Contribution to the knowledge of the oribatid mite genus *Angullozetes* (Acari: Oribatida: Scheloribatidae)

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Abstract
A new species of the genus *Angullozetes* (Oribatida: Scheloribatidae) is described from New Zealand. *Angullozetes arilloi* sp. nov. differs from the type species, *A. rostratus* Hammer, 1967 by the smaller body length, the presence of four pairs of notogastral porose areas and the absence of aggenital setae. A revised generic diagnosis of *Angullozetes* is presented.

Key words: mites; systematics; generic diagnosis; new species; morphology; Australian region.

Introduction
The oribatid mite genus *Angullozetes* (Acari: Oribatida) of the family Scheloribatidae¹ is monotypic; it was proposed by Hammer (1967) with *Angullozetes rostratus* Hammer, 1967 as type species.

Among the material collected from New Zealand, we found a new species of *Angullozetes*. The main goals of the paper are: (a) to describe and illustrate this new species, (b) to propose a revised generic diagnosis of *Angullozetes*.

Material and Methods

Material. The detailed collection locality and habitat is given in the “Material examined” section.

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 of the notogaster behind pteromorphs. 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

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¹ According to Subías’s catalogue (2004, updated version 2018), the genus is included in the family Liebstadiidae Balogh and Balogh, 1984.
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genu–tibia–tarsus.

Drawings were made with a camera lucida using a Leica transmission light microscope “Leica DM 2500”.

Morphological terminology used in this paper follows that of F. Grandjean: see Travé and Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton and Behan–Pelletier (2009), for overview.

The following abbreviations are used: lam – lamella; plam – prolamella; slam – sublamella; tu – tutorium; ar, pr, lr – anterior, posterior and lateral ridges of prodorsum, respectively; ro, le, in, bs, ex – rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; bo – bothridium; D – dorsophragma; P – pleurophragma; c, la, lm, lp, h, p – notogastral setae; Aa, A1, A2, A3 – notogastral porose areas; ia, im, ip, ih, ips – notogastral lyrifissures; gla – opisthonotal gland opening; cs – circumpedal scissure; csb – circumpedal sigillar band; a, m, h – subcapitular setae; v, l, d, cm, acm, ul, sul, vt, lt – palp setae; ω – palp and leg solenidion; cha, chb – cheliceral setae; Tg – Trägårdh’s organ; Pd I, Pd II – pedotecta I, II, respectively; 1a, 1b, 1c, 2a, 3a, 3b, 4a, 4b – epimeral setae; dis – discidium; cp – circumpedal carina; g, an, ad – genital, anal and adanal setae, respectively; iad – adanal lyrifissure; p.o. – preanal organ; p.a. – leg porose area; σ, φ – leg solenidia; ε – leg famulus; v, ev, bv, l, d, ft, tc, it, p, u, a, s, pv – leg setae.

Systematics

Superfamily Oripodoidea

Family Scheloribatidae

Genus Angullozetes Hammer, 1967
Type species Angullozetes rostratus Hammer, 1967

Angullozetes arilloi sp. nov.
(Figures 1–12)

Diagnosis. Body size: 225–254 × 131–147. Rostral, lamellar, interlamellar, notogastral, epimeral and anogenital setae short, setiform, thin, smooth. Bothridial setae clavate, barbed. Four pairs of rounded porose areas. Aggenital setae absent. Ventral side of body indistinctly striate.

Description. Measurements. Body length: 254 (holotype, female), 225, 229 (two paratypes, two males); notogaster width: 147 (holotype, female), 131, 135 (two paratypes, two males).

Integument (Figure 4). Body color light yellow. Body surface densely microfoveolate, ventral side indistinctly and longitudinally striate (foveolae and stria visible only under high magnification in dissected specimens).

Prodorsum (Figures 1, 5). Rostrum slightly protruding (visible in anterior view), rounded. Lamellae of half of the prodorsum length (measured in lateral view). Prolamellae and sublamellae thin. Tutoria poorly developed. Rostral, lamellar, interlamellar (all 8–10) and exobothridial (4) setae setiform, thin, smooth; in inserted on poorly developed longitudinal ridges. Bothridial setae (16; stalks in bothridia not considered) clavate, barbed. Anterior, posterior and lateral ridges on the lateral parts of prodorsum distinct.

Notogaster (Figure 1–3, 5). Ten pairs of notogastral setae (4) setiform, thin, smooth. Four pairs of rounded porose areas developed; Aa (8) little larger than A1, A2 and A3 (all 6). Lyrifissures, opisthonotal gland openings, circumpedal scissure and circumpedal sigillar scissure distinct.

Gnathosoma (Figure 6–8). Subcapitulum longer than wide (53–57 × 82–86). Subcapitular (4–6) and adoral (2) setae setiform, thin, smooth. Palps (length 28–32) with typical setation 0–2–1–3–9(+)o. Postpalpal setae (2) spiniform, smooth. Chelicerae (length 57–61) with two setiform, barbed setae, cha (20–24) longer than chb (12–16). Trägårdh’s organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figure 4, 5). Epimeral setae setiform, thin, smooth; lc (6–8) longer and slightly thicker than 1a, 1b, 2a, 3a, 3b, 4a, 4b (4). Humeral porose areas Ah oval, poorly visible. Pedotecta II rounded distally in ventral view. Discidia roundly triangular. Circumpedal carinae long, directed to triangular custodia.

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Figures 1–3. *Angulozetes arilloi* sp. nov., adult: 1 – dorsal view; 2 – posterior view (part of right half not shown); 3 – posterior part of body, lateral view. Scale bar 50 µm.

Anogenital region (Figure 2, 3, 4, 5). Three pairs of genital, two pairs of anal and three pairs of adanal setae (4) setiform, thin, smooth. Aggenital setae absent. Adanal lyrifissures located close and parallel to anal plates. Postanal porose areas narrowly elongate oval (32–36 × 4).

Legs (Figure 9–12). Claw of each leg strong, smooth dorsally. Dorsoparaxial porose areas on femora I–IV and on trochanters III, IV poorly visible; ventral porose areas in basal parts of tarsi and distal parts of tibiae not visible. Formulas of leg setation and solenidia: I (1–5–2–4–17) [1–2–2], II (1–5–2–4–15) [1–1–2], III (2–3–0–3–15) [1–1–0], IV (1–2–1–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1.

Material examined. New Zealand, North Island, Waipoua Forest, soil of kauri pine (*Agathis australis*) near a river, collected by E. Peñalver on 29 February 2008.

Type deposition. The holotype (female, in ethanol with drop of glycerol): Senckenberg Institute, Görlitz, Germany; two paratypes (two males, in ethanol with drop of glycerol): Tyumen State University Museum of Zoology, Tyumen, Russia.
Figures 4–8. *Angullozetes arilloi* sp. nov., adult: 4 – ventral view (gnathosoma and legs not shown); 5 – anterior part of body, lateral view (gnathosoma and legs not shown); 6 – subcapitulum, ventral view; 7 – palp, right, antiaxial view; 8 – chelicera, right, antiaxial view. Scale bar 50 µm (4, 5), 20 µm (6, 8), 10 µm (7).

**Etymology.** The species is named in honor of the acarologist Dr. Antonio Arillo (Universidad Complutense de Madrid, Madrid, Spain), who provided the material for study to the authors.

**Differential diagnosis.** *Angullozetes arilloi* sp. nov. differs from the type species, *Angullozetes rostratus* Hammer, 1967 by the smaller body length (225–254 versus 360), number of notogastral porose areas (four versus three) and the absence of aggenital setae (versus present).
Figures 9–12. Angullozetes arilloi sp. nov., adult: 9 – leg I, right, antiaxial view; 10 – trochanter, femur and genu of leg II, right, antiaxial view; 11 – trochanter, femur and genu of leg III, right, antiaxial view; 12 – leg IV, right, antiaxial view. Scale bar 20 µm.
Table 1. Leg setation and solenidia of adult Angullozetes arilloi sp. 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 | Tr | Fe | Ge | Ti | Ta |
|-----|----|----|----|----|----|
| I   | v’ | d, (l), bv”, v’” | (l), σ | (l), (v), ϕ₁, ϕ₂ | (ft), (tc), (it), (p), (a), s, (pv), v’, ε, ω₁, ω₂ |
| II  | v’ | d, (l), bv”, v’” | (l), σ | (l), (v), ϕ | (ft), (tc), (it), (p), (a), s, (pv), ω₁, ω₂ |
| III | l’, v’ | d, l’, ev’ | σ | l’, (v), ϕ | (ft), (tc), (it), (p), (a), s, (pv) |
| IV  | v’ | d, ev’ | d | l’, (v), ϕ | ft”, (tc), (p), (a), s, (pv) |

Distribution. At present, both known species of Angullozetes (A. rostratus Hammer, 1967 and A. arilloi sp. nov.) are distributed only in New Zealand.

Revised generic diagnosis of Angullozetes²

Adult. Prodorsum. Rostrum rounded. Lamellae of medium size, narrow, without cusps. Prolamellae, sublamellae and tutoria present. Translamella and sublamellar porose areas absent. Prodorsum with one pair of lateral ridges located between rostral setae and acetabula I. Rostral, lamellar, interlamellar and exobothridial setae very short, setiform. Bothridial setae clavate to globose, heads longer than stalks. Bothridia cup-like, covered completely by notogaster. Dorsosejugal porose areas present. Surface of prodorsum without heavily sculpturing and ornamentation. Notogaster. Anterior margin of notogaster not developed medially, posterior margin of notogaster rounded. Surface of prodorsum without heavily sculpturing and ornamentation. Notogaster. Anterior margin of notogaster not developed medially, posterior margin of notogaster rounded. Pteromorphs triangular, not movable. With three or four pairs of porose areas. Ten pairs of setae very short, setiform. Surface of notogaster without heavily sculpturing and ornamentation. Gnathosoma. Subcapitular setae setiform. Palps with setation 0–2–1–3–9(+ω). Solenidion of palp tarsi bacilliform, attached to eupathidium. Chelicerae chelate-dentate, with two setiform setae. Lateral podosomal and epimeral regions. Humeral porose areas Ah present, Am absent. Pedotecta I and II represented by small laminae. Custodia, discidia and circumpedal carinae present. Epimeral setal formula: 3–1–2–2; setae 3c and 4c absent. Anogenital region. With three pairs of genital, two pairs of anal and three pairs of adanal setae; one pair of aggenital setae present or absent. Adanal lyrifissures located close and lateral to anal plates. Postanal porose area present. Surface without heavily sculpturing and ornamentation. Legs. Monodactylous. Solenidion ϕ₂ on tibiae I inserted on distinct apophysis. Leg tarsi I with 17 setae (pl’, pl” and l”’ absent). Juvenile instars. Not known.

Acknowledgments

We cordially thank Prof. Dr. Badamdorj Bayartogtokh (National University of Mongolia, Ulaanbaatar, Mongolia) for the valuable comments.

References

Hammer, M. (1967) Investigations on the oribatid fauna of New Zealand. Part II. Det Kongelige Danske Videnskabernes Selskab Biologiske Skrifter, 15(4), 1–60.

Minor, M.A., Babenko, A.B. & Ermilov, S.G. (2017) Oribatid mites (Acari: Oribatida) and springtails (Collembola) in alpine habitats of southern New Zealand. New Zealand Journal of Zoology, 44 (1), 65–85.

² The generic diagnosis is based on descriptions of Angullozetes rostratus Hammer, 1967 (Hammer 1967) and Angullozetes arilloi sp. nov. (data of this paper) and morphological study of A. rostratus (collected earlier from New Zealand; Minor et al. 2017) from the personal collection of the first author.
Norton, R.A. (1977) A review of F. Grandjean’s system of leg chaetotaxy in the Oribatei (Acari) and its application to the family Damaeidae. In: Dindal D.L., editor. Biology of oribatid mites. SUNY College of Environmental Science and Forestry, Syracuse; p. 33–61.

Norton, R.A. & Behan-Pelletier, V.M. (2009) Oribatida. Chapter 15. In: Krantz, G.W. & Walter, D.E., editors. A Manual of Acarology. Texas Tech University Press, Lubbock; p. 430–564.

Subías, L.S. (2004) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). Graellsia, 60 (número extraordinario), 3–305. Online version accessed in January 2018, 605 pp.; http://escalera.bio.ucm.es/usuarios/bba/cont/docs/RO_1.pdf

Travé, J. & Vachon, M. (1975) François Grandjean. 1882–1975 (Notice biographique et bibliographique). Acarologia, 17 (1), 1–19.