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Some polydesmidan millipedes from caves in southern China (Diplopoda: Polydesmida), with descriptions of four new species

Некоторые многоножки-многосвязы из пещер Южного Китая (Diplopoda: Polydesmida) с описанием четырех новых видов

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KEY WORDS: Diplopoda, Polydesmida, taxonomy, new species, cave, China.

КЛЮЧЕВЫЕ СЛОВА: Диплоподы, многосвязы, таксономия, новый вид, пещера, Китай.

ABSTRACT: In addition to two common epigean species of Paradoxosomatidae, a collection of polydesmidan millipedes from Chinese caves has revealed the following four new species: *Epanerchodus draco* sp.n., *E. frater* sp.n., *E. soror* sp.n. and *Usbekodesmus varius* sp.n. (Polydesmidae). Two of these taxa, in particular *E. draco* sp.n. and *E. frater* sp.n., are presumed troglobites, the other two are presumed troglophiles.

РЕЗЮМЕ: Вместе с двумя банальными наземными видами из семейства Paradoxosomatidae коллекция многосвязов из китайских пещер содержала следующие четыре новые вида: *Epanerchodus draco* sp.n., *E. frater* sp.n., *E. soror* sp.n. и *Usbekodesmus varius* sp.n. (Polydesmidae). Два из этих таксонов, а именно *E. draco* sp.n. and *E. frater* sp.n., предположительно троглобионты, а прочие два, вероятно, троглофилы.

Introduction

China is perhaps the last great terra incognita for millipedes. The Chinese diplopod fauna, as currently known, only includes about 160 species [Wang & Mauriès, 1996], whereas at least several times as many can be expected to occur there.

As collections of cavernicolous Diplopoda from China have only relatively recently become available for study, only a small number of cave-dwelling millipede species have hitherto been recorded there. Although a brief review of the cave millipede fauna exists [Chen et al., 2003], it fails to emphasize that the limited number of Chinese diplopod cavernicoles known include some very unusual higher taxa. These are especially remarkable among the order Callipodida. Firstly, Zhang [1993] described *Sinocallipus simplipodicus* Zhang, 1993, from a cave in Yunnan, and erected the monobasic family Sinocallipodidae. *S. simplipodicus* has since been encountered epigeically in Laos and this species is now considered to represent a suborder of its own, Sinocallipodidea, the basalmost in the entire order [Shear et al., 2003]. Secondly, Wang & Zhang [1993a] described seven species in three genera, all from Yunnan caves and all placed in a new family, Paracortinidae. This family continues to be recognized as valid, but the number of genera has been reduced to one [Shear et al., 2003]. Stoev [2004] has just described a new troglobitic species of *Paracortina* Wang & Zhang, 1993, from two adjacent caves in southern Yunnan and discussed the status of the family in the light of this new discovery.

The first representatives of the millipede order Chordeumatida have only very recently been recorded in China, with two of the seven currently known species being cavernicoles [Mauriès & Nguyen Duy–Jacquemin, 1997; Shear, 1999].

As regards the Polydesmida in Chinese caves, Loksa [1960] described not only two new monotypic genera of Cambalopsidae (Spirostreptida) — although both were later synonymized [Mauriès & Nguyen Duy–Jacquemin, 1997] — but also two polydesmidan species. One of these is currently referred to as *Pacidesmus sinensis* (Golovatch & Hoffman, 1989) (Polydesmidae) [Golovatch & Hoffman, 1989; Golovatch, 1991] and the other as *Desmoxytes longispina* (Loksa, 1960) (Paradoxosomatidae) [Golovatch & Enghoff, 1994], both from Guizhou Province. More recently, Chen & Zhang [1990] described a new species of the genus *Epanerchodus* Attems, 1901 (Polydesmidae), from a cave in Guizhou Province. Finally, three remarkable new monotypic genera of the family Doratodesmidae have been obtained from Yunnan caves [Wang & Zhang, 1993b].

The present paper treats the collection of Polydesmida taken by Josiane and Bernard Lips (Villeurbanne, France) and their collaborators in 1999, during one of their numerous speleological expeditions to southern China. Four new species of Polydesmidae have been

found, all of which are described below. The Chordeumatida taken by the same expedition will be described elsewhere.

The following museum acronyms are used: Muséum national d'Histoire naturelle, Paris, France (MNHN) and Zoological Museum, University of Moscow, Russia (ZMUM).

Part of the material collected in China by Fabien Darne (French speleological expedition), in China and Vietnam by Boris Sket and Peter Trontelj (University of Ljubljana, Slovenia), and in China by Leonardo Latella (Museo Civico di Storia naturale, Verona, Italy) has been identified and added to the present work. The remaining part of these collections will be studied later.

Faunistic part

PARADOXOSOMATIDAE

Oxidus gracilis (C. L. Koch, 1847)

MATERIAL (MNHN JA126): 1 ♂, 1 ♀, China, Sichuan Prov., Chengdu County, Cave Huan Long Dong, No. 591, 26.08.1999, leg. J. & B. Lips; 1 ♂, Guizhou Prov., Vill. Fugia, Fugia Cave, 20.08.1998, leg. F. Darne; 2 juv., Guizhou Qianxi Prov., Village Hong Lin, Cave Liao Jing Ling Dong, 16.11.2001, leg. L. Latella; 1 ♂, same province, Libo County, Cave Yaman Dong, 27.02.1995, leg. G. Ajlančić & P. Trontelj; 1 ♂, 5 juv., same province and county, Cave Shui-Jiang Dong-Shuipu, 28.02.1995, leg. P. Trontelj; 2 juv., same province and county, Cave Long Quan Dong, 07.03.1995, leg. P. Trontelj.

REMARKS: This subcosmopolitan species, presumably of East Asian origin, is there certainly nothing else but a trogloxene, even if some populations seem well distributed from the entrance to the twilight zone of the respective cave. In addition, Cave Huan Long Dong appears to be «very small» (J. Lips, in litt.).

Kronopolites swinhoei (Pocock, 1895)

MATERIAL (MNHN JA 127): 1 ♂, 1 ♀, China, Yunnan Prov., Zheng Xiong County, Grotte du Cirque (Circus Cave), No. 555, 21.08.1999, leg. J.-M. Verdet; 1 ♀, 6 juv., same province and county, Cave Yan Bao Dong, Nos 532 & 534, 19.08.1999, leg. J. & B. Lips; 1 ♂, Guizhou Qianxi Prov., Village Xingren Huawu, Cave Ha Chong Dong, 25.11.2001, leg. L. Latella & Zorzin.

REMARKS: This large species is very common in China (Shantung, Chekiang, Sichuan, Kansu and Hangchow provinces — cf. Hoffman [1963]), very probably being a trogloxene in caves. It is mainly a soil-dwelling saprophagous macro-arthropod. The adult female at least was captured near the entrance (J. Lips, in litt.). The occurrence of this species in Yunnan and Guizhou is hardly surprising, given its known distribution.

POLYDESMIDAE

Epanerchodus draco **sp.n.**
Figs 1–8.

Holotype ♂ (MNHN JC299), China, Yunnan Prov., Zheng Xiong County, Cave Brouillard matinal, No. 511, 17.08.1999, leg. J. & B. Lips.

DIAGNOSIS: Differs from congeners by the unusually high position of the paraterga, the extremely long antennae and legs, and by certain details of gonopod structure (see also Remarks below).

NAME: To emphasize its dragon-like appearance.

DESCRIPTION: Length ca 23 mm, maximum width 1.5 and 2.0 mm on midbody pro- and metazona, respectively. Coloration uniformly pallid. Head densely pilose, genae subquadrate in dorsal view. Antennae extremely long and slender (Fig. 1), reaching the midlength of segment 4 dorsally, with typical distodorsal groups of bacilliform sensilla on antennomeres 5–7, and a minute dorso-parabasal knob on antennomere 7.

Head width ≈ collum < segment 2 = 3 (Fig. 2) < 4 < 5 = 16 > 17 > 18 >> 19 >> telson. Tergal and sternal surface moderately shining, dull below paraterga due to microgranulation. Metatergal sculpture distinct (Figs 2 & 3), becoming slightly and gradually more obliterate, yet remaining evident, towards telson, represented by usual three transverse rows of flat setigerous bosses, latter in first row typically flatter than in the other two rows; metaterga very slightly convex medially. Tergal setae simple, short, especially short on knobs of two rear rows of bosses. Collum tauriform, paraterga acute caudally (Fig. 2), with an incision in caudal one-third. Paraterga well-developed, set very high on all segments but 19th (Fig. 4), caudal end lying clearly above level of dorsum, on 19th slightly below this level; caudal corners of all postcollar paraterga invariably and increasingly acute, beak-shaped, always protruding well behind rear tergal contour (Figs 2–4), most strongly so on segment 19. Fore-corner of paraterga largely obtusangular, lateral edge slightly convex (Fig. 3). Poreless and pore-bearing paraterga with 3 or 4 lateral incisions, respectively (Figs 2 & 3). Tergal limbus typical of the family, irregularly microdentate (Fig. 5). Epiproct long, digitiform, slightly bent ventrad in lateral view, rather broadly emarginate at tip in dorsal view. Subanal scale roundly subtriangular, with a paramedian pair of rather small but evident setigerous knobs at caudal edge.

Pleurotergal carinae absent. Sterna without modifications. Legs extremely long and slender (Fig. 6), growing increasingly long toward telson, in midbody part ca 1.8 times as long as body height (Fig. 4). Sphaerotrichomes absent.

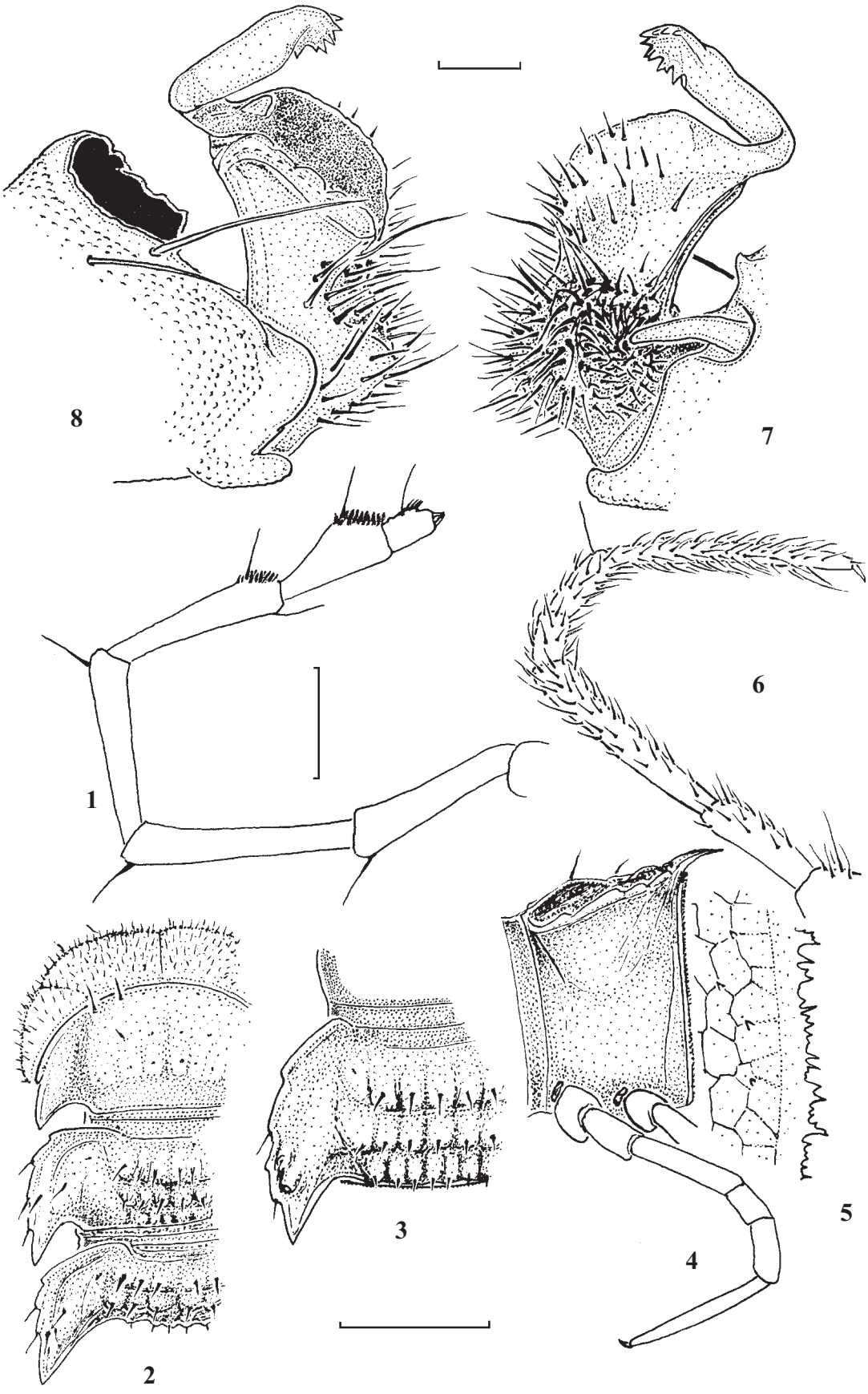
Gonopods (Figs 7 & 8) without exomerite vestige; clivus prominent, with a distolateral lobuliform outgrowth at base of a single, sigmoid, relatively thick and stout, distofemoral process, which is denticulate near and at apex.

REMARKS: This animal is so striking in appearance — superficially resembling several species of the dragon millipede genus *Desmoxytes* Chamberlin, 1923 (Paradoxosomatidae) [cf. Golovatch & Enghoff, 1994] — that, given its Chinese provenance, it fully deserves this name. The pallid coloration, coupled with the extremely long antennae and legs suggest a strictly troglobitic form. Several congeners in Japan and Korea have long been known as troblobites, but none shows such strikingly elongate antennae and legs as *E. draco* sp.n. and *E. frater* sp.n. do (see below).

With over 60 species currently described, mostly from Japan and Korea, and only a few forms from China and the Russian Far East, *Epanerchodus* is probably the most speci-

Figs 1–8. *Epanerchodus draco* sp.n., ♂ holotype: 1 — antenna; 2 — anterior body end, dorsal view; 3 — left side of metatergum 10, dorsal view; 4 — body segment 10, lateral view; 5 — limbus (strongly enlarged, not to scale), 6 — leg 7; 8 & 9 — right gonopod, medial and lateral views, respectively. — Scale bars 0.1 (7, 8), 0.6 (1, 6) and 1.0 mm (2–4).

Рис. 1–8. *Epanerchodus draco* sp.n., голотип ♂: 1 — антенна; 2 — передний конец тела, вид сверху; 3 — левая сторона метатергита 10, вид сверху; 4 — туловищный сегмент 10, вид сбоку; 5 — лимбус (сильно увеличено, вне масштаба), 6 — нога 7; 8 и 9 — правый гонопод, соответственно изнутри и сбоку. — Масштаб 0,1 (7, 8), 0,6 (1, 6) и 1,0 мм (2–4).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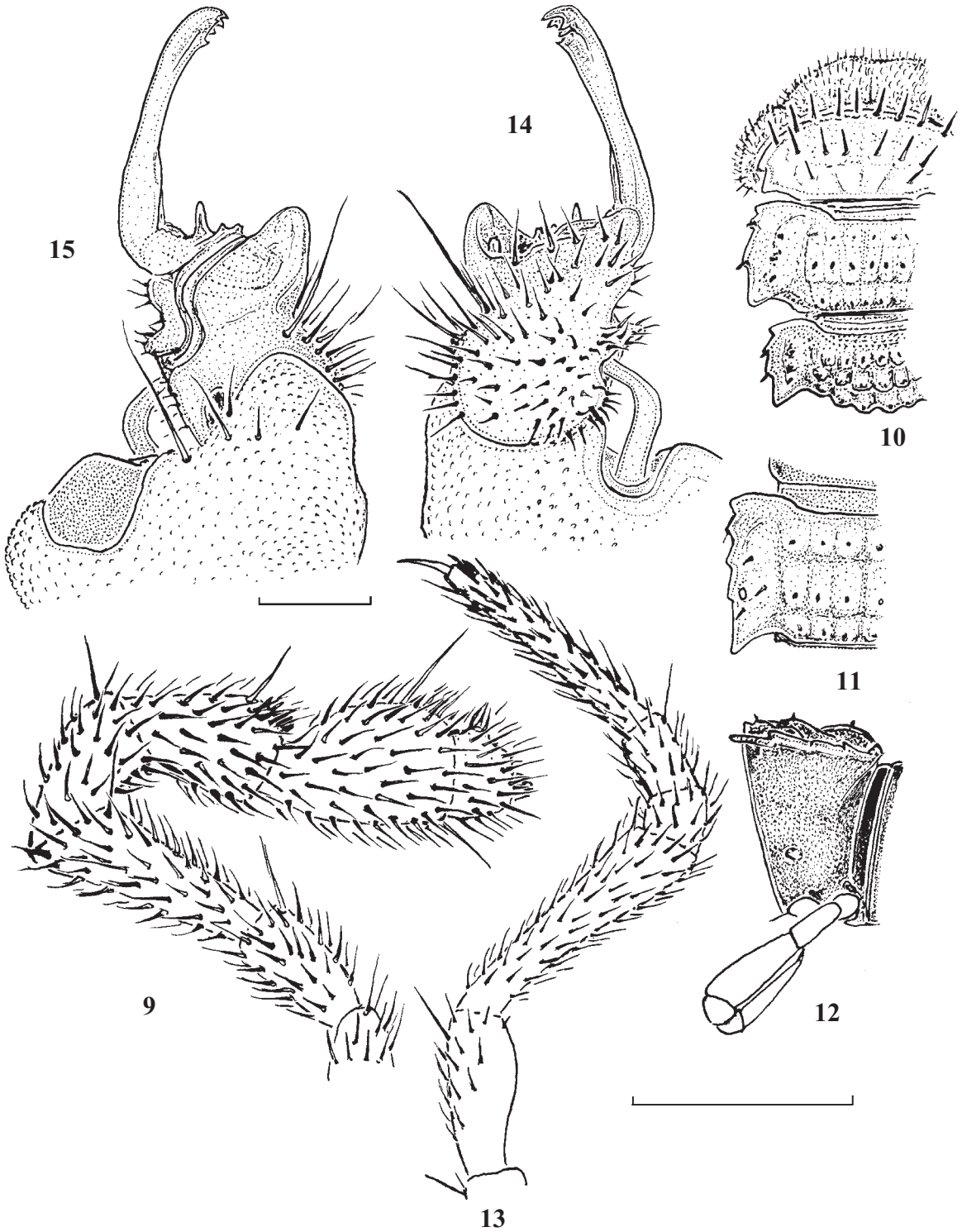


Figs 9–15. *Epanerchodus soror* sp.n., ♂ paratype from Cave Da Hei Dong: 9 — antenna; 10 — anterior body end, dorsal view; 11 — left side of metatergum 10, dorsal view; 12 — body segment 10, lateral view; 13 — leg 7; 14 & 15 — right gonopod, submedial and sublateral views, respectively. — Scale bars 0.1 (14, 15), 0.2 (9, 13) and 1.0 mm (10–12).

Рис. 9–15. *Epanerchodus soror* sp.n., паратип ♂ из пещеры Da Hei Dong: 9 — антенна; 10 — передний конец тела, вид сверху; 11 — левая сторона метатергита 10, вид сверху; 12 — туловищный сегмент 10, вид сбоку; 13 — нога 7; 14 и 15 — правый гонопод, соответственно примерно изнутри и примерно сбоку. — Масштаб 0,1 (14, 15), 0,2 (9, 13) и 1,0 мм (10–12).

ose millipede genus in the whole of East Asia. Leaving aside the fauna of Taiwan and such nomina dubia as *Polydesmus moorei* Pocock, 1895 (Da-zeh valley, 60 miles inland of Sam-Moom Bay) and *P. paludicola* Pocock, 1895 (Wee Lee Lake, 25 miles S of Ningpo) [cf. Pocock, 1895], the following unquestioned *Epanerchodus* have hitherto been encountered in continental China: *E. sphaerisetosus* Zhang & Chen, 1983 (Zhejiang, epigean), *E. stylotarseus* Chen & Zhang, 1990 (Guizhou, cavernicole), *E. potanini* Golovatch, 1991 (Sichuan and Kansu, epigean) and *E. eurycornutus* Zhang & Wang, 1992 (Tianmu Shan, Zhejiang, epigean) [Zhang & Chen, 1983; Chen & Zhang, 1990; Golovatch, 1991; Zhang & Wang, 1992].

Based on gonopod traits, *E. draco* n.sp. and the other two new congeners described below join the large group (about 20 forms) showing no traces of an exomerite. However, because a single, relatively simple distofemoral process, devoid of branches and/or prominent parabasal processes/outgrowths, only appears to occur in a handful of *Epanerchodus* species, *E. draco* sp.n. seems particularly close to *E. stylotarseus*, another cave-dweller from southeastern China [Chen & Zhang, 1990], as well as to both *E. soror* sp.n. and *E. frater* sp.n. (see below). Nevertheless, each of them is easily distinguishable by details of peripheral and gonopod structure, in particular the armament of the apical part of the gonopod distofemoral process (see also Diagnoses). The new trio is also characterized by a relatively modest body size, as well as by a lack of sphaerotrichomes.

The general shape of the distofemoral process in the three new congeners described here vividly resembles that observed in most species of the Japanese group formerly comprising the genus *Prionomatis* Miyosi, 1956 (synonymized under *Epanerchodus* by Golovatch [1991]), which are distinctive due to their peculiar tergal sculpture and setation pattern.

Epanerchodus soror **sp.n.**
Figs 9–15.

Holotype ♂ (MNHN JC300), China, Yunnan Prov., Zheng Xiong County, Cave Da Hei Dong, No. 545, 20.08.1999, leg. J. & B. Lips. — Paratypes: 2 ♂♂, 3 ♀♀, 1 fragment (MNHN JC300), 1 ♂, 1 ♀ (ZMUM), same data, together with holotype; 1 ♂, 1 ♀ (MNHN JC300), same cave, No. 537, 20.08.1999; 2 ♀♀ (MNHN JC300), same cave, No. 548, 20.08.1999; 1 ♀ (MNHN JC300), same county, Cave Liao Jun Dong, No. 508, 17.08.1999; 1 ♀ (MNHN JC300), same county, Cave Brouillard matinal, No. 511, 17.08.1999, 1 ♀ (MNHN JC300), same county, Cave Xien Ren Dong, No. 579, 21.08.1999, all leg. J. & B. Lips.

DIAGNOSIS: Differs from congeners first of all by the single and relatively simple distofemoral process of the gonopods, coupled with the short antennae, small body size, characteristically modified sterna and parallel-sided paraterga.

NAME: Soror (Latin), meaning «sister», to emphasize its close relations with, and same provenance as, the following species.

DESCRIPTION: Length of holotype ca 12 mm, maximum width 0.8 and 1.1 mm on midbody pro- and metazona, respectively. Paratypes ca 11–12 (♂) to 12–14 mm long (♀), 0.8–0.9 and 1.0–1.2 (♂), 0.9–1.0 and 1.2–1.3 mm wide (♀) on midbody pro- and metazona, respectively. Coloration uniformly pallid. Head densely pilose, genae subquadrate in dorsal view. Antennae short and clavate (Fig. 9), reaching the end (♂) or midway (♀) of segment 3 dorsally, with typical distodorsal groups of bacilliform sensilla on antennomeres 5–7, and a minute dorso-parabasal knob on antennomere 7.

Head width = segment 2 = 3 > collum < 4 < 5 = 17 > 18 >> 19 >> telson. Tergal and sternal surface moderately shining, rather dull below paraterga due to microgranulation. Metatergal sculpture distinct (Figs 10 & 11), slightly and gradually becoming more obliterate, yet remaining evident, towards telson, represented by usual three transverse rows of flat setigerous bosses, latter in first row typically flatter than in the other two rows; metaterga slightly convex medially. Tergal setae simple, normally very short, considerably longer only on collum. Latter with a distinct subcaudal incision on each side, paraterga acute caudally (Fig. 10). Paraterga well-developed, most poorly elevated laterad, nearly horizontal, invariably set high, lying well below level of dorsum only on collum and segment 2, thereafter only slightly below the level (Fig. 12). Caudal corner of all paraterga acute, beak-shaped, (nearly) pointed, relatively modestly protruding behind rear tergal contour on segments 4–19 (Figs 11 & 12), most strongly on segment 19. Fore-corner of paraterga largely subrectangular, lateral edges parallel-sided (Fig. 11). Poreless and pore-bearing paraterga with 3 or 4 lateral incisions, respectively (Figs 10 & 11). Tergal limbus typical for the family, irregularly microdentate. Epiproct rather long, digitiform, slightly bent ventrad in lateral view, rather narrowly truncate at tip in dorsal view. Subanal scale roundly subtriangular, with usual, minute setigerous knobs paramedially at caudal edge.

Pleurotergal carinae present, gradually decreasing in size towards telson, in ♂ forming an evident tubercle both anteriorly and posteriorly on segments 2–16, barely visible on segments 17 and 18; carinae of ♀ somewhat smaller, gradually disappearing towards segment 16 or 17, sometimes even towards midbody segments. Sterna setose and characteristically modified, with two more (♂) or less (♀) distinct cones near each coxa, the front and caudal cones on each body segment being larger than both intermediate ones. Legs rather long and slender (Fig. 13), growing increasingly long towards telson, those of ♂ midbody part ca 1.6 times as long as body height (Fig. 12), those of ♀ slightly more slender and shorter. Sphaerotrichomes absent.

Gonopods (Figs 14 & 15) without exomerite vestige; clivus prominent but narrow, with a distolateral dentiform outgrowth at base of a single, suberect and slender distofemoral process, which is denticulate near and at apex.

Epigynal ridge low, bulging, straight, simple, its lateral corners rounded. Vulvae elongate, typical for the genus.

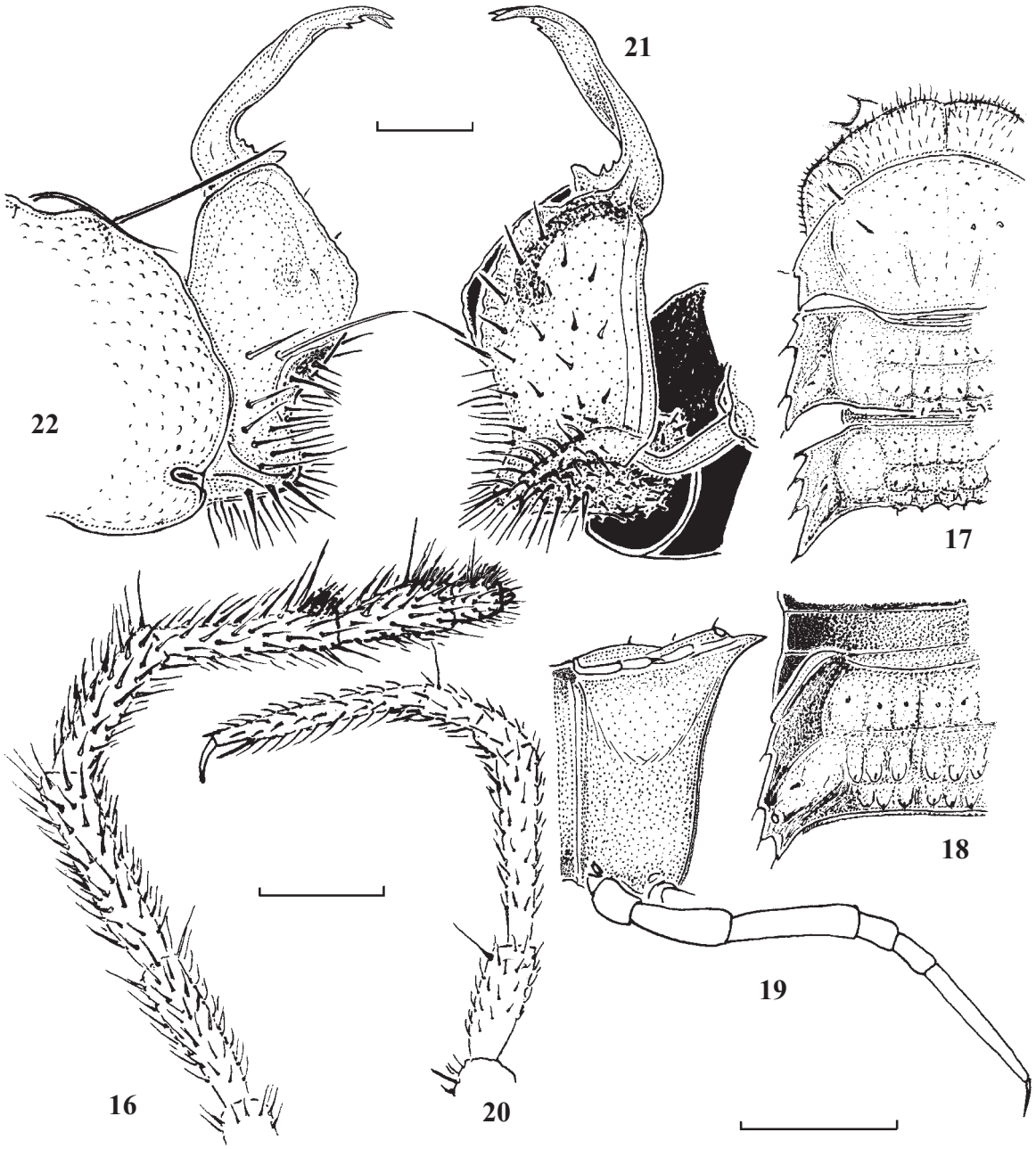
REMARKS: Due to the single, very simple distofemoral process of the gonopods, this new species seems to be particularly close to *E. frater* sp.n. (see below). However, they differ strikingly in size, in the shape and length of the legs and antennae, in paratergal structure, etc.

Superficially, due to its robust antennae, this animal looks only troglophilic, but this remains to be verified. On the other hand, troglophily rather than true cavernicoly seems to be supported by the presence of this new species in four different caves in the same region.

Epanerchodus frater **sp.n.**
Figs 16–22.

Holotype ♂ (MNHN JC301), China, Yunnan Prov., Zheng Xiong County, Cave Da Hei Dong, 20.08.1999, leg. J. & B. Lips.

DIAGNOSIS: Differs from congeners primarily by the single and relatively simple distofemoral process of the gonopods, coupled with the extremely long and slender legs and antennae, medium-sized body and particularly strongly incised paraterga.



Figs 16–22. *Epanerchodus frater* sp.n., ♂ holotype: 16 — antenna; 17 — anterior body end, dorsal view; 18 — left side of metatergum 10, dorsal view; 19 — body segment 10, lateral view; 20 — leg 7; 21 & 22 — right gonopod, medial and lateral views, respectively. — Scale bars 0.1 (21, 22), 0.6 (16, 20) and 1.0 mm (17–19).

Figs 16–22. *Epanerchodus frater* sp.n., голотип ♂: 16 — антенна; 17 — передний конец тела, вид сверху; 18 — левая сторона метатергита 10, вид сверху; 19 — туловищный сегмент 10, вид сбоку; 20 — нога 7; 21 и 22 — правый гонопод, соответственно изнутри и сбоку. — Масштаб 0,1 (21, 22), 0,6 (16, 20) и 1,0 мм (17–19).

NAME: Frater (Latin), meaning «brother», to emphasize its close relationship to and sympatry with *E. soror* sp.n.

DESCRIPTION: Length ca 21 mm, maximum width 0.95 and 1.0 mm on midbody pro- and metazona, respectively. Coloration uniformly pallid. Head densely pilose, genae subquadrate in dorsal view. Antennae very long and slender (Fig. 16), nearly reaching end of segment 5 dorsally, with typical distodorsal groups of bacilliform sensilla on antennomeres 5–7, and a minute dorso-parabasal knob on antennomere 7.

Head width < collum < segment 2 = 3 < 4 < 5 = 17 > 18 >> 19 >> telson. Tergal and sternal surface moderately shining, below paraterga rather dull due to microgranulation. Metatergal sculpture distinct (Figs 17 & 18), slightly and gradually growing more obliterate, yet remaining evident, toward telson, represented by usual three transverse rows of flat setigerous bosses, latter in first row typically flatter than in the other two rows; metaterga slightly convex medially. Tergal setae simple, very short, considerably longer only on

collum. Latter with a distinct subcaudal incision on each side, paraterga acute caudally (Fig. 17). Paraterga rather well-developed, most of paraterga poorly elevated laterad, nearly horizontal, invariably set high, lying well below level of dorsum only on collum and segment 19, in between level to or slightly above the dorsum (Fig. 19). Caudal corners of all paraterga acute, beak-shaped, pointed, on postcollar segments modestly protruding behind rear tergal contour (Figs 17–19), best on segment 19. Fore corner of paraterga largely strongly and roundly obtusangular, lateral edges of midbody paraterga convex in outline (Fig. 18). Poreless and pore-bearing paraterga with 3 or 4 especially strong lateral incisions, respectively (Figs 17 & 18). Tergal limbus typical of the family, irregularly microdentate. Epiproct rather long, digitiform, slightly bent ventrad in lateral view, rather narrowly subtruncate at tip in dorsal view. Subanal scale roundly subtriangular, with unusually prominent setigerous knobs paramedially at caudal edge.

Strongly arcuate and prominent pleurotergal carinae only present on segments 2 and 3, forming a lower subvertical ridge on segment 4 caudally, and a small caudal swelling on segments 5 and 6, onward missing. Sterna moderately setose, without modifications. Legs extremely long and slender (Fig. 20), becoming increasingly long toward telson, about 2 times as long as midbody height (Fig. 19). Sphaerotrichomes absent.

Gonopods (Figs 21 & 22) much like in *E. soror* sp.n., but clivus highly inconspicuous, while distofemoral process differently denticulate near and at apex.

REMARKS: The coexistence of both *E. soror* sp.n. and *E. frater* sp.n. in a single cave could readily be explained in terms of niche segregation, regardless of the presumed troglophily of *E. soror* sp.n. Indeed, however closely related, these species differ substantially in body size, in length of the extremities and in many other peripheral characters.

Usbekodesmus varius **sp.n.**
Figs 23–38.

Holotype ♂ (MNHN JC302), China, Hubei Prov., Banqiao County, Cave Chuan Dong Zi, No. 482, 09.08.1999, leg. J. & B. Lips. — Paratypes: 1 ♂, 2 ♀♀, 5 juv. (MNHN JC302), same data, together with holotype; 1 ♀ (MNHN JC302), same county, Cave Couronne d'Epines 1, No. 389, 04.08.1999; 1 ♂ (MNHN JC302), Sichuan Prov., Xin Long County, Snake Mouth Cave, No. 401, 05.08.1999; 1 ♂ (ZMUM), same cave, No. 380, 05.08.1999; 1 ♂, 3 ♀♀, 2 juv. (MNHN JC302), same cave, No. 389, 05.08.1999; 1 ♀ (MNHN), same county, Lin Cave 1, No. 386, 04.08.1999; 2 ♀♀, 2 juv. (MNHN), same county, Gan Chuan Cave, No. 421, 06.08.1999; 1♀ (MNHN JC 302), same cave, No. 431, 06.08.1999; 1 juv. (MNHN JC302), same cave, No. 413, 06.08.1999; 1 ♂, 3 ♀♀ (ZMUM), same county, Monkey Kid Cave, No. 381, 04.08.1999; 1 ♀, 2 juv. (MNHN JC302), same county, Yellow Cave, No. 450, 08.08.1999, 2♀♀ (MNHN JC302), same cave, No. 456, 08.08.1999; 1 ♀ (MNHN JC302), same cave, No. 464, 08.08.1999; 1♀ (MNHN JC302), same county, Cave Gu Fen Bao, No. 408, 05.08.1999; 1 ♀ (MNHN JC302), same cave, No. 409, 05.08.1999; 1 ♂, 1 ♀ (MNHN JC302), same county, Three Eyes Cave, No. 438, 07.08.1999, all leg. J. & B. Lips.

DIAGNOSIS: Distinguished by its large body size, the large setigerous tubercles on the subanal scale and certain details of gonopod structure (see below).

NAME: To emphasize variability.

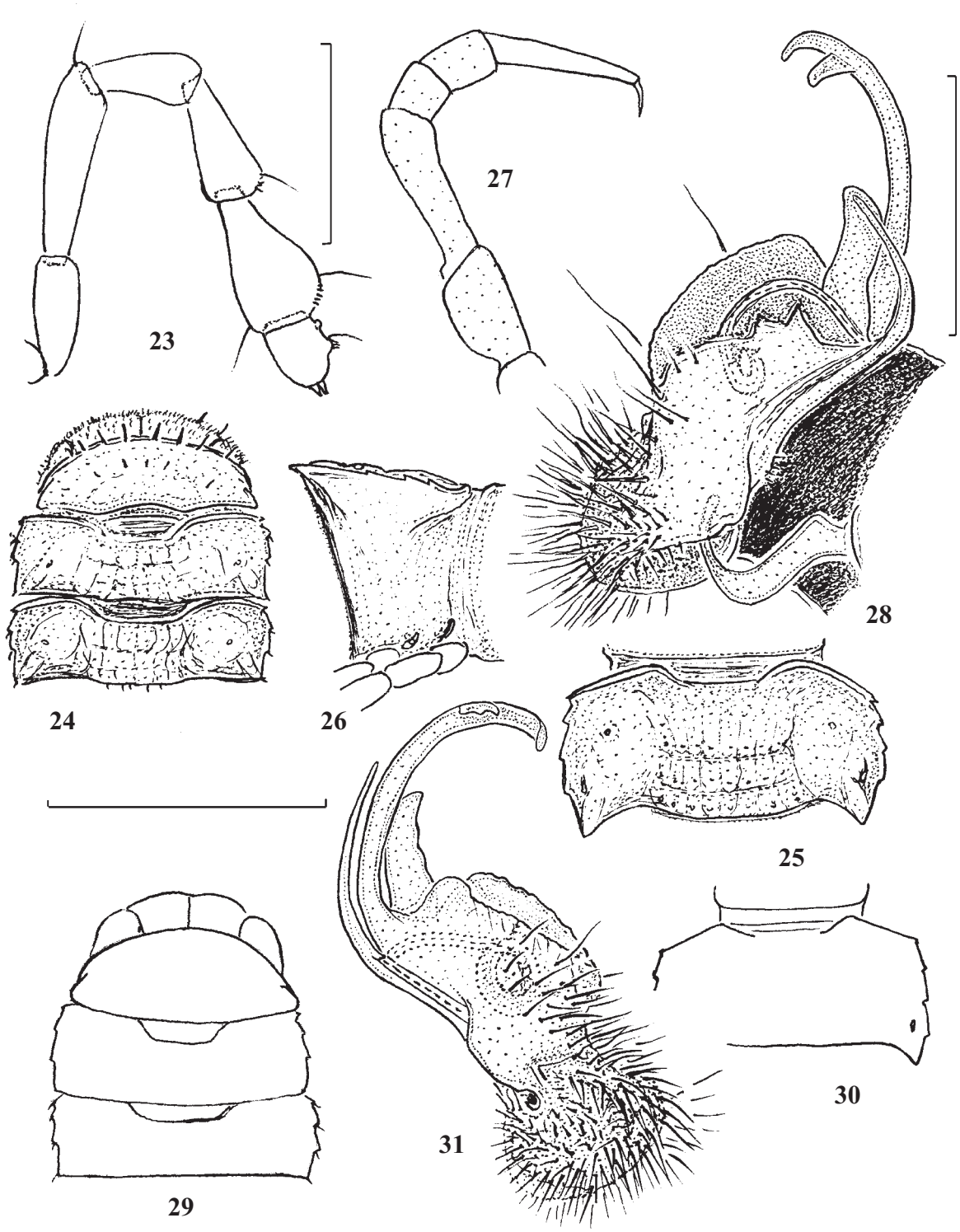
DESCRIPTION: Length of holotype ca 26 mm, maximum width 1.8 and 3.1 mm on midbody pro- and metazona, respectively. Length in ♂ paratypes ca 21–26 mm, of ♀ paratypes 27–30 mm; width of ♂ midbody pro- and metazona 1.5–2.0 and 2.6–3.1 mm, respectively; in ♀ 1.9–2.5 and 3.0–3.4 mm, respectively. Coloration uniform pallid. Head densely pilose, genae subquadrate in dorsal view. Antennae rather short and clavate (Figs 23 & 32), in situ reaching the end of segment 2 dorsally, a little shorter in ♀, with typical distodorsal groups of bacilliform sensilla on antennomeres 5–7, and a minute dorso-parabasal knob on antennomere 7.

Head width < collum < segment 2 = 3 < 4 < 5 = 17 > 18 >> 19 >> telson. Tergal and sternal surface moderately shining, below paraterga rather dull due to microgranulation. Metatergal sculpture more or less distinct (Figs 24, 25, 33 & 34), slightly and gradually growing more obliterate, yet remaining rather evident, toward telson, represented by usual three transverse rows of flat setigerous bosses, latter in first row typically flatter than in the other two rows; metaterga slightly convex medially. Tergal setae simple, very short, considerably longer only on collum. Latter with an indistinct subcaudal incision on each side, paraterga (sub)acute caudally (Figs 24 & 33). Paraterga very well-developed, wide; most of paraterga poorly elevated laterad to nearly horizontal, invariably set high, caudal ends lying a little above level of dorsum on terga 4 and 5, in other segments largely slightly below the level (Fig. 35). Caudal corners of all paraterga (sub)acute, beak-shaped, (nearly) pointed, from segment 5 on modestly protruding behind rear tergal contour (Figs 25, 30 & 34), best on segment 19. Fore corner of paraterga largely obtusangular, lateral edges of midbody paraterga modestly convex (Figs 25, 30 & 34). Poreless and pore-bearing paraterga with 3 or 4 evident lateral incisions, respectively (Figs 24, 25, 29, 30, 33 & 34). Tergal limbus typical of the family, irregularly microdentate. Epiproct rather long, digitiform, slightly bent ventrad in lateral view, coniform and rounded at tip in dorsal view. Subanal scale roundly subtriangular, with unusually prominent setigerous tubercles paramedially at caudal edge.

Pleurotergal carinae absent Sterna moderately setose, without modifications. Legs rather long and slender (Figs 27 & 36), growing increasingly long toward telson, about 1.4 times as long as midbody height (Fig. 35). Sphaerotrichomes poorly developed, sometimes totally absent, more often present only on postfemora and tibiae ventrally in legs of anterior body half. Prefemora somewhat swollen dorsally, especially so in ♂. Prefemur, femur, partly postfemur and sometimes even tibia microgranulose (Figs 27 & 36).

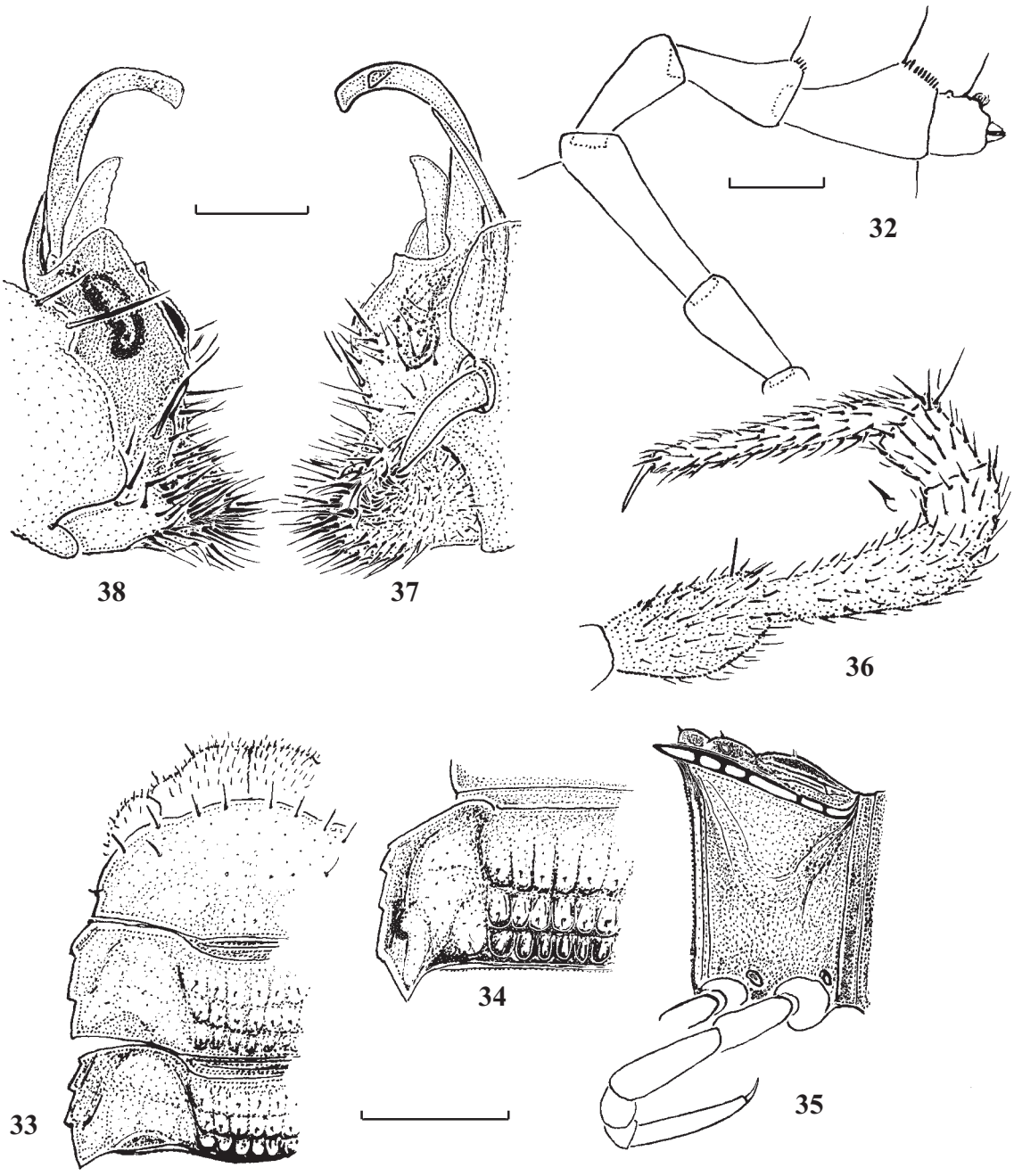
Gonopods (Figs 28, 31, 37 & 38) typical of the genus. Exomerite prominent, spiniform, about twice as short as outer distofemoral process and about as long as parabasal lobe. Clivus modest. Distofemoral process often subfalcate, with a subapical lobule of varying size and shape.

REMARKS: The genus *Usbekodesmus* Lohmander, 1933 has hitherto been known to encompass eight species, including one in Uzbekistan, Tajikistan and northwestern Afghanistan, one more in northern Pakistan, and six in Himalayan Nepal [cf. Golovatch, 1991]. The discovery of this new congener in southeastern China not only extends considerably the range of the entire genus to the southeast, but it also bridges the vast geographical gap that remained between *Usbekodesmus* and *Epanerchodus*. Morphologically, both these genera have long been believed to be particularly close to each other. Furthermore, *E. potanini* Golovatch, 1991 (Sichuan and Kansu) and *E. eurycornutus* Zhang & Wang, 1992 (Zhejiang), with their particularly well-expressed exomerite vestiges, may be regarded as a kind of link, both phylogenetically and geographically, between the basically more advanced and peripheral (= East Asian) *Epanerchodus* and the more primitive, central *Usbekodesmus* [cf. Golovatch,



Figs 23–31. *Usbekodesmus varius* sp.n., ♂ paratype from Cave Chuan Dong Zi (23–28) and ♂ paratypes from Snake Mouth Cave (29–31); 23 — antenna; 24 & 29 — anterior body end, dorsal view; 25 & 30 — metatergum 10, dorsal view; 26 — body segment 10, lateral view; 27 — leg 9; 28 & 31 — gonopods, medial view. — Scale bars 0.2 (28, 31), 0.6 (23, 27), and 2.0 mm (24–26, 29, 30).

Рис. 23–31. *Usbekodesmus varius* sp.n., паратип ♂ из пещеры Chuan Dong Zi (23–28) и паратипы ♂♂ из пещеры Snake Mouth Cave (29–31); 23 — антенна; 24 и 29 — передний конец тела, вид сверху; 25 и 30 — метатергит 10, вид сверху; 26 — туловищный сегмент 10, вид сбоку; 27 — нога 9; 28 и 31 — гоноподы, вид изнутри. — Масштаб 0,2 (28, 31), 0,6 (23, 27), и 2,0 мм (24–26, 29, 30).



Figs 32–38. *Usbekodesmus varius* sp.n., ♂ paratypes from Snake Mouth Cave; 32 — antenna; 33 — anterior body end, dorsal view; 34 — metatergum 10, dorsal view; 35 — body segment 10, lateral view; 36 — leg 7; 37 & 38 — gonopods, medial and lateral views, respectively. — Scale bars 0.2 (37, 38), 0.3 (32, 36) and 1.0 (33–35) 2.0 mm.

Рис. 32–38. *Usbekodesmus varius* sp.n., паратипы ♂♂ из пещеры Snake Mouth Cave; 32 — антенна; 33 — передний конец тела, вид сверху; 34 — метатергит 10, вид сверху; 35 — туловищный сегмент 10, вид сбоку; 36 — нога 7; 37 и 38 — гоноподы, соответственно виды изнутри и сбоку. — Масштаб 0,2 (37, 38), 0,3 (32, 36) и 1,0 (33–35).

1991]. The discovery of a form showing an exomerite somewhat less prominent than that observed in *U. varius* sp.n. would allow not only to completely bridge *Usbekodesmus* and *Epanerchodus*, but also to sink the former genus under the latter one.

Based on the simplicity of the gonopod structure, *U. varius* sp.n. seems to come closest to *U. swatensis* Golovatch, 1991, from northern Pakistan, but it differs in the much larger body (even in females, ca 30 versus 13–17 mm in length), so far the largest among all congeners, the absence of a profound sexual dimorphism in body size, the anteriorly more strongly obtusangular paraterga, the shorter exomerite, which is only about half the length of the main distofemoral process, etc. [cf. Golovatch, 1991].

Variation in the new species concerns body size, the outlines of paraterga, the degree of expression of the metater-

gal sculpture, the length of the exomerite and the shape and armament of the distal part of the main distofemoral process of the gonopod. This variation seems, however, to be purely individual.

Based on the absence of obvious troglomorphisms, as well as the occurrence in several, often relatively disparate caves, this species seems to be troglophilic. However, it would be of great interest to reveal some more cave-dwelling and/or epigean relatives in the surrounding areas.

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