

Fig.6 *Gnorimosphaeroma tsushimaense* n. sp.

A. Dorsal view ; B. Antennule ; C. Antenna ; D. Right mandible ; E. Maxillula ; F. Maxilla ; .G . Maxilliped ; H-N. Pereopods 1-7 ; O. Penes ; P-T. Pleopods 1-5 ; U. Uropd (All : Holotype male).

distal corner and 2 seta at inner distal corner ; propodus with 6~7 setae on inner margin ; dactylus bifid.
 Pereopod 5 (Fig.6L). Basis oblong, 4 times as long as wide ; ischium half length of basis, with pubescent inner margin ; merus as long as ischium with a seta at outer distal corner ; carpus a little shorter than merus with 2 setae at outer distal corner and 2 seta at inner distal corner ; propodus with 3 setae and many fine

setae on inner margin ; dactylus bifid.

Pereopod 6 (Fig.6M). Basis oblong, 4 times as long as wide ; ischium with pubescent inner margin ; merus as long as ischium with a seta at outer distal corner ; carpus a little shorter than merus with 2 setae at outer distal corner and a seta at inner distal corner ; propodus with 10~13. setae on inner margin ; dactylus bifid

Pereopod 7 (Fig.6N). Basis oblong, 4.5 times as long as wide ; ischium 2/3 time as long as basis, with 4 setae on both margins ; merus a little shorter than ischium, with several setae on inner margin ; carpus as long as merus with 4 setae at inner-distal corner and 2 setae at outer-distal corner ; propodus as long ; carpus with 4 seta on inner margin and 4 setae on inner margin ; dactylus bifid.

Penes (Fig.6O) straight, each penis 4 times as long as wide.

Pleopod 1 (Fig.6P). Basis with 6~7 coupling hooks ; endopod with 16~17 plumose setae ; exopod round with 40~42 setae.

Pleopod 2 (Fig.6Q). Basis with coupling hooks ; endopod with 14~15 plumose setae ; appendix masculina straight and slightly exceeds beyond both rami ; exopod round with 18~20 setae.

Pleopod 3 (Fig.6R). Basis with coupling hooks ; endopod with 12~15 plumose setae ; exopod round with 26~28 setae.

Pleopod 4 (Fig.6S). Basis without coupling hook ; endopod with plumose setae ; exopod round with 10 setae.

Pleopod 5 (Fig.6T). Basis small ; endopod lanceolate ; exopod with 2 bosses.

Uropod (Fig.6U) Endopod lanceolate with margins densely pubescent and with apex acute. ; exopod 80% as long as endopod, e with margins densely pubescent.

Habitat : These animal occurs only from the pure freshwater area, especially from the surface of stones and sand of stream, They do not occur from the estuary the brackish water influencing. These specimens were collected together with insects. *Epeorus curvatus* and *Eubrianax* sp.

Remarks : this species most closely allied to *Gnorimosphaeroma naktongense* Kwon et Kim, reported from the mouth of Naktong River, South Korea. The former is separated from the latter in the following features (1) single coupling hook on the lateral border of maxilliped, (2) more numerous setae on maxilliped, (3) more numerous setae on merus of pereopod 1, (4) numerous flagellum of antenna, (5) more numerous setae on maxilla, (6) more pubescent inner margin of ischium, merus of pereopod 1, (7) stout body shape, (8) less numerous setae of second, (9) less numerous setae of second segment (10) less protruded inner margin of propodus of pereopod 2.

Etymology : The specific name derives from the type locality.

Material examined ; 18 ♂♂ (1 ♂ holotype, 7.7 mm in body length and 17 paratypes 4.1~5.2 mm in body length) and 18 ♀♀ (paratypes 2.8~4.6 mm in body length) Asu river, Izuhara, Tushima, Nagasaki Prefecture, Aug. 18, 1996 coll. Noboru Nunomura. Type series is deposited as follows : Holotype (TOYA Cr 12527) and 8 paratypes (TOYA Cr-12528~12535) at the Toyama Science Museum 6 paratypes (OMNH Ar 3975~3980) at the Osaka Museum of Natural History ; 6 paratypes (CBM-ZC-4081) at the Natural History Museum and Institute, Chiba.

Gnorimosphaeroma rayi Hoestlandt, 1969

(Iso-Kotsubumushi)

(Fig.7)

Gnorimosphaeroma rayi Hoestlandt, 1969

For further synonymy, See Kim and Kwon, 1985.

Description female from Atsumi, Yamagata. Body ovate, 1.8 times as long as wide ; lateral margin subparallel. Dorsal surface smooth lateral margin subparallel, with scattered chromatophore ; maximum width at perconite. Perconite 1 protruded anteriorly, convex the lateral many of cephalon. Pleonite 2 with 2 pairs of incomplete suture lines, anterior one more approximately the middle line..

Antennule (Fig.7B), reaching pereonal somite, consists of 3 peduncular segments and 10~13 flagellar

segments. Antenna (Fig.7C), reaching the posterior half of the first pereonal somite, consists of 5 peduncular segments and 10~14 flagellar segments.

Right mandible (Fig.7D). Pars incisiva 4-headed ; lacinia mobilis 3-headed but not chitinized ; 7 setae behind lacinia ; mobilis processus molaris. Left mandible Pars incisiva 4-headed ; lacinia mobilis 3-headed but not chitinized ; 3~5 setae ; processus molaris wide. Palpal segment 2 with 8 setae ; segment 3 with 11 setae on inner margin.

Maxillula (Fig.7E). Endopod with 4 plumose setae ; exopod with 11 teeth at the tip of which 6 are serrate. Maxilla (Fig.7F) endopod with 12~15 plumose setae ; exopod with 11~12 pectinated spine on inner lobe and 11~12 pectinated spines on outer lobe. Maxilliped (Fig.7G) with a coupling hook ; palpal second 2 bearing 11 setae on inner margin and 5~8 long setae at outer-distal corner ; segment 3 with 15~16 seta on inner margin and 3 setae at outer-distal corner ; segment. 4 with 13 setae on inner margin and 3 setae in outer margin ; segment 5 with 15 setae around the margin.

Pereopod 1 (Fig.7H). Basis 2.5 times as long as wide with 7~8 long setae at inner distal corner ; ischium $2/3$ times as long as basis with 6 setae on inner margin and 3 setae on outer margin ; merus with 2 setae on inner margin and 6~8 seta at outer distal corner ; carpus triangular with 3 setae on inner margin and propodus with a seta on inner margin ; dactylus bifid.

Pereopod 2 (Fig.7I). Basis 3.5 times as long as wide with 4 long setae at inner-distal corner ; ischium 0.7 time as long as wide with 4~5 setae on inner margin ; merus half length of ischium with 3 relatively long seta on inner margin and 3 setae at outer distal corner ; carpus rectangular with 6~7 setae on inner margin and 6~7 setae on distal margin ; propodus 4~6 setae on inner margin ; dactylus bifid.

Pereopod 3 (Fig. 7J). Basis long 4.5 times as long as wide ; ischium 55% as long as basis ; merus $3/4$ as long as ischium, and ; carpus a little longer than merus with 6~7 setae on inner margin and 6~7 setae on distal margin ; propodus rectangular with 2~3 setae on inner margin ; dactylus bifid.

Pereopod 4 (Fig.7K). Basis with a seta at inner-distal corner ; ischium as long as basis ; merus with setae at outer-distal corner ; carpus with a seta at inner distal corner and a seta at outer-distal corner, densely pubescent along inner margin ; propodus densely pubescent along inner margin ; dactylus bifid.

Pereopod 5 (Fig.7L). Basis rectangular, 3.5 times as long as wide with ; ischium rectangular with 2 setae on inner margin ; merus pubescent on inner margin and with 2 seta outer distal corner ; carpus rectangular with 2 setae at outer distal corner propodus with 4 inner margin ; dactylus bifid.

Pereopod 6 (Fig.7M). Basis 3 times as long as wide, with a seta ; ischium $4/5$ time ; merus half length as long as ischium, with 6~7 setae on distal margin densely pubescent along inner margin ; carpus as long as merus with 5~6 seta on distal margin ; propodus with 3 setae on inner margin and 2 setae at outer distal corner ; dactylus bifid.

Pereopod 7 (Fig.7N). Basis times as long as wide ; ischium a little shorter than basis with pubescent outer margin ; merus with 2 relatively long seta on inner margin and 2 setae at outer-distal corner ; carpus as long as merus, with 4 setae including distal 3 ones and 3 setae ; propodus relatively swollen with 4 seta on inner margin and 8~9 setae on outer margin. ; dactylus bifid.

Pleopod 1. Basis with 3 coupling hooks ; endopod with 20~22 plumose setae ; exopod with 22 plumose setae around the margin.

Pleopod 2. Basis rectangular, with 4 coupling hooks ; endopod with 31~33 setae plumose setae ; exopod with 50 plumose setae.

Pleopod 3 (Fig.7O). Basis with 3 coupling hooks ; endopod with 11~14 plumose setae ; exopod with 24-26 plumose setae.

Pleopod 4 (Fig.7P). Basis with 2 coupling hooks ; endopod with 6 setae ; exopod with 4 setae.

Pleopod 5. Basis ; endopod ; exopod with 2 bosses.

Uropod (Fig.7Q) endopod rectangular ; exopod 0.8 time as long as endopod.

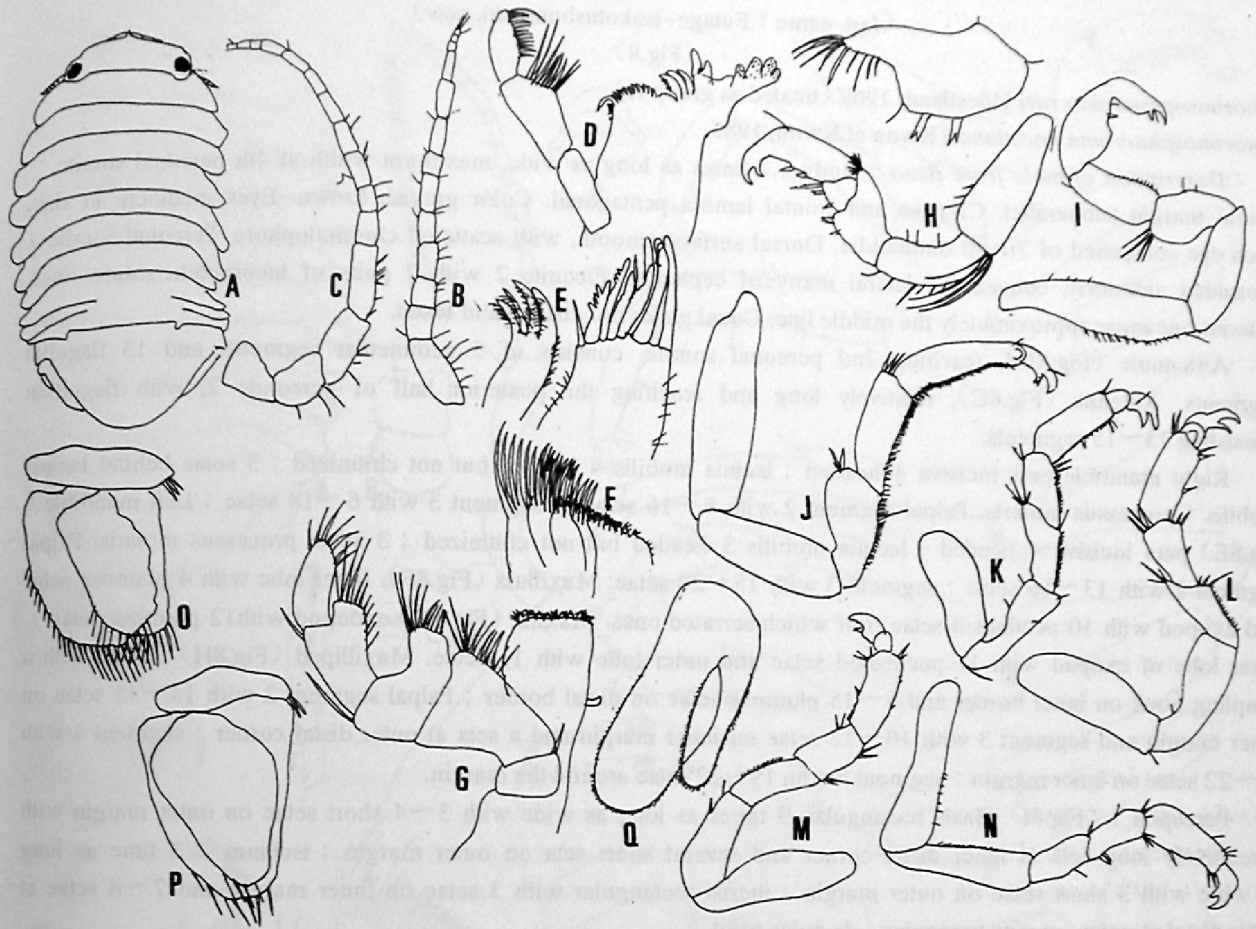


Fig.7. *Gnorimosphaeroma rayi* Hoestlandt, 1969

A. Dorsal view B. Antennule C. Antenna ; D. Right mandible ; E. Maxillula ; F. Maxilla ; G. Maxilliped ; H-N. Pereopods 1-7 ; O. Pleopod 1 ; P. Pleopod 4 ; Q. Uropod (All : Female from Nezugasaki, Yamagata Prefecture).

Remarks : These specimens agree with original description, Tomales Bay of California but differs from the following features (1) longer setae at inner distal corner of basis, (2) shorter setae at outer distal corner of merus, (3) less numerous seta on inner side of pereonal somite 1, (4) less numerous setae behind lacinia mobilis of mandible.

Distribution : Muroran, Hakodate, Awakominato, Misaki, Shimonoda, Sugasima, Hatakejima. Lake Nakaumi, Tomioka, Russia-Petrov Island, Korea, Tomales Bay (California) USA, Hawaii.

Material examined : 45 ♀♀ (2.6~3.6 mm in body length), Nezugasaki, Atsumi-cho, Yamagata Pref. coll. Noboru Nunomura N Sep. 6, 1990 ; 1 ♂ (1 ♀ coll. Noboru Nunomura Emi, Kamogawa, City Chiba Pref and, 1 ♀ (8.1 mm in leng) from Sakai-Minato Tottori Prefecture.

Gnorimosphaeroma hoestlandti Kim and Kwon, 1985

(Jap. name : Futage-isokotusbumushi, new)

(Fig.8)

Gnorimosphaeroma rayi Hoestlandt 1969 (treated as group II)*Gnorimosphaeroma hoestlandti* Kwon et Kwon, 1985

Description of male from Boso : Body 1.7 times as long as wide, maximum width at 4th pereonid somite ; lateral margin subparallel. Clypeus and frontal lamina pentagonal. Color grayish brown. Eyes mediocre in size, each eye composed of 70-80 ommatidia. Dorsal surface smooth, with scattered chromatophore. Pereonid somite 1 protruded anteriorly, convex the lateral margin of cephalon. Pleonite 2 with 2 pairs of incomplete suture lines, anterior one more approximately the middle line. Coxal plates not distinct and fused.

Antennule (Fig.8B), reaching 2nd pereonid somite, consists of 5 peduncular segments and 13 flagellar segments. Antenna (Fig.8C), relatively long and reaching the posterior half of pereonite 2, with flagellum consisting 13~15 segments.

Right mandible pars incisiva 4-headed ; lacinia mobilis 4-headed but not chitinized ; 3 setae behind lacinia mobilis ; processus molaris. Palpal segment 2 with 8~16 setae ; segment 3 with 6~18 setae ; Left mandible (Fig.8E) pars incisiva 4-headed ; lacinia mobilis 3-headed but not chitinized ; 3-setae processus molaris. Palpal segment 2 with 13~16 setae ; segment 3 with 15~20 setae. Maxillula (Fig.8F). Inner lobe with 4 plumose setae and exopod with 10 pectinated setae 6 of which serrated ones. Maxilla (Fig.8G) endopod with 12 plumose setae ; inner lobe of exopod with 11 pectinated setae and outer lobe with 11 setae. Maxilliped (Fig.8H) Endite with a coupling hook on inner border and 9~15 plumose setae on distal border ; Palpal segment 2 with 14~15 setae on inner margin and segment 3 with 10~12 setae on inner margin and a seta at outer distal corner ; segment 4 with 20~22 setae on inner margin ; segment 5 with 19~22 setae around the margin.

Pereopod 1 (Fig.8I). Basis rectangular, 3 times as long as wide with 3~4 short setae on outer margin with a relatively long seta at inner distal corner and several short seta on outer margin ; ischium $2/3$ time as long as wide with 3 short setae on outer margin ; merus rectangular with 3 setae on inner margin and 7~8 setae at outer distal margin ; carpus triangular ; dactylus bifid.

Pereopod 2 (Fig.8J). Basis, 4.5 times as long as wide ; ischium half length of basis merus $4/5$ as long as wide, with 2 seta at outer-distal corner ; merus a little shorter than ischium with 3 setae at outer-distal corner propodus rectangular as long as merus with 2 setae at outer distal corner ; propodus a little longer than carpus with 3 spines ; dactylus bifid.

Pereopod 3 (Fig.8K). Basis ; long, 5 times as long as wide ; ischium half length of basis ; merus $3/4$ time as long as wide, with 2 seta at outer-distal corner, and densely pubescent along inner margin ; carpus, as long as ischium with 2 seta at outer-distal corner, densely pubescent along inner margin ; propodus as long as wide ; densely pubescent along inner margin ; dactylus bifid.

Pereopod 4 (Fig.8L). Basis long, 5 times as long as wide ; ischium about half length of basis ; merus again half length of ischium, with 2 setae at outer-distal corner and with 2 setae on inner margin ; carpus rectangular with a seta at inner distal corner and a seta on outer distal corner ; propodus a little shorter than ischium with a seta outer distal corner and densely pubescent along inner margin ; dactylus bifid.

Pereopod 5 (Fig.8M). Basis 3.3 times as long as wide, with a seta at inner-distal corner ; ischium $4/5$ time as long as basis ; merus $2/3$ as long as ischium, with 2 setae at outer distal corner, densely pubescent along inner margin ; carpus $2/3$ time as long as wide, with 2 setae at outer distal corner and on inner margin ; propodus with 2 setae on inner margin at outer distal corner ; dactylus bifid.

Pereopod 6 (Fig.8N). Basis 3 times as long as wide, with a seta on inner distal corner ; ischium $4/5$ as long as basis ; merus half length as long as ischium, with 2 long setae at outer distal corner ; with 4 setae on inner margin and 2~3 setae at outer distal corner ; propodus relatively short ; dactylus bifid.

Pereopod 7 (Fig.8O). Basis 4.5 times as long as wide ; ischium 0.7 time as long basis with densely

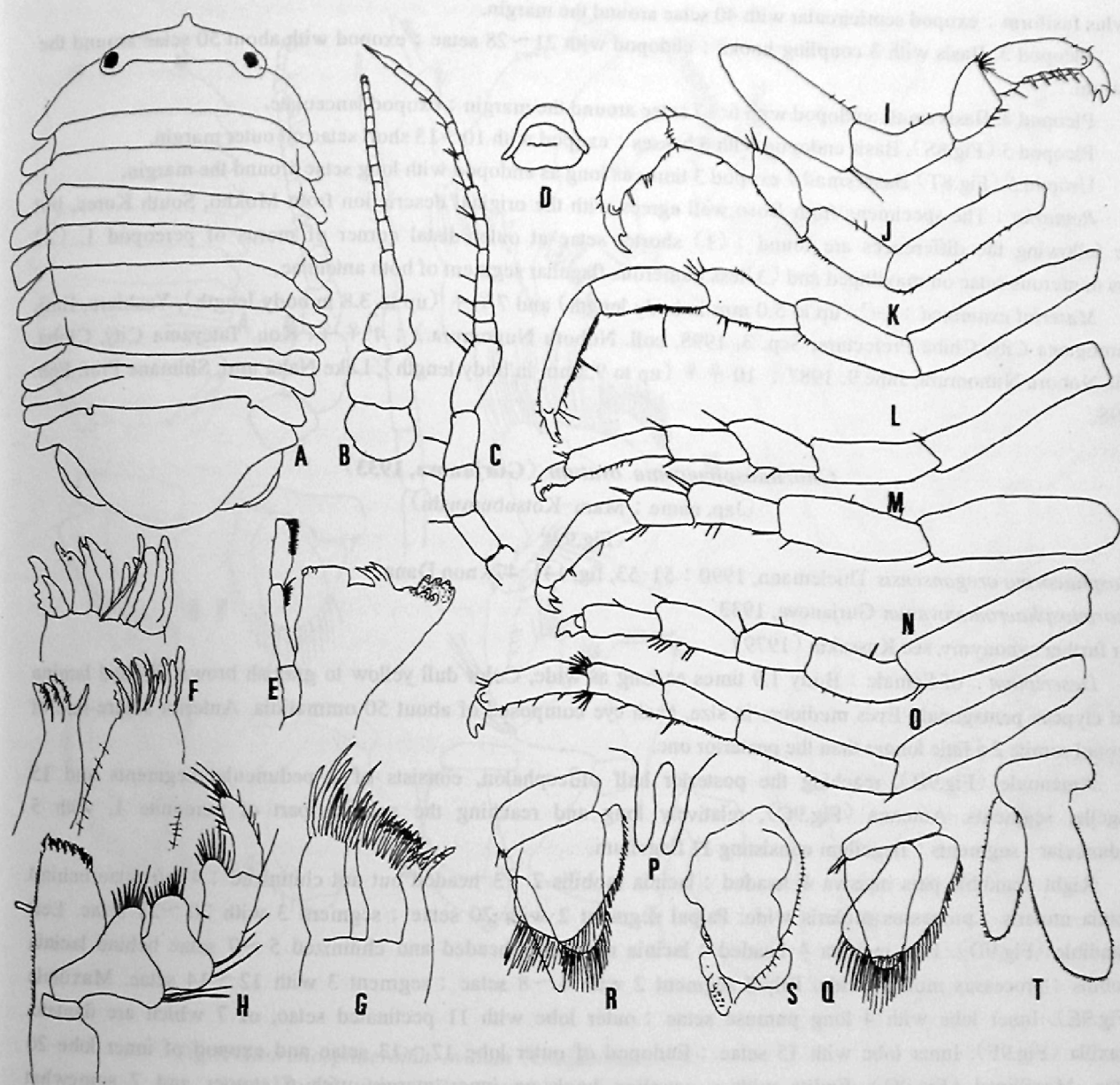


Fig.8 *Gnorimosphaeroma hoestlandti* Kim and Kwon, 1985

A. Dorsal view ; B. Antennule ; C. Antenna ; D. Clypeus and frontal lamina ; E. Left mandible ; F. Maxillula ; G. Maxilla ; H. Maxilliped ; I. Pereopod 1 ; J-O. Pereopods 2-7 ; P. Penis ; Q. Pleopod 1 ; R. Pleopod 2 ; S. Pleopod 5 ; T. Uropod (All : Male from Chikura, Chiba).

pubescent along inner margin ; merus a long seta on inner margin and densely pubescent along inner margin ; carpus as long as merus with 15 setae on distal margin ; propodus with 2 setae on inner margin ; dactylus bifid.

Penes (Fig.8P) straight, each penis about 5 times as long as wide.

Pleopod 1 (Fig.8Q). Basis with 3 coupling hooks ; endopod with 36 setae ; exopod with about 20 setae around the margin.

Pleopod 2 (Fig.8R). Basis with 2 coupling hooks ; endopod lanceolate with 10~14 seta on inner margin ;

stylus fusiform ; exopod semicircular with 40 setae around the margin.

Pleopod 3. Basis with 3 coupling hooks ; endopod with 21~28 setae ; exopod with about 50 setae around the margin.

Pleopod 4. Basis small ; endopod with 6~7 setae around the margin ; exopod lanceolate.

Pleopod 5 (Fig.8S). Basis endopod with 3 bosses ; exopod with 10~13 short setae on outer margin.

Uropod 5 (Fig.8T) Basis small ; exopod 3 times as long as endopod with long setae around the margin.

Remarks : The specimens from Boso well agrees with the original description from Mokho, South Korea, but the following the differences are found : (1) shorter setae at outer distal corner of merus of pereopod 1, (2) less numerous setae on maxilliped and (3) less numerous flagellar segment of both antennae.

Material examined : 1♂ (up to 5.0 mm in body length) and 7♀ (up to 3.8 in body length), Yoshiura, Emi, Kamogawa City, Chiba Prefecture, Sep. 3, 1998, coll. Noboru Nunomura.) ; 4♀. Kou. Tateyama City, Chiba, coll. Noboru Nunomura, June 9, 1987 ; 10♀ (up to 9.2mm in body length), Lake Naka umi, Shimane Pref. Feb. 1998.

Gnorimosphaeroma ovatum (Gurjanova, 1933)

(Jap. name : Maru-Kotsubumushi)

(Fig.9)

Exosphaeroma oregonensis Thielemann, 1990 : 51-53, fig, 141-47 (non Dana)

Gnorimosphaeroma ovatum Gurjanova, 1933

For further synonymy, see Kussakin (1979)

Description : of Female : Body 1.9 times as long as wide, Color dull yellow to grayish brown. Frontal lamina and clypeus pentagonal. Eyes mediocre in size, each eye composed of about 50 ommatidia. Anterior suture line of pleonal somite 2 a little longer than the posterior one.

Antennule (Fig.9B), reaching the posterior half of cephalon, consists of 3 peduncular segments and 15 flagellar segments. Antenna (Fig.9C), relatively long and reaching the anterior part of pereonite 1, with 5 peduncular segments ; flagellum consisting 11 flagellum.

Right mandible pars incisiva 4-headed ; lacinia mobilis 2~3-headed but not chitinized ; 4~6 setae behind lacinia molaris ; processus molaris wide. Palpal segment 2 with 20 setae ; segment 3 with 20~21 setae. Left mandible (Fig.9D). Pars incisiva 4-headed ; lacinia mobilis 3-headed and chitinized 5~7 setae behind lacinia mobilis ; processus molaris wide. Palpal segment 2 with 6~8 setae ; segment 3 with 12~14 setae. Maxillula (Fig.9E). Inner lobe with 4 long plumose setae ; outer lobe with 11 pectinated setae, of 7 which are dantate. Maxilla (Fig.9F). Inner lobe with 15 setae ; Endopod of outer lobe 12~13 setae and exopod of inner lobe 20 setae. Maxilliped (Fig.9G). Endite with a coupling hook on inner margin with 6 stouter and 7 somewhat slenderer setae. Palp five-segmented ; second segment big and triangular with 6 setae and 2 longer setae on inner distal corner segment 3 square with a rounded protruded areas and 12 setae on inner margin and a seta at outer distal corner, with 4 long setae on outer margin ; fourth segment slender with 6 shorter setae ; fourth segment slender with 6 short setae on the basal area of inner margin, and a small protuberance at the distal area, with 7~8 setae and a long seta on outer distal area ; fifth segment with 12~13 setae on distal margin, especial a long seta at the tip.

Pereopod 1 (Fig.9H). Basis rectangular with 2 long setae on inner distal corner, ; ischium slender 2/3 as long as basis with 2 long setae on inner margin ; merus triangular with 6 setae on outer-distal corner ; carpus triangular with a long seta and 3~4 setae on inner margin ; propodus rectangular with 3 setae ; inner margin and stout setae outer distal margin ; dactylus bifid.

Pereopod 2 (Fig.9I). Basis long, its length 4.5 times as long as wide ; ischium 1.5 times as basis with 3~4 relatively long setae inner margin ; merus half the length of ischium, with 4 long setae inner margin and a seta at outer-distal corner ; carpus as long as merus with 3 setae inner margin on outer-distal corner ;

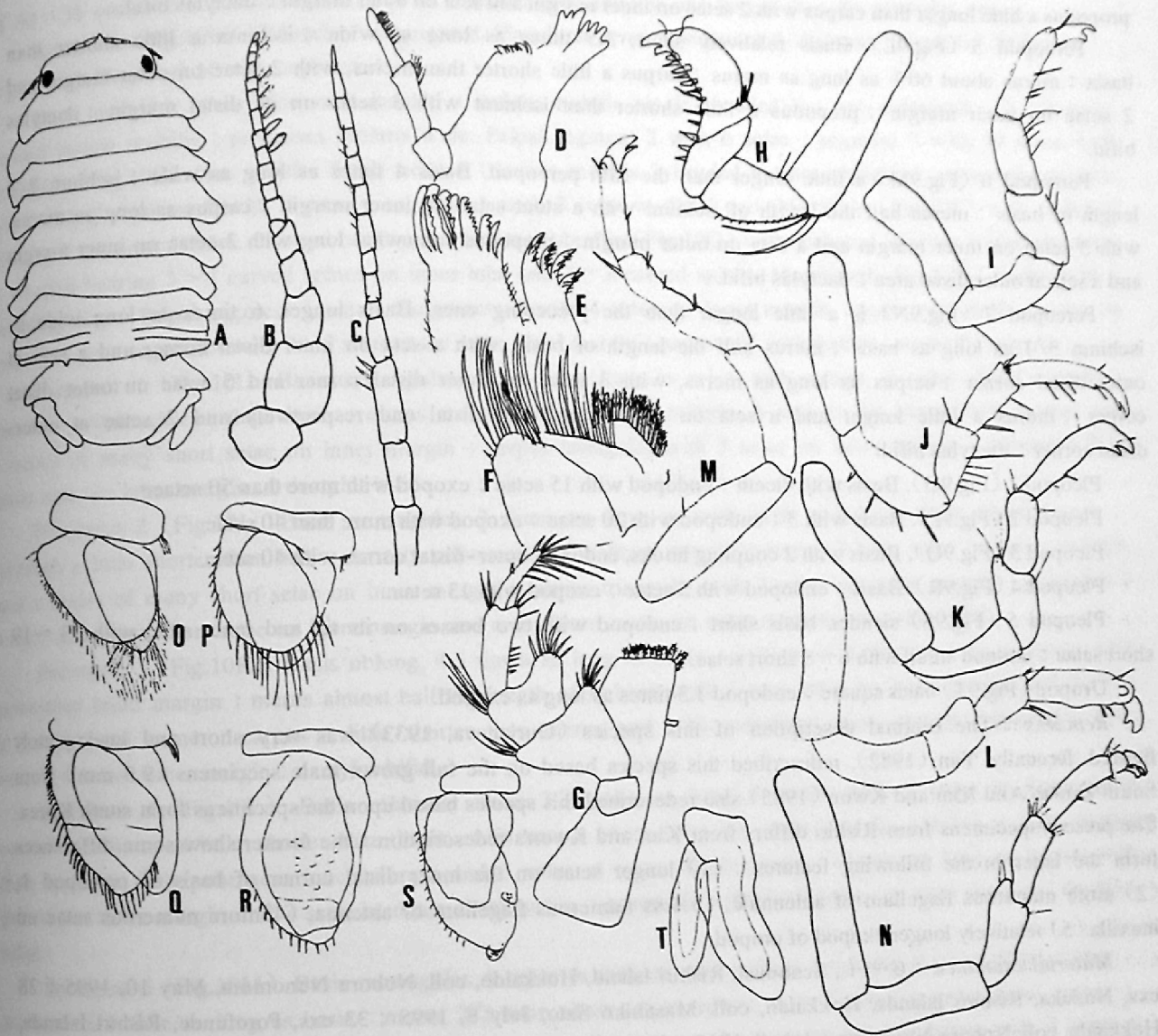


Fig.9 *Gnorimosphaeroma ovatum* (Gurjanova, 1933)
 A. Dorsal view ; B. Antenna ; C. Antenna ; D. Left mandible ; E.
 Maxillula ; F. maxilla ; G. Maxiilliped ; H-N. Pleopods 1-7 ; O-S.
 Pleopods 1-5 ; T. Uropod (All : Female from Rishiri, Hokkaido).

propodus as long as ischium, with 4 stout setae on inner margin. ; dactylus bifid.

Pleopod 3 (Fig.9J) Basis long with a relatively long seta on inner distal margin ; ischium as long as basis with 2 relatively long setae on inner margin ; merus about half the length of ischium with 2 long setae ; carpus with 6 setae on inner margin ; propodus somewhat long with 3 setae on inner margin ; dactylus bifid.

Pereopod 4 (Fig.9K) as long as pereopod 3 ; basis long, 5 times as long as wide with a relatively long seta on inner distal corner ; ischium about half length of basis with a relatively short seta on inner distal corner ; merus about half the length with a long seta near the inner distal corner and 3 setae at ht outer corner ; carpus as long as merus with a seta and inner distal corner and a seta at outer distal corner ;