

Marine harpacticoids of genus *Parathalestris* (Copepoda, Harpacticoida, Thalestridae) from Korea

Cheon Young Chang and Sung Joon Song

(Department of Biology, College of Natural Sciences, Taegu University,
Kyungsan, 712-714 Korea)

ABSTRACT

Marine harpacticoid copepods of the genus *Parathalestris*, which are suspected as a chief cause of pinholes or galls of cultivated seaweeds like *Undaria pinnatifida*, are studied taxonomically. As a result of examining the specimens from 23 localities in Korea since 1989, the authors confirmed six species of the genus *Parathalestris* including a new species, *P. parviseta* n. sp., and four species new to Korean fauna: *P. bulbiseta* Lang, 1965; *P. verrucosa* Ito, 1970; *P. pacificus* Tschislenko, 1971 and *P. areolata* Ito, 1972. A key to these six species of *Parathalestris* was made out, with the illustrations for them.

Key words: Taxonomy, marine, Copepoda, Harpacticoida, Thalestridae *Parathalestris*, Korea.

The harpacticoid copepods belonging to the genus *Parathalestris* Brady and Robertson, 1873, in which 20 species are currently recognized (Bodin, 1996), are usually epiphytic, and very abundant in algal bed of littoral or sublittoral rocky shore. Some of them have been suspected as a chief cause of pinholes or galls of cultivated seaweeds like wakame (*Undaria pinnatifida*) (Ho and Hong, 1988).

In Korea, Kang (1981) first reported the infesting thalestrid harpacticoids, supposed to be a species of *Parathalestris*, from southeast coast of Korea. Ho and Hong (1988) described *Parathalestris infestus* and estimated the infestation of it with another co-occurring new thalestrid species of *Amenophia orientalis* on the basis of the samples collected from wakame beds at Soando Island in southeast coast of Korea.

Followed by Chang and Song (1995, 1997) dealing with Korean thalestrid harpacticoids, we accomplished a taxonomic study on Korean *Parathalestris*. As a result of examining our collection from 23 localities of South Korea, six species including a new species were recognized: *P. bulbiseta*

Lang, 1965; *P. verrucosa* Ito, 1970; *P. pacificus* Tschislenko, 1971; *P. areolata* Ito, 1972; *P. infestus* Ho and Hong, 1988; *P. parviseta* new species.

Collections were made with a dipnet of no. 10 mesh size or a light trap. Specimens were dissected, figured and measured in lactophenol on the Cobb's aluminum hole slide. Figures were made with the aid of a drawing tube.

SYSTEMATIC ACCOUNTS

Family Thalestridae Sars, 1905

Subfamily Thalestrinae Lang, 1936

Genus *Parathalestris* Brady and Robertson, 1873

1. *Parathalestris parviseta* new species (Figs. 1, 2)

Material examined. Holotype female and paratypes (11 females and 7 males) collected with light trap from an algal bed near a small breakwater at Myongsa, Keoje I. (34° 43' 21" N, 128° 36' 20" E) on 1 May 1995. Holotype, allotype and undissected paratypes (3 females and 2 males) will be deposited in the U.S. National Museum of Natural History, Smithsonian Institution, and the remaining paratypes in the collection of the authors.

Additional material examined. 1 ♀, Chungmun, Cheju I., 20 Apr. 1995.

Female. Body (Fig. 1A, B) somewhat depressed laterally; 1.18 mm long, measured from tip of rostrum to posterior margin of furcal rami; greatest width 0.39 mm measured across posterior margin of cephalothorax; about 1.16 times longer than wide. Nauplius eye conspicuous, dark violet in color. Rostrum (Fig. 1D) very prominent and directed downward, triangular in shape with 1 pair of sensory hairs on each proximal lateral margin, about 1.60 times longer than wide. All posterior margins of thoracic somites ornamented with hairs. Abdomen gradually narrowing posteriorly, without delicate hairs on posterior margin of each segment. Genital double somite (Fig. 1C) slightly wider than long; fusion indicated by a faint chitinous suture ventrally. Leg 6 represented by 3 tiny setae. Furcal ramus as long as wide, without bulbous setae at base.

Antennule (Fig. 1D) 9-segmented; aesthetasc each on tip of fourth and distal segment; second segment longest; sum of third and fourth ones as long as next 5 segments. Allobasis of antenna (Fig. 1E) about 3.75 times as long as maximum width, with a hairy seta on about proximal two-thirds; exopod distinctly 2-segmented, first segment shorter than second, with 1 bare and 1 plumose setae near distal edge; second segment with 4 long setae in total, one seta on one-third and others on distal, of which middle one longest; endopod with 3 strong claws along inner margin, 4 long geniculate spines, and 1 slender long and 2 bare setae subdistally on inner side.

Mandible (Fig. 1F). Praecoxa with strong bidentate pars incisiva, 1 prominent hairy seta along cutting edge. Coxa-basis somewhat widened distally with a bundle of spinules on subproximal surface, and 3 setae distally on inner protuberance, and 1 seta on outerdistal edge. Endopod with inner and outer protuberances; inner protuberance bearing 2 setae; outer one bilobate each bearing 2 and 3 setae. Exopod much smaller than endopod, with 3 setae in total.

Maxillula (Fig. 1G). Praecoxa bare, its outer margin rounded; arthrite with 2 bare juxtaposed setae

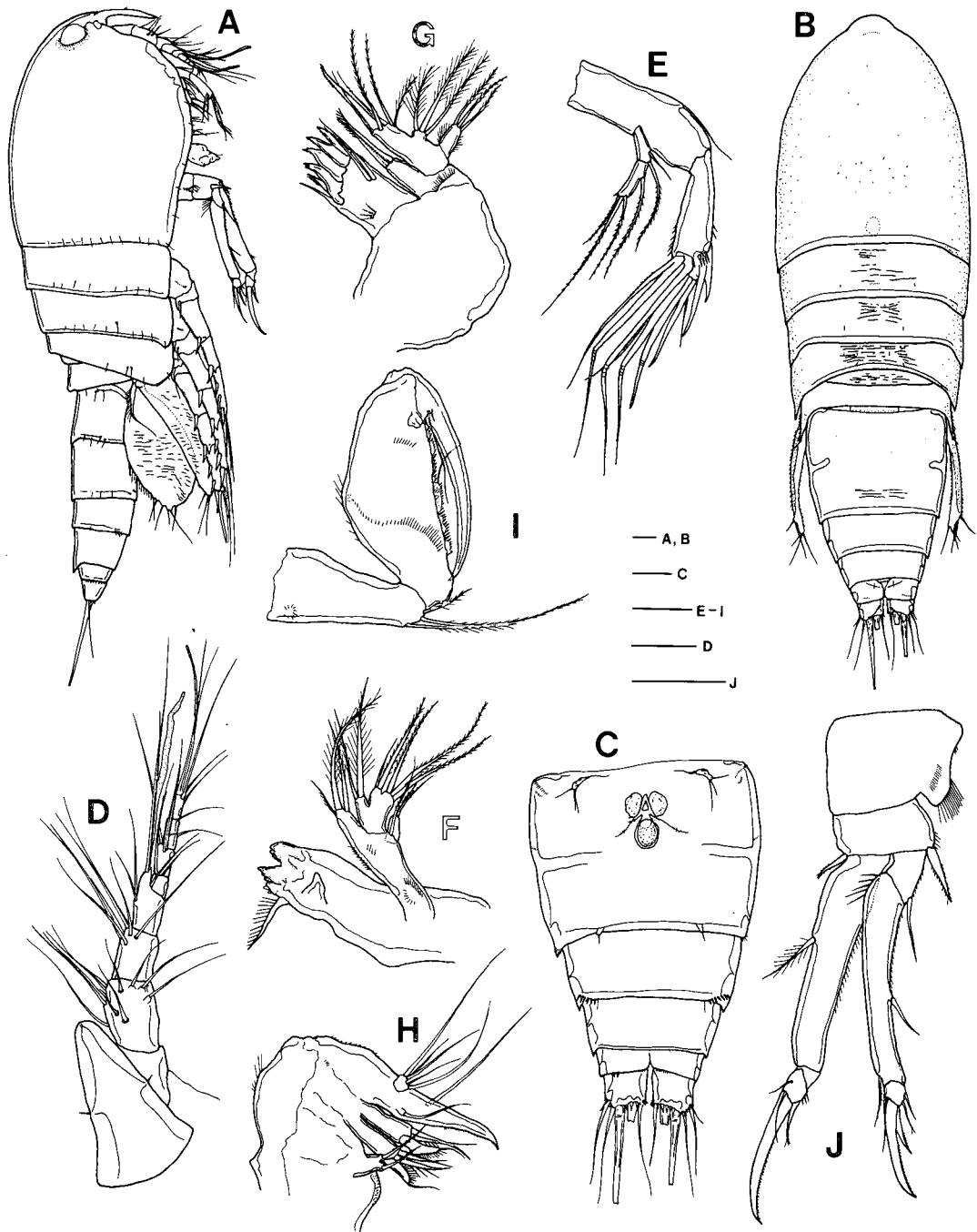


Fig. 1. *Parathalestris parviseta* new species, female: A, habitus, lateral; B, habitus, dorsal; C, urosome, ventral; D, rostrum and antennule; E, antenna; F, mandible; G, maxillula; H, maxilla; I, maxilliped; J, leg 1. (scales: 0.05 mm)

and a fine spinular row on surface, 5 strong claws and a setae along cutting edge. Coxa with a spinular row on proximal end of posterior surface. Basis bilobed with 6 setae in total. Endopod represented by small protuberance with 3 plumose setae. Exopod cylindrical and slightly tapering distally, about 2.0 times longer than wide, furnished with many hairs along both margins, with 3 setae on distal end.

Maxilla (Fig. 1H). Syncoxa ornamented with a row of tiny spinules along outer margin, with 3 endites; proximal endite bilobed, with well-developed seta on each lobule; middle and distal endite with a spiniform seta and 2 normal setae on each endite; basis bearing a pectinate strong claw with a seta on ventral and dorsal sides; endopodite small and separated from basis, with 5 bare setae in total.

Maxilliped (Fig. 1I). Basis slightly tapering distally, with a bundle of spinules near inner proximal end, with 3 setae on inner distal edge; endopod convex on outer margin, with 2 spinular rows on surface, with a stout claw as long as endopod, bearing 2 tiny setae and a long basal seta.

Leg 1 (Fig. 1J). Coxa slightly wider than long, with a longitudinal row of spinules on outer surface, and with spinules on outer edge. Basis about 1.88 times wider than long, with 2 spines on inner and outer corner. Exopod distinctly 3-segmented, first and second segment obliquely divided; first segment with a seta on outerodistal edge and many spinules along outer margin; second one longest with a spine at middle of outer margin, with a seta on inner distal edge and some hairy spinules near inner basal part; distal one as long as wide with 2 bare setae on outer margin and one seta on inner distal end, with 2 stout pectinate spines, of which inner one about 2 times as outer one. Endopod as long as exopod, 3-segmented; first segment about 4.75 times as long as wide, with plumose thick seta not reaching middle of inner margin, and with small spinules along outer margin; second one without ornamentation; distal one with 2 strong pectinate spines, of which inner one about 3 times as outer one, with a setule on inner margin and a bare seta on inner distal end.

Legs 2-4 (Figs. 2A-C). Rami of legs 2-4 3-segmented. Ornamentation of legs 2-4 as follows:

Leg 2	basis	0-1	exopod	1-1, 1-1, 2-2-III	endopod	1-0, 2-0, 2-2-1
Leg 3	basis	0-1	exopod	1-1, 1-1, 3-2-III	endopod	1-0, 1-0, 3-2-1
Leg 4	basis	0-1	exopod	1-1, 1-1, 3-2-III	endopod	1-0, 1-0, 2-2-1

Leg 5 (Fig. 2D). Both rami foliaceous; baseoendopod furnished with a bare seta on a long cylindrical process, with 5 marginal setae, of which outer 3 setae bare, fourth one plumose and innermost one shortest, plumose, and somewhat separated from others; exopod extending to baseoendopod, about 1.52 times as long as greatest width, bearing fine spinules along inner and outer margin, with 6 marginal naked setae in total, of which second outer one shortest and second inner one longest.

Male. Body (Fig. 2E) 0.86-0.90 mm long, excluding rostrum and caudal setae, and broadest near posterior margin of cephalothorax, tapering behind. First to third segments of antennule (Fig. 2F) bearing a few plumose setae. Disteromedian spine on basis of leg 1 as shown in Fig. 2G. Distal endopodal segment of leg 2 (Fig. 2H) with 1 short and 2 long plumose setae on inner margin, 1 plumose seta and 1 small projection on distal end, 2 spiniform process on outer margin, of which second one more thickened and somewhat dentated on outer border. Leg 3 and leg 4 nearly same in shape with female. Distal end of baseoendopod in leg 5 (Fig. 2I) not reaching exopod, bearing 3 setae, innermost one of which stout and apart from other two tiny ones; baseoendopod confluent on

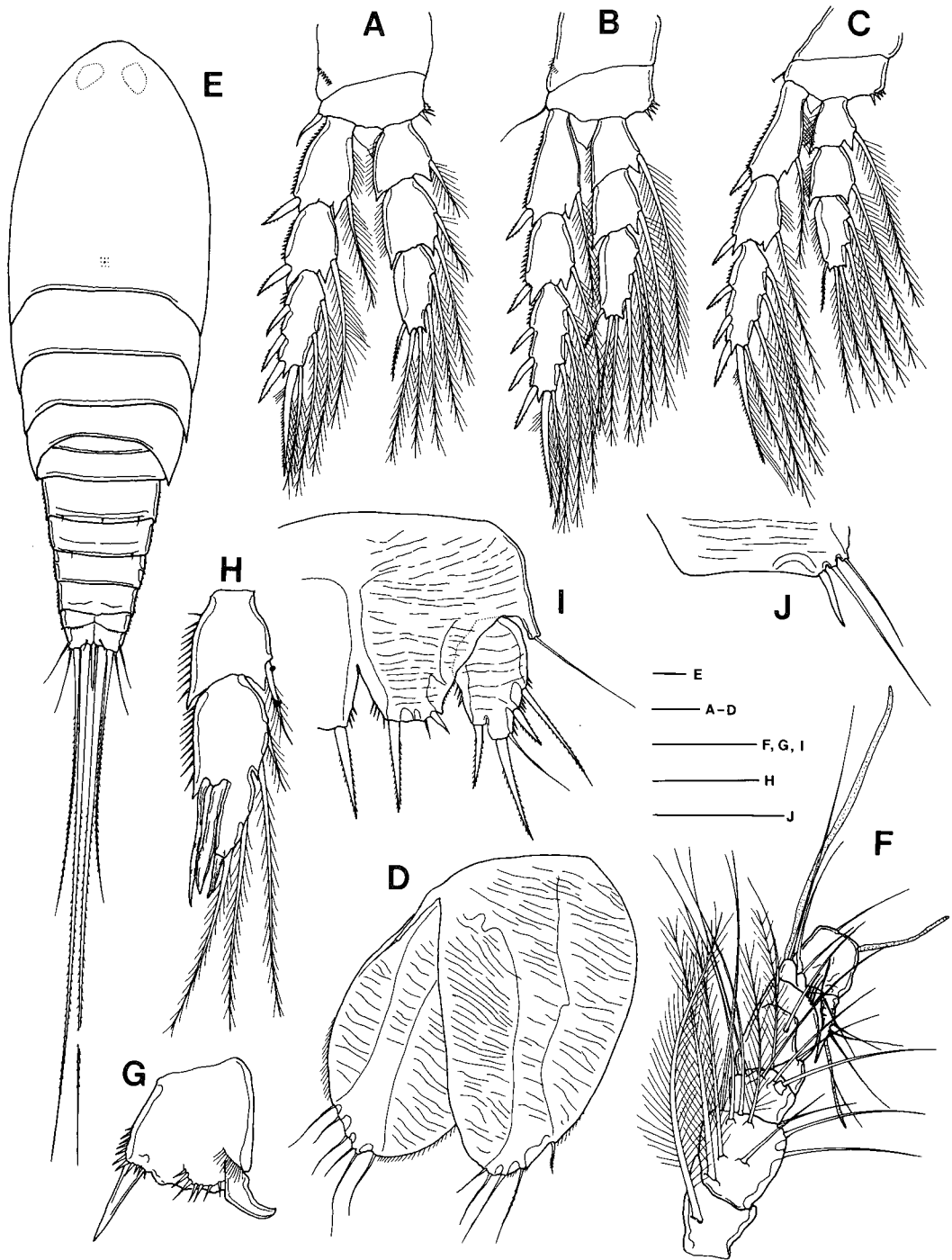


Fig. 2. *Parathalestris parviseta* new species, female: A-D, leg 2-5. male: E, habitus, dorsal; F, antennule; G, basis of leg 1; H, endopod of leg 2; I, leg 5; J, leg 6. (scales: 0.05 mm)

proximal two-thirds of its inner margin; exopod much longer than wide with 5 setae in total. Leg 6 (Fig. 2J) represented by a small plate bearing 1 inner spine and 2 outer slender setae.

Etymology. The specific name is taken from the tiny and diminutive setae on leg 5 baseoendopod of male.

Remarks. The present new species appears most close to *P. mourei* Masunari, 1988 from Santos Bay of Brazil in the Atlantic, of its 20 congeners, but the former is easily distinguished from the latter by the following characteristics: (1) posteroventral margins of abdominal somites smooth; (2) proximal endite of maxilla has 2 well-developed setae, as shown in *P. areolata*, *P. verrucosa* and *P. pacificus*; (3) shape of male leg 5, with baseoendopod more thickened outermost spine, and with exopod much elongated bearing well developed spines.

Furthermore, *P. similis* Lang, 1936, which was first recorded from Beagle Canal of South America (Lang, 1936) and later collected again from Tristan da Cunha Is., southernmost part of the Atlantic, by Wiborg (1964), is easily discernible from the present new species by the number of seta on antenna exopod, non-convex maxilliped, and above all, the the setal arrangement of leg 5 baseoendopod in male.

On the other hand, 5 species of genus *Parathalestris* are known from the Far East, of which *P. pacificus* Tschislenko, 1971 described from Possjet Bay, the northernmost part of the East Sea, is most closely related to this new species, but readily discernible from it by the following characters: (1) endopod of maxilliped convex on outer margin, while smooth in this new species; (2) male antennule without plumose setae on first to third segments, (3) different shape and setal arrangement of male baseoendopod.

2. *Parathalestris bulbiseta* Lang, 1965 (Fig. 3A-E)

Parathalestris bulbiseta Lang, 1965 (p. 171, figs. 92-95).

Material examined. 1 ♂, Chokpyokkang, Puan, 17 May 1991; 1 ♀, Chosa-ri, Yongdok, 27 June 1991; 1 ♀ (ovi.), Kadubong, Ullung I., 9 May 1992; 2 ♀ ♀ (1 ovi.), 3 ♂ ♂, Taejin, Yongdok, 2 July 1992; 2 ♀ ♀ (1 ovi.), 1 ♂, Taejin, Yongdok, 24 July 1992; 1 ♀ (ovi.), Taebyon, Yangsan, 4 Feb. 1993; 1 ♀ (ovi.), 1 ♂, Namae 2-ri, Yangyang, 8 May 1993; 1 ♀ (ovi.), Songjung, Pusan, 2 Nov. 1993; 2 ♀ ♀ (1 ovi.), Songjung, Pusan, 25 March 1994; 1 ♀, Taedong 2-ri, Pohang, 30 March 1995; 1 ♀, 1 ♂, Cheodong, Ullung I. 7 April 1995; 2 ♀ ♀, Myongsa, Keoje I., 1 May 1995; 1 ♂, Kanggu, 28 May 1995; 1 ♀ (ovi.), Masan-ri, Pohang, Feb. 23 1997.

Remarks. The present species is distinguished from *P. infestus* Ho and Hong, 1988 by the following characteristics: (1) outer bulbous seta of furcal ramus issuing terminally, while laterodistally in *P. infestus*; (2) proximal segment of antennal exopod with 2 setae and distal one with 3 setae, while 1 seta and 4 setae respectively in *P. infestus*.

Distribution. California, Korea (East Sea).

3. *Parathalestris verrucosa* Ito, 1970 (Fig. 3F-J)

Parathalestris verrucosa Ito, 1970 (p. 211, figs. 1-4)

Material examined. 1 ♂ (copepodid), Nokdong, Kohung, 22 Dec. 1993; 4 ♀ ♀ (3 ovi.), 5 ♂ ♂, Hakdong, Kohung, 22 Dec. 1993; 5 ♀ ♀ (1 ovi.), 7 ♂ ♂, Cheodong, Ullung I., 7 Apr. 1995; 1 ♂,

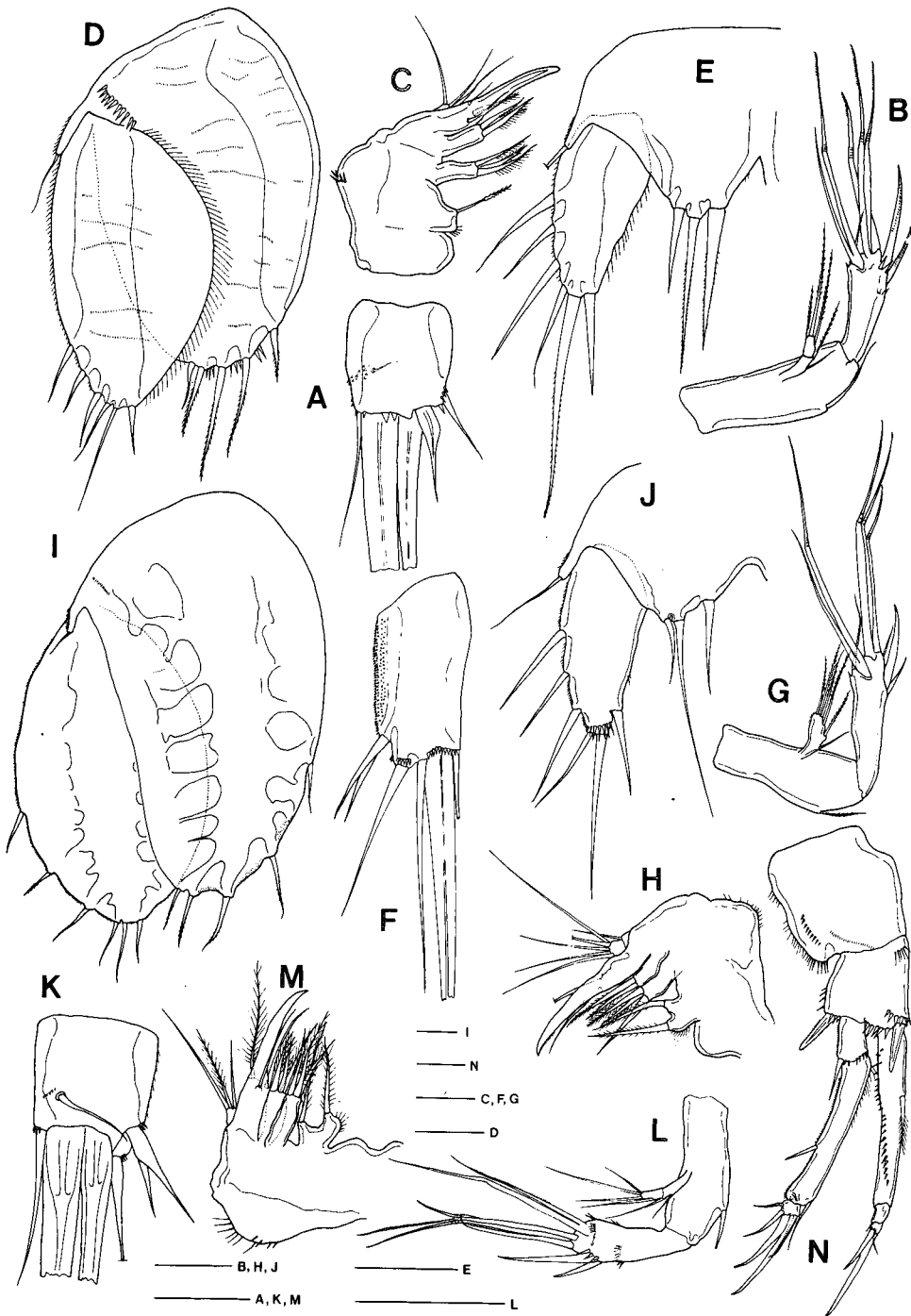


Fig. 3. *Parathalestris bulbiseta* Lang, female: A, furcal ramus; B, antenna; C, maxilla; D, leg 5. male: E, leg 5. *Parathalestris verrucosa* Ito, female: F, furcal ramus; G, antenna; H, maxilla; I, leg 5. male: J, leg 5. *Parathalestris pacificus* Tschislenko, female: K, furcal ramus; L, antenna; M, maxilla; N, leg 1. (scales: 0.05mm)

Cheodong, Ullung I., 9 Apr. 1995.

Remarks. Our specimens showed a few minor discrepancies from Ito's original description as follows: (1) furcal ramus elongated (about 1.90 times longer than wide); (2) with antennal exopod unsegmented, while Ito's having 2-segmented one; (3) posteroventral margin of abdominal somites bearing stronger spinular rows than Ito's.

Distribution. Japan, Korea (East Sea, South Sea).

4. *Parathalestris pacificus* Tschislenko, 1971 (Figs. 3K-N, 4A-B)

Parathalestris pacificus Tschislenko, 1971 (p. 165, figs. 9-12)

Material examined. 1 ♀, Pangjukpo, Tolsan I., 12 Oct. 1989; 1 ♀, 1 ♂, Cheodong, Ullung I., 7 April 1995; 1 ♂, Myongsa, Keoje I., 1 May 1995.

Remarks. Tschislenko (1971) described this species on the basis of specimens collected from Possjet Bay, the northernmost part of the East Sea (Sea of Japan), so this species is still restricted within the Far East of Northern Pacific. Our specimens are well coincided with his original description except that endopodal inner seta of leg 1 is much shorter than his.

Distribution. Russia (Possjet Bay), Korea (East Sea, South Sea).

5. *Parathalestris areolata* Ito, 1972 (Fig. 4C-H)

Parathalestris areolata Ito, 1972 (p. 305, figs. 1-4).

Material examined. 4 ♀ ♀, 4 ♂ ♂, Naebal-ri, Kohung, 30 Jan. 1991; 7 ♀ ♀, 4 ♂ ♂, Sochon, 5 Mar. 1992; 1 ♀(ovi.), Yulpo, Posung, 20 Dec. 1993; 1 ♀(ovi.), Chonbu, Ullung I., 2 Mar. 1995.

Remarks. Our specimens are well fitted with Ito's (1972) original description except much elongated furcal ramus (about 2.0 times longer than wide, while about 1.5 times in Ito's). *P. areolata* is somewhat similar to *P. infestus*, but easily distinguished from it by the character combination: a short rostrum, long furcal rami, 6 setae on exopod of antenna, much longer leg 5 exopod, and the setal arrangement of leg 5 baseoendopod. In consideration of the characteristics above-mentioned, *P. areolata* is surely allied to the other two species inhabiting the Far East of Northern Pacific, *P. verrucosa* Ito, 1970 and *P. pacificus* Tschislenko, 1971.

Distribution. Japan (Hokkaido), Korea (South Sea, Yellow Sea).

6. *Parathalestris infestus* Ho and Hong, 1988 (Fig. 4H)

Parathalestris infestus Ho and Hong, 1988 (p.1623, figs. 1-8)

Material examined. 2 ♀ ♀ (1 ovi.), 2 ♂ ♂, Myongsa, Keoje I., 1 May 1995; 1 ♀, Chisepo, Keoje I., 4 May 1995.

Remarks. No remarkable difference was found between original description and our specimens except that tip of female leg 5 exopod reached slightly beyond baseoendopod in our dissected specimen (Fig. 4H). This characteristic was not clearly figured in Ho and Hong (1988).

Distribution. Korea (South Sea).

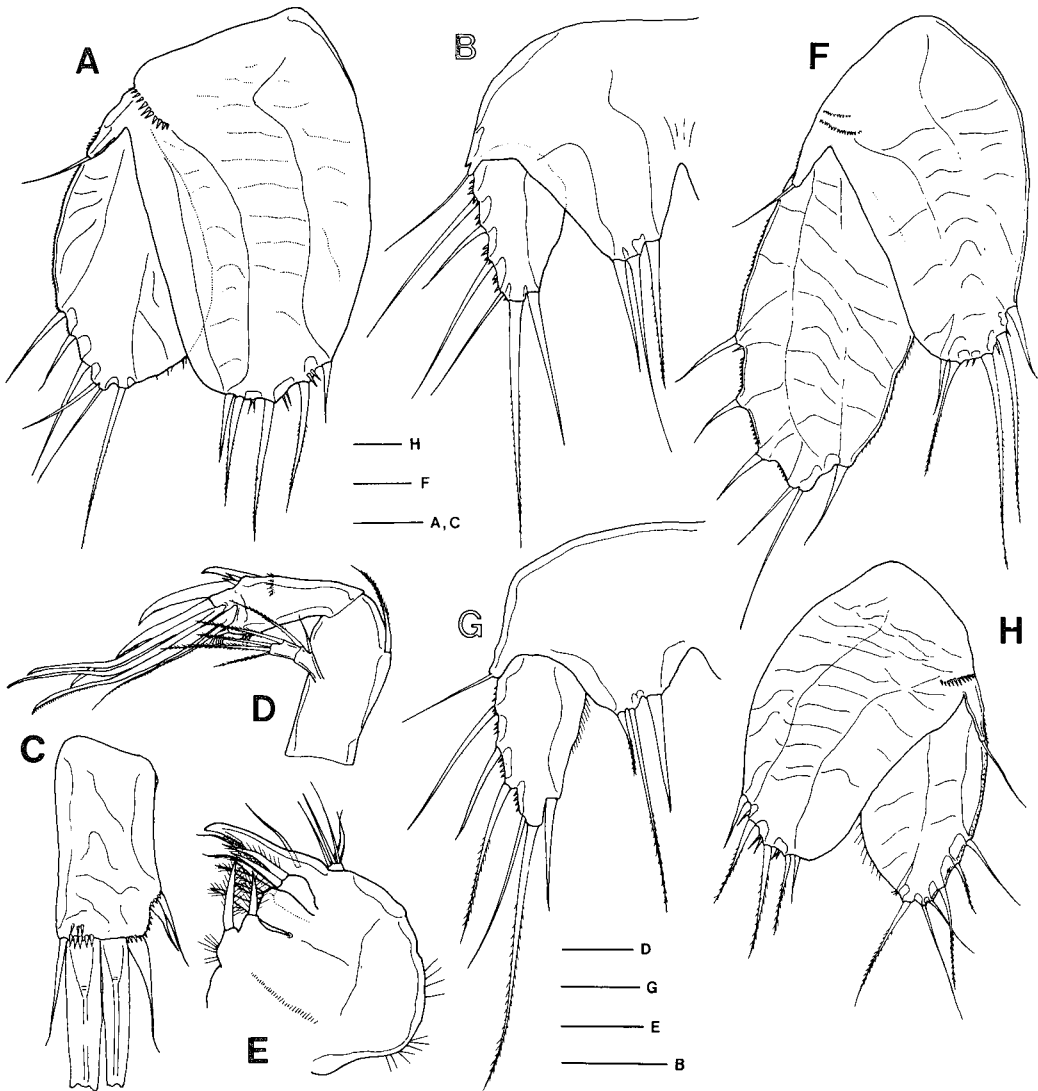


Fig. 4. *Parathalestris pacificus* Tschislenko, female: A, leg 5, male: B, leg 5. *Parathalestris areolata* Ito, female: C, furcal ramus; D, antenna; E, maxilla; F, leg 5. male: G, leg 5. *Parathalestris infestus* Ho and Hong, female: H, leg 5. (scales: 0.05 mm)

A key to the species of *Parathalestris* from Korea.

1. Furcal ramus as long as broad ----- 2
 Furcal ramus over 1.5 times as long as broad ----- 5
2. Exopod of antenna with 6 setae in total, proximal endite of maxilla bearing 2 setae ----- 3
 Exopod of antenna with 5 setae in total, proximal endite of maxilla bearing 1 seta ----- 4
3. Baseoendopod of male leg 5 flattened distally, bearing 2 small and 1 normal spines -----
 ----- *P. parviseta* n. sp.

- Baseoendopod of male leg 5 tapering distally, bearing 3 well-developed spines -----
----- *P. pacificus* Tschislenko
4. One of lateral setae of furcal ramus of female swollen at base; male leg 5 baseoendopod reaching middle of exopod ----- *P. infestus* Ho and Hong
- Outer distal seta of furcal ramus of female bulbous at base; male leg 5 baseoendopod not reaching middle of exopod ----- *P. bulbiseta* Lang
5. Furcal ramus without swollen seta in female ----- *P. verrucosa* Ito
- Lateral and outer distal setae swollen at base in female ----- *P. areolata* Ito

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한국산 *Parathalestris*속의 요각류
(요각아강, 갈고리노벌레목, Thalestridae과)의 기재

장 천 영 · 송 성 준
(대구대학교 자연과학대학 생물학과)

요 약

Thalestridae科的 하르팍티쿠스류에 대한 분류학적 연구의 일환으로, 혹형성과 穿孔 등 양식 해조류에 심각한 피해를 일으키는 것으로 주목받고 있는 *Parathalestris*속의 하르팍티쿠스류를 조사한 결과 1신종(*P. parviseta* n. sp.) 4한국미기록종(*Parathalestris bulbiseta* Lang, 1965; *P. verrucosa* Ito, 1970; *P. pacificus* Tschislenko, 1971; *P. areolata* Ito, 1972)을 포함하여 6종을 동정·분류하였다. 본 논문에서는 1신종과 4미기록종에 대한 삽화와 분류학적 고찰 및 한국산 *Parathalestris*속 6종에 대한 검색표를 작성하였다.