

A NEW SPECIES OF THE FAMILY ALYCIDAE (ACARI, ENDEOSTIGMATA) FROM SOUTHERN SIBERIA, RUSSIA

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ABSTRACT: A new species is described from southern Siberia, Tuva Republic, Russia: *Amphialycus* (*Amphialycus*) *holarcticus* sp.n. (Acari, Endeostigmata, Alycidae). This species can be recognized by its broad naso with longitudinally arranged striae; two pairs of cheliceral setae, posterior one being forked; three pairs of adoral setae; and a large number of genital setae. Two pairs of palpal eupathidia are close to each other, representing a kind of transitional form towards the fusion of the basal parts of eupathidia, observed in the subgenus *Orthacarus*.

KEY WORDS: Mites, *Amphialycus*, taxonomy, Asia.

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INTRODUCTION

Mites of the family Alycidae G. Canestrini and Fanzago, 1877 (Acari, Endeostigmata) are free-living soil-dwellers, characterized by a worldwide distribution. A recent revision of the family by Uusitalo (2010) has focused on the European species. Meanwhile, species from other regions are virtually unknown. For example, alycids were not included in a recent thorough checklist of the mites of Pakistan (Halliday *et al.* 2018). There are only four records of the tribe Alycini G. Canestrini and Fanzago, 1877 from Asia: *Alycus roseus* C.L. Koch, 1842 from Tuva, Russia (Uusitalo 2010); *Alycus denasutus* (Grandjean, 1937) from Iran (Naghbinejad *et al.* 2009); and *Pachygnathus nipponicus* Shiba, 1982 and *Pachygnathus ornithorhynchus* sensu Shiba (1982) from Japan. No records of the tribe Petralycini Uusitalo, 2010 have been reported from Asia. Another alycid tribe, Proteromichaeliini Uusitalo, Ueckermann and Theron, 2020 is African. The tribe Bimichaeliini Womersley, 1944 is more common than the aforementioned ones. For example, *Bimichaelia* sp. has been recorded from China by Peng *et al.* (1988). Similarly, in the 1960s and 1970s, within the framework of the International Biological Program (IBP), the following species have been reported and described from Asia by Shiba (1969, 1976): *Bimichaelia reticulata* Shiba, 1969 and *Bimichaelia diadema* sensu Shiba (1969) from Japan; *Bimichaelia torrida* Shiba, 1976 (= *Bimichaelia torridus* Shiba, 1976, wrong gender), *Bimichaelia arbusculosa* sensu Shiba (1976), and *Laminamichaelia shibai* Uusitalo, Ueckermann et Theron, 2020 (= *Bimichaelia ramosus* Shiba, 1976, nom. preocc.) from the Malay Peninsula. Based only on the original descriptions, they all probably belong to the genus *Laminami-*

chaelia Uusitalo, 2010 and should be re-examined. For example, *Bimichaelia ramosus* was redescribed and renamed as *Laminamichaelia shibai* Uusitalo *et al.*, 2020 in a recent review of the South African Alycidae (Uusitalo *et al.* 2020).

Furthermore, *Bimichaelia grandis* was described by Berlese (1913) from the island of Java, Indonesia; this species will be redescribed based on recent material from Polynesia. Here, we describe an alycine species, *Amphialycus holarcticus* sp.n. from Russia, referred to as ‘amp’ in my revision (Uusitalo 2010).

MATERIALS AND METHODS

The samples were collected by the author using a collapsible, full-sized Berlese-funnel system (Norton and Kethley 1988). The specimens were examined by SEM (Scanning Electron Microscope, JEOL JSM-5200) after being dehydrated by critical point drying (CPD) and coated with gold.

The character states of clades above the species level are only briefly commented on here. My revision of the family Alycidae (Uusitalo 2010) should be used for descriptions of the family, tribe and genus. This work should also be used as a key to species and synonymy.

We used the standardized terminology proposed for various morphological features of Prostigmata; abbreviations mainly follow Kethley (1990). In species of the family Alycidae, gender cannot be recognized by SEM-micrographs unless the genital valves are open—enough to allow the counting of eugenital setae.

The holotype was collected from the Republic of Tuva, Central Asia; the North American specimens are from the State of Utah.

SYSTEMATICS

Family Alycidae G. Canestrini and Fanzago, 1877

The presence of two pairs of prodorsal sensilla (*ve* and *sci*) inserted in separate bothridia (=large pores) is the easiest way to recognize these soft, sack-like and segmented species of Alycidae (Fig. 2).

Tribe Alycini G. Canestrini and Fanzago, 1877 Type genus: *Alycus* C.L. Koch, 1842

The tribe Alycini can be separated from the tribes Proteromichaeliini, Bimichaeliini and Petralycini, as well as from the rest of the Endeostigmata, by the presence of rudimentary posterior pair of lateral eyes, two pairs of filamentous sensilla and chelate chelicerae with two to four teeth each (Figs. 1 and 4).

Amphialycus Zachvatkin, 1949

Type species: *Amphialycus pentophthalmus* Zachvatkin, 1949; by original designation.

The genus differs from other genera of the family by a pubescent pair of setae *in*; elongated and robust chelicera (Fig. 1); microtrichous palpal eupathids (Fig. 4), which may be separated (subgenus *Amphialycus*) or basally fused (subgenus *Orthacarus*); and by empodia densely setulated.

Amphialycus (*Amphialycus*) *holarcticus* sp.n.

Figs. 1–10

Description: *Dorsum* (Figs. 1, 2). Length 560–700 µm; ciliate setae with longer central points in caudal segments; naso prominent, cone-shaped, longitudinally striated, pilose setae *vi*, *sce* and *exp* on hard integument, *exp* smallest, setae *in* pubescent, two pairs of filamentous sensilla *ve* and *sci* ciliated entire length, anterior pair of lateral eyes glabrous.

Venter (Figs. 5, 6). Setae numerous and short; genital setae 35–45 per valve; anal setae 5–9 per valve.

Gnathosoma (Figs. 1, 3, 4). Two pairs of cheliceral setae, smooth anterior pair abaxially, forked posterior pair in more dorsal position; rutella widen to a round hyaline membrane with two lobes apically, three pairs of well-developed adoral setae; four microtrichous eupathidia on palps close to each other but clearly apart.

Legs (Figs. 6–9). Setae elongated; solenidial formula for tarsi, tibiae, genua and femora on legs

I–II–III–IV, respectively: 2–1–0–0, 3–2–2–0, 3–2–2–1, 2–0–0–1+0, spine-like famulus on tarsus I and II.

Type material. Holotype from a *Larix* stand, 100 m away from the river, on northern slope, litter and soil under *Larix*, *Rhododendron*, *Spiraea*, *Clematis*, *Caragana* and *Pleurozium*, Tuva Republic, Russia, southern range of Tannu-Ola, 1,350 m a. s. l., 50°54'N, 94°29'E, Aryskanny-Khem River, 5 km ENE of the Khol-Oozha Village, 18 July 1995, sample MU 95-39, Matti Uusitalo; USA, Utah, Blacksmith Fork Canyon, ex Utah juniper duff, 24 April 1970, G.F. Knowlton and W.J. Hanson: 15 ex., Acarology Laboratory, Ohio State University, OSU coll. no. AL0726 sub *Alycus* sp.

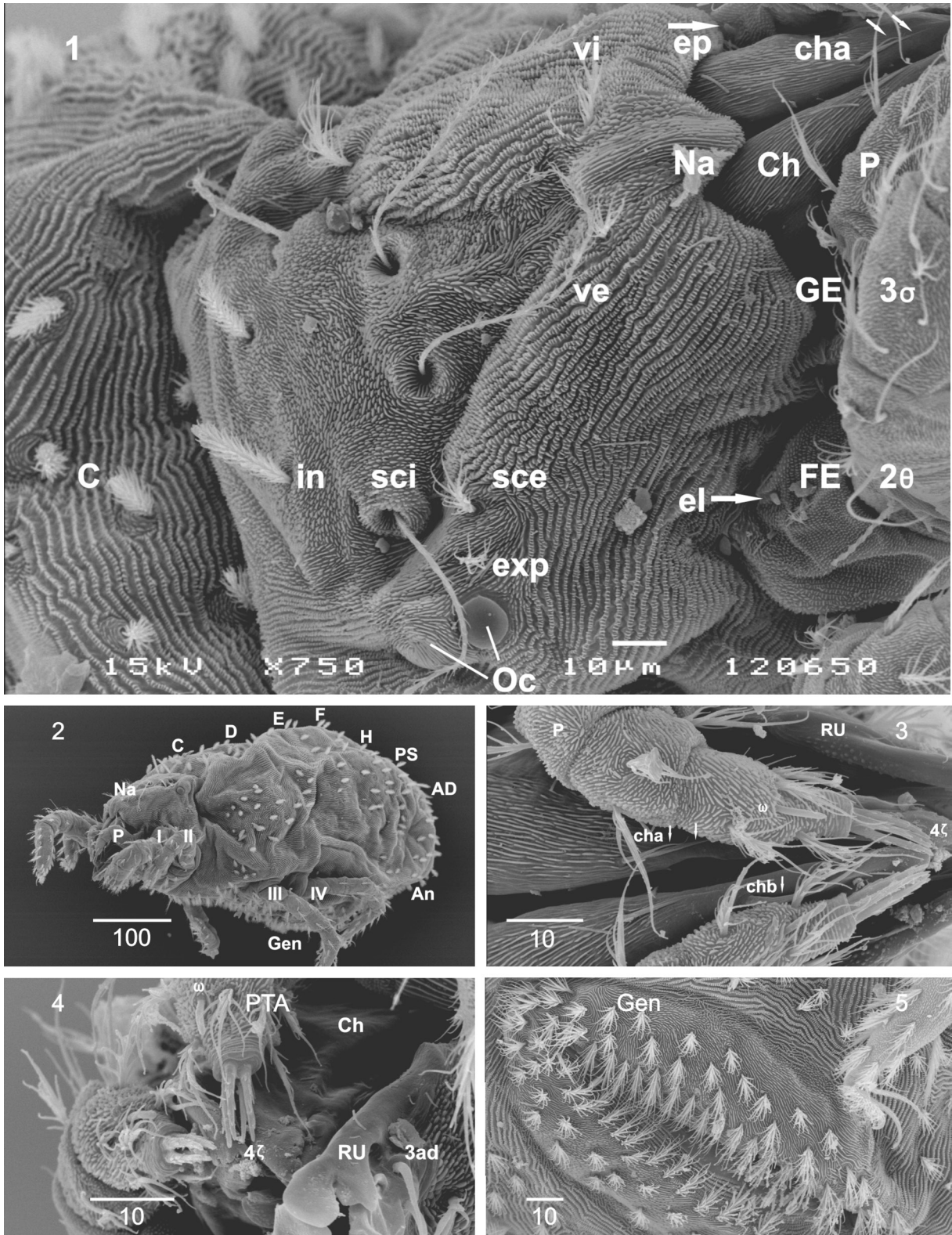
Type depository. Holotype on SEM-stub U200 at Zoological Museum, University of Turku, Finland (ZMT); one paratype female at Zoological Museum, University of Turku; 9 paratype females and 4 paratype males at Acarology Laboratory, Ohio State University.

Etymology. The specific name refers to the circumpolar distribution of the species.

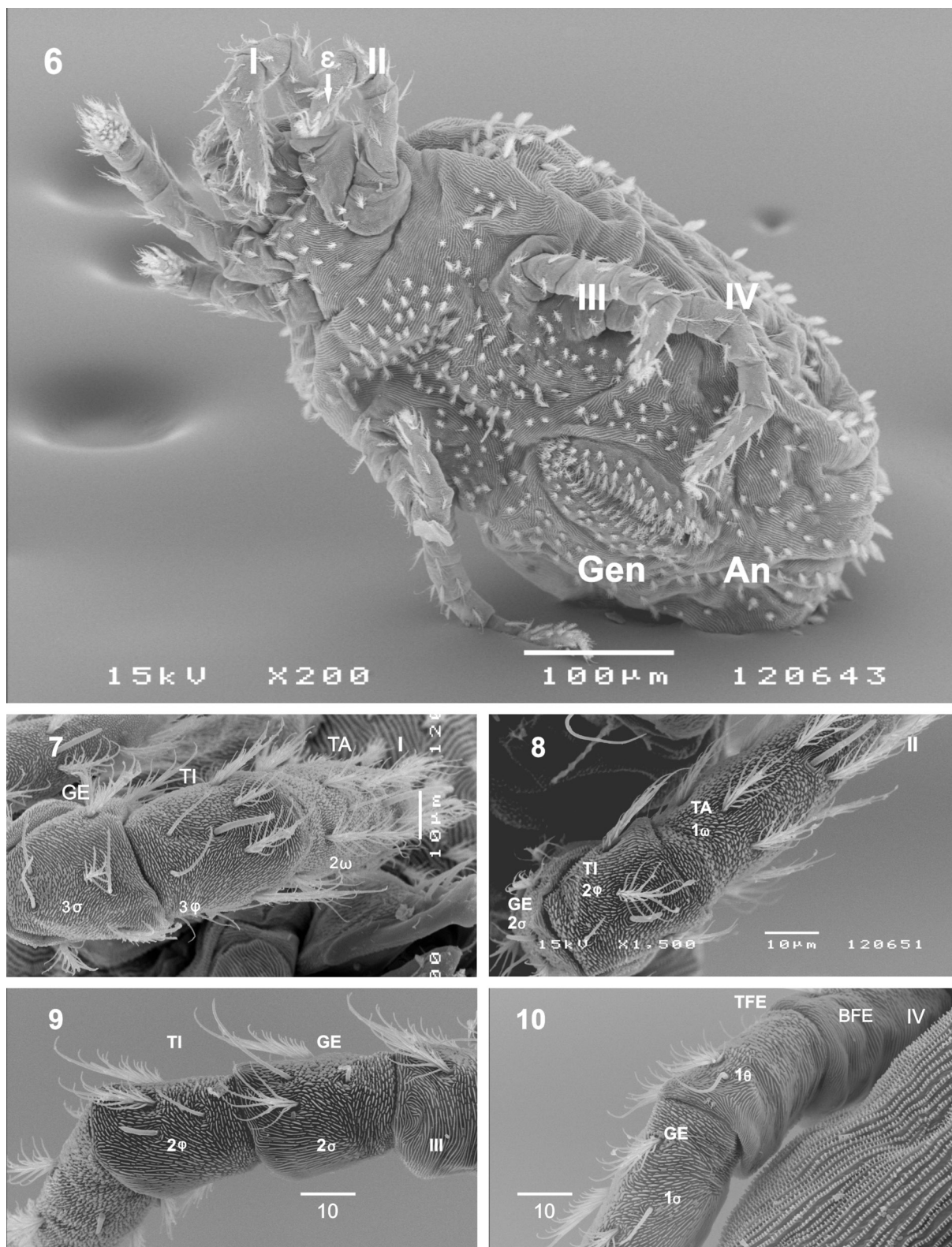
Differential diagnosis. This species can be distinguished from the other *Amphialycus* species by the following: its broad naso with longitudinally arranged striae (Fig. 1) (vs. striae arranged transversely or naso being a roundish button or absent (Uusitalo 2010: figs. 4, 71, 82; Uusitalo *et al.* 2020: figs. 30, 49, 64)); two pairs of cheliceral setae, with the posterior one being forked (Figs. 1, 3) (vs. one pair of smooth cheliceral setae abaxially or cheliceral setae absent (Uusitalo 2010: figs. 4, 5, 74; Uusitalo *et al.* 2020: figs. 34, 48, 68)); three pairs of adoral setae (Fig. 4) (vs. one or two pairs (Uusitalo 2010: figs. 70, 79; Uusitalo *et al.* 2020: figs. 36, 52, 69)); and 35–45 genital setae per valve (Fig. 5) (vs. 21–24 genital setae in *A. leucogaster*, 12–18 genital setae in *A. oblongus*, 21–22 in *A. acacia*, 19–22 in *A. adustus*, 17–24 in *A. mayteni* (Uusitalo *et al.* 2020: figs. 32, 51, 72, 79)). Two pairs of palpal eupathidia are close to each other (Figs. 3, 4)—a kind of transitional form towards the fusion of the basal parts of eupathidia, observed in the subgenus *Orthacarus* (Uusitalo 2010: fig. 85).

DISCUSSION

Mites of the family Alycidae are not of economic importance—they are not pests or useful in controlling pests or weeds—and therefore not subjects of any intensive investigation in that sense. People's fascination with this family is a result of the prehis-



Figs. 1–5. *Amphialycus holarcticus* sp. n. 1—Prodorsum with conical naso, setae *vi*, *sce* and *exp* on hard integument, plus forked cheliceral *cha* (two small arrows), supracoxal setae of palp and leg I (large arrows), Genu I (3 solenidia), Femur I (2 solenidia); 2—Lateral habitus, integument with continuous ridges; 3—Two pairs of cheliceral setae, *chb* simple (one arrow) *cha* forked (two arrows); 4—Four microtrichous eupathids on palps, rutellum lobed, 3 pairs of adoral setae; 5—Genital valves with 42–44 setae.



Figs. 6–10. *Amphialycus holarcticus* sp.n. 6—Ventral habitus with prominent neotrichy, genital valves with 42–44 setae, anal valves with seven setae, famulus II (arrow); 7—Tarsus I (2 solenidia), Tibia I (3 solenidia), Genu I (3 solenidia); 8—Tarsus II (1 solenidion), Tibia II (2 solenidia), Genu II (2 solenidia); 9—Tibia III (2 solenidia), Genu III (2 solenidia); 10—Genu IV (1 solenidion), Telofemur IV (1 solenidion). 1–10 from Russia (SEM-stub U200).

toric nature of the phenotypical characteristics of its members. Plesiomorphic character states, e.g., soft, sack-like and segmented body, two pairs of bothridial sensilla, chelate-dentate chelicera, linear palps and four pairs of walking legs strongly support the idea of an ancient origin of the family, although strong fossil evidence is still missing (Sidorchuk 2018).

The intense early descriptive work was inadequate to allow species identification. Kethley (1982) stated that the family contains 7 nominal genera and 34 nominal species, but only 4 of the genera and 11 of the species were recognizable. Based on the global material, phylogenetic analysis revealed 2 subfamilies, 4 tribes, 6 genera, and, to date, about 50 species of alycid mites. However, only 30 of the species are accurately described (Uusitalo 2010, Uusitalo *et al.* 2020). This paper is an effort to advance our knowledge of alycid biodiversity.

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