FRAGMENTA FAUNISTICA 56 (2): 157–166, 2013
PL ISSN 0015-9301 © MUSEUM AND INSTITUTE OF ZOOLOGY PAS
DOI 10.3161/00159301FF2013.56.2.157

Two new and one little-known species of the millipede genus *Epanerchodus* Attems, 1901 from southern China (Diplopoda, Polydesmida, Polydesmidae)

Sergei I. GOLOVATCH

Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071 Russia, e-mail: sgolovatch@yandex.ru

Abstract: Two new, obviously high-montane, forest-dwelling species of the large eastern Palaearctic genus *Epanerchodus* are described from China: *E. belousovi* sp. n., from Sichuan, and *E. typicus* sp. n., from Yunnan. Both differ from congeners chiefly by certain details of gonopod structure.

Key words: diplopod, *Epanerchodus*, taxonomy, new species, China

INTRODUCTION

The eastern Palaearctic genus *Epanerchodus* Attems, 1901 is one of the most speciose amongst the diplopod genera in the region, at present counting 70 plus nominate species. Most of this diversity is restricted to Japan, whereas the remaining areas like Central Asia (Uzbekistan and Tajikistan), Afghanistan, Pakistan, the Russian Far East (Maritime Province, Sakhalin and Kurile Islands), Korea, China (together with Taiwan) and the Himalayas each support but a handful of species. The fauna of *Epanerchodus* of mainland China has very recently been reviewed and keyed, actually counting only 14 unquestioned species (Golovatch 2014).

All the more interesting is the discovery of a further two new *Epanerchodus* in the mountains of southern China. In addition, one more, apparently montane species seems to be especially widespread in the region; its distribution is mapped, including the first record in Yunnan Province.

MATERIAL AND METHODS

The fresh samples treated below were received for study from Igor Belousov (Institute of Plant Protection, St. Petersburg, Russia), now kept in the collection of the Zoological Museum, State University of Moscow, Russia. Digital images of the specimens were taken in the laboratory and assembled using Helicon automontage software.

TAXONOMIC PART

Epanerchodus potanini Golovatch, 1991

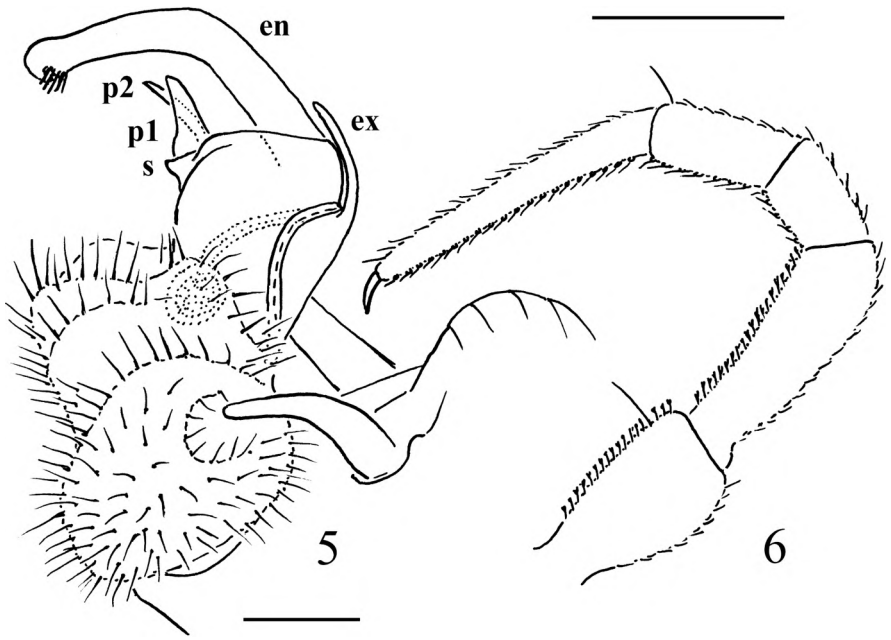
(Figs 1–6)

Material: 1 ♂, 1 ♀, China, Yunnan Prov., Deqen, Tuoxia Highway, mountain range between Xiaruolisuzuxiang and Yezhizhen, 4025 m a.s.l., upper part of forest belt near timberline, open woodland with a sparse stand of conifers, shrubby vegetation and meadows, 27°42'10"N, 99°11'27"E, 11.06.2013, leg. I. A. Belousov, I. I. Kabak & G. E. Davidian.

Remarks: This species, originally described both from Gansu and Sichuan provinces (Golovatch 1991), has recently been documented from rather abundant near-topotypes (Golovatch 2014). The above specimens represent the first formal record of *E. potanini* in Yunnan.

Fig. 1. Currently known distribution of *Epanerchodus potanini* Golovatch, 1991.

Figs 2–4. *Epanerchodus potanini* Golovatch, 1991, ♂ from Deqen, anterior, middle and posterior parts of body, respectively, dorsal view. Pictures by K. Makarov, taken not to scale.



Figs 5 & 6. *Epanerchodus potanini* Golovatch, 1991, ♂ from Deqen: 5 – right gonopod, mesal view; 6 – leg 7, lateral view. Scale bars: 0.2 (5) and 1.0 mm (6). Designations of gonopod structural details explained in text.

Generally, this definitely montane to high-montane species, which always seems to be restricted to elevations exceeding 2800 m a.s.l. and occurring up to well above 4000 m a.s.l., is probably among the most widespread congeners in continental China (Fig. 1). Slight variations concern only coloration (only rarely a little lighter or darker, but usually rather dark brown, Figs 2–4) and the shape and length of the outgrowths on the gonopod telopodite, in particular the exomere (**ex**) and the processes at the base of the endomere (**en**) (Fig. 5). Processes **p1** and **p2** can vary a little in shape and length, e.g. **p2** in the male from Yunnan is rather spiniform and only slightly longer than a lobe-shaped **p1**. The mesal lobule **s** near the base of **p1** remains small and typical (Fig. 5). Ventral sphaerotrichomes are present in male postfemora, tibiae and tarsi while both prefemora and femora are beset with ventral bi- or trifid setae (Fig. 6) (see also Golovatch 1991, 2014).

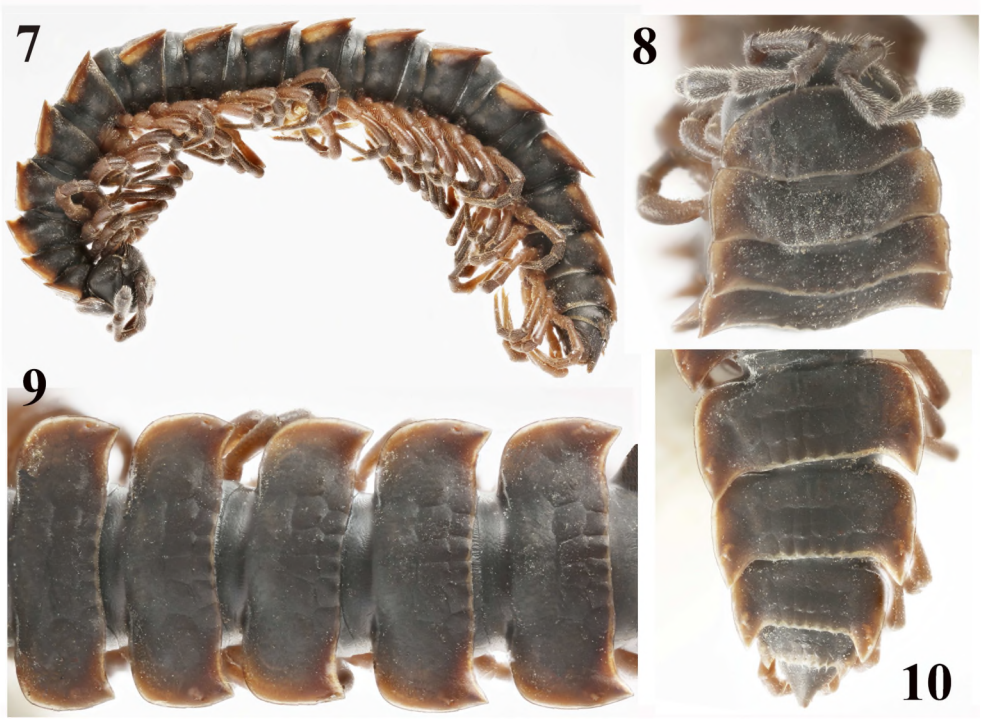
Epanerchodus belousovi sp. n.
(Figs 7–13)

Holotype ♂, China, Sichuan Prov., Kangding, NNE of Walaxiang, NE of Yancun, 3790 m a.s.l., small-leaved forest with thorny *Quercus* and shrubs near pastures, 30°10'19"N, 101°57'39"E, 04.07.2013, leg. I.A. Belousov & I.I. Kabak.

Paratype: 1 ♂, same data, together with holotype.

Name: Honours Igor Belousov (St. Petersburg), one of the collectors.

Diagnosis: Differs from congeners by a rather large size (width > 3.0 mm), coupled with the head being clearly narrower than the collum, the presence of sphaerotrichomes on male femora, postfemora, tibiae and tarsi, of a prominent and digitiform exomere, and of a stout and complex endomere. See also Remarks below.

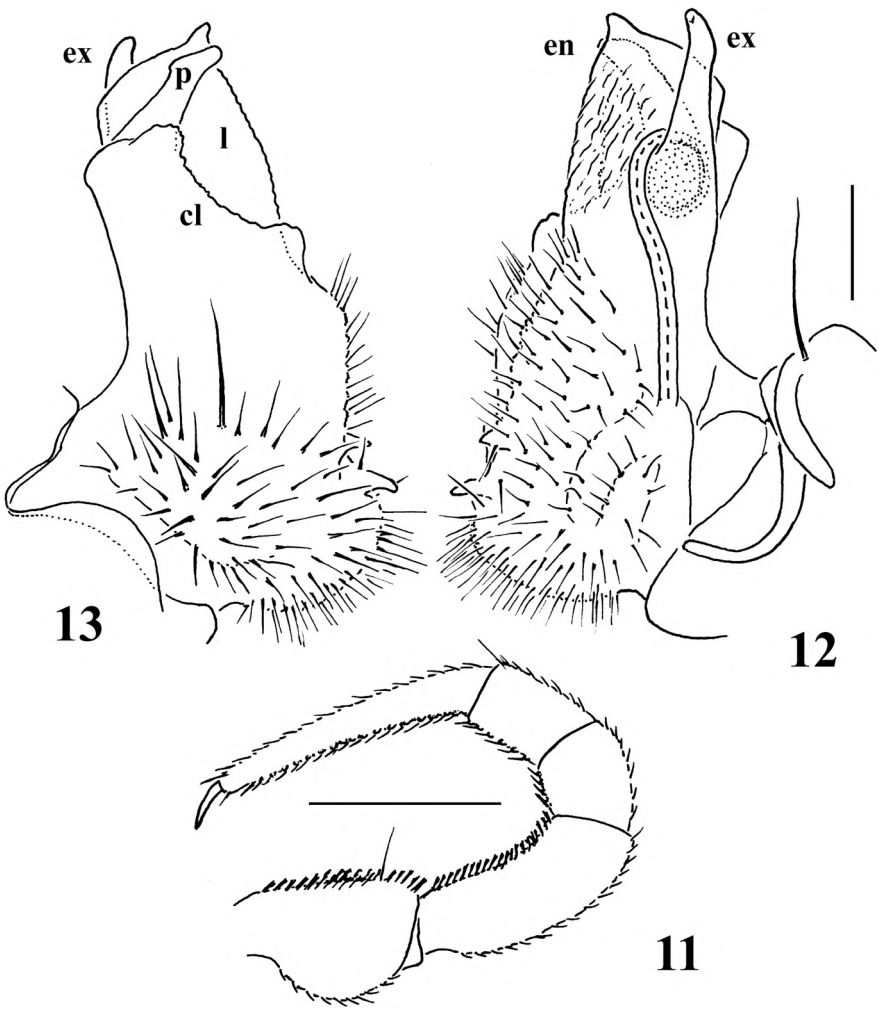


Figs 7–10. *Epanerchodus belousovi* sp. n., holotype: 7 – habitus, lateral view; 8–10 – anterior, middle and posterior parts of body, respectively, dorsal view. Pictures by K. Makarov, taken not to scale.

Description: Length of holotype ca 21 mm, of paratype ca 20 mm; width of middle pro- and metazonae in holotype 2.0 and 3.5 mm, respectively, in paratype 1.9 and 3.3 mm, respectively. Coloration in alcohol rather uniformly blackish-brown with red-brown paraterga and grey-brown legs and epiproct (Figs 7–10). Body with 20 segments. Tegument mainly shining, texture very delicately alveolate. Head very densely pilose throughout, with squarish genae. Antennae rather long and only slightly clavate, antennomere 6 being highest (height measured from the lower to the higher edge) (Figs 7 & 8), reaching caudal margin of body segment 3 when stretched dorsally; antennomere 3 longest, ca 1.3 longer than subequal antennomeres 2 and 4–6; 5th and 6th each with a small, compact, distodorsal group of bacilliform sensilla; antennomere 7 with a minute dorsoparabasal cone and a distodorsal group of microscopic sensilla.

In width, head < collum < segment 2 < 3 < 4 < 5=16, thereafter body gradually tapering towards telson (Figs 8–10). Paraterga strongly developed, midbody pro- to metatergite ratio being ca 1:1.7; set high (at about upper ¼ of midbody height), starting from collum, dorsum faintly convex; following paraterga mostly subhorizontal, very weakly upturned, all lying a little below dorsum, drawn clearly forward only on metatergum 2 (Fig. 8). Caudolateral corner of postcollum paraterga spiniform, pointed, from segment 7 or 8 drawn back increasingly well behind rear tergal margin, especially clearly so in segments 16–18 (Fig. 10). All poreless segments with 3, all pore-bearing ones with 4, minute incisions at lateral margin. Front edges of metaterga slightly bordered and upturned, straight, usually forming a distinct shoulder. Pore formula normal, ozopores evident, dorsal, located in front of posteriormost marginal indentation. Metatergal sculpture typical, rather well-developed, with 3 transverse rows of

setiferous, polygonal bosses (Figs 8–10). Tergal setae very short, simple, mostly retained. Stricture between pro- and metazonae wide, shallow and smooth. Limbus very thin, microdenticulate. Pleurosternal carinae oblique rounded crests on segment 2 gradually reduced to a subcaudal field of microgranulations towards segment 7 or 8. Epiproct rather short, conical, pre-apical lateral papillae evident (Fig. 10). Hypoproct semi-circular; caudal, paramedian, setiferous papillae large, rather well-separated.



Figs 11–13. *Epanerchodus belousovi* sp. n., paratype: 11 – leg 7, lateral view; 12 & 13 – right gonopod, submesal and sublateral views, respectively. Scale bars: 0.2 (12 & 13) and 1.0 mm (11). Designations of gonopod structural details explained in text.

Sterna without modifications, densely setose. Legs generally rather long and slender, likely to be slightly incrassate in male compared to female (Figs 7 & 11), ca 1.6–1.7 times as long as midbody height, male prefemora clearly bulging laterad, coxae, prefemora and femora beset

ventrally with bi- or trifid setae turning into short sphaerotrichomes on postfemora, tibiae and tarsi (Fig. 11).

Gonopods (Figs 12 & 13) with large, subquadrate coxae strongly fused medially at base and carrying a few long setae ventrally. Telopodite stout and suberect, prefemoral (densely setose) portion slightly more than half as long as entire telopodite; seminal groove running mesally over most of its extent, only distally recurved laterobasad and squeezed neatly between a finger-shaped exomere (**ex**) and a similarly high, but more complex endomere (**en**). Most of **en** taken up by a prominent, squarish, mesal lobe (**l**) deeply split from a digitiform process (**p**), with accessory seminal chamber lying near bottom of this split and carrying a hairy pulvillus parabasally on mesal wall of clivus (**cl**) inside a modest caudoventral femoral cavity. The latter with an irregular ventral margin, forming two small, but distinct lateral lobules at both ends, one of which lies at base of **p**.

Remarks: Using the available key to Chinese mainland *Epanerchodus* (GOLOVATCH 2014), this new species keys out to couplet 9, but differs from all relevant congeners in the combination of a larger size (body > 3.0 mm wide) and the stout endomere (**en**) represented by a large, subquadrate, mesal lobe (**l**) deeply split from a single prominent digitiform process (**p**) and a strong lateral clivus (**cl**).

Epanerchodus typicus sp. n.

(Figs 14–20)

Holotype ♂, China, Yunnan Prov., from Shangrila to Deqen, 214 Natn. Road, Kangding, NE slope of SE Baima Mt. Range, SW of Benzilanzhen, 3260 m a.s.l., mixed forest with clearings, 28°06'50"N, 99°12'24"E, 07.06.2013, leg. I. A. Belousov, I. I. Kabak & G. E. Davidian.

Name: To emphasize the typical *Epanerchodus* facies of the new species.

Diagnosis: Differs from congeners by the large size, coupled with slender male prefemora, the presence of sphaerotrichomes on male postfemora, tibiae and tarsi and of two distinct processes at the base of a curved, thick, simple and subcylindrical endomere, one of these processes being clearly bifid, and the absence of an exomere. See also Remarks below.

Description: Length ca 19 mm; width of middle pro- and metazonae 2.0 and 3.8 mm, respectively. Coloration in alcohol rather uniformly dark chocolate brown with lighter, reddish brown paraterga, legs and epiproct (Figs 14–18).

All characters as in *E. belousovi* sp. n., except as follows.

Paraterga a little more strongly developed, relatively broader, midbody pro- to metatergite ratio being ca 1:1.9. Metatergal sculpture typical, but more strongly obliterated (Figs 16–18). Pleurosternal carinae wanting. Epiproct rather short, conical; pre-apical lateral papillae small (Fig. 18). Hypoproct semi-circular; caudal, paramedian, setiferous papillae small, rather well-separated.

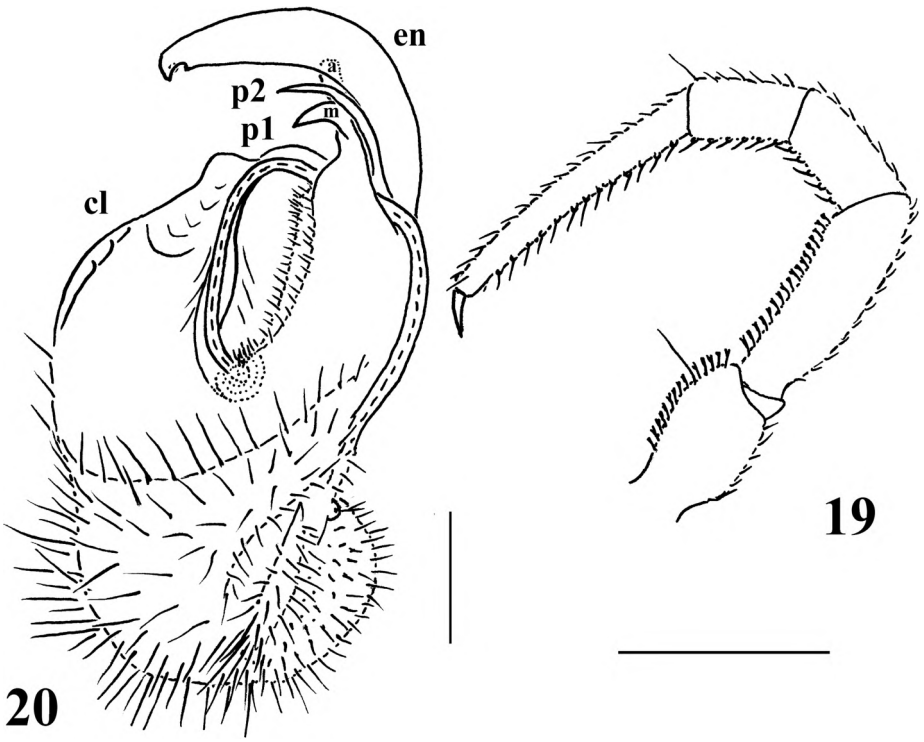
Legs generally rather long and slender, likely to be slightly incrassate in male compared to female (Figs 14, 15 & 19), male prefemora not bulging laterad, coxae, prefemora and femora beset ventrally with bi- or trifid setae turning into short sphaerotrichomes on postfemora, tibiae and tarsi (Fig. 19).

Gonopods (Fig. 20) with stout, but clearly curved telopodites, prefemoral (densely setose) portion about half as long as entire telopodite; seminal groove running mesally over about half of its extent, distally recurved behind a prominent bifid process (**p1**) to run caudobasad quite a long way until bottom of femoral cavity, terminating on a hairy pulvillus located on mesal wall of an unusually extended clivus (**cl**); an exomere wanting. Most of endomere (**en**) taken up by a prominent, thick, distinctly curved, simple, subcylindrical branch with a minute denticle near

apex and a considerable, slender, subflagelliform process (**p2**) at its base; **p1** branching distally into an unciform mesal (**m**) and a straight digitiform (**a**) arm.

Remarks: Using the recent key to Chinese continental *Epanerchodus* (Golovatch 2014), this new species keys out to *E. yunnanensis* Golovatch, 2014, also from Yunnan, but differs readily by the male paraterga being mostly upturned and lying slightly above the dorsum, whereas the gonopod telopodite is much stouter, the endomere considerably thicker and simpler, the clivus much longer, and process **p1** bifid (see Golovatch 2014).

Figs 14–18. *Epanerchodus typicus* sp. n., holotype: 14 – habitus, lateral view; 15 & 16 – anterior part of body, ventral and dorsal views, respectively; 17 & 18 – middle and posterior parts of body, respectively, dorsal view. Pictures by K. Makarov, taken not to scale.



Figs 19 & 20. *Epanerchodus typicus* sp. n., holotype: 19 – leg 7, lateral view; 20 – right gonopod, mesal view. Scale bars: 0.2 (20) and 1.0 mm (19). Designations of gonopod structural details explained in text.

ACKNOWLEDGEMENTS

I am most grateful to my friends I. Belousov, I. Kabak and G. Davidian (all St. Petersburg) for the samples they collected and so kindly rendered to me for treatment. K. Makarov (Moscow, Russia) very skillfully took all pictures. An anonymous reviewer very kindly provided a very thorough review of the submission.

REFERENCES

GOLOVATCH S. I. 1991. The millipede family Polydesmidae in Southeast Asia, with notes on phylogeny (Diplopoda: Polydesmida). Steenstrupia 17 (4): 141–159.

GOLOVATCH S. I. 2014. Review of the millipede genus *Epanerchodus* Attems, 1901 in continental China, with descriptions of new species (Diplopoda: Polydesmidae). Zootaxa 3760 (2): 275–288.

STRESZCZENIE

[Dwa nowe i jeden mało znany gatunek krocionoga z rodzaju *Epanerchodus* Attems, 1901 z południowych Chin (Diplopoda, Polydesmida, Polydesmidae)]

Praca zawiera opis i ilustracje dwóch nowych krocionogów należących do rodzaju *Epanerchodus* Attems, 1901, jednego z najbogatszych gatunkowo wśród Diplopoda wschodniej Palearktyki. Oba gatunki znaleziono w wysokogórskich lasach Chin. *E. belousovi*

sp. n., z prowincji Syczuan, and *E. typicus* sp. n., z prowincji Junnan. Oba różnią tylko szczegóły budowy gonopodów. Ponadto, zmapowano zasięg innego gatunku z tego rodzaju, *E. potanini*, opisanego pierwotnie z gór w prowincji Syczuan, który okazał się gatunkiem szeroko rozprzestrzenionym w wysokich górach południowej części Chin.

Accepted: 4 March 2014