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On the synonymy of *Lithobius giganteus* SSELIWANOFF, 1881 and the taxonomic status of *Porobius* ATTEMS, 1926 (Chilopoda)

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(Mit 7 Testabbildungen)

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Zusammenfassung

Lithobius cacodontus ATTEMS, 1904, *L. jugorum* ATTEMS, 1904 and *L. mongolicus* VERHOEFF, 1934 werden nach Typusmaterial wiederbeschrieben. Es wird gefolgert, daß die Gattung *Porobius* ATTEMS, 1926, in welcher diese drei nominellen Arten untergebracht waren, nicht ein valides Taxon ist und daß alle drei jüngere Synonyme von *L. giganteus* SSELIWANOFF, 1881, einer weit verbreiteten zentralasiatischen Art, die hier in die Untergattung *Ezembius* CHAMBERLIN, 1919, gestellt wird, sind. Die Gattungen *Paobius* CHAMBERLIN 1916 und *Schizotergitus* VERHOEFF, 1930 werden diskutiert. Eine komplette Synonymie von *L. giganteus* wird gegeben.

Summary

Lithobius cacodontus ATTEMS, 1904, *L. jugorum* ATTEMS, 1904 and *L. mongolicus* VERHOEFF, 1934 are redescribed from type material. It is concluded that the genus *Porobius* ATTEMS, 1926, in which these three nominal species have been placed, is not a valid taxon and that all three are junior synonyms of *L. giganteus* SSELIWANOFF, 1881, a widespread central Asiatic species which is placed here in the subgenus *Ezembius* CHAMBERLIN, 1919. The genera *Paobius* CHAMBERLIN, 1916 and *Schizotergitus* VERHOEFF, 1930 are discussed. A full synonymy of *L. giganteus* is given.

Introduction

ATTEMS (1904) described two species of *Lithobius*, *L. cacodontus* and *L. jugorum*, each from a number of localities in Kirgizia, Turkestan. The same author later (ATTEMS 1926) created the genus *Porobius*, which he defined as having the anterior border of the prosternum broad with small medially-placed teeth bounded on either side by an extensive untoothed margin, to receive *L. cacodontus*, *L.*

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jugorum, *L. parvicornis* PORAT and *L. jugorum tigriaccola* BRÖLEMANN,, designating *L. cacodontus* as type-species (ATTEMS 1927). VERHOEFF (1934) described another species, *L. mongolicus*, based on two females from Inner Mongolia, which he tentatively placed in *Porobius*: but at the same time he questioned the inclusion of *L. parvicornis* in this taxon and, indeed, the status of *Porobius* as a genus of even as a subgenus of *Lithobius*. PORAT (1893) description of *L. parvicornis* from Syria certainly does not suggest that it has any of the prosternal features of *Porobius*, and the same may be said of BRÖLEMANN'S (1922) description of *L. jugorum tigriaccola* from Amara in southeastern Iraq: neither of these forms has been rediscovered or redescribed and there is no reason to believe that either is closely akin to *L. cacodontus*.

The purpose of the present paper is to redescribe some of the type material of *Lithobius cacodontus* and *L. jugorum* and the two syntypes of *L. mongolicus*, and to show that each of these three nominal species belongs to the widespread and variable central Asiatic species, *L. giganteus* Sseliwanoff, a species placed here in the subgenus *Ezembius* Chamberlin and described originally (SSELIWANOFF 1881a) from Changai, south of Uljassutai (now Jibhalanta) in Outer Mongolia and subsequently by LIGNAU (1929) from eastern Kirgizia, by DOBRORUKA (1961, 1970) from Outer Mongolia and by ZALESSKAYA (1978) who extended the known range of the species to Buryat, Soviet Central Asia. LOKSAS (1965) description under *Paobius jangtseanus* Verhoeff of specimens from Outer Mongolia also refers to this species (LOKSA 1978).

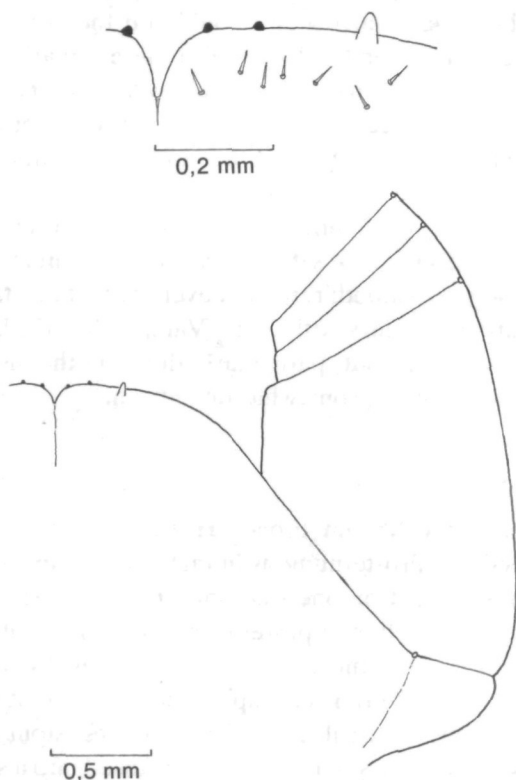
Descriptions

General:

All the specimens described below have the following characters: Shape: almost parallel-sided with the head, T.1, 3 and 5 all of much the same breadth and the body broadest at T.8 and 10. Antennae: less than a third of body-length with 20 moderately elongate articles. Ocelli: obscure and difficult to count, but the organ of Tömösváry appears to be rather smaller than the smallest ocellus. Prosternum: with 2 + 2 teeth. Tergites: posterior angles rounded without projections. Intermediate tergite: posterior border moderately emarginate in both sexes. Coxal pores: small, circular, separated from one another by twice their own diameter or more. Anterior legs: with distinct tarsal articulations. 15th legs: about a quarter of body-length. Glandular pores: on 14th and 15th legs only. Male second genital sternite: without setae. Female gonopod: with two well-separated long conical spurs and a simple claw; about eight dorsolateral setae on the second article and eight on the third, not clearly differentiated from the general setae; no dorsomedial setae. Spinulation: variable on the 15th legs, otherwise in general agreement with the table given by ZALESSKAYA (1978: 131) for *Lithobius giganteus*, the most notable feature being the presence of VpT on the anterior legs.

Lithobius cacodontus ATTEMS (Figs 1 & 2)*Lithobius cacodontus* ATTEMS, 1904: 116.

Type localities as published: Ara-bel, Karakol-Thal. – Sary-bel, Kuru-Sai, Ottuk-Tasch, Etsch-Keli-Tasch.

Syntypes: A male and a female preserved in spirit labelled „*Lithobius cacodontus* B 1180 Ütsch-kili-Tasch Alm-Stum“: Naturhistorisches Museum, Wien (Myriop. Inv. No. 1933).

Figures 1 & 2. *Lithobius cacodontus* male syntype. Fig. 1. Dental margin of prosternum, left half, ventral. Fig. 2. Prosternum and base of left forcipule, ventral.

„Alm-Stum“, which also appears on the labels attaching to the syntypes of *L. jugorum*, is ATTEMS abbreviation of the names of the collectors, Drs von ALMASSY and von STUMMER (J. GRUBER, pers. comm.).

Description of male

Size: 30 mm long and 3.3 mm broad. Head: marginal interruptions faint without lateral projections. Prosternum: with very small closely-set teeth; porodont stout, translucent, placed further from the lateral tooth than the distance

between the lateral and medial teeth on the left (Fig. 1), absent or broken on the right; lateral to the porodont the free border is feebly convex and slopes back to the coxofemoral condyle with barely a trace of the concavity found in most species of *Lithobius*; both forcipular claws missing (Fig. 2). Large tergites: emargination of posterior borders increasing from before backwards, becoming marked on T.10 and 12 and very marked with a feeble median notch on T.14; T.5, 8, 10, 12 and 14 longer than broad, the longest tergite, T.8, in the ratio 45:41. Coxal pores: 4, 3, 3, 3 lying in distinct gutters. Anterior legs: apical claws short and stout. 14th and 15th legs: very slightly swollen relative to anterior legs; dorsal sulci narrow and interrupted on the 14th tibiae, narrow and double on the 14th femora, broad and well-defined on the 15th tibiae; on the 15th femora there is marked flattening of the dorsal aspect, almost amounting to a broad shallow sulcus; apical claws short and stout as on anterior legs; 15th accessory apical claws absent. Seriate setae: a single row on the first to 10th tibiae and a double row on the first to 13th tarsi and metatarsi. Special ventral setae: sparse on S. 12, more numerous on S. 13, 14 and 15; sparse on 13th coxae, more numerous on 14th and 15th; present on telopodites of 11th, 12th and 13th legs. Special dorsal setae: very few and minute, seen on T.14 and intermediate tergite only. Gonopod: retracted over the first genital sternite and not seen clearly. Spinulation: 15th legs with Vmt, VampP, VamF, DaC, DampP and DpF; dorsal spines short and stout, particularly those on the more posterior legs, those on the 15th prefemur being somewhat unguiform.

Description of female

Size: 20 mm long and 2.5 mm broad. Head: marginal interruptions faint without lateral projections. Prosternum: as in male but forcipular claws intact and the porodont, which is present on one side only, much less stout with a setiform apex. Large tergites: emargination of posterior borders as in male but no notch on T.14; all broader than long as in most species of *Lithobius*. Coxal pores: 5, 4, 4, 4 lying in ill-defined gutters. Anterior legs: apical claws less stout than in male. 14th and 15th legs: neither swollen nor sulcate; apical claws less stout than in male; 15th accessory apical claws absent; tarsus and metatarsus fused into a single short article on both 15th legs, probably due to abnormal regeneration following injury. Seriate setae: none on tibiae but a double row on the first to 13th tarsi and metatarsi and a single ill-defined row on the 14th tarsus and metatarsus. Special setae: none. Claw of gonopod: very slightly curved. Spinulation: as in male but dorsal spines less stout, those on the 15th prefemur not unguiform.

Remarks

The porodonts of *Lithobius giganteus* are variable in size and shape, being sometimes much stouter than the teeth (LIGNAU 1929: Abb. 9) and sometimes relatively slender (LOKSA 1965: Abb. 56; ZALESSKAYA 1978: Taf. 71, Fig. 3), but always much stouter than the setae. ATTEMS failure to notice the stout translucent

porodont which is easily overlooked, in the above male syntype, and the presence in the female of a more slender porodont bearing no resemblance to a tooth, account for his separation of *cacodontus* from *jugorum* on the basis of the supposed number of prosternal teeth. The extreme variability in the number and disposition of the dorsal sulci on the 14th and 15th tibiae and femora in males was noted by LIGNAU on the 15th legs and is shown by the fact that none of the redescriptions of *L. giganteus* agree exactly with one another in this respect: the presence of a well-defined 15th tibial sulcus in *cacodontus* compared with its feeble counterpart on one side only in *jugorum*, which was overlooked by ATTEMS, was another differential character he used for separating the two forms.

ATTEMS (1926), in his key to the separation of the species of *Porobius*, gave *cacodontus* the notation 0–1, 0, 2, 0 for the ventral spinulation of the 15th legs. This was probably a misprint as it is not only altogether unlikely, but in his original description of *cacodontus* ATTEMS gave 0, 1, 3, 2, 0 as in the syntypes.

Lithobius jugorum ATTEMS (Figs 3 & 4)

Lithobius jugorum ATTEMS, 1904: 117.

Type localities as published. Kubergen-ty-Pass, Kurmenty-Pass, Ar-tschaly, Tocor-Pass, Przewalsk.

Syntypes. A male labelled "*Lithobius jugorum* B1412 Turkestan Alm-Stum" and a female labelled "*Lithobius jugorum* Kuhbergen ty Pass B758 Alm-Stum", both preserved in spirit: Naturhistorisches Museum, Wien (Myriop. Inv. No. 1934, 1935).

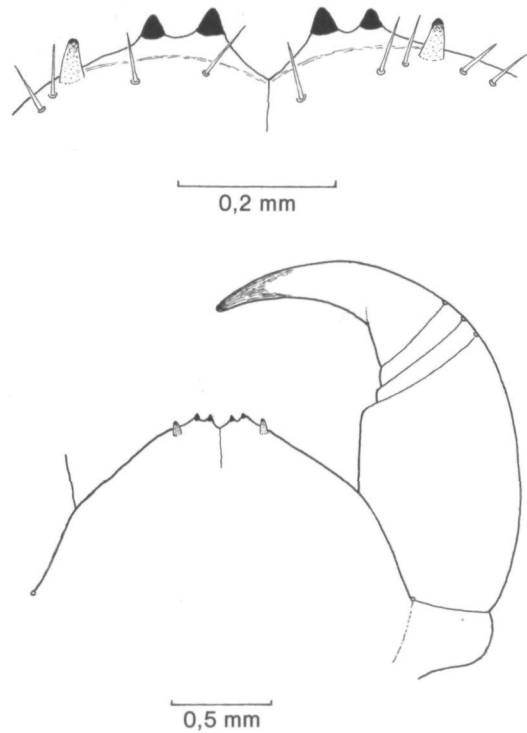
Description of male

Size: 27 mm long and 2.8 mm broad. Head: marginal interruptions faint without lateral projections. Posternum: as in *cacodontus* but with a stout feebly pigmented porodont present on both sides. Large tergites: emargination of posterior borders more marked than in either syntype of *cacodontus*, with a feeble median notch on T.5 and a distinct median notch on T.14; T.5, 8, 10, 12 and 14 longer than broad, the longest tergite, T.5, in the ratio 37:33. Coxal pores: 4, 3, 3, 3 lying in well-marked gutters. Anterior legs: many missing but the apical claws on the few intact legs as in the female *cacodontus*. 14th and 15th legs: very slightly swollen relative to anterior legs; dorsal sulci absent on the 14th tibiae, narrow on the 14th femora, feeble and narrow on the left 15th tibiae but absent on the right, narrow and interrupted on the 15th femora; apical claws as in the female *cacodontus*; 15th accessory apical claws absent. Seriate setae: none on tibiae but a double row on the first to 13th tarsi and metatarsi. Special ventral setae: distributed on the sternites and coxae as in the male *cacodontus* but present on the telopodites of the 12th and 13th legs only. Special dorsal setae: very few seen on T.14 only. Gonopod: of a single article with seven setae. Spinulation: 15th legs with Vmt, VampP, VamF,

VmT (on one side only), DaC, DmpP and DpF; dorsal spines short and stout, those on the 15th prefemur being somewhat unguiform.

Description of female

Size: 21 mm long and 2.4 mm broad. Head: marginal interruptions faint without lateral projections. Prosternum: teeth relatively large; porodonts stout and feebly pigmented (Fig. 3); lateral to the porodont the free forder is almost straight, sloping obliquely back to a feeble convexity before reaching the coxofemoral



Figures 3 & 4. *Lithobius jugorum* female syntype. Fig. 3. Dental margin of prosternum, ventral. Fig. 4. Prosternum and left forcipule, ventral.

condyle (Fig. 4). Large tergites: emargination of posterior borders less marked than in either syntype of *cacodontus*, without median notches; all broader than long. Coxal pores: 5, 4, 4, 4 lying in distinct gutters. Anterior legs: apical claws as in the female *cacodontus*. 14th and 15th legs: neither swollen nor sulcate: apical claws as in the female *cacodontus*; a small 15th accessory apical claw on the right side only; left 15th prefemur very slender, probably due to abnormal development. Seriate setae: none on tibiae but a double row on the first to 13th tarsi and metatarsi. Special setae: none. Claw of gonopod: strongly curved towards apex. Spinulation: 15th legs with Vmt, VaP (on one side only), VmpP, VamF, VamT, DaC, DampP,

DpF and DpT (on one side only); dorsal spines less stout than in male, those on the 15th prefemur not unguiform; VmT on anterior legs very long and stout.

Remarks

ATTEMS was obviously counting the large pigmented porodonts as teeth when he described the prosternal teeth in *jugorum* as 3 + 3: and the long stout ventral tibial spines (VmT) which he also mentioned as characteristic of *jugorum* are present in the female syntype of *jugorum* but not in the male. In describing *jugorum* with well-developed prosternal teeth but without special ventral setae, in his key to the separation of the species of *Porobius*, ATTEMS (1926) seems also to have been considering the female only.

Lithobius mongolicus VERHOEFF (Figs 5–7)

Lithobius (Porobius?) mongolicus VERHOEFF, 1934: 34, Taf. 5, Fig. 11a.

Type locality as published. Südmongolei.

Syntypes. A female, entire but with most legs missing, preserved in spirit labelled "*Lithobius mongolicus* S. Mongolei Verh." "Sven Hedins Exp. Ctr. Asien Dr. HUMMEL" "S. Mongoliet 1927" "C 26 Exp. Tabun-tologoi" and a fragmented female cleared and mounted on a glass slide labelled "*Lithobius (Porobius) mongolicus* Verh. S. Mongolei ♀": Naturhistoriska Riksmuseet, Stockholm.

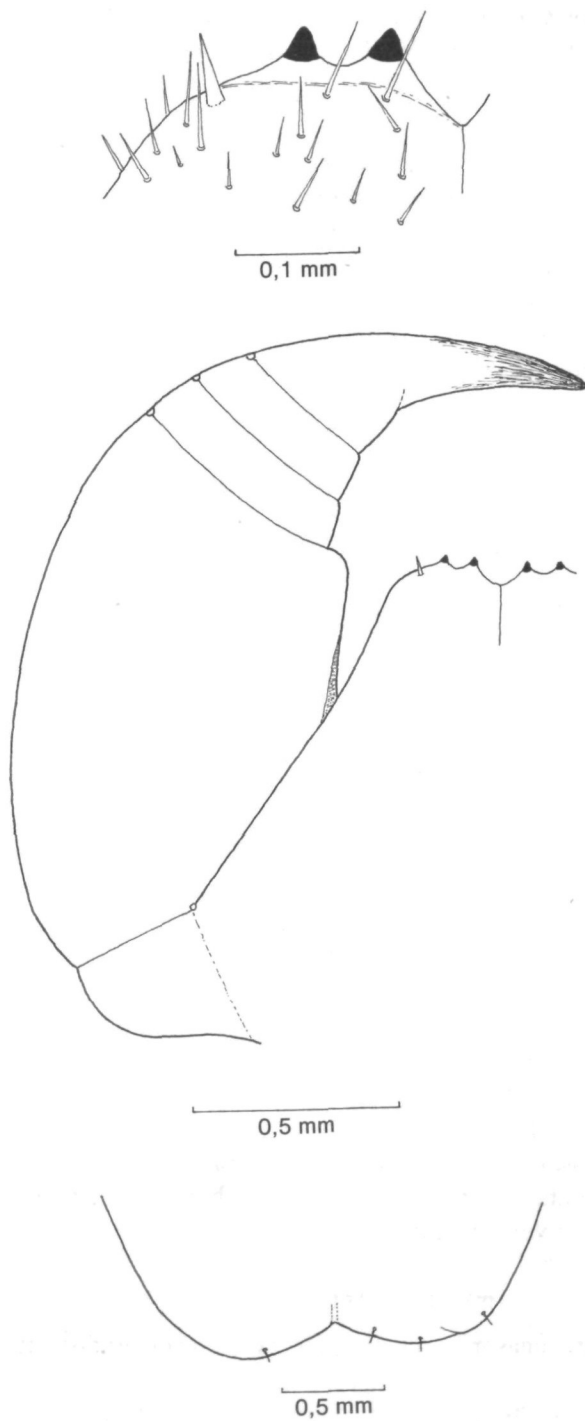
Description of entire female

Size: 19.5 mm long and 2.0 mm broad. Head: marginal interruptions faint with feeble lateral projections. Prosternum: teeth relatively large; porodonts much stouter than the setae but with setiform apices, placed as close to the lateral teeth as the distance between the lateral and medial teeth (Fig. 5); lateral to the porodont the free border is quite strongly convex before sloping almost straight back to the coxofemoral condyle with barely a trace of concavity (Fig. 6). Large tergites: emargination of posterior borders marked, with feeble median notches on T.5, 8 and 10; T.3, 8, 10 and 12 only slightly longer than broad but T.5 relatively much longer in the ratio 50:45. Coxal pores: 4, 3, 3, 3 lying in ill-defined gutters. Anterior legs: apical claws rather more slender than in the female *cacodontus*. 14th and 15th legs: missing. Seriate setae: a single row on the tibiae and a double row on the tarsi and metatarsi of the 13th and all the other intact legs. Special setae: none. Claw of gonopod: very slightly curved.

Description of fragmented female

Few accurate measurements could be taken owing to distortion of many of the tergites.

Length: about 20 mm. Head: marginal interruptions faint with very feeble lateral projections. Prosternum: as in last specimen. Large tergites: emargination of posterior borders marked, with a feeble median notch on T.10 and a distinct



Figures 5-7. *Lithobius mongolicus* female syntype. Fig. 5. Dental margin of prosternum, right half, ventral. Fig. 6. Prosternum and right forcipule, ventral. Fig. 7. Posterior border of T. 12, dorsal.

median notch on T.12 (Fig. 7); the only measurable tergite, T.12, is as long as broad. Coxal pores: 5, 4, 4, 4. Anterior legs: as in last specimen. 14th and 15th legs: not swollen; apical claws as in the female *cacodontus*; 15th accessory apical claws absent. Seriate setae: as in last specimen. special setae: none. Claw of gonopod: strongly curved towards apex. Spinulation: 15th legs with Vmt, VampP, VamF, VaT, DaC, DampP and DpF, taking into account the sockets indicating broken spines; shape of dorsal spines as in the female syntypes of *cacodontus* and *jugorum*.

Remarks

VERHOEFF, while recognizing the similarity between *mongolicus* and *cacodontus*, distinguished the former by its larger prosternal teeth, the absence of special ventral setae, and the dorsal spinulation of the 15th legs which he gave as 1, 0, 1, 1, 0. The teeth of the syntypes of *mongolicus* are no larger than those of the female syntype of *jugorum*, the special ventral setae constitute a secondary sexual character confined to males, and VERHOEFFS formula for spinulation may have been due to his examination of the intact syntype before the 15th legs became detached but after most of the dorsal prefemoral spines had been broken off: the fragmented syntype has, in fact, DpP intact on the left and DmpP on the right.

Discussion

LIGNAU (1929) examined numerous examples of *Lithobius giganteus* and found considerable variation in size, the number of ocelli, the number of prosternal teeth (which he clearly distinguished from porodonts), the arrangement of the sulci on the 15th legs of males, the spinulation of the 15th legs, and in the 15th accessory apical claw which he found present or absent. DOBRORUKA (1961) suggested that some of these variations might provide the basis for dividing *giganteus* into subspecies but later, after examining numerous specimens from three separate regions, he decided that they showed no correlation with geographical distribution and dismissed the likelihood of subspeciation (DOBRORUKA 1970).

In addition to the variations noted by LIGNAU and DOBRORUKA, there are several others, some of which have been used to characterise *Lithobius giganteus* or one of its synonyms. The shape of the large tergites, which are unusually long in the male syntypes of *cacodontus* and *jugorum* (see also SSELIWANOFF 1881b: Taf. 1, Fig. 4), less so in the entire female of *mongolicus* and relatively broad in the females of *cacodontus* and *jugorum*, seem to vary according either to sex or size. The short unguiform dorsal prefemoral spines on the 15th legs, which are only present in the two males, probably constitute a secondary sexual character. The apical claws of the legs are short and stout only in the male *cacodontus* so that this feature may occur only in the largest specimens. Seriate setae seem always to be present on the tarsi and metatarsi of the anterior legs, extending back onto the 13th or 14th, but on the tibiae they are only present on the first 10 legs of the male *cacodontus* and the first 13 of both females of *mongolicus*, being altogether absent

in the other specimens. The depth of the gutters containing the coxal pores and the degree of curvature of the claw of the female gonopod are also variable. But the most striking variation is in the appearance of the prosternum: its shape in the male *cacodontus* (Fig. 2) and in *mongolicus* (Fig. 6), taken in conjunction with the size and spacing of the teeth and porodonts (Figs. 1 & 5), certainly suggest two distinct species. But in a small collection of *L. giganteus* from Arschan in the neighbourhood of Lake Baikal, now preserved in the Naturhistorisches Museum, Vienna, the shape of the prosternum varieties from that of *cacodontus* to that of *mongolicus*.

The continuous outline of the lateral margins of the head, due to the absence of any projections at the points where the marginal ridge of the head is interrupted, was mentioned by Chamberlin as one of the distinctive features of his genus *Paobius* (CHAMBERLIN 1916: Taf. 4, Fig. 3). Although these projections are absent in the syntypes of *cacodontus* and *jugorum*, with only a trace in those of *mongolicus* and the specimens from Arschan, and although many similar central Asiatic species have been placed in *Paobius* Chamberlin by VERHOEFF (see EASON 1976: 123), there is no reason for placing *Lithobius giganteus* or, indeed, any other Asiatic species in this genus which consists of a fairly well-defined group of very small North American species with distinctive spinulation and apically expanded spurs on the female gonopods (CHAMBERLIN 1916: Taf. 4, Figs. 2 & 4).

The more or less distinct posterior median notches on one or other of the large tergites from T.5 to T.14 in four of the six specimens described above are very similar to the notches on T.3 to T.12 on which VERHOEFF (1930) based a monotypic genus, *Schizotergitus*, from Turkestan. LOKSA (1978) described two species from Mongolia with the same modification which he placed in *Schizotergitus*, and the shape of T.12 in the fragmented female of *mongolicus* (Fig. 7) is exactly the same as that of T.5 in *S. altaicus* Loksa (LOKSA 1978: Abb. 10). But this modification is much too variable to justify placing *Lithobius giganteus* in *Schizotergitus*, and should this notching prove to be variable in the species already placed in it, *Schizotergitus* Verhoeff can hardly be regarded as a valid taxon.

Porobius was based on the shape of the prosternum and the size and spacing of the prosternal teeth which, though very distinctive in some specimens of *Lithobius giganteus*, is less so in others. An arcuate prosternum with neither angulation nor irregularity is found in all forms of the species which are, in this respect, unlike many other species of Lithobiidae, but it does not justify the retention of *Porobius* either as a genus or as a subgenus. *L. giganteus* should be placed in the widespread Asiatic *Ezembius* Chamberlin, 1919 which is regarded here as a subgenus of *Lithobius* and is characterized by having only 20 antennal articles, 2 + 2 (rarely 3 + 3) posternal teeth and distinct tarsal articulations on the anterior legs.

Synonymy of *Lithobius (Ezembius) giganteus* SSELIWANOFF

DOBRORUKA (1961) proposed *Lithobius alaicus* TROTZINA, described originally from the Alai Mts., southern Kirgizia (TROTZINA 1894), as a synonym of *L. giganteus*. Another form, *L. aeruginosus* var. *mongolicus* ATTEMS, might, from

ATTEMS' (1901) brief description, be regarded as another synonym: but a male syntype from Urga (now Ulan Bator), preserved in the Naturhistorisches Museum, Vienna, has been examined and, although closely akin to *L. giganteus* and bearing little resemblance to *L. aeruginosus* L. KOCH, it seems to belong to a distinct species of *Ezembius*. LOKSA (1965) believed that his specimens of *L. giganteus* belonged to *L. (Paobius) jangtseanus* VERHOEFF and VERHOEFFS (1942) description of this species might well apply to females of *L. giganteus* with deformed gonopods: but two female syntypes of *L. jangtseanus* from the upper Yangtse Valley, preserved in the Zoologische Staatssammlung, Munich, have been examined and the structure of the gonopods shows that they belong to the genus *Hessebius* VERHOEFF as defined by ZALESSKAYA (1978).

The full synonymy of *L. giganteus* is therefore:

Lithobius giganteus SSELIWANOFF, 1881a: 15; 1881b: 126, Taf. 1, Figs. 4–6; LIGNAU, 1929: 170, Abb. 9–11; DOBRORUKA, 1961: 15; 1970: 94; LOKSA, 1978: 115; ZALESSKAYA, 1978: 130, Taf. 71, Figs. 1–9.

Lithobius alaicus TROTZINA, 1894: 250; ZALESSKAYA, 1978: 130.

Lithobius cacodontus ATTEMS, 1904: 116; ZALESSKAYA, 1978: 132, syn. nov.

Lithobius jugorum ATTEMS, 1904: 117; ZALESSKAYA, 1978: 144, syn. nov.

Porobius cacodontus: ATTEMS, 1926: 231; 1927: 249.

Porobius jugorum: ATTEMS, 1926: 232; 1927: 249.

Lithobius (Porobius?) mongolicus VERHOEFF, 1934: 34, Taf. 5, Fig. 11a, syn. nov. (non *L. aeruginosus* var. *mongolicus* ATTEMS, 1901).

Paobius jangtseanus: LOKSA, 1965: 213, Abb. 55–62 (non *L. (Paobius) jangtseanus* VERHOEFF, 1942).

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