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New millipedes from Korea, with notes on the identity of *Epanerchodus koreanus* Verhoeff, 1937 (Diplopoda)

Новые двупарноногие многоножки из Кореи с заметками об идентичности *Epanerchodus koreanus* Verhoeff, 1937 (Diplopoda)

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KEY WORDS: Diplopoda, new species, new synonymy, *Epanerchodus, Ansiulus, Anaulaciulus,* Korea.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, новый вид, новая синонимика, *Epanerchodus, Ansiulus, Anaulaciulus*, Корея.

ABSTRACT: Among the samples of South Korean Diplopoda kept at the Chonbuk National University, Jeonju, Republic of Korea there occurred four species new to science: *Ansiulus deminutus* sp.n. (Mongoliulidae), *Anaulaciulus parvulus* sp.n. (Julidae), *Epanerchodus gangwonus* sp. n., and *E. multiprocessus* sp.n. (Polydesmidae). Based on a restudy of the holotype of *Epanerchodus koreanus*, the following new synonyms are advanced: *Epanerchodus koreanus* Verhoeff, 1937 = *Epanerchodus dichotomus* Takakuwa, 1954, syn.n. = *Epanerchodus bifidus* Takakuwa, 1954, syn.n., the valid name being the former.

РЕЗЮМЕ: Среди южнокорейских Diplopoda, хранящихся в Университете Чонбук, Чонджу, Корея, оказались четыре новых для науки вида: *Ansiulus deminutus* sp.n. (Mongoliulidae), *Anaulaciulus parvulus* sp.n. (Julidae), *Epanerchodus gangwonus* sp.n. и *E. multiprocessus* sp.n. (Polydesmidae). На основе переисследования голотипа *Epanerchodus koreanus* установлены новые синонимы: *Epanerchodus koreanus* Verhoeff, 1937 = *Epanerchodus dichotomus* Takakuwa, 1954, syn.n. = *Epanerchodus bifidus* Takakuwa, 1954, syn.n., валидное название первое.

Introduction

Among the diplopod samples from South Korea, kept at the Chonbuk National University, Jeonju, Republic of Korea, four species new to science have been found. Their descriptions are presented below. In addition, a re-examination of type material of *Epanerchodus koreanus* Verhoeff, 1937 has permitted to resolve its identity as one of the particularly poorly-known Korean species as well as to reveal its two junior synonyms.

Most of the type material treated below is kept at the Chonbuk National University, Jeonju, Republic of Korea (ChNU), while a few duplicates have been shared with the collections of the Zoological Museum of the State University of Moscow, Russia (ZMUM) and of the Institute of Biology and Soil Science, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia (IBSV). Type material of *Epanerchodus koreanus* Verhoeff, 1937 has been returned to the Zoologische Staatssammlung, Munich, Germany (ZSM), where it belongs.

Descriptive part

Epanerchodus gangwonus Mikhaljova & Lim, **sp.n.**
Figs 1–8.

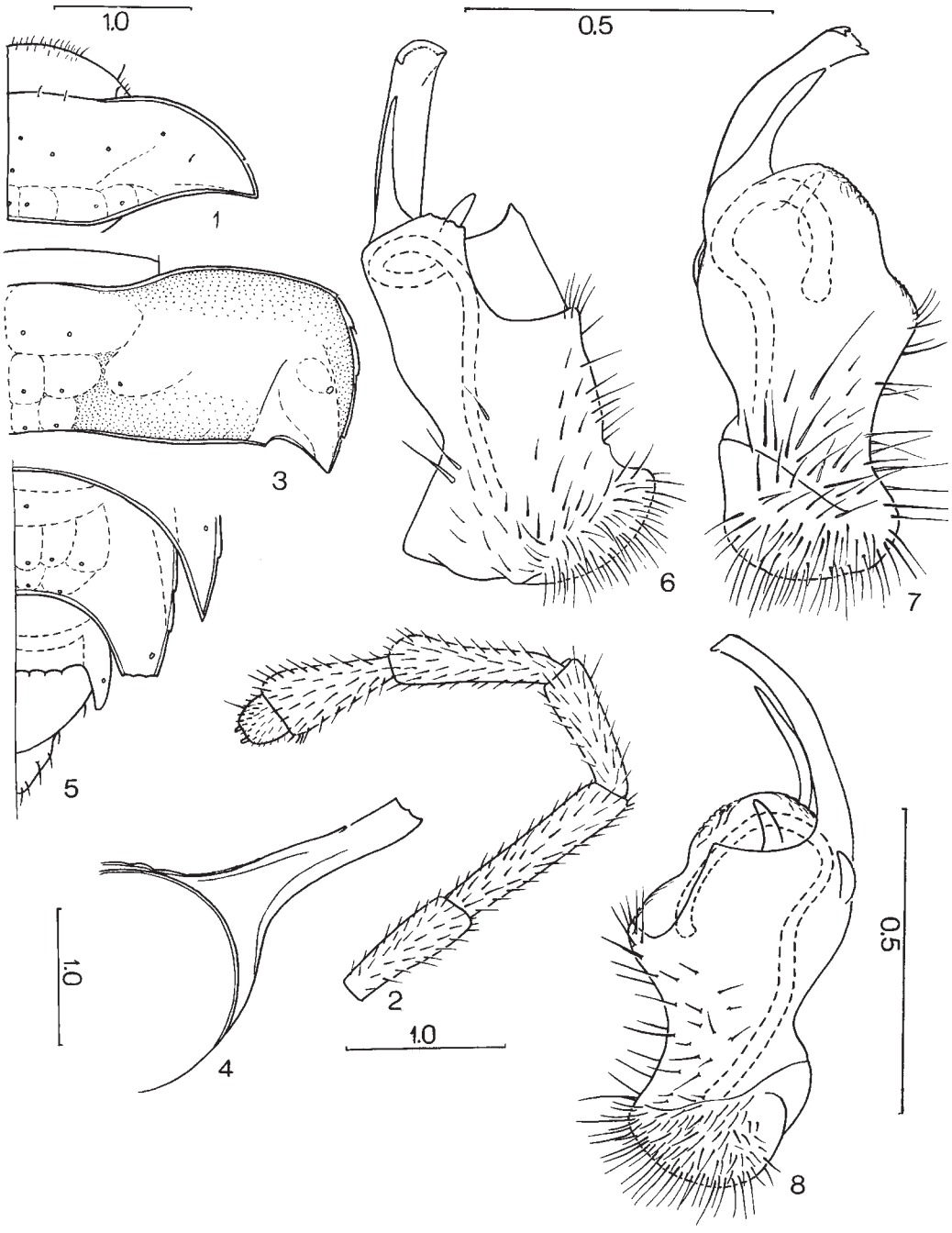
Holotype ♂ (ChNU), South Korea, Gangwon-do, Inje, 5.IX.1998; leg. K.Y. Lim

NAME: The specific epithet refers to the type locality.

DIAGNOSIS: Differs from other congeners by the presence and configuration both of the postfemoral and the additional processes of the gonopods, also by the flattened gonopod telopodite and the curved outer horn (or by the presence and configuration of three distofemoral processes and the curved exomerite in terms of Golovatch [1991] and Djursvoll et al. [2001]).

DESCRIPTION: Adult male 27 mm in length, 4.5 mm in width. Coloration reddish pink, venter pinkish beige, antennae reddish pink.

Head (Fig. 1) with a densely setose anterior part. Vertigial setae absent. Genae rectangular in dorsal view. Antennae (Fig. 2) long and slender, clavate. Length ratios of antennomeres 2–7 as 3.3:4.5:3.2:4.0:3.0:1, width ratios as 1:1:1:1.05:1.4:1. Collum (Fig. 1) much broader than head, transverse and protruding laterad, acutangular posterolaterally. Body parallel-sided on somites 6-15, further on gradually tapering toward telson. Metatergal polygonal sculpture very weak, like three transverse rows of bosses (Fig. 3). Tergal setae tiny, blunt, almost all broken off. Paraterga very well-developed, elevated above middorsal level (Fig. 4), each paratergum wider than long, caudolateral corners pointed; anterior margin convex and smooth, lateral margin with 3–4 weak incisions, each bearing a minute seta, posterior margin



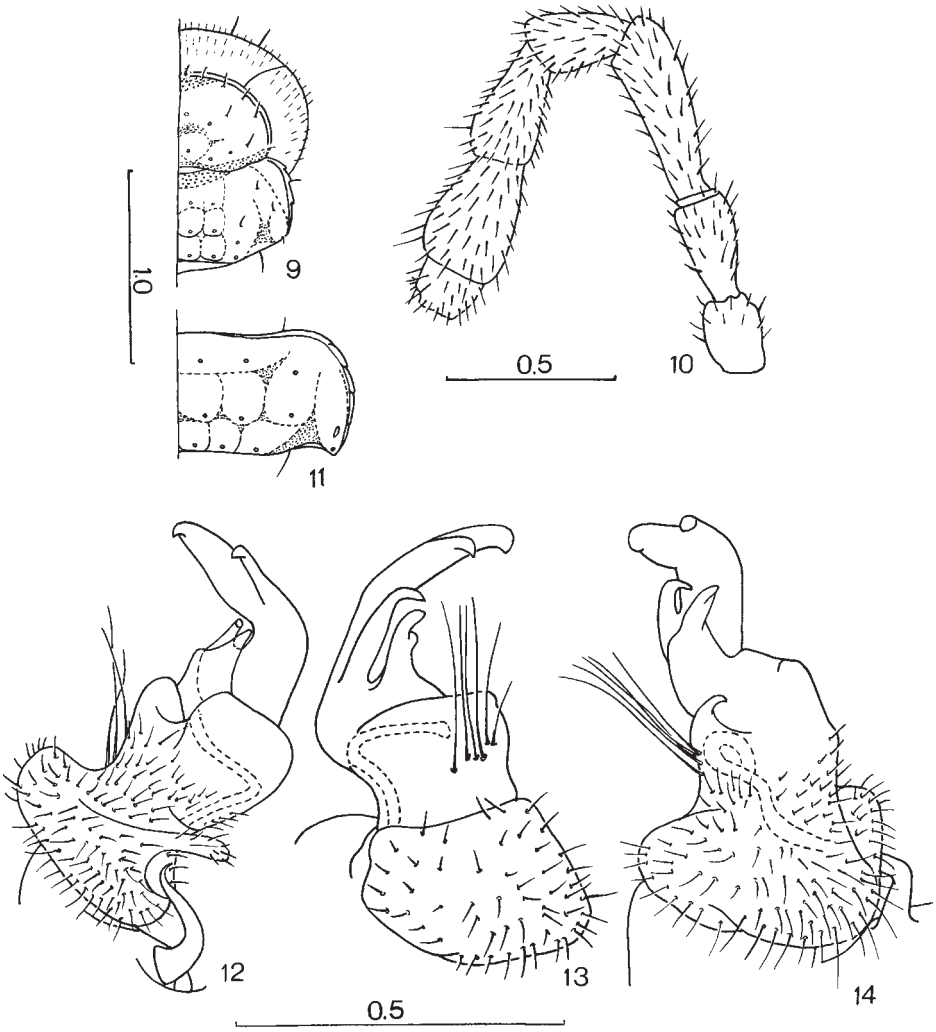
Figs 1–8. *Epanerchodus gangwonus* sp.n., holotype ♂: 1 — head and collum; 2 –antenna; 3 — body segment 9; 4 — body segment 6 (caudal view); 5 — rear part of body (caudolateral corner of body segment 18 broken off); 6 — gonopods (ventral view, slightly shifted mesad); 7 — gonopods (lateral view); 8 — gonopods (mesal view). — Scales in mm. Mikhaljova del.

Рис. 1–8. *Epanerchodus gangwonus* sp.n., голотип ♂: 1 — голова и коллум; 2 — антенна; 3 — сегмент тела 9; 4 — сегмент тела 6 (вид сзади); 5 — задняя часть тела (заднебоковой угол сегмента тела 18 обломан); 6 — гоноподии (вид снизу, немного повернут к середине); 7 — гоноподии (вид сбоку); 8 — гоноподии (вид изнутри). — Масштаб в мм. Mikhaljova del.

with an incision on somites 3–15, this incision gradually growing deeper toward midbody somites and then again shallower toward telson. Ozopores evident, dorsal, ozopore formula normal. Telson (Fig. 5) with an ovoid, setigerous epiproct.

Legs long and slender. Legpairs 1 and 2 somewhat reduced as compared to subsequent pairs.

Following traditional terminology, gonopods (Fig. 6–8) with a usual, heavily setose prefemoral portion. Femur well-developed, with a short, somewhat curved, outer horn. Clivus broad, with a lamelliform margin. Seminal (= prostatic) groove making a characteristic loop, ending at bottom of femoral cavity. Postfemoral process small, blunt apically.



Figs 9–14. *Epanerchodus multiprocessus* sp.n., holotype ♂: 9 — head and collum; 10 — antenna; 11 — body segment 10; 12 — gonopods (mesal view, slightly shifted ventrad); 13 — gonopods (lateral view); 14 — gonopods (ventral view). — Scales in mm. Mikhaljova del.

Рис. 9–14. *Epanerchodus multiprocessus* sp.n., голотип ♂: 9 — голова и коллум; 10 — антенна; 11 — сегмент тела 10; 12 — гоноподии (вид изнутри, немного повернут на вентральную сторону); 13 — гоноподии (вид сбоку); 14 — гоноподии (вид снизу). — Масштаб в мм. Mikhaljova del.

Telopodite long, somewhat curved, flattened, at base with a slender additional process pointed apically.

Following a modern approach to polydesmid gonopod promorphology [Golovatch, 1991], endomerite, currently referred to as exomerite [Djursvoll et al. 2001] (= outer horn), short and somewhat curved while distofemoral processes three, of which cephalic one long, flattened, curved. Middle distofemoral process slender, pointed apically; caudal one small and digitiform.

Female unknown.

Epanerchodus multiprocessus Mikhaljova, **sp.n.**
Figs 9–14.

Holotype ♂ (ChNU), South Korea, Gyeongsangbuk-do, Dodong, Ulreungdo, 4.IV.1991; leg. K.Y. Lim

Paratypes: 2 ♀♀ (ChNU), same locality, together with holotype; leg. K.Y. Lim

NAME: The specific epithet refers to the presence of several further gonopod processes and branches as compared to other congeners.

DIAGNOSIS: Differs from congeners by the presence and shape both of the gonopod postfemoral and the additional processes, the bifurcate tibiotarsus, and the absence of an outer horn (or by three distofemoral processes with a bifurcate cephalic one and by an absent exomerite in terms of Golovatch [1991] and Djursvoll et al., [2001]).

DESCRIPTION: Male. Length 15.0 mm, 1.4 in width. Coloration pinkish beige, legs whitish yellow.

Head (Fig. 9) moderately setose. Genae rectangular in dorsal view. Antennae (Fig. 10) slender, clavate. Antennomere 7 with a small pubescent knob dorsally. Length ratios of antennomeres 2-7 as 2.1:3.7:2.1:2.4:2.4:1, width ratios as 0.9:0.9:0.9:1.0:1.3:1. Collum (Fig. 9) narrower than both head and somite 2. Body parallel-sided on somites 7–17, further on gradually tapering toward telson. Metatergal po-

lygonal sculpture like three transverse rows of bosses (Fig. 11). Tergal setae short, somewhat blunt apically. Paraterga well-developed, horizontal, somewhat longer than wide, their caudolateral corners beak-shaped pointed on somites 7–19; anterior margin convex and smooth, lateral margin with 3–4 weak incisions, each bearing a minute seta. Telson with an ovoid epiproct.

Legs moderately long and slender, more densely setose ventrally. Legpairs 1 and 2 somewhat reduced as compared to subsequent pairs. Male tarsus, tibia and, partly, postfemur with sphaerotrichs on ventral surface.

Using traditional denomination, gonopods (Figs 12–14) with a heavily setose prefemoral and femoral portions. Femur without outer horn but with long setae laterally. Clivus moderately low, with an excavation. Seminal groove making a characteristic loop. Postfemoral process with a subbasal projection. Telopodites falcate, distally with two branches, of which one longer than the other. Apex of each branch unciform. Basally, telopodite with an additional process with an unciform tip.

Using modern terminology [Golovatch 1991; Djursvoll et al. 2001], gonopods without exomerite (= outer horn) but with three distofemoral processes, of which cephalic one the strongest and bifurcate. Each branch with an unciform apex. Middle distofemoral process slender, with an unciform tip; caudal one with a subbasal projection.

Female. Length 15.0–15.5 mm, width 1.4–1.5 mm. Coloration, head and body structure like in male but legs without sphaerotrichs. Epigynal ridge behind legpair 2 low, rounded transversely. Vulva not dissected for examination.

Epanerchodus koreanus Verhoeff, 1937
Figs 15–28.

Material examined: ♂ holotype (consisting of three distinct parts) (ZSM), "Nordkorea, Yuki ♂, Tiergarten (Typus - Verh.)... Etk. Nr. 1446". — 1 ♂ (IBSV), Russia, Primorskii krai (= Maritime Prov.), Kedrovaya Pad' Nature Reserve, bank of Kedrovaya River, rotten stump, 7.VII.1979. — 2 ♂♂ (IBSV), Primorskii krai, Nadezhdinskaya Distr., near Kiparisovo, valley of Sirenevka River, broadleaved forest, litter, VII.1997. — 1 ♂ (IBSV), same locality, VIII.1997. — 1 ♂, 1 ♀, 2 juv. (IBSV), same locality, 28.IX.1997. — 3 ♂♂, 3 juv. (IBSV), Primorskii krai, Khasan Distr., Bryusa Peninsula, Kruglaya Bay, *Quercus* forest, litter, 3.VIII.1998. — 1 ♂ (IBSV), same locality, 5.VIII.1998. — 1 ♂ (IBSV), same locality, 6.VIII.1998. — 1 ♂ (IBSV), same locality, 7.VIII.1998; all leg. E.V. Mikhaljova. — 1 ♂ (IBSV), Primorskii krai, near Andreevka, 42°35−36′N, 131°13′E, 11−15.VIII.1998; leg. Y. M. Marusik. — 1 ♂, 1 ♀ (IBSV), Primorskii krai, near Vladivostok, Eleny Island, broadleaved forest, litter, 9.VIII.2000; leg. E.V. Mikhaljova.

DESCRIPTION: Male. Length 15–22 mm, width 3.3–3.8 mm with paraterga. Coloration uniform reddish beige, grayish brown or reddish brown with paraterga bright pink dorsally, forming a characteristic pattern of spots and stripes, legs yellowish, antennae beige.

Head (Fig. 15) moderately setose, with two pairs of longer vertigial setae. Genae rectangular in dorsal view. Antennae long and slender, clavate. Length ratios of antennomeres 2-7 as 2.1:3.9:2.7:3.0:2.7:1, width ratios as 1:1:1:1.1:1.3:1. Collum much broader than head, elliptical transversely; lateral ends angulate, with one very weak notch on each side; a row of fine setae present along anterior margin. Somite 2 broader than collum, paraterga somewhat bent forward. Body parallel-sided on somites 6–15, further on gradually tapering toward telson. Each metapleurite divided by a deep transverse groove into two unequal parts. Metatergal polygonal sculpture weak (very weak on anterior somites), like three transverse rows of bosses, 2nd and 3rd rows being developed more strongly than 1st one (Fig. 16). Tergal setae tiny, blunt. Paraterga well-developed, horizontal, usually as wide as long; their caudolateral corners increasingly pointed on somites 4–19; anterior margin convex and smooth, lateral margin with 3–4 weak incisions, each bearing a minute seta. Ozopore formula normal. Epiproct rounded at tip, sparsely setose.

Legs moderately long and slender, claws normal. Legpairs 1 and 2 somewhat reduced in size as compared to subsequent ones. Male tarsus, tibia and, partly, postfemur with sphaerotrichs on ventral surface.

Using traditional terminology, gonopods (Figs 17 & 18) with a heavily setose prefemoral portion. Femur well-developed. Clivus broad, with a lamelliform margin, outer horn unequally bifurcate. Seminal groove making a characteristic loop. Gonopod telopodites with a hook-shaped apex and a group of batons subapically. Number of batons and projections of telopodite's middle part varied (Figs 17–28). Basally, telopodite with an additional process. Postfemoral process long, pointed apically.

Using modern terminology [Golovatch, 1991; Djursvoll et al., 2001], gonopods with a well-developed femorite, a bifurcate exomerite (= outer horn) and three distofemoral processes, of which cephalic one the strongest, bearing a group of batons subapically and a hook-shaped tip. Number of batons and projections on cephalic process' middle part varied (Figs 17–28). Middle distofemoral process slender, pointed apically, somewhat curved; caudal one with a pointed apex.

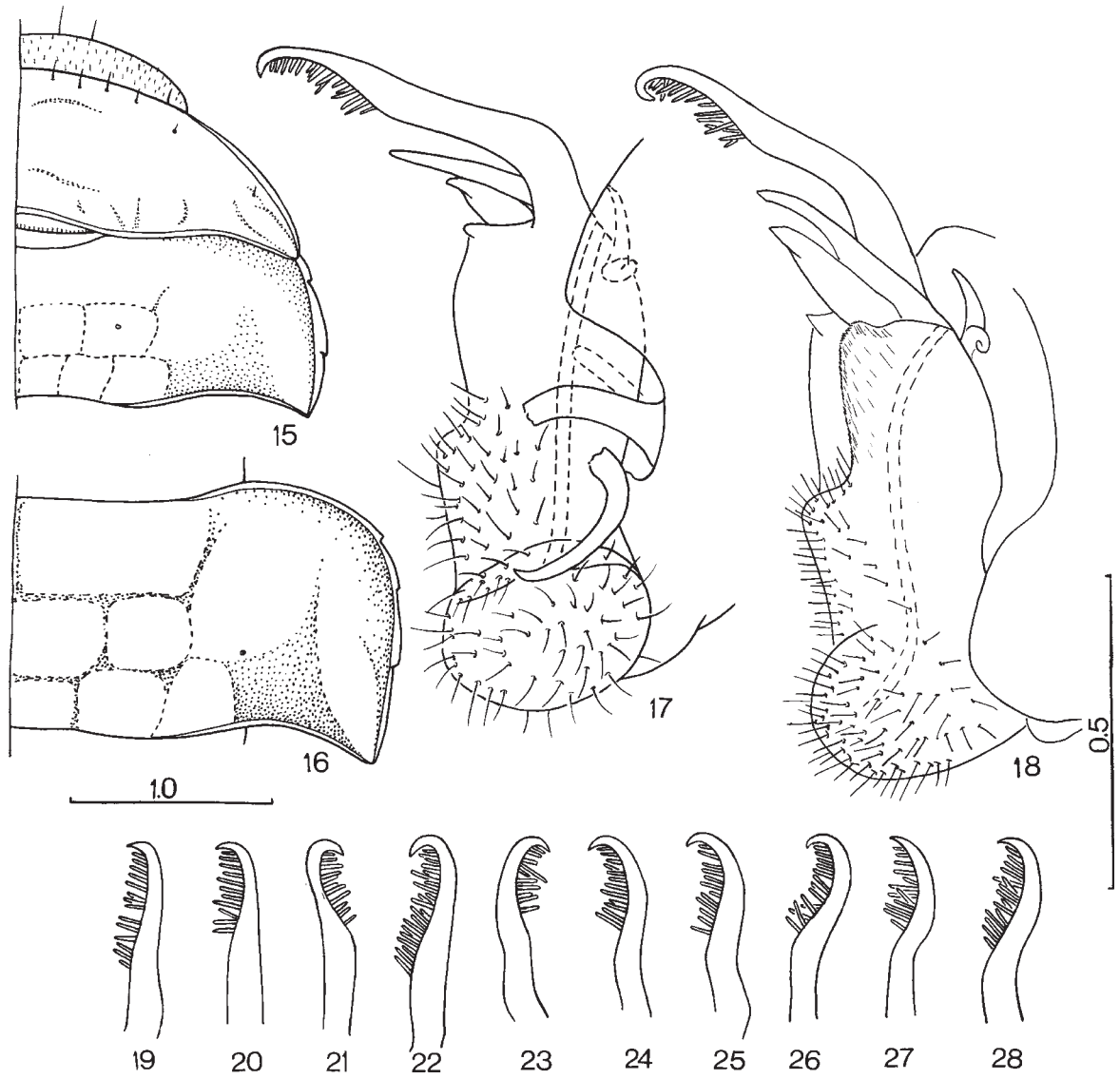
Female. Length 33–35 mm, width 4.2–4.5 mm with paraterga. Coloration always reddish brown with paraterga bright pink dorsally, forming a characteristic pattern of spots and stripes. Legs without sphaerotrichs. Epigynal ridge behind legpair 2 low, rounded transversely. Vulva not dissected for examination.

DISTRIBUTION: Korea, Russian Far East, Japan.

REMARKS: Among the *Epanerchodus* species occurring in Korea, there are three forms particularly similar to one another: *E. koreanus* Verhoeff, 1937, *E. dichotomus* Takakuwa, 1954, and *E. bifidus* Takakuwa, 1954. The former species was described from Yuki, North Korea [Verhoeff, 1937] and later erroneously reported from South Korea as well [Lim, 1988]. The second species was described from the very same locality Yuki while at least *E. bifidus* was diagnosed and illustrated based on samples from Aso, Kyushu, Japan and Pujeon-Koweon and Masan, Korea [Takakuwa, 1954]. It was under the name *E. bifidus* that Murakami & Paik [1968] redescribed and illustrated this species in due detail as based on Korean cave material. Since then, also sub *E. bifidus*, this taxon has also been reported from the Maritime Province, Russian Far East, where it appears to be quite common [cf. Mikhaljova, 1998a].

That *bifidus* might prove to be but a junior synonym of *koreanus* has long been suspected [Mikhaljova, 1993; Mikhaljova & Kim, 1993] but it is only recently that the holotype of the latter species has been obtained for restudy. This has allowed to finally confirm this synonymy as well as to add *E. dichotomus* to the synonymy list even though the types of neither *E. dichotomus* nor *E. bifidus* have been revised. Fortunately, their original descriptions are still good enough to be certain about the identities and synonymy. In addition, plentiful material of *bifidus* has become available to directly compare it with the type of *koreanus*.

Takakuwa [1954], in describing both *E. dichotomus* and *E. bifidus*, distinguished them from *E. koreanus* first of all by



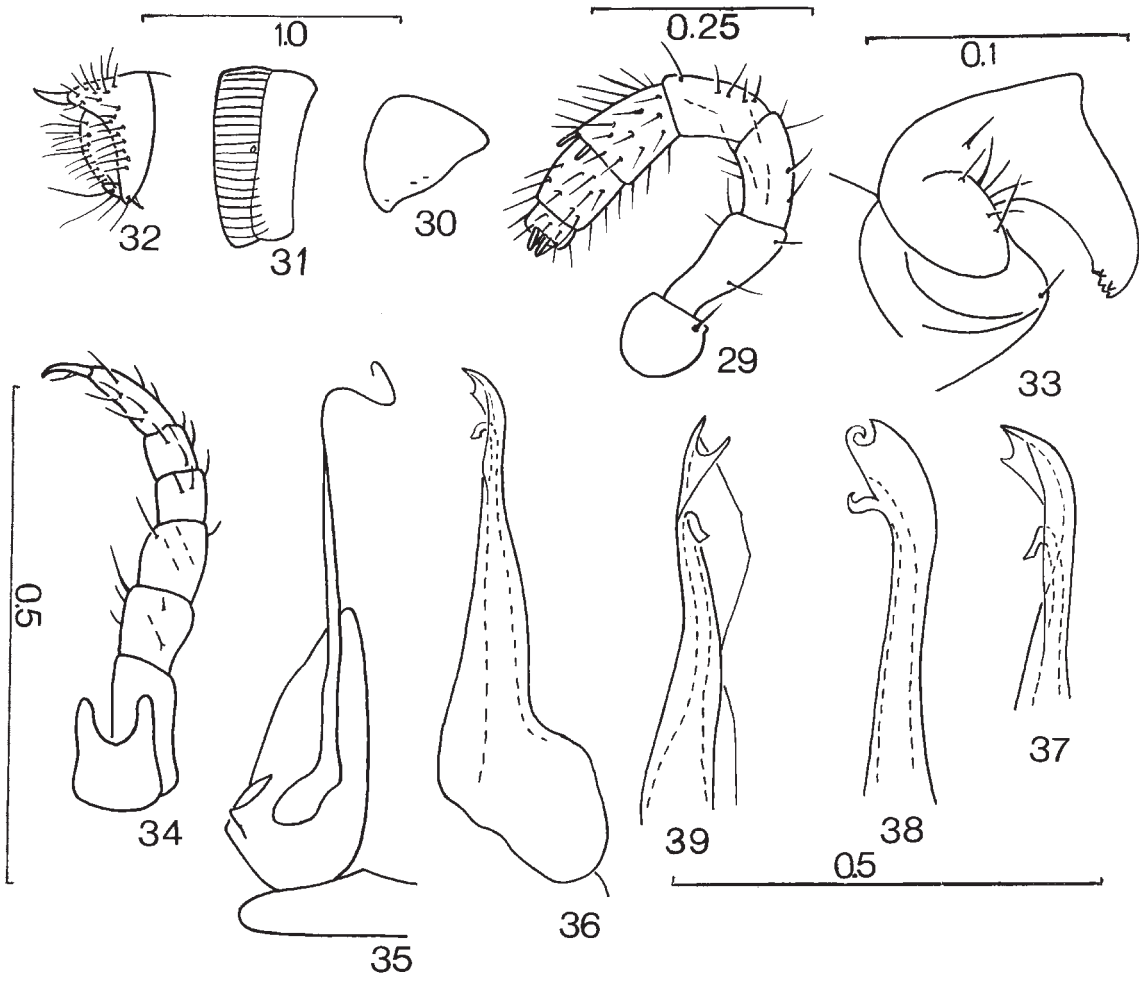
Figs 15– 28. *Epanerchodus koreanus* Verhoeff, 1937, holotype ♂: 15 — fore part of body; 16 — body segment 8; 17 — gonopods (anteromesal view); 18 — gonopods (posterolateral view); 19–28 — variation in distal part of gonopod telopodite (= cephalic distofemoral process according to Golovatch [1991]) from Khasan Distr. (19, 20, 27, 28), Kiparisovo (22, 23, 24, 26), Eleny Island (21), Kedrovaya Pad' Nature Reserve (25). — Scales in mm. Mikhaljova del.

Рис. 15–28. *Epanerchodus koreanus* Verhoeff, 1927, голотип ♂: 15 — передняя часть тела; 16 — сегмент тела 8; 17 — гоноподии (передне-внутренний вид); 18 — гоноподии (задне-боковой вид); 19–28 — изменчивость дистальной части телоподита гоноподий (= главного дистофеморального отростка по [Golovatch, 1991]) из Хасанского района (19, 20, 27, 28), Кипарисово (22, 23, 24, 26), острова Елены (21), заповедника "Кедровая Падь" (25). — Масштаб в мм. Mikhaljova del.

the presence in both former species of a bifid outer femoral horn (= exomerite). Indeed, based on the original description by Verhoeff [1937], this structure was depicted uniramous and compared with the similarly uniramous horn in *E. orientalis* Attems, 1901 [cf. Attems, 1901; Verhoeff, 1936; Myiosi, 1959; Murakami, 1969]. However, as in the holotype of *E. koreanus* the exomerite is actually bifid (Figs 17 & 18), the distinction does not hold.

E. dichotomus was said to differ from congeners by the presence of a subtriangular projection on the midway part of the gonopod telopodite [Takakuwa, 1954] (= cephalic distofemoral process in terms of Golovatch [1991]). Yet the fresh material shows this projection to vary from barely visible to well-developed subtriangular (Figs 17–28). This character is thus also illusory and cannot be considered as sufficiently stable to distinguish the three species compared. The number of bacilli in the distal part of the gonotelopodite likewise varies considerably.

In addition, Takakuwa [1954] discriminated his *E. dichotomus* from both other forms of the trio by length of the gonopod postfemoral process (= caudal process in terms of Golovatch [1991]), stating this to be shorter than the additional process (= middle process in terms of Golovatch [1991]). However, both the holotype of *E. koreanus* (Figs 17 &18) and



Figs 29–39. *Anaulaciulus parvulus* sp.n., paratypes ♂♂: 29 — antenna; 30 — collum; 31 — midbody segment; 32 — telson; 33 — legpair 1; 34 — legpair 2; 35 — promerite; 36 — opisthomerite; 37 — distal part of opisthomerite (front view); 38 — distal part of opisthomerite (mesal view); 39 — distal part of opisthomerite (caudal view). — Scales in mm. Mikhaljova del.

Рис. 29–39. *Anaulaciulus parvulus* sp.n., паратипы ♂♂: 29 — антенна; 30 — коллум; 31 — срединный сегмент тела; 32 — тельсон; 33 — первая пара ног; 34 — вторая пара ног; 35 — промерит; 36 — опистомерит; 37 — дистальная часть опистомерита (вид спереди); 38 — дистальная часть опистомерита (вид изнутри); 39 — дистальная часть опистомерита (вид сзади). — Масштаб в мм. Mikhaljova del.

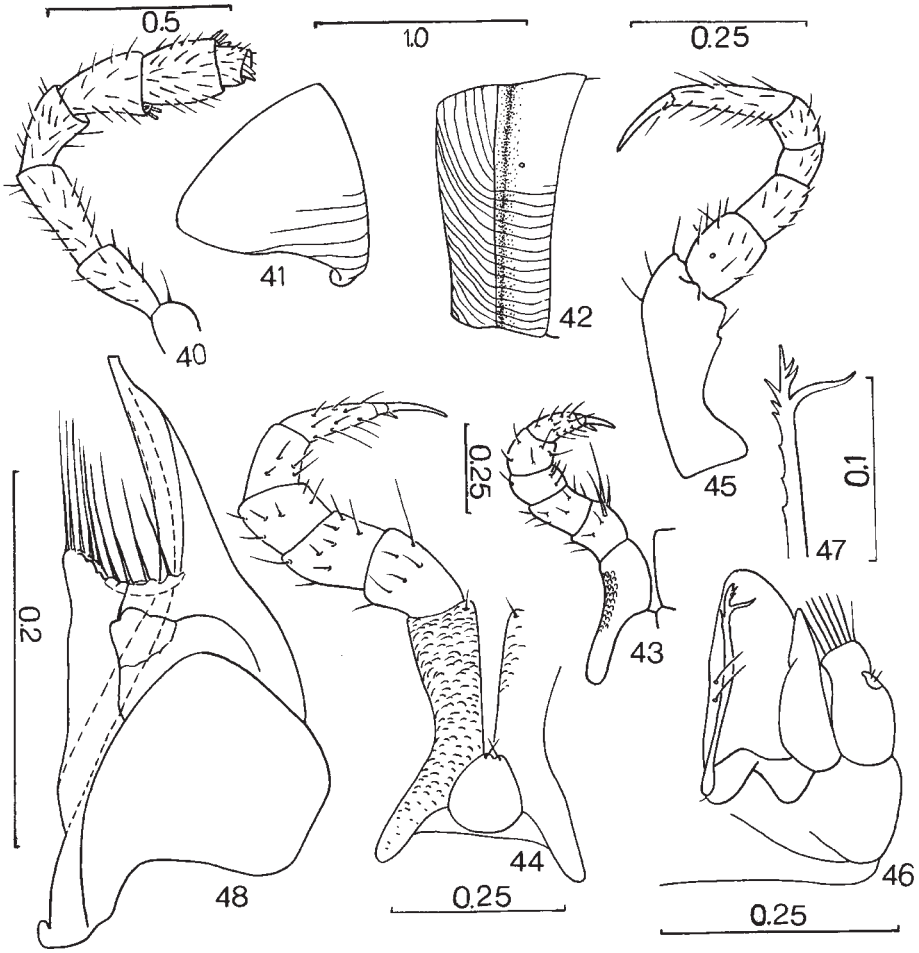
the males of *E. bifidus* show this very condition as well. In other words, there are no differences between the trio in this respect either, even though the additional process displays some length variation as well [Mikhaljova & Lim, 2000].

Takakuwa [1954] diagnosed *E. bifidus* by the presence of two small outgrowths near the tip of the gonopod postfemoral process (= caudal process in terms of Golovatch [1991]), a structure stated absent from both *E. dichotomus* and *E. koreanus*. No such outgrowths have been revealed based on a study of fresh *E. bifidus* samples. Instead, a curvature has been elucidated close to the apex of this process, something that indeed could be mistaken for a couple of outgrowths when viewed at a certain angle [Takakuwa, 1954]. Yet in no way can this curvature be considered as distinguishable for *E. bifidus*, as at least the *E. koreanus* type shows exactly the same condition (Figs 17 & 18). Murakami &. Paik [1968], when redescribing *E. bifidus,* have failed to trace any such outgrowths either.

To put a long story short, there are no characters that would allow for discrimination between the three nominate species to be made. Hence the new synonymy advanced: *Epanerchodus koreanus* Verhoeff, 1937 = *Epanerchodus dichotomus* Takakuwa, 1954, syn.n. = *Epanerchodus bifidus* Takakuwa, 1954, syn.n., the valid name being the former.

As stated above, the species is rather variable, this being coherent with its rather vast geographical distribution. Besides the variable distal end of the gonopod telopodite (Fig. 17–28) and certain variation in length of the additional process, variation also concerns the thickness of the gonopod postfemoral process and the posterior edge of the subanal scale from round to subquadrate. Body size and coloration appear to vary especially considerably in males, which range from 15–17 to 20–22 mm in length and, among the bulk whose coloration resembles that of the female (reddish brown with characteristic spots on the dorsal side of the paraterga), contain samples uniform pink-beige or grey-beige, devoid of spots [Mikhaljova, 1998b; Mikhaljova & Lim, 2000].

Interestingly, strong variation in gonopod traits is also characteristic of *E. orientalis* [Nishikawa & Murakami, 1993], a common Japanese species definitely very closely related to *E. koreanus*. Furthermore, splitting *E. orientalis* into subspe-



Figs 40–48. *Ansiulus deminutus* sp.n., paratype ♂: 40 — antenna; 41 — collum; 42 — midbody segment; 43 — legpair 1; 44 — legpair 2; 45 — legpair 7; 46 — anterior gonopods (caudal view); 47 — distal part of anterior gonopod flagellum; 48 — posterior gonopods (lateral view). — Scales in mm. Mikhaljova del.

Рис. 40–48. *Ansiulus deminutus* sp.n., паратип ♂: 40 — антенна; 41 — коллум; 42 — срединный сегмент тела; 43 — первая пара ног; 44 — вторая пара ног; 45 — седьмая пара ног; 46 — передние гоноподии (вид сзади); 47 — дистальная часть жгутика передних гоноподий; 48 — задние гоноподии (вид сбоку). — Масштаб в мм. Mikhaljova del.

cies [cf. Attems, 1940] might prove to be as groundless as keeping both synonyms of *E. koreanus* as valid species. No less important, some congeners prove polymorphous as well [Mikhaljova & Golovatch, 1981].

Anaulaciulus parvulus Mikhaljova, **sp.n.**
Figs 29–39.

Holotype♂ (ChNU), Gangwon-do, Yeoryang Cave, 2.IV.1991; leg. J. NamGeung.

Paratypes: 2 ♂♂ (ChNU), 1 ♂ (IBSV), 1 ♂, 1 ♀ (ZMUM), same locality, together with holotype, 2.IV.1991; all leg. J. NamGeung.

NAME: The specific name derives from Latin parvulus, standing for the small body.

DIAGNOSIS: Differs from congeners by the structure of the posterior gonopods with three apical processes but without lateral lobe.

DESCRIPTION: Male. Length 10.5–18.5 mm, diameter 0.3–0.5 mm. Body segments without telson 38(-6), 38(-6), 41(-5), 42(-5), 54(-2). Coloration beige. Legs and antennae beige. Eyes black, 5-9 ocelli in a round eyepatch. A dark spot can be present near ozopores. Vertigial setae 1+1, supralabral ones 2+2, labral ones 7+7. Male genae unmodified. Gnathochilarium usual. Antennae (Fig. 29) short, clavate. Sensory bacilli at distal end of antennomere 5 rather few (3–4), forming no corolla. Collum (Fig. 30) without striae.

Body slender, subcylindrical, metazona not setose. Suture between pro- and metazona shallow. Metazona (Fig. 31) striate all along their length, 4–5 striae in a square with sides equal to metazonital length of a midbody ring. Ventral edge of somite 7 curved. Prozona smooth. Ozopores small, almost set off and lying behind suture dividing pro- and metazona. Telson (Fig. 32) setigerous, distally with an epiproct surmounted by a strong claw curved dorsally. Anal valves covered with dense and long setae. Subanal scale bearing long setae throughout.

Legs slender, not long. Claw with a somewhat thin, long, setiform outgrowth at base ventrally. Male legpair 1 (Fig. 33) unciform, with an apical outgrowth and setose ventrally. Legpairs 2–7 normal. Penes flat, bifid apically (Fig. 34).

Anterior gonopods (promerites) (Fig. 35) plate-shaped, subtriangular, each with a long flagellum and a rudimentary, barely distinguishable telopodite. Distal part of posterior gonopod (opisthomerite) (Figs 36–39) bearing a thin, hyaline blade with an apical excavation. Width of the blade varied (Figs 37 & 38).

Female. Length 15 mm, diameter 0.7 mm. Body segments without telson 48(-4). Ocelli 10. Main characters like in male but legs without modifications. Vulva not dissected for examination.

Ansiulus deminutus Mikhaljova, **sp.n.**
Figs 40–48.

Holotype ♂ (ChNU), Gyeongsangbuk-do, Goreong, 25.IX.1990; leg. K.Y. Lim.

Paratype: 1 ♂ (IBSV), same locality, together with holotype; leg. K.Y. Lim.

NAME: The species epithet refers to both gonopods and penes being very small.

DIAGNOSIS: Differs from congeners by the small, subovoid penes and the structure of the posterior gonopods.

DESCRIPTION: Both holo- and paratype are only anterior body portions (16 somites in holotype, 6 in paratype), with rear parts missing. Hence neither full segment counts nor body length available. Diameter 1.2–1.3 mm. Body's ventral side, legs and antennae light brown. Prozona dark brown. Metazona dark brown with vague, light marble spots laterally. Somites 1–6 with oval marble spots dorsally and laterally. Eyes black.

Body subcylindrical, smooth. About 25 ocelli in a triangular eyepatch on each side of head. Vertigial setae absent. Supralabral setae 2+2, labral ones 8+8 or 9+9. Genae oval, without outgrowths. Gnathochilarium usual; three distal setae and a low basal outgrowth on stipes; 6 to 7 setae on each lingual lamina; prementum like a long, slender triangle. Antennae (Fig. 40) relatively short, clavate; 3rd antennomere the longest, 5th with four thin bacilli ventrally, 6th with three such bacilli dorsally. Collum (Fig. 41) with 9 striae of different length laterally. Prozona with very thin striations directed obliquely laterally and increasingly transversely dorsad (Fig. 42). Metazona with thin striae below ozopores. Ozopores small, beginning from somite 6 on, lying behind and set off from a shallow suture dividing pro- and metazona.

Legs moderately long, slender, claw long, with an additional minute claw at base. Legpair 1 (Fig. 43) somewhat reduced but leg-like, with 5-segmented telopodites. Legpair 2 (Fig. 44) with papillate coxites; penes small, suboval, with two setae at apex. Legpair 7 (Fig. 45) reduced but leg-like, without coxal process.

Gonopods very small. Anterior gonopods (Fig. 46) with an apically setose telopoditomere 1 and a rudimentary 2nd segment. Coxal process flat, with two setae at interior margin, its lateral edge bent caudad like a lamella with a pointed apex. Flagella short, spinose distally (Fig. 47). Posterior gonopods (Fig. 48) placed on a well-sclerotized horseshoe-shaped sternum, subbasally with a sublateral remnant of telopodite, each latter with an apical seta. Distocoxal portion biramous, medially with a distinct wide groove attached to a flagellum apiece. Rear branch with long apical setae, anterior one bare, narrower distally.

Female unknown.

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