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Soldanellonyx lohmannelloides (Sokolov & Yankovskaya, 1970) (Acari: Halacaridae), a re-description

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(with 14 figures)

Abstract

Soldanellonyx lohmannelloides (Sokolov & Yankovskaya, 1970), 40 years ago described under the name of *Pseudosoldanellonyx lohmannelloides*, is re-described. Its characters do not require a separate genus, accordingly, *Pseudosoldanellonyx* is classified as a junior synonym of the genus *Soldanellonyx* Walter, 1917.

K e y w o r d s: Acari, Halacaridae, re-description, Lake Baikal, Russia.

Introduction

The lake Baikal is the most ancient and deepest freshwater lake of the world (Kozhov 1963; Mats 1993). The initial lake formation, with several large shallow-water basins, dates back to the late Cretaceous-Eocene; the deepening of the Baikal rift depression started in the Oligocene (Mats 1993). Present day Lake Baikal has a maximal depth of 1642 m and a water volume of 23,515 km³ (Fact Sheet 2007). The waters in the basins are well-mixed throughout the water column (Shimaraev *et al.* 2011), accordingly well-oxygenated in the deep parts. The Lake Baikal is known to have a unique fauna, with a large number of endemisms (*e.g.* Snimschikova & Akinshina 1994). The halacarid mites are present with at least five species in the Baikal water fauna (Sokolov & Yankovskaya 1973). One of these five species is *Soldanellonyx lohmannelloides* (Sokolov & Yankovskaya, 1970), about 40 years ago described as *Pseudosoldanellonyx lohmannelloides*. The original descriptions (Sokolov & Yankovskaya 1970, 1973) are rather short and do not allow a careful comparison with related species and genera. The species is re-described on the basis of a slide with a male.

Material and method

The present description is based on the original descriptions (Sokolov & Yankovskaya 1970, 1973) and a slide with a male, mounted in dorsal aspect. The slide of the halacarid collection I.I. Sokolov and A.I. Yankovskaya was given to the author in spring 1980 during a short stay at the Zoological Museum in St Petersburg. It is deposited in the Zoological Museum in Hamburg.

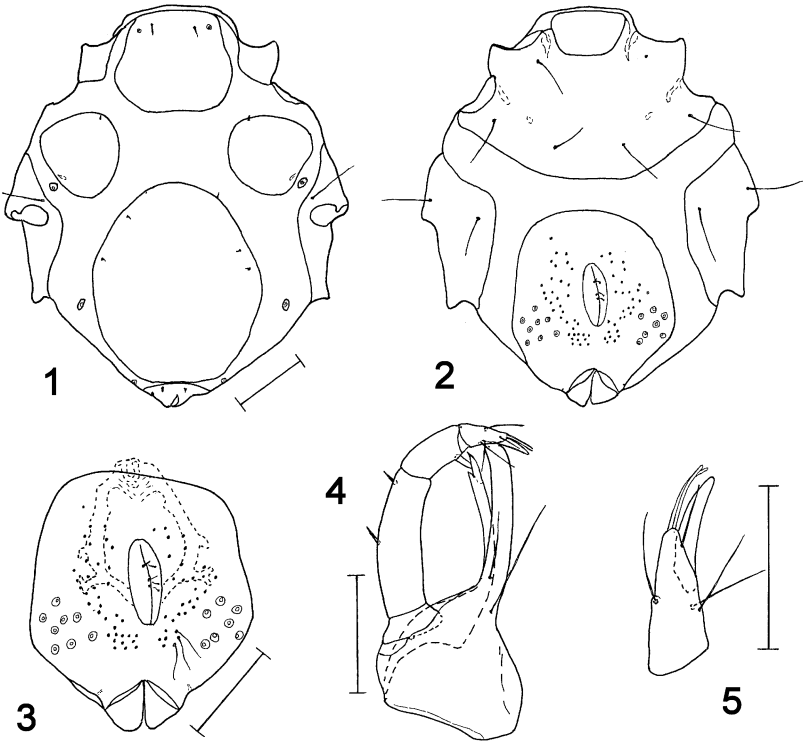
The legs, their segments and claws are numbered I to IV. The setation formula of the legs presents the number of setae from trochanter to tarsus. Data presented with a question mark (?) are in need of verification.

Description

Soldanellonyx Walter, 1917

TYPE SPECIES. – *Soldanellonyx chappuisi* Walter, 1917

DIAGNOSIS (adults). – Dorsum with anterior and posterior dorsal plate and pair of ocular plates; with four to five pairs of very short dorsal setae and four(?) to five pairs of gland pores. Third, fourth and fifth pair of gland pores on minute sclerites in striated integument. Venter with anterior epimeral plate, pair of posterior epimeral plates and genitoanal plate. Anterior epimeral plate with three pairs of setae, posterior epimeral plates with a dorsal, lateral and ventral seta. Genital acetabula in posterior part of genitoanal plate lateral



Figs 1-5. *Soldanellonyx lohmannelloides* (Sokolov & Yankovskaya, 1970), male. **1**. idiosoma, dorsal, **2**. idiosoma, ventral, **3**. genitoanal plate, ventral, **4**. gnathosoma, lateral, **5**. fourth palpal segment, lateral. (Scale = 100 µm).

to genital opening. Females with three to seven pairs of perigenital setae, males with up to 66 setae. Anal sclerites about as large as genital sclerites. Rostrum with two pairs of maxillary setae. Palps four-segmented, attached dorsally. Second palpal segment with two slender dorsal setae. Third segment with large ventral spine. Apical segment with six setae and a spine. Genua on legs I and II shorter than telofemora. Several of dorsal setae short and spur-like. Tarsi I to IV with 1, 0, 0, 0 ventral setae and 4, 4, 4, 3 dorsal setae (famulus omitted). Tarsi I to III with solenidia in dorsolateral position. Tarsi with paired claws; median claw lacking. Tines on claw I larger than those on following claws.

Soldanellonyx lohmannelloides (Sokolov & Yankovskaya, 1970)

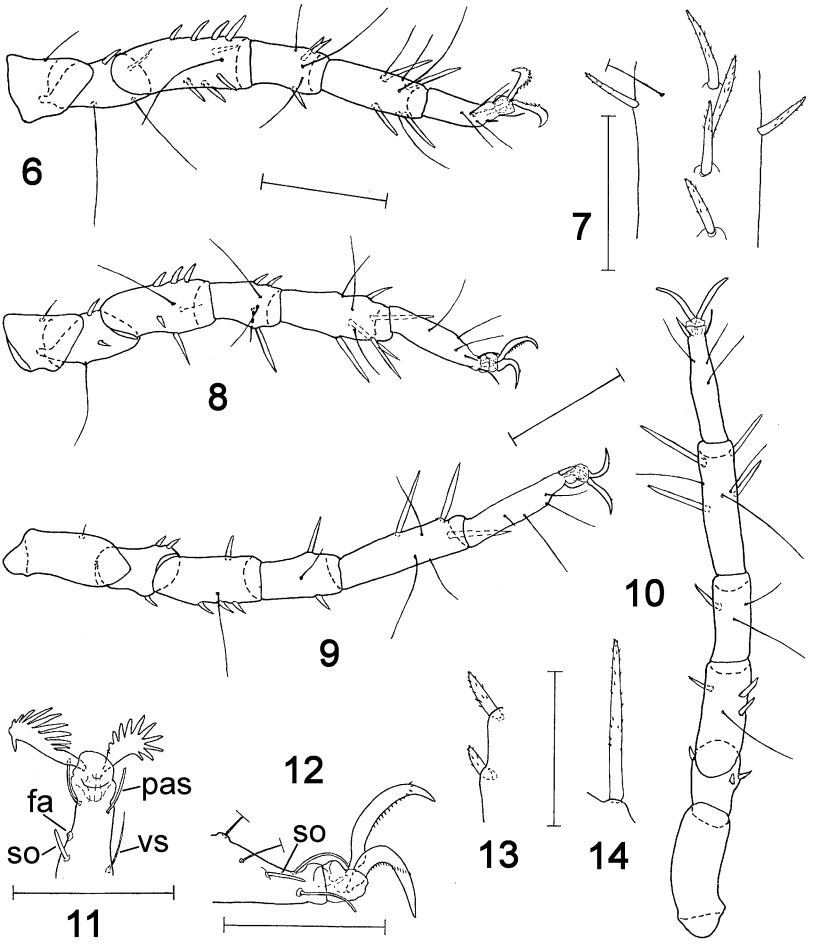
MATERIAL EXAMINED. – A male, Zoological Museum, University Hamburg (ZMH Acc. No. A22/12), Lake Baikal, southeastern coast, near Solzan, 50 m depth, 26 June 1965, sandy bottom, coll. M.M. Kozhov.

DIAGNOSIS (adults). – Length of idiosoma 500-550 µm. Cornea lacking. Gnathosoma almost half length of idiosoma. Female genital plate with seven pairs of external acetabula and seven pairs of perigenital setae. Male genitoanal plate with seven to eight pairs of genital acetabula and 60-70 perigenital setae. Rostrum and second palpal segment slender and distinctly longer than gnathosomal base. Leg I shorter than leg IV and shorter than idiosoma. Telofemur of leg I longer than this leg's tibia, telofemora III and IV shorter than tibiae. Genua I to IV with 2, 1, 1, 1 short ventral spines, tibiae I to IV with 4, 4, 3, 4 long spines. Pectines on claw I extending to basal part of claw, its tines stout. Pectines on following claws with minute tines.

MALE. – Length of idiosoma 535 µm. Dorsal plates faintly reticulate. Anterior dorsal plate almost quadrangular, 136 µm long, 154 µm wide; anterior margin truncate. Ocular plates as long as wide, 110x110 µm. Posterior dorsal plate ovate in outline, 264 µm long, 224 µm wide. Dorsal idosomatic setae very short; first pair of setae on anterior dorsal plate, second pair in anterior margin of ocular plate; a third pair of setae assumedly in anterior margin of posterior dorsal plate (a delicate pore on left side is expected to be a remnant of a seta); fourth and fifth pairs of setae marginally in anterior half of posterior dorsal plate, sixth pair on anal plate. First pair of gland pores immediately lateral to first pair of dorsal setae. Second pair of pores not seen in the single specimen studied. Third pair of pores on minute sclerites immediately lateral to posterior part of ocular plate, fourth and fifth pairs on sclerites lateral to posterior part of posterior dorsal plate (Fig. 1).

Anterior epimeral plate 160 µm long, 360 µm wide, posterior epimeral plates 220 µm long, genital and anal plate fused to genitoanal plate, this plate 259 µm long, 220 µm wide; its anterior margin truncate. Anterior epimeral plate with three pairs of setae (Fig. 2), PE with one dorsal, one lateral and one ventral seta. Genitoanal plate with seven and eight genital acetabula posterolateral to genital opening. With about 66 perigenital setae arranged around genital opening. Spermatopositor extending slightly beyond anterior margin of genitoanal plate (Fig. 3).

Gnathosoma 250 µm long, equalling almost half the length of idiosoma, and, according to Sokolov & Yankovskaya (1970, 1973), 2.1 times longer than wide. Rostrum and palps long and slender. Gnathosoma with two pairs of maxillary setae, both inserted within basal half of rostrum (Fig. 4). Distance from tip of rostrum to basal pair of maxillary setae almost 0.6 of gnathosomal length. Second palpal segment three times longer than high; segment with two short spur-like setae, inserted at 0.5 and 0.9 (relative to length



Figs 6-14. *Soldanellonyx lohmannelloides* (Sokolov & Yankovskaya, 1970), male. **6**. leg I, dorsal, **7**. marginal and dorsal spurs of telofemur I, left leg, **8**. leg II, dorsolateral, **9**. leg III, lateral, **10**. leg IV, dorsal, **11**. tip of tarsus I, dorsal (ventral setae omitted), **12**. tip of tarsus II, lateral, **13**. dorsal spurs of telofemur IV, left leg, **14**. basal spine of tibia III, left leg. (fa, famulus; pas, parambulacral seta; so, solenidion; vs, ventral seta) (Figs 6, 8-12: Scale = 100 µm, Figs 7, 13, 14: scale = 50 µm).

of segment and from basal to distal). Third segment with short basal spine at 0.8. Fourth segment with three basal setae, an apical spine, one slender seta and two eupathid setae (Fig. 5).

Length of legs I and II about 0.8 times of idiosomal length, that of legs III and IV about 0.9 times. Telofemur I longer than tibia I (Fig. 6), telofemora III and IV shorter than tibiae (Figs 9 and 10). Different number of setae on right- and left-side legs. From trochanter to tarsus (famulus and parambulacral setae omitted) leg I with 1, 3-4, 9-10, 6, 8, 5 setae, leg II with 1, 3-4, 6-7, 6, 7-8, 4, leg III with 1, 3, 4-5, 3, 6, 4, and leg IV with 0, 3, 4, 3, 7, 3 setae. Several leg segments with dorsal spurs and ventral spines, both spurs and spines delicately pectinate (Figs 7, 13, 14). Dorsal seta on basifemora I and II (Figs. 6 and 8) and both dorsal and ventral setae on basifemora III and IV spur-like (Figs 9 and 10). Telofemora I to IV with 2-3, 1, 1, 1 ventral spines; on telofemora I and II these spines longer than dorsal, medial and lateral spurs, on telofemora III and IV ventral spines only slightly longer than dorsal spurs. Genua I to IV with 2, 1, 1, 1 short ventral spines, tibiae I to IV with 4, 4(-5), 3, 4 long spines, respectively. Tarsus I with three slender dorsal setae, a solenidion, 9 µm long, and a bud-like famulus, both in dorsolateral position, a ventral seta and apically a pair of single parambulacral setae (Fig. 11). Tarsus II with three dorsal setae, dorsolateral solenidion, 12 µm long, and apical pair of single parambulacral setae (Fig. 12). Tarsi III and IV with four and three dorsal setae, respectively, a spur-like lateral and a seta-like medial parambulacral seta. All tarsi with paired claws. No median claw present. Pecten on claw I with about 11 large tines, pecten extending to basal part of claw. Pectines on following claws with minute tines.

FEMALE. – Genital plate with seven pairs of external acetabula and seven pairs of perigenital setae.

Taxonomic Remarks

Soldanellonyx lohmannelloides is easily distinguished from congeners because of its long and slender rostrum and palps. The elongate rostrum prompted Sokolov & Yankovskaya (1970) to erect a new genus. They called the genus *Pseudosoldanellonyx* because of its similarity with the genus *Soldanellonyx*, attributed it to the subfamily Limnohalacarinae and underlined the immediate proximity to *Soldanellonyx*. Bartsch (1989, 2009a) raised doubts about the validity of the genus *Pseudosoldanellonyx* and listed it as a synonym of *Soldanellonyx*. The characters of *S. lohmannelloides*, as redescribed above, do not support a position distinct from *Soldanellonyx*.

Unusual in *S. lohmannelloides*, compared to congeners, are the long rostrum and palps and the arrangement of the tines on claw I. In *S. lohmannelloides* the distance from the tip of rostrum to the basal pair of maxillary setae equals almost two-third of the gnathosomal length, in the other *Soldanellonyx* species this distance is slightly more than one-third of the gnathosoma. The length of the gnathosoma and its rostrum is an important specific character but no generic. Remarkable intrageneric differences have been documented, *e.g.* in the marine genera *Agaue, Agauopsis* and *Lohmannella*. *Agaue scita*

Bartsch, 1999 has a short rostrum and gnathosoma, *A. circellaris* Bartsch, 1999 an extremely long and slender rostrum; in *A. scita* the length of the gnathosoma equals about 0.3 times that of the idiosoma, the gnathosoma is twice as long as wide and the length of the rostrum is almost the same as that of the gnathosomal base, in *A. circellaris* these relations are 0.6, 4.0 and 3.8 times (Bartsch 1999a, b). *Agauopsis glabra* Bartsch, 2009 and *A. novaezelandiae* Bartsch, 1986 have a short rostrum and gnathosoma, *A. filirostris* MacQuitty, 1983 a long rostrum. The gnathosoma of the two first-mentioned species is 1.7 times longer than wide and the rostrum is less than 0.4 times the length of the gnathosomal base, the gnathosoma of the third species is 1.8 times longer than wide and the rostrum 1.2 times longer than the gnathosomal base (MacQuitty 1983, Bartsch 1986, 2009b). In the genus *Lohmannella* most species have long and slender rostra and palps, in some species (*e.g. L. fukushimai* Imamura, 1968, *L. cygna* Bartsch, 1988) the gnathosoma is almost as long as the idiosoma and the rostrum is almost twice as long as the gnathosomal base (Imamura 1968; Bartsch 1988, 1993), in other species (*e.g. L. kervillei* (Trouessart, 1894)) the gnathosoma is short, about or less than half the length of the idiosoma, and the length of rostrum and palps is less than that of the base (Bartsch 1977). In general, the shape of the gnathosoma is correlated with the mode of feeding and food.

In *S. lohmannelloides* tines are present on the apical part and the shaft of claw I, whereas in most *Soldanellonyx* species only the apical part of claw I bears tines. An arrangement of the tines similar to that of *S. lohmannelloides* seems to be present in *S. biwaensis* Tuzovskij, 2011 (Tuzovskij 2011: fig. 7). Further intermediate arrangements of the tines on claw I may be found in future studies.

At present nine *Soldanellonyx* species have been described, *S. akiyoshiensis* Imamura, 1959, *S. biwaensis*, *S. chappuisi* Walter, 1917, *S. lohmannelloides*, 1968, *S. miyakoensis* Imamura, 1957, *S. monardi* Walter, 1919, *S. morimotoi* Imamura, 1970, *S. papillosus* Imamura, 1957, *S. visurgis* Viets, 1959. The species once described as *Soldanellonyx marlieri* Bader, 1968 has been moved to the genus *Limnohalacarus* (Bartsch, in press). *Soldanellonyx monardi* includes four subspecies, *i.e. S. monardi monardi*, *S. monardi hyogoensis* Imamura, 1981, *S. monardi japonicus* Imamura, 1971, and *S. monardi saranganensis* Viets, 1929. *Soldanellonyx m. monardi* is spread world-wide, *S. m. hyogoensis*, *S. m. japonicus* are recorded from Japan and *S. m. saranganensis* from Java (Viets 1929; Imamura 1971, 1981; Bartsch 2009a).

Within the genus *Soldanellonyx* one can roughly distinguish between two lineages, one includes species with long telofemora I, with a length more than twice the height, and long tibiae with 4, 4, 3, 4 ventral spines on tibiae I to IV, respectively (*e.g. S. chappuisi* Walter, 1917), the other contains species with a short telofemur I, its length less than 1.5 times the height, and short tibia I with no more than two slightly spiniform ventral setae (*e.g. S. monardi* Walter, 1919). Two other distinguishing characters may be the absence (*S. chappuisi* group) versus presence (*S. monardi* group) of a pair of epimeral pores and the number of setae on genu III, three in *S. chappuisi* (and related species) versus four in *S. monardi*. *Soldanellonyx lohmannelloides* is a representative of the first-mentioned lineage, the shape of the legs is very

similar to that of *S. chappuisi* and the chaetotaxy almost identical. The *S. chappuisi* group includes *S. biwaensis*, *S. chappuisi*, *S. lohmannelloides*, *S. morimotoi*, *S. papillosus*, and *S. visurgis*; *S. akiyoshiensis* certainly also belongs to this group, its legs I are long and stout and the telofemora and tibiae I longer than those of the following legs (Imamura 1959). The *S. monardi* group includes the two species *S. miyakoensis* and *S. monardi*.

Biological Remarks

Soldanellonyx lohmannelloides seems to be a rather common species in the lake Baikal. Amongst the 100 mites collected by M.M. Kozhov, 74 belonged to *Soldanellonyx lohmannelloides* (Sokolov & Yankovskaya 1970, 1973). The samples were from a depth of 40-100 m. They included both females, males and juveniles. Within the genus *Soldanellonyx* females generally dominate in a given population and most of the species' descriptions are based on females; males seem to be rare, except for the two species *S. lohmannelloides* and *S. akiyoshiensis*. Sokolov (1952: fig. 91, 4) presented a drawing of a genital plate of a male *S. monardi*, but the sex of this mite is in need of confirmation.

The Lake Baikal, like other ancient and rather isolated water bodies with a long history, harbours a unique fauna; more than 1800 species are expected to be endemisms (Fact Sheet 2007). The Oligochaeta is one of the most abundant invertebrate taxa in the Lake Baikal, 160 out of 207 species and 13 out of 44 genera are endemic (Snimschikova & Akinshina 1994). Surprisingly the mite fauna seems to be poor. The freshwater mite taxon Hydrachnidia includes more than 6,000 species world-wide (Di Sabatino *et al.* 2008), but just 10 species are mentioned from the Lake Baikal (Tuzovski 2009), whereas of the family Halacaridae, which actually are marine mites with about 50-60 species living in freshwater areas (Bartsch 2008), at least five species are present in the Baikal water fauna (Sokolov & Yankovskaya 1973), *i.e. Parasoldanellonyx baicalensis* Sokolov, 1952, *P. parviscutatus* (Walter, 1917), *Soldanellonyx chappuisi*, *S. lohmannelloides*, a variety of *Parasoldanellonyx typhlops* Viets, 1933, and one of *P. parviscutatus*. *Parasoldanellonyx parviscutatus* and *S. chappuisi* are wide-spread in the Neoarctic and Paleoarctic region, *P. typhlops* is known from Europe and *Parasoldanellonyx baicalensis* from the Lake Hovsgol (Khövsgöl Nuur, Khubsugal) (Yankovskaya 1976), a lake which is a part of the Pribaikalye area (Mats 1993). At present, *Soldanellonyx lohmannelloides* has not been taken from outside the Lake Baikal, but detailed analyses of Siberian lakes are lacking.

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