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A new species of the millipede genus *Hedinomorpha* Verhoeff, 1934, from China, the first to be reported from Hebei Province (Diplopoda: Polydesmida: Paradoxosomatidae)

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Hedinomorpha Verhoeff, 1934 currently includes 23 species from central, western and northern China as well as an outlier species from Tajikistan in Central Asia (Golovatch 2021). A historical account of research on the genus *Hedinomorpha*, its diagnosis and description, as well as a fully topical key to the species can be found in the publications of Golovatch (2019, 2021).

Among the diplopod samples from China kept at the collection of the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch of the Russian Academy of Sciences (FSCB) in Vladivostok, Russia, one new species of *Hedinomorpha* has been found that represents the easternmost record of the genus and the first species of *Hedinomorpha* to be described from Hebei Province. With the new species described herein, the number of species in the genus of *Hedinomorpha* is elevated to 25.

The work presented in this paper was carried out with the aid of facilities at the Instrumental Centre for Biotechnology and Gene Engineering at the Federal Scientific Centre of East Asia Terrestrial Biodiversity of the Far East Branch of the Russian Academy of Sciences. SEM micrographs were prepared using a Merlin 62–15 ZEISS scanning electron microscope. Mounts for SEM were cleaned in an ultrasonic bath (50 Hz) for 10 to 30 seconds, and after transfer to acetone from 96% ethanol dried, mounted on stubs, and coated with chromium. Colour photographs (Figs 1–3) were taken with an Olympus SZX16 stereo microscope and an Olympus DP74 digital camera, all stacked using Helicon Focus software.

Following Enghoff *et al*. (2025) who described the orientation of the gonopod: each gonopod is considered as extending perpendicularly from the gonopod opening and then curving 90° forward. As a result, the gonopod telopodite is visible from the ventral side of the body. Therefore, the curved perpendicular distal part of the gonopod is fully visible from the front view, not ventral view.

The type material is stored in the Bioresource Collection of the Federal Scientific Centre of East Asia Terrestrial Biodiversity of the Far East Branch of the Russian Academy of Sciences (reg. number 2797657). The research was carried out within the state assignment of Ministry of Science and Higher Education of the Russian Federation (theme No. 124012400285-7).

We are grateful to Dr. S.I. Golovatch (Moscow) for confirming the validity of the new species. Our thanks extend to Dr. V.M. Loktionov (FSCB, Vladivostok) for the help in preparing some photographs (Figs 1–3) as well as to referees, Dr. S.I. Golovatch (Moscow) and an anonymous one, for reviewing the manuscript and valuable comments.

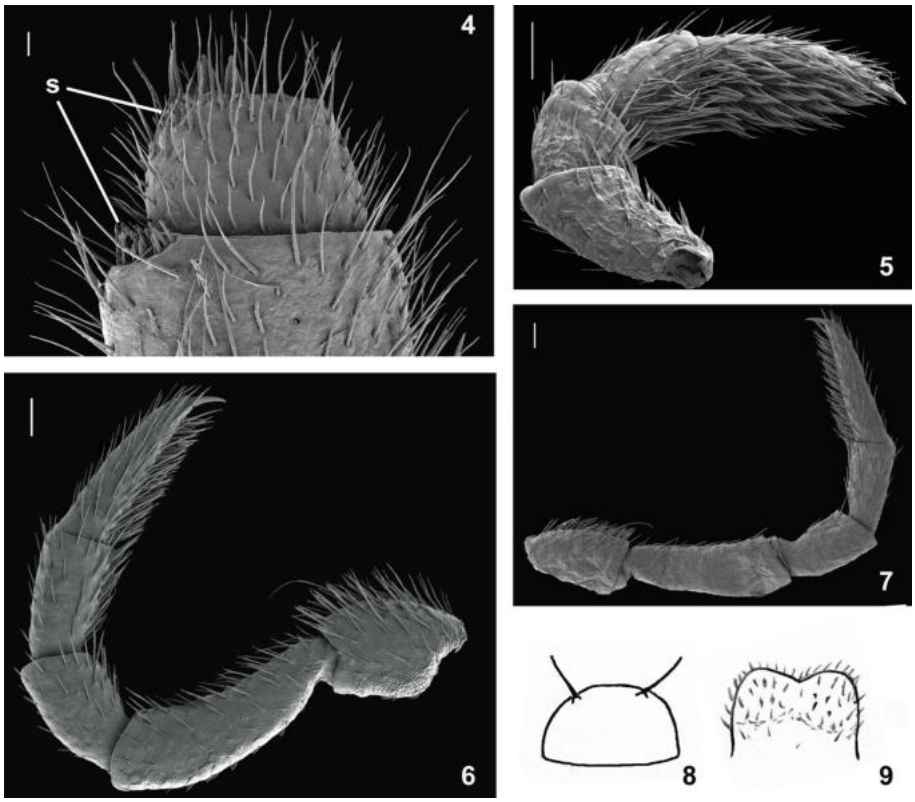
Hedinomorpha hebeiensis Mikhaljova sp. nov.

Figs 1–15

Material examined. Holotype: 1 male (4 fragments: head and 6 body rings + 1 body ring with gonopods +1 body ring + 10 body rings including telson—see remarks) (FSCB, N 2797657), China, Hebei Prov., Mt. Xiaowutai, 40.025˚N,

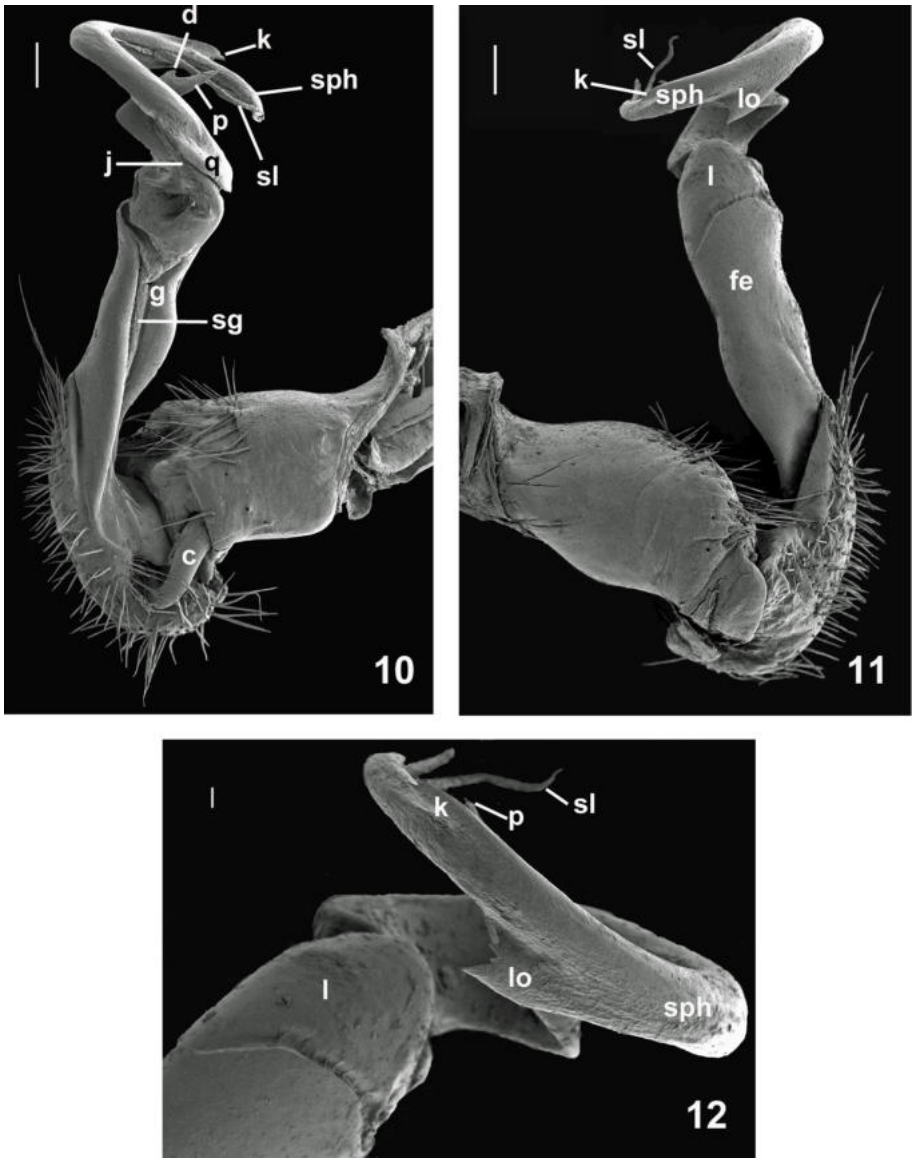
115.303˚E, 09.10.2005, leg. Yu. M. Marusik; Paratype: 1 female (3 fragments: head with 7 body rings + 3 body rings + 10 body rings) (FSCB, N 2797657), same data as for holotype.

FIGURES 1–3. *Hedinomorpha hebeiensis* **sp. nov.**, male holotype and female paratype (**FSCB**). **1**. Male, habitus (4 fragments: 18 body rings), lateral view. **2.** Posterior part of male body, dorsal view. **3.** Female, habitus, lateral view. Scale bars: 1 mm (Figs 1, 3), 0.2 mm (Fig. 2).



FIGURES 4–9. *Hedinomorpha hebeiensis* **sp. nov.**, male holotype (**FSCB**). **4**. Distal part of antenna (two other sensory cones are broken off). **5**. Distal part of leg 1. **6**. Prefemur, femur, postfemur, tibia and tarsus of leg 2. **7**. Prefemur, femur, postfemur, tibia and tarsus of midbody leg. **8**. Hypoproct, ventral view. **9**. Sternal lobe between coxae 4, caudal view. **Abbreviation: s**, sensilla. Scale bars: 20 μm (Fig. 4), 100 μm (Figs 5–**7**), without scales (Figs 8–9).

Diagnosis. Differs from congeners in the following. Mainly by the uniformly beige colouration (vs light brown to dark brown and blackish in other congeners, except for nearly pallid in *H. jaegeri* Golovatch, 2021). By the presence and ribbon-shaped shape of gonopod processes **p** with a pointed apex and a subapical tooth (**d**) (vs absence of process **p** or process **p** of different shape, absence a subapical tooth in other congeners). The presence of gonopod solenophore spine **k** with apical outgrowth (vs absence of spine **k** or spine **k** of different shape, absence an apical outgrowth of spine k in other congeners). The presence of solenophore small process/lobe **lo** with pointed apical outgrowths of different lengths (vs absence of small process/lobe lo in other congeners, excluding in *H. jaegeri*, absence of pointed apical outgrowths in other congeners) (Figs 10–15).

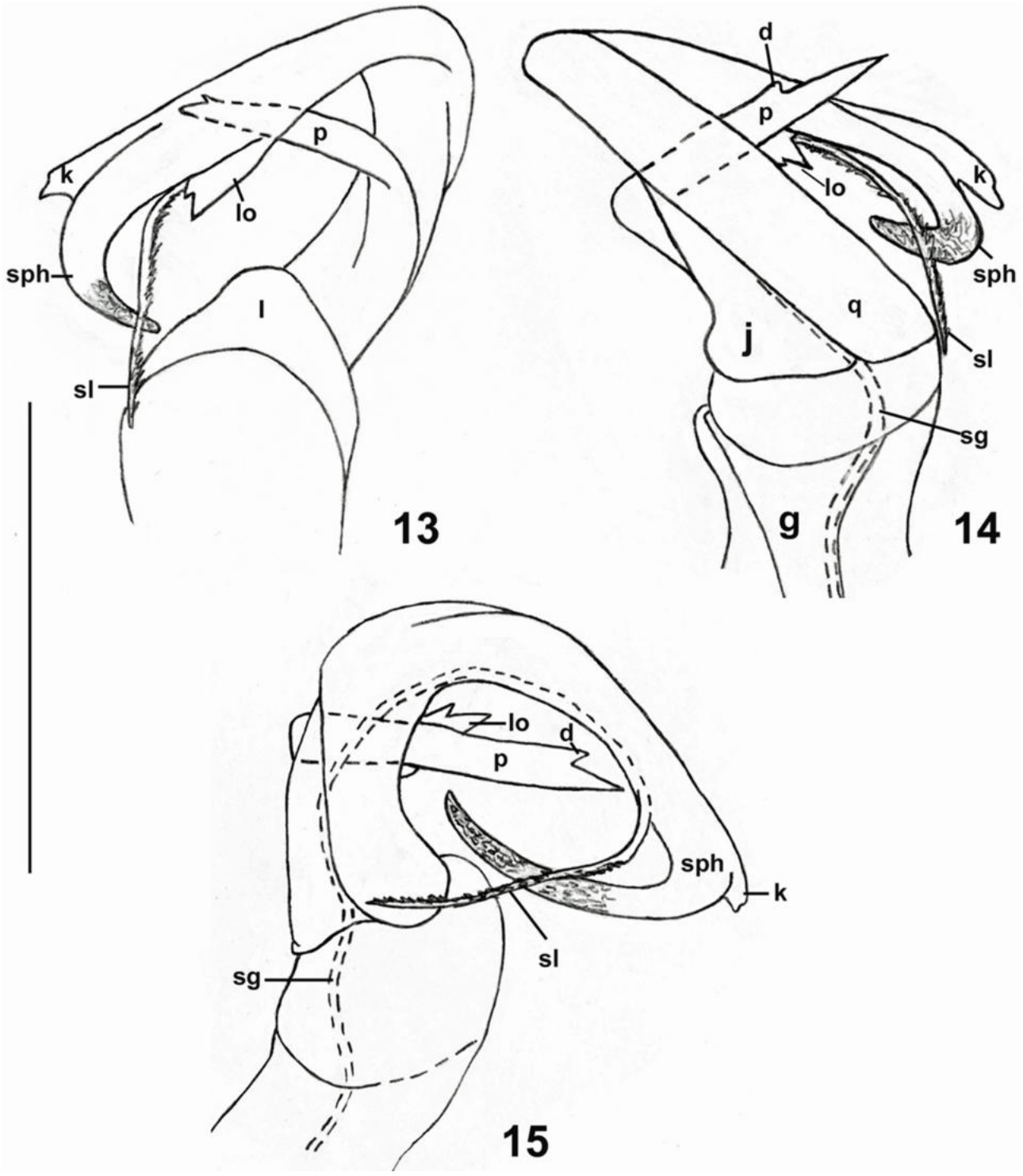


FIGURES 10–12. *Hedinomorpha hebeiensis* **sp. nov.**, male holotype (**FSCB**). **10**. Gonopod, mesal view. **11**. Gonopod, lateral view. **12**. Distal part of gonopod, lateral view. **Abbreviations: c**, cannula; **d**, subapical tooth; **fe**, femorite; **g**, mesal groove; **j**, lamina medialis; **k**, spine; **l**, lateral lobe; **lo**, process/lobe; **p**, process; **q**, lamina lateralis; **sg**, seminal groove; **sl**, solenomere; **sph**, solenophore. Scale bars: 20 μm (Fig. 12), 100 μm (Figs 10–11).

The species seems to be particularly similar to *H. jaegeri* but differs mainly from it in the following: the uniformly beige colouration (vs brown to nearly pallid); a shallow, narrow and smooth stricture between pro- and metazona (vs densely ribbed); a thin and short tergal setae (vs thin and moderately long); simple, shallow and smooth transverse metatergal sulci not reaching the bases of paraterga (vs evident, deep and wide, microgranulate at bottom, reaching the bases of paraterga); an apical outgrowth of gonopod solenophore spine **k** (vs absence apical outgrowth); the pointed apical

outgrowths of different lengths of solenophore process/lobe **lo** (vs subtriangle solenophore process/lobe **lo** without apical outgrowths); gonopod processes **p** with a subapical tooth **d** (vs absence of a subapical tooth); absence of solenophore small subapical tooth (vs presence of such tooth) (addition to the key to *Hedinomorpha* species by Golovatch (2021)).

Description. *Male.* Length in alcohol about 18 mm, width of midbody pro- and metazona 1.5 and 1.9 mm, respectively. Colouration in alcohol beige, devoid of a pattern; head and anterior rings darker, light brown; antennae beige (Fig. 1).



FIGURES 13–15. *Hedinomorpha hebeiensis* **sp. nov.**, male holotype (**FSCB**). **13**. Distal part of gonopod, mesal view. **14**. Distal part of gonopod, lateral view. **15**. Distal part of gonopod, almost front view. **Abbreviations: d**, subapical tooth; **g**, mesal groove; **j**, lamina medialis; **k**, spine; **l**, lateral lobe; **lo**, process/lobe; **p**, process; **q**, lamina lateralis; **sg**, seminal groove; **sl**, solenomere; **sph**, solenophore. Scale bar: 0.5 mm.

Clypeolabral region moderately setose, vertex with a few setae; epicranial suture thin, but evident. Antennae moderately long and slightly clavate, extending almost to the posterior margin of metatergum 3 when stretched laterally. Distodorsal parts of antennomeres 5–7 each with a group of short baton-shaped sensilla (**s**) (Fig. 4). Interantennal isthmus about 1.5X as broad as diameter of antennal socket. Tegument generally smooth, only in places slightly rugulose above and below paraterga; surface below paraterga microgranulate; pro- and metazona very delicately shagreened. Transverse metatergal sulci simple, shallow, smooth at bottom, not reaching the bases of paraterga, starting with ring 4, but almost invisible there; ring 19 (before telson) without sulcus (Fig. 2). Stricture between pro- and metazona shallow and narrow, smooth. Axial suture missing. Tergal setae largely abraded or broken, few remaining ones thin and short, 1/5–1/6 as long as metaterga. In width, collum < head < rings 3 and 4 < ring 2 < ring 5 = a number of subsequent rings, thereafter three posteriormost rings gently and gradually tapering toward telson. Ozopores on male body fragments present on the following rings: 1) fragment "head and 6 body rings": ozopores present on ring 5; 2) fragment "body ring with gonopods (= ring 7)": ozopores present; 3) fragment "separate body ring (probably ring 8)": ozopores absent; 4) fragment "10 body rings including telson": ozopores present on rings 2, 3, 5–9, if one counts them in order (or on rings 12, 13, 15–19, if one considers that the male body consists of 20 rings). In the latter case, rings 9 and 10 were probably lost during collection or transportation. That is pore formula is assumes to be normal for Polydesmida (see remarks). Each ozopore lying inside an elongate groove near the caudal corner of pore-bearing paraterga. Paraterga poorly developed, pore-bearing ones somewhat thicker than poreless ones in lateral view, rounded and delimited by a narrow sulcus on collum, clearly drawn both anteriad and caudad, and somewhat projecting beyond both tergal margins on ring 2; caudal corner drawn into a small and sharp tooth on each of rings 3 and 4 and extending past tergal margin. Caudal corner of subsequent paraterga barely elongated and only slightly extending past rear tergal margin. Lateral calluses horizontal, smooth and narrow, easily visible, delimited by a distinct and complete sulcus dorsally, with an additional ventral sulcus in caudal third. Pleurosternal carinae (granulared ridges) of rings 2–7 with well developed rounded caudal flaps, reduced to small flaps on ring 8, the carinae gradually decreasing on subsequent rings toward telson. Epiproct (Fig. 2) rather long, concave to subtruncate at apex, lateral subapical papillae small. Hypoproct (Fig. 8) semi-circular, caudal margin with 1+1 setae. Sterna without modifications except for a small, poorly concave and setose lobe between coxae 4 (Fig. 9). Gonopod opening without tubercles around.

Legs moderately long and slender (Figs 5–7), with denser setae on ventral side (pregonopodal legs especially densely setose), with ventral brushes on prefemora and tarsi including 2 last leg-pairs; adenostyles absent, prefemora not swollen laterally. Midbody legs ca 1.7–1.8 times as long as body height. Limbus straight, simple.

Gonopods (Figs 10–15) *in situ* held parallel to each other, their distal parts coiled; coxite subcylindrical, setose distoventrally, approximately as long as femorite (**fe**); a densely setose prefemoral part almost half as long as femorite; cannula (**c**) typical, a curved and hollow tube. Seminal groove (**sg**) passing at bottom of shallow mesal groove (**g**), then between a lamina lateralis (**q**) and a lamina medialis (**j**), in the distal part being transformed into an independent, flagelliform and spinulose solenomere (**sl**). Postfemoral part with a subtriangular, lateral lobe (**l**) delimited at base by a transverse sulcus and bearing a long, ribbon-shaped, coiled, distally finely serrated and apically acuminate solenophore branch (**sph**), this being supplied with both a distinct spine (**k**) in distal 2/3 and a small process/lobe (**lo**) near midway; apex of spine (**k**) with outgrowth; apex of process/lobe (**lo**) with pointed outgrowths of different lengths; distal part of **sph** shagreened. A large, ribbon-shaped and curved process (**p**) located at base of lateral lobe (**l**). Pointed apex of the process **p** with a subapical tooth (**d**).

Female (Fig. 3). Length in alcohol about 22 mm, width of midbody pro- and metazona 2.0 and 2.9 mm, respectively. Antennae extending almost to anterior margin of metatergum 3 when stretched laterally. Legs slimmer compared to male; midbody legs ca 0.9–1.0 times as long as body height. Calluses as in male.

Etymology. The specific epithet refers to the type locality, Hebei Province, adjective.

Remarks. The material examined consists of 4 fragments of a male and 3 fragments of a female. Four fragments of the male contain 18 body rings together with the telson. As it cannot be assumed that the male body of *H. hebeiensis* **sp. nov.** includes just 16 podous rings. Such number of body rings is very rare in male Polydesmida and in that case, females have one more body ring (Golovatch & Enghoff 2015). But female body of *H. hebeiensis* **sp. nov.** consists of 20 rings including the telson (not 19). Taking into account the location of the ozopores on the male fragments, we come to the conclusion that pore formula of this species is normal (i.e. ozopores are on rings 5, 7, 9, 10, 12, 13, 15, 16–19 after Golovatch & Enghoff 2015), and rings 9 and 10 of the holotype were lost. In other words, the male holotype body of *H. hebeiensis* **sp. nov.**, albeit incomplete, must have been composet of 20 rings.

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