ZOOSYSTEMATICA ROSSICA

ISSN 2410-0226 [online] 0320-9180 [print]

Zoological Institute, Russian Academy of Sciences, St Petersburg ▪ https://www.zin.ru/journals/zsr/
Vol. 29(2): 278–283 ▪ Published online 11 November 2020 ▪ DOI 10.31610/zsr/2020.29.2.278

RESEARCH ARTICLE

A new species of the subgenus *Scheloribates* (*Topobates*) (Acari: Oribatida: Scheloribatidae) from Panama

Новый вид подрода *Scheloribates* (*Topobates*) (Acari: Oribatida: Scheloribatidae) из Панамы

S.G. Ermilov

С.Г. Ермилов

Sergey G. Ermilov, Institute of Environmental and Agricultural Biology (X-BIO), Tyumen State University, 10 Semakova Str., Tyumen 625003, Russia. E-mail: ermilovacari@yandex.ru

Abstract. The oribatid mite subgenus *Scheloribates* (*Topobates*) Grandjean, 1958, is recorded from the Neotropical region for the first time. A new species of this subgenus is described from the leaf litter collected in Cayo Agua Island, Panama. *Scheloribates* (*Topobates*) *panamaensis* **sp. nov.** differs from its related species by the very large body size and presence of a strong ventrodistal process on the leg femora II–IV.

Резюме. Подрод панцирных клещей *Scheloribates* (*Topobates*) Grandjean, 1958, впервые зарегистрирован в Неотропической области. Новый вид этого подрода описан из лесной подстилки острова Кайо-Агуа (Панама). *Scheloribates* (*Topobates*) *panamaensis* **sp. nov.** отличается от похожих видов очень большим размером тела и наличием сильного вентродистального выступа на бедрах ног II–IV.

Key words: oribatid mites, taxonomy, morphology, Neotropical region, *Scheloribates*, *Topobates*, Scheloribatidae, new species

Ключевые слова: панцирные клещи, таксономия, морфология, Неотропическая область, *Scheloribates*, *Topobates*, Scheloribatidae, новый вид

Zoobank Article LSID: urn:lsid:zoobank.org:pub:96F07039-7B08-47BD-B18D-C2EC2A5DB81F

Introduction

Topobates (Oribatida: Scheloribatidae) was proposed by Grandjean (1958) with *Topobates granifer* Grandjean, 1958 as type species. Later, Weigmann & Miko (1998) proposed a subgeneric status for this genus, however, some acarologists continue to maintain the independence of the generic status (Subías, 2004, updated 2020; Mahunka & Mahunka-Papp, 2009). The subgenus comprises 25 species, which are distributed in the Palaearctic, Ethiopian, Oriental and Australian regions (Subías, updated 2020). The main subgeneric traits were summarised by Grandjean (1958) and Weigmann & Miko (1998). Identification keys for some species of *Scheloribates* (*Topobates*) were presented by Weigmann & Miko (1998), Mahunka & Mahunka-Papp (2009) and Balogh & Balogh (2002).

Saporito et al. (2007) presented several unidentified oribatid mite taxa from Panama and Costa Rica. During taxonomic study of these species, I found a new species belonging to *Scheloribates* (*Topobates*) (designated as "genus near *Megascheloribates* sp." in Saporito et al., 2007). It is the first record of the subgenus in the Neotropical region. The main goal of my paper is to describe and illustrate this new species.

Material and methods

Specimens. The specimens of the new species were received from the personal collection of Prof. Dr. Roy A. Norton (State University of New York, Syracuse, U.S.A.). They are deposited in two institutions, the National Museum of Natural History, Smithsonian Institution, Washington, DC, U.S.A. (currently housed with the U.S. Department of Agriculture collections in Beltsville, Maryland) (USNM), and the Tyumen State University Museum of Zoology, Tyumen, Russia (TSUMZ). The collection locality and habitat information are given in the *Material examined* section.

Observation and documentation. Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Body length was measured in dorsal view, from the tip of the rostrum to the posterior edge of the notogaster. Notogastral width refers to the maximum width of the notogaster 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-genu-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 transmitted 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; *kf* = keel-shaped ridge; *ro*, *le*, *in*, *bs*, *ex* = rostral, lamellar, interlamellar, bothridial, and exobothridial setae, respectively; *bo* = bothridium; *Ad* = dorsosejugal porose area; *D* = dorsophragma; *P* = pleurophragma. Notogaster: *c*, *da*, *dm*, *dp*, *la*, *lm*, *lp*, *h*, *p* = notogastral setae; *Sa*, *S1*, *S2*, *S3* = sacculi; *ia*, *im*, *ip*, *ih*, *ips* = lyrifissures; *gla* = opisthonotal gland opening. Gnathosoma: *a*, *m*, *h* = subcapitular setae; *or* = adoral seta; *d*, *l*, *cm*, *acm*, *ul*, *su*, *lt*, *vt* = 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; *Am*, *Ah* = humeral porose areas; *PdI*, *PdII* = pedotecta I and II, respectively; *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; *trp* = trochanteral process; *fep* = femoral process; *pa* = leg porose area; ω, σ, φ = leg solenidia; ε = leg famulus; *d*, *l*, *v*, *ev*, *bv*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl* = leg setae.

Taxonomy

Suborder **Oribatida** Duges, 1834

Superfamily **Oripodoidea** Jacot, 1925

Family **Scheloribatidae** Grandjean, 1933

Genus ***Scheloribates*** Berlese, 1908

Subgenus ***Scheloribates* (*Topobates*)** Grandjean, 1958

***Scheloribates* (*Topobates*) *panamaensis* sp. nov.**
(Figs 1–10)

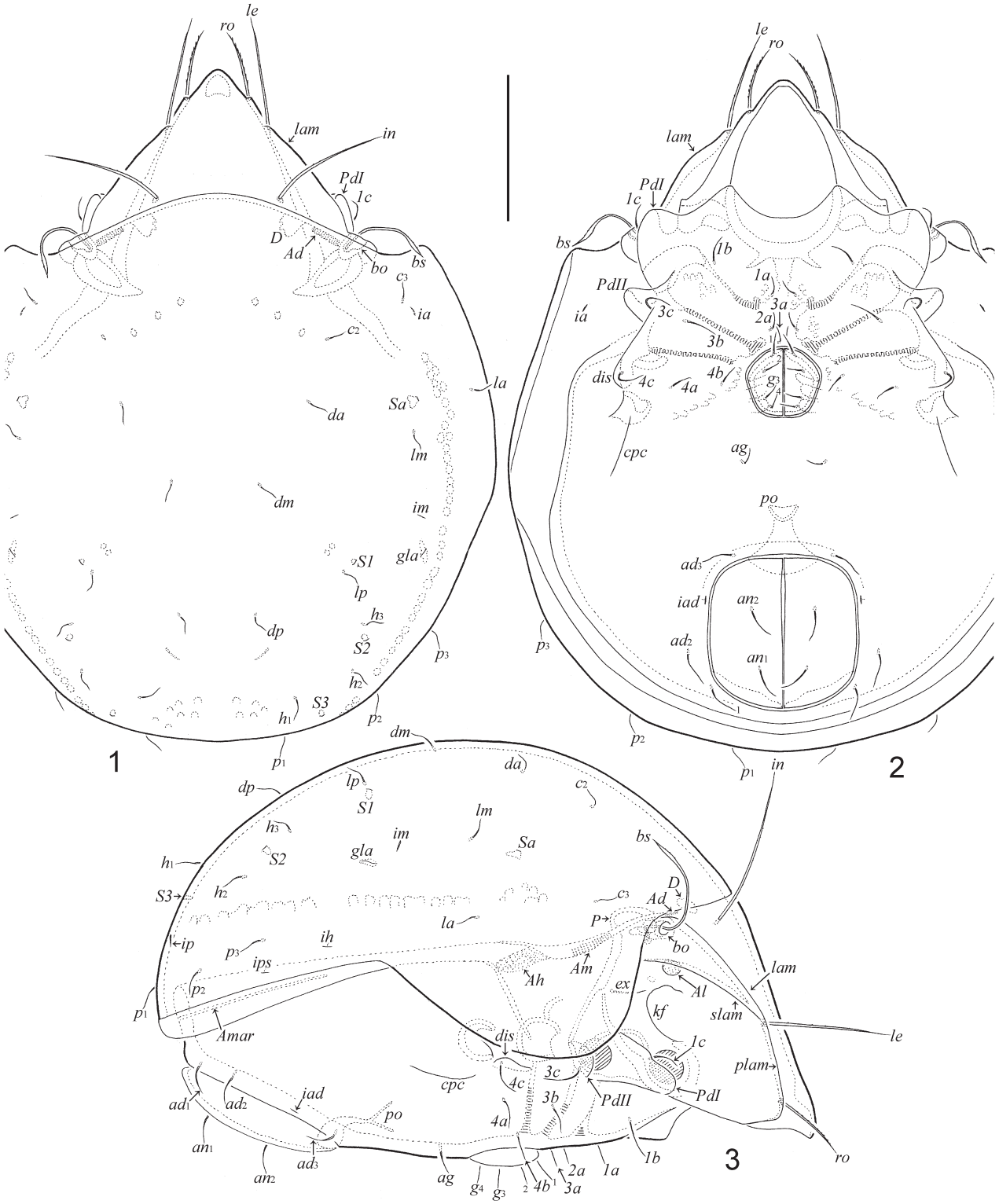
Holotype. Male (in ethanol with a drop of glycerol), **Panama**, *Bocas del Toro*, Cayo Agua I., leaf litter, July 2006, R. Saporito leg. (USNM).

Paratypes. Two females (in ethanol with a drop of glycerol), same data as for holotype (TSUMZ).

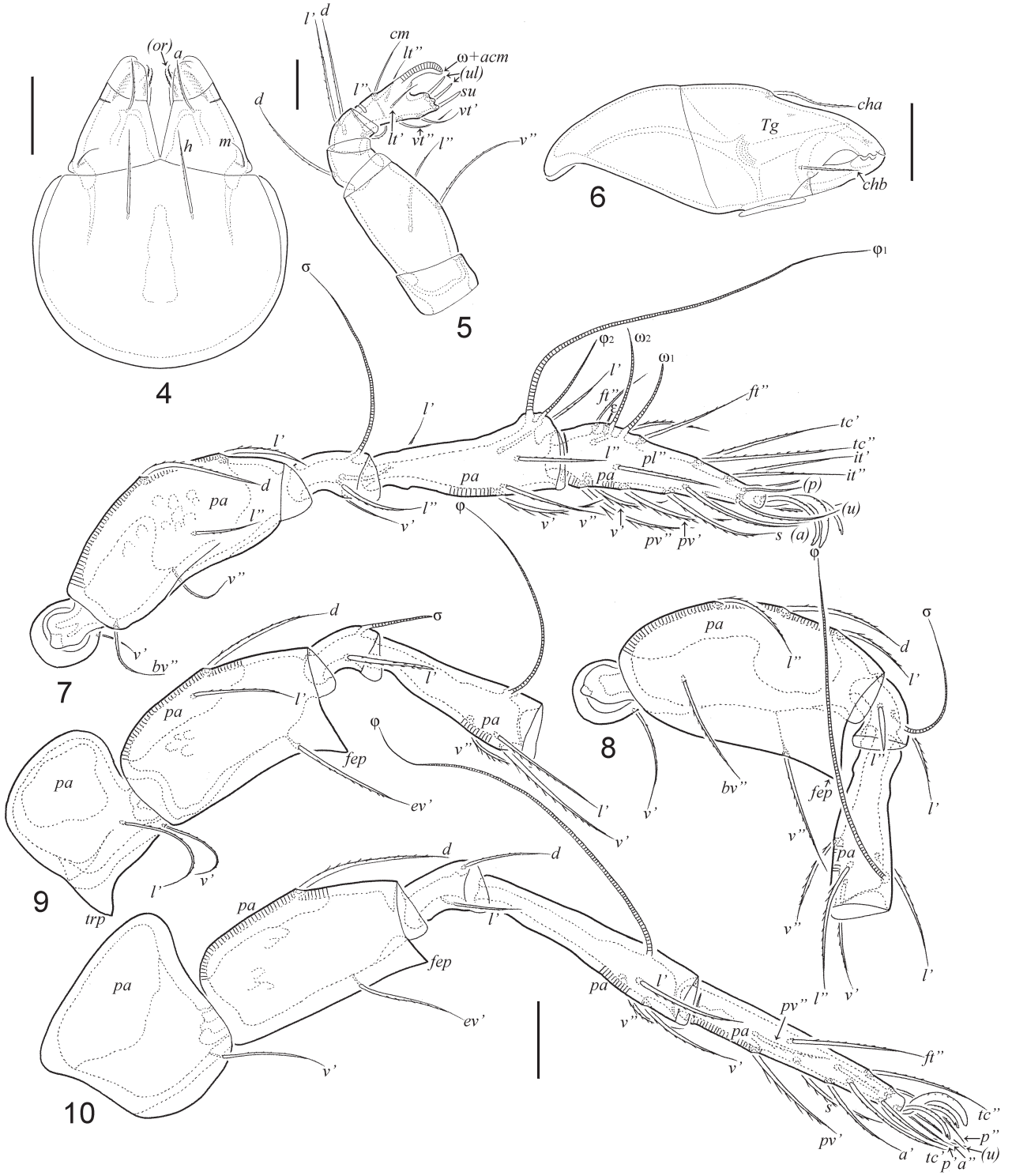
Diagnosis. Body size: 929–1062 × 763–898. Prolamella, sublamella and lateral keel-shaped ridge present. Rostral, lamellar and interlamellar setae long, setiform; *ro* shortest, *in* longest. Bothridial seta long, spindle-form, with short, thin apex. Fourteen pairs of notogastral setae short, setiform, with short attenuate tip, thin, smooth. Epimeral and anogenital setae short, setiform, thin, roughened. Leg femora II–IV with triangular process ventrodistally; trochanter III with triangular process posteriorly.

Description. Measurements. Body length: 929 (holotype, male), 1045, 1062 (two paratypes, two females); notogaster width: 763 (holotype), 879, 898 (two paratypes).

Integument. Body color brown to dark brown. Cuticle densely microporose (visible under high magnification, ×1000). Lateral side of body partially with microgranulate cerotegument.



Figs 1–3. *Scheloribates* (*Topobates*) *panamaensis* **sp. nov.**, adult. **1,** dorsal view; **2,** ventral view (gnathosoma and legs not shown); **3,** lateral view (gnathosoma and legs not shown). Scale bar: 200 μm.



Figs 4–10. *Scheloribates* (*Topobates*) *panamaensis* **sp. nov.**, adult. **4,** subcapitulum, ventral view; **5,** palp, left, paraxial view; **6,** chelicera, right, antiaxial view; **7,** leg I, right, antiaxial view; **8,** leg II, without tarsus, right, antiaxial view; **9,** leg III, without tarsus, left, antiaxial view; **10,** leg IV, left, antiaxial view. Scale bars: 50 μm (4, 6–10), 20 μm (5).

Table 1. *Scheloribates* (*Topobates*) *panamaensis* **sp. nov.,** leg setation and solenidia of adult mite.

Leg	*Tr*	*Fe*	*Ge*	*Ti*	*Ta*
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*), ε, ω_1, ω_2
II	*v'*	*d*, (*l*), *bv"*, *v"*	(*l*), σ	(*l*), (*v*), φ	(*ft*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*, (*pv*), ω_1, ω_2
III	*v'*, *l'*	*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*)

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.

Prodorsum. Rostrum narrowly rounded. Lamella about 1/2 length of prodorsum, simple. Prolamella linear, reaching insertion of rostral seta. Sublamella linear, similar to lamella in length. Sublamellar porose area (20–24 × 16) oval, partially covered by sublamella. Lateral keel-shaped ridge distinct. Rostral seta (94–102) setiform, distinctly barbed. Lamellar (184–205) and interlamellar (246–258) setae setiform, slightly barbed. Exobothridial seta (61–65) setiform, roughened. Bothridial seta (135–139) with long stalk and shorter, spindle-form, slightly barbed head having short, thin apex. Bothridium cup-like. Dorsosejugal porose area (32–41 × 8–10) elongate oval. Dorsophragma slightly elongate.

Notogaster. Fourteen pairs of notogastral setae (36–49) setiform, with short attenuate tip, thin, smooth, often broken. Four pairs of sacculi drop-like. Opisthonotal gland opening, circumgastric sigillar band and all lyrifissures distinct.

Gnathosoma. Subcapitulum longer than wide (188–205 × 155–164). All subcapitular setae setiform, slightly barbed; *h* (57–61) longer than *m* (20) and *a* (36–41); *m* thinnest. Adoral seta (20) setiform, barbed. Palp (114–123) with typical setation 0-2-1-3-9 (+ω). Postpalpal seta (8) spiniform, smooth. Chelicera (205–225) with two setiform, barbed setae (*cha*: 57–65; *chb*: 36–45). Trägårdh's organ elongate triangular.

Epimeral and lateral podosomal regions. With typical epimeral formula (3-1-3-3). All epimeral setae (*1a*, *2a*, *3a*, *4b*: 32–41; *1c*, *3b*, *4a*: 45–53; *1b*, *3c*, *4c*: 61–69) setiform, thin, roughened. Humeral porose areas *Am* and *Ah* elongate oval, poorly visible. Pedotecta I and II represented by small lamina. Discidium broadly rounded. Circumpedal carina comparatively very short.

Anogenital region. Four pairs of genital (g_1: 41–53; others: 32–41), one pair of aggenital (32–41), two pairs of anal (45–53) and three pairs of adanal (45–53) setae setiform, thin, roughened. Adanal lyrifissure distinct. Marginal porose area band-like, complete. Preanal organ goblet-like. Ovipositor elongate (323 × 94), blade (118) shorter than length of distal section (beyond middle fold; 205). Each of the three blades with four smooth setae, $\psi_1 \approx \tau_1$ (69) setiform, $\psi_2 \approx \tau_a \approx \tau_b \approx \tau_c$ (32) narrowly thorn-like. Six coronal setae (4) spiniform.

Leg. Median claw distinctly thicker than lateral claws, all barbed on dorsal side. Lateral claw with minute tubercle ventrodistally. Tibiae I and II with slightly developed tubercle ventroproximally. Femora II–IV with triangular process ventrodistally. Trochanter III with triangular process posteriorly. Typical ventroproximal and ventrodistal porose area well visible on each tarsus and each tibia, respectively. All femora with dorsoparaxial porose area. 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. Famulus of tarsus I short, erect, slightly dilated and blunt distally, inserted posterior to solenidion ω_2. Solenidion ω_1 on tarsus I, ω_1 and ω_2 on tarsus II and σ on genu III slightly bacilliform, other solenidia setiform.

Comparison. Scheloribates (*Topobates*) *panamaensis* **sp. nov.** is morphologically most similar to *S.* (*T.*) *tanzanicus* (Mahunka, 1993) from Tanzania (see Mahunka, 1993) and *S.* (*T.*) *ultraforaminosus* (Lee & Pajak, 1988) from Australia (see Lee & Pajak, 1988) in having spindle-form bothridial seta and 14 pairs of short notogastral

setae. However, the new species differs from its related species by the presence of very large body length (929–1062 versus 452–512 in *S.* (*T.*) *tanzanicus* and 515–586 in *S.* (*T.*) *ultraforaminosus*) and strong ventrodistal process on leg femora II–IV (versus femoral process absent in *S.* (*T.*) *tanzanicus* and *S.* (*T.*) *ultraforaminosus*).

Etymology. The species name *panamaensis* refers to the country, Panama, where the new species was collected.

Acknowledgements

I cordially thank Prof. Dr. Roy A. Norton and Dr. Ralph A. Saporito for sending specimens of the new species for my study and two anonymous reviewers for their comments on the draft manuscript.

References

Balogh J. & Balogh P. 2002. *Identification keys to the oribatid mites of the Extra-Holarctic regions. Vol. 1.* Miskolc, Well-Press Publishing Limited, 453 p.

Grandjean F. 1958. Scheloribatidae et Oribatulidae (Acariens, Oribates). *Muséum National d'Histoire Naturelle*, 2e *Série,* **30**(4): 352–359.

Lee D.C. & Pajak G.A. 1988. Setobates (Acarida: Cryptostigmata: Scheloribatidae) from South Australian soils. *Transactions of the Royal Society of South Australia*, **112**: 21–27.

Mahunka S. 1993. A new series of publication on new or little known oribatid taxa from Africa (Acari), I. *Acta Zoologica Hungarica*, **39**(1–4): 91–119.

Mahunka S. & Mahunka-Papp L. 2009. Topobates helveticus sp. n. and some other remarkable moss mites from Switzerland (Acari: Oribatida). *Revue suisse de Zoologie*, **116**(3–4): 325–336. https://doi.org/10.5962/bhl.part.81322

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.** (Ed.). *Biology of oribatid mites*. Syracuse, SUNY College of Environmental Science and Forestry: 33–61.

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

Saporito R.A., Donnelly M.A., Norton R.A., Garraffo H.M., Spande T.F. & Daly J.W. 2007. Oribatid mites as a major dietary source for alkaloids in poison frogs. *Proceedings of the National Academy of Sciences of the United States of America*, **104**(21): 8885–8890. https://doi.org/10.1073/pnas.0702851104

Subías L.S. 2004. Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del mundo (1758–2002). *Graellsia*, **60** (número extraordinario): 3–305.

Subías L.S. 2020. *Listado sistemático, sinonímico y biogeográfico de los Ácaros Oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles), 15ª actualización* [online]. http://bba.bioucm.es/cont/docs/RO_1.pdf [viewed 1 January 2020].

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

Weigmann G. & Miko L. 1998. Taxonomy of European Scheloribatidae, 3. Remarks on Scheloribates Berlese, 1908 with description of two new species of the subgenus Topobates Grandjean 1958 (n. stat.) (Arachnida: Acari: Oribatida). *Senckenbergiana Biologica*, **77**(2): 247–255.

Received 5 September 2020 / Accepted 3 November 2020. Editorial responsibility: A.V. Frolov