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The morphology of juvenile stages of *Malaconothrus gracilis*
HAMMEN, 1952
(Acari: Oribatida: Malaconothridae)

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ABSTRACT. The morphology of immatures and adult stages of *Malaconothrus gracilis* HAMMEN, 1952 is described and illustrated. All immatures are compared with juveniles description presented by KNÜLLE (1957). Adult stage is compared with holotype. All specimens studied come from a bog moss (*Sphagnum* sp.) and soil from bog moor in Nizhniy Novgorod region (Russia).

Key words: acarology, morphology, Oribatida, *Malaconothrus gracilis* HAMMEN, 1952, juvenile stages.

INTRODUCTION

The family Malaconothridae includes two genera: *Malaconothrus* and *Trimalaconothrus*, which representatives are different in size, body shape, the number of genital setae and claws on tarsi. Their prodorsum is triangular and rostrum rounded. Bothridium is lacking. On the notogastral plate occur 15 pairs of setae (setae f_1 lacking).

Representatives of Malaconothridae are recorded in the Holarctic, Neotropical and Australian Regions. They are hygrophilous and prefer strongly humidified, wet soils.

The morphology of juvenile stages of moss mites from superfamily Crotonioidea has been intensively studied for last two decades. However, these studies concerned mainly only three families: Camisiidae, Nothridae, Trhypochthoniidae (SENICZAK 1990, 1992, SENICZAK et al. 1998, OLSZANOWSKI et al. 2004, KUTY 2007). In spite that family Malaconothridae is the largest group in the superfamily Crotonioidea (more than 130 species), the morphology descriptions of immatures are really seldom. They have concerned only two species from genus *Trimalaconothrus* so far: *T. foveolatus* WILLMANN, 1931 and *T. maior* (BERLESE, 1910) (SENICZAK 1993).

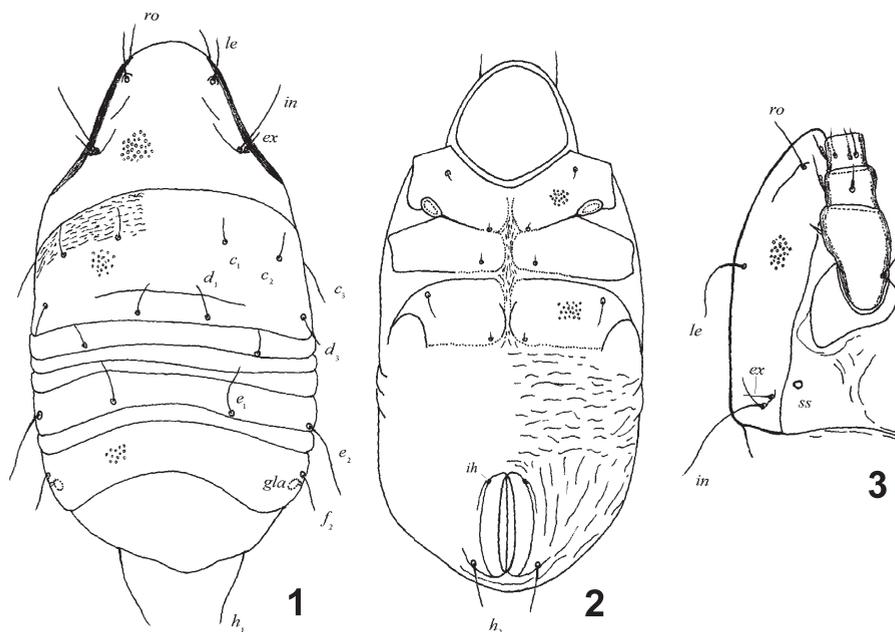
In present paper the morphology of all ontogeny stages of *Malaconothrus gracilis* HAMMEN, 1952 is described and illustrated. Moreover, redescribed adult stage is compared with the holotype.

MATERIAL AND METHODS

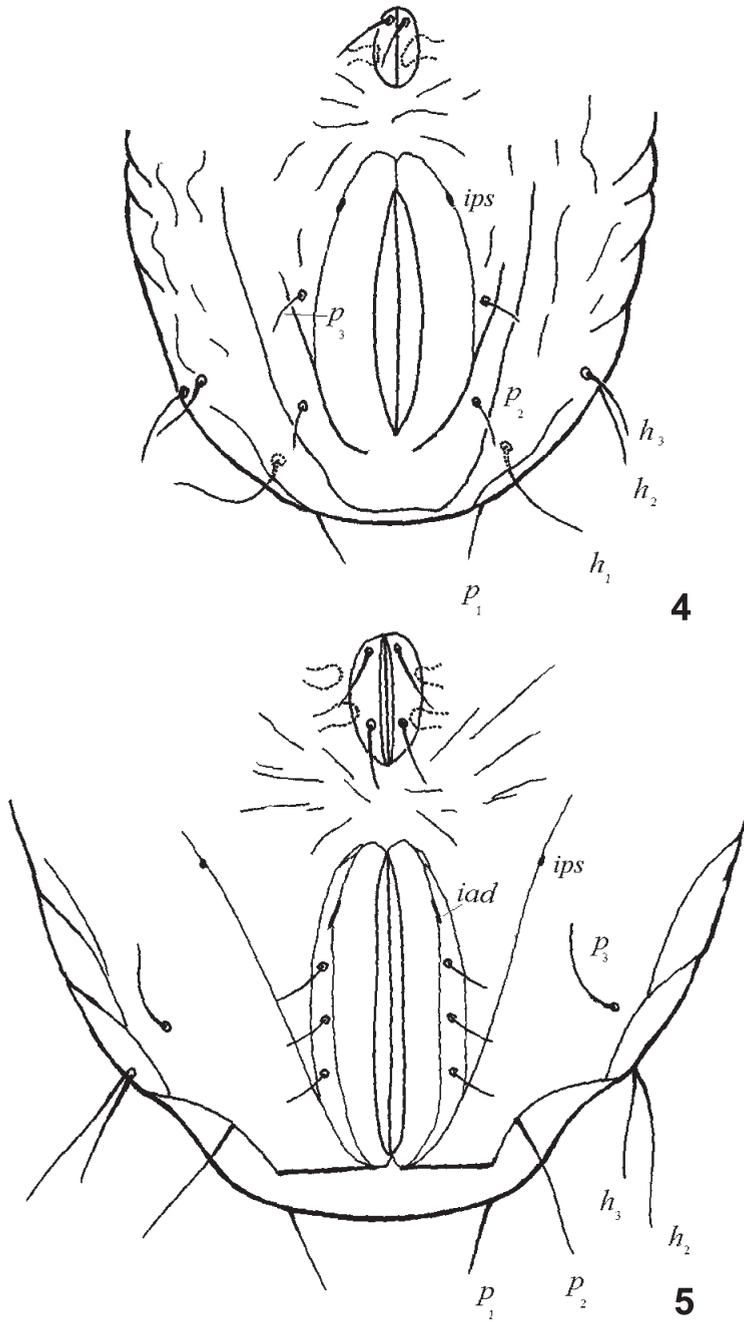
The description of *Malaconothrus gracilis* HAMMEN, 1952 presented is based on the material from a bog moss (*Sphagnum* sp.) and soil from bog moor in Nizhniy Novgorod region, Russia (coll. Sergey G. ERMILOV). The samples were extracted in period 2003-2005.

There were found about 200 adults and more than 300 immatures. The mites were preserved in 70% ethanol and cleared in lactic acid.

The terminology used in present papers follows that of Grandjean (TRAVÉ and VACHON 1975 for references).



1-3. *Malaconothrus gracilis*, larva: 1 –dorsal aspect; 2 –ventral aspect; 3 –prodorsum, lateral aspect



4, 5. *Malacothrus gracilis*: 4 – protonymph, ventral aspect; 5 – deutonymph, ventral aspect

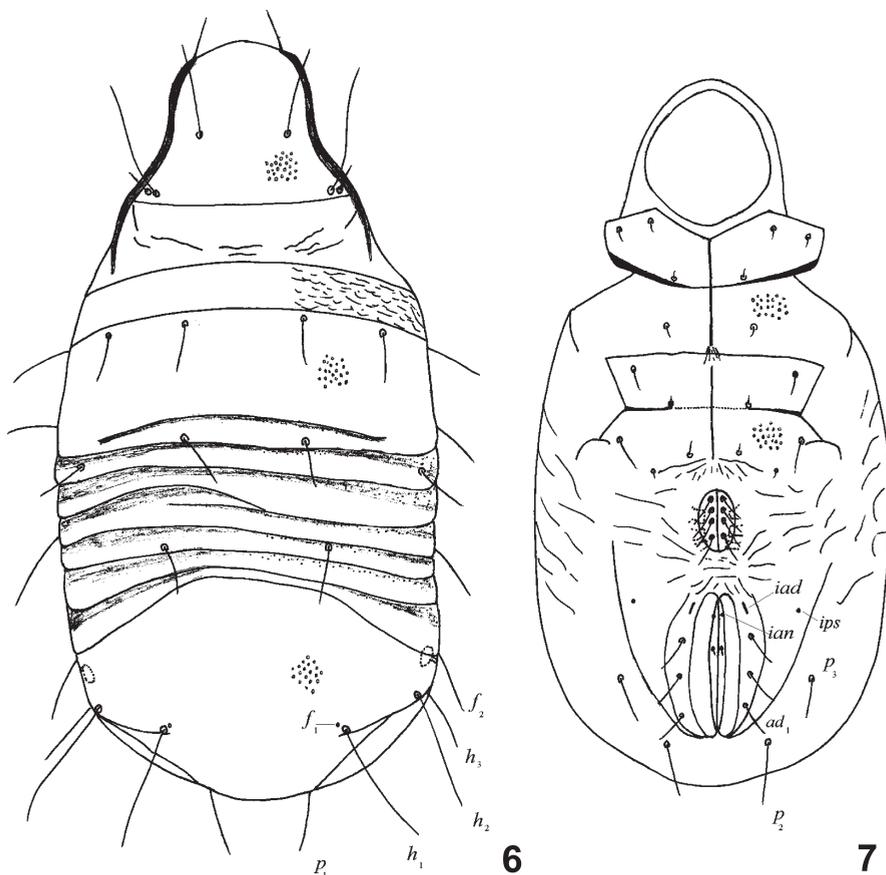
RESULTS

Larva (Figs 1-3)

Body length: 217-233 μm ; body width: 98-110 μm . colour: white.

Prodorsum triangular, rostrum rounded. Prodorsal plate covered with pits of different size. Rostral (*ro*, 12-20 μm), lamellar (*le*, 20-28 μm), interlamellar (*in*, 28-36 μm) and exobothridial (*ex*, 4-8 μm) setae thin and smooth. Setae *in* and *ex* located close to each other. Sensilli and bothridia lacking, alveoli visible. Lateral part of prodorsum with thickenings in the form of crests.

Notogaster covered with pits, in anterior part with small folds; central part with 7-10 transverse folds. Eleven pairs of smooth notogastral setae (setae f_1 and h_3 lacking). The shortest setae c_1 , c_2 and d_2 slightly shorter than *ro*. Setae c_3 , d_1 , f_2 and h_2 similar to *ro*. Setae e_1 similar to *le*, e_2 twice as long as *ro*. The longest setae h_1 similar to *in*. Small openings of opisthosomal glands (*gla*) situated under setae f_2 . Clapared's organ (*cl*)



6, 7. *Malaconothrus gracilis*, tritonymph: 6 – dorsal aspect; 7 – ventral aspect

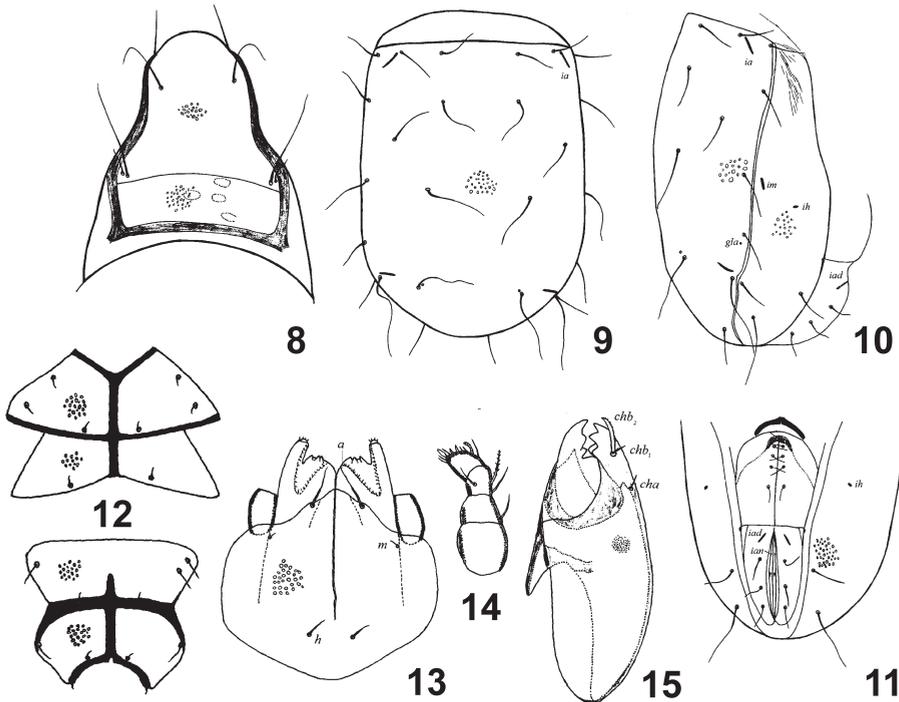
developed. Epimeral setation: 2-1-2. Genital and aggenital plates and anal and adanal setae lacking. All legs monodactylous.

Nymphs (Figs 4-7)

Prodorsum triangular, rostrum rounded. Anterior part of prodorsal plate covered with pits of different size; in central part, under setae *in* and *ex* bases run two transverse folds; posterior part with small folds. All prodorsal setae long and thin. Sensilli and bothridia lacking, alveoli visible.

Notogaster covered with pits, central part with transverse folds. With 15 pairs of smooth and well developed notogastral setae (setae *f1* lacking, setae *h3* and *p1-p3* present). Clapared's organ lacking. Oval openings of opisthosomal glands (*gla*) situated under setae *f2*. Protonymphal genital plates with 1 pair of setae; anal and adanal setae lacking. Deutonymphal genital plates with 2 pairs of setae; 3 pairs of adanal setae; anal setae lacking. Tritonymphal genital plates with 4-5 pairs of setae; 1 pair hardly visible anal setae; 3 pairs of adanal setae. Epimers covered with pits. Epimeral setation develops according to formula:

- protonymph: 3-1-2-1
- deutonymph: 3-1-2-2
- tritonymph: 3-1-2(3)-3.



8-15. *Malacothrus gracilis*: 8 – adult, prodorsum, dorsal aspect; 9 – adult, notogaster, dorsal aspect; 10 – adult, notogaster, ventral aspect; 11 – adult, epimeral region; 12 – infracapitulum; 13 – pedipalpa; 14 – chelicera

Adults (Figs 8-15)

Body length: 366-410 μm ; body width: 155-188 μm . colour: brown or gray-brown. Shape of body oblong, cylindrical, covered with pits of different size.

Prodorsum triangular, rostrum rounded. Setae *ro* (28-36 μm), *le* (36-45 μm), *in* (49-57 μm) and *ex* (12-24 μm) smooth. Setae *in* and *ex* located close to each other. Sensilli and bothridia lacking. Longitudinal thickenings on lateral part of prodorsum connected with posterior transverse thickening.

Notogaster with 15 pairs of long and smooth setae (setae *f*₁ lacking, alveoli visible). Setae *c*₂ as long as the distance *c*₁-*c*₂, located closer to *c*₃ than to *c*₁. Setae *c*₂ and *c*₃ similar to *c*₂. Other setae longer, the longest setae *h*₂ twice as long as setae *c*₂. The distance between setae *d*₁ and *e*₁ is twice longer than distance between *c*₁ and *d*₁. Oval openings of opisthosomal glands (*gla*) situated under setae *f*₂. Pairs of epimers separated. Epimeral setation: 3-1-2(3)-3. Genital plates with 5-7 pairs setae; aggenital setae lacking. Anal plates with 1 pair of fine setae. Adanal plates with 3 pairs of setae.

Gnathosoma. Infracapitulum (69-77 μm \times 53-65 μm) brown-colored, with 3 pairs of setae: *a*, *m*, *h* (setae *or* lacking). Pedipalps (32-41 μm) with setation: 0-1-3-10 (tarsi with 9 setae and 1 solenidium ω). Chelicerae (69-77 μm) light coloured, oblong, with dot punctuation. Both of fingers with well developed teeth. The dorsal part of chelicerae with 3 setae (*chb*₁, *chb*₂, *cha*). The comparison of chosen morphological characters of ontogeny stages of *M. gracilis* is given in Table.

Legs. Tarsi monodactylous.

Table. The comparison of selected morphological characters of juvenile and adult stages of *Malaconothrus gracilis* HAMMEN, 1952 (* in μm)

Characters	Larva	Protonymph	Deutonymph	Tritonymph	Adult
Body length*	217-233	258-282	315-348	366-398	366-410
Body width*	98-110	114-127	132-149	149-182	155-188
Length of <i>ro</i> *	12-20	16-24	24-28	24-32	28-36
Length of <i>le</i> *	20-28	24-32	32-36	36-41	36-45
Length of <i>in</i> *	28-36	36-45	41-49	45-53	49-57
Length of <i>ex</i> *	4-8	4-8	8-12	12-16	12-24
Epimeral setation	2-1-2	3-1-2-1	3-1-2-2	3-1-2(3)-3	3-1-2(3)-3
Genital setae	-	1	2	4-5	5-7
Anal setae	-	-	-	1	1
Adanal setae	-	-	3	3	3
Notogastral setae	11	15	15	15	15

REMARKS

The original description of *M. gracilis* HAMMEN, 1952 is very short and incomplete (HAMMEN 1952). The author noted only several information about morphology, e.g. length of notogastral setae, body length or idiosoma punctuation. However, he presented drawings of dorsal view and body sculpture. Examined specimens differ from holotype by longer setae *c* (setae c_1 and c_2 of holotype are half as long as c_3) and smaller body dimensions (length of holotype: 405-455 μm).

KNÜLLE (1957) presented precise description of *M. gracilis*. The author supplemented species description with leg setation, number of genital, anal and adanal setae and epimeral setation. In addition, he scrutinized all juvenile stages. Our examination shows that immatures and adult stage differ particularly by legs I and II setation. WEIGMANN (1997) presented description of infracapitulum and pedipalps. We redescribed them and, in addition, studied a structure of chelicerae.

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