

## Terrestrial Isopoda (Crustacea) from Korea

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**Eighteen species of terrestrial isopods are recorded from Korea. *Lucasioides taitii*, n. gen. and n. sp. is described. *Mongoloniscus* Verhoeff is considered to be a full genus. Four poorly known species are described, viz., *Exalloniscus cortii*, *Lucasioides gigliotosi*, *Mongoloniscus koreanus*, and *M. nipponicus*. *Tylos granuliferus* and *Alloniscus balssi* are discussed and illustrated. *Porcellio (Nagara) vannamei* Arcangeli from Japan is transferred to *Mongoloniscus*. *Nagurus katakurai* Nunomura from Japan is considered to be a junior synonym of *Mongoloniscus nipponicus*.**

**KEY WORDS:** Crustacea, Isopoda, Oniscidea, taxonomy, Korea.

The terrestrial isopods from Korea, as well as from other parts of the northeast Asia, have scarcely and improperly been studied. Arcangeli (1927, 1952) described five new species, *Porcellio (Lucasius?) racovitzai*, *P. (Lucasius) gigliotosi*, *P. (Nagara) vannamei*, *Exalloniscus cortii*, and *Protracheoniscus (Mongoloniscus) nipponicus*, and recorded *Ligidium japonicum* Verhoeff from Korea. Other contributions were given by Verhoeff (1930, 1937) who described a new species, *Protracheoniscus (Mongoloniscus) koreanus*, and added *Armadillidium vulgare* Latreille to Korean fauna, by Vandel (1969) who described briefly a cavernicoleous species, although he didn't identify the species, and by Flasarova (1972) who recorded *Ligia (Megaligia) exotica* Roux and *Koreoniscus racovitzai*, and described a new species, *Ligidium koreanum* from North Korea. Recently Taiti and Ferrara (1986a, 1989) added a new species, *Littorophiloscia koreana*, and *Armadilloniscus*

*litoralis* Budde-Lund to Korean fauna.

This paper deals with the material collected by myself in 1990 from South Korea and by Dr. P. Beron (Sofia) in 1982 and 1987 from North Korea, together with other material from South Korea collected during the past two decades by my colleagues as well as the unpublished specimens collected by late Dr. F. Silvestri (Portici). All the available type specimens and non-type material studied by Arcangeli (1927, 1952) were also re-examined.

For the bibliography of each species, as a rule, only the original description and records from Korea are cited. In 'Material Examined', collectors are referred only when the specimens were not collected by myself. All figures were made with the aid of a camera lucida. In Trachelipidae, the pleon and telson were drawn from the teared parts which were mounted on microscopic slides. For an explanation of the graphs of the co-ordinates of noduli laterales, see Taiti and Ferrara (1982).

*Abbreviations:*

- BM Natural History Museum, London  
DEAP Dipartimento di Entomologia Agraria dell'Università, Portici  
IJB Department of Biology, Inje University, Kimhae

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MZUF Museo di Storia Naturale, Sezione di Zoologia "La Specola" dell'Università, Florence  
 NNHMS National Natural History Museum, Sofia

### Systematics

**Family TYLIDAE Milne-Edwards**

**Genus *Tylos* Audouin, 1826**

***Tylos granuliferus* Budde-Lund, 1885**

(Figs. 1-3)

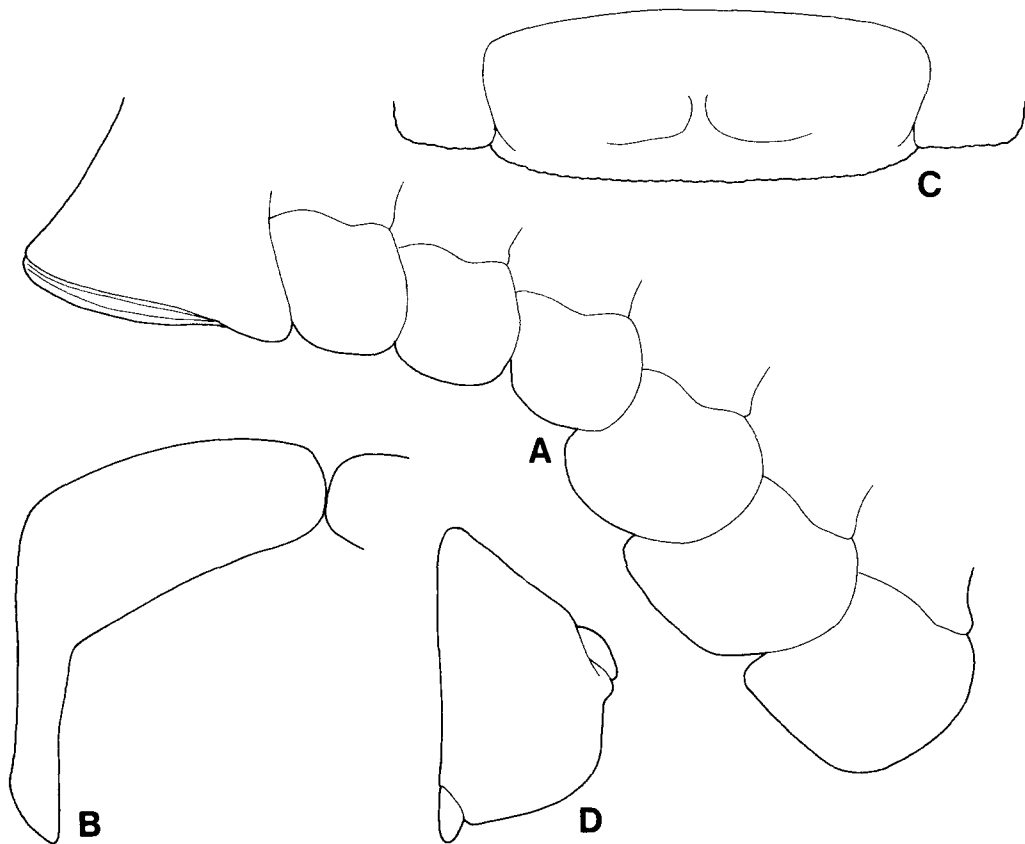
*Tylos granulatus* Miers, 1877 (p. 674, pl. 69, fig. 2), nomen nudum [non Krauss].

*Tylos granuliferus* Budde-Lund, 1885 (p. 279).

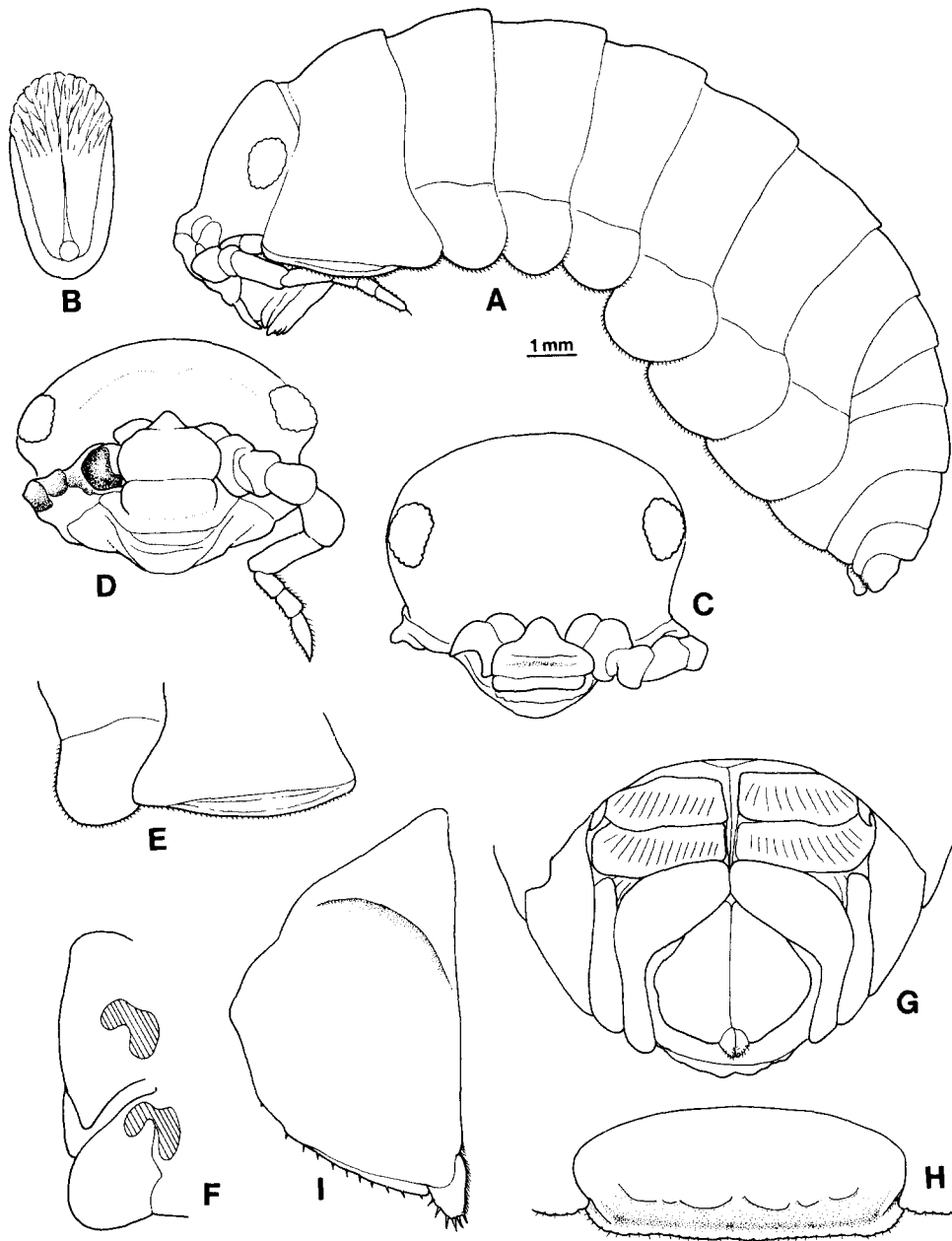
**Material examined:** Kang-wön-do - 5 ♂♂, Kosöng-gun, T'osöng-myön, Ayajin, May 11, 1981, leg. K.J. Hwang; 2 ♀♀, Yang-yang-gun, Sörak Beach Resort, Aug. 4, 1979; 6 ♂♂, 3 ♀♀, Kangnüng, Kangmun, Jan. 1980, leg. I.H. Kim. Kyöngsangbuk-do - 2 ♂♂, Yöngdök-gun, Pyöng-gok, Jul. 18, 1985; 2 ♂♂, 11 ♀♀, Yöng-il-gun, Kuryongp'o, Aug. 12, 1976, leg. H.S. Kim. (all in IJB).

**NORTH KOREA:** 8 juvs., Kangwon Prov., Lake Sijung-ho, Aug. 22, 1982, leg. P. Beron (NNHMS).

**Syntypes re-examined:** 1 ♀, lectotype, JAPAN, Hiogo, leg. G. Lewis (BM 1872:17); 2 ♀♀, 1 ♀ without anterior half, BORNEO, among rotten woods, forest, leg. A. Adams (BM 1847: 21).



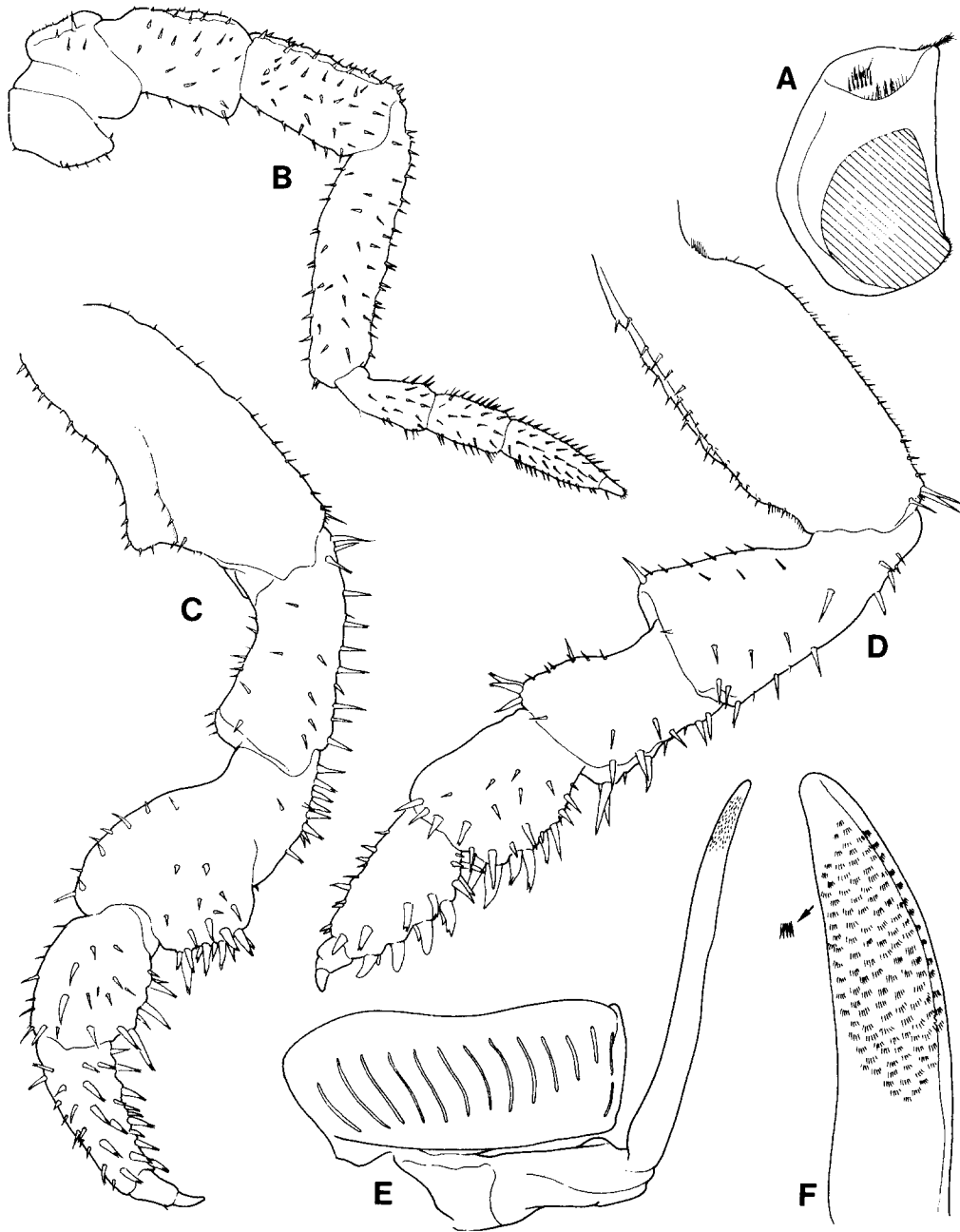
**Fig. 1.** *Tylos granuliferus* Budde-Lund, 1885, lectotype female (BM 1872: 17): A, epimera of pereon, lateral view; B, pleon plate 5; C, telson; D, uropod.



**Fig. 2.** *Tylos granuliferus* Budde-Lund, 1885, male: A, habitus, lateral view; B, dorsal scale spine; C, cephalon, dorsal view; D, cephalon, frontal view; E, epimera of pereonites 1 and 2; F, epimera of pereonites 1 and 2, ventral view; G, pleon and telson, ventral view; H, telson; I, uropod.

**Remarks:** This species was originally described as *Tylos granulatus* by Miers (1877) based on speci-

mens collected from Japan and Borneo. Re-examination of the syntypes proved that they included



**Fig. 3.** *Tylos granuliferus* Budde-Lund, 1885, male: A, antennule; B, antenna; C, pereopod 1; D, pereopod 7; E, pleopod 2; F, distal part of pleopod 2 endopod.

three different species: i) a female, from Hiogo (= Hyogo), Japan, 20 mm in length, which is here designated as lectotype (Fig. 1); ii) a female from Borneo, 12 mm, with granulated dorsum, proba-

bly belongs to *Tylos albidus* Budde-Lund; iii) another female and one without anterior half are not granulated.

*Tylos granuliferus* is characterized by the gran-

ulated dorsum, quadrangular pereonal epimera, pleonal plate 5 with rounded medial margin and male pereopod 1 merus distally with a big protrusion on sternal margin.

Since recognition of this species is difficult due to the poor descriptions and inadequate illustrations by previous authors [Miers, 1877; Nunomura, 1990, p. 39, fig. 156 as *Tylos granuiferus* (sic)], the characteristic features are illustrated in Figs. 2 and 3 based on the specimens from Korea. **Distribution:** Korea and Japan.

### Family LIGIIDAE Brandt and Ratzeburg

#### Genus *Ligia* Fabricius, 1798

##### *Ligia exotica* Roux, 1828

*Ligia exotica* Roux, 1828 (p. 3, pl. 13, fig. 9).

*Ligia* (*Megaligia*) *exotica*: Flasarova, 1972 (p. 92, figs. 1-5).

**Material examined:** Kyönggi-do-2♂♂, 2♀♀, Taech'öngdo I., Sönjinp'o, Jul. 22, 1973, leg. H. S. Kim; 1♂, 1♀, Yong-yudo I., Ülwang-ri, Oct. 3, 1974, leg. K.S. Lee; 1♂, Tökchök Is., Paekado I., Aug. 3, 1982. Kang-wön-do-1♂, 9♀♀, Sokch'o, Aug. 5, 1978; 2♀♀, Myöngju-gun, Kangdong-myön Aninjin, Jun. 3, 1978. Ch'ungch'öngnam-do-5♂♂, 8♀♀, Anmyöndo I., Jul. 15, 1974. Kyöngsangbuk-do-2♂♂, Ullöngdo I., Sadong, Jun. 4, 1979; 2♂♂ 1, Yöng-il-gun, Kuryongp'o, Jun. 3, 1979. Kyöngsangnam-do-2♀♀, Yangsan-gun, Kori, Nov. 5, 1979. Pusan - 2♂♂, 1♀, Haeundae, Mip'o, Jul. 22, 1976, leg. H.S. Kim; 1♂, Naktong River estuary, Changjado, Jul. 27, 1980, leg. W. Kim; 1♀, Kadökto I., Taehang-ri, May 22, 1978. Chöllabuk-do - 1♀, Pangch'ukto I., Jul. 25, 1980, leg. K.S. Lee; 1♂, Piando I., Jul. 28, 1980, leg. W. Kim; 1♂, 1♀, Puan-gun, Chulp'o-myön, Komso, Oct. 24, 1980. Chöllanam-do-1♂, Wando-gun, Maando I., Aug. 22, 1982; 1♀, Kohüng-gun, Tüngnyangman Bay, Aug. 22, 1972, leg. K.B. Park; 1♂, 2♀♀, Yöch'ön, Aug. 6, 1978, leg. K.S. Lee. Cheju-do - 2♀♀, Cheju I., Cheju, Hwabuk-dong, Jul. 18, 1979; 4♂♂, 3♀♀, Cheju I., Pukcheju-gun, Hamdök, Jul. 18, 1979; 11♀♀, Cheju I., Söngsanp'o, Jul. 19, 1979; 1♂, 1♀, Cheju I., Sögwip'o, Pomok-ri, Jun. 5, 1977, leg. H.S. Kim. (all in IJB).

**Distribution:** Circumtropical.

#### Genus *Ligidium* Brandt, 1833

##### *Ligidium koreanum* Flasarova, 1972

*Ligidium japonicum*: Arcangeli, 1927 (p. 267); Arcangeli, 1952 (p. 311) [non Verhoeff, in part from Keijo, Korea].

*Ligidium koreanum* Flasarova, 1972 (p. 95, figs. 6-22).

**Material examined:** Seoul - 5♂♂, 9♀♀, Uidong, Jun. 20, 1976, leg. Y.S. Rho. Kyönggi-do - 4♂♂, 11♀♀, Tökchökto I., Jun. 5, 1973, leg. H.S. Kim. Ch'ungch'öngbuk-do - 1♀, Yöngdöng-gun, Haksan-myön, Apch'i, Jun. 29, 1990. Kyöngsangnam-do - 2♂♂, 3♀♀, 4 juvs., Chinyang-gun, Munsan-myön, Aug. 1, 1990; 16♀♀, 2 juvs., Kosöng-gun, Tosan-myön, Suwöl-ri, Jul. 9, 1990, leg. K.A. Lee. Pusan - 4♂♂, 10♀♀, 1 juv., Yöngdo-gu, T'aejongdae, Aug. 15, 1977, leg. Y.S. Rho. Chöllabuk-do - 1♀, Mujugun, Tögyusan Mt., Inwölam, Jun. 29, 1990; 1♂, 9♀♀, Chöng-üp-gun, Naejangsan Mt., Oct. 23, 1980. Chöllanam-do - 1 juv., Tolsando I., Kulchön, Jul. 10 1990, leg. K.A. Lee. Cheju-do - 3♂♂, 2♀♀, Cheju I., Sögwip'o, near Ch'önjigyo Bridge, Jun. 5, 1977, leg. Y.S. Rho. (all in IJB).

**NORTH KOREA:** 13♂♂, 18♀♀, N. Pyongan Prov., Mt. Myohyang, Jun. 10-12, 1987, leg. P. Beron (NNHMS); 5♂♂, 5♀♀, same data (MZUF); 7♂♂, 8♀♀, Kangwon Prov., Kumgangsán, 100-800 m, Jun. 4, 1987, leg. P. Beron (IJB); 1♀, same locality, 400-900 m, Jun. 4, 1987, leg. P. Beron (NNHMS); 3♀♀, Kangwon Prov., near Lake Sijung, Jun. 5, 1987, leg. P. Beron (NNHMS).

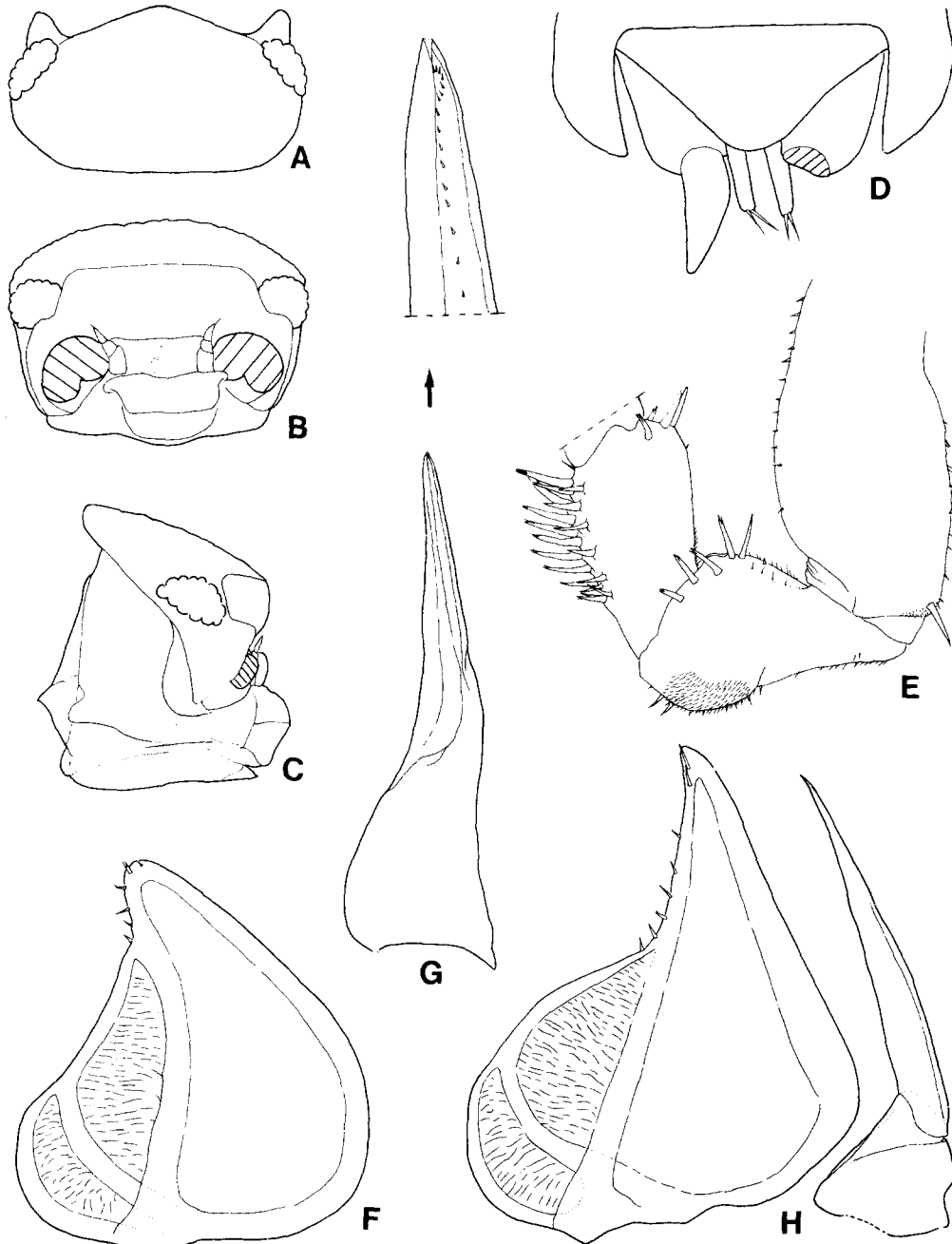
**Material re-examined:** 1♀, KOREA, Keijo (= Seoul), Oct. 2, 1925, leg. F. Silvestri (DEAP) [specimen identified as *Ligidium japonicum* Verhoeff by Arcangeli (1927)].

**Remarks:** Arcangeli (1927) recorded *Ligidium japonicum* Verhoeff from Keijo (= Seoul), Korea. Due to the lack of male, further identification of the specimen, which was studied by the Italian author, is impossible. The record, however, is regarded as a misidentification of *L. koreanum*, because *L. japonicum* has not been collected ever since in Korea in spite of the extensive fieldworks.

**Distribution:** Korea and Japan (Tsushima Is. and Kyushu).

**Family SCYPHACIDAE Dana**  
**Genus *Alloniscus* Dana, 1854**  
***Alloniscus balsii* (Verhoeff, 1928)**

**(Fig. 4)**  
*Japononiscus balsii* Verhoeff, 1928 (p. 32, figs. 7-16).



**Fig. 4.** *Alloniscus balsii* (Verhoeff, 1928), male: A, cephalon, dorsal view; B, cephalon, frontal view; C, cephalon, lateral view; D, pleonite 5, telson and uropods; E, pereopod 7 merus, ischium and basis; F, pleopod 1 exopod; G, pleopod 1 endopod; H, pleopod 2.

**Material examined:** Kyöngsangbuk-do - 13 ♂♂, 41 ♀♀, Ullüngdo I., Todong, Oct. 1, 1981, leg. I. H. Kim. Kyöngsangnam-do - 9 ♂♂, 15 ♀♀, T'ong-yöng-gun, Kukto I., Jul. 21, 1978, leg. H.S. Kim. Chöllabuk-do - 13 ♂♂, 16 ♀♀, Puan-gun, Chulp'o-myöñ, Komso, Oct. 24, 1980. Chöllanamdo - 3 ♂♂, 22 ♀♀, Chindo-gun, Tokködo I., Jul. 27, 1983; 2 ♂♂, 11 ♀♀, Taehüksando I., Shim-ri, Jul. 19, 1986. (all in IJB).

**Remarks:** This species is characterized by the profrons of cephalon without protrusion and well developed antero-lateral lobes; frontal line and supra-antennal line clearly visible; eyes with about 20 ommatidia; male pereopod 7 ischium slightly concave on proximal half of sternal margin, a big setulose boss on distal half; and male pleopod 1 endopod straight with unmodified apical part. Subadult males have pleopod 1 endopod distally bent outwards with acute apex (see Verhoeff, 1928, fig. 12; Nunomura, 1984, figs. 42I, 44G and 45I).

Diagnostic characters of this species are illustrated in Fig. 4.

**Distribution:** Korea and Japan.

#### **Genus *Armadilloniscus* Uljanin, 1875**

##### ***Armadilloniscus ellipticus* (Harger, 1878)**

*Actoniscus ellipticus* Harger, 1878 (p. 373).

*Armadilloniscus litoralis*: Taiti and Ferrara, 1989 (p. 82).

**Material examined:** Chöanam-do - 1 ♀, Tolsando I., Kulchön, May. 10, 1986; 2 ♀♀, Chindo-gun, Tokködo I., Jul. 27, 1983; 2 ♀♀, Chindo-gun, Hajodo I., Üpkü, debris on strand line, Jul. 29, 1983. (all in IJB).

**Remarks:** This species was formerly recorded from North Korea as *Armadilloniscus litoralis* Budde-Lund, 1885 (Taiti and Ferrara, 1989). Garthwaite *et al.* (1992) synonymised *A. litoralis* with *A. ellipticus* on the basis of both morphological and biochemical comparison.

**Distribution:** Korea, Hong Kong, Malaysia, Madagascar, Mediterranean coasts of Europe, Azores, Madeira, Bermuda, Atlantic coasts of N. America and Hawaii Is.

#### **Family PHILOSCIIIDAE Maccagno**

##### **Genus *Littorophiloscia* Hatch, 1947**

##### ***Littorophiloscia koreana* Taiti and Ferrara, 1986**

*Littorophiloscia koreana* Taiti and Ferrara, 1986a (p. 1369, figs. 14-15).

**Material examined:** Chöanam-do - 1 ♂, 3 ♀♀, Wando-gun, Nöpto I., Aug. 22, 1982 (IJB).

**Remarks:** This species was originally described from Nampo, the Yellow Sea coast of North Korea (Taiti and Ferrara, 1986a).

**Distribution:** Korea.

#### **Genus *Burmoniscus* Collinge, 1914**

##### ***Burmoniscus mauritiensis* (Taiti and Ferrara, 1983)**

*Renneloscia mauritiensis* Taiti and Ferrara, 1983 (p. 203, fig. 2).

**Material examined:** Cheju-do - 5 ♂♂, 21 ♀♀, Cheju I., Sögwip'o, near Ch'önjigyo Bridge, Jun. 5, 1977, leg. Y.S. Rho (IJB).

**Remarks:** Taiti and Ferrara (1986b) transferred this species to *Burmoniscus* because *Renneloscia* Vandel, 1970 was considered to be a junior synonym of *Burmoniscus* with which *Formosocia* Verhoeff, 1928 and *Vavoscia* Schultz, 1985 are synonymous (Taiti and Ferrara, 1986b; Taiti *et al.*, 1992).

**Distribution:** Mauritius, China, Korea and Hawaii Is.

#### **Family ONISCIDAE Verhoeff(?)**

##### **Genus *Exalloniscus* Stebbing, 1911**

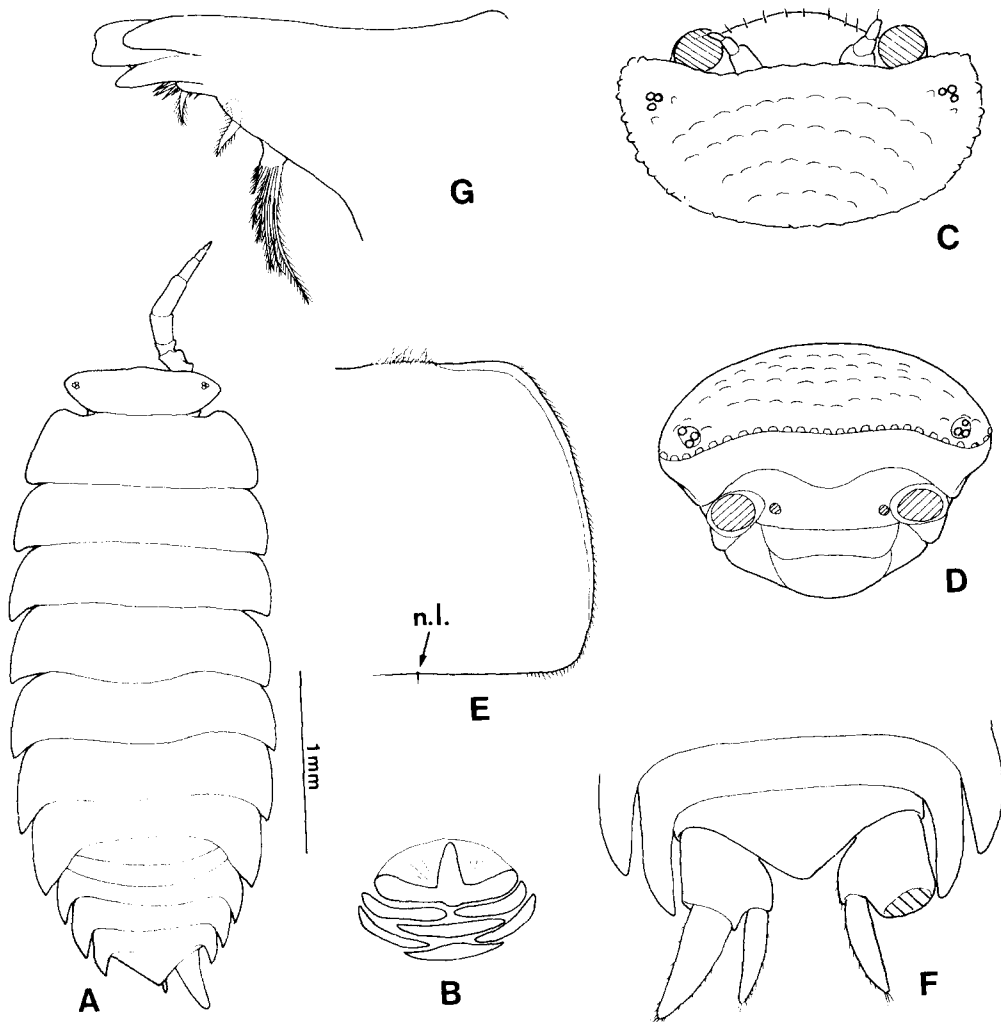
##### ***Exalloniscus cortii* Arcangeli, 1927**

(Figs. 5 and 6)

*Exalloniscus Cortii* Arcangeli, 1927 (p. 263, fig. 21); 1952 (p. 310). [in part, from Schanhaikwan, China and Heijo, Korea].

**Material examined:** NORTH KOREA: 1 ♂, 1 ♀, Heijo (= Pyongyang), Oct. 4, 1925, leg. F. Silvestri (DEAP).

**Syntypes re-examined:** CHINA: 1 ♀, Hunan, Yolushan, Oct. 24, 1925, leg. F. Silvestri; 1 ♂, Hebei, Schanhaikwan, Oct. 7, 1925, leg. F. Silvestri; 1 ♀, Shanghai, May 19, 1925, leg. F. Silvestri. KOREA: 2 ♂♂ (1 ♂ lectotype), 1 ♀, Heijo (= Pyongyang), Oct. 4, 1925, leg. F. Silvestri. JAPAN: 1 ♀, Kioto, Jul. 13, 1925, leg. F. Silvestri; 1 ♀, Atami, Aug. 14, 1925, leg. F. Silvestri; 1 ♂, 1 ♀, Arashiyama, Jul. 19, 1925,



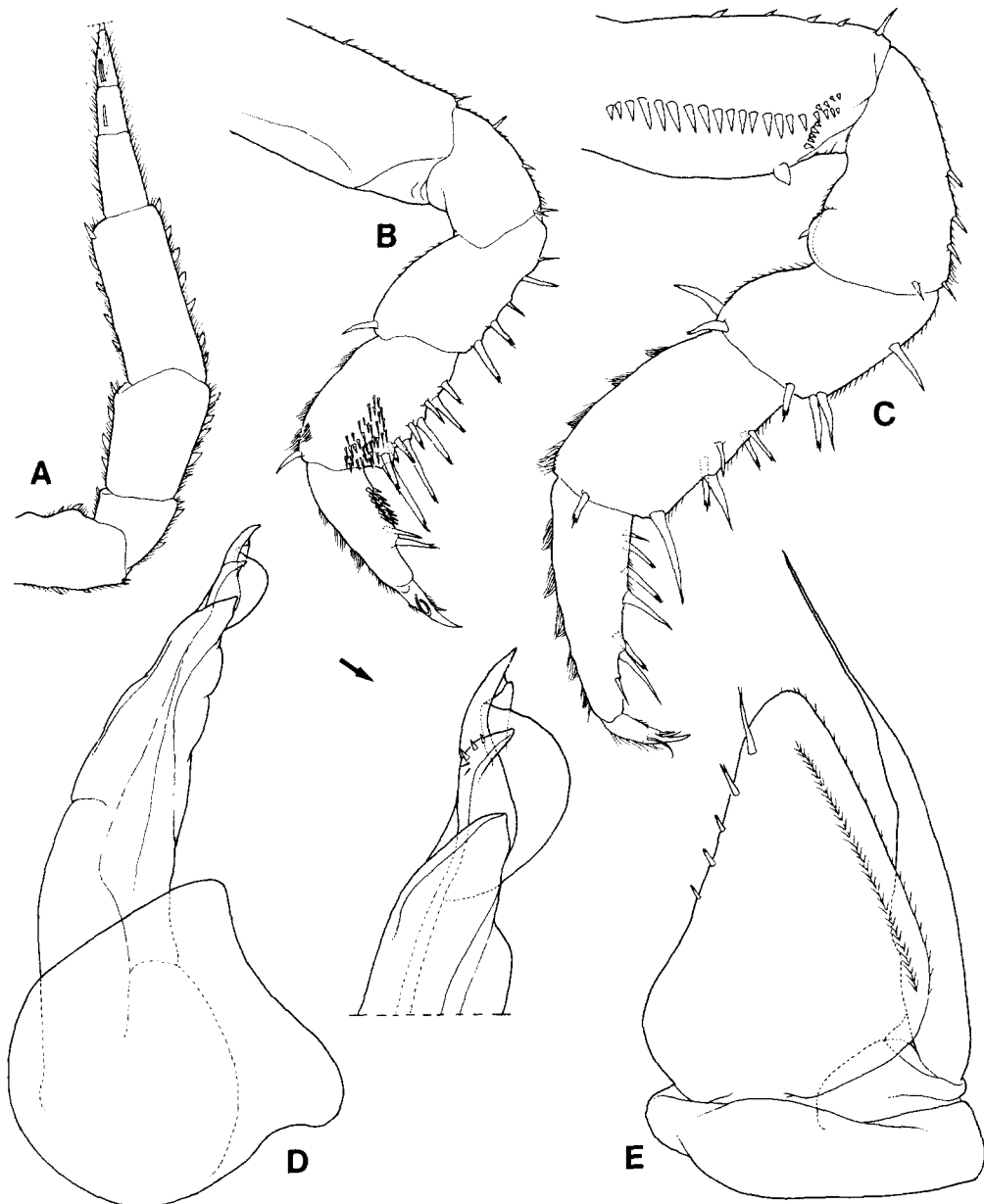
**Fig. 5.** *Exalloniscus cortii*, Arcangeli, 1927: A, habitus; B, dorsal scale spine; C, cephalon, dorsal view; D, cephalon, frontal view; E, right epimeron of pereonite 1, n.l. = nodulus lateralis; F, pleonites 4-5, telson and uropods; G, mandible. (A & C, male from "Heijo"; B & D-F, female from "Heijo"; G, paralectotype male from Schanhaikwan).

leg. F. Silvestri; 1 ♀, Kobe, Jun. 24, 1925, leg. F. Silvestri; 3 ♀ ♀, Chofu, Oct. 4, 1924, leg. F. Silvestri; 1 ♀, Ichinomiya, Nov. 2, 1924, leg. F. Silvestri. (all in DEAP).

**Description:** Maximum length of both male and female 3.5 mm. Color faded by long preservation. Dorsum granulated with numerous large scale spines as in Fig. 5B. Eye with 3 large ommatidia. Body outline as in Fig. 5A. Lateral lobes of cephalon rounded, slightly protruding outwards; frontal line slightly bent downwards in the middle; supra-antennal line conspicuously bent downwards

in the middle. Pereonite 1 with posterior margin straight and postero-lateral corner rounded. Pereonites 2-7 with corners progressively pointing further backwards. Pleonal epimera 3-5 falciform, directed backwards. Telson triangular with nearly straight sides and obtusely angled apex; over twice as wide as long. Antenna with peduncular article 5 as long as flagellum; ratio of flagellar articles 3:2: 2; flagellar articles 2 and 3 with 1 and 2 aesthetascs respectively. Mandible as characteristic of the genus, i.e. with molar penicil consisting of several (about 7) plumose setae arising from a com-





**Fig. 6.** *Exalloniscus cortii* Arcangeli, 1927: A, antenna; B, pereopod 1; C, pereopod 7; D, pleopod 1; E, pleopod 2. (A & D, male from "Heijo"; B & C, lectotype from "Heijo"; E, paralectotype male from Schanhaikwan).

mon stalk. Maxillule not examined due to bad condition. Maxilliped with a minute penicil on endite. Pleopodal exopods without respiratory structure. Uropodal protopod slightly surpassing tip of telson; exopod short and stout, slightly longer than protopod; endopod inserted slightly proximal to exopod.

**Male.**—Pereopods 1-2 with several trifid setae on carpus. Pereopod 7 ischium distally with rounded lobe on rostral surface, slightly protruding compared with tergal margin. Pleopod 1 exopod about as long as wide, outer margin slightly sinuous; endopod with apical part bearing large rounded hyaline lobe, apex acute. Pleopod 2 endopod,

much longer than exopod, with filiform distal part.  
**Remarks:** This species was described by Arcangeli (1927) based on material from several localities in China, Korea and Japan. And recently Taiti and Ferrara (1988) gave illustrations of main characters of the species based on Japanese material. Re-examination of the syntypes revealed that the specimens from Schanhaikwan, China (1 ♂) and Heijo (= Pyongyang), Korea (2 ♂, 1 ♀) are conspecific and fit well with the original description, especially in the male pereopod 7 ischium with a rounded lobe at distal part of tergal margin and male pleopod 1 endopod with a rounded hyaline lobe at apex. Unfortunately a male from Arashiyama, Japan, lacking pereopod 7 and pleopod 1, shows no reliable male characters which are particularly important in identifying the species of *Exalloniscus* as mentioned by Taiti and Ferrara (1988). All the other syntypes are female specimens, thus safe identification is impossible. A male syntype from Heijo, Korea is designated as lectotype, and redescribed and illustrated in Figs. 5 and 6 based on type specimens from Heijo and Schanhaikwan, and on other material from Heijo, the type locality.

*E. cortii* from Japan, examined by Taiti and Ferrara (1988), according to their illustrations, has different shape of cephalon (compare fig. 5C and fig. 6D in Taiti and Ferrara, 1988) and male pleopod 1 endopod (compare fig. 6D and fig. 6G in Taiti and Ferrara, 1988), thus is supposed to be close to, but probably different, from this species.

**Distribution:** China, Korea and Japan.

#### Family TRACHELIPIDAE Strouhal

##### Genus *Lucasioides*, gen. nov.

*Protracheoniscus* (*Lucasioides*), Arcangeli, 1952 (p. 298), nomen nudum.

*Lucasioides*, Vandel, 1969 (p. 159), nomen nudum.

**Diagnosis:** Body relatively flat; dorsum granulated. No gland pores. Cephalon with frontal line separated from vertex by a groove; median and lateral lobes well-developed; triangular median lobe dorsally concave, and protruding upwards; a deep transverse groove near posterior margin. Epimeron of pereonite 1 bent outwards. Noduli laterales on pereonites 2-4 farther from lateral

margin than ones on pereonites 1 and 5-7. Male pereopods 1-4 propodus and carpus with brush of long setae on sternal margins. Exopods of pleopods 1-5 with *Protracheoniscus*-type pseudotrachea; opening of pseudotrachea single-holed in a lateral groove on outer-proximal margin of exopod. Gender masculine.

**Type species:** *Porcellio* (*Lucasius*) *gigliotosi* Arcangeli, 1927.

**Remarks:** *Lucasioides* was instituted by Arcangeli (1952) as a subgenus of *Protracheoniscus* Verhoeff, 1917 to include *P. mazzarellii* (Arcangeli, 1927) from Japan, *P. isseli* (Arcangeli, 1927) from China, *P. zavattarii* (Arcangeli, 1927) from Hong Kong, and *P. gigliotosi* (Arcangeli, 1927) from China, Korea and Japan, because they differ from all the other subgenera of the genus, including *Protracheoniscus*, s. str. and *Mongoloniscus*, by the pereonal epimeron 1 with sinuous posterior margin.

Vandel (1969) considered *Lucasioides* to be a full genus, pointing out that it has a cephalon with well-developed median and lateral lobes ("les lobes frontaux"). I agree with his opinion. But, since both Arcangeli (1952) and the French author did not designate type species for *Lucasioides*, this name is unavailable because it does not comply with Article 13b of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1985). In order to validate the name *Lucasioides*, *Porcellio* (*Lucasius*) *gigliotosi* is here selected as the type species of the genus.

Although both Arcangeli (1952) and Vandel (1969) regarded the sinuous posterior margin of pereonite 1 epimeron as one of the diagnostic characters of *Lucasioides*, this character is not shared by all the species of the genus, i.e., some species, such as *L. zavattarii*, *L. isseli* (refer Kwon and Taiti, 1993), and *L. taitii*, n. sp. (see below), have nearly straight margin. It looks like to be sinuous (in dorsal view) due to the outwardly bent pereonite 1 epimeron, which is unique among closely related genera.

*Lucasioides* is close to *Agnara* Budde-Lund, 1908, *Koreoniscus* Verhoeff, 1937, *Protracheoniscus* Verhoeff, 1917, and *Mongoloniscus* Verhoeff, 1930 (see below) in the number and

structure of pleopodal pseudotrachea, while several characters, viz., the granulated dorsum, the cephalon with triangular median lobe, well-developed lateral lobes and a deep transverse groove near posterior margin, and the co-ordination of noduli laterales, are shared with *Nagurus* Holthuis, 1949, which has different respiratory structure.

***Lucasioides gigliotosi* (Arcangeli, 1927)**

(Figs. 7 and 8)

*Porcellio* (*Lucasius*) *Giglio-Tosi* Arcangeli, 1927 (p. 234, fig. 9).

*Protracheoniscus* (*Lucasioides*) *Giglio-Tosi*: Arcangeli, 1952 (p. 259).

*Lucasioides* sp.: Vandel, 1969 (p. 159, figs. A-E).

**Material examined:** Kang-wŏn-do - 2 ♂♂, 3 ♀♀, Samch'ŏk-gun, Unam, Jun. 1, 1990. Ch'ungch'ŏngbuk-do - 5 ♂♂, 2 ♀♀, Chung-wŏn-gun, Salmi-myŏn, Hyangsan village, Jun. 28, 1990; 3 ♀♀, Koesan-gun, Somaegok-ri, Kigok village, Jun. 29, 1990; 3 ♂♂, 4 ♀♀, Okch'ŏn-gun, Kunbuk-myŏn, Ibaek-ri, Jun. 29, 1990, leg. I. K. Jang. Ch'ungch'ŏngnam-do - 2 ♂♂, 1 ♀, Nonsan-gun, Pangdong village, Jun. 29, 1990, leg. I.K. Jang. Kyŏngsangbuk-do - 3 ♂♂, 8 ♀♀, Sangju-gun, Kongsŏng-myŏn, Kŏch'ang-2-ri, Jun. 27, 1990; 1 ♂, 1 ♀, Ch'ŏngdo-gun, Hwayang-ŭp, Shingi-2-ri, Jun. 27, 1990. Kyŏngsangnam-do - 1 ♂, 3 ♀♀, Yangsan-gun, Kijang-ŭp, Shirang-ri, Kongsu village, Apr. 26, 1983; 1 ♀, Kimhae, Ŏbang-dong, Inje University, Apr. 23, 1990; 1 ♀, Sach'ŏn-gun, Sanam-myŏn, Hwajŏn, Aug. 1, 1990; 2 ♀♀, Namhaedo I., Sŏlch'ŏn-myŏn, Moch'ŏn-ri, Jul. 20, 1990. Pusan - 4 ♀♀, Haeundae, Jul. 21, 1976, leg. Y.S. Rho. Ch'ŏllabuk-do - 1 ♀, Muju-gun, Sŏlch'ŏn-myŏn, Soch'ŏn, Jun. 30, 1990; 1 ♂, 13 ♀♀, Wanju-gun, Sanggwang-myŏn, Shinhŏng village, Jul. 18, 1990. (all in IJB).

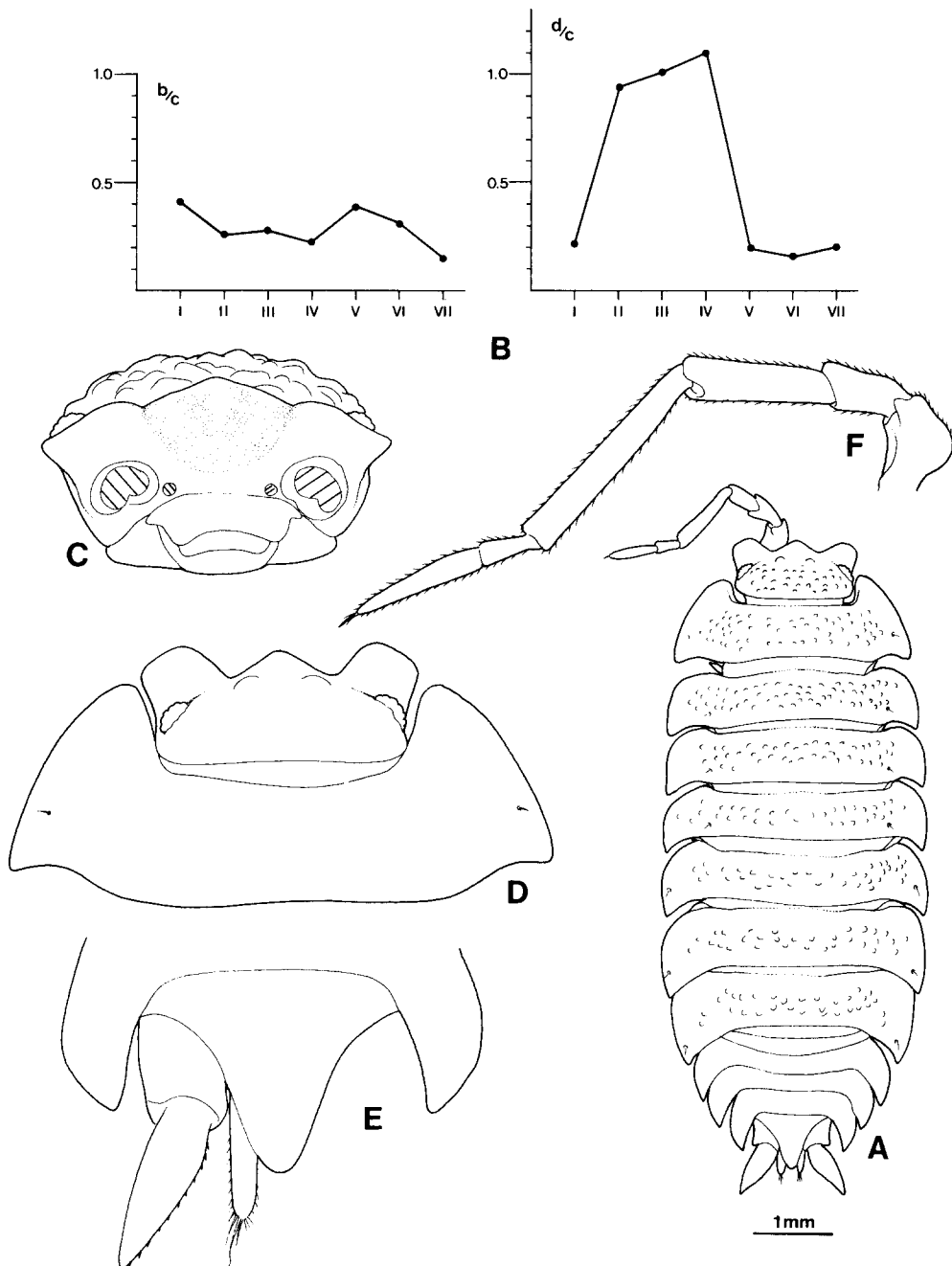
**Syntypes re-examined:** KOREA: 1 ♂ lectotype, Fusan (= Pusan), Sep. 29, 1925, leg. F. Silvestri. JAPAN: 1 ♂, Kobe, Jun. 24, 1925, leg. F. Silvestri. CHINA: 2 ♂♂, 2 ♀♀, Shanghai, May 19, 1925, leg. F. Silvestri. (all in DEAP).

**Description:** Maximum length of male 7.5 mm, of female 10 mm. Dark brown color with the usual pale muscle spots; a pale spot at the base of pereonal epimera 2-7; pleon and telson evenly pig-

mented. Cephalon, pereon, and rarely pleon and telson distinctly granulated. No gland pores. Noduli laterales on pereonites 2-4 much farther from lateral margins than those on pereonites 1 and 5-7. Eyes with 14-15 ommatidia. Triangular median lobe of cephalon well-developed, dorsally concave, and clearly protruding upwards in the middle; quadrangular lateral lobes well-developed. Pereonites 1-7 with epimera bent outwards. Pereonite 1 with acutely pointed postero-lateral corners; posterior margin of epimeron distinctly sinuous. Telson triangular with deeply concave sides. Antennal flagellum with distal article twice as long as proximal one. Mandible with molar penicil consisting of numerous plumose setae; right mandible with 1 + 2 and left with 2 + 2 penicils. Maxillular outer branch with 4 + 6 teeth plus a minute accessory one, a short seta on dorsal surface; inner branch with two large penicils and an acute posterior point. Maxilliped as in Fig. 8C. All pleopodal exopods with *Protracheoniscus*-type pseudotrachea. Uropod with short exopod, about 1.5 times as long as protopod; endopod slightly shorter than exopod.

**Male.-Pereopods** 1-4 with a brush of long bifurcated setae on carpus and merus. Pereopod 7 carpus conspicuously expanded on tergal margin; ischium with sternal margin slightly concave and fringed with setae, rostral surface with round depression encircled with setae, about 5 bifurcated setae on tergal margin. Pleopod 1 exopod with bilobed apex of which inner lobe larger than outer one; endopod with acute apex, bearing fine setae and bent outwards. Pleopod 2 endopod styliform, slightly longer than exopod. Pleopod 5 exopod as in Fig. 8G.

**Remarks:** Arcangeli (1927) described *Porcellio* (*Lucasius*) *gigliotosi* with illustrations of only the male pleopod 2 exopod and right epimeron of pereonite 4. The present specimens are identified after comparison with the syntypes of which a male from Fusan (= Pusan), Korea, is herein designated as lectotype. Vandel (1969)'s specimens, from caves in Korea, which he ascribed to *Lucasioides* without specific name, is considered to be *L. gigliotosi*. Recently Nunomura (1987) recorded this species from Japan and referred it to *Nagurus*. According to the description and illustra-

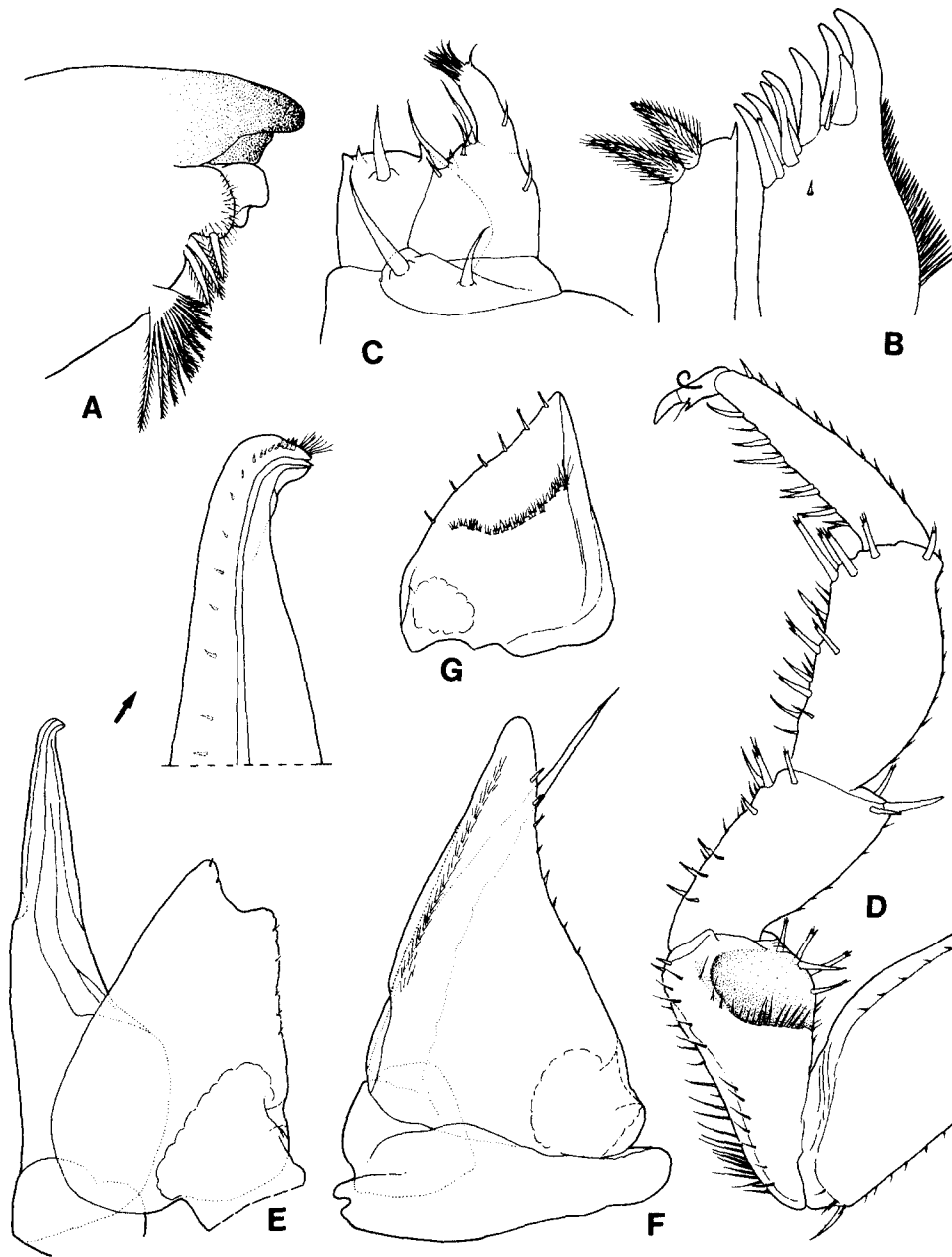


**Fig. 7.** *Lucasioides gigliotosi* (Arcangeli, 1927): A, habitus; B, co-ordinates of noduli laterales; C, cephalon, frontal view; D, cephalon and pereonite 1, dorsal view; E, pleonite 5, telson and left uropod; F, antenna.

tions, however, the Japanese author's material belongs to neither *Nagurus* nor *L. gigliotosi*.

This species is close to *Lucasioides mazzarellii*

(Arcangeli, 1927) from Japan in pereonite 1 epimeron distinctly sinuous on posterior margin but differs in the male pleopod 1 exopod (bilobed



**Fig. 8.** *Lucasioides gigliotosi* (Arcangeli, 1927), male: A, mandible; B, maxillule; C, maxilliped; D, pereopod 7; E, pleopod 1; F, pleopod 2; G, pleopod 5.

*us. truncate apex).*

**Distribution:** China, Korea and Japan.

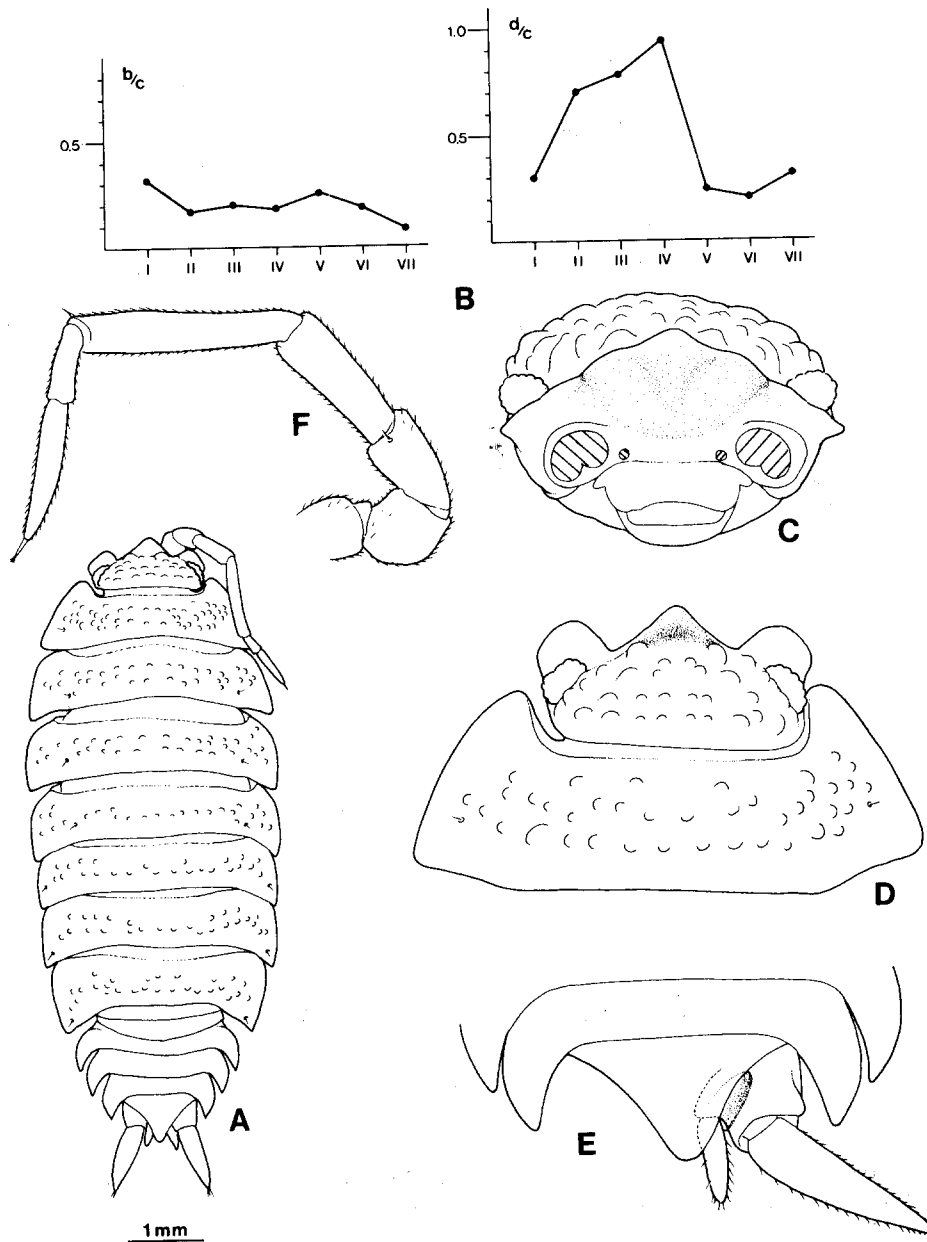
***Lucasioides taitii*, n. sp.**  
(Figs. 9 and 10)

**Holotype:** ♂, 5.5 mm long, Kyöngsangbuk-do, Ullüngdo I., Chödong, Aug. 6, 1980, leg. I.H. Kim (IJB).

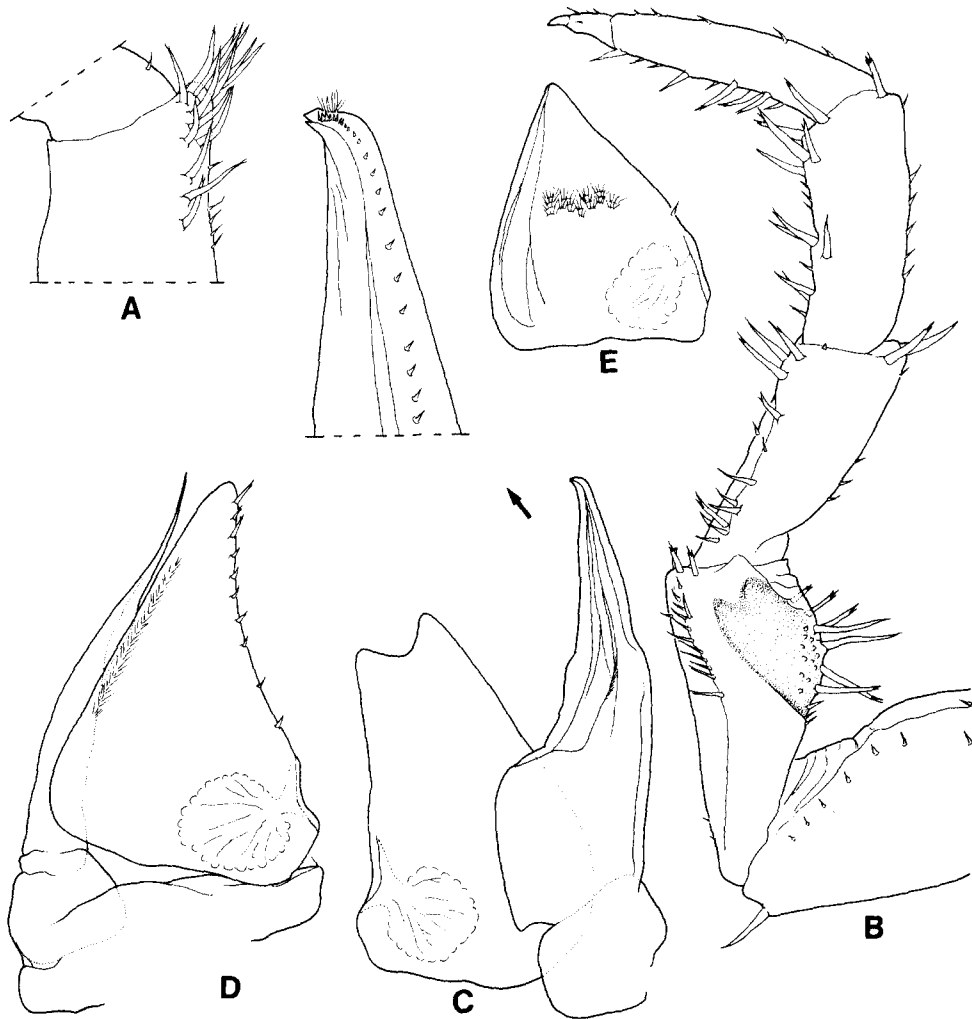
**Paratypes:** 2 ♀♀, same data as holotype (IJB); 2 ♀♀, same data (MZUF).

**Description:** Length of male 5.5 mm, maximum length of female 8.5 mm. Dark brown color with the usual pale muscle spots; a pale spot at the base of pereonial epimera; pleonites 1-2 light-col-

ored. Cephalon and pereon distinctly granulated. No gland pores. Noduli laterales on pereonites 2-4 much farther from lateral margins than those on pereonites 1 and 5-7. Eyes with 18-20 ommatidia.



**Fig. 9.** *Lucasioides taitii*, n. sp., paratype female: A, habitus; B, co-ordinates of noduli laterales; C, cephalon, frontal view; D, cephalon and pereonite 1, dorsal view; E, pleonites 4-5, telson and right uropod; F, antenna.



**Fig. 10.** *Lucasioides taitii*, n. sp., holotype male: A, pereopod 6 basis; B, pereopod 7; C, pleopod 1; D, pleopod 2; E, pleopod 5.

Triangular median lobe of cephalon well-developed, dorsally concave, and prominently protruding upwards in the middle; quadangular lateral lobes well-developed. Pereonite 1 with epimera bent outwards; postero-lateral corners right-angled; posterior margin of epimeron almost straight. Telson triangular with slightly concave sides. Antennal flagellum with distal article 2.8 times as long as proximal one. Buccal pieces as in *L. gigliotosi*. All pleopodal exopods with *Protracheoniscus*-type pseudotrachea. Uropodal exopod more than twice as long as endopod.

**Male.**— Pereopods 1-4 with a brush of long bifurcated setae on carpus and merus. Pereopod 8 with a sterno-distal protrusion fringed with setae. Pereopod 7 carpus not enlarged; ischium with depression on rostral surface, 7 bifurcated setae on tergal margin. Pleopod 1 exopod with bilobed apex; endopod with acute apex, bearing fine setae and bent outwards. Pleopod 2 endopod styliform, slightly longer than exopod. Pleopod 5 exopod as in Fig. 10E.

**Etymology:** This species is named after my colleague, Dr. Stefano Taiti, Florence.

**Remarks:** This species is close to *Lucasioides zavattarii* and *L. isseli* in the pereonite 1 epimeron with nearly straight posterior margin. *L. taitii* differs from *L. zavattarii* by the shorter uropodal exopod, and from *L. isseli* by the cephalon with much developed median lobe and bilobed male pleopod 1 exopod with inner lobe larger than outer one.

**Genus *Koreoniscus* Verhoeff, 1937**

***Koreoniscus racovitzai* (Arcangeli, 1927)**

(Fig. 11)

*Porcellio* (*Lucasius*?) *Racovitzai* Arcangeli, 1927 (p. 228, fig. 7).

*Koreoniscus racovitzai*: Verhoeff, 1937 (p. 421); Flasarova, 1972 (p. 102, figs. 24-47).

*Koreoniscus Racovitzai*: Arcangeli, 1952 (p. 301).

**Material examined:** Seoul - 12♂♂, 25♀♀, Kwanak-gu, Shillim-dong, May. 17, 1976, leg. Y. S. Rho; 9♂♂, 18♀♀, Tobong-gu, Ui-dong, valley, Jun. 20, 1976, leg. Y.S. Rho. Kyōnggi-do-1♂, Tōkchōkto I., Sōp'ō-ri, Aug. 6, 1982. Kangwōn-do - 2♂♂, 8♀♀, Sokch'ō, Changsa-dong, Aug. 2, 1981; 1♂, 2♀♀, Samch'ōk-gun, Kūndōk-myōn, Unam. Ch'ungch'ōngbuk-do - 8♂♂, 13♀♀, Chewōn-gun, Susan-myōn, Sugok-ri, Jun. 28, 1990; 3♂♂, 10♀♀, Ch'ōng-wōn-gun, Miwōn-myōn, Chung-ri, Jun. 29, 1990; 4♂♂, 9♀♀, Poūn-gun, Samsūng-myōn, Songjuk-ri, Jun. 29, 1990; 3♂♂, 6♀♀, Yōngdong-gun, Yongsan-myōn, Jun. 29, 1990. Ch'ungch'ōngnam-do - 1♂, 1♀, Puyō-gun, Puyō-ūp, Songsan-ri, Jun. 29, 1990, leg. I.K. Jang; 4♂♂, 2♀♀

Hongsōng-gun, Hongsōng-ūp, Jul. 3, 1990, leg. I. K. Jang. Kyōngsangbuk-do - 1♂, 4♀♀, Ulchingu-gun, Kūnnam-myōn, Mang-yang, Jun. 2, 1990; 1♀, Ch'ōngdo-gun, Hwayang-ūp, Chilla-2-ri, Jun. 27, 1990; 11♂♂, 21♀♀, Sangju-gun, Konggōm-myōn, Jun. 27, 1990; 6♂♂, 15♀♀, Kūmnūng-gun, Nam-myōn, Jun. 27, 1990. Kyōngsangnam-do - 2♂♂, 2♀♀, Kōjedo I., Tundōk-myōn, Haksan-ri, Jul. 12, 1990, leg. K.A. Lee; 4♂♂, 5♀♀, Namhaedo I., Sōlch'ōn-myōn, Mochōn-ri, Jul. 20, 1990; 1♂, 8♀♀, Ūiryōng-gun, Karyemyōn, Unam, Jun. 30, 1990; 7♂♂, 16♀♀, Sanch'ōng-gun, Saengbiryang-myōn, Do-ri, Jun. 30, 1990; 15♂♂, 12♀♀, 4 juvs., Hadong-gun, Kojōn-myōn, Jul. 18, 1990; 8♂♂, 15♀♀, Sach'ōn-gun, Sanam-myōn, Aug. 1, 1990. Pusan - 9♂♂, 10♀♀, Haeundae, Tongbaeksōm, Jul. 20, 1976, leg. Y.S. Rho. Chōllabuk-do - 1♂, 1♀, Okku-gun, Sōngsan-myōn, Haje, Apr. 2, 1983; 20♂♂, 24♀♀, Muju-gun, Mup'ung-myōn, Jun. 30, 1990; 1♀, Kimje-gun, Puryang-myōn, Jul. 19, 1990; 1♂, 2♀♀, Namwōn, Yōngjōng-dong, Jul. 19, 1990. Chōllanam-do - 2♂♂, 19♀♀, Koksōng-gun, Koksōng-ūp, Jul. 18, 1990; 1♀, Sūngju-gun, Songgwang-myōn, Jul. 19, 1990; 1♀, Tolsando I., Kulchōn, Jul. 10, 1990, leg. K.A. Lee. (all in IJB).

**NORTH KOREA:** 1♂, 3♀♀, Heijo (= Pyongyang), Oct. 4, 1925, leg.F. Silvestri (DEAP); 4♂♂, 12♀♀, N. Pyongan Prov., Mt. Myohyang, Jun. 10-12, 1987, leg. P. Beron (NNHMS); 2♂♂, 11♀♀, Pyongyang, Moran-bong, Jun. 9, 1987, leg. P. Beron (IJB); 4♀♀, Pyongyang, Taesong-san, Jun. 8, 1987, leg. P. Beron

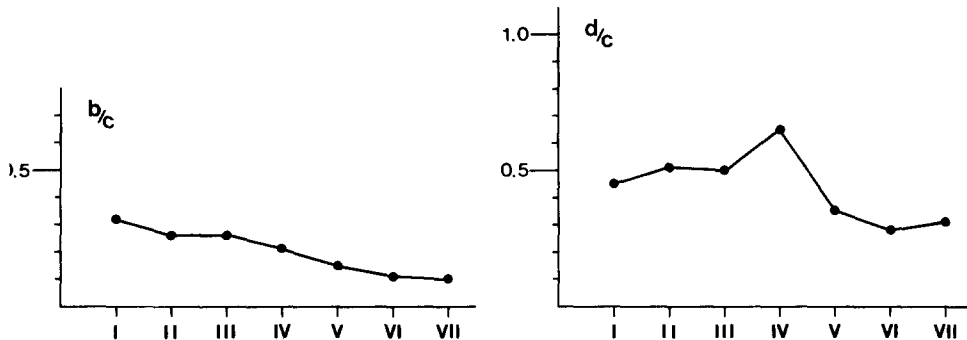


Fig. 11. *Koreoniscus racovitzai* (Arcangeli, 1927): co-ordinate of noduli laterales.



(NNHMS); 2♂♂, 10♀♀, Pyongyang, Ryongaksan, Jun. 13, 1987, leg. P. Beron (MZUF); 3♂♂, 8♀♀, 1 juv., Kangwon Prov., Kumgang-san, 100-800 m, Jun. 4, 1987, leg. P. Beron (IJB); 2♀♀, same locality, 400-900 m, Jun. 4, 1987, leg. P. Beron (NNHMS).

**Syntypes re-examined:** KOREA: 1♂, 2♀♀, Keijo (= Seoul) [Arcangeli (1927) erroneously wrote as "Heijo"], Oct. 2, 1925, leg. F. Silvestri (mixed with 1♀ of *Porcellionides pruinosus*); 2♂♂ (1♂ lectotype), Fusan (= Pusan), Sep. 29, 1925, leg. F. Silvestri. CHINA: 8♂♂, 4♀♀, Pechino, Oct. 10, 1925, leg. F. Silvestri. JAPAN: 1♂, Okitsu, Aug. 20, 1925, leg. F. Silvestri. (all in DEAP).

**Remarks:** *Koreoniscus* is a monotypic genus erected by Verhoeff (1937). *Koreoniscus* is close to *Mongoloniscus* Verhoeff, 1930 (see below) but distinguished only by the pereonal epimera elongated posteriorly with sinuous posterior margin. The validity of the genus is obscure but, to avoid further confusion, *Koreoniscus* is considered here as a distinct genus until a comprehensive study is performed. A male syntype specimen from Fusan, Korea, is designated as lectotype. For description and illustrations of *K. racovitzai* see Arcangeli (1927) and Flasarova (1972). The b/c and d/c co-ordination of this species is given in Fig. 11.

**Distribution:** China (Beijing), Korea and Japan (Okitsu).

### **Genus *Mongoloniscus* Verhoeff, 1930**

**Remarks:** *Mongoloniscus* was instituted by Verhoeff (1930) as a subgenus of *Protracheoniscus* to accommodate his new species, *Protracheoniscus koreanus* from Korea, *P. sinensis* (Dollfus, 1901) from China, and "*Nagara*" *sundaica* (non Dollfus, 1898) from Korea and Japan (= *Protracheoniscus nipponicus*, Arcangeli, 1952) studied by Arcangeli (1927). Verhoeff (1930) differentiated *Mongoloniscus* from *Protracheoniscus*, s. str., by i) the male pleopods 1 and 2 exopod with outer margin deeply concave (vs. straight) at opening of pseudotrachea; ii) male pereopod 7 carpus expanded (vs. not expanded) on tergal margin; iii) male pleopod 1 exopod bilobed with distinct concavity (vs. not bilobed) at apex; and iv) male pleopod 2 endopod elongate

with filiform distal part (vs. short and rod-shaped). But these two subgenera are considered to be arbitrarily subdivided (Arcangeli, 1948), therefore, in fact, species with either male pereopod 7 carpus expanded (Borutzky, 1975), or male pleopod 1 exopod with bilobed distal part (Verhoeff, 1939), have been ascribed to *Mongoloniscus*.

Anyway, about 15 species and subspecies have been ascribed to the subgenus *Mongoloniscus* by several authors but, in my opinion, it is a heterogeneous group. In order to provide a revised definition of the subgenus, *Protracheoniscus* (*Mongoloniscus*) *koreanus*, which is here selected as type species, from Korea, *P. (M.) sinensis* from, China (Beijing; specimens in IJB), and *P. (M.) nipponicus* from Korea and Japan, were examined.

*Mongoloniscus* is characterized by the granulated dorsum, numerous gland pores along the whole margin of pereonites, noduli laterales more or less at the same distance from lateral margin, triangular median lobe of cephalon, frontal line separated from vertex by a groove, pereonite 1 evenly convex with postero-lateral corners rounded, pleopodal exopods 1-5 with *Protracheoniscus*-type pseudotrachea, male pleopod 1 exopod with bilobed distal part, and male pleopod 2 endopod with filiform distal part. *Mongoloniscus* is close to *Protracheoniscus* and *Lucasioides*, but differs from *Protracheoniscus* by the granulated dorsum and triangular median lobe of cephalon, from *Lucasioides* by the co-ordination of noduli laterales, less developed median lobe of cephalon, and evenly convex pereonite 1 which is not bent outwards. In these reasons, *Mongoloniscus* is considered to be a good genus and includes four valid species, *M. koreanus*, *M. sinensis*, *M. nipponicus* (Arcangeli, 1952) and *M. vancouverensis* (Arcangeli, 1927), all from the Machourian subregion of Palaearctic Region. The other species have to be verified after examination of the type specimens. Several species which were ascribed to *Nagurus* and *Protracheoniscus* from Japan by Nunomura (1987, 1991) probably belong to *Mongoloniscus*.

### ***Mongoloniscus koreanus* Verhoeff, 1930 (Figs. 12 and 13)**

*Protracheoniscus (Mongoloniscus) koreanus* Verhoeff, 1930 (p. 117).

**Material examined:** Chöllabuk-do - 4 ♂♂, 9 ♀♀, 17 juvs., Imsil-gun, Kwanch'on-myön, Jul. 18, 1990 (IJB).

**Description:** Maximum length of male 8.2 mm, of female 9.7 mm. Dark brown color with the usual pale muscle spots; a pale spot at the base of pereon epimera; a median light stripe on pereon and pleon. Cephalon and pereon weakly but clearly granulated. Numerous gland pores along the whole margin of pereonites. Noduli laterales almost at the same distance from lateral margin. Eyes with 20-23 ommatidia. Median lobe of cephalon obtusely triangular, dorsally concave, and slightly protruding upwards in the middle; rounded lateral lobes directed obliquely. Pereonite 1 with postero-lateral corners rounded; posterior margin evenly rounded. Telson triangular with concave sides. Antennal flagellum with distal article about twice as long as proximal one. Mandible with molar penicil consisting of numerous plumose setae; right mandible with 1 + 5 and left with 2 + 5 penicils. Maxillular outer branch with 4 + 6 teeth plus a minute accessory one, a short seta on dorsal surface; inner branch with two large penicils and an acute posterior point. Maxilliped as in Fig. 13C. All pleopodal exopods with *Protracheoniscus*-type pseudotrachea. Uropodal endopod with tuft of setae at apex; exopod about 1.5 times as long as endopod.

**Male.-** Pereopods 1-4 with a brush of long bifurcated setae on carpus and merus. Pereopod 7 carpus with rounded lamellate lobe on tergal margin; ischium with sternal margin slightly concave and fringed with numerous setae, rostral surface with deep depression, about 8 bifurcated setae on tergal margin. Pleopod 1 exopod with bilobed distal part, inner lobe slender, apex deeply sinuous, outer margin conspicuously sinuous on distal half; endopod with acute apex, bearing fine setae and bent outwards. Pleopod 2 endopod with filiform distal part, longer than exopod. Pleopod 5 exopod as in Fig. 13H.

**Remarks:** *Mongoloniscus koreanus* is close to *M. sinensis* (Dollfus) from China, but distinguished by the more convex body, cephalon with less developed lateral lobes, and male pleopod 1 exopod distally with slender inner lobe.

**Distribution:** Korea.

***Mongoloniscus nipponicus* (Arcangeli, 1952)**

(Figs. 14 and 15)

*Porcellio (Nagara) Van Namei* Arcangeli, 1927 (p. 243) [in part, from Changsha, China; Fusan, Korea; and Kyoto and 2 ♀♀ Mt. Maya, Kobe, Japan].

*Porcellio (Nagara) sundaicus*: Arcangeli, 1927 (p. 248, fig. 15) [non Dollfs].

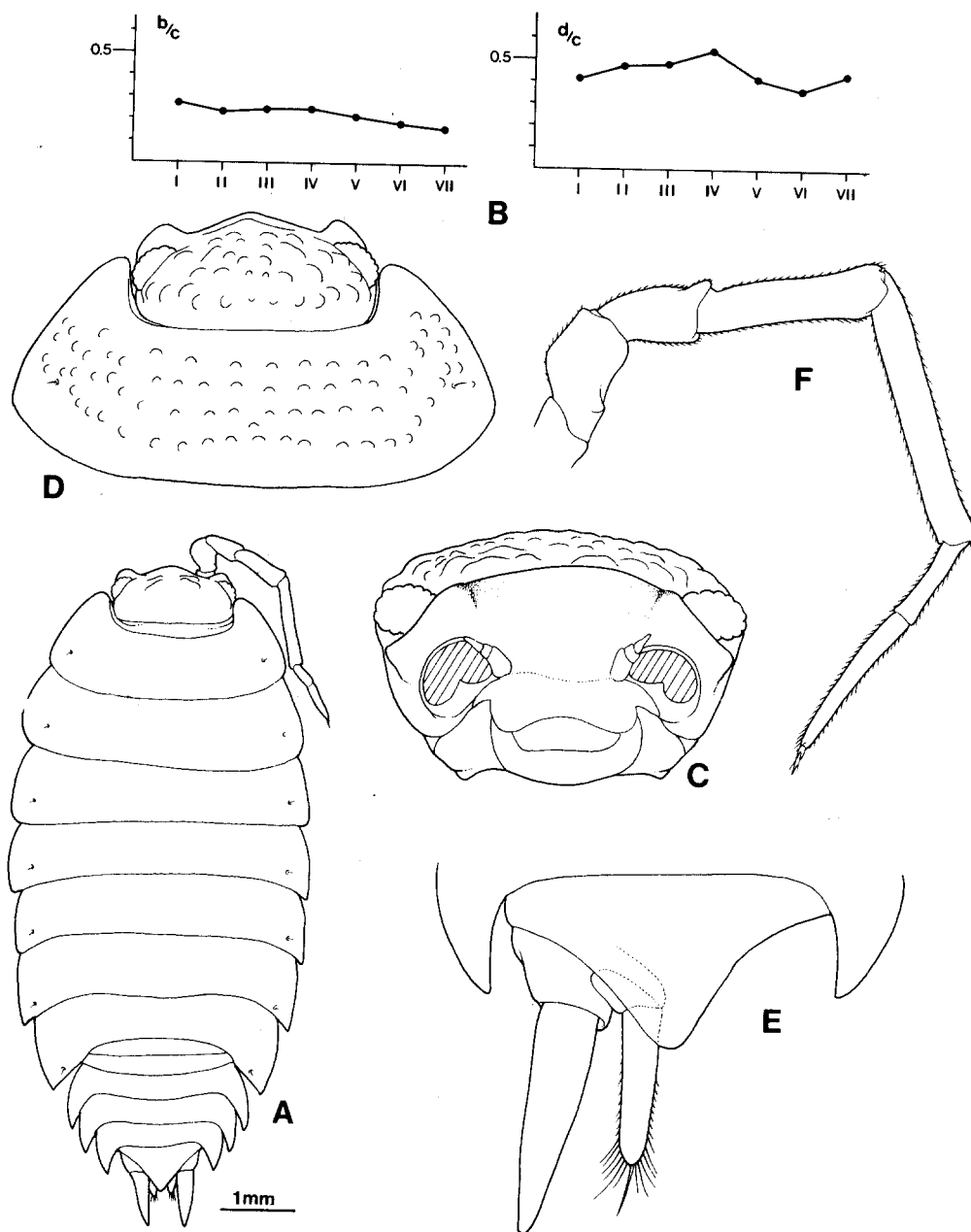
*Protracheoniscus (Mongoloniscus) nipponicus* Arcangeli, 1952 (p. 299).

*Nagara (Nagara) Van Namei*: Arcangeli, 1952 (p. 302). [in part].

*Nagurus Van Namei*: Arcangeli, 1963 (p. 12). [in part].

**Material examined:** Seoul - 16 ♂♂, 21 ♀♀, Kwanak-gu, Shillim-dong, May. 1, 1976, leg. Y.S. Rho. Ch'ungch'öngbuk-do - 1 ♂, 25 ♀♀, Yöngdong-gun, Haksan-myön, Apkye, Jun. 29, 1990; Okch'ön-gun, Kunbuk-myön, Ibaek-ri, Jun. 29, 1990. Ch'ungch'öngnam-do - 4 ♂♂, 4 ♀♀, Poryöng-gun, Ch'öngso-myön, Jul. 3, 1990, leg. I. K. Jang; 1 ♂, 16 ♀♀, Puyö-gun, Puyö-üp, Songsan-ri, Jun. 29, 1990, leg. I.K. Jang. Kyöngsangbuk-do - 2 ♀♀, Sangju-gun, Kongsöngmyön, Koch'ang-2-ri, Jun. 27, 1990; 1 ♀, Kümnüng-gun, Nam-myön, Jun. 27, 1990. Kyöngsangnam-do - 3 ♀♀, Kimhae, Öbang-dong, Apr. 23, 1990, leg. J.T. Kim; 3 ♂♂, 3 ♀♀, Sach'ön-gun, Konyang-myön, Söngnae, Jul. 18, 1990; 2 ♀♀, Üich'ang-gun, Taesan-myön, Jun. 27, 1990; 3 ♂♂, 7 ♀♀, Namhaedo I., Mijomyön, Songjöng-ri, Jul. 19, 1990; 17 ♀♀, Köjedo I., Irun-myön, Kujora, Jul. 12, 1990. Pusan - 1 ♀, Haeundae, Jul. 21, 1976, leg. Y.S. Rho. Chöllabuk-do - 8 ♂♂, 2 ♀♀, Wanju-gun, Sanggwang-myön, Shinhüng village, Jul. 18, 1990; 1 ♂, 5 ♀♀, Puan-gun, Hasö-myön, Jul. 19, 1990; 1 ♀, Namwön-gun, Chusaeng-myön, Chech'ön village, Jul. 18, 1990. Chöllanam-do - 2 ♂♂, 10 ♀♀, Süngju-gun, Songgwang-myön, Jul. 19, 1990; 3 ♀♀, 2 juv., Koksöng-gun, Kodal-myön, Jul. 18, 1990; 5 ♀♀, Tolsando I., Kulchön, Jul. 10, 1990. (all in IJB).

**Syntypes re-examined:** KOREA: 2 ♂♂ (1 ♂ lectotype), 7 ♀♀, Suigen (= Suwon?), Oct. 1, 1925, leg. F. Silvestri (DEAP). JAPAN: 1 ♂, Ichinomiya,

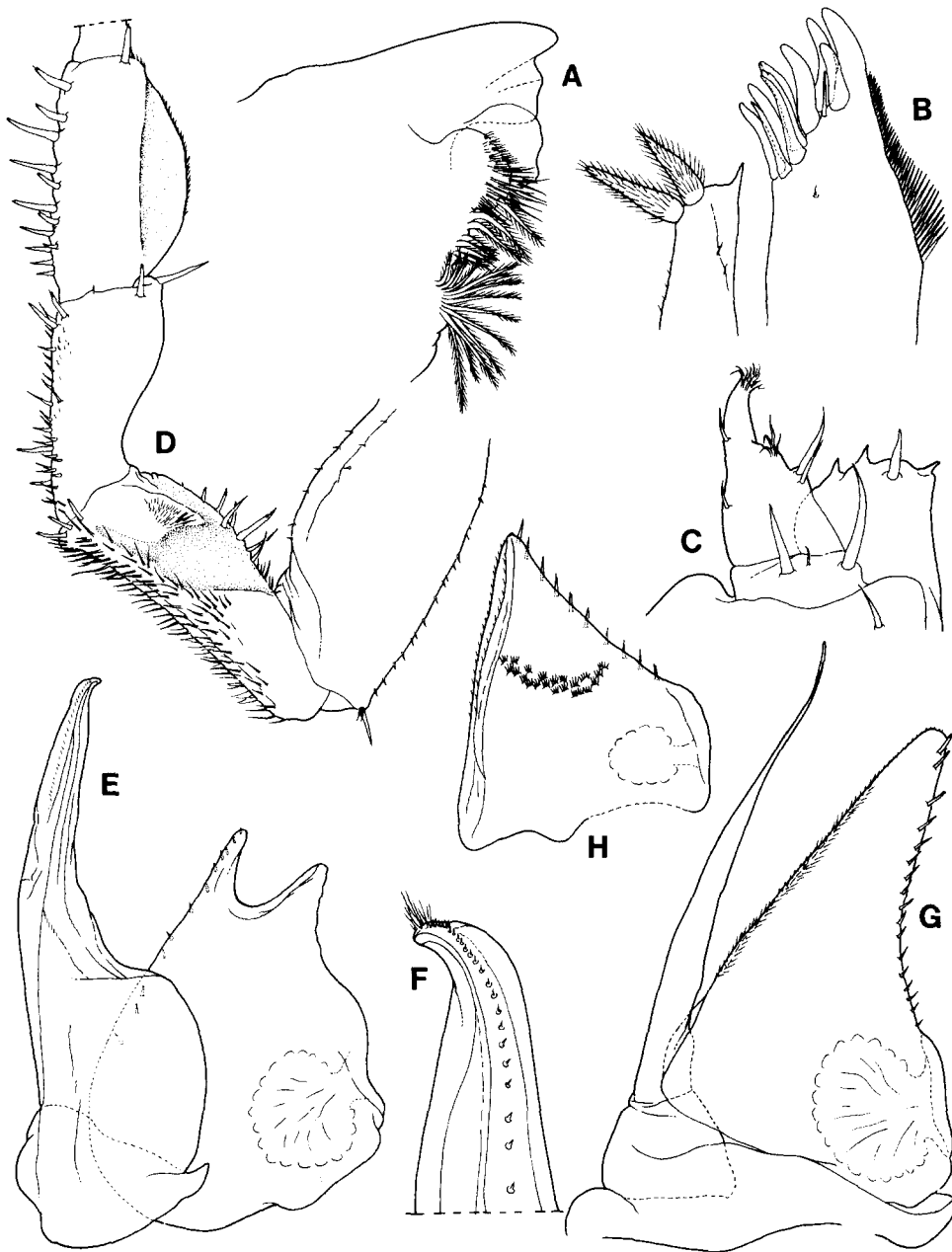


**Fig. 12.** *Mongoloniscus koreanus* (Verhoeff, 1930): A, habitus; B, co-ordinates of noduli laterales; C, cephalon, frontal view; D, cephalon and pereonite 1, dorsal view; E, pleonite 5, telson and left uropod; F, antenna.

Nov. 2, 1924, leg. F. Silvestri (DEAP).

**Description:** Maximum length of male 5.3 mm, of female 5.5 mm. Brown color with the usual pale muscle spots; a pale spot at the base of pereonal epimera and at the middle of pereonites near

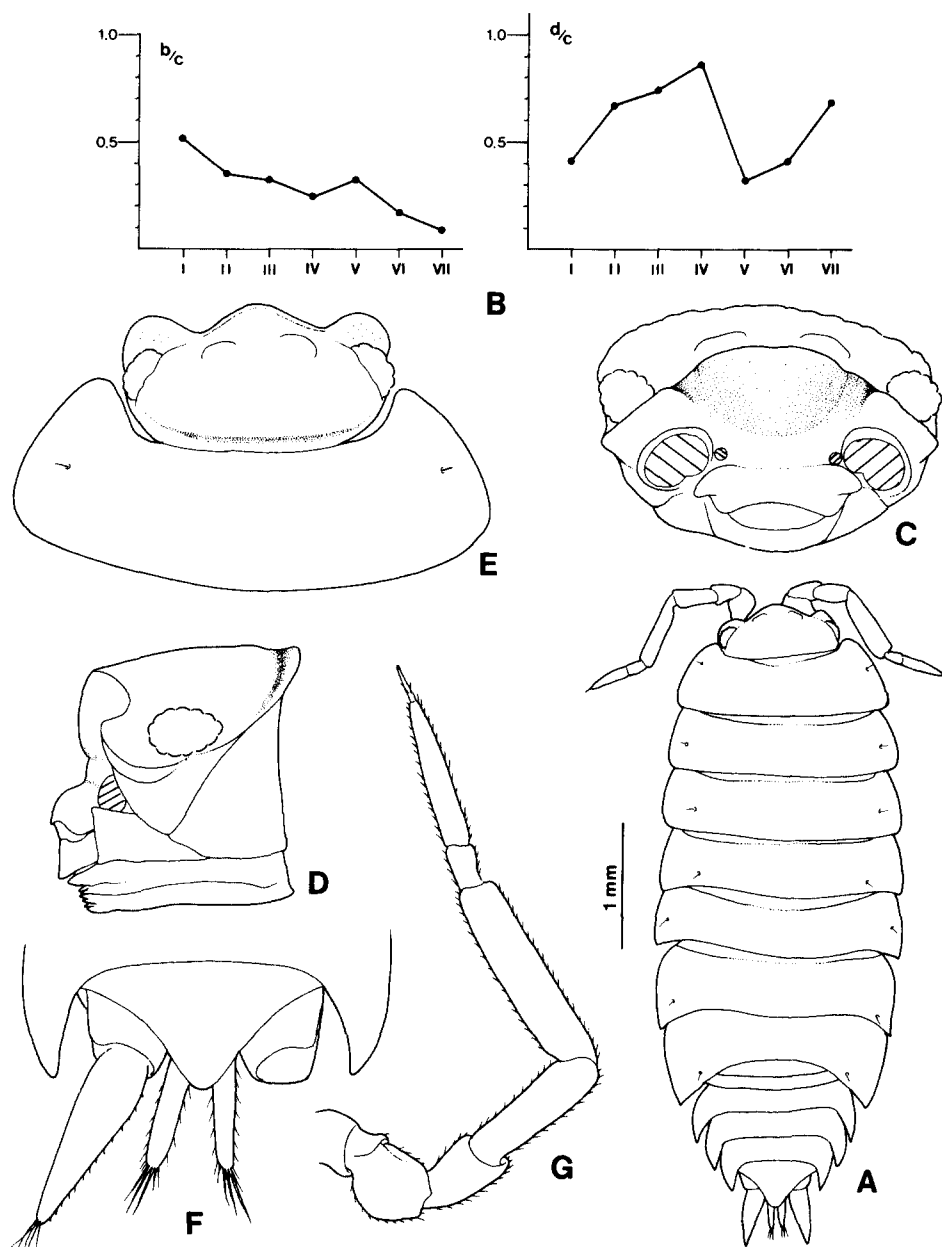
anterior margin. Cephalon and pereon weakly granulated. Numerous gland pores along the whole margin of pereonites. Noduli laterales with b/c and d/c co-ordinates as in Fig. 14B. Eyes with 15-16 ommatidia. Median lobe of cephalon



**Fig. 13.** *Mongoloniscus koreanus* (Verhoeff, 1930), male: A, mandible; B, maxillule; C, maxilliped; D, pereopod 7; E, pleopod 1; F, distal part of pleopod 1 endopod; G, pleopod 2; H, pleopod 5.

obtusely triangular with rounded apex and slightly bent over vertex, frontal line separated from vertex by a groove; rounded lateral lobes directed obliquely. Pereonite 1 with postero-lateral corners

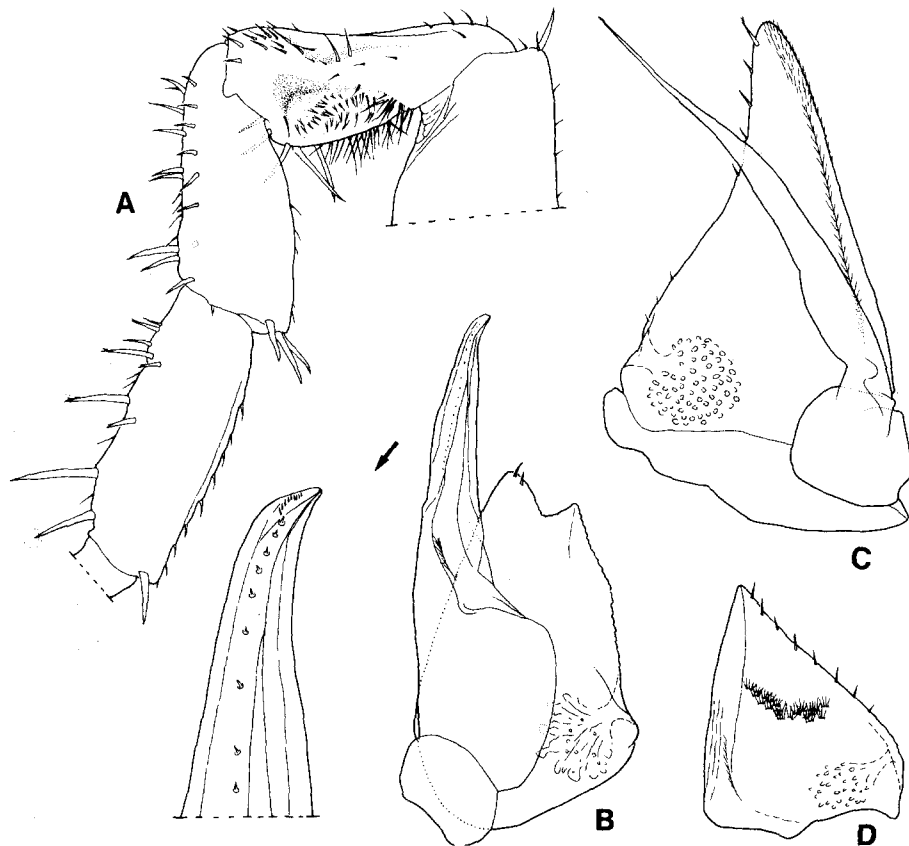
rounded; posterior margin evenly rounded. Telson triangular with concave sides. Antennal flagellum with distal article about twice as long as proximal one. Mandible with molar penicil consisting of



**Fig. 14.** *Mongoloniscus nipponicus* (Arcangeli, 1952), male: A, habitus; B, co-ordinates of noduli laterales; C, cephalon, frontal view; D, cephalon, lateral view; E, cephalon and pereonite 1, dorsal view; F, pleonite 5, telson and uropod; G, antenna.

numerous plumose setae; right mandible with 1 + 2 and left with 2 + 2 (or 3) penicils. Maxillule and maxilliped as in *M. koreanus*. All pleopodal

exopods with *Protracheoniscus*-type pseudotrachea. Uropodal exopod about 1.5 times as long as endopod.



**Fig. 15.** *Mongoloniscus nipponicus* (Arcangeli, 1952), male: A, pereopod 7; B, pleopod 1; C, pleopod 2; D, pleopod 5.

**Male.**- Pereopods 1-4 with a brush of long bifurcated setae on carpus and merus. Pereopod 7 carpus without lamellate lobe on tergal margin; ischium with sternal margin slightly concave, rostral surface with shallow depression, tergal margin fringed with setae. Pleopod 1 exopod with bilobed apex of which inner lobe larger than outer one; endopod with acute apex bent outwards. Pleopod 2 endopod with filiform distal part, longer than exopod. Pleopod 5 exopod as in Fig. 15D.

**Remarks:** Arcangeli (1952) instituted a new species, *Protracheoniscus (Mongoloniscus) nipponicus* from Korea and Japan on the specimens which he had formerly identified as *Porcellio (Nagara) sundaicus* Dollfus, 1898 (Arcangeli, 1927). The present specimens are identified after comparison with the syntypes, of which a male

specimen from Suigen, Korea is herein designated as lectotype. Due to the poor description (Arcangeli, 1927, p. 248, fig. 15, as *P. sundaicus*) recognition of this species is difficult. Thus redescription and diagnostic illustrations are given on the new material.

*Mongoloniscus nipponicus* is very close to *M. vannamei* (Arcangeli) from Japan (see below) in the habitus and co-ordination of noduli laterales, but distinguished by the smaller size and median lobe of cephalon with rounded apex. *M. nipponicus* differs from *M. koreanus* and *M. sinensis* in the co-ordinations of noduli laterales (compare Figs. 12B and 14B), less granulated dorsum, male pereopod 7 carpus without lamellate lobe, and male pleopod 1 exopod with a shallower concavity at apex.

Nunomura (1987) recorded *Protracheoniscus nipponicus* from Japan, but it is, according to his description and illustrations, not conspecific with the lectotype, while *Nagurus katakurai* Nunomura, 1987 is considered to be a junior synonym of *M. nipponicus*.

Re-examination of syntypes of *P. (N.) vannamei* (deposited in DEAP) revealed that they include three different species: i) the specimens from Fusan, Korea; Changsha, China; Kioto, Japan; and two (out of three) females from Mt. Maya, Kobe, Japan are considered to be *M. nipponicus*; ii) an ovigerous female (with male-like pleopod 2 endopod) from Kamakura, Japan and a female from Mt. Maya probably belong to different genus; iii) the specimens from Nara, Kumamoto and Kobe, all from Japan, are considered as *vannamei* because they fit well with the original description and illustrations (except for figs. XIII, 3 in Arcangeli, 1927, which is drawn from Kamakura specimen). A female specimen from Nara is designated as lectotype of *vannamei*. Because this species has all the characters of the genus *Mongoloniscus*, the new combination, *Mongoloniscus vannamei*, is given here.

**Distribution:** China, Korea and Japan.

#### Family PORCELLIONIDAE Brandt and Ratzeburg

##### Genus *Protracheoniscus* Verhoeff, 1917

##### *Protracheoniscus major* (Dollfus, 1903)

*Metoponorthus major* Dollfus in Dydych, 1903 (p. 64).

**Material examined:** NORTH KOREA: 1 ♂, Kangwon Prov., Lake Sijung-ho, Aug. 22, 1982, leg. P. Beron (IJB); 2 ♀, same data (NNHMS).

**Remarks:** The formerly known easternmost locality of this specie is southern Kansu, China (Verhoeff, 1939, as *Protracheoniscus asiaticus* Uljanin; for synonymy refer Gruner, 1966b). The occurrence of this species in Korea is not so surprising, because this species is known to spread synanthropically (Gruner, 1966a).

**Distribution:** Turkestan, Estonia, Romania, Hungary, Czechoslovakia, Austria, Poland, Eastern Germany, China and Korea.

##### Genus *Porcellio* Latreille, 1804

##### *Porcellio laevis* Latreille, 1804

*Porcellio laevis* Latreille, 1804 (p. 46).

**Material examined:** Seoul - 3 ♂♂, 9 ♀♀, Tobong-gu, Mia-dong, Jun. 13, 1976, leg. Y.S. Rho; 1 ♀, Kwanak-ku, Sillim-dong, Aug. 19, 1978. Kang-wön-do - 2 ♀♀, Kangnüng, Ch'odang-dong, Jun. 13, 1980, leg. I.H. Kim. Kyöngsangbuk-do-3 ♂♂, 1 ♀, Ullüngdo I., Hyönp'o, Aug. 7, 1986. Kyöngsangnam-do - 2 ♀♀, Yangsan-gun, Kijang-üp, Shirang-ri, Apr. 26, 1983; 6 ♂♂, 2 ♀♀, Miryang-gun, Sangnam-myön, Hyangch'on-ri, Jun. 27, 1990. Chöllabuk-do - 2 ♂♂, 6 ♀♀, Wanju-gun, Sanggwon-myön, Shinhüng village, Jul. 18, 1990; 7 ♂♂, 6 ♀♀, Namwön-gun, Chusaeng-myön, Chech'on village, under moist hay, Jul. 18, 1990. Chöllanam-do - 1 ♂, Chindo-gun, Kwansado I., Jul. 26, 1983. (all in IJB).

**Distribution:** Cosmopolitan.

##### Genus *Porcellionides* Miers, 1877

##### *Porcellionides pruinosus* (Brandt)

*Porcellio pruinosus* Brandt, 1833 (p. 181).

**Material examined:** Seoul-1 ♂, Kwanak-gu, Shillim-dong, May 23, 1979, leg. I.H. Kim. Kang-wön-do - 3 ♀♀, Kangnüng, Ch'odang-dong, Jun. 13, 1980. Ch'ungch'öngbuk-do - 1 ♂, 1 ♀, Chung-wön-gun, Wöraksan Mt., near Mirüksa Temple, Jun. 28, 1990. Kyöngsangbuk-do - 5 ♂♂, 10 ♀♀, Ullüng-gun, Tokto I., Tongdo, Oct. 1, 1981, leg. H.S. Kim and B.L. Choe; 3 ♂♂, 3 ♀♀, Ch'öngsong-gun, Chinbo-myön, Kwangdök village, Jun. 29, 1978, leg. Y.C. Kwon; Kyöngsangnam-do - 3 ♂♂, 7 ♀♀, Yangsan-gun, Kijang-üp, Shirang-ri, Apr. 26, 1983; 1 ♂, Namhaedo I., Sölch'on-myön, Moch'on-ri, Jul. 20, 1990. Pusan - 7 ♂♂, 7 ♀♀, Haeundae, Jul. 21, 1976, leg. Y. S. Rho. Chöllabuk-do - 7 ♂♂, 6 ♀♀, Koch'ang-gun, Shillim-myön, Jul. 19, 1990; 6 ♂♂, 3 ♀♀, Puan-gun, Hasö-myön, Haech'ang, Jul. 19, 1990; 8 ♂♂, 9 ♀♀, Wanju-gun, Sanggwon-myön, Shinhüng village, Jul. 18, 1990. Chöllanam-do - 1 ♀, Wando-gun, Pogildo I., Yesong-ri, Aug. 21, 1982; 2 ♂♂, 2 ♀♀, Süngju-gun, Pyölyang-myön, Tongmak, Jul. 19, 1990. (all in IJB).

**NORTH KOREA:** 1 ♀, Pyongyang, Moran-bong, Jun. 9, 1987, leg. P. Beron (NNHMS).

**Distribution:** Cosmopolitan.

**Family ARMADILLIDIIDAE Brandt and Ratzeburg**

**Genus *Armadillidium* Brandt and Ratzeburg, 1831**

***Armadillidium vulgare* (Latreille, 1804)**

*Armadillo vulgaris* Latreille, 1804 (p. 48).

*Armadillidium vulgare*: Verhoeff, 1937 (p. 422).

**Material examined:** Kyönggi-do - 12♂♂, 13♀♀, Tökchökto I., Söp'o-1-ri, May. 13, 1976, leg. Y.S. Rho. Kang-wön-do - 5♀♀, Myöngju-gun, Kangdong-myön, Aninjin, Jun. 1, 1990; 1♂♂, Samch'ök-gun, Changho, Aug. 16, 1982. Ch'ungch'öngnam-do - 17♂♂, 6♀♀, Taech'ön, Shinhük-dong, Jul. 19, 1990, leg. I.K. Jang; 10♂♂, 21♀♀, T'aean-gun, Kühüng-myön, Kaüido I., Aug. 1, 1977, leg. K.S. Lee. Kyöngsangbuk-do - 1♀, Ulchin-gun, Künnam-myön, Mang-yang, Jun. 2, 1990; 1♂♂, 1♀, Kimch'ön, Jun. 27, 1990; 5♂♂, 2♀♀, Ch'öngsong-gun, Chinbo-myön, Jun. 29, 1978 leg. Y.C. Kwon; 6♂♂, 1♀, Ullüngdo I., Chödong, Aug. 6, 1980, leg. I.H. Kim. Kyöngsangnam-do - 2♂♂, 2♀♀, T'ong yöng-gun, Yokchido I., Jul. 21, 1978, leg. H.S. Kim; 2♂♂, 3♀♀, Sach'ön-gun, Konyang-myön, Söngnae, Jun. 18, 1990; 5♂♂, Yangsang-gun, Yangsang-üp, Jul. 5, 1990, leg. M.J. Kim; Köjedo I., Tundök-myön, Haksan-ri, Jul. 12, 1990, leg. K. A. Lee; 5♂♂, 3♀♀, Miryang-gun, Sangnam-myön, Hyangch'on-ri, Jun. 27, 1990. Pusan - Haeundae, Jul. 21, 1976, leg. Y.S. Rho. Chöllabuk-do - 2♂♂, 2♀♀, Chönju, Söngdök-dong, Jul. 19, 1990; 5♂♂, 4♀♀, Kimje-gun, Puryang-myön, Jul. 19, 1990; 3♂♂, 5♀♀, Puan-gun, Sannaemyön, Kyökp'o, Jul. 19, 1990; 1♂♂, Namwön-gun, Chusaeng-myön, Chech'ön vilage, Jul. 18, 1990. Chöllanam-do - 2♂♂, Yösu, Mansöngri, Jul. 11, 1990., leg. K.A. Lee; 9♂♂, 3♀♀, Wando-gun, Ch'öngsando I., Aug. 20, 1982; 8♂♂, 5♀♀, Haenam-gun, Ultolmok, Jul. 25, 1983; 6♂♂, 2♀♀, Chindo-gun, Kwammaedo I., Jul. 27, 1983; 2♂♂, 1♀, 7 juvs., Taehüksando I., Shim-ri, Jul. 19, 1986. Cheju-do - 4♂♂, 7♀♀, Ch'ujado I., Aug. 5, 1978, leg. I.H. Kim; 7♂♂, 1♀, Cheju I., Cheju, Hwabuk-dong, Jul. 18, 1979; 8♂♂, 3♀♀, Cheju I., Sögwip'o, Ch'önjigyo Bridge, Jun. 5, 1977, leg. Y.S. Rho. (all in IJB).

**Distribution:** Cosmopolitan.

***Armadillidium nasatum* Budde-Lund, 1885**

*Armadillidium nasatum* Budde-Lund, 1885 (p. 51).

**Material examined:** Pusan - 1♂♂, Haeundae-gu, Söktae-dong, in green house, Jul. 1, 1990 (IJB); 1♀, Tongnae-gu, Onch'ön-dong, in green house, Aug. 24, 1986 (IJB).

**Remarks:** In Korea, this species is found only in green houses.

**Distribution:** Originated in northern Italy. Widely distributed in France, the Atlantic coasts from northern Spain to the Netherlands and southern England, western Swiss. In Germany, Denmark, Sweden, Finland, Poland, Czechoslovakia, Romania, Austria and eastern Swiss, this species is found only in green houses. It is also found in Canada, U.S.A. and Japan.

## Discussion

A total of 18 species of oniscidean isopods are now known from Korea. This number certainly represents only a small fraction of the terrestrial isopod fauna present in Korea. This study, however, includes a new species, *Lucasioides taitii*, and other six species which are new records for Korea: *Alloniscus balsii*, *Burmoniscus mauritiensis*, *Protracheoniscus major*, *Porcellio laevis*, *Porcellionides pruinosus*, and *Armadillidium nasatum*. Re-examination of most of the material from Korea, as well as from China and Japan, previously studied by Arcangeli (1927, 1952), made possible the safe identification and permitted to correct some misidentification done by that author.

Due to the poor knowledge on the terrestrial isopods in this area as well as in the adjacent regions, it is almost impossible to discuss their distribution. However, it can be pointed out that most species are either the Palaearctic components or cosmopolitan (or circumtropical) species, while only one species, *Burmoniscus mauritiensis*, is related to the tropical Indo-Pacific area.



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한국산 육서 등각류(갑각류)

권도현 (인제대학교 자연과학대학 생물학과)

북한지방을 포함한 한국 전역에서 1 신속 신종(*Lucasioides taitii*)과 6 한국 미기록종을 포함하여 육서등각류 18종을 기록한다. 신종과 이전의 기재가 불충분한 4종(*Exalloniscus cortii*, *Lucasioides gigliotosi*, *Mongoloniscus koreanus*, *M. nipponicus*)은 새로이 기재하고, *Tylos granuliferus*, *Alloniscus balsii*는 삽화로 묘사하고 논의한다. *Mongoloniscus*는 아속에서 속으로 승격시킨다. 일본산인 *Porcellio (Nagara) vannamei* Arcangeli는 *Mongoloniscus* 속으로 이전한다. 일본산인 *Nagurus katakurai* Nunomura는 *Mongoloniscus nipponicus*의 하위동물이명으로 간주된다.