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TWO NEW SPECIES OF *EULOHMANNIA* BERLESE 1910 (ACARI, ORIBATIDA, EULOHMANNIIDAE) FROM THE RUSSIAN FAR EAST AND KASHMIR

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In surveying material of the genus *Eulohmannia* Berlese 1910, representatives of two new species were discovered. *Eulohmannia aborigensis* sp. n., described based on all instars, is known only from alpine environments of the Kolyma Highlands in Magadan Oblast, Russia. It is the largest species of the genus known (length often well over 800 μm) and appears to be bisexual. Adults are unique among the known species of *Eulohmannia* in having a relatively long femur IV (about 2 times the length of trochanter IV), three setae on trochanter III, 14 setae on tarsus IV, and a minute tooth or spine at the base of each lateral claw. *Eulohmannia juvenalis* sp. n., described based on adults and a single tritonymph, is known only from forest soil in the Kashmir Valley (Kashmir). Among the known species of the genus, adults are unique in having paedomorphic legs, resulting from several specific neotenic characters. The most conspicuous is a monodactylous pretarsus on all legs and the retention of a single seta on trochanters III and IV, but several other setae are delayed or fail to be developed.

Ключевые слова: эдафические почвенные клещи, партеногенез, педоморфоз, таксономия, морфология, онтогенез, Евразия

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Eulohmannia Berlese 1910 (Eulohmanniidae) is a distinctive oribatid mite genus that exhibits a Laurasian distribution (Hammer, Wallwork, 1979), having been reported from across temperate and boreal regions of the Nearctic and Palaearctic realms (Marshall et al., 1987; Mahunka, Mahunka-Papp, 1995) while apparently being absent from the Southern Hemisphere (Subías, 2004; Subías et al., 2012). Its species have a unique body form – narrowly cylindrical and constricted at the sejugal articulation – and are members of the euedaphic soil fauna found predominantly in fine humus under forest litter, mosses, or tundra.

Most published information about the genus relates to the widespread type species, *E. ribagai* (Berlese 1910), which has long been viewed as the single well-documented species in a family that is typically characterized as relictual and thelytokous ('parthenogenetic'). But recently, Norton and Ermilov (2022) revealed a greater diversity in Eulohmanniidae, from the standpoints of taxa, morphology and biology. They proposed a second genus (*Paedolohmannia*), the type species of which – *P. metzi* Norton et Ermilov 2022 – is both distinctly paedomorphic and sexual; they recognized *E. bifurcata* Fujikawa 2014 (first proposed as a subspecies of *E. ribagai*) as a distinct species; they reported sexual populations of *E. ribagai* in the northwestern Nearctic; and they revealed the existence of two undescribed *Eulohmannia* species from Asia.

Our purpose herein is to formally describe the latter two species, each known only from its type locality. *Eulohmannia aborigensis* sp. n. from the subarctic Kolyma Highlands of Magadan Oblast, Russian Far East, is a large species having a proportion of males and females that is typical of sexual oribatid mite species. The description is based on all instars. *Eulohmannia juvenalis* sp. n. from a mixed forest in the Kashmir Valley (Kashmir), is described based on adults and one tritonymph. It apparently is a thelytokous species (no males found) that exhibits several paedomorphic traits, the most conspicuous of which is monodactylous leg pretarsi. In both descriptions, some traits are compared to those of *E. ribagai*, as presented by Norton and Ermilov (2022).

METHODS

S p e c i m e n s. Material of *E. aborigensis* sp. n. came from two sources. Most is from the Canadian National Collection, Ottawa, Canada (CNC) and derived from a 1979 collecting expedition by Drs. V. Behan-Pelletier and A. Fjellberg to the Kolyma Highlands (Magadan Oblast), linked to a USA-USSR Bilateral Exchange Program. A smaller portion was more recently

collected from the same location (2006, by A. Alfimov) and contributed by Dr. O. Makarova. Due to specimen hardening and inability to clear properly, data for nymphs (all from 1979 collections) are incomplete; particularly, a full set of setal measurements, as in the larva and adult, was not possible.

Material of *E. juvenalis* derives from a single soil sample, taken by author R.A.N. during a collecting trip to the Kashmir Valley in 1986.

Observation and documentation. Most specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Some data and images were obtained from dissected specimens, or from specimens permanently mounted on slides in the CNC collection (see below). For body length measurement we followed the method of Norton and Ermilov (2022), which removes the variation derived from differing degrees of body distention; due to the broad, soft sejugal articulation and potential for telescoping, a fully contracted individual may have only 90–94% of its fully distended length. Specifically, body length was measured as the sum of notogastral (gastronotal in juveniles) and prodorsal length, with the latter measured only to the tip of the rostrum – i.e., the projecting parts of the gnathosoma were not included as they also varied in distension. Therefore, the largest individuals – if they are fully distended and measured from the tip of the gnathosoma to the end of the hysterosoma – could be almost 15% longer than our indicated upper limit. Notogastral (gastronotic) width refers to the maximum width of the hysterosoma in dorsal view. Lengths of body setae were measured as to avoid foreshortening errors. All measurements are presented in micrometers. Formulas for leg setation counts are given in parentheses according to the sequence trochanter-femur-genu-tibia-tarsus (famulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu-tibia-tarsus. Drawings were made with a camera lucida using a Leica DM 2500 transmission light microscope. Other observations and light photography employed bright-field, polarized, and Nomarski (DIC) illumination using a Nikon Eclipse E800 compound microscope. Light micrographs were obtained, usually as image stacks, with an AmScope MU800 digital camera. Image stacks were combined using the Helicon Focus Pro (v. 5.0) suite; the stacks varied widely in number of individual images, usually only several for highly magnified images and 15–30 for lower magnifications. As needed, images were adjusted with Adobe Photoshop (CS3) for contrast and color balance.

Terminology and conventions. General morphological terminology used in this paper mostly follows that of Grandjean (see Travé, Vachon, 1975 for references), Norton (1977), and Norton and Behan-Pelletier (2009).

Abbreviations. *Prodorsum*. Setae: *ro*, *le*, *in*, *bs*, *exa*, *exp* – rostral, lamellar, interlamellar, bothridial, and exobothridial (anterior, posterior) setae, respectively. Other structures: *rph* – rostrophragma; *col* – cervical collar; *sej* – sejugal articulation. *Notogaster*, *gastronotum*. Setae: *c*-row (c_1, c_2, c_3, *cp*); *d*-row (d_1, d_2); *e*-row (e_1, e_2); f_2; *h*-row (h_1, h_2, h_3); *ps*-row (ps_1, ps_2, ps_3). Other structures: *ia*, *im*, *ip* – anterior, middle, posterior lyrifissures, respectively; *ih*, *ips* – lyrifissures associated with setal rows *h* and *ps*, respectively; *ncx* – narrow scissure between notogaster and coxisternum. *Coxisternum and lateral podosoma*. Setae: *eI* – supracoxal seta; *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *3d* – setae of epimeres I–III. Structures: *Cl* – Claparède's organ; *cpc* – podocephalic canal; *pdc* – prodorsal carina; *vc* – vertical contour marking anterior extent of cervical collar. *Anogenital region*. Setae: ad_1, ad_2, ad_3, ad_4 – adanal setae; an_1, an_2 an_3, an_4 – anal setae; *x* – questionable neotrichous seta. Other structures: *AD* – adanal plate or segment; *AN* – anal plate or segment; *iad*, *ian* – adanal, anal lyrifissure, respectively. *Gnathosoma*. Setiform organs: *a*, *m* – anterior, middle seta of gena; *h* – hypostomal seta of mentum; *sup*, *inf*, *d*, *l*, *acm*, *cm*, *ul*, *vt*, *lt* – palp setae; *ep* – postpalpal seta; ω – palp tarsal solenidion; *chb* – cheliceral seta. Other structures: α*f* – adaxial (antiaxial) fissure of rutellar manubrium; *br* – rutellar brush (=ciliary comb); *RU* – rutellum; *G* – gena; *H* – mentum; *LL* – lateral lip; *LS* – labrum; *en* – line of attachment for cheliceral frame; *l.or* – lamellated organ; *op*' – adaxial oncophysis. *Legs*. Setiform organs: σ, φ, ω – solenidia of genu, tibia and tarsus, respectively (with numeric subscript if relevant); *e* – famulus of tarsus I; *d*, *l*, *v* – dorsal, lateral, ventral setae of whorl, respectively; *bv*, *ev* – basal trochanteral setae; *a*, *c*, *ft*, *it*, *m*, *p*, *pl*, *pv*, *s*, *tc*, *u* – tarsal setae; *dv* – vestige of seta *d*. Parentheses around leg setal notations denote the two members of a pseudosymmetrical pair on a given leg segment, rather than a true bilateral pair (unless otherwise indicated); when denoted separately, prime and double-prime (', '') distinguish the seta on the anterior and posterior face, respectively.

TAXONOMY

Eulohmannia aborigensis Ermilov et Norton sp. n.

(Figs 1–5, 8)

Material. Holotype (♀), seven paratypes (5♀♀, two undetermined sex) and two non-type larvae: Russia, Russian Far East, Kolyma Highlands of Magadan Oblast, Aborigen, above Alpine Field Station, litter in dense thicket of *Betula nana*, 26.07.1979 (leg. A. Fjellberg). Five adult paratypes (unsexed) from same location, litter and turf in dense stand of *Rhododendron aureum*, 24.07.1979 (leg. A. Fjellberg)*; 15 adult paratypes (unsexed) from same locality, Alpine Study Area, Saddle site, from lichens, moss and soil under *Dryas*, *Empetrum*. 23.07.1979 (leg. V. Behan). Six paratypes (4♀♀, two undetermined) and one non-type larva: Russia, Russian Far East, Kolyma Highlands of Magadan Oblast, Annachag, Aborigen, valley of the

Fig. 1. *Eulohmannia aborigensis* sp. n., adult: *a* – dorsal view (legs omitted); *b* – ventral view (legs and part of palps omitted); *c* – lateral view (gnathosoma and legs omitted or represented by trochanter); *d* – posterior view of hysterosoma; *e* – subcapitulum, ventral view (palps omitted); *f* – chelicera, adaxial view. Scale bars (μm): *a*–*d* – 100; *e*, *f* – 50 .

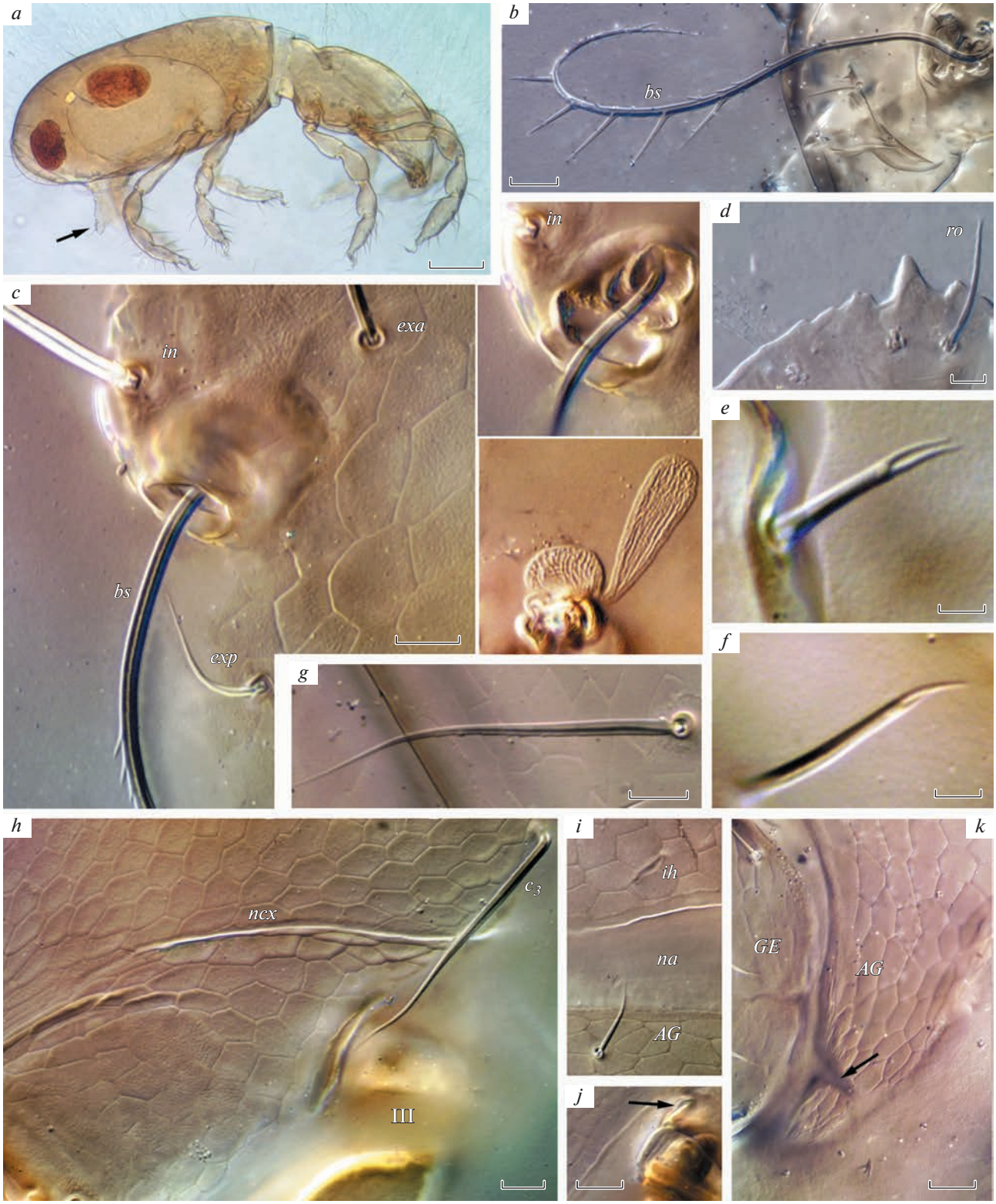

Fig. 2. *Eulohmannia aborigensis* sp. n., adult: *a* – gravid female, lateral view (arrow on extended ovipositor); *b* – bothridial seta, dorsal view; *c* – bothridial region at surface (left) and two successive depths of focus, showing internalized chambers (upper right insert) and heteromorphic saccules (lower right insert); *d* – middle of rostral tectum margin; *e* – typical supracoxal setae *eI*; *f* – unusual, asymmetrical *eI*; *g* – notogastral seta c_1; *h* – lateral view of anterior hysterosoma; *i* – region of venter showing neotrichous seta of aggenital region and lyrifissure *ih* close to band *na*, anterior to right; *j* – region of leg IV insertion (arrow to opening of gland *g4*); *k* – partial genital plate and encompassing arm of aggenital sclerite (arrow to notch in sclerotization). Scale bars (μm): 100 (*a*), 10 (*b*, *c*, *g*–*k*); 5 (*d*), 2 (*e*, *f*).

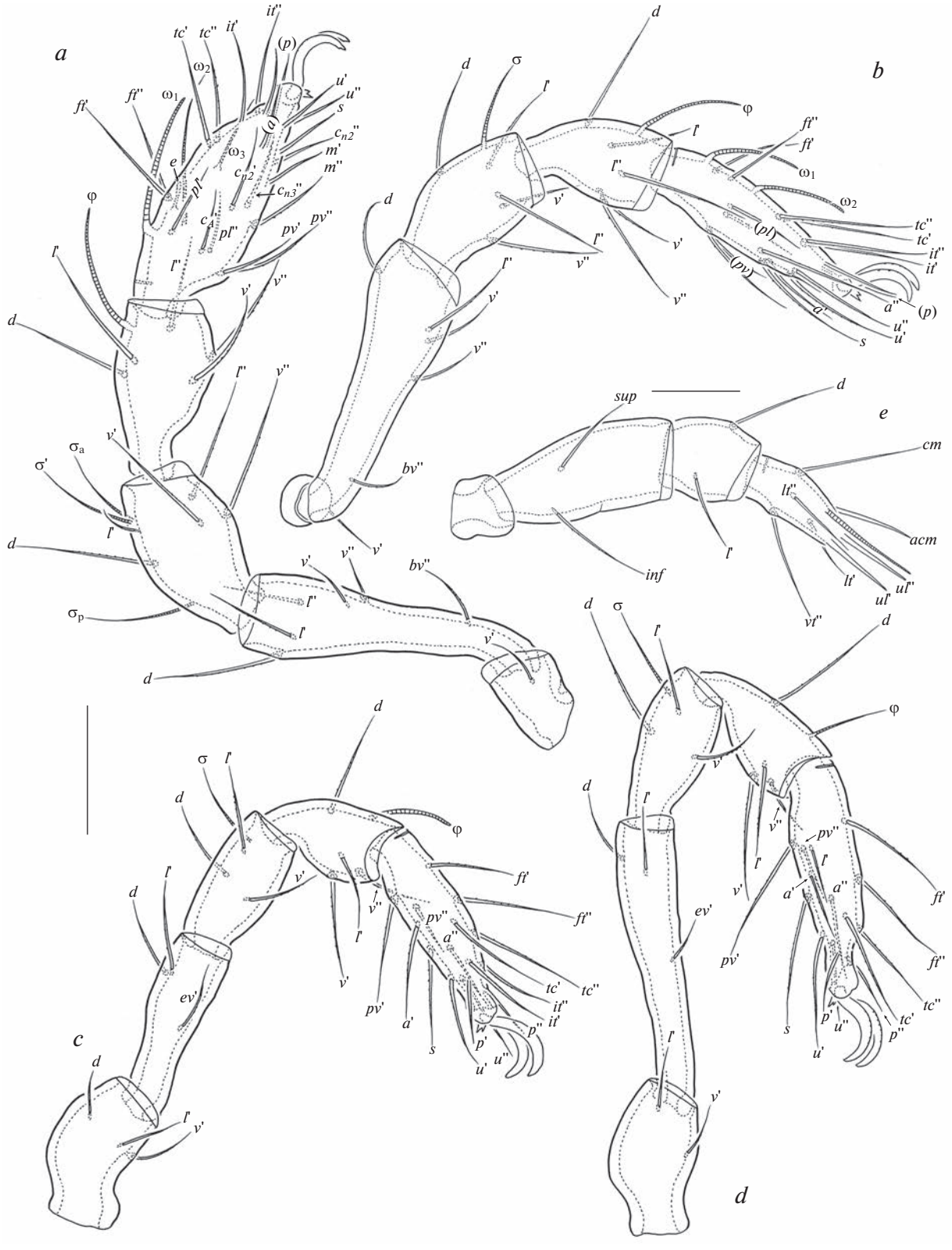

Fig. 3. *Eulohmannia aborigensis* sp. n., adult: *a* – left leg I, adaxial view; *b* – right leg II, abaxial view; *c* – left leg III, abaxial view; *d* – left leg IV, abaxial view; *e* – right palp, abaxial view. Scale bars (μm): 50 (*a*–*d*), 20 (*e*).

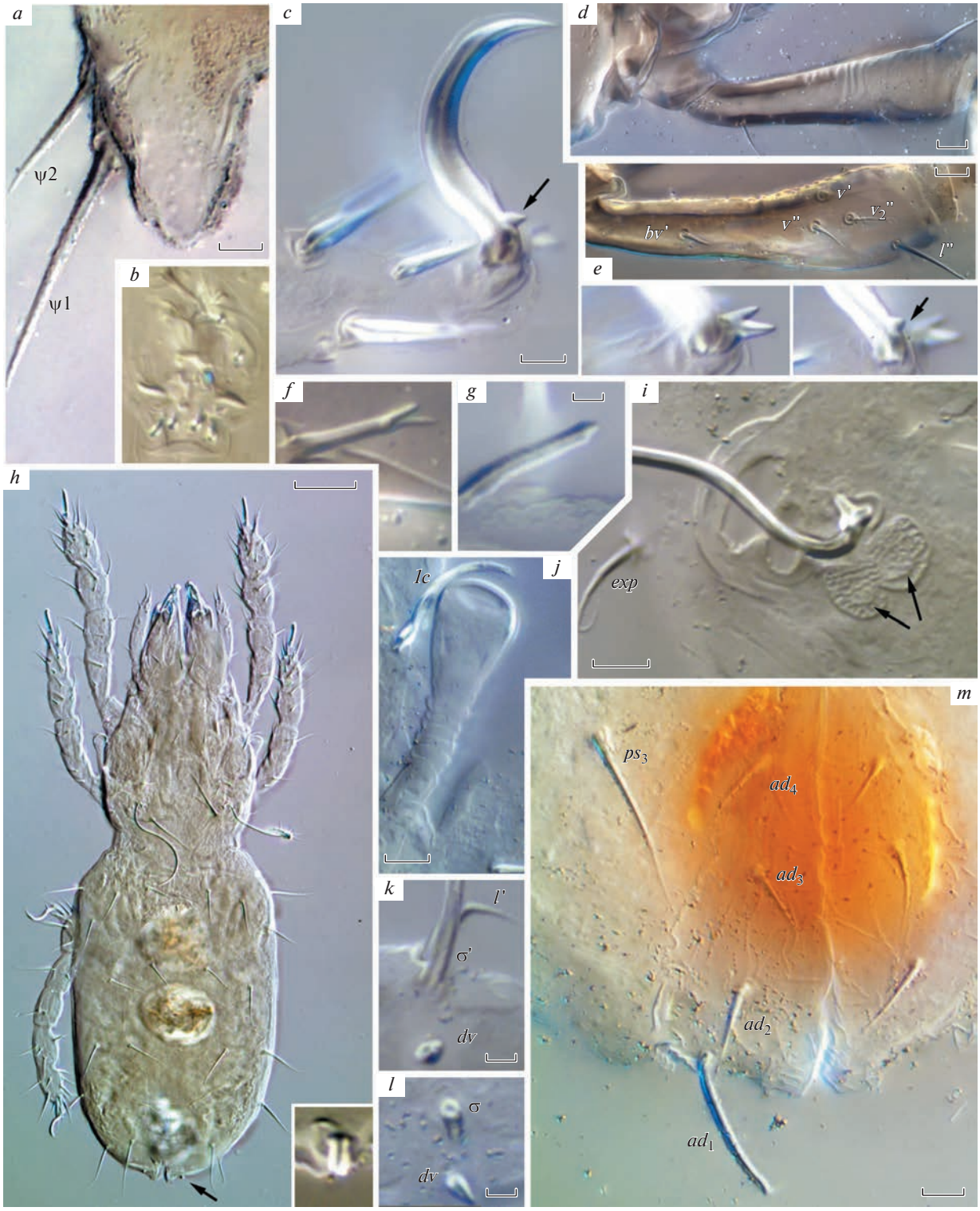

Fig. 4. *Eulohmannia aborigensis* sp. n., adult (*a*–*g*) and juveniles (*h*–*l*): *a* – ventral lobe of ovipositor, lateral view (see Fig. 2*a*); *b* – spermatopositor, ventral view; *c* – pretarsus IV, focused successively on upper lateral claw, empodium, and lower lateral claw arrows to basal spine); *d* – base of left leg I, ventrolateral view; *e* – left femur I, ventral view, with variable seta v_2"; *f* –seta *ep*; *g* – famulus; *h* – larva, dorsal view (arrow on base of broken seta ps_1, enlarged in insert); *i* – optical section of larval bothridium showing homomorphic saccules (arrows); *j* – left larval Claparède's organ, ventral view (scale-like seta *lc* seen from side); *k* – dorsocentral region of larval genu I, showing setal vestige *dv*; *l* – same, genu III (only base of σ in focus); *m* – posterior hysterosoma of protonymph, ventral view (seta ad_1 broken from one side). Scale bars (μm): 50 (*h*), 10 (*d*, *e*, *j*), 5 (*a*–*c*, *i*, *m*), 2 (*f*, *g*, *k*, *l*). N.B., the fine particulate debris coating various structures is an artifact (precipitate).

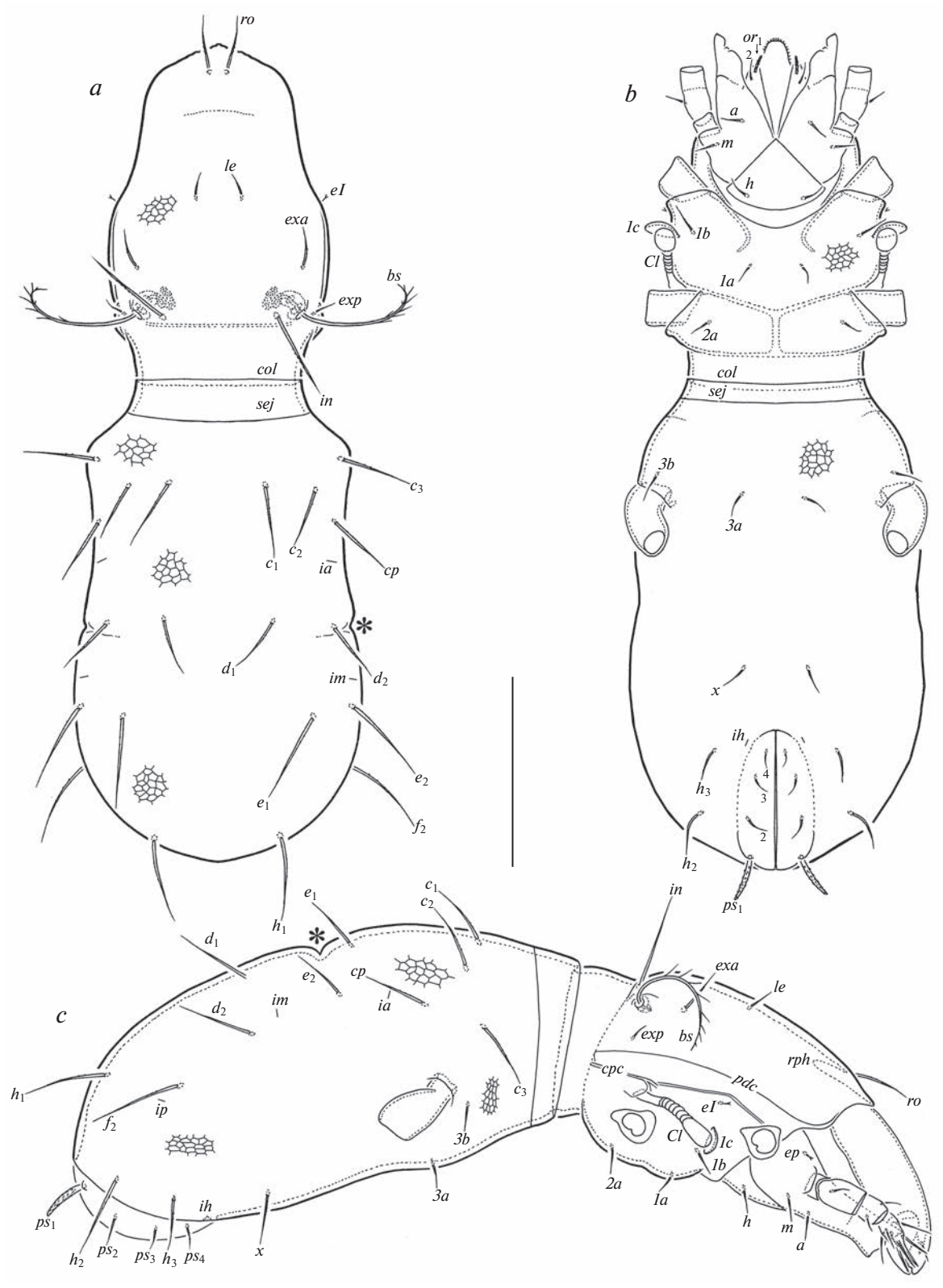

Fig. 5. *Eulohmannia aborigensis* sp. n., larva: *a* – dorsal view; *b* – ventral view (palp and legs only partly drawn); *c* – lateral view (legs indicated only by trochanters). N.B., the illustrated specimen has a slight transverse dorsal crease on the hysterosoma, marked by *, that represents an artifact of preservation or preparation, which commonly occurs in juveniles of Eulohmanniidae (see Norton, Ermilov, 2022). Scale bar 100 μm.

Olen' river, mosses and lichens on a slope, 23.08.2006 (leg. A. Alfimov).

The holotype is deposited in the CNC. Thirteen paratypes and three larvae are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia, preserved in 70% solution of ethanol with a drop of glycerol. Of the remaining paratypes (in alcohol), 18 are deposited in the CNC; two are in the personal collection of author R.A.N.

Other studied material (all non-types borrowed from the CNC) included 10 juveniles in alcohol (3 larvae, 2 protonymphs, 2 deutonymphs, 3 tritonymphs) and the following series of specimens mounted on permanent slides with the indicated label data. Aborigen, southern parts of Bolshoi Annachag Mountain, July 1979, A. Fjellberg col. (3♀♀, 4♂♂); same, along Aufeis River, 25.07.1979, A. Fjellberg col. (1♀); Aborigen Alpine Study Area, Saddle site, 23.07.1979, V. Behan col. (5♀♀, 4♂♂, 1 protonymph, 2 deutonymphs, 2 tritonymphs); same, Aborigen transect T1S4, 25.07.1979, V. Behan col. (1♀). Three additional males (from the Fjellberg collection marked above with *) were highly dissected and not retained.

D i a g n o s i s. **Adult.** Body length: 718–854. Males frequent. Rostrum with distinct medial mucro, flanked by pair of distinct notches. Relative lengths of prodorsal setae: *bs* > *in* > *exa* > *ro* > *le* > *exp*. Epimere III with four pairs of setae; fused epimere IV and aggenital region with about 16 pairs of neotrichous setae. With 9–10 pairs of genital setae; posterior arms of aggenital sclerite each notched medially, partly isolating small terminal section. Leg pretarsi heterotridactylous with empodial claw strongly reduced, bidentate; femur IV elongate, about twice length of trochanter IV; trochanter III with three setae. **Juveniles.** Bothridial saccules homomorphic in all juvenile instars. Larva with one pair of setae anterior to paraprocts; stalk of Claparède's organ with 6–7 annuli proximal to clavate head.

D e s c r i p t i o n. With generic traits of *Eulohmannia* (see Norton, Ermilov, 2022); adults and juveniles generally similar to those of *E. ribagai* except as noted.

Adult. *Measurements*. Large species: body length 718–854 (holotype 780); males usually slightly smaller than females (718–786 versus 776–854). Body width: 250–310 (holotype 270).

Integument. Body color pale yellow to light yellow in preserved specimens. Irregular surface reticulation of depressed lines leaving slightly protruding, plateau-like polygons (Figs 2*c*, 2*h*, 2*k*), mostly 5- or 6-sided; polygons of prodorsum almost equal-sided, ca. 8–10 wide; those of notogaster more variable and irregular, in part like those of prodorsum, in part about twice as long (8–12) as wide (4–6) and vaguely aligned in transverse (middorsal) or longitudinal (lateral; Fig. 2*h*) rows; reticulation of venter similar to that of prodorsum, but mostly smaller (4–6), sometimes with vague longitudinal alignment. Cervical collar roughened ventrally with reticulate pattern, but without distinct longitudinal striae or ridges.

Prodorsum. Rostrum with distinct, triangular medial mucro, set off by pair of flanking lateral notches; remainder of rostral margin nearly smooth or weakly serrate-crenulate immediately lateral to notches (Fig. 2*d*). Setae *ro* (41–45), *le* (24–26), *in* (97–112), *exa* (56–67) and *exp* (15–17), weakly barbed or roughened with sparse minute, spicule-like barbs. Bothridial seta (123–131) sub-pectinate, with about 10 tines on outer curvature; with several distinct barbs on inner curvature and stalk (Figs 2*b*, 2*c*). Porose bothridial saccules heteromorphic: length of flattened, elongated saccule slightly more than twice diameter of spherical saccule (Fig. 2*c*).

Notogaster. Sub-elliptical, widest near middle, at level of setal row *e*. All 15 pairs of notogastral setae medium-sized (c_1, d_1, e_1, h_1: 52–60; ps_3: 41–48; others: 60–71), attenuate, slightly roughened with inconspicuous, spicule-like barbs, sometimes nearly smooth (Figs 2*g*, 2*h*). Lyrifissure *ia* positioned between setae *cp* and d_1; *im* between setae d_2 and e_2; *ip* posterior to seta f_2; *ips* closely anterior to seta ps_3; *ih* about one-third distance between *ips* and leg IV insertion but in variable location close to (Fig. 2*i*) or distant from (Fig. 1*c*) articulating band *na*.

Epimeral and lateral podosomal regions. Lateral scissure *ncx* (Fig. 1*c*) well defined in anterior half but may be indistinct or absent posteriorly (Fig. 2*h*). Setal formula for epimeres I–III: 3–1–4, with about 16 but up to 19 pairs of neotrichous setae on fused epimere IV and aggenital region; all setae (*3d*: 37–45; *1b*, *1c*, *2a*, *3a*, *3b*, *3c* and two pairs near leg IV: 22–26; others: 15–17) attenuate, inconspicuously barbed or roughened with sparse, minute spicules. Seta *eI* (9) bifurcated, with distal fork usually occupying about one-third its length (Fig. 2*e*); sometimes asymmetrical (Fig. 2*f*). Without vertical ridge posterior to leg I (*r1* absent).

Anogenital region. Posterior arms of aggenital sclerite each notched medially, partly isolating small terminal section (Fig. 2*k*). With 9 (usually) or 10 pairs of genital setae (11–13) attenuate, inconspicuously roughened; 10 pairs more common in females (6/15 plates examined) than males (1/14). Anal (an_1, an_2: 30–41; an_3, an_4: 18–26) and adanal (ad_1: 41–56; ad_2: 33–45; ad_3: 26–37; ad_4: 22–26) setae attenuate, inconspicuously barbed or roughened. Anal lyrifissure positioned close and anterolateral to an_4; adanal lyrifissure close and lateral to ad_4. Form and setation of ovipositor and spermatopositor as in *E. ribagai* (see Norton, Ermilov, 2022); ovipositor (Fig. 4*a*) setae ψ1 (28–34), ψ2 (12–19), τ1 (12–13), and τ2, τ3, τ4 (all 10–11); spermatopositor (Fig. 4*b*) ca. 20–25 long, with typical seven pairs of setae (6–8).

Gnathosoma. Subcapitulum size: 142–146 × 101–120 (Fig. 1*e*). Subcapitular setae (*a*, *h*: 33–41; *m*: 26–30) attenuate, inconspicuously barbed or roughened. Adoral seta or_1 (22) slightly thickened, rounded apically, barbed; or_2 (22) and or_3 (15) attenuate, slightly barbed. Palp

Table 1. Development of leg setation in *Eulohmannia aborigensis* sp. n.

Instar	Trochanter	Femur	Genu	Tibia	Tarsus
			Leg I		
Larva	–	*d*, *bv*"	(*l*), *dv*, σ', σ_p	*d*, *l*', (*v*), φ	(*ft*), (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*), (*pl*), *m*", *e*, ω_1
Protonymph	*v*'	(*l*)	*d*, (*v*), σ_a	*l*"	(*it*), ω_2
Deutonymph	–	*v*"	–	–	*m*', c_{n2}', c_{n2}"
Tritonymph	–	*v*'	–	–	c_{n3}", ω_3
Adult	–	+/– v_2 "	–	–	c_A'
			Leg II		
Larva	–	*d*, *bv*"	(*l*), *dv*, σ	*d*, *l*', (*v*), φ	(*ft*), (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*), *pl*', ω_1
Protonymph	*v*'	*l*"	*d*, *v*"	*l*"	–
Deutonymph	–	*v*'	*v*'	–	*it*", ω_2
Tritonymph	–	*v*'	–	–	*it*', *pl*"
Adult	–	+/– v_2 "	–	–	–
			Leg III		
Larva	–	*d*, *ev*'	*l*" *dv*, σ	*d*, (*v*), φ	(*ft*), (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*)
Protonymph	*v*', *l*'	*l*'	*d*, *v*'	–	–
Deutonymph	–	–	–	*l*"	–
Tritonymph	*d* ↓	–	–	–	(*it*)
Adult	–	–	–	–	–
			Leg IV		
Protonymph	–	–	–	*v*"	*ft*", (*p*), (*u*), (*pv*)
Deutonymph	*v*', *l*' ↓	*d*, *ev*'	*d*, *l*', *v*', σ	*d*, *l*', *v*', φ	*ft*', (*tc*), *a*', *s*
Tritonymph	–	*l*'	–	–	*a*'
Adult	–	–	–	–	*l*'

Structures are listed when they first appear and are assumed present in subsequent instars. Roman letters refer to setae, Greek letters to solenidia; *dv* = vestige of seta *d*, which appears fully formed in the protonymph. Prime (') and double-prime (") indicate anterior and posterior setae of a pseudosymmetrical pair; parentheses refer to both members of the pair collectively. Setae with variable instar of appearance are entered in the most common cell, with an arrow indicating the less-common cell; setae present or absent in the adult are indicated by +/– (see text for details).

length: 90–97 (Fig. 3*e*); setation: 0–[2 + 0]–2–7(+1ω). Postpalpal seta (9) bifurcated, with minute distal fork (Fig. 4*f*). Chelicera length: 150–161 (Fig. 1*f*); seta *chb* (15) slightly thickened, pointed apically, roughened; with vertical rows of denticles on adaxial face and oblique row of denticles on movable digit, but less developed than in *E. ribagai*.

Legs. Legs (Figs 3*a*–3*d*) relatively elongated; tarsus I ca. 3 × longer than high; femur IV ca. twice length of trochanter IV. Adaxial face of leg segments usually with closely-spaced, parallel vertical ridges or undulations (Fig. 4*d*). All leg pretarsi heterotridactylous (Figs 3, 4*c*): lateral claws large, fully formed, hook-like, slightly barbed dorsally, usually with small ventral spine at base (sometimes only blunt tooth or swelling); empodial claw minute, bidentate. Typical formulas of leg setation and solenidia: I (1–6–5–5–24) [3–1–3], II (1–5–5–5–17) [1–1–2], III (3–3–3–4–15) [1–1–0], IV (2–3–3–4–14) [1–1–0]; homologies of setae and solenidia indicated in Table 1. Notably, trochanter III with three setae (*d* present); seta *l*' present on femur IV (see below); tarsus I with four setae in *c*-row (two on each face). Tarsus I with 11 eupathidia: (*it*), (*p*), (*u*), (*a*), *s*, *m*', c_{n2}"; famulus (Fig. 4*g*) typical of genus, bacilliform with small conical head, not noticeably annulated. Variations (not indicated in above formulas) include occasional addition of seta v_2" to femora I and II (Remark 3) and *v*' to femur IV (Remark 4) and single instances of *l*' being added to femur II and *l*' being absent from tarsus IV.

Juveniles. (Figs 4*g*–4*l*; 5). *Measurements*. Larva body length ($n = 6$): 420–450, width: 135–180; protonymph ($n = 3$) length 480–549, width 152 (single measurement); deutonymph ($n = 4$) length 559–598, width 172–196; tritonymph ($n = 5$) length 652–730, width 196–211. Measurements of individual structures

given below in parentheses are only for larva (many details of nymphs not measurable).

Integument. Body color pale yellow in preserved specimens. Surface reticulation mostly as in adult.

Prodorsum. Rostral medial mucro less distinct than in adult, more rounded and less clearly bordered by lateral notches. Setae *ro* (30), *le* (15–18), *in* (52–56), *exa* (30) and *exp* (11) attenuate, inconspicuously barbed or roughened by minute spicules. Bothridial seta (*bo*: 75–82) like that of adult, larva with several fewer tines. Bothridium with two chambers in larva, three in nymphs; porose bothridial saccules homomorphic in larva (Fig. 4*i*) and nymphs.

Gastronotic region. Sub-elliptical, widest in posterior half, at level of setal row *e*. All gastronotic setae (e_1, e_2, f_2, h_1, h_2: 41–45; c_1, c_2, c_3, *cp*, d_1, d_2: 30–33; h_3: 26 in larva) attenuate, inconspicuously barbed or roughened with minute spicules. Lyrifissures as in *E. ribagai*.

Epimeral and lateral podosomal regions. Setal formula for epimeres I–III in larva: 3–1–2; *1c* (15–18) scaliform (Fig. 4*j*), others (*1a*: 11; others: 15–18) attenuate, inconspicuously barbed or roughened; 3–1–3 in protonymph, 3–1–4 in deuto- and tritonymph; exact numbers of neotrichous setae on epimere IV and aggenital region not determined. Seta *eI* (5) bifurcated, larva and nymphs with distal fork similar to that of adult. Larval Claparède's organ (45–48) with 6–7 annuli proximal to clavate head (Fig. 4*j*).

Anogenital region. Larva with single pair of attenuate, inconspicuously barbed or roughened setae (28) anterior to paraprocts: with position similar to that of "*x*" in *E. ribagai* (Fig. 5*b*; cf. Norton, Ermilov, 2022). Form and distribution of lyrifissures and tendon insertions (latter clearly seen only in one larva and one deutonymph) as in *E. ribagai*. Genital setation (proto- to tritonymph) 1–4–7. Paraproctal ontogeny similar to that of *E. ribagai*: larva with ps_1 (26) thickened, barbed (often broken, Fig. 4*h*); others (ps_2: 18; ps_3, ps_4: 15) attenuate, inconspicuously barbed or roughened; protonymph with paraproctal seta ad_1 (20) thickened, roughened by minute barbs (Fig. 4*m*), others attenuate, nearly smooth.

Gnathosoma. Subcapitulum size: 86–93 × 75–78 in larva. Subcapitular setae (*a*, *m*, *h*: 15–18) attenuate, inconspicuously barbed or roughened. Adoral seta or_1 (7) slightly thickened, rounded apically, barbed; or_2 (7) attenuate, roughened; or_3 similar, formed in protonymph. Palp length in larva: 60–63; setation: 0–[1 + 0]–2–7(+1ω), with second femoral seta (*inf*) forming in protonymph; tarsal seta *acm* normal in larva, eupathidial from protonymph. Postpalpal seta (5) bifurcated, with small distal fork; form in nymphs similar to that of adult. Chelicera length in larva: 93–97; seta *chb* (9–11) slightly thickened, pointed apically, roughened with small barbs; proportionally similar in nymphs.

Legs. All leg pretarsi monodactylous, with large, fully formed, hook-like empodium; claw slightly barbed dorsally and with strong ventrobasal spine. Development of leg setation and solenidia given in Table 1. Notably: trochanter IV forms seta *l'* in deuto- or tritonymph and adds *d* in tritonymph (rarely in adult); femur I forms *l'* in protonymph; tarsus I forms c_{n2}" in deutonymph; tarsus II forms *pl*" in deutonymph (see Norton, Ermilov, 2022). In larva, setal vestige *dv* on genua small, but spiniform, distinctly projecting (1–2) from alveolus (Figs 4*k*, 4*l*). On tarsus I, setal pair (*p*) eupathidial from larva; eupathidial transformation of pair (*u*) and *s* in protonymph, pair (*it*) and *a*" in deutonymph, *a*', *m*' and c_{n2}" in tritonymph.

R e m a r k s. 1. *Comparisons*. In having heterotridactylous legs with a bidentate empodial claw, heteromorphic bothridial saccules, and four pairs of setae on epimere III, the adult of *Eulohmannia aborigensis* sp. n. is similar to that of *E. ribagai*. However, it can be distinguished from the latter by: its larger size (body length 718–840 versus 600–786); a relatively longer femur IV (about 2 times the length of trochanter IV versus 1.3–1.4 times); and the number of setae on leg trochanter III (3 versus 2), tarsus I (24 versus 23) and tarsus IV (14 versus 13). Overall, the cells of cuticular reticulation are slightly smaller (width mostly 8–10 versus 10–13). Additionally, the small spine at the base of lateral claws does not appear in *E. ribagai* or any other known eulohmanniid species. The presence of males distinguishes *E. aborigensis* from most *E. ribagai* populations, exceptions being the apparently sexual populations in northwest North America (Norton, Ermilov, 2022).

Larvae of the two species are easily distinguished. In addition to the larger size (420–450 versus 340–369 in *E. ribagai*) the reticulation pattern is noticeably smaller (cf. our Fig. 3*a* versus Fig. 3A of Norton, Ermilov, 2022). Also, a single pair (versus 2 pairs) of setae insert anterior to the paraprocts and Claparède's organ has more annuli (6–7 versus 3–4). In these latter two traits the larva of *E. aborigensis* is similar to that of *Paedolohmannia metzi*. The single setal pair in *P. metzi* was tentatively considered to represent setae "*y*" of *E. ribagai* (Norton, Ermilov, 2022) but this is equivocal, since the single pair in *E. aborigensis* has the same position as setae "*x*" in *E. ribagai*. Nymphs are distinguished from those of *E. ribagai* by the homomorphic bothridial saccules (versus heteromorphic, like those of adult).

Leg setation of *E. aborigensis* is slightly richer (less regressed) than in other *Eulohmannia* species (cf. Norton, Ermilov, 2022). Seta *l'* develops earlier on trochanter III (deuto- or tritonymph) and femur I (protonymph). It has four setae in the *c*-row on tarsus I and has the most eupathidia on tarsus I (11) of any known eulohmanniid species. Also, it is the only species to add seta *d* to trochanter III (Remark 2) and seta *l'* to tarsus IV (Remark 5), and at low frequency it may add a third ventral seta to femora I, II (Remark 3) and IV

(Remark 4), which is unknown in other eulohmanniid species.

2. *Trochanter III setation. Eulohmannia aborigensis* is unique among known Eulohmanniidae in having three setae on trochanter III of the adult (slightly twisted in Fig. 3*c*). Setae *v*' and *l*' are added in the protonymph, as in other species, but a third seta appears in the tritonymph (three of four legs III examined), or else in the adult where it is almost always present (absent from only one of 38 adult legs III examined). Setae *v*' and *l*' have their usual positions, comparable to the same setae on trochanter IV (Fig. 3*d*), while the third seta is high on the segment and can confidently be considered seta *d*.

On oribatid mite femora, seta *d* has been resistant to regression, being essentially ubiquitous in all instars, but *d* had an opposite evolution on the trochanters. Of the standard verticil of five setae only *v*' is consistently present on oribatid mite trochanters; it is the only seta present on I and II (glabrous in some groups), while trochanter III – and IV in most early-derivative taxa – commonly adds *l*'. The resulting adult trochanteral setation of 1-1-2-2 (legs I–IV) is widespread in Palaeosomata, basal Enarthronota, Parhyposomata and Mixonomata, and also is common in Endeostigmata (Grandjean, 1942b); we consider it to be ancestral in oribatid mites.

The formula 1-1-2-1 (reflecting the loss of *l*' from trochanter IV) is typical of Nothrina and Brachypylina, but there are exceptions of two types relating to trochanter III. One involves neotrichy in the form of linear multiplications of seta *l*', found on trochanter III of Nanhermanniidae (e.g., Grandjean, 1954; Ermilov, Łochynska, 2008; Ermilov, Anichkin, 2011), and Crotoniidae (sensu lato; Travé, Olszanowski, 1988, 1991). The other involves an apparent evolutionary reversal: the atavistic reappearance on trochanter III of setae from the primitive verticil that already had been lost (suppressed) from the ancestors of oribatid mites, viz. setae *d* and *v*''. These appear in development after the typical *v*' and *l*' in, for example, the genus *Metabelba* (Damaeidae), where they can be added in either the tritonymph or adult (e.g., Norton, 1977; Ermilov, 2010; Seniczak, Seniczak, 2013). To our knowledge, the late-developing seta *d* of *E. aborigensis* is the first example of setal atavism on the trochanter of a macropyline oribatid mite.

3. *Lateral and ventral setae on femora I, II.* We consider the ancestral state for the lateral pair (*l*) in Mixonomata to have both setae being present on femora I and II, and to be formed in the protonymph, as in *Perlohmannia* (Grandjean, 1958). In *E. aborigensis*, lateral setae also are formed in the protonymph, except *l*' usually has been lost from femur II (present on only 1/37 examined). Lateral setae exhibit strong basculation (transverse displacement; Grandjean, 1947; van der Hammen, 1980) on femora I and II of *Eulohmannia*: *l*' is high on the adaxial face (femur I) while *l*'' is very low on the abaxial face (Figs 3*a*, 3*b*; 4*e*), almost as low as the level of *v*'' and easily misinterpreted as a ventral seta. In other taxa, pair (*l*) may be present on both legs but delayed to the deuto- or tritonymph, e.g., in *Nehypochthonius* and *Collohmannia* (Norton, Metz, 1980; Norton, Sidorchuk, 2014), and *l*'' is not so low. As in *E. aborigensis*, if one member of the pair is absent, it usually is *l*'; examples include femur II of *Elliptochthonius* and both I and II of *Rhysotritia* (Norton, 1975; Ermilov, 2011; Ermilov, Bayartogtokh, 2022).

In these same taxa, the ventral pair may appear together or, as in *E. aborigensis*, the two setae may form in different instars. In the latter case, *v*'' forms earlier in ontogeny than *v*'. In *E. aborigensis* (as in *E. ribagai*), there is a distinct anterior disjunction (*v*' is distal to *v*''), but other taxa may exhibit no disjunction (e.g., *Collohmannia*) or it may be distinctly posterior (*v*'' distal; *Nehypochthonius*, *Perlohmannia*).

In *E. aborigensis* we encountered no variation in the lateral pair, but a third ventral seta may form on femur I or II. This additional seta appears on the posterior ('') face, such that the three *v*-setae form a pattern in which one *v*'' is proximal to the level of *v*', while the other *v*'' is distal to *v*'. The additional *v*'' was present on three of 37 examined adult femora I (8%) and four of 37 femora II (11%). We could examine only two tritonymphs, but no second *v*'' existed on either femur I or II so we interpret the seta as an uncommon adult addition. Because the positional relationship between *v*' and the proximal *v*'' mirrors that in the tritonymph (as well as in all adults having only two *v*-setae), we consider the distal *v*'' to be the variable seta and designate it v_2'' (Fig. 4*e*).

In *Perlohmannia* no extra *v*'' seta is added, but there is a second *l*'' seta on femora I and II; this also has a more distal position than the earlier (protonymphal) *l*'' (Grandjean, 1958). While the evidence is minimal, it appears that in mixonomatans additional lateral and ventral setae form distally on femora, congruent with patterns seen on femora (and trochanters) of Nanhermanniidae and Crotoniidae (see references in Remark 2) but contrasting with the better-known pattern on tarsi, where additional *v*- or *l*- setae appear proximally (Grandjean, 1958a).

4. *Femur IV.* A fourth seta, *v*', may be added to this segment, apparently in the adult as it was not seen in examined tritonymphs. In addition to the constant *d*, *ev*' and *l*', seta *v*' was present on five of 36 adult legs IV examined.

5. *Lateral seta on tarsus IV*. In addition to the typical 13 setae found on tarsus IV of other Eulohmanniidae, the adult of *E. aborigensis* has a seta in the *l*' position proximal to seta *a*'; it is not present on any examined tritonymph so presumably forms in the adult. It was absent from only one of 36 adult tarsi IV examined. This is one of the more surprising traits of the species, since the presence of a lateral setae on tarsus

IV can be explained by none of F. Grandjean's evolutionary models or rules of setation.

Hypothetically, a seta in this position on a leg tarsus can be either a proximal ("posterior") accessory seta, *l'*, or a fundamental primilateral seta, *pl'*. For each type of seta, Grandjean's carefully formulated regression models (e.g., 1958a, 1959) characterize the evolutionary "priority" (resistance to regressive evolutionary loss) as decreasing in a posterior direction (legs I to IV). In this case, accessory lateral seta *l'* should not develop on tarsus IV because it does not exist on tarsi I–III. Similarly, primilateral setae have been lost from tarsus III, so *pl'* should not appear on tarsus IV.

Grandjean (1959) indicated that primilateral setae are entirely absent from tarsus IV of oribatid mites, but it can be argued that there are rare exceptions in early-derivative Enarthronota (Norton, Fuangarworn, 2015, their Remark 18). Also, we previously argued (Norton, Ermilov, 2022) that primilateral seta *pl''* is present on tarsus II of Eulohmanniidae but is uncharacteristically delayed. A similar argument would be unconvincing for the lateral seta on tarsus IV since tarsus III lacks primilaterals.

Despite the general absence of proximal accessory setae of *v*- and *l*-rows in Eulohmanniidae (Norton, Ermilov, 2022), we tentatively consider this seta to be *l'*. For comparison, it seems homologous with *l'* on this segment in *Nehypochthonius* (Norton, Metz, 1980), where it is clearly the only proximal accessory seta and also is added in the adult; however, unlike *E. aborigensis*, *Nehypochthonius* adds *l'* to more anterior legs as well. The presence of *l'* on tarsus IV of *E. aborigensis* seems to represent an exception to Grandjean's (1958a) rules of priority. Alternatively, it could represent an evolutionary reversal—the atavistic reappearance of an adult-forming accessory seta that was present in distant ancestors—and as such, it might not be explainable by those rules.

E t y m o l o g y. The species name *aborigensis* refers to the provenance of the type specimens and only known location, Aborigen (Kolyma Highlands, Magadan Oblast).

Eulohmannia juvenalis Ermilov et Norton sp. n.

(Figs 6–8)

M a t e r i a l. Holotype (♀) and six paratypes (♀♀): Kashmir, Dachigam National Forest (near Srinagar), from litter at base of elm tree (*Ulmus wallichiana*) in mixed forest, 20.08.1986 (leg. R.A. Norton).

The holotype and two paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia, preserved in 70% solution of ethanol with a drop of glycerol. Three paratypes are in the personal collection of author R.A.N., two in alcohol and one slide-mounted in Hoyer's medium. Damaged, non-type material in the collection of R.A.N. includes a partially dissected slide-mounted female and a slide-mounted tritonymph.

D i a g n o s i s. **Adult.** Body length: 669–720. Males unknown. Rostrum with broadly triangular medial mucro but without lateral notches. Relative lengths of prodorsal setae: *bs* > *in* > *exa* > *ro* > *le* = *exp*. Epimere III with four pairs of setae; fused epimere IV and aggenital region with about 13–14 setae pairs of neotrichous setae. With 7–8 (rarely 9) pairs of genital setae. Leg pretarsi monodactylous, empodial claw with basal spine; femur IV relatively short, ca. 1.4 × length of trochanter IV; trochanters III and IV with one seta.

D e s c r i p t i o n. **Adult.** With generic traits of *Eulohmannia*; generally similar to *E. ribagai* (see Norton, Ermilov, 2022). *Measurements*. Body length: 705 (holotype), 669–720 (paratypes); body width: 225 (holotype), 177–210 (paratypes).

Integument. Body color light yellow in preserved specimens. Surface reticulation of depressed lines sharply defined, leaving slightly protruding 4- to 6-sided (usually 5-) plateau-like polygons with width mostly 7–10; arranged in vague longitudinal rows on hysterosomal venter, vaguely transverse rows on parts of notogaster; laterally with regions of elongated polygons (e.g., 4 × 12). Cervical collar rugose, partly with ridge-like longitudinal striation. Leg segments partially microgranulate.

Prodorsum. Rostral mucro broadly triangular, edges slightly irregular (roughened), not flanked by lateral notches. Setae *ro* (33–37), *le* (15–18), *in* (75–82), *exa* (41–48) and *exp* (11–15) attenuate, nearly smooth. Bothridial seta (101–112) sub-pectinate, with about 10 tines on outer side and 2–3 tines or large barbs on opposite side. Bothridial saccules strongly heteromorphic, with flat saccule paddle-like, at end of long stalk, length about 4 × diameter of spherical saccule (Fig. 8*d*).

Notogaster. Sub-elliptical, widest in posterior half, at level of seta f_2. All 15 pairs of notogastral setae medium-sized (c_1, d_1, e_1, h_1: 41–45; ps_3: 30–33; others: 60–63), attenuate, nearly smooth. Lyrifissure *ia* positioned anterior to seta d_1; *im* between setae d_2 and e_2; *ip* midway between setae f_2 and h_2; *ips* close to notogastral margin, anteromedial to seta ps_3; *ih* with unusual position (Fig. 8*c*), well removed from margin, midway between setae ps_3 and f_2.

Epimeral and lateral podosomal regions. Lateral scissure *ncx* poorly defined (Fig. 6*c*), vaguely distinguishable only at anterior and posterior ends. Setal formula for epimeres I–III: 3–1–4; IV neotrichous (see below); all setae (*3d*: 48–52; *1b*, *2a*, *3c*: 18; others: 11) attenuate, smooth. Seta *eI* (7) bifurcated with distinct distal fork (Fig. 8*f*). Without vertical ridge posterior to leg I (*r1* absent).

Anogenital region. Neotrichy in combined aggenital region and epimere IV collectively about 13–14 pairs. Genital setae (11) attenuate, smooth, variable in number, 7–9 per valve: two specimens with 7/7 (left/right),

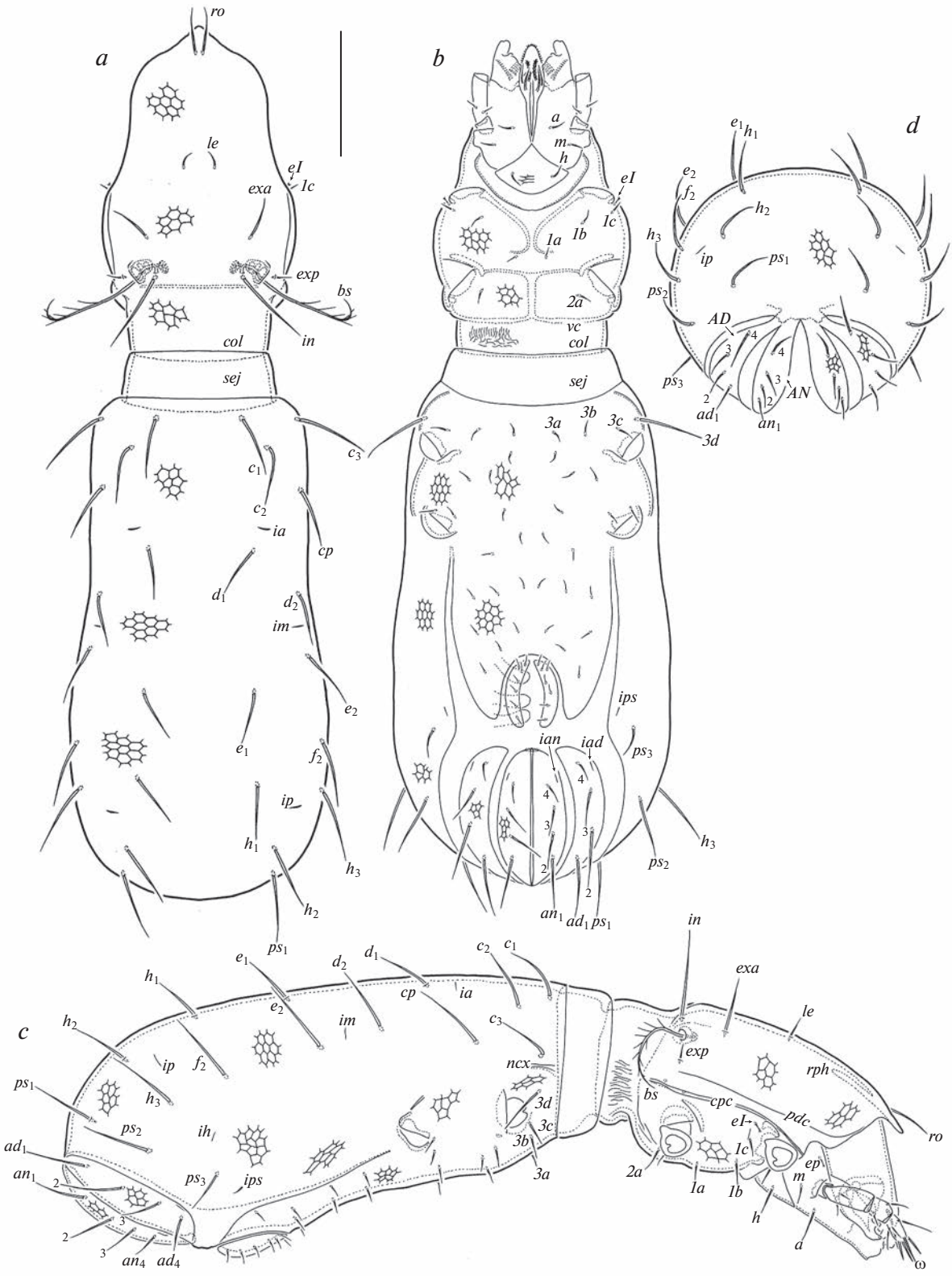

Fig. 6. *Eulohmannia juvenalis* sp. n., adult: *a* – dorsal view; *b* – ventral view (palp tarsus and legs omitted); *c* – lateral view (legs omitted); *d* – posterior view of hysterosoma. Scale bar 100 μm.

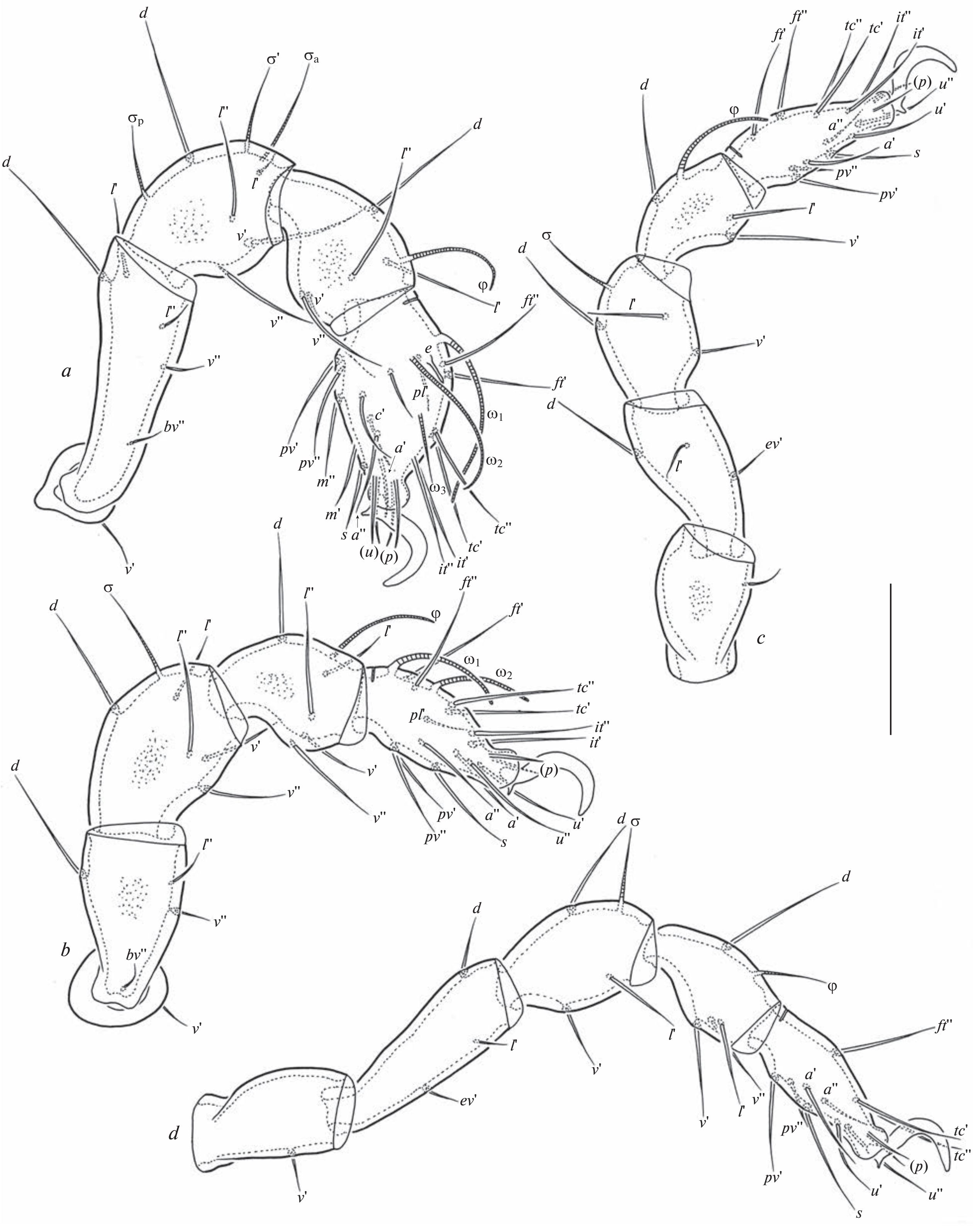

Fig. 7. *Eulohmannia juvenalis* sp. n., adult: *a* – right leg I, abaxial view (for setal notations of tarsus, see also Fig. 8*j*, *k*); *b* – right leg II, abaxial aspect; *c* – left leg III, abaxial aspect; *d* – left leg IV, abaxial aspect. Scale bar 50 μm.

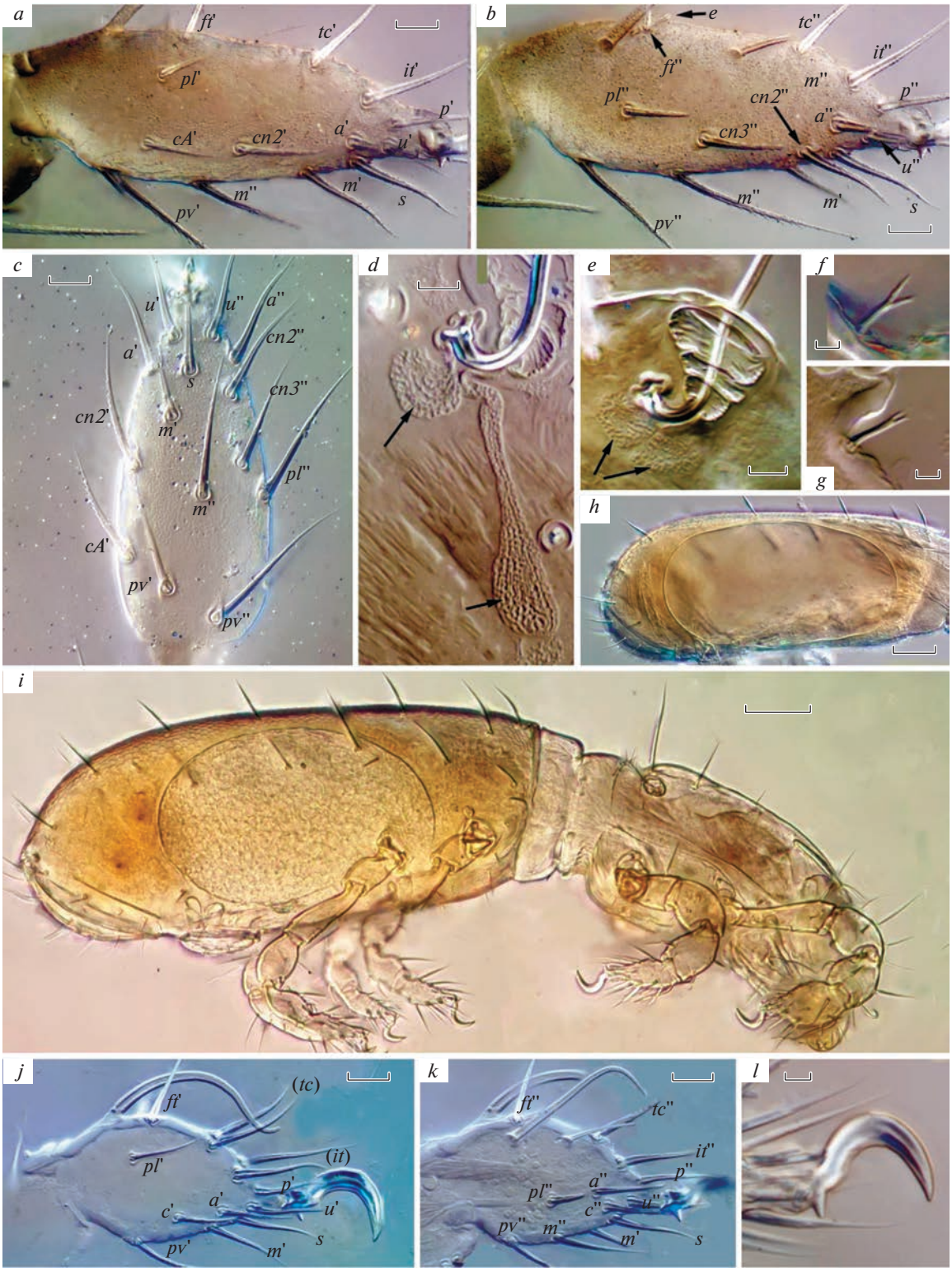

Fig. 8. *Eulohmannia aborigensis* sp. n. (*a*–*c*): *a* – adult left tarsus I, adaxial view (solenidia not labeled); *b* – same, abaxial surface (by transparency); *c* – same, ventral view. *Eulohmannia juvenalis* sp. n. (*d*–*l*): *d* – bothridium of adult, arrows to internalized saccules; *e* – same, tritonymph; *f* – supracoxal seta *eI* of adult; *g* – same, tritonymph; *h* – hysterosoma of gravid female with mature egg, lateral view; *i* – full lateral view of gravid female; *j* – left tarsus I of tritonymph, adaxial view (solenidia not labeled); *k* – same, abaxial surface (by transparency); *l* – pretarsus of adult leg II. Scale bars (μm): 50 (*h*, *i*), 10 (*a*–*c*, *j*, *k*), 5 (*d*, *e*, *l*), 2 (*f*, *g*). N.B., in *a*–*c* the fine particulate debris is an artifact (precipitate) of preservation.

Table 2. Leg setation in *Eulohmannia juvenalis* sp. n.

Instar	Trochanter	Femur	Genu	Tibia	Tarsus
			Leg I		
Present in tritonymph	*v*'	*d*, *bv*'' (*l*)	*d*, (*l*), (*v*), σ', σ_a, σ_p	*d*, (*l*), (*v*), φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*), (*pl*), (*m*), *c*', *c*'', *e*, ω_1, ω_2, ω_3
Adult	–	*v*''	–	–	–
			Leg II		
Present in tritonymph	*v*'	*d*, *bv*'' *l*''	*d*, (*l*), (*v*), σ	*d*, (*l*), (*v*), φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*), *pl*'', ω_1, ω_2
Adult	–	*v*''	–	–	–
			Leg III		
Present in tritonymph	*v*'	*d*, *ev*', *l*'	*d*, *v*', *l*', σ	*d*, *v*', *l*', φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*)
Adult	–	–	–	–	–
			Leg IV		
Present in tritonymph	*v*'	*d*, *ev*', *l*'	*d*, *l*', *v*', σ	*d*, *l*', *v*', φ	*ft*'', (*tc*), (*p*), (*u*), (*pv*), (*a*), *s*
Adult	–	–	–	*v*''	–

See Table 1 for explanations. The tritonymph ($n = 1$) is the only juvenile instar known, so the indicated complement is cumulative from the larva; setae *c*' and *c*'' probably represent c_{n2}' and c_{n2}'', respectively (see Remark 3).

two with 8/8, one each with 7/8, 8/9. Posterior arms of aggenital sclerite apparently without isolated "island-like" sclerite. Ovipositor setae: ψ1 (30–38), ψ2 (18–20), τ1 (20–22), τ2, τ3, τ4 (10–12). Anal (an_1: 37–45; an_2: 30–37; an_3: 26–30; an_4: 22) and adanal (ad_1, ad_2: 48–52; ad_3: 30–33; ad_4: 22–26) setae attenuate, nearly smooth; anomalous fifth anal seta (minute, anterior to ad_4) present unilaterally in two specimens. Anal lyrifissure positioned close and anterolateral to an_4; adanal lyrifissure close and lateral to ad_4.

Gnathosoma. Subcapitulum size: 131–142 × 93–105. Subcapitular setae (*a*: 26; *m*: 13–15; *h*: 18–22) attenuate, nearly smooth. Adoral seta or_1 (15) slightly thickened, apically blunt, slightly barbed; or_2 (15) and or_3 (15) attenuate, roughened; or_3 thinnest. Palp length: 86–93; setation: 0–[2 + 0]–2–7(+1ω). Postpalpal seta (7) bifurcated, with minute distal fork. Chelicera length: 146–150; seta *chb* (15) slightly thickened, pointed apically, roughened; with vertical rows of denticles on adaxial face and oblique row of denticles on movable digit as in *E. ribagai*, though less conspicuous.

Legs (Fig. 7) relatively compact; tarsus I ca. 2 × longer than high; femur IV ca. 1.4 × length of trochanter IV. All leg pretarsi monodactylous, empodial claw large, fully formed, hook-like, smooth dorsally, with strong ventrobasal spine; identical to juvenile claws in *Eulohmannia* species. Formulas of leg setation and solenidia: I (1–5–5–5–22) [3–1–3], II (1–4–5–5–16) [1–1–2], III (1–3–3–3–15) [1–1–0], IV (1–3–3–4–12) [1–1–0]; homologies of setae and solenidia indicated in Table 2. Notably, trochanters III and IV with single seta, *v*' (*l*' absent); tarsus I with only two setae in *c*-row, one on each face; tarsus II without seta *pl*''. Tarsus I with nine eupathidia (see Remark 3): (*it*), (*p*), (*u*), *c*'', *s*, *m*'. Famulus (10) typical of genus but relatively narrow and conical head only vaguely defined; without noticeable surface undulations.

Tritonymph. Measurements: total length 563 ($n = 1$); width 177. Similar to tritonymph of *E. ribagai* (see Norton, Ermilov, 2022) except as noted. Rostral mucro triangular, not flanked by lateral notches. Bothridial saccules homomorphic, spherical (Fig. 8*e*). Formulas of leg setae and solenidia: I (1–5–5–5–22) [3–1–3], II (1–4–5–5–16) [1–1–2], III (1–3–3–3–15) [1–1–0], IV (1–3–3–4–12) [1–1–0]. Homologies of setae and solenidia indicated in Table 2; notably, seta *v*'' absent from tibia IV (Remark 4).

R e m a r k s. 1. *Comparisons*. Adults of *E. juvenalis* sp. n. differ from those of other known species of *Eulohmannia* by the monodactylous (versus heterotridactylous) pretarsi, the absence (versus presence) of notches lateral to the medial rostral mucro, and a reduced leg setation (see below) that includes a single seta on trochanters III/IV (versus 2/2 or 3/2)

2. *Paedomorphosis*. The presence of paedomorphosis in a family generally thought to be relictual (i.e., including only "living fossils") is unexpected, but Eulohmanniidae present two striking and indisputable examples (Norton, Ermilov, 2022). *Paedolohmannia metzi* curtails normal development by not adding segment AD, and *E. juvenalis* retains the monodactylous juvenile pretarsus into the adult. But in the latter species paedomorphosis in leg morphology also is manifested in several other traits that can be interpreted as neotenic. The following represent ontogenetic delay or loss (by curtailed development) with respect to other members of the family for which development is known. (1) On trochanters III and IV seta *l*' is lost. (2) On femora I and II seta *v*' is lost. (3). On tibia III seta

v" is lost and on tibia IV it is delayed to the adult (see below). (4) On tarsus I setae c_{n3}" and c_A' are lost (Remark 3). (5) On tarsus II seta *pl*" is lost. (6) On tarsus IV seta *ft*' is lost. Further, on tarsus I the eupathidial transformation of antelateral setae, which has occurred by the tritonymph in other Eulohmanniidae (except for *a*' in *P. metzi*), fails to occur; *E. juvenalis* is unique among known Eulohmanniidae in having no antelateral seta among the eupathidial complement.

Outside of legs, one also could consider the poor development or near-absence of lateral scissure *ncx* in adult *E. juvenalis* as neotenic, since all juveniles in Eulohmanniidae lack the scissure, while it is distinct in adults of all other species.

Two other traits apparently are neotenic but are not exclusive to *E. juvenalis*. Adults of *E. juvenalis* have a variable genital setation that may not increase past the tritonymphal complement of seven pairs, but this also can occur in *E. ribagai*. Compared to *E. ribagai*, the transition from homomorphic to heteromorphic bothridial saccules is later (adult versus protonymph), but *E. aborigensis* and *P. metzi* also change in the adult, making *E. ribagai* unique in having an early transformation.

3. *Complement of* c*-setae on tarsus I.* The tarsus I setation of *E. juvenalis* is known only for the tritonymph and adult, which are identical, but while earlier instars are unknown we still can make strong inferences about the homologies of the two *c*-setae. The adaxial seta, *c*', is almost certainly c_{n2}': in all three eulohmanniid species with known development, c_{n2}' forms in the deutonymph and no *c*-seta forms before that instar (Norton, Ermilov, 2022). The abaxial seta, *c*", is eupathidial and among other eulohmanniid species c_{n2}" is the only *c*-seta to make this transformation (*E. aborigensis*, *P. metzi*). In *E. ribagai* this deutonymphal seta never forms, nor is it present in the adult of *E. bifurcatus* Fujikawa, 2014 (Norton, Ermilov, 2022). Comparing the adaxial tarsus I face of *E. juvenalis* (Fig. 8*k*) with that of *E. aborigensis* (Fig. 8*b*), the positions of *c*" and c_{n2}" relative to other nearby eupathidia (*s* and *m*') are identical. Their positions relative to *a*" differ but this can be attributed to the fact that *a*" is a normal seta in *E. juvenalis*, but eupathidial in *E. aborigensis*; when transformed from a normal seta (mechanoreceptor) to a eupathidium (contact chemoreceptor) its position in the latter species is shifted distally, as commonly occurs with such transformations.

It seems likely, therefore, that pair (c_{n2}) has the same developmental course as in *E. aborigensis* and *P. metzi*. If their deutonymphal appearance is confirmed in the future, they will exemplify how *c*-setae are eustasic in Eulohmanniidae but do not follow the typical pattern of proximal accessory setae, since only the earliest-developing setae remain (Norton, Ermilov, 2022; their Remarks 19, 20).

4. *Unusual case of seta v*" *on tibiae III, IV.* In other Eulohmanniidae, seta *v*" is present on both tibia III and IV when the leg is first formed; it is the seta responsible for the uncommon protonymphal leg IV setation of 0-0-0-1-7 (Grandjean, 1946). The *v*" development in *E. juvenalis* is strikingly different. While the seta is present on tibia IV of all examined adults, it is absent from the tritonymph, indicating that *v*" is added at the end of ontogeny rather than the beginning, and on tibia III the seta never appears. While these may seem like insignificant neotenic traits, they are highly unusual in that *v*" – fundamental in other Eulohmanniidae – is affected while other setae of the respective segment seem to have a normal development. It contradicts the idea that early-developing setae have high evolutionary "priority", i.e., that they are least affected by evolutionary delays or loss (Grandjean, 1942, 1942a).

E t y m o l o g y. The species name *juvenalis* refers to the various traits that we consider neotenic, i.e., similar to traits of juveniles in other *Eulohmannia* species.

KEY TO ADULTS OF KNOWN EULOHMANNIIDAE SPECIES

1 Anal segment and its setae completely suppressed; body surface punctate, without clear reticulate pattern; rostral tectum without mucro, with medial emargination; empodial claw of all legs minute, toothlike; body length 621–698 .....*Paedolohmannia metzi* Norton et Ermilov 2022. Distribution: western USA

– Anal segment and its setae developed; body surface without clear punctation, with distinct reticulate pattern; rostral tectum with medial mucro; empodial claw of all legs either minute, bidentate, or large, fully formed, hook-like 2

2 All leg pretarsi monodactylous (lateral claws absent; empodial claw large, fully formed, hook-like); trochanters III and IV each with one seta; notches absent lateral to medial rostral mucro; body length: 675–720 .... *Eulohmannia juvenalis* sp. n. Distribution: Kashmir

– All leg pretarsi heterotridactylous (lateral claws present, large, fully formed, hook-like; empodial claw minute, bidentate); trochanter III with two or three setae, IV with two; notches present lateral to medial rostral mucro 3

3 Epimere III with five pairs of setae; leg femur IV about 1.5–1.7 × length of trochanter IV; body length 630–670 (our measurement method; 571–629 in original description) .....*Eulohmannia bifurcata* Fujikawa 2014. Distribution: Japan

– Epimere III with four pairs of setae; leg femur IV about 1.3–1.4 or 2 × length of trochanter IV 4

4 Leg femur IV with 13 setae (*l*' absent), length about 1.3–1.4 × that of trochanter IV; trochanter III with two setae; most populations parthenogenetic, lacking males (exceptions in northwestern North America); body length 600–786 .....

Eulohmannia ribagai (Berlese 1910). Distribution: Holarctic region, southeastern China

– Leg femur IV with 14 setae (*l'* present), length about 2 × that of trochanter IV; trochanter III with three setae; sexual species (males present); body length 718–840 ..... *Eulohmannia aborigensis* sp. n. Distribution: Russian Far East

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ДВА НОВЫХ ВИДА РОДА *EULOHMANNIA* BERLESE 1910 (ACARI, ORIBATIDA, EULOHMANNIIDAE) С РОССИЙСКОГО ДАЛЬНЕГО ВОСТОКА И ИЗ КАШМИРА

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При изучении рода *Eulohmannia* Berlese 1910 были обнаружены два новых вида. Описание *Eulohmannia aborigensis* sp. n. базируется на всех стадиях, найденных только в высокогорных местообитаниях Колымского нагорья Магаданской области (Россия). Это крупнейший известный вид (длина часто значительно превышает 800 мкм) и, по-видимому, двуполый. Имаго уникальны среди известных видов *Eulohmannia* тем, что имеют относительно длинное бедро IV (примерно в два раза больше длины вертлуга IV), три щетинки на вертлуге III, 14 щетинок на лапке IV и крошечный зубец или шип в основании каждого бокового когтя. Описание *Eulohmannia juvenalis* sp. n. базируется на имаго и одной тритонимфе, найденных только в лесной почве Кашмирской долины (Кашмир). Среди известных видов этого рода имаго уникальны тем, что имеют педоморфные ноги, что выражено в нескольких специфических неотенических признаках, таких как наличие монодактильного претарзуса на всех ногах, сохранение одной щетинки на вертлугах III и IV, а также задержка в развитии или полное отсутствие некоторых щетинок.

Keywords: почвенные клещи, партеногенез, педоморфоз, таксономия, морфология, онтогенез, Евразия