A new species of *Scheloribates* (Acari, Oribatida, Scheloribatidae) from South Africa

SERGEY G. ERMILOV¹, ELIZABETH A. HUGO-COETZEE²,³ & ALEXANDER A. KHAUSTOV¹

¹Institute of Environmental and Agricultural Biology (X-BIO), Tyumen State University, 10 Semakova Str., Tyumen 625003, Russia. E-mail: ermilovacari@yandex.ru, alex1973khaustov@gmail.com
²National Museum, 36 Aliwal St., Bloemfontein 9301, South Africa. E-mail: lhugo@nasmus.co.za
³University of the Free State, 205 Nelson Mandela Dr., Park West, Bloemfontein 9301, South Africa

Received 12 January 2021 | Accepted by V. Pešić: 11 February 2021 | Published online 13 February 2021.

Abstract
A new species of the genus *Scheloribates* is described from soil in South Africa. *Scheloribates* (*Scheloribates*) *curviprolamellatus* sp. nov. differs from all species of the subgenus by the thick, specifically curved (concave) prolamella.

Key words: scheloribatid mites, taxonomy, morphology, Hogsback, Afrotropical region.

Introduction
During taxonomic identification of Scheloribatidae from Hogsback State Forest in South Africa, we found one new species belonging to the genus *Scheloribates* Berlese, 1908, the nominative subgenus, which we describe and illustrate herein.

*Scheloribates* (*Scheloribates*) comprises 214 species with a cosmopolitan distribution (Subías, online version 2020); of these 16 species and one subspecies have been recorded from South Africa: *S. confusius* Coetzer, 1968, *S. elsi* Pletzen, 1965; *S. fimbriatus* Thor, 1930, *S. laevigatus* (Koch, 1835), *S. louwi louwi* Pletzen, 1965, *S. loulou nimirum* Coetzer, 1968, *S. obtusus* Pletzen, 1963, *S. pallidulus* (Koch, 1841), *S. parvus* Pletzen, 1963, *S. perisi* Pérez-Iñigo, 1982, *S. potchefstroomensis* Ermilov, Hugo-Coetze, Khaustov & Theron, 2017, *S. pubescens* Mahunka, 1984, *S. rectus* Hammer, 1958, *S. robustus* Pletzen, 1963, *S. sudafricanus* Subias, 2018, *S. tricarinus* Coetzer, 1968, and *S. variabilis* Pletzen, 1965 (see e.g., Pletzen 1963, 1965; Coetzer 1968; Mahunka 1984; Ermilov *et al.* 2017; Ermilov & Hugo-Coetze 2019; Subías 2020).
Material and methods

**Specimens.** Substrate samples containing oribatid mites were collected in Hogsback State Forest, a centuries-old indigenous Afromontane forest near the village of Hogsback (32°35'S, 26°57'E), situated in the Amathole mountains, Eastern Cape Province, South Africa. Mites were extracted using Berlese’s funnels with electric lamps in laboratory conditions during five days, and stored in 75% ethanol.

Specimens are deposited in three institutions: the National Museum Bloemfontein, South Africa (NMB); the Senckenberg Museum, Görlitz, Germany (SMG); and the Tyumen State University Museum of Zoology, Tyumen, Russia (TSUMZ).

**Observation and documentation.** 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 notogaster. Notogastral width refers to the maximum width of the notogaster behind pteromorphs in dorsal view. 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-genus-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 transmission light microscope “Leica DM 2500”.

**Terminology.** Morphological terminology used in this paper follows that of Grandjean: see Travé & Vachon (1975) for references; Norton (1977) for leg setal nomenclature; and Norton & Behan-Pelletier (2009) for overview.

**Abbreviations.** Prodorsum: lam = lamella; plam = prolamella; slam = sublamella; Al = sublamellar porose area; tlam = translamella; kf = keel-shaped ridge; ro, le, in, bs, ex = rostral, lamellar, interlamellar, bothridial, and exobothridial setae, respectively; Ad = dorsosejugal porose area; D = dorsodorsal lyrifissures; P = pleurophragma. Notogaster: c, la, lm, lp, h, p = notogastral setae; Sa, S1, S2, S3 = sacculi; ia, im, ih, ips = lyrifissures; gla = opisthonal gland opening. Gnathosoma: a, m, h = subcapitular setae; or = adoral seta; d, l, cm, acm, ul, su, lt, vt, inf, sup = palp setae; ω = palp solenidion; cha, chb = cheliceral setae; Tg = Trägårdh’s organ. Epimeral and lateral podosomal regions: 1a, 1b, 1c, 2a, 3a, 3b, 3c, 4a, 4b, 4c = epimeral setae; PdI, PdII = pedotecta I and II, respectively; z = aperture of supracoxal gland; dis = discidium; cpc = circumpedal carina. Anogenital region: g, ag, an, ad = genital, aggenital, anal, and adanal setae, respectively; iad = adanal lyrifissure; Amar = marginal porose area; po = preanal organ. Legs: Tr, Fe, Ge, Ti, Ta = leg trochanter, femur, genu, tibia, and tarsus, respectively; pa = leg porose area; ω, σ, θ = leg solenidia; ε = leg famulus; d, l, v, ev, bv, ft, tc, it, p, u, a, s, pv, pl = leg setae.

Description of new species

**Scheloribates (Scheloribates) curviprolamellatus sp. nov.**

(Figs 1–10)

https://zoobank.org/urn:lsid:zoobank.org:act:7A1B1C9D-FD4A-4540-8FB9-9BD857A1BDFA

**Material examined.** Holotype (female) and 11 paratypes (seven males and four females): South Africa, Amathole mountains in the Eastern Cape Province, Hogsback State Forest at the village of Hogsback, 32°35’21.6”S, 26°57’38.5”E, indigenous Afromontane mixed forest (Mucina & Geldenhuys 2006), consisting of tall trees (dominant species *Afrocarpus falcatus* (yellowwood), *Celtis africana* (white stinkwood), *Calodendrum capense* (Cape chestnut) and *Vepris lanceolata* (white ironwood)) and a dense understorey of shrubs, herbs and moss, in soil, 14.IX.2019, collected by V.A. Khaustov, S.G. Ermilov, E.A. Hugo-Coeetzee, and A.A. Khaustov.

**Type deposition.** The holotype and one paratype are deposited in NMB; one paratype is deposited in SMG; nine paratypes are deposited in TSUMZ. All specimens are preserved in ethanol with a drop of glycerol.

**Diagnosis.** Body size 464–548 × 315–364. Lateral side of prodorsum with several ridges between insertion of rostral seta and acetabulum I. Prolamella thick, specifically curved (concave). Translamella absent, only two short ridges developed near lamellae. Rostral, lamellar and interlamellar setae long, setiform, barbed: ro shortest, inserted before prolamella, in longest. Bothridial setae of medium length, with long stalk and small, rounded, slightly barbed head. All notogastral setae minute, simple. Four pairs of
sacculi drop-like. Epimeral and anogenital setae short, setiform, thin, slightly barbed; $g_1$ distinctly longer than other genital setae. Circumpedal carina short. Leg tarsus I with 19 setae ($l''$ absent), genu II with two setae ($v'$ absent).

Figures 1–3. Scheloribates (Scheloribates) curviprolamellatus sp. nov., adult: 1 – dorsal view; 2 – ventral view (gnathosoma and legs not shown); 3 – lateral view (gnathosoma and legs not shown). Scale bar 100 μm.

**Description of adult.** Measurements. Body length 514 (holotype), 464–548 (11 paratypes); body width 332 (holotype), 315–364 (11 paratypes). No difference between males and females.
Figures 4–10. Scheloribates (Scheloribates) curviprolamellatus sp. nov., adult: 4 – subcapitulum, ventral view; 5 – palp, left, paraxial view; 6 – chelicera, left, paraxial view; 7 – leg I, without trochanter, right, antiaxial view; 8 – leg II, without trochanter and tarsus, right, antiaxial view; 9 – leg III, without trochanter and tarsus, left, antiaxial view; 10 – leg IV, left, antiaxial view. Scale bar 20 μm (4, 6–10), scale bar 10 μm (5).

Integument. Body color brown. Cuticle microporose (visible under high magnification, ×1000). Lateral side of body with microgranulate cerotegument between bothridium and acetabula I–III. Lateral side of prodorsum with several strong ridges between insertion of rostral seta and acetabulum I; and with dense stria lateral to lamella. Ventrolateral side of pedotectum I slightly striate.

Prodorsum (Figs 1, 3). Rostrum rounded. Lamella about 1/2 length of prodorsum. Prolamella thick, specifically curved backward. Sublamella linear, similar to lamella in length. Sublamellar porose area (12 × 8) oval. Translamella absent, only two short ridges developed near lamellae. Lateral keel-shaped ridge distinct. Rostral (82–86), lamellar (98–106) and interlamellar (131–139) setae setiform, barbed; ro inserted...
NEW SPECIES OF SCHELORIBATES FROM SOUTH AFRICA

anterior to prolamella. Exobothridial seta (10–12) setiform, thin, slightly barbed. Bothridial seta (65–69) with long, smooth stalk and short, rounded, barbed head. Bothridium with lateral scale. Dorsosejugal porose area (18–20 × 8–10) elongate oval. Dorsosejugal area slightly elongate.

Notogaster (Figs 1, 3). Ten pairs of notogastral setae (6) setiform, thin, smooth. Four pairs of sacci

Gnathosoma (Figs 4–6). Subcapitulum longer than wide (114–118 × 77–82). All subcapitular (20) and adoral (10–12) setae setiform, barbed. Pulp (69–73) with typical setation 0-2-1-3-9 (+0). Postpalpal seta (4) spiniform, smooth. Chelicera (118–123) with two setiform, barbed setae (cha 36; chb 24).

Epimeral and lateral podosomal regions (Figs 2, 3). Epimeral formula 3-1-3-3. All setae (1b, 3b, 3c, 4c 20–24; others 12–16) setiform, thin, slightly barbed. Humeral porose areas not observed. Pedotectum I and II represented by small lamina. Discidium triangular, rounded apically. Circumpedal carina comparatively short, anteriorly not reaching pedotectum II, posteriorly not reaching margin of ventral plate.

Anogenital region (Figs 2, 3). Genital (g1, 24–28; others 12–16), aggenital (12–16), anal (20–24), and adanal (20–24) setae setiform, thin, slightly barbed. Adanal lyrifissure distinct. Marginal porose area band-like, complete.

Legs (Figs 7–10). Median claw distinctly thicker than lateral claws, all barbed on dorsal side. Lateral claws with minute tubercle ventrodistally. Typical porose area on all femora, tarsi and tibiae, and on trochanters III, IV well visible. Formulas of leg setation and solenidia: I (1-5-3-4-19) [1-2-2], II (1-5-2-4-15) [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. Femur of tarsus I short, erect, slightly swollen distally, inserted posterior to solenidion ω2. Solenidion ω1 on tarsus I, ω1 and ω2 on tarsus II and σ on genu III slightly bacilliform, other solenidia setiform.

TABLE I. Leg setation and solenidia of adult Scheloribates (Scheloribates) curviprolamellatus sp. nov.

| Leg | Tr | Fe | Ge | Ti | Ta |
|-----|----|----|----|----|----|
| I   | v' | d, (l), bv", v" | (l), l", σ | (l), (v), φ1, φ2 | (f1), (tc), (it), (p), (u), (a), s, (pv), v", (pl), ε, ω1, ω2 |
| II  | v' | d, (l), bv", v" | (l), σ | (l), (v), φ | (f1), (tc), (it), (p), (u), (a), s, (pv), ω1, ω2 |
| III | l', v' | d, l", ev' | l", σ | l", (v), φ | (f1), (tc), (it), (p), (u), (a), s, (pv) |
| IV  | v' | d, ev' | d, l' | l", (v), φ | f", (tc), (p), (u), (a), s, (pv) |

Note: Roman letters refer to normal setae, Greek letters to solenidia (except ε = famulus). Single quotation mark (’’) designates setae on the anterior and double quotation mark (’’) setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae.

Etymology. The species name curviprolamellatus refer to the specifically curved prolamella.

Remarks. Scheloribates (Scheloribates) curviprolamellatus sp. n. differs from all species of the subgenus by the thick, specifically curved (backward) prolamella (versus prolamella simple, straight).

Acknowledgements

We thank Vladimir A. Khaustov (Tyumen State University, Tyumen, Russia) and Jan Andries Neethling (National Museum, South Africa) for helping with fieldwork; and two anonymous reviewers for valuable comments. Permission to sample in Hogsback State Forest was granted by the Department of Agriculture, Forestry and Fisheries (DAFF). The study was funded by the Russian Foundation for Basic Research according to the research project № 18-04-00096A.

References

Coetzer, A. (1968) New Oribatulidae Thor, 1929 (Oribatei, Acari) from South Africa, new combinations and a key to the genera of the family. Memórias do Instituto de Investigaçāo Cientifica de Moçambique, 9 (A), 15–126.

Ermilov, S.G. & Hugo-Coetzee, E.A. (2019) New data on oribatid mites (Acari, Oribatida) of South Africa, with description of two new species of the family Oppiidae. Systematic and Applied Acarology, 24
Ermilov, S.G., Hugo-Coetzee, E.A., Khaustov, A.A. & Theron, P.D. (2017) New and interesting oribatid mites (Acari, Oribatida) near Potchefstroom (South Africa), with description of two new species. *Systematic and Applied Acarology*, 22 (11), 1849–1871.

Mahunka, S. (1984) Oribatids of the eastern part of the Ethiopian region (Acari) VI. *Acta Zoologica Hungarica*, 30 (3–4), 393–444.

Mucina, L. & Geldenhuys, C.J. (2006) Afrotemperate, subtropical and azonal forests. In: Mucina, L. & Rutherford, M.C. (Editors), *The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19*. South African National Biodiversity Institute, Pretoria, 585–615.

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, 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, 430–564.

Pletzen, van, R. (1963) Studies on South African Oribatei (Acarina). *Acarologia*, 5 (4), 690–703.

Pletzen, van, R. (1965) Studies on the South African Oribatei (Acari). III. Further new species of the genus *Scheloribates* Berlese 1908. *Acarologia*, 7 (1), 113–120.

Subías, L.S. (2020) Listado sistemático, sinonímico y biogeográfico de los Ácaros Oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles), 15ª actualización. 527 pp. Available from: http://escalera.bio.ucm.es/usuarios/bba/cont/docs/RO_1.pdf (accessed January 2020).

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