

## On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda: Polydesmida), XXIX

### О нескольких новых или плохоизученных ориентальных Paradoxosomatidae (Diplopoda: Polydesmida), XXIX

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КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Polydesmida, Paradoxosomatidae, таксономия, новые находки, новые виды, Китай.

ABSTRACT. This contribution is devoted to new records of five known, and to descriptions of two new, species from southern China: *Hedinomorpha liuae* sp.n. and *H. distincta* sp.n., both from Sichuan. The first precise locality is given for *Mandarinopus corticinus* (Attems, 1936), with notes on morphological variations in this species.

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РЕЗЮМЕ. Данное сообщение посвящено новым находкам пяти известных и описаниям двух новых видов из Южного Китая: *Hedinomorpha liuae* sp.n. and *H. distincta* sp.n., оба из Сычуани. Впервые указано точное место находки вида *Mandarinopus corticinus* (Attems, 1936), с замечаниями о его морфологической изменчивости.

#### Introduction

This paper is devoted to new records of five known, as well as to descriptions of two new, species of paradoxosomatid millipedes from Yunnan or Sichuan, southern China.

#### Material and methods

All material is deposited in the collection of the Zoological Museum, Moscow State University (ZMUM), Russia. Pictures were taken with a Canon EOS 5D digital camera and stacked using Zerene Stacker software.

#### Taxonomic part

*Gonobelus sinensis* Attems, 1936  
Figs 1–6.

MATERIAL. 1 ♀ (ZMUM), China, Yunnan Prov., Laojunshan, W slope of mountain ridge NE of Hexi, N26°42'57", E99°33'28", 2695 m a.s.l., 26.VI.2014; 3 ♂♂, 2 ♀♀ (ZMUM), Yunnan Prov., Laojunshan, river above Shanliju village, N26°45'20", E99°37'16", 2755 m a.s.l., 26.VI.2014, all I. Belousov & I. Kabak leg.

REMARKS. The genus *Gonobelus* Attems, 1936 is endemic to China and it presently comprises only four species [Golovatch, 2017]. Of them, *G. sinensis* is not only the type species, but is the only congener that seems to be endemic to Yunnan, where it has hitherto been recorded at 2615 m a.s.l. [Golovatch, Liu, 2020]. The new samples come from about the same elevations. New pictures (Figs 1–6) are provided to document the species' identity, as well as to show minor variations in body coloration (uniformly blackish brown to brown) and gonopodal structure.

#### *Kronopolites biagrilectus* Hoffman, 1963

MATERIAL. 1 ♀ (ZMUM), China, Yunnan Prov., Laojunshan, watershed of rivers to Shigu and Liming, N26°53'32", E99°39'43", 3795 m a.s.l., 3.VI.2014; 1 ♂, 1 ♀ (ZMUM), Yunnan Prov., Laojunshan, middle course of river, Xiaoqiaotou, N26°42'29", E99°41'5", 3000 m a.s.l., 24.VI.2014; 3 ♂♂ (ZMUM), Yunnan Prov., Laojunshan, sources of Yushi River, Shangzhuping, N29°39'5", E99°40'6", 3465 m a.s.l., 21.VI.2014; 2 ♂♂, 1 ♀ (ZMUM), Yunnan Prov., E of Lanping, SE of Xinshanchang, N26°31'13", E99°28'47", 3325 m a.s.l., 18.VI.2014, all I. Belousov & I. Kabak leg.

REMARKS. This species is widespread across southern China, its vertical distribution ranging from 35 to 3600 m a.s.l. [Golovatch, Liu, 2020]. One of the above records is from almost 3800 m a.s.l. The habitus, coloration and gonopodal characters have been illustrated by Golovatch [2017]. More information on the diversity of *Kronopolites* Attems, 1914, including a key to all 11 species, is given by Golovatch [2020].

#### *Mandarinopus corticinus* (Attems, 1936) Figs 7–15.

MATERIAL. 1 ♂, 1 ♀ (ZMUM), China, Yunnan Prov., Laojunshan, NE of Dajdugang village, Yushi River, N26°35'16", E99°36'28", 2579 m a.s.l., 21.VI.2014, I. Belousov & I. Kabak leg.

REMARKS. This species, originally described as *Orthomorpha corticina* from an unspecified locality in Yunnan [Attems, 1936], has recently been transferred to the Chinese



Figs 1–6. *Gonobelus sinensis* Attems, 1936, ♂ from NE of Hexi (1, 3, 4) and ♂ from above Shanliju (2, 5, 6). 1, 2 — habitus, lateral view; 3, 4 — right gonopod, lateral and mesal views, respectively; 5, 6 — left gonopod, mesal and lateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 1–6. *Gonobelus sinensis* Attems, 1936, ♂ из СВ Hexi (1, 3, 4) и ♂ выше Shanliju (2, 5, 6). 1, 2 — общий вид, сбоку; 3, 4 — правый гонопод, соответственно сбоку и изнутри; 5, 6 — левый гонопод, соответственно изнутри и сбоку. Фотографии К.В. Макарова, сняты без масштаба.

genus *Mandarinopus* Verhoeff, 1934 and shown to be particularly similar to *M. rugosus* (Golovatch, 2013), the latter species taken at 2400 m a.s.l. from north of Lijiang, Yunnan [Golovatch, 2013]. Both these species formed one couplet in the key presented to all five *Mandarinopus* spp. known to date, and were distinguished by the presence of a small, but

evident, basally directed distogonofemoral (**j**) and a clear, mesal, spiniform process (**k**) at about the midway of the solenophore's apical branch in *M. corticinus* [Golovatch, 2019a], *vs.* their absence in *M. rugosus* [Golovatch, 2013].

The above new samples are the first to be documented from an exact locality; ♂ ca. 25, ♀ ca. 27 mm long, 2.1 and



Figs 7–10. *Mandarinopos corticinus* (Attems, 1936), ♂ from NE of Dajdugang. 7, 8 — anterior part of body, dorsal and lateral views, respectively; 9 — midbody segments, dorsal view; 10 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 7–10. *Mandarinopos corticinus* (Attems, 1936), ♂ из СВ Дайдуганг. 7, 8 — передняя часть тела, соответственно сверху и сбоку; 9 — среднетуловищные сегменты, сверху; 10 — задняя часть тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

3.1 mm, and 3.1 and 4.0 mm wide on midbody pro- and metazonae, respectively (vs. 34 mm long and 3.3 mm wide, as given by Attems [1936]). The coloration is dark chocolate brown to blackish; the colour pattern is less contrasting in the ♂ (Figs 7–10) than in the ♀, the ♂ paraterga being rather light brown, not yellowish as in ♀ (vs. a slightly

lighter general coloration with intense yellow paraterga and mostly considerably lighter, light yellow-brown posterior halves of metaterga in *M. rugosus*, see Golovatch [2013]). The collum and following metaterga are roughly rugose, with rather numerous, scattered, short, tergal setae arranged in several, irregular, transverse rows (Figs 7–10). The go-



Figs 11–15. *Mandarinopus corticinus* (Attems, 1936), ♂ from NE of Dajdugang, left gonopod, sublateral, submesal, anterolateral, ventromesal and mesal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 10–15. *Mandarinopus corticinus* (Attems, 1936), ♂ из СВ Дайдуганг, левый гонопод, соответственно почти сбоку, почти изнутри, одновременно спереди и сбоку, одновременно снизу и изнутри, а также изнутри. Фотографии К.В. Макарова, сняты без масштаба.

nopodal structure (Figs 11–15) is nearly the same as described by Attems [1936], but the distogonofemoral outgrowth (**j**) is a small tooth rather than a short peg, while apical process **a** of the solenophore is a little stronger, but still much smaller than process **b** (Figs 10–15). The clear, mesal, spiniform process (**k**) at about the midway of an

acuminate apical branch (**c**) of the solenophore, one of the key characters of *M. corticinus* that distinguishes it from *M. rugosus*, is as strong (and supporting the terminal part of the solenomere) as in the syntype illustrated by Attems [1936]. However, as all those variations are minor and definitely individual, the new material can be identified as unequivocal.



Figs 16–20. *Hedinomorpha liuae* sp.n., ♂ (16, 18–20) and ♀ (17) paratypes. 16, 17 — habitus, lateral view; 18 — anterior part of body, ventral view; 19 — midbody segments, dorsal view; 20 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 16–20. *Hedinomorpha liuae* sp.n., паратипы ♂ (16, 18–20) и ♀ (17). 16, 17 — общий вид, сбоку; 18 — передняя часть тела, снизу; 19 — среднетеловишние сегменты, сверху; 20 — задняя часть тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

cally belonging to *M. corticinus*. More material must become available for study to decide if *M. rugosus* is not a junior synonym of *M. corticinus*.

*Sigipinius grahami* Hoffman, 1961

MATERIAL. 1 ♂, 1 ♀ (ZMUM), China, Sichuan Prov., N of Luding City, N of Lanau, N30°4'42", E102°13'53", 3260 m a.s.l., 19.V.2014; 3 ♂♂ (ZMUM), same locality, N30°5'14", E102°13'54", 3670 m a.s.l., 20.V.2014; 3 ♂♂, 1 ♀ (ZMUM), same locality, N30°6'2", E102°13'49", 3190 m a.s.l., 22.V.2014; 2 ♂♂ (ZMUM), Yunnan, Laojunshan, lake, sources of river near Xishiyuan, N26°39'15", E99°41'50", 3935 m a.s.l., 23.VI.2014, all I. Belousov & I. Kabak leg.

REMARKS. This high-montane species (2810–4170 m a.s.l., Golovatch, Liu [2020]) is widespread in Gansu and Sichuan provinces of China [Golovatch, 2017, 2019a], thus being recorded herewith from Yunnan for the first time.

*Tylopus kabaki* Golovatch, 2014

MATERIAL. 1 ♂ (ZMUM), China, Yunnan Prov., Laojunshan, sources of Yushi River, Shangzhuping, N29°39'5", E99°40'6", 3465 m a.s.l., 21.VI.2014, I. Belousov & I. Kabak leg.

REMARKS. This high-montane species is quite widespread in, but endemic to, Yunnan, also being rather variable in gonopodal structure [Golovatch, 2014, 2019b]. It has hitherto been encountered at 3575–4025 m a.s.l. [Golovatch, Liu, 2020], the above new record thus coming from only a little lower elevation.

*Hedinomorpha liuae* sp.n.

Figs 16–32.

HOLOTYPE ♂ (ZMUM), China, Sichuan, N of Luding City, N of Lanau, N30°5'14", E102°13'54", 3670 m a.s.l., 20.V.2014, I. Belousov & I. Kabak leg.

PARATYPES: 3 ♀♀ (ZMUM), same data, together with holotype; 1 ♂ (ZMUM), Sichuan, N of Luding City, N of Lanau, N30°4'42", E102°13'53", 3260 m a.s.l., 13.V.2014; 1 ♀ (ZMUM), Sichuan, N of Luding City, N of Lanau, N30°5'9", E102°14'12", 3890 m a.s.l., 21.V.2014; 1 ♂, 2 ♀♀ (ZMUM), Sichuan, N of Luding City, N of Lanau, N30°6'2", E102°13'49", 3190 m a.s.l., 22.V.2014, all I. Belousov & I. Kabak leg.

NAME. Honours Mrs Dr. Liu Weixin (South China Agricultural University, Guangzhou, China), a prominent specialist in the Diplopoda of China.

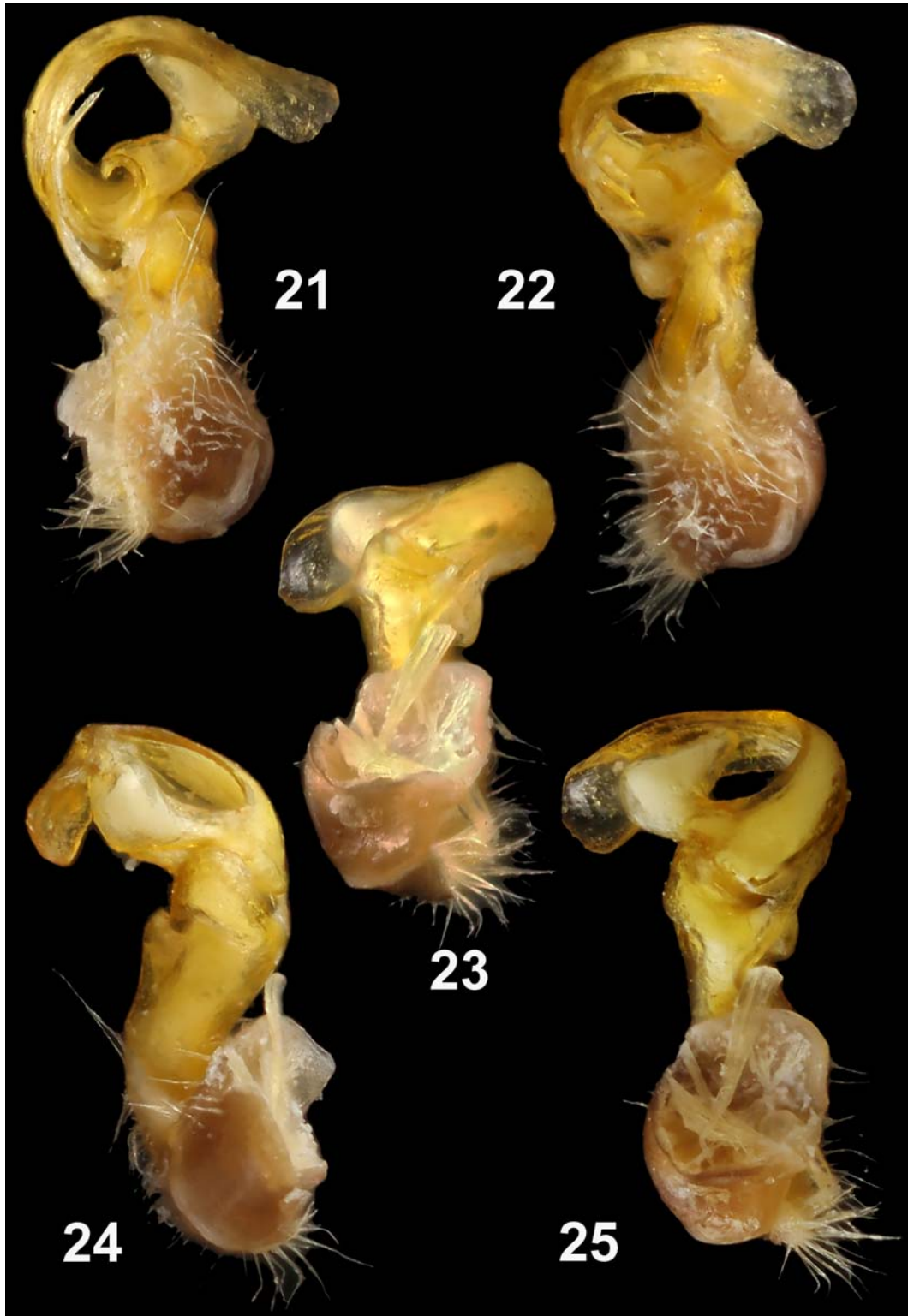
DIAGNOSIS. Using the latest key to 18 species of *Hedinomorpha* Verhoeff, 1934 [Golovatch, 2019a], as well as considering another congener described since from Sichuan [Golovatch, 2020] and one more described below, *H. liuae* sp.n. readily joins a group of four species, all from China, known to show a densely hirsute and bulbous epiproct. However, the new species differs from all congeners by the hypertrophied, complex, laterobasal, gonopostfemoral process (**p**), coupled with the absence of a more or less midway process on the solenophore (**sph**). This genus is subendemic to China and mostly contains high mountainous species encountered at 1300–4490 m a.s.l. [Golovatch, Liu, 2020]. The new species likewise seems to be high-montane.

DESCRIPTION. Length ca. 15–16 (♂) or 17–18 mm (♀), width of midbody pro- and metazonae 1.5–1.6 (♂) or 2.0–2.1 mm (♀) and 2.0–2.1 or 2.6 mm (♀), respectively. Holotype ca. 15 mm long and 1.5 or 2.0 mm wide on modbody pro- and metazonae, respectively. Coloration in alcohol mostly dark chocolate brown (♂, ♀) to brown (♀), with light yellow-brown paraterga, venter, legs and gonopods; legs slightly and antennae strongly increasingly infuscate, but tips of antennae pallid (Figs 16–20).

Clypeolabral region densely setose, vertigial region with only 1+1 setae; epicranial suture fine, but distinct (Fig. 18). Antennae moderately long and clavate (Figs 16–18), extending past metatergum 3 (♂) or 2 (♀) when stretched dorsally. In length, antennomere 2=3=4=5=6>>1=7. Interantennal isthmus ca. 0.8x diameter of antennal socket (Fig. 18). Tegument generally smooth and shining, metaterga in places rugulose, especially so at bases of paraterga and near caudal margin of metaterga, below paraterga microgranulate. In width, head < collum < segment 3 = 4 < 2 < 5–16; body gradually tapering thereafter. Paraterga well-developed (♂) or only moderately strong (♀), mostly set at ca. upper 1/4 (♂) or 1/3 (♀) of midbody height, either slightly upturned (♂) or clearly declined (♀); calluses rather thin, in lateral view considerably thicker on pore-bearing segments than on poreless ones due to ozopores, delimited by a complete sulcus dorsally on all segments and by an incomplete sulcus abbreviated in anterior 1/4 ventrally (♂) or incomplete (♀) only in pore-bearing segments; paraterga on collum broadly rounded anteriorly and laterally, particularly thin, bordered, with several insertion points of abraded setae along lateral margin, its caudal corner angulate, subrectangular and more narrowly rounded (Figs 16, 17). Paraterga 2 lower than others, as usual, rounded lappets drawn both anteriorly and caudad, also with several insertion points of abraded setae along lateral margin; anterior margin of following paraterga broadly rounded shoulders, lateral edge almost straight, without incisions, but 2–3 insertion points of mostly abraded setae; caudal corners of almost all paraterga following 2<sup>nd</sup> lying within rear tergal margin, only in segments 17–19 (♂) or 18 and 19 (♀) triangular, almost pointed and somewhat drawn past rear margin (Figs 16–20). Pore-bearing calluses faintly sinuous in caudal 1/3, marking evident and dorsally invisible ozopores; each ozopore lying inside an ovoid pit ca. 1/4 off caudal corner of poriferous paraterga. Tergal setae often retained, abraded only on calluses, ca. 1/4 as long as metatergum; setation pattern mostly traceable, 2+2 setae typically arranged in one transverse, anterior, pre-sulcus row, only in a few posteriormost segments (usually at least 19<sup>th</sup>) in two transverse rows, the other located near caudal margin, regardless of usually 2–3 lateral insertion points on calluses. Limbus entire. Stricture between pro- and metazonae deep and narrow, faintly striolate at bottom only dorsally. Transverse metatergal sulci deep, simple, slightly arched medially, nearly smooth at bottom, somewhat not reaching the bases of paraterga, present on segments 5–18. Axial line missing. Pleurosternal carinae evident, more or less arcuated, granular ridges in segments 2–5, with a rounded caudal lobe in segments 6 and 7, thereafter increasingly reduced first to form only small ridges and then low bulges traceable until segment 17 (♂, ♀). Epiproct (Fig. 20) rather long, bulbous, densely hirsute. Hypoproct (Fig. 26) roundly subtrapeziform, caudal margin with 1+1 setae not borne on knobs.

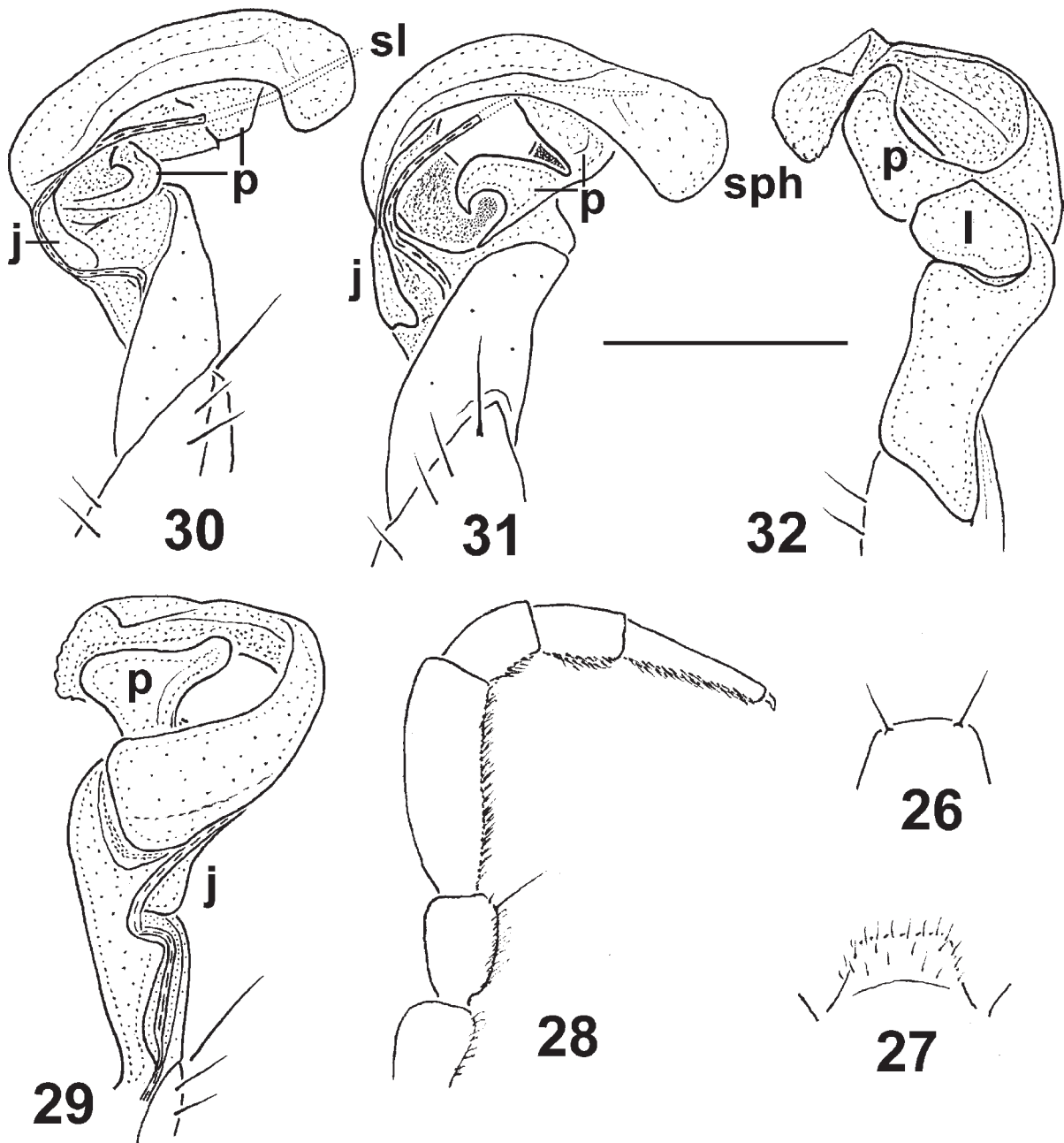
Sterna densely setose, cross-impressions shallow, axial impressions especially weak, without modifications except for a large, paramedian, setose, trapeziform lobe between ♂ coxae 4 (Fig. 27). No tubercles near gonopod aperture. Legs moderately long and slender (Figs 16–20, 28), slightly incrassate in ♂ compared to ♀, midbody ones ca. 1.7–1.8 (♂) or 1.1–1.2 times (♀) as long as body height, very densely setose ventrally, neither adenostyles nor laterally swollen prefemora; ventral brushes on all ♂ tarsi until last two pairs, only a little less dense brushes on all other ♂ podomeres.

Gonopods (Figs 18, 21–25, 29–32) relatively complex, *in situ* held parallel to each other, with tips directed laterad.



Figs 21–25. *Hedinomorpha liuae* sp.n., ♂ paratype, left gonopod, caudoventral, ventral, dorsal, lateral and dorsolateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 21–25. *Hedinomorpha liuae* sp.n., паратип ♂, левый гонопод, соответственно одновременно сзади и снизу, снизу, сверху, сбоку и одновременно сверху и сбоку. Фотографии К.В. Макарова, сняты без масштаба.



Figs 26–32. *Hedinomorpha liuae* sp.n., ♂ paratype. 26 — hypoproct, ventral view; 27 — sternal lobe between coxae 4, caudal view; 28 — leg 9, lateral view; 29–32 — left gonopod, sublateral, subventral, ventral and lateral views, respectively. Scale bar: 0.15 (26–28) or 0.3 mm (29–32). Designations explained in text.

Рис. 26–32. *Hedinomorpha liuae* sp.n., паратип ♂. 26 — гипопрокт, снизу; 27 — стерральная пластинка между тазиками 4; 28 — нога 9, сбоку; 29–32 — левый гонопод, соответственно почти сбоку, почти снизу, снизу и сбоку. Масштаб: 0,15 (26–28) и 0,3 мм (29–32). Объяснения обозначений в тексте.

Coxite subcylindrical, approximately as long as femorite, setose distoventrally; cannula as usual, a small, curved, hollow tube. Prefemoral (= densely setose) part ca. 1/3 as long as acropodite and approximately as long as a medially excavated femorite. Seminal groove running along mesal face of femorite at bottom of a femoral gutter, then moving onto a long, flagelliform, bare, free solenomere (**sl**) (distal half shown broken off in Figs 21, 30, 31) at base of both a simple, rounded, subpentagonal, postfemoral, lateral lobe

(**l**), the latter being demarcated by a distinct, transverse, distofemoral, lateral sulcus, and a small, rounded, membranous, mesal lobe (**j**) marking a lamina medialis and following the early course of a simple/bare **sl**. Solenophore (**sph**) long, slender, membranous, about as long as a mostly sheathed **sl**, devoid of processes, apically spade-shaped, rounded and finely microdentate at margin, showing a particularly well developed lamina lateralis (= most of **sph**) and a much smaller lamina medialis (**j**); **sph** at base with an unusually





Figs 33–34. *Hedinomorpha distincta* sp.n., ♂ paratype (33) and ♂ holotype (34), habitus, lateral views. Pictures by K. Makarov, not taken to scale.

Рис. 33–34. *Hedinomorpha distincta* sp.n., паратип ♂ (33) и голотип ♂ (34), общий вид, сбоку. Фотографии К.В. Макарова, сняты без масштаба.

massive, hypertrophied, postfemoral, irregularly shaped process (**p**) deeply divided into a larger, roundly subtriangular, dorsolateral, main part and a smaller, ventromesal hook, with **sph** very clearly coiled around **p**.

*Hedinomorpha distincta* sp.n.  
Figs 33–48.

HOLOTYPE ♂ (ZMUM), China, Sichuan, N of Luding City, N of Lanan, N30°3'29", E102°14'0", 2525 m a.s.l., 18.V.2014, I. Belousov & I. Kabak leg.

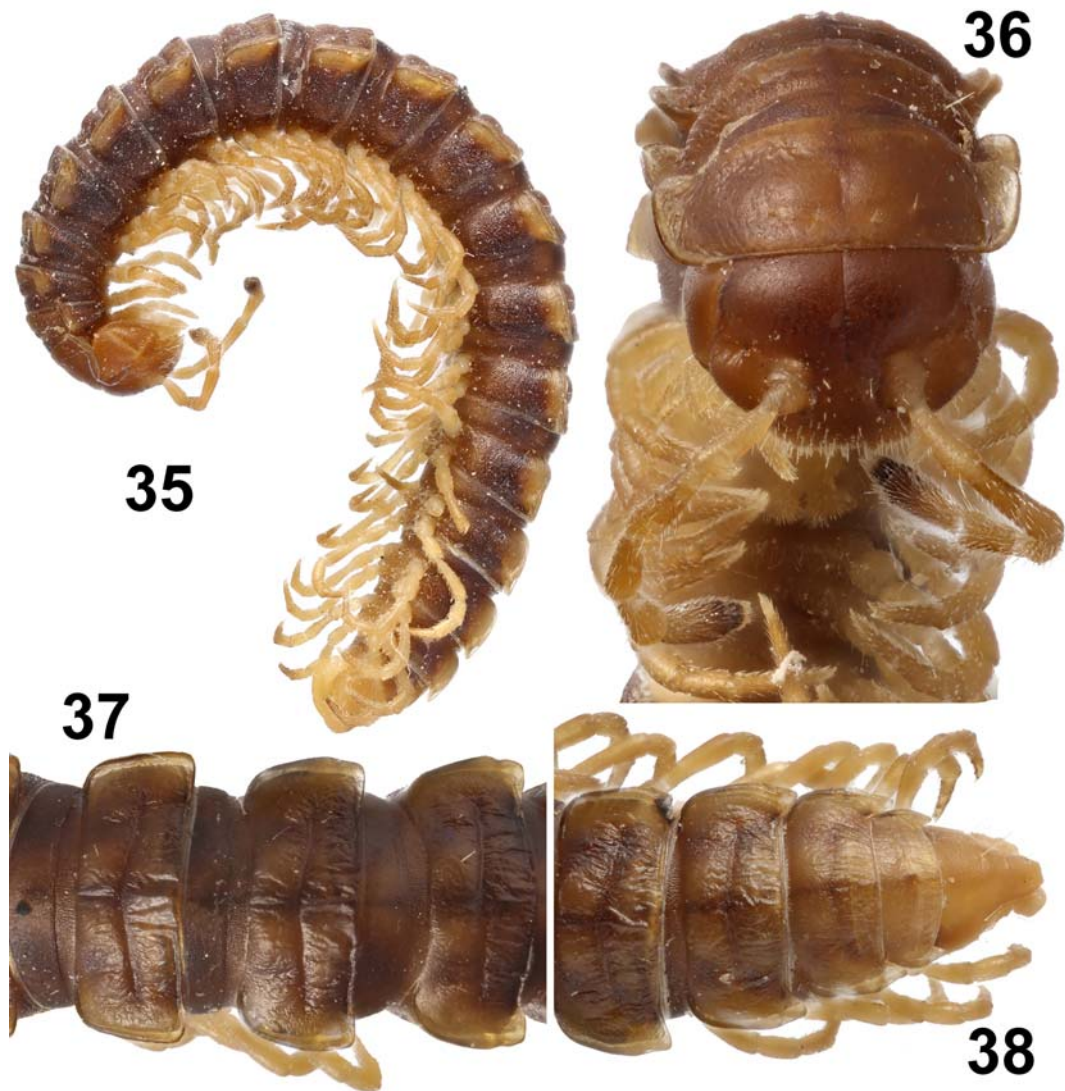
PARATYPE: 1 ♂ (ZMUM), same data, together with holotype.

NAME. To emphasize the distinctness among congeners; adjective in feminine gender.

DIAGNOSIS. Using the latest key to 18 species of *Hedinomorpha*, as well as considering one congener described since [Golovatch, 2020] and one more described above, *H. distincta* sp.n. keys out to a deadend in couplet 17(18) [Golovatch, 2019a], yet it readily differs from all congeners by the presence of two laterobasal gonopostfemoral processes, one stump-shaped (**p**) and the other a hook (**r**), coupled with a parbasal ventromesal process (**k**) on a deeply bifid solenophore (**sph**) with subequal and apically curved spines at tip.

DESCRIPTION. Length of both holo- and paratype ca. 15–16 mm, width of midbody pro- and metazonae 1.2 or 1.6–1.7 mm, respectively (♂). Coloration in alcohol mostly dark brown to brown (♂), but paraterga, venter, legs and paraprocts considerably lighter, yellow brown; pattern indistinct, but visible on both pro- and metaterga as alternating a narrow dark brown axial line/stripe flanked on each side first by a broader, lighter, yellowish brown stripe, then a similarly wide, but dark brown stripe covering also the bases of paraterga, and finally considerably lighter, yellow-brown paraterga themselves; sides below paraterga again dark brown (Figs 33–38); legs slightly and antennae strongly and increasingly infuscate distad, but tips of antennae pallid.

Clypeolabral region densely setose, vertigial region bare; epicranial suture fine, but distinct (Fig. 36). Antennae moderately long and clavate (Figs 33–36), extending past metatergum 3 (♂) when stretched dorsally. In length, antennomere 2=3=4=5=6>>1=7. Interantennal isthmus about as wide as diameter of antennal socket (Fig. 36). Tegument generally shining, but metaterga clearly rugulose-rugose and microgranulate, collum and metaterga 2–4 also with flat bosses; prozonae shagreened, strictures between pro- and metazonae microgranulate and dorsally finely striolate; below paraterga more roughly microgranulate. In width, segment 4



Figs 35–38. *Hedinomorpha distincta* sp.n., ♂ paratype. 35 — habitus, lateral view; 36 — anterior part of body, ventral view; 37 — midbody segments, dorsal view; 38 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 35–38. *Hedinomorpha distincta* sp.n., паратип ♂. 35 — общий вид, сбоку; 36 — передняя часть тела, снизу; 37 — среднетелувищные сегменты, сверху; 38 — задняя часть тела, сверху. Фотографии К.В. Макарова, сняты без масштаба.

$< 2 = 5-16 < 3 < \text{head} < \text{collum}$ ; body gradually tapering on segments 17–20. Paraterga well-developed ( $\sigma^7$ ), mostly set at ca. upper 1/4 of midbody height, slightly upturned; calluses thin, in lateral view considerably thicker on pore-bearing segments than on poreless ones due to ozopores, all delimited by a complete sulcus dorsally and ventrally; paraterga on collum broadly rounded anteriorly and laterally, particularly thin, bordered, with several insertion points of abraded setae along lateral margin, its caudal corner angulate, more narrowly rounded and faintly drawn past caudal margin (Figs 33–36). Paraterga 2 lower than others, as usual, rounded lappets drawn both anteriorly and caudad, also with several insertion points of abraded setae along lateral margin; anterior margin of following paraterga broadly rounded shoulders, lateral edge almost straight, without incisions, but 2–3 insertion points of mostly abraded setae; caudal corners of almost all paraterga following 2<sup>nd</sup> lying within or almost within rear tergal margin, only in segments 14–19 triangu-

lar, almost pointed and increasingly drawn past rear margin (Figs 33–36). Pore-bearing calluses faintly sinuous in caudal 1/3, marking evident and dorsally invisible ozopores; each ozopore lying inside an ovoid groove ca. 1/4 off caudal corner of poriferous paraterga. Tergal setae often abraded, each ca. 1/4 as long as metatergum; setation pattern mostly traceable due to minute tubercles or insertion points, 2+2 and 2+2 setae typically arranged in two transverse rows. Limbus entire. Stricture between pro- and metazonae deep and rather narrow. Transverse metatergal sulci deep, slightly arched medially, microgranulate at bottom, a faint impression on collum in caudal 1/3, thereafter clear-cut sulci on all following segments, abbreviated on segments 2–4, reaching the bases of paraterga 5–18, wanting on 19<sup>th</sup>. Axial line a distinct sulcus on collum and all following metaterga. Pleurosternal carinae evident, increasingly clear, arcuated, granular ridges in segments 2–4, with a rounded caudal lobe/flap in segments 5–8, thereafter increasingly reduced, but trace-



Figs 39–42. *Hedinomorpha distincta* sp.n., ♂ paratype, right gonopod, dorsal, lateral, mesal and suboral views, respectively. Pictures by K. Makarov, not taken to scale. Designations explained in text.

Рис. 39–42. *Hedinomorpha distincta* sp.n., паратип ♂, правый гонопод, соответственно сверху, сбоку, изнутри и почти спереди. Фотографии К.В. Макарова, сняты без масштаба. Объяснения обозначений в тексте.

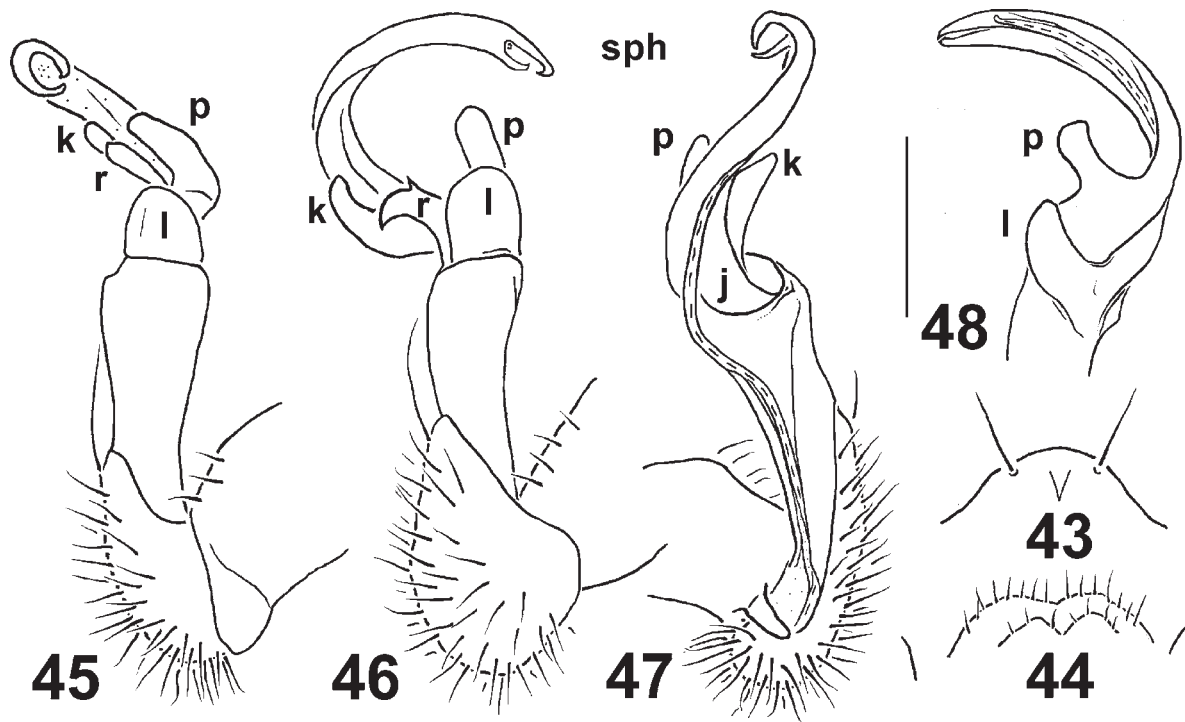
able until segment 17. Epiproct (Figs 33, 34, 38) rather long, as usual, slender, subtruncate, with small, lateral, pre-apical papillae. Hypoproct (Fig. 43) semi-circular, caudal margin with 1+1 setae not borne on knobs.

Sterna densely setose, cross-impressions shallow, axial impressions especially weak, without modifications except for two, low, setose, bimodal ridges between ♂ coxae 4 (Fig. 44). No tubercles near gonopod aperture. Legs moderately long and slender (Figs 33–35), apparently slightly incrassate in ♂ compared to ♀, midbody ones ca. 1.6–1.7 times as long as body height (♂), densely setose ventrally, neither adenostyles nor laterally swollen prefemora; ventral brushes on all ♂ tarsi until last two pairs.

Gonopods (Figs 39–42, 45–48) relatively complex, *in situ* held parallel to each other, with tips directed laterad. Coxite subcylindrical, approximately as long as both femurite and prefemoral part, setose distoventrally; cannula as usual, a small, curved, hollow tube. Prefemoral (= densely setose) part ca. 1/4 as long as acropodite. Seminal groove running along mesal face of a medially excavated femurite at bottom of femoral gutter, then moving onto a long, flagelliform, free solenomere (sl) at base of a simple, rounded, postfemoral, lateral lobe (l), the latter being demarcated by a distinct, transverse, distofemoral, lateral sulcus, a small, rounded, membranous, mesal lobe (j) marking a lamina medialis and following the early course of a simple/bare sl, as well as two prominent lateral processes: one stump-shaped and apically rounded (p), and the other membranous, acuminate and curved (r); postfemoral process r directed mesad, with a small midway spike. Solenophore (sph) long, slender, membranous, about as long as a mostly sheathed sl, clearly coiled around p, showing a particularly well developed lamina lateralis (= most of sph) and a much smaller lamina medialis (j), with a long, membranous, sublanceolate, dorso-parabasal process (k) adjacent to r, apically deeply bifid, both tips being subequal and forming a kind of forceps.

REMARKS. In showing not one, but two gonopostfemoral processes, p and r, in addition to a distinct postfemoral lobe (l), *H. distincta* sp.n. resembles certain species of *Tylopus* Jeekel, 1968. This latter genus is the largest in Paradoxosomatidae (presently 74 species, including several grossly sympatric with *Hedinomorpha* in southern China, see Golovatch [2020]), but the gonopodal structure in *Hedinomorpha* is typically far less complex: femurite normally with a mesal gutter, but devoid of outgrowths; postfemoral part at most with a single process or outgrowth, two in *H. distincta* sp.n. being exceptional; lobe l simple and not always delimited by a basal sulcus; sph usually more slender and supplied at most with a single midway or parabasal process. The above distinctions between *Tylopus* and *Hedinomorpha* are often reinforced through two ♂ leg characters as well, namely the presence of adenostyles and laterally bulged prefemora in numerous *Tylopus* species vs. their absence from *Hedinomorpha* spp. This suggests a phylogenetically more basal position of the latter genus relative to the former one, even though with the ongoing descriptions of new species from both genera their distinctions grow increasingly blurred.

Species of both genera are largely allopatric: *Tylopus* spp. mostly occur in Indochina, Thailand and Myanmar, only a few being encountered in southern China, whereas *Hedinomorpha* spp. are largely confined to China, with only a single congener endemic to Tajikistan, Central Asia [Golovatch, Liu, 2020]. The distributions of both genera grossly overlap only in Yunnan and Sichuan, but the species appear to be parapatric, never to be met together. No two species of *Hedinomorpha* have ever been found to co-occur strictly in the same place. Both new species of *Hedinomorpha* described above are sympatric or parapatric, but not syntopic. The same concerns *Tylopus* species in China, although in Thailand and Indochina several congeners can often be found syntopically [Likhitrakarn *et al.*, 2016].



Figs 43–48. *Hedynomorpha distincta* sp.n., ♂ paratype. 43 — hypoproct, ventral view; 44 — sternal ridges between coxae 4, ventrocaudal view; 45–48 — left gonopod, lateral, subventral, mesal and dorso-oral views, respectively. Scale bar: 0.25 mm. Designations explained in text.

Рис. 43–48. *Hedynomorpha distincta* sp.n., паратип ♂. 43 — гипопрокт, снизу; 44 — стеральные гребни между тазиками 4, одновременно снизу и сзади; 45–48 — левый гонопод, соответственно сбоку, почти снизу, изнутри и одновременно сверху и спереди. Масштаб: 0,25 мм. Объяснения обозначений в тексте.

As noted recently [Golovatch, 2019a], further new *Hedynomorpha* species and/or records can readily be expected from China in addition to those 20 known at the moment.

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