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FIRST REPORT OF MALACONOTHRIDAE (ACARI, ORIBATIDA) FROM THE PHILIPPINES, WITH DESCRIPTION OF A NEW SPECIES OF THE GENUS *MALACONOTHRUS*

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ABSTRACT: The oribatid mite family Malaconothridae (Acari, Oribatida) is recorded from the Philippines for the first time. A new species of the genus *Malaconothrus*, *M. agusanensis* Ermilov et Corpuz-Raros sp. n., is described and illustrated on the basis of adult specimens collected in litter of mixed swamp forest from the Agusan Marsh in Mindanao Island. The new species is similar to *M. adilatatus* Ermilov, Anichkin et Tolstikov, 2014, but differs from the latter by the morphology of interlamellar and exobothridial (ex_1) setae and leg claws, and by the lengths of notogastral setae p_2 and subcapitular setae.

KEY WORDS: oribatid mites, *Malaconothrus*, new species, Philippines

INTRODUCTION

This work is a part of our continuing study of the oribatid mite fauna of the Philippines (Ermilov et al. 2014*b*, *c*; Ermilov and Corpuz-Raros 2015*a*, *b*). The present study includes new data on Malaconothridae (Acari, Oribatida). It is a large family comprising two genera and more than 170 species, and has a cosmopolitan distribution (Colloff and Cameron 2013; Subías 2004, online version 2014; Ermilov et al. 2014*a*).

During taxonomic study of the oribatid collection in the Museum of Natural History (University of the Philippines Los Baños), we found one species of this family that is a new to the genus *Malaconothrus* Berlese, 1904. This represents the first record of Malaconothridae from the Philippines.

The main goal of present paper is to describe and illustrate the new species under the name *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n.

MATERIAL AND METHODS

Specimens of *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n. (holotype: female; 13 paratypes: all females) were collected: Philippines, Mindanao Island, Panlabuhan, Loreto, Agusan del Sur Province, mixed swamp forest in the Agusan Marsh Wildlife Sanctuary, litter, 18.05. 2014 (W.S.M. Gruezo).

Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation 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. General terminology used in this paper follows that of Grandjean (summarized by Norton and Behan-Pelletier 2009). Drawings were made with a drawing tube using a Carl Zeiss transmission light microscope "Axioskop-2 Plus". Images were obtained with an AxioCam ICc3 camera using a Carl Zeiss transmission light microscope "Axio Lab.A1".

TAXONOMY

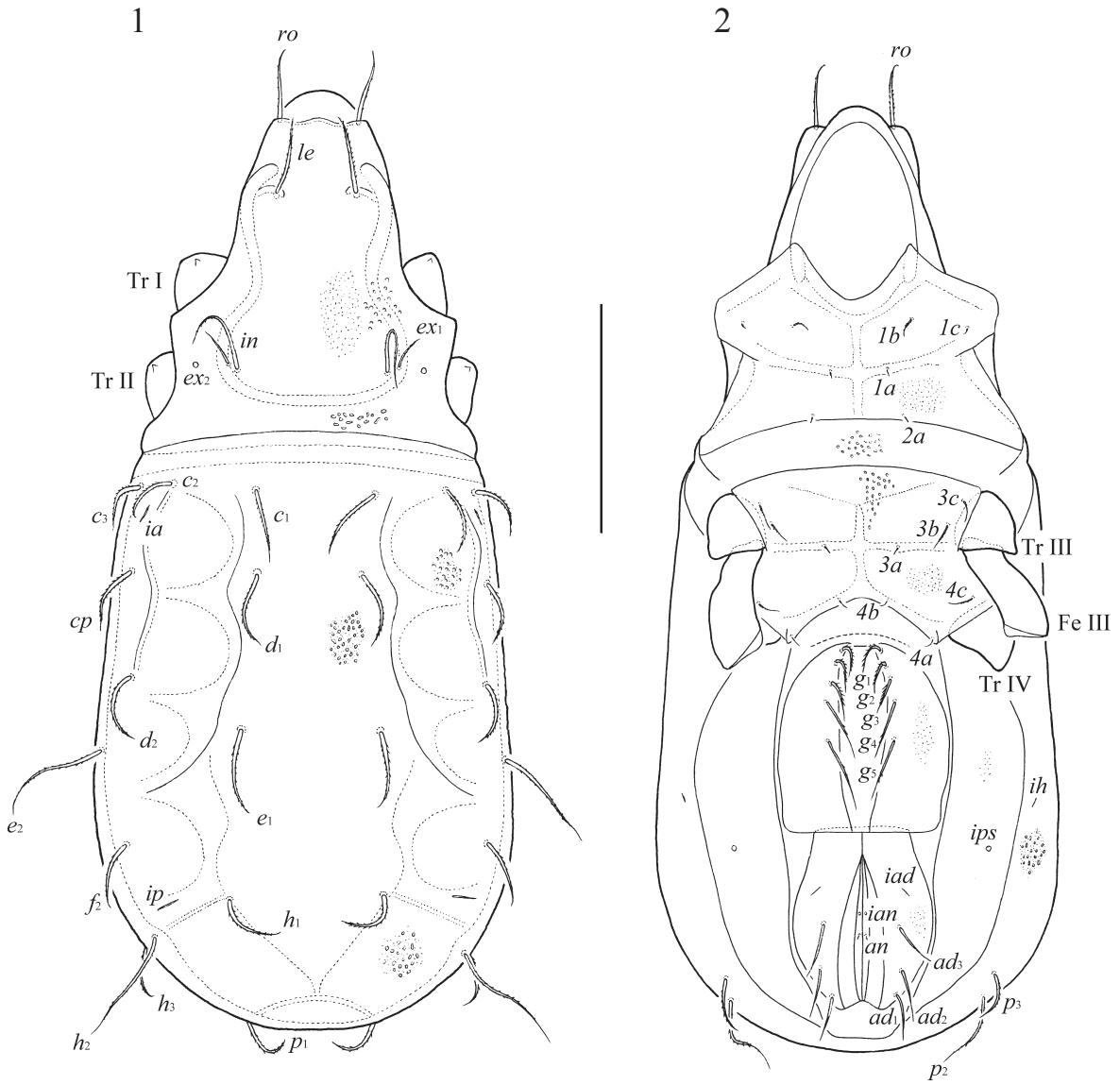
Malaconothrus agusanensis Ermilov et Corpuz-Raros sp. n.

Figs 1–14

Diagnosis. Body size: 398–415 × 166–188. Body surface porose, covered by granular cerotegument. Prodorsal setae barbed, interlamellar setae considerably longer than ex_1. Notogastral ridges present. Notogastral setae densely barbed; e_2, p_2 and h_2 longer than other. Epimeral setal formula: 3–1–3–3; *1a*, *2a* and *3a* spiniform; *1b*, *3b*, *3c* and *4c* longest, barbed. Five pairs of genital setae barbed. Legs monodactylous, all claws serrate on dorsal side.

Description. *Measurements*. Body length: 415 (holotype, female), 398–415 (five paratypes, all females); notogaster width: 166 (holotype), 166–182 (five paratypes).

Integument. Body color light brownish. Body surface finely porose (clearly visible under high magnification) and covered by amorphous and



Figs 1–2. *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n., adult: 1 — dorsal view (legs except trochanters I and II not illustrated); 2 — ventral view (gnathosoma and legs except basal parts of legs III and IV not illustrated). Scale bars 100 μm.

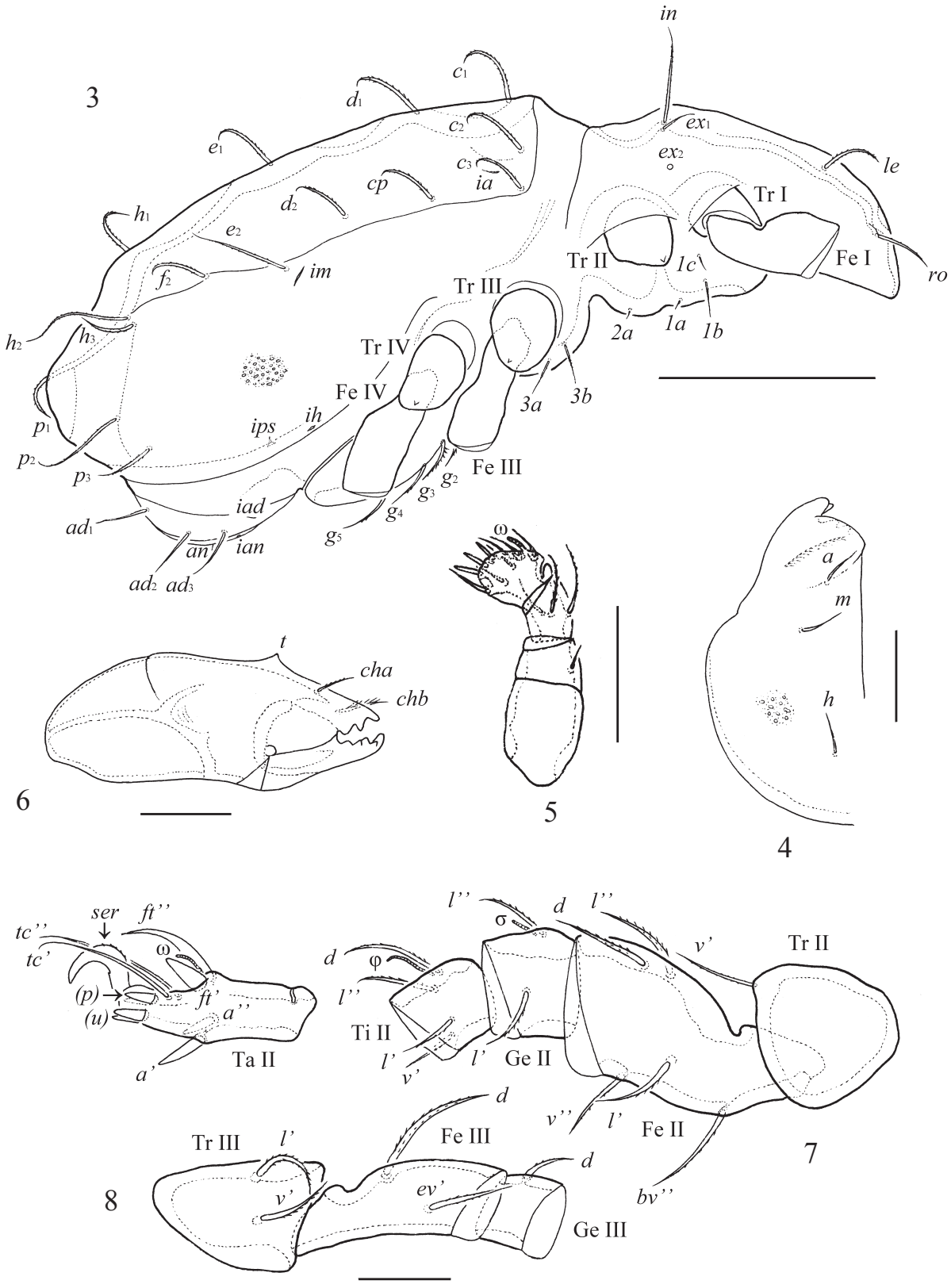
granular cerotegument (granules rounded or slightly elongated, their diameter and length up to 4).

Prodorsum. Rostrum widely rounded. Lateral carinae straight, reach of insertions of the rostral setae, connected by thin, slightly visible translamellar ridge. Each carina with medially-directed transverse extension (located latero-anteriorly to lamellar setae). Rostral setae (*ro*, 28–32) thickened, sparse barbed. Lamellar setae (*le*, 28–34) thickened, densely barbed. Interlamellar (*in*, 45–53) and exobothridial setae ex_1 (16–24) setiform, barbed. Exobothridial setae ex_2 represented by alveoli.

Notogaster. Anterior margin straight. Posterior margin rounded. Notogastral ridges present, but clearly visible only in anterior half. Notogaster with four to five pairs of concavities located dorso-laterally in two longitudinal rows; also, unpaired posterior concavity visible. All notogastral setae thickened, densely barbed: c_1–c_3, *cp*, d_1, d_2, e_1, f_2, h_1, h_3, p_1 and p_3 of medium size (36–61) shorter than p_2 (49–57), e_2 and h_2 (both 61–65). Lyrifissures *ia*, *im*, *ip* and *ih* distinct.

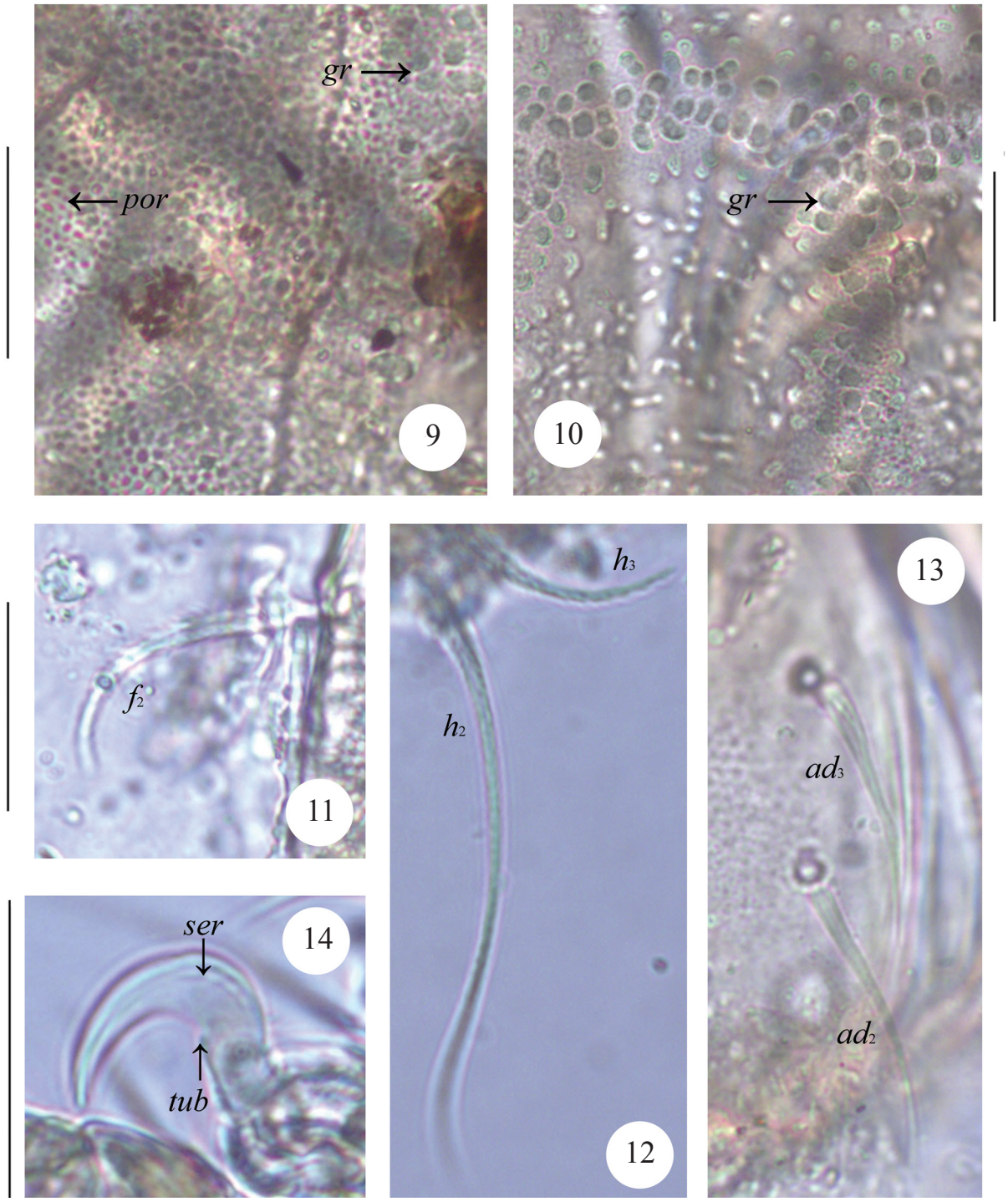
Gnathosoma. Subcapitulum longer than wide: 73–77 × 65. Subcapitular setae (*a*, *m*, *h*) setiform, smooth, similar in length (10–12). Palps (36–41) with setation 0–2–1–3–9(+ω). Solenidion short, thickened, blunted, not attached to eupathidium. Chelicerae (77–82) with two simple setae; *cha* (8) slightly barbed, shorter than ciliate *chb* (12).

Epimeral region. Epimeral plates I, II and IV fused medially, plates III fused partially posteromedially. Epimeral setal formula (from 1 to 4):



Figs 3–8. *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n., adult: 3 — lateral view (gnathosoma and legs except basal parts not illustrated); 4 — subcapitulum, right half, ventral view; 5 — palp; 6 — chelicera, right, antiaxial view; 7 — leg II, right, paraxial view; 8 — trochanter, femur and genu of leg III, right, antiaxial view. Scale bars 100 μm (3), 20 μm (4–8).

3–1–3–3. Epimeral setae *1a*, *2a* and *3a* short (4–6), spiniform; *1c*, *4a* and *4b* (8) thin, smooth; *1b*, *3b*, *3c* and *4c* longest (16–20), setiform, barbed. Setae *4a* located on triangular tubercles.



Figs 9–14. *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n., adult, microscope images: 9 — surface in medial part of prodorsum; 10 — cerotegument in medial part of notogaster; 11 — notogastral seta f_2; 12 — notogastral setae h_2 and h_3; 13 — right adanal plate with adanal setae; 14 — claw of leg III, left, antiaxial view. Scale bar 20 μm.

Anogenital region. Five pairs of genital setae (g_1–g_3, 20–24; g_4, 24–28; g_5, 28–32) simple, g_1–g_3 densely barbed, g_4 and g_5 with one to three barbs in distal part. One pair of anal setae minute (4), thin, smooth. Three pairs of adanal setae (ad_1–ad_3, 24 –28) simple, smooth or indistinctly barbed. Lyrifissures *ian*, *iad* and *ips* distinct. Ovipositor short: 44–52 × 32–41; lobes (16–20) shorter than distal section (beyond middle fold; 28–32). Each of three lobes with four straight, smooth setae: $\psi_1 \approx \tau_1$ (20) longer than $\psi_2 \approx \tau_1 \approx \tau_2 \approx \tau_3$ (12). Six coronal setae (*k*, 6) spiniform.

Legs. Monodactylous. Claw of each leg serrate (*ser*) on dorsal side and with small, conical tubercle (*tub*) on ventral side. Morphology of leg segments typical for *Malaconothrus* (Knülle 1957;

Table 1.

Leg setation and solenidia of *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n.

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	*v′*	*d, (l), bv″, v″*	*dσ, (l)*	*dφ, (l), v′*	*(ft), (tc), (p), (u), (a),* ε, ω_1, ω_2, ω_3
II	*v′*	*d, (l), bv″, v″*	*dσ, l′*	*dφ, (l), v′*	*(ft), (tc), (p), (u), (a),* ω
III	*l′, v′*	*d, ev′*	*d*	*dφ, v′*	*(ft), (tc), (p), (u), (a)*
IV	*v′*	*d, ev′*	*d*	*d, v′*	*ft″, (tc), (p), (u), (a), s*

Roman letters refer to normal setae (ε — famulus), Greek letters refer to solenidia, *dφ* and *dσ* — seta and solenidion coupled. One apostrophe (′) marks setae on anterior and double apostrophe (″) setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

Colloff and Cameron 2013). Formulas of leg setation and solenidia: I (1–5–3–4–11) [1–1–3], II (1–5–2–4–10) [1–1–1], III (2–2–1–2–10) [0–1–0], IV (0–2–1–2–10) [0–0–0]; homology of setae and solenidia indicated in Table 1. Famulus and solenidia short, simple, blunted.

Type deposition. The holotype is deposited in the collection of the Senckenberg Institution Frankfurt, Germany; five paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia; eight paratypes are deposited in the collection of the University of the Philippines Los Baños Museum of Natural History, Philippines.

Etymology. The specific name *"agusanensis"* refers to Agusan, the province from where types originated.

Remarks. *Malaconothrus agusanensis* Ermilov et Corpuz-Raros sp. n. is most similar to *M. adilatatus* Ermilov, Anichkin et Tolstikov, 2014 from Vietnam (see Ermilov et al. 2014*a*) in the presence of monodactylous legs, granular body cerotegument, notogastral ridges, barbed notogastral setae (e_2, h_2 and p_3 longer than other), five pairs of genital setae, and interlamellar setae longer than exobothridial setae ex_1. However, the new species differs from the latter by the interlamellar setae and exobothridial setae ex_1 barbed (versus smooth in *M. adilatatus*); notogastral setae p_2 similar in length to centrodorsal setae, clearly shorter than e_2, h_2 and p_3 (versus little longer than centrodorsal setae, little shorter than e_2, h_2 and p_3 in *M. adilatatus*); subcapitular setae all short, 12 (versus *h* and *m*, both 32, longer than *a*, 24, in *M. adilatatus*); and leg claws serrate (versus smooth *M. adilatatus*).

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