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Contribution to knowledge of the oribatid mite genus *Dynatozetes*

(Acari, Oribatida, Mochlozetidae)

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A revised generic diagnosis for the oribatid mite genus *Dynatozetes* (Oribatida, Mochlozetidae) is proposed. A new species is described from upper soil and leaf litter in a primary evergreen lowland rainforest of Amazonian Peru. *Dynatozetes hexaporosus* Ermilov spec. nov. differs from the other representatives of the genus by the presence of well-developed interlamellar seta and elongate notogastral porose area *Aa*. An identification key to all known species of *Dynatozetes* is provided.

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Introduction

This work is part of our continuing study of the Peruvian oribatid mite fauna (e.g. Ermilov 2016, Ermilov & Friedrich 2016, Ermilov et al. 2016) and includes data on the mochlozetid genus *Dynatozetes* Grandjean, 1960 (Acari, Oribatida, Mochlozetidae).

Dynatozetes (Acari, Oribatida, Mochlozetidae) is a small genus that was proposed by Grandjean (1960) with *Dynatozetes amplus* Grandjean, 1960 as type species. At present, it comprises three species, which are distributed in the Neotropical and Nearctic regions (Subías 2004, updated 2016).

During taxonomic identification of new material from Peru, we found one new species (fourth identified representative) of *Dynatozetes*. The main goal of the paper is to revise generic diagnosis, to describe a new species, and to present an identification key for known species of the genus.

Material and methods

Material examined

Holotype (male) and four paratypes (two females and two males) of *Dynatozetes hexaporosus* Ermilov spec. nov. were collected from: South America, Amazonian Peru, 09°37'S, 74°56'W, Huánuco Department, Puerto Inca Province, Yuyapichis District, Área de Conservación Privada, Panguana (biological field station), near Rio Yuyapichis (river), 230 m a.s.l., upper soil and leaf litter in a primary evergreen lowland rainforest, Winkler extraction, 1.V.2015–21.V.2015 (S. Friedrich & F. Wachtel).

Methods

Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. 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 behind pteromorphs 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. Morphological terminology used in this paper follows that of F. Grandjean: see Travé & Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton & Behan-Pelletier (2009) for overview. Drawings were made with a camera lucida using a Leica transmission light microscope "Leica DM 2500".

Systematics

Genus *Dynatozetes* Grandjean, 1960

Type species: *Dynatozetes amplus* Grandjean, 1960, p. 104.

Revised generic diagnosis

Adult. Mochlozetidae (Grandjean 1960, Norton & Behan-Pelletier 2009). Body large, length more than 700 µm. Integument without ornamentation. Rostrum rounded. Lamella long and broad, cusp short, with one lateral tooth. Translamella and prolamella absent. Sublamella strongly developed. Tutorium ridge-like, with small distal tooth. Rostral, lamellar and interlamellar setae long, setiform, barbed, but *in* usually absent, represented by alveolus, *ro* inserted at end of tutorium. Bothridial seta of medium size, clavate to lanceolate, barbed. Pedotecta I and II represented by small lamina. Porose areas *Ad*, *Al*, *Am* and *Ah* present. Pteromorph well-developed. Dorsophragma and pleurophragma present. Notogaster with five to eight pairs of rounded (sometimes *Aa* elongate oval) porose areas including anterolateral *Aa*, dorsomedial *A1* and three to six pairs of posteroperipheral areas, *Aa* not divided. Ten pairs of notogastral setae represented only by alveoli. Posterior margin of notogaster rounded. Axillary saccule on subcapitulum absent. Subcapitular seta well-developed. Custodium, discidium and circumpedal carina present. Epimeral setal formula: 3–1–3–3. Six pairs of genital, one pair of aggenital, two pairs of anal and three pairs of adanal setae, ad_1 in postanal position. Adanal lyrifissure located close to anal plate, paraanal. Marginoventral porose area represented by several round or oblong parts. Porose area on leg femora and trochanters III and IV, in postero-ventral part of leg tarsi and antero-ventral part of leg tibiae, and sometimes in dorsal part of leg tarsi I and II well visible. Tarsus I with 20 setae (including *l″* and *v′*), seta *p* on tarsi II–IV with long cilia unilaterally. Sexual dimorphism absent.

Juvenile instars. Unknown.

Description

Dynatozetes hexaporosus Ermilov spec. nov.

Figs 1–13

Diagnosis. Body size: 763–863 × 647–697. Rostrum with small, semi-oval protruding. Rostral, lamellar and interlamellar setae long, setiform, barbed, *in* longest. Bothridial seta lanceolate, barbed. Eight pairs of porose areas present in typical case including six pairs of posteroperipheral areas, *Aa* elongate oval. Epimeral seta thin, barbed, anogenital seta indistinctly barbed. Leg trochanter IV with elongate triangular process anterodorsally. Dorsal porose area present on leg tarsi I and II.

Description

Measurements. Body length: 763 (holotype: male), 763–863 (four paratypes: two females and five males); notogastral width: 664 (holotype), 647–697 (four paratypes). No clear differences between females and males in the body sizes.

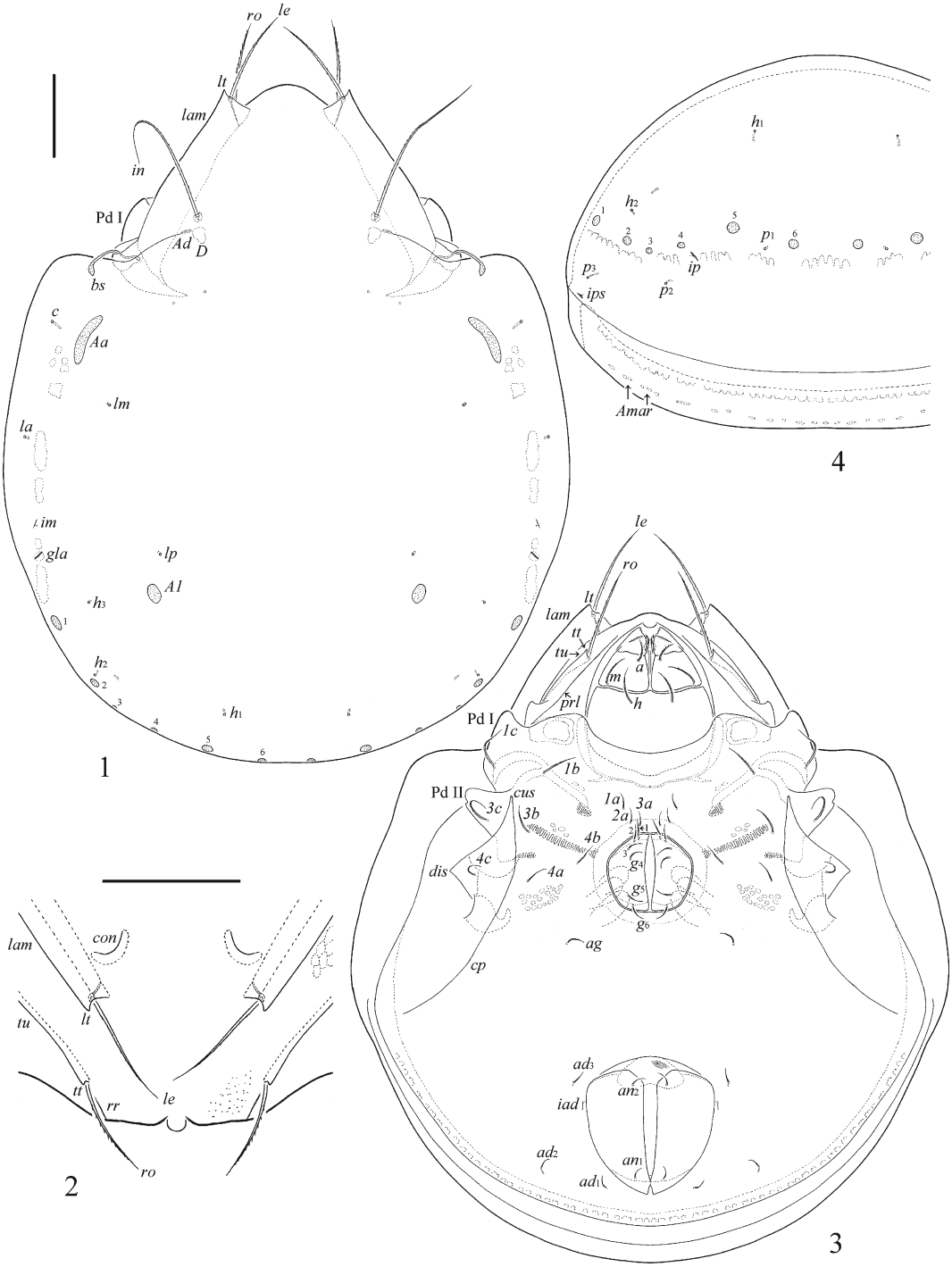
Integument (Fig. 5). Body colour brown to black-brownish. Surface microporose, lateral side of prodorsum densely microgranulate (diameter of granule up to 1). Pteromorph finely striate.

Prodorsum (Figs 1–3, 5). Rostrum with small, semi-oval protruding (visible in dorso-frontal view). Rostral (*rr*) and lateral (*prl*) ridges present. Lamella (*lam*), sublamella (*slam*) and tutorium (*tu*) longer than half of prodorsum. Lamellar (*lt*) and tutorial (*tt*) teeth distinctly developed. Small concavity (*con*) located near lamella. Sublamellar porose area oval (*Al*, 20–28 × 16–20). Rostral (*ro*, 110–131), lamellar (*le*, 110–131) and interlamellar (*in*, 266–274) setae setiform, barbed. Exobothridial seta (*ex*, 41–49) thin, erect, barbed. Bothridial seta (*bs*, 110–114) with stalk longer than short, lanceolate, barbed head. Dorsophragma (*D*) slightly elongated longitudinally. Dorsosejugal porose area (*Ad*) small, oval (12–16 × 4–6), located posterior to each interlamellar seta.

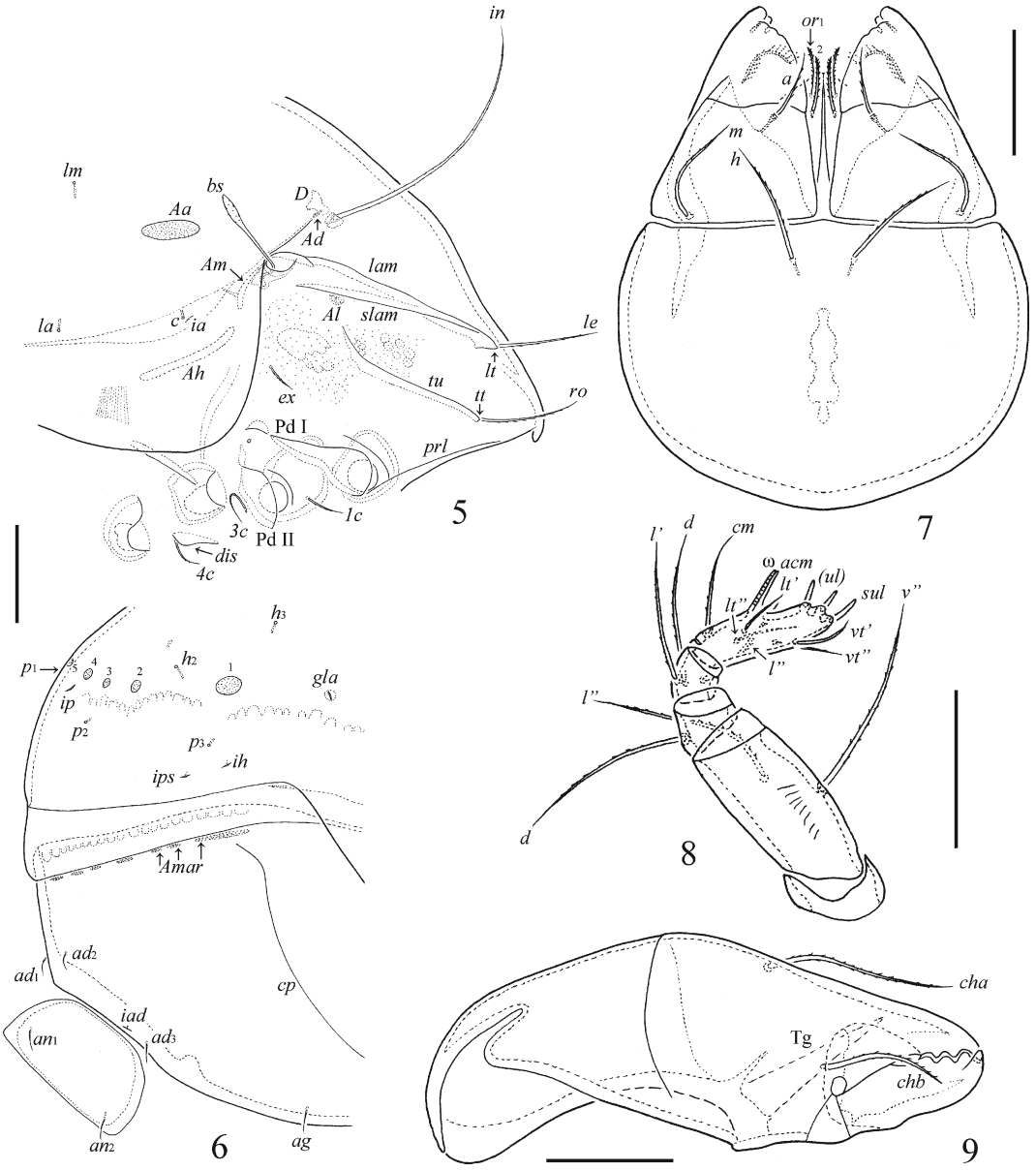
Notogaster (Figs 1, 4–6). Eight pairs of porose areas present in typical case, *Aa* elongate oval (49–65 × 16–20), longitudinally oriented, *A1* rounded (28–41), six pairs of posteroperipheral areas (NN1–6)

Table 1. Leg setation and solenidia of adult *Dynatozetes hexaporosus* Ermilov spec. nov. [Roman letters refer to normal setae, Greek letters to solenidia (except ε = famulus). Single prime (′) marks setae on the anterior and double prime (″) setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae].

Leg	trochanter	femur	genu	tibia	tarsus
I	*v′*	*d*, (*l*), *bv″*, *v″*	(*l*), *v′*, σ	(*l*), (*v*), ϕ_1, ϕ_2	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*), *v′*, (*pl*), *l″*, ε, ω_1, ω_2
II	*v′*	*d*, (*l*), *bv″*, *v″*	(*l*), *v′*, σ	(*l*), (*v*), φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*), ω_1, ω_2
III	*l′*, *v′*	*d*, *l′*, *ev′*	*l′*, σ	*l′*, (*v*), φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*)
IV	*v′*	*d*, *ev′*	*d*, *l′*	*l′*, (*v*), φ	*ft″*, (*tc*), (*p*), (*u*), (*a*), *s*, (*pv*)



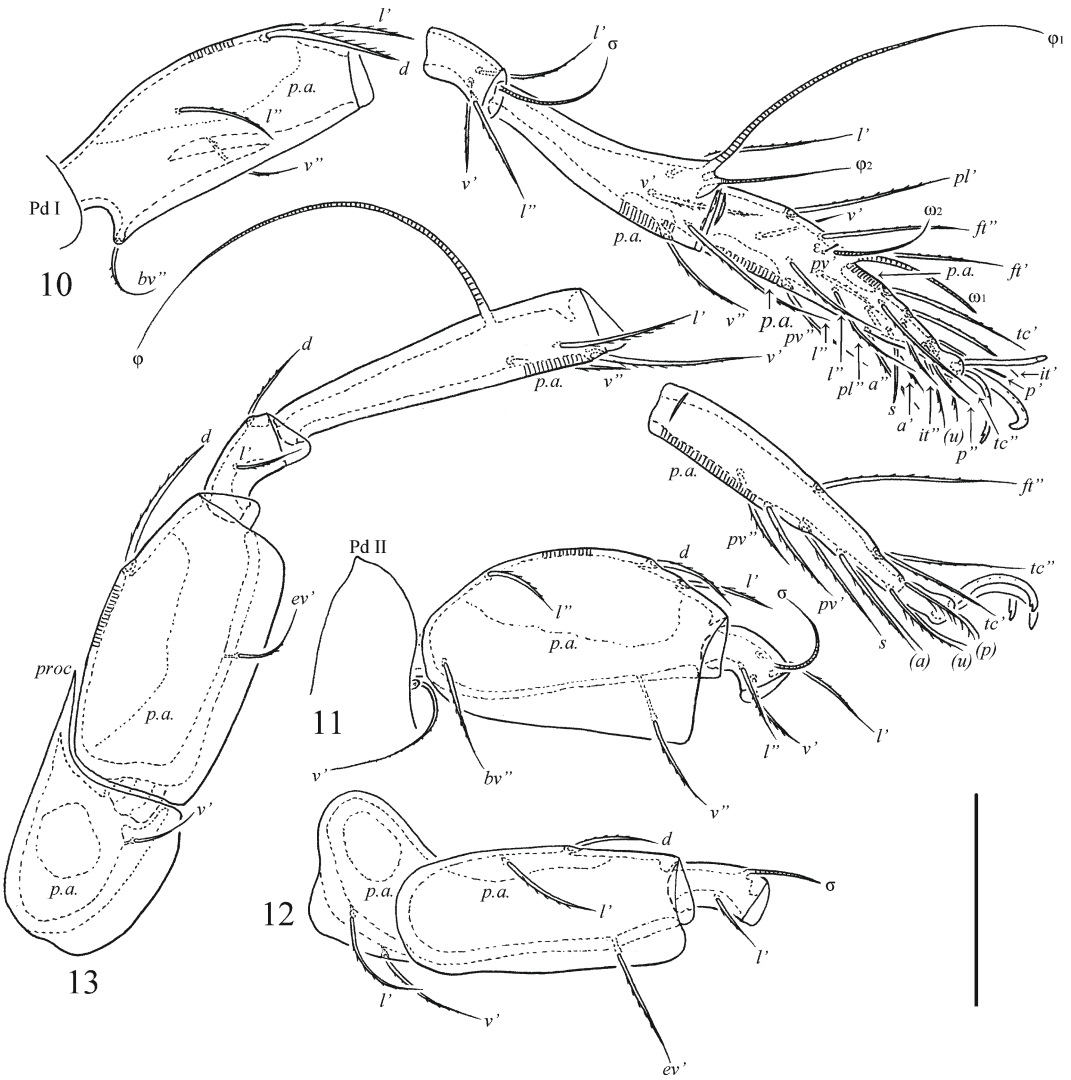
Figs 1–4. *Dynatozetes hexaporosus* Ermilov spec. nov., adult. **1.** Dorsal view, legs not illustrated. **2.** Rostrum, dorsofrontal view. **3.** Ventral view, legs not illustrated. **4.** Notogaster and part of ventral plate, posterior view. Scale bars = 100 μm.



Figs 5–9. *Dynatozetes hexaporosus* Ermilov spec. nov., adult. **5.** Prodorsum, podosomal region and anterior part of notogaster, lateral view, legs and gnathosoma not illustrated. **6.** Posterior part of hysterosoma, lateral view. **7.** Subcapitulum, ventral view. **8.** Palp, left, paraxial view. **9.** Chelicera, right, antiaxial view. Scale bars (5, 6) = 100 µm; scale bars (7–9) = 50 µm.

rounded, of these, the first pair (N1) larger (28–36) than other (10–24). Number of posteroperipheral areas sometimes asymmetric (six or five on one side and five or four on other side, respectively). All lyrifissures (*ia*, *im*, *ip*, *ips*, *ih*) and opisthonotal gland opening (*gla*) clearly visible.

Gnathosoma (Figs 3, 7–9). Subcapitulum longer than wide (196–204 × 147–161). Subcapitular seta setiform, barbed, *h* and *m* (both 53–61) longer than *a* (28–32). Adoral seta (or_1, or_2, 20–22) thickened, densely ciliate. Palp with length 141–149. Postpalpal seta (*ep*, 6) spiniform, smooth. Chelicera (217–227)



Figs 10–13. *Dynatozetes hexaporosus* Ermilov spec. nov., adult. **10.** Leg I (except trochanter and basal part of femur), right, antiaxial view. **11.** Genu and femur of leg II (except basal part of femur), right, antiaxial view. **12.** Genu, femur and trochanter of leg III, left, antiaxial view. **13.** Leg IV, left, antiaxial view. Scale bar = 100 μm.

with two barbed setae, *cha* (69–77) longer than *chb* (49–53). Trägårdh's organ (Tg) elongate triangular.

Epimeral and podosomal regions (Figs 3, 5, 6). Humeral porose area *Am* diffuse, elongate oval, *Ah* clearly bordered, band-like. Pedotecta I (Pd I) and II (Pd II) of typical form. Custodium (*cus*) strong, elongate triangular. Discidium (*dis*) triangular. Circumpedal carina (*cp*) connected to *cus*. Epimeral setae thin, barbed, *1a*, *2a* and *3a* (24–32) shorter than the others (49–57).

Anogenital region (Figs 3, 4, 6). Genital (g_1–g_6, 28–36), aggenital (*ag*, 28–36), anal (an_1, an_2, 16) and adanal (ad_1–ad_3, 20) setae setiform, thin, indistinctly barbed (visible under high magnification). Adanal lyrifissure (*iad*) and marginoventral porose area (*Amar*) well visible.

Legs (Figs 10–13). Median claw thicker than laterals, all serrate on dorsal side; lateral claws each with small tooth ventrodistally. Trochanter IV with elongate triangular process (*proc*) anterodorsally. Dorsal porose area (*p.a.*) present on tarsi I and II. Alveoli of tibial and genual solenidia without posterior spine. Formulas of leg setation and solenidia: I (1–5–3–4–20) [1–2–2], II (1–5–3–4–15) [1–1–2],

III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1. Solenidia ω_1 on tarsus I, ω_1 and ω_2 on tarsus II and σ on genu III blunt-ended, other solenidia longer, pointed. Famulus minute, slightly swollen distally, inserted posterior to ω_2.

Material examined. Holotype (male) and four paratypes (two females and two males): see "Material and methods" section.

Type deposition. The holotype is deposited in the collection of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; one paratype is deposited in the collection of the Bavarian State Collection of Zoology, Munich, Germany; one paratype is deposited in the collection of the Senckenberg Institute, Görlitz, Germany; two paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology. The specific name *hexaporosus* refers to six pairs of peripheral porose areas on the notogaster.

Remarks. The distinctive characters of the new species from other *Dynatozetes* species can be found in the identification key given below.

Key to known species of *Dynatozetes*

1. Interlamellar seta well-developed; notogastral porose area *Aa* elongate oval; body size: 763–863 × 647–697. ..... *Dynatozetes hexaporosus* Ermilov spec. nov.
   Distribution: Peru
– Interlamellar seta represented by alveolus; notogastral porose area *Aa* rounded. 2

2. Dorsal porose area on leg tarsi I and II absent; lamellar seta as long as distance *le–le*; body length: 934–964. ..... *Dynatozetes magnus* (Banks, 1895) (see also Norton 1984)
   Distribution: Nearctic region
– Dorsal porose area on leg tarsi I and II present; lamellar seta shorter than distance *le–le*. 3

3. Five or six pairs of notogastral posteroperipheral areas present; leg trochanter III with one seta (*v'* absent); body length: 770–870. ..... *Dynatozetes amplus* Grandjean, 1960
   Distribution: Neotropical region
– Four pairs of notogastral posteroperipheral areas present; leg trochanter III with two setae (*v'* present); body length: 800–930. ..... *Dynatozetes obesus* Grandjean, 1960
   Distribution: Neotropical region

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