two New Freshwater Species of the Genus Jesogammarus (Crustacea: Amphipoda: Anisogammaridae) from Northern Japan**

Authors: Tomikawa, Ko, and Morino, Hiroshi

Source: Zoological Science, 20(2) : 229-241

Published By: Zoological Society of Japan

URL: <https://doi.org/10.2108/zsj.20.229>

---

BioOne Complete ([complete.BioOne.org](https://complete.BioOne.org)) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](https://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

# Two New Freshwater Species of the Genus *Jesogammarus* (Crustacea: Amphipoda: Anisogammaridae) from Northern Japan

Ko Tomikawa<sup>1\*</sup> and Hiroshi Morino<sup>2</sup>

<sup>1</sup>*Division of Biological Sciences, Graduate School of Science, Hokkaido University,  
Sapporo, 060-0810 Japan*

<sup>2</sup>*Department of Environmental Sciences, Faculty of Science,  
Ibaraki University, Mito, 310-8512 Japan*

**ABSTRACT**—Two new anisogammarid species belonging to the genus *Jesogammarus* were obtained from freshwater habitats from northern Japan. They are *Jesogammarus (J.) fujinoi* sp. nov. and *Jesogammarus (J.) shonaiensis* sp. nov.. The former new species is diagnosed by the pleonites without spine and the telson without distolateral spine. The other new species differs from the congeneric species in having many dorsal spines on pleonites 1–3.

**Key words:** new species, Anisogammaridae, *Jesogammarus*, Taxonomy, Japan

## INTRODUCTION

The genus *Jesogammarus* in the sense of Morino (1985) has been known from the northwestern Pacific rim regions including Japan, Korea and China (Morino, 1994). To date it contains 11 species within two subgenera that occur in cold fresh waters to brackish habitats. This species diversity is surely an underestimate when consider a poor knowledge for the continental regions (Morino and Dai, 1990). This is also partly the case in Japan, as some Japanese species remain to be described (Bousfield, 1979; Morino, 1985), and several areas of this country await intensive taxonomical surveys. The senior author has carried out field studies to clarify the fauna in northern Japan, intensively in Yamagata Prefecture. The present study yielded two new species in the subgenus *Jesogammarus* as described below.

## MATERIALS AND METHODS

The specimens were collected by scooping with a fine mesh hand-net, and fixed in 70% ethanol at the site. The body length from the base of the first antenna to that of a telson was measured to the nearest 0.1 mm by straightening out each animal. The sex of each individual was determined by the presence of brood plates for females and genital papillae for males. Appendages were dissected and embedded in a gum-chloral medium on glass slides. The type material is deposited in the National Science Museum, Tokyo

(NSMT).

## TAXONOMY

***Jesogammarus (Jesogammarus) fujinoi* sp. nov.**

(Japanese name: Fujino-yokoebi, new)

(Figs. 1–5)

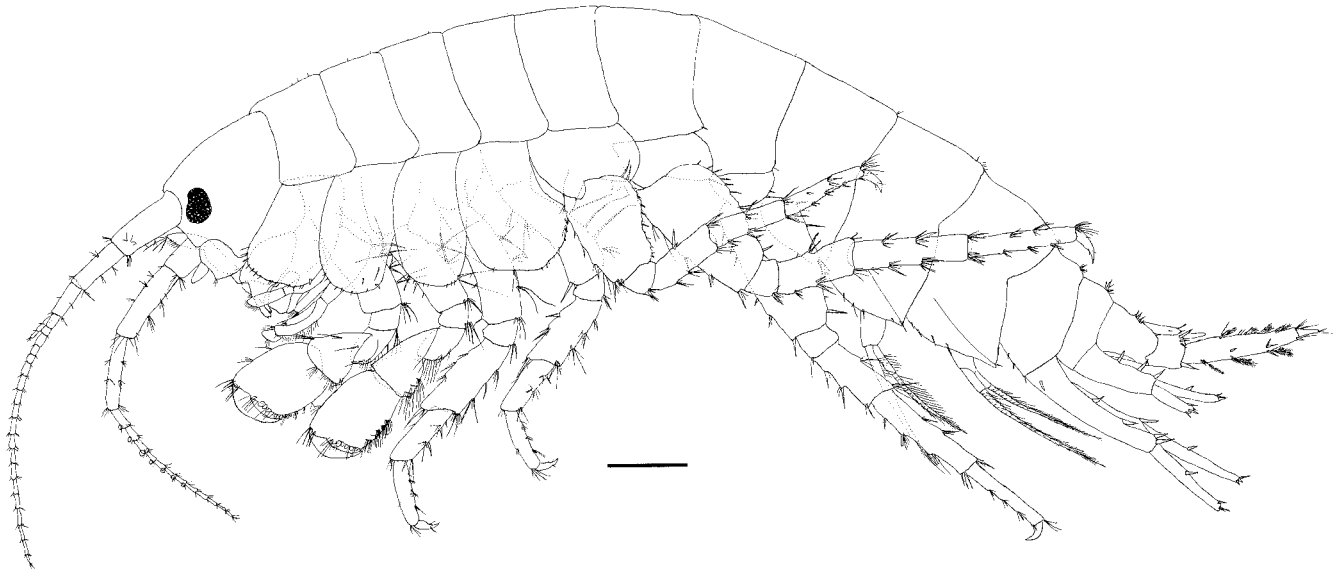
### Type series

Holotype, NSMT-Cr. 2757 (male, 13.6 mm, 10 Oct. 2000, 4 microscope slides and 1 ethanol); paratypes, NSMT-Cr. 2758 (allotype, ovigerous female, 9.7 mm, 26 Jul. 2000, 10 microscope slides and 1 ethanol), NSMT-Cr. 2759 (male, 13.0 mm, 28 Aug. 2000, 3 microscope slides and 1 ethanol), NSMT-Cr. 2760 (male, 12.1 mm, 17 Nov. 2001, 1 ethanol), NSMT-Cr. 2761 (male, 12.7 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2762 (male, 11.9 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2763 (male, 12.5 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2764 (male, 10.2 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2765 (female, 9.8 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2766 (female, 8.9 mm, 10 Oct. 2000, 1 ethanol), NSMT-Cr. 2767 (ovigerous female, 9.0 mm, 10 Oct. 2000, 1 ethanol), and NSMT-Cr. 2768 (female, 8.9 mm, 10 Oct. 2000, 1 ethanol); Gobanmiki (38°14'07"N, 140°10'47"E), Yamanobe-machi, Yamagata Prefecture, a spring from Mt. Shirataka, collected by K. Tomikawa.

### Other materials

14 males, 11 females, 2 juveniles, 19 Nov. 2000, Katsura-buchi (38°20'37"N, 140°25'44"E), Tendo-shi, Yamagata Prefecture, collected by K. Tomikawa; 4 males, 14 (2

\* Corresponding author: Tel. +81-11-706-3524;  
FAX. +81-11-746-0862.  
E-mail: tomikawa@sci.hokudai.ac.jp



**Fig. 1.** *Jesogammarus (Jesogammarus) fujinoi* sp. nov. Gobanmiki, Yamagata Pref., Japan. Male 13.0 mm-paratype. Scale: 1 mm.

ovig.) females, 6 Feb. 2001, Benzaiten-shimizu (38°15'17"N, 140°10'45"E), Yamanobe-machi, Yamagata Prefecture, collected by K. Tomikawa; 14 males, 28 (19 ovig.) females, 26 Apr. 2000, Ohira (38°14'08"N, 140°10'46"E), Yamagata-shi, Yamagata Prefecture, collected by K. Tomikawa; 24 males, 10 (1 ovig.) females, 13 Feb. 2001, Ohira (38°13'50"N, 140°11'14"E), Yamagata-shi, Yamagata Prefecture, collected by K. Tomikawa; 22 males, 35 (4 ovig.) females, 17 juveniles, 9 Apr. 2001, Owarabi (38°13'51"N, 140°10'47"E), Yamanobe-machi, Yamagata Prefecture, collected by K. Tomikawa.

### Diagnosis

Peduncular article 1 of antenna 1 with 1 posterodistal spine. Pleonites 1–3 without spine. Urosomites 1 and 2 with closely-set spine clusters in the middle of dorsal margin, urosomite 3 with a pair of lateral spines and a pair of medial spine-cluster. Outer ramus of uropod 2 marginally bare.

### Description of male (holotype)

Head as long as deep. Eyes small, suboval.

Antenna 1 (Fig. 2A): 45.2% of body length; length ratio of peduncular articles 1–3 = 1: 0.85: 0.45; peduncular article 1 with 1 posteromarginal short setal cluster, 1 seta and 1 posterodistal spine; articles 2 and 3 with 2 and 1 posteromarginal short setal clusters, respectively; flagellum 22-articulated; accessory flagellum 6-articulated.

Antenna 2 (Fig. 2B, C): 72.0% length of antenna 1; peduncular articles 4 and 5 subequal in length, with 3 and 2 posteromarginal short setal clusters, respectively; flagellum 13-articulated, articles 1–7 with cup-calceoli.

Mandible (Fig. 2I–K): left and right incisors 5- and 4-dentate, respectively; left lacinia mobilis 4-dentate, right lacinia mobilis 2-edged; palp article 1 unarmed; article 2 with 11 marginal and 8 submarginal setae, 1 middle stiff seta,

proximo-submarginally with 2 groups of double spines; article 3 92.2% length of article 2, with 3 A-setae clusters and 1 B-setae cluster.

Right maxilla 1 (Fig. 2F, G): palp article 2 with 4 setae on outer margin, apically with 8 spines and 8 setae; outer plate apically with 11 serrated spines; inner plate with 18 plumose setae medially.

Left maxilla 1: palp article 2 apically with 9 spines and 8 setae; inner plate with 23 plumose setae medially

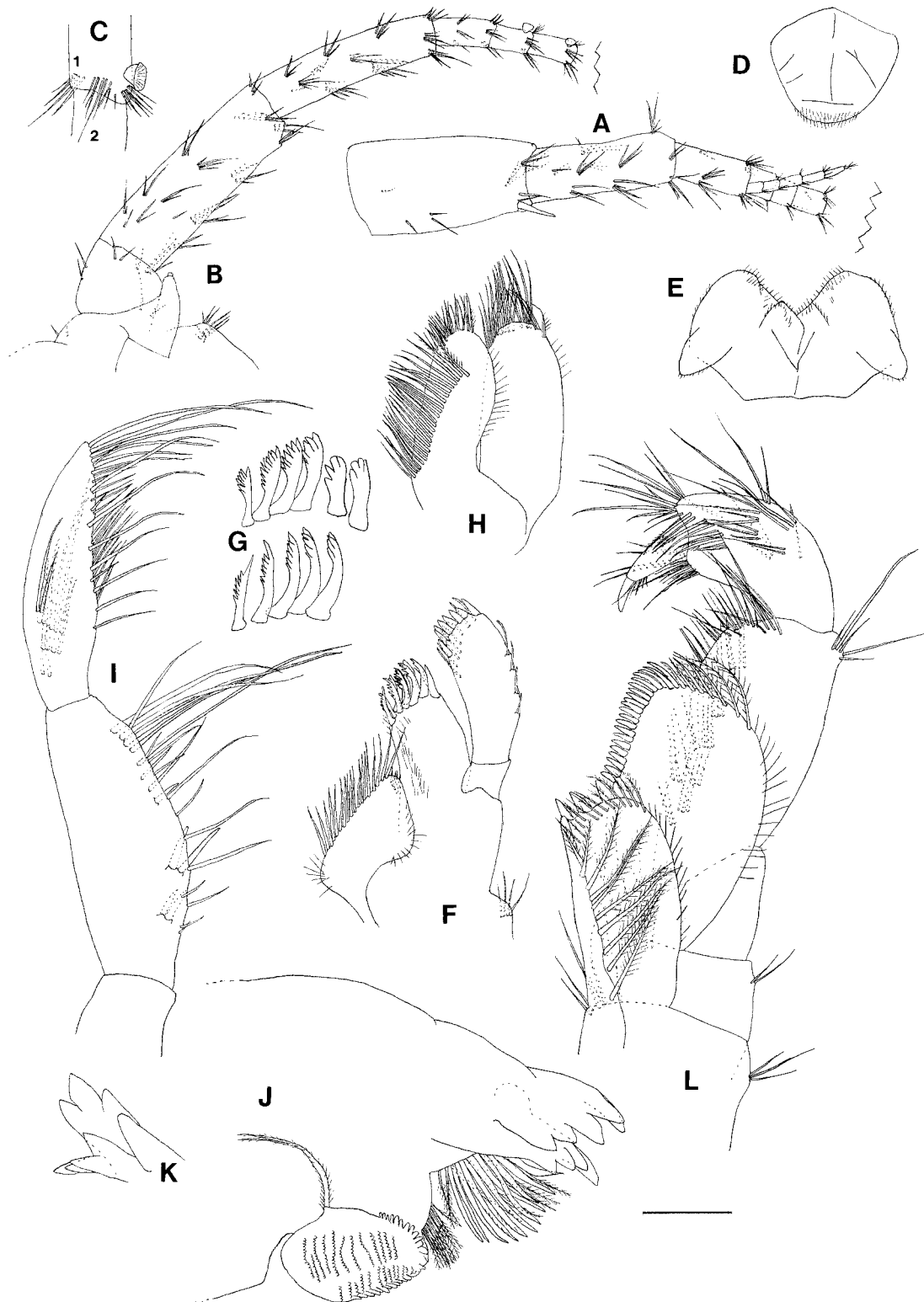
Maxilla 2 (Fig. 2H): inner plate with 26 facial setae.

Maxilliped (Fig. 2L): inner plate 82.5% length of outer plate, with 3 apical spines and 3 medial bent spines; outer plate 79% length of palp article 2, medial marginal spines closely set, a few distal spines pectinate.

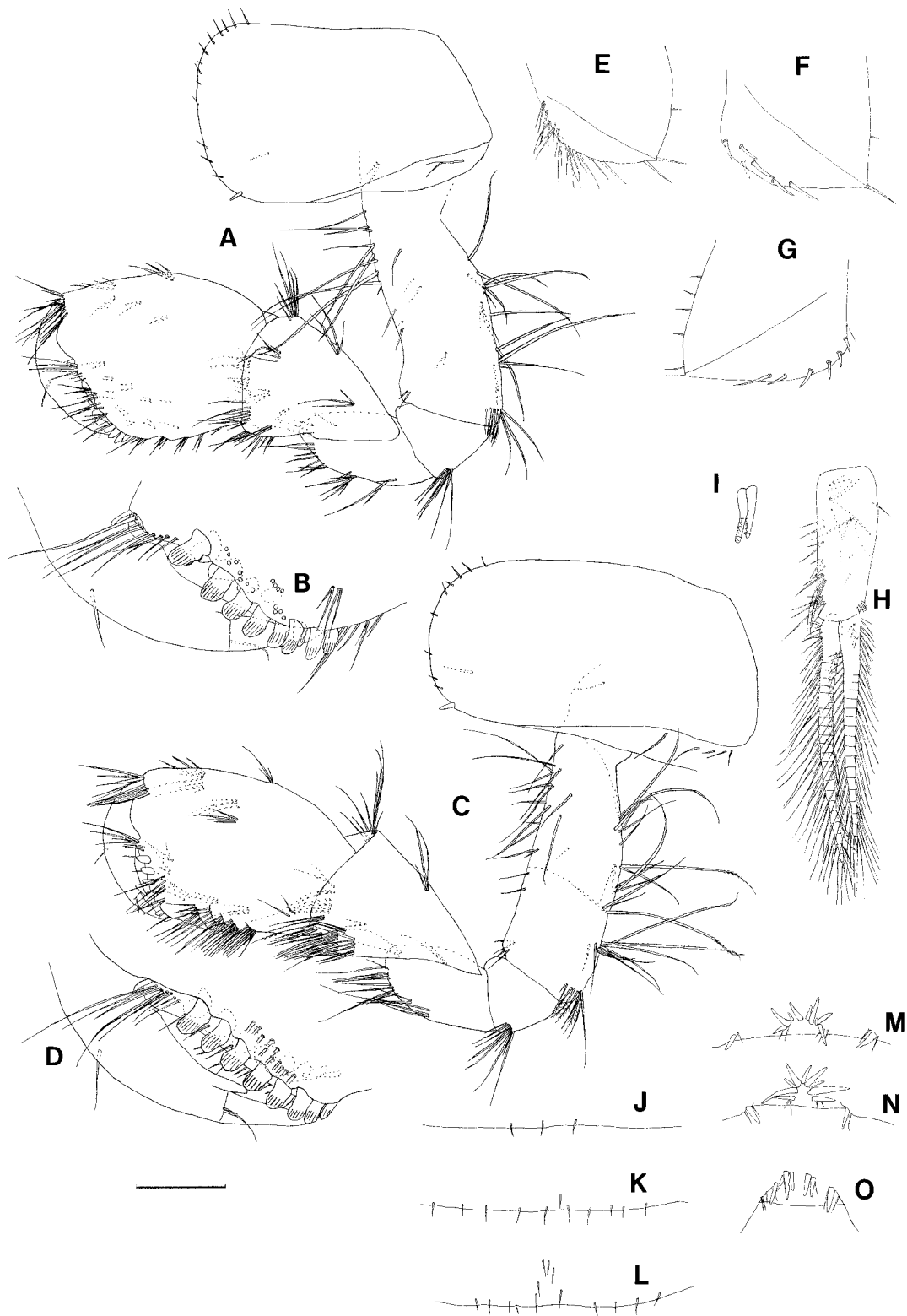
Gnathopod 1 (Fig. 3A): coxa weakly expanded distally, lower margin setulose, posterodistal corner with 1 stiff seta, posteroproximal margin bare; posterior and anteroproximal margins of basis with long setae; propod palmar margin (Fig. 3B) lined with 4 inner and 9 outer striated peg spines, anterior margin with 2 setae groups; dactyl accessory blade longer than nail, basally elevated.

Gnathopod 2 (Fig. 3C): coxa lower margin setulose, posteroproximal margin bare, posterodistal corner with 1 spine; basis posterior and anteroproximal margins with long setae, which are denser than those of gnathopod 1, anterodistal angle with short setae; propod more slender than that of gnathopod 1, palmar margin (Fig. 3D) with 8 inner and 8 outer striated peg spines; dactyl accessory blade longer than nail, basally elevated.

Pereopod 3: coxa anterodistal margin setulose, posterodistal corner with 1 spine and stiff seta; basis posterior and anteroproximal margins with long setae, anterodistal margin with short setae; merus anterior margin with long spines, posterior margin with stiff setae and long setae; carpus-propod posterior margins spinose and setose.



**Fig. 2.** *Jesogammarus (Jesogammarus) fujinoi* sp. nov. Gobanmiki, Yamagata Pref., Japan. Male 13.6 mm-holotype. A: antenna 1; B: antenna 2; C: calceolus of antenna 2 (1, 2: flagellar article 2, 3); D: upper lip; E: lower lip; F: right maxilla 1; G: distal spines on outer plate of maxilla 1; H: maxilla 2; I: palp of left mandible; J: left mandible; K: incisor and lacinia mobilis of right mandible; L: maxilliped. Scale: 0.50 mm for A, B, D, E; 0.25 mm for C, I–L; 0.30 mm for F, H; 0.15 mm for G.



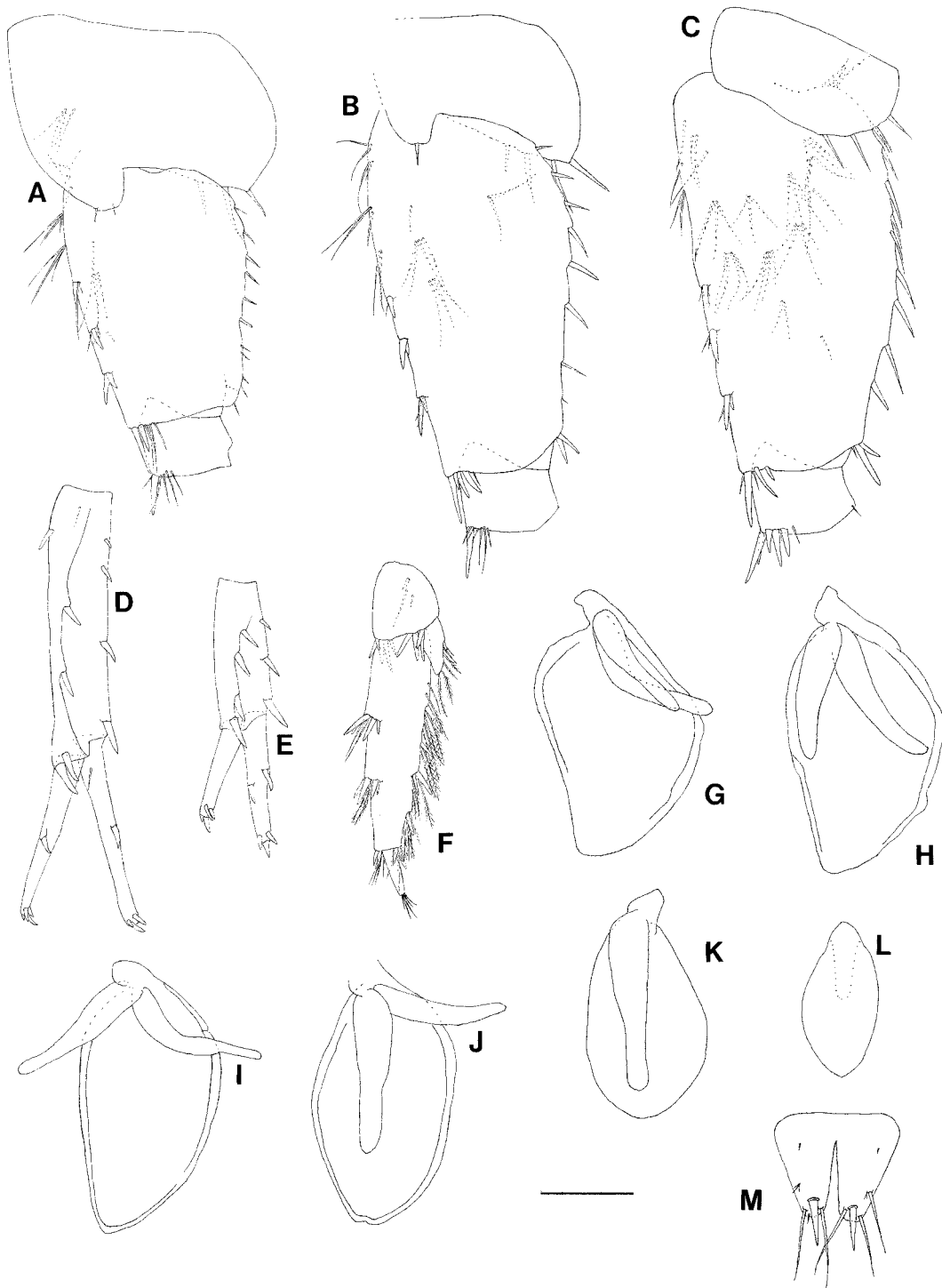
**Fig. 3.** *Jesogammarus (Jesogammarus) fujinoi* sp. nov. Gobanmiki, Yamagata Pref., Japan. Male 13.6 mm-holotype. A: gnathopod 1; B: propod palm and dactyl of gnathopod 1; C: gnathopod 2; D: propod palm and dactyl of gnathopod 2; E, F and G: abdominal side plates 1, 2 and 3; H: pleopod 1; I: retinaculæ of pleopod 1; J, K and L: postero-dorsal margins of pleonites 1, 2 and 3; M, N and O: postero-dorsal margins of urosomites 1, 2 and 3. Scale: 0.50 mm for A, C, J–O; 0.25 mm for B, D; 0.80 mm for E–H; 0.15 mm for I.

Pereopod 4: coxa posterodistal margin spinose, anterodistal margin setulose; basis posterior and anteroproximal margins with long setae, anterodistal angle with 1 spine; merus-propod posterior margin spinose and setose, merus anterior margin spinose and weakly setose.

Pereopod 5 (Fig. 4A): coxa anterior lobe with distal

setae, lower margin of posterior lobe with long stiff setae; basis anteroproximal margin with setae clusters, anterodistal margin spinose, and with a few inner facial setae; margins of merus-propod spinose and setose.

Pereopod 6 (Fig. 4B): coxa anterior lobe with distal stiff seta, lower margin of posterior lobe with long stiff setae;



**Fig. 4.** *Jesogammarus (Jesogammarus) fujinoi* sp. nov. Gobanmiki, Yamagata Pref., Japan. Male 13.6 mm-holotype. A, B and C: coxa-ischium of pereopods 5, 6 and 7; D, E and F: uropods 1, 2 and 3; G, H, I, J, K and L: coxal gills of pereopods 2, 3, 4, 5, 6 and 7; M: telson. Scale: 0.50 mm for A–C; 0.80 mm for D–L; 0.45 mm for M.

basis anterior margin proximally setose, distally spinose, posterior margin with spines and a few stiff setae, and with inner facial setae; margins of merus and carpus spinose and weakly setose; propod marginally spinose and weakly setose.

Pereopod 7 (Fig. 4C): coxa posterior margin with long stiff setae; basis posterior margin with spines and stiff setae, anterior margin proximally with long setae, distally spinose, and inner surface with setal clusters.

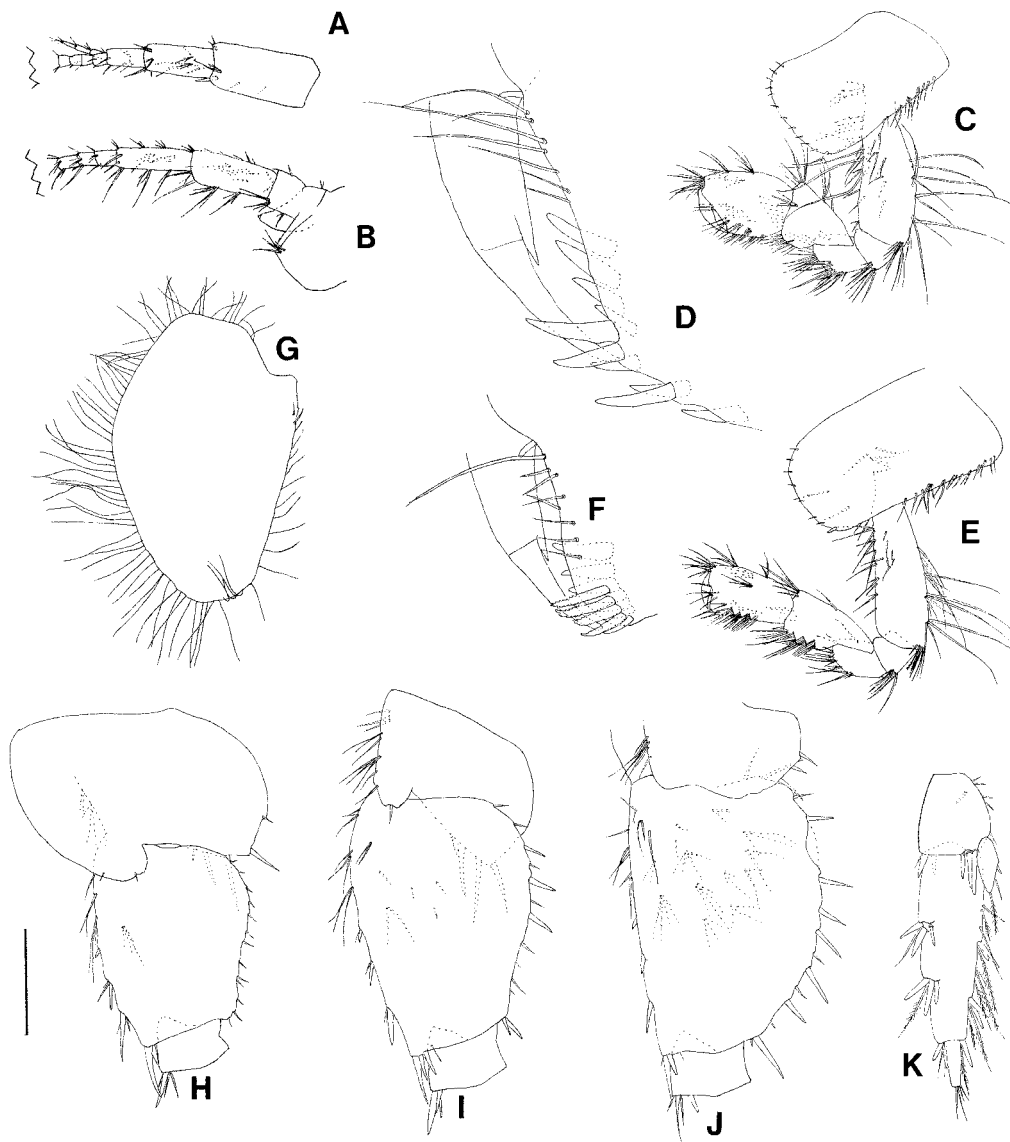
Coxal gills of pereopods 2–4 (= gills 2–4)(Fig. 4G–I) subequal to bases of respective pereopods in length, posterior accessory lobes longer than anterior one and little longer than half of the main lobes. Gill 5 (Fig. 4J) longer than the basis. Gill 6 (Fig. 4K) accessory lobe distinctly longer than half of the main lobe. Gill 7 (Fig. 4L) shorter than

half of the basis of pereopod 7, accessory lobe shorter than half of the main lobe.

Pleonites 1–3: posterodorsal margins (Fig. 3J–L) with 3 setules, 10 marginal and 1 submarginal setules, and 8 marginal and 6 submarginal setules, respectively.

Abdominal side plates (Fig. 3E–G) posteriorly with 1–5 setules. Plates 2 and 3 rectangular posterodistally. Plate 1: anterior margin with ca. 18 long setae, ventral margin with 2 long stiff setae. Plate 2: ventrally with 4 marginal and 2 submarginal slender spines. Plate 3: anterior to ventral margin with 1 setule and 6 slender spines.

Pleopods: peduncles with outer marginal and facial setae; inner ramus with 4 clothes-pin spines. Pleopod 1 (Fig. 3H, I): outer ramus 24-, inner ramus 19-articulated. Pleopod 2: outer ramus 25-, inner ramus 18-articulated. Pleopod 3:



**Fig. 5.** *Jesogammarus (Jesogammarus) fujinoi* sp. nov. Gobanmiki, Yamagata Pref., Japan. Female 9.7 mm-allotype. A: antenna 1; B: antenna 2; C: gnathopod 1; D: propod palm and dactyl of gnathopod 1; E: gnathopod 2; F: propod palm and dactyl of gnathopod 2; G: brood plate of gnathopod 2; H, I and J: coxa-ischium of pereopods 5, 6 and 7; K: uropod 3. Scale: 0.80 mm for A–C, E, G; 0.10 mm for D, F; 0.50 mm for H–K.

outer ramus 24-, inner ramus 18-articulated.

Urosomites 1 and 2 (Fig. 3M, N) dorsomarginally with single lateral spines and middle spine cluster of 9 spines, with interspersed setae. Urosomite 3 (Fig. 3O) with a pair of lateral spines and a pair of medial spine-cluster, with interspersed setae.

Uropod 1 (Fig. 4D): outer ramus 66.7% length of peduncle; peduncle with marginal spines and 1 basofacial spine; outer and inner ramus with 1 marginal spine, respectively.

Uropod 2 (Fig. 4E): peduncle with marginal spines; outer ramus marginally bare; inner ramus with 1 outer and 1 inner marginal spine.

Uropod 3 (Fig. 4F): outer margin of outer ramus with 2 spine clusters and a few plumose and simple setae, inner margin of outer ramus with 4 spine clusters and many plumose setae; terminal article distinct, 23.8% length of proximal article; inner ramus 20.7% length of outer ramus, with apical and medial plumose setae.

Telson (Fig. 4M): length 83.0% of basal maximum width, each lobe with 1 apical spine and distolateral setae.

#### Female (allotype)

Antenna 1 (Fig. 5A): length ratio of peduncular articles 1–3=1: 0.69: 0.35; peduncular article 1 with 2 posteromarginal short setae and 1 posterodistal spine; articles 2 and 3 with 2 and 1 posteromarginal short setal clusters, respectively; flagellum 24-articulated; accessory flagellum 4-articulated.

Antenna 2 (Fig. 5B): length ratio of peduncular articles 4: 5=1: 0.85, peduncular articles 4 and 5 with 2 long setal clusters posteromarginally, respectively; flagellum 11-articulated, distal articles with medium long setae posteriorly.

Gnathopod 1 (Fig. 5C): coxa with 12 setae on postero-proximal margin; basis with several facial setae; propod palmar margin (Fig. 5D), posterodistal margin with 10 simple spines; dactyl posterior accessory blade much shorter than nail, basally not elevated.

Gnathopod 2 (Fig. 5E): coxa posteroproximal margin with 21 setae; carpus and propod slender; propod parallel-sided, propod palmar margin (Fig. 5F), outer distal margin with 5 pectinate spines, inner distally with 3 simple and 3 pectinate spines; dactyl posterior blade much shorter than nail, basally not elevated.

Bases of pereopods 5–7 (Fig. 6H–J) more expanded posteroproximally than those of male.

Brood plate of gnathopod 2 (Fig. 5G) large and broad, expanded anteroproximally, fringed with numerous setae.

Uropod 3 (Fig. 5K): terminal article of outer ramus 23.4% length of proximal article; inner ramus 22.8% length of outer ramus.

Egg number: 26.

#### Remarks

*Jesogammarus (Jesogammarus) fujinoi* sp. nov. is similar to *J. (J.) hokurikuensis* Morino, 1985 in having (1) 1 distal spine of peduncular article 1 of antenna 1, (2) closely-set

medial spine clusters on urosomites 1 and 2, (3) expanded bases of pereopods 5–7, and (4) shorter marginal spines on abdominal side plates. The new species, however, is distinguished from *J. (J.) hokurikuensis* in having (1) pleonites without dorsal spines, (2) marginally bare outer ramus of uropod 2, and (3) telson without distolateral spine.

*Jesogammarus (J.) fujinoi* sp. nov. is also similar to *J. (J.) jesoensis* Schellenberg, 1937 in having (1) 1 distal spine of peduncular article 1 of antenna 1, (2) short and a few setal clusters of peduncular articles 4 and 5 of antenna 2, and (3) shorter telson. *Jesogammarus (J.) fujinoi* sp. nov. is, however, distinguished from *J. (J.) jesoensis* in having (1) expanded bases of pereopods 5–7, (2) pleonites without dorsal spines, (3) shorter marginal spines on abdominal side plates, (4) closely-set medial spine clusters of urosomites 1 and 2, and (5) telson without distolateral spine.

#### Etymology

The species is named in honor of Prof. Takahiro Fujino of Yamagata University, who led the senior author to this study.

#### Distribution

This new species is collected from mountain springs and spring brooklets around Mt. Shirataka and Mt. Amayobari, Yamagata Prefecture. The water temperature of the spring of the type locality is 9.0–9.5°C throughout the year. Mature adults are found at all seasons of the year in this place.

#### *Jesogammarus (Jesogammarus) shonaiensis* sp. nov.

(Japanese name: Shonai-yokoebi, new)

(Figs. 6–9)

*Eogammarus jesoensis*: Karaman, 1979, pp. 34–38, figs. 5–7. (in part, specimens only from Ishikawa)

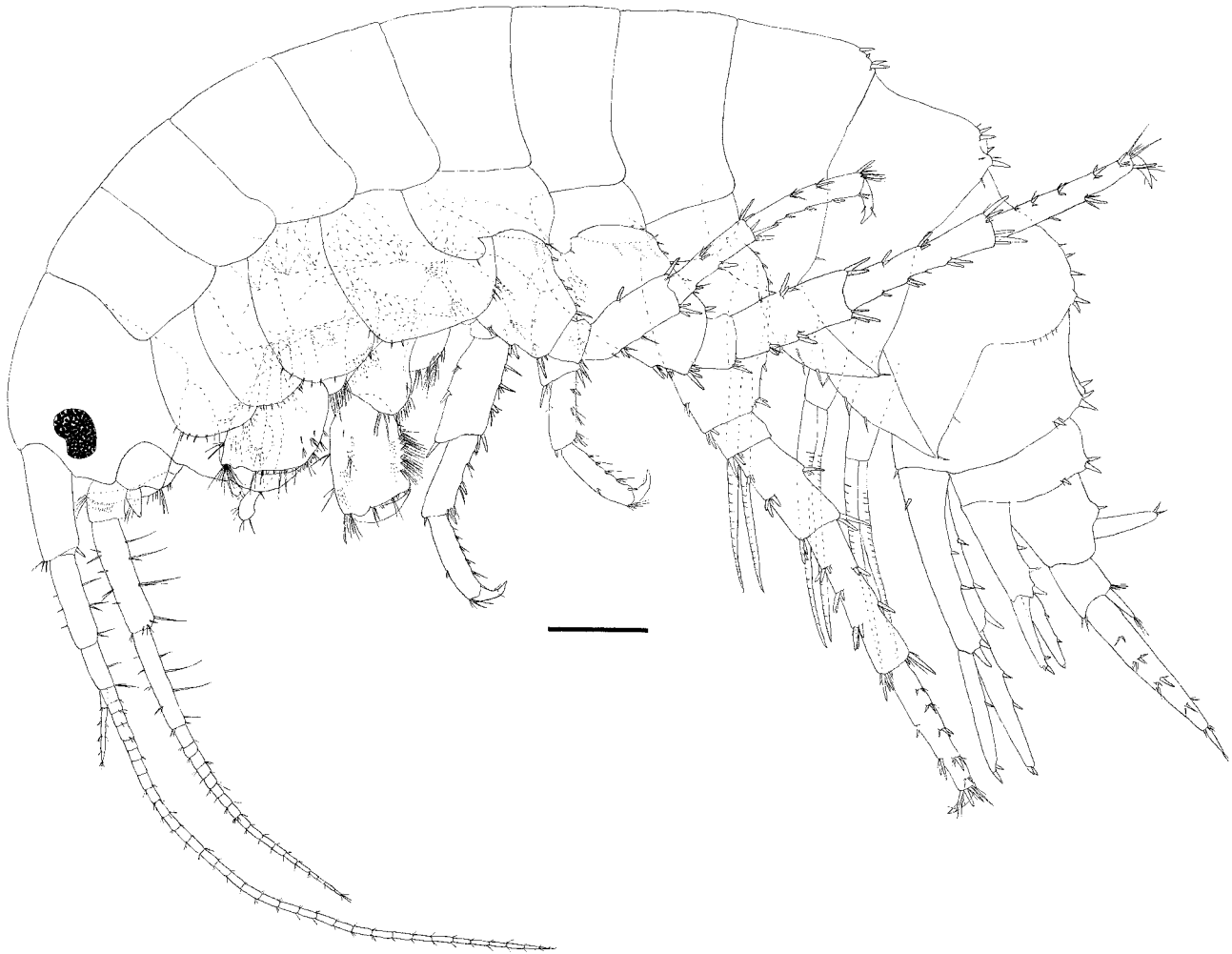
*Jesogammarus* sp.: Bousfield, 1979, pp. 335–336.

*Jesogammarus (Jesogammarus)* sp.: Morino, 1985, p. 34.

#### Type series

Holotype, NSMT-Cr. 2769 (male, 17.9 mm, 6 microscope slides and 1 ethanol); paratypes, NSMT-Cr. 2770 (allotype, juvenile female, 12.8 mm, 5 microscope slides and 1 ethanol), NSMT-Cr. 2771 (male, 14.9 mm, 5 microscope slides and 1 ethanol), NSMT-Cr. 2772 (male, 14.5 mm, 1 ethanol), NSMT-Cr. 2773 (male, 12.4 mm, 1 ethanol), NSMT-Cr. 2774 (female, 13.0 mm, 3 microscope slides and 1 ethanol), NSMT-Cr. 2775 (female, 13.3 mm, 2 microscope slides and 1 ethanol), NSMT-Cr. 2776 (female, 11.1 mm, 1 ethanol), NSMT-Cr. 2777 (female, 10.3 mm, 1 ethanol), and NSMT-Cr. 2778 (female, 11.9 mm, 1 ethanol); Kuromori (38°50'45"N, 139°48'53"E), Sakata-shi, Yamagata Pref., a spring brooklet in the Shonai district, 7 Nov. 2001, collected by K. Tomikawa.





**Fig. 6.** *Jesogammarus (Jesogammarus) shonaiensis* sp. nov. Kuromori, Yamagata Pref., Japan. Female 13.3 mm-paratype. Scale: 1mm.

#### Other materials

33 males, 43 (5 ovig.) females, 17 Nov. 2001, Jimoto (38°5'30"N, 139°23'23"E), Nakajo-machi, Niigata Prefecture, collected by K. Tomikawa.

#### Diagnosis

Peduncular article 1 of antenna 1 with 1 posterodistal spine. Article 1 of mandible palp unarmed, article 2 with proximal spines. Pleonites 1–3 dorsomarginally with spines and setae. Urosomites 1 and 2 with separated spine clusters in the middle of dorsal margin. Telson longer than basal maximum width.

#### Description of male (holotype)

Head as long as deep. Eyes small, subreniform.

Antenna 1 (Fig. 7C): 51% of body length, length ratio of peduncular articles 1–3=1: 0.80: 0.38; peduncular article 1 with 1 posteromarginal short setal clusters, 2 setae, 3 setules, and 1 posterodistal spine; article 2 with some posteromarginal short setal clusters; article 3 with 1 posteromarginal short setal cluster and 1 seta; flagellum 36-articulated;

accessory flagellum 6-articulated.

Antenna 2 (Fig. 7D, E): peduncular article 5 85% length of article 4, both articles bearing 3 short setal clusters on posterior margin; flagellum 19-articulated, proximal 10 articles with cup-calceoli.

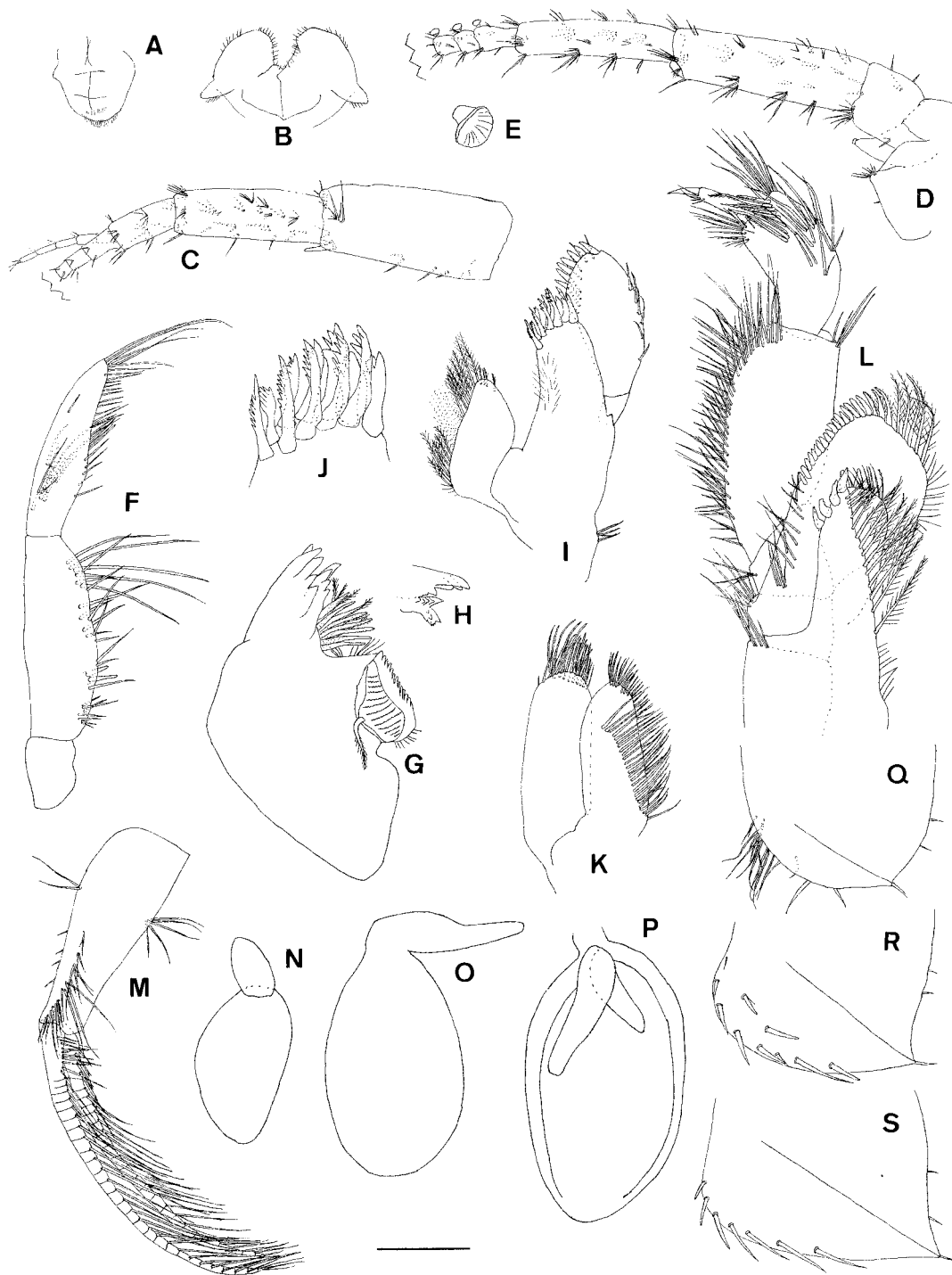
Mandible (Fig. 8F–H): left and right incisors 5- and 4-dentate, respectively; left lacinia mobilis 4-dentate, right lacinia mobilis 2-edged; palp article 1 unarmed; palp article 2 with 7 marginal and 18 submarginal setae, 1 group of double spines; palp article 3 subequal to article 2 in length, with 5 A-setal clusters, 1 seta, and 2 B-setal clusters.

Right maxilla 1 (Fig. 7I, J): palp article 2 with 5 setae on outer margin, and with 7 spines and 8 stiff setae distally; outer plate apically with 11 serrated spines; inner plate with 21 plumose setae medially.

Left maxilla 1: palp article 2 with 6 setae on outer margin, and with 10 spines and 9 stiff setae distally; inner plate with 22 plumose setae medially.

Maxilla 2 (Fig. 7K): inner plate with 25 facial setae.

Maxilliped (Fig. 7L: distorted at the junction of palp): inner plate shorter than outer plate, with 3 apical spines and



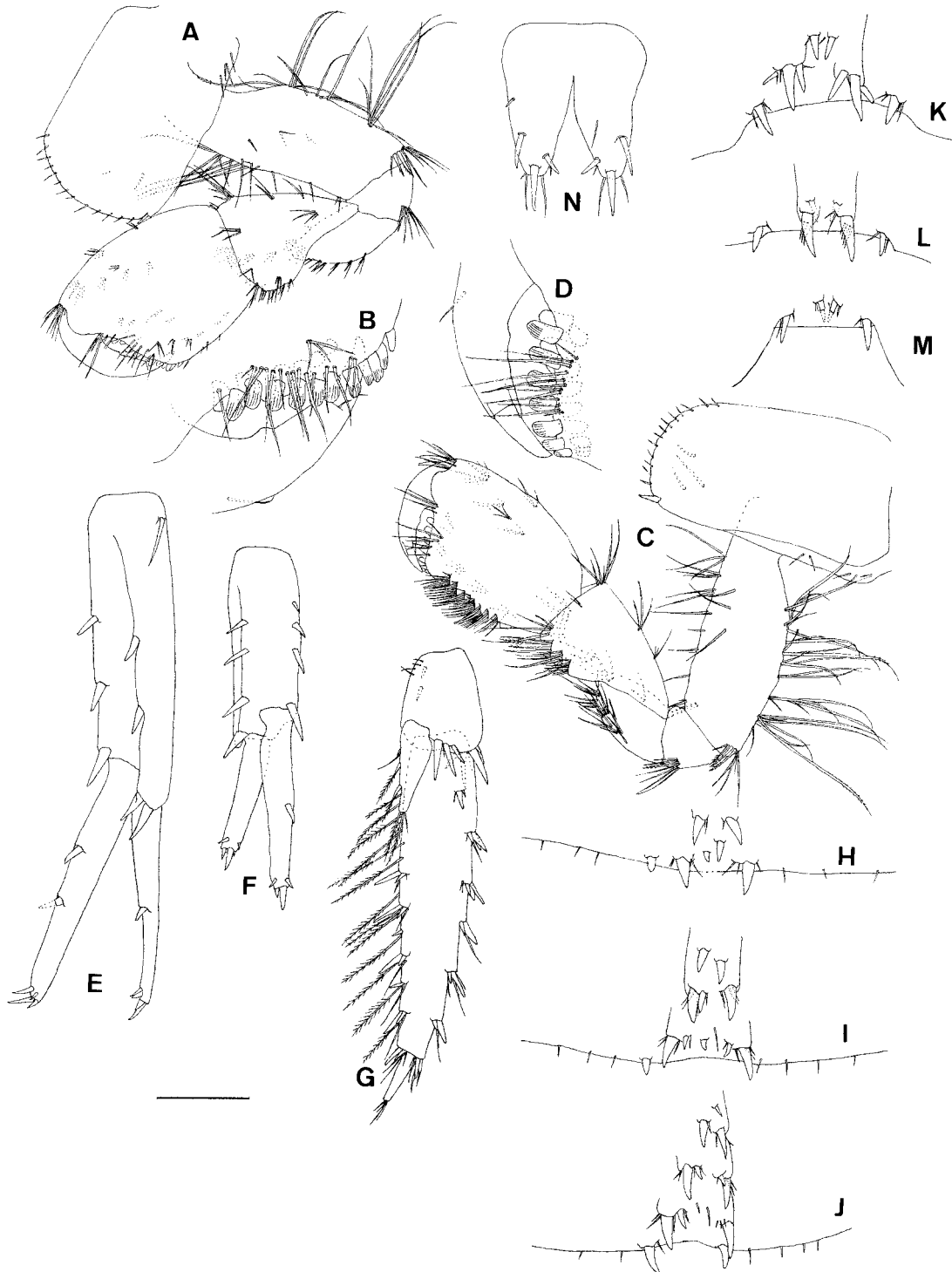
**Fig. 7.** *Jesogammarus (Jesogammarus) shonaiensis* sp. nov. Kuromori, Yamagata Pref., Japan. Male 17.9 mm-holotype. A: upper lip; B: lower lip; C: antenna 1; D: antenna 2; E: calceolus; F: palp of left mandible; G: left mandible; H: incisor and lacinia mobilis of right mandible; I: right maxilla 1; J: distal spines on outer plate of maxilla 1; K: maxilla 2; L: maxilliped; M: pleopod 1; N, O and P: coxal gills of pereopods 7, 6 and 5; Q, R and S: abdominal side plates 1, 2 and 3. Scale: 0.74 mm for A–D, M–S; 0.15 mm for E, J; 0.38 mm for F–I, K; 0.30 mm for L.

3 medial bent spines; outer plate subequal to palp article 2 in length, medial spines closely set, a few distal spines weakly pectinate.

Gnathopod 1 (Fig. 8A, B): coxa, lower margin setulose with 1 spine on posterior corner, posteroproximal margin with 4 setae; basis anteroproximal and posterior margins

with long setae; propod palmar margin with 14 and 11 striated peg-spines on inner and outer margins, respectively; dactyl accessory blade longer than nail, basally elevated.

Gnathopod 2 (Fig. 8C, D): setation of coxa and basis as those of gnathopod 1; propod palmar margin with 11 and 7 striated peg-spines on inner and outer margins, respec-



**Fig. 8.** *Jesogammarus (Jesogammarus) shonaiensis* sp. nov. Kuromori, Yamagata Pref., Japan. Male 17.9 mm-holotype. A: gnathopod 1; B: propod palm and dactyl of gnathopod 1; C: gnathopod 2; D: propod palm and dactyl of gnathopod 2; E, F and G: uropods 1, 2 and 3; H, I and J: postero-dorsal margins of pleonites 1, 2 and 3; K, L and M: postero-distal margins of urosomites 1, 2 and 3; N: telson. Scale: 0.74 mm for A, C, E–G; 0.30 mm for B, D; 0.50 mm for H–N.

tively; dactyl (Fig. 8D) accessory blade longer than nail, basally elevated.

Pereopod 4: coxa, posterior margin almost vertical.

Pereopod 5 (Fig. 9A): coxa anterior lobe with 1 distal

seta; basis weakly expanded posteriorly, bearing 2 inner facial setal clusters, posterior margin with spines and stiff setae, posterodistal lobe weak.

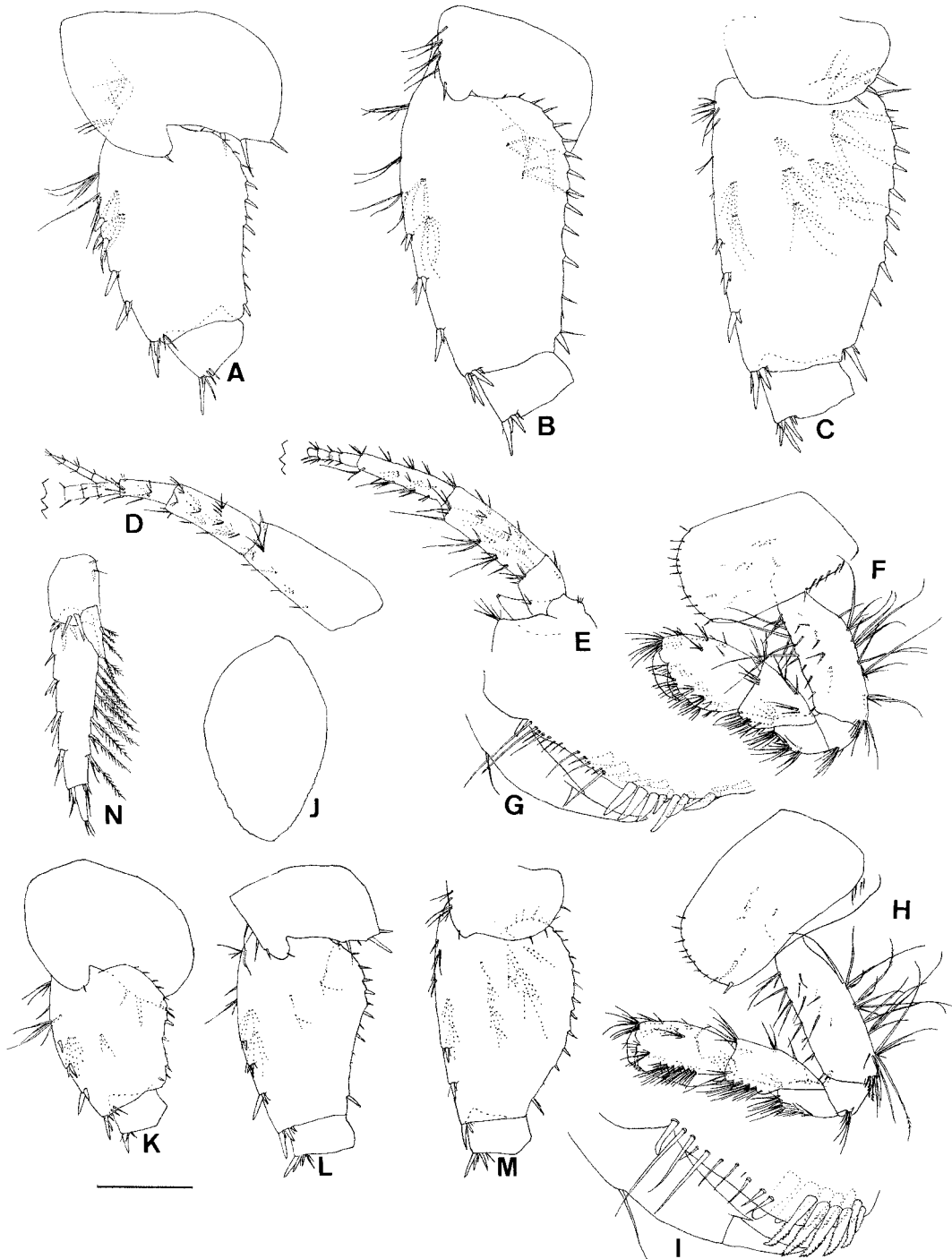
Pereopod 6 (Fig. 9B): coxa anterior lobe without distal

spine; basis weakly expanded posteriorly, bearing 2 inner facial setal clusters, posterior margin with spines and stiff setae.

Pereopod 7 (Fig. 9C): basis weakly expanded posteriorly, bearing 11 inner facial setal clusters, posterior margin with spines and stiff setae.

Coxal gills of pereopods 2–4 subequal to bases in length, anterior accessory lobes slightly longer than posterior accessory lobes. Gill of pereopod 5 (Fig. 7P) longer than basis. Gill of pereopod 6 (Fig. 7O) reaching half of basis. Gill of pereopod 7 (Fig. 7N) not reaching half of basis.

Pleonite 1 (Fig. 8H) with 7 spines, 6 marginal and 11



**Fig. 9.** *Jesogammarus (Jesogammarus) shonaiensis* sp. nov. Kuromori, Yamagata Pref., Japan. A, B and C: coxa-ischium of pereopods 5, 6 and 7; D: antenna 1; E: antenna 2; F: gnathopod 1; G: propod palm and dactyl of gnathopod 1; H: gnathopod 2; I: propod palm and dactyl of gnathopod 2; J: brood plate of gnathopod 2; K, L and M: coxa-ischium of pereopods 5, 6 and 7. A, B and C: male 17.9mm-holotype; others: female 12.8mm-allotype. Scale: 0.74 mm for A–F, H, J–M; 0.20 mm for G; 0.40 mm for I.

interspersed setules dorsomarginally. Pleonite 2 (Fig. 8I) with 11 spines, 7 marginal and 16 interspersed setules dorsomarginally. Pleonite 3 (Fig. 8J) with 12 spines, 6 marginal and 20 interspersed setules dorsomarginally.

Abdominal side plates (Fig. 7Q–S) posteriorly with 2 setules. Plates 2 and 3 rectangular posterodistally. Plate 1: ventral margin horizontal, with 16 setae on anterior corner. Plate 2 with 2 submarginal spines, 7 marginal spines and 2 setae on the anterior corner. Plate 3 with 7 marginal spines on anterior corner.

Pleopods: peduncle outer margin with several setae and setal clusters, inner ramus of pleopods 1–3 with 4, 3 and 3 clothes-pin spines, respectively. Pleopods 1 (Fig. 7M) and 2: outer ramus 28- and inner ramus 23-articulated. Pleopod 3: outer ramus 26- and inner ramus 21-articulated.

Urosomite 1 (Fig. 8K) with a pair of lateral spines and 2 pairs of medial spine-clusters, with interspersed setae. Urosomite 2 (Fig. 8L) with a pair of lateral spines and a pair of medial spine-cluster, with interspersed setae. Urosomite 3 (Fig. 8M) with a pair of lateral spines and a pair of medial spines with interspersed setae.

Uropod 1 (Fig. 8E): peduncle with marginal spines and 1 basofacial spine; outer ramus 74% length of peduncle, bearing 1 marginal spine; inner ramus bearing 2 marginal spines.

Uropod 2 (Fig. 8F): peduncle marginally spinose; outer ramus shorter than inner ramus, marginally bare; inner ramus with 1 marginal spine.

Uropod 3 (Fig. 8G): outer margin of outer ramus with 5 spine clusters and a few simple setae, inner margin with 6 spine clusters and many plumose setae; terminal article distinct, 16.2% length of proximal article; inner ramus 24.7% length of outer ramus, with apical and medial plumose setae.

Telson (Fig. 8N) length 110% length of basal maximum width, each lobe with 1 apical spine and distomedial and distolateral spines.

### Female (allotype, juvenile)

Antenna 1 (Fig. 9D): length ratio of peduncular articles 1–3=1: 0.65: 0.35; peduncular article 1 with 1 posterodistal spine and 2 short setal clusters and 1 seta posteromarginally; articles 2 and 3 with 2 and 1 short setal clusters on posterior margin, respectively; flagellum 23-articulated; accessory flagellum 5-articulated.

Antenna 2 (Fig. 10E): length ratio of peduncular articles 4–5=1: 0.91; peduncular articles 4 and 5 with 3 medium long setal clusters on posterior margins, respectively; flagellum 19-articulated.

Gnathopod 1 (Fig. 9F): coxa slightly expanded distally, inner surface and posterior margin setose; propod palmar margin (Fig. 9G) with 6 and 10 simple spines on outer and inner margins, respectively; dactyl accessory blade shorter than nail, basally not elevated.

Gnathopod 2 (Fig. 9H): coxa inner surface and posterior margin setose; outer margin of propod palm (Fig. 9I)

with 6 spines, most of which pectinated, inner margin (Fig. 9I) with 3 simple and 3 pectinated spines; dactyl accessory blade as that of gnathopod 1.

Pereopods 5–7 (Fig. 9K–M): bases expanded posteriorly, anteroproximal margin setose, inner facial setae slightly more numerous than in male.

Coxal gills of pereopods 2–6 longer than basis. Gill of pereopod 7 longer than half of basis.

Pleonite 1 with 4 spines, 4 marginal and 7 interspersed setules dorsomarginally. Pleonite 2 with 5 spines, 5 marginal and 14 interspersed setules dorsomarginally. Pleonite 3 with 6 spines, 3 marginal and 17 interspersed setules dorsomarginally.

Uropod 3 (Fig. 9N): outer ramus, outer margin with 4 spine clusters and a few simple setae, inner margin with 3 spine clusters and 8 plumose setae and a few simple setae; terminal article distinct, 21.6% length of proximal article; inner ramus 25% length of outer ramus, with apical and medial plumose setae.

### Remarks

Judging from the description and figures by Karaman (1979), the Ishikawa materials accord with *Jesogammarus (Jesogammarus) shonaiensis* sp. nov. in having spines on pleonite 1, and many spines on pleonites 2 and 3.

*Jesogammarus (Jesogammarus) shonaiensis* sp. nov. is morphologically similar to *J. (J.) jesoensis* Schellenberg, 1937 in having (1) 1 distal spine of peduncular article 1 of antenna 1, (2) separated medial paired spine clusters on urosomites 1 and 2, and (3) long marginal spines on abdominal side plates. *Jesogammarus (J.) shonaiensis* sp. nov. is, however, distinguished from *J. (J.) jesoensis* by the following characters: (1) expanded bases of pereopods 5–7 (vs. slender), (2) presence of spines on pleonite 1 (vs. no spine), (3) presence of many spines (up to 23) on pleonites 2 and 3 (vs. a few spines (up to 10)), and (4) telson length longer than basal maximum width (vs. shorter than wide).

*Jesogammarus (J.) shonaiensis* sp. nov. is also similar to *J. (J.) ilhoii* Lee et Seo, 1992 in having many spines on pleonites 2 and 3, but distinguished from the latter by the following characters: (1) small eye size (vs. medium), (2) presence of spines on pleonite 1 (vs. no spine), (3) presence of spines on the proximal part of article 2 of mandibular palp (vs. no spine), (4) all spines of palmar margin of gnathopod 2 of male are naked, (vs. some spines are pectinated), and (5) telson length longer than basal maximum width (vs. shorter than wide).

*Jesogammarus (J.) shonaiensis* sp. nov. is distinguished from *J. (J.) fujinoi* sp. nov. by the following characters: (1) presence of spines on pleonites (vs. no spine), (2) longer marginal spines on abdominal side plates (vs. shorter), (3) separate medial spine clusters of urosomites 1 and 2 (vs. closely-set), (4) telson length longer than basal maximum width (vs. shorter), and (5) telson with distolateral spine (vs. no spine).

### Etymology

The species is named for the type locality, the Shonai district.

### Distribution

This new species occurs in the spring brooklet in Kuro-mori (the Shonai district, Yamagata Pref.), Nakajo (Niigata Pref.) and Ishikawa Prefecture (Bousfield, 1979; Karaman, 1979; Morino, 1985).

### ACKNOWLEDGEMENTS

We express our sincere gratitude to Prof. Isamu Nakatani (Yamagata University) for his helpful support in collecting samples and in providing generous guidance. We are also grateful to Dr. Masatsune Takeda (The National Science Museum, Tokyo), Prof. Takahiro Fujino (Yamagata University), Prof. Shunsuke F. Mawatari (Hokkaido University), and Dr. Wataru Abe (Hokkaido University) for their comments on the manuscript. We would like to express our hearty thanks to Prof. John R. Holsinger (Old Dominion University) and two anonymous reviewers for their critical reading of the manuscript and for their useful advice.

### REFERENCES

- Bousfield EL (1979) The amphipod superfamily Gammaroidea in the northeastern Pacific region: Systematics and distributional ecology. *Bull Biol Soc Wash* 3: 297–357
- Karaman GS (1979) First discovery of genus *Melitoides* Tzv. in Japan with remarks on some Japanese *Eogammarus* species. *Contribution to the knowledge of the Amphipoda* 98. *Poljoprivreda I Sumarstvo* 25 (3): 23–40
- Lee KS, Seo IS (1992) One new species of freshwater *Jesogammarus* (Crustacea, Amphipoda, Anisogammaridae) from South Korea. *Korean J Zool* 35: 344–349
- Morino H (1984) On a new freshwater species of Anisogammaridae (Gammaroidea: Amphipoda) from central Japan. *Publ Itako Hydrobiol Stn* 1: 17–23
- Morino H (1985) Revisional studies on *Jesogammarus-Annanogammarus* group (Amphipoda: Gammaroidea) with descriptions of four new species from Japan. *Publ Itako Hydrobiol Stn* 2: 9–55
- Morino H (1993) A new species of the genus *Jesogammarus* (Amphipoda: Anisogammaridae) from brackish waters of Japan. *Publ Itako Hydrobiol Stn* 6: 9–16
- Morino H (1994) The phylogeny of *Jesogammarus* species (Amphipoda: Anisogammaridae) and life history features of two species endemic to Lake Biwa, Japan. *Arch Hydrobiol Beih Ergebn Limnol* 44: 257–266
- Morino H, Dai AY (1990) Three amphipod species (Crustacea) from East China. *Publ Itako Hydrobiol Stn* 4: 7–27
- Schellenberg A (1937) Schlüssel und Diagnosen der dem Süßwasser-*Gammarus* nahestehenden Einheiten ausschließlich der Arten des Baikalsees und Australiens. *Zool Anz* 117: 267–280

(Received September 9, 2002 / Accepted November 11, 2002)