

NEW FAUNISTICAL AND TAXONOMIC DATA ON ORIBATID MITES (ACARI, ORIBATIDA) FROM THE AFROTROPICAL REGION

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ABSTRACT: The present study is based on oribatid mite materials collected in Ghana and Mozambique. A list of identified taxa, including 13 species from 12 genera and nine families, is provided. Of these, nine species, five genera and two families are recorded for the first time in the fauna of the above countries. One new species—*Zetorchella ghanaensis* sp. n. (Caloppiidae)—is described.

KEY WORDS: Mite fauna, new record, taxonomy, morphology, *Zetorchella*, Ghana.

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INTRODUCTION

This work is based on oribatid mite materials (Acari, Oribatida), which were collected during the expeditions in the Afrotropical region (Ghana and Mozambique). The primary goal of our paper is to present a list of the identified taxa with notes on new findings.

The secondary goal of this paper is to describe and illustrate a new species belonging to the genus *Zetorchella* Berlese, 1916 (family Caloppiidae) that was collected in Ghana. *Zetorchella* was proposed by Berlese (1916), with *Chaunoproctus cancellatus* Pearce, 1906 as type species. The genus comprises 25 species that are distributed in the Afrotropical and Oriental regions, namely in Guyana and Japan (Subías 2004, online version 2021; Ermilov and N'Dri 2019; Ermilov *et al.* 2021). This paper presents the first record of *Zetorchella* in the fauna of Ghana. The revised generic diagnosis and an identification key to the species of *Zetorchella* from the Afrotropical region were presented by Ermilov and N'Dri (2019).

At present, the oribatid mite fauna of Ghana and Mozambique are insufficiently studied, and only a few taxa are known (e.g., Wallwork 1962; Niedbała, 2008; Ermilov and Bąkowski 2021).

MATERIALS AND METHODS

Specimens. Substrate samples containing oribatid mites were collected in four localities:

(1) Mozambique, Nampula Province, Island of Mozambique District, Lumbo, 15°03'16.53''S, 40°40'27.75''E, 14 m a.s.l., dead wood in shrubs, 10 Jul. 2021 (collected by Marek Bąkowski); (2) Mozambique, Sofala Province, Gorongosa District, Gorongosa National Park, Chitengo Camp, 18°58'45.62''S, 34°21'7.70''E, 38 m a.s.l., dead wood in Miombo forest, 17–23 Apr. 2016 (col-

lected by Marek Bąkowski); (3) Mozambique, Sofala Province, Cheringoma District, near Pauai, 18°25'30.61''S, 35°20'54.25''E, 152 m a.s.l., leaf litter in Miombo forest, 14–19 Apr. 2018 (collected by Marek Bąkowski); (4) Ghana, Birim North District, Mamang, River Forest Reserve, 06°15'02''N, 01°02'25.7''W, 130 m a.s.l., leaf litter in forest, 31 Aug.–4 Sept. 2006 (collected by Marek Bąkowski). In case of the sites 1–3, mites were extracted using Berlese's funnels with electric lamps (25 W) in laboratory conditions during six days and preserved in 75% of ethanol. In case of the site 4, the mini-Winkler extractor was used in the field—this technique addresses the ground and leaf litter-inhabiting fauna. Detailed description of the Mamang, River Forest Reserve and of the field study are provided in McCullough *et al.* (2008).

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 gastronotum. 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 (µm). 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 Leica transmission light microscope “Leica DM 2500”. SEM micrographs were made with the aid of a JEOL-JSM-6510LV SEM microscope.

Terminology. General morphological terminology used in this paper mostly 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.

Abbreviations. *Prodorsum*: *lam*—lamella; *tlam*—translamella; *slam*—sublamella; *Al*—sublamellar porose area; *ro*, *le*, *in*, *bs*, *ex*—rostral, lamellar, interlamellar, bothridial, and exobothridial seta, respectively; *tu*—tutorium; *D*—dorsophragma; *P*—pleurophragma. *Notogaster*: *Aa*, *A1*, *A2*, *A3*, *A4*—porose areas; *c*, *la*, *lm*, *lp*, *h*, *p*—setae; *ia*, *im*, *ip*—lyrifissures; *gla*—opisthonotal gland opening. *Gnathosoma*: *a*, *m*, *h*—subcapitular setae; *or*—adoral seta. *Epimeral and lateral podosomal regions*: *1a–c*, *2a*, *3a–c*, *4a–c*—epimeral setae; *PdI*, *PdII*—pedotectum I, II, respectively; *dis*—discidium; *cp*—circumpedala carina. *Anogenital region*: *g*, *ag*, *an*, *ad*—genital, aggenital, anal, and adanal setae, respectively; *iad*—adanal lyrifissure. *Legs*: *Tr*, *Fe*, *Ge*, *Ti*, *Ta*—trochanter, femur, genu, tibia, tarsus, respectively; *pa*—porose area; ω , ϕ , σ —solenidia; ϵ —famulus; *d*, *l*, *v*, *bv*, *ev*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl*—setae.

LIST OF IDENTIFIED TAXA*

Trhypochthoniidae

Archezogetes magnus (Sellnick, 1925): 3 (1 ex.). Distribution: Pantropical region. New record of the genus and species in Mozambique.

Otocepheidae

Pseudotocepheus pygmaeus Balogh, 1962: 2 (1 ex.). Distribution: Madagascar. New record of the genus and species in Mozambique.

Scutoverticidae

Ethiovertex macrosetosus Mahunka, 1982: 2 (1 ex.). Distribution: eastern Africa. New record of the family, genus and species in Mozambique.

Caloppiidae

Zetorchella sp.n.: 4 (4 ex.). New record of the family and genus in Ghana.

Mochlozetidae

Unguizetes yemeniticus Mahunka, 2000: 3 (1 ex.). Distribution: Ethiopian region.

Scheloribatidae

Scheloribates aethiopicus Mahunka, 1982: 2 (3ex.). Distribution: Ethiopian region, Canary Islands. New record of the species in Mozambique.

Scheloribates elsi Pletzen, 1965: 1 (2 ex.). Distribution: Ethiopian region. New record of the species in Mozambique.

Haplozetidae

Rostrozetes ovulum (Berlese, 1908): 1 (3 ex.). Distribution: Tropical and Subtropical regions.

Galumnidae

Allogalumna oromiaensis Ermilov, 2019: 1 (4 ex.). Distribution: Ethiopia. New record of the species in Mozambique.

Galumna wojciechniedbalai Ermilov, 2012: 1 (5 ex.). Distribution: Zambia. New record of the species in Mozambique.

Pergalumna somalica (Berlese, 1916): 1 (1 ex.). Distribution: Somalia. New record of the species in Mozambique.

Pilogalumna kimberleyensis Engelbrecht, 1972: 1 (1 ex.). Distribution: South Africa. New record of the genus and species in Mozambique.

Galumnellidae

Galumnella subareolata Mahunka, 1969: 1 (30 ex.). Distribution: Ethiopian region.

TAXONOMY

Family Caloppiidae

Genus *Zetorchella* Berlese, 1916

Type species: *Chaunoproctus cancellatus* Pearce, 1906

Zetorchella ghanensis sp.n.

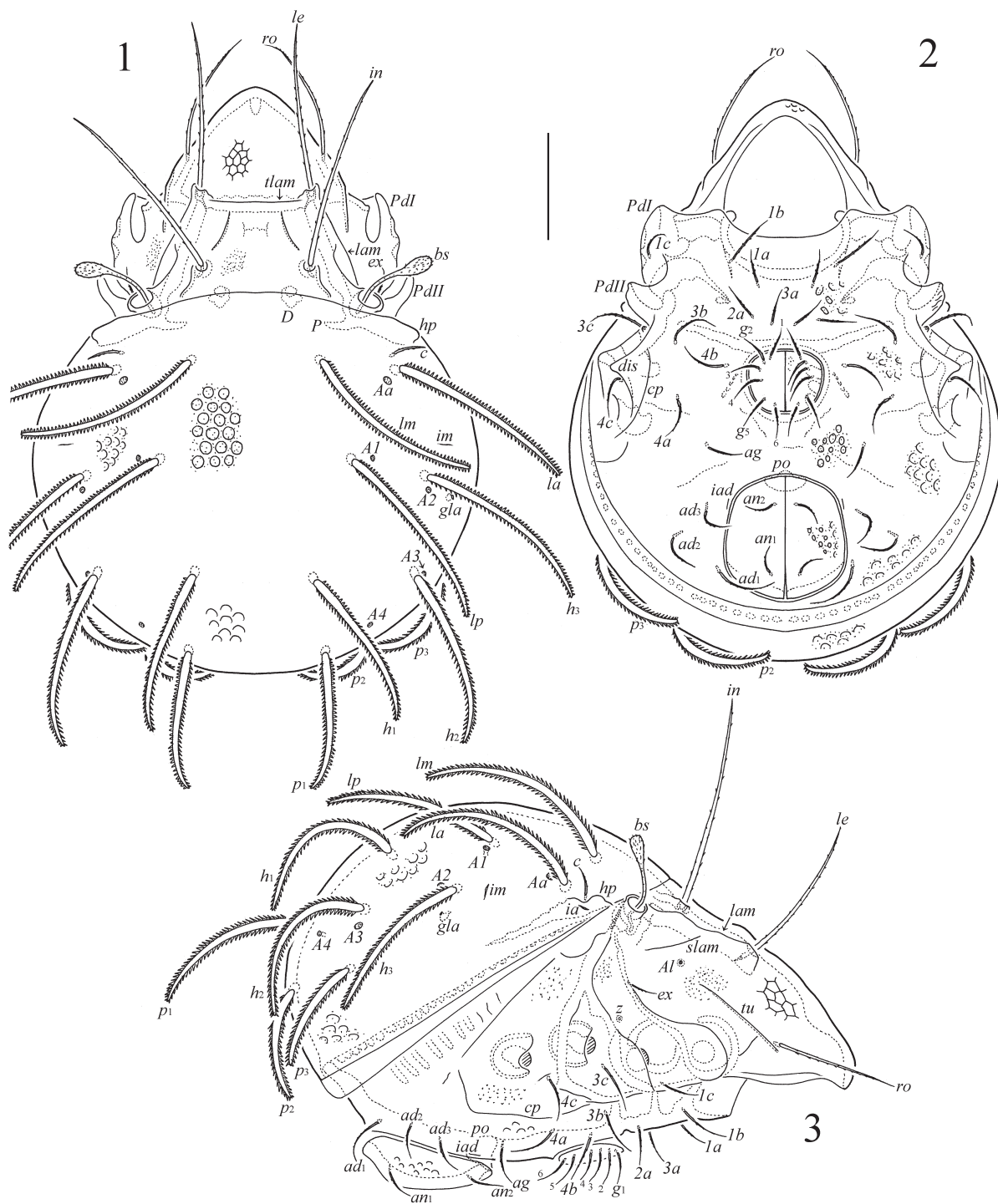
Figs. 1–13

Diagnosis. Body size: 564–630 × 398–481. Notogaster and anogenital region foveolate. Rostral, lamellar and interlamellar setae setiform, barbed; *ro* shortest, *in* longest. Bothridial seta of medium length, clavate, barbed. Humeral process tubercle-like. Ten pairs of notogastral setae developed; *c* short, setiform, barbed; others long, uniformly flattened, bilaterally densely serrated. Epimeral and anogenital setae setiform, thin, barbed. Leg tarsus I with 20 setae (*l*'' present).

Description of adult. *Measurements.* Body length: 630 (holotype, male), 564–630 (three paratypes, three males); body width: 481 (holotype), 398–481 (three paratypes).

Integument. Body color brown. Body covered by microgranulate cerotegument. Surface densely granulate microsculpturing. Anterior part of prodorsum foveate-reticulate. Notogaster, anogenital region, anal plates and partially epimeres foveolate (diameter of foveola up to 16).

*Distribution: mostly from Subías (online version 2021). Ptyctimous mites not included. All examined specimens (except holotype) are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. References for the original descriptions of species are not presented in the References section.



Figs. 1–3. *Zetorchella ghanaensis* sp.n., adult: 1—dorsal view; 2—ventral view (gnathosoma and legs omitted); 3—lateral view (gnathosoma and legs omitted). Scale bar=100 μ m.

Prodorsum. Rostrum broadly rounded. Lamella about 1/2 length of prodorsum. Translamella lineate. Sublamella about 1/2 length of lamella. Sublamellar porose area rounded (6–8). Tutorium long, similar to lamella in length, ridge-like, distinctly not reaching rostral margin. Rostral (114–123), lamellar (147–155) and interlamellar (192–205) setae setiform, barbed. Bothridial seta (73–86) clavate,

barbed; stalk longer than head. Exobothridial seta (36–41) setiform, thin, slightly barbed.

Notogaster. Anterior notogastral margin slightly convex medially. Humeral process small, tubercle-like. Ten pairs of notogastral setae developed; *c* (28–32) setiform, barbed, others (*la*, *lm*, *lp*, *h*₁–*h*₃: 180–188; *p*₁–*p*₃: 147–159) uniformly flattened, bilaterally densely serrated. Five pairs of



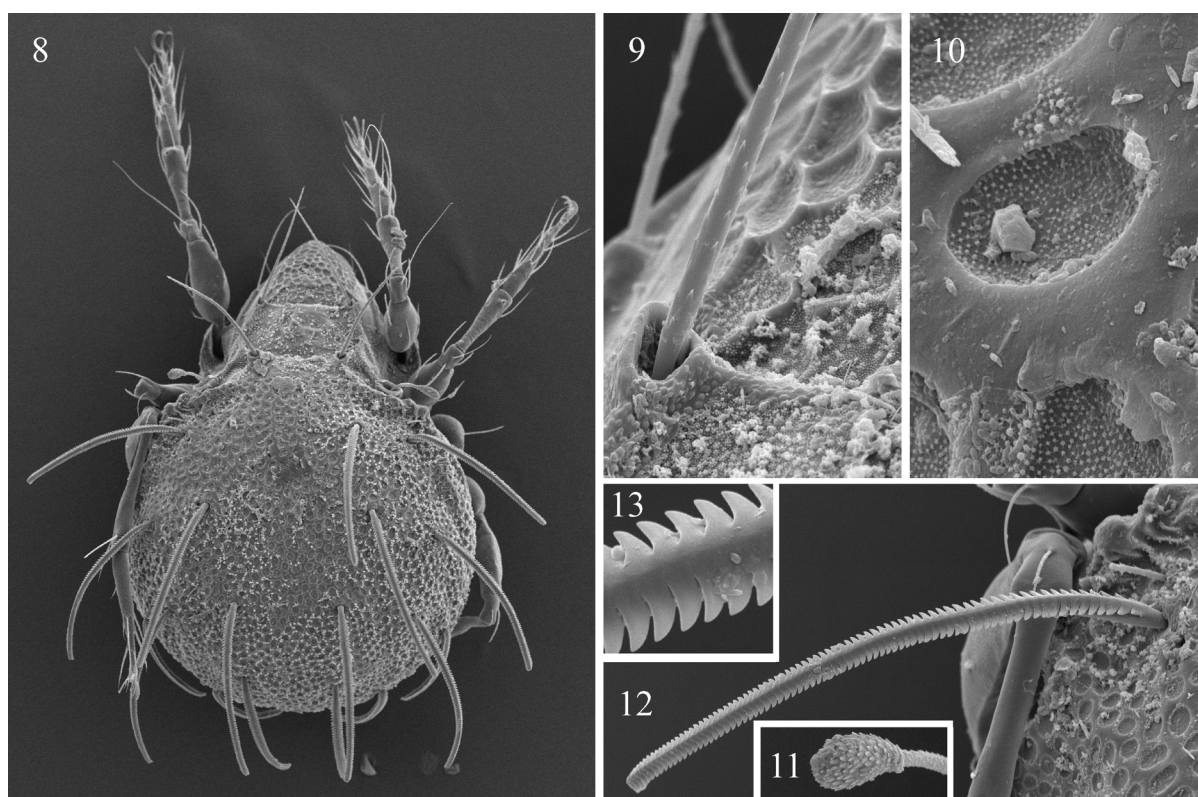
Figs. 4–7. *Zetorchella ghanaensis* sp.n., adult: 4—posterior view; 5—subcapitulum, ventral view; 6—leg I, right, antiaxial view; 7—leg IV, right, antiaxial view. Scale bar=100 μ m (4), 50 μ m (5–7).

porose areas rounded (4–8). Opisthonotal gland openings *ih* and *ips* not observed.

Gnathosoma. Mostly similar to other species of *Zetorchella* (e.g., Ermilov and N'Dri 2019; Ermilov *et al.* 2021). Subcapitulum size: 135–143 \times 102–110. Subcapitular (*a*: 28–32; *m*: 36–41; *h*: 32–36) and adoral (16–20) setae setiform, barbed. Palp (94–102) with setation 0–2–1–3–9(+ ω). Postpalpal seta (8) spiniform, roughened. Chelicera (143–155) with two setiform, barbed setae (*cha*: 61; *chb*: 41).

Epimeral and lateral podosomal regions. Epimeral setal formula: 3–1–3–3. Setae (*1a*, *1c*, *2a*, *3a*: 32–41; others: 41–49) setiform, barbed. Circumpedal carina long, strong. Discidium subtriangular.

Anogenital region. Genital (32–41), aggenital (41–49), anal (41–49), and adanal (*ad*₁: 53–61; *ad*₂, *ad*₃: 32–41) setae setiform, barbed. Adanal lyrifissure located close and parallel to anal plate. Marginal porose area absent.



Figs. 8–13. *Zetorchella ghanaensis* sp.n., adult, SEM micrographs: 8—dorsal view; 9—part of prodorsum nearly insertion of lamellar seta; 10—integument in central part of notogaster; 11—mediobasal part of bothridial seta; 12—notogastral seta *la*; 13—part of notogastral seta of *la* under high magnification.

Legs. Mostly similar to other species of *Zetorchella* (e.g., Ermilov and N’Dri 2019; Ermilov *et al.* 2021). Median claw distinctly thicker than lateral claws, all slightly barbed on dorsal side; each lateral claw with small tooth ventrodistally. Dorsoparaxial porose area on femora I–IV and on trochanters III, IV, proximoventral porose area on tarsi I–IV, and distoventral porose area on tibiae I–IV well observed. Formulas of leg setation and solenidia: I (1–5–3–4–20) [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 on tarsus I short, erect, slightly swollen distally, inserted between solenidium ω_1 and seta *ft*’. Seta *s* on tarsus I eupathidial, located between setae *u* and *a*.

Material examined. Holotype (male) and three paratypes (all males): locality 4.

Type deposition. The holotype is deposited in the collection of the Senckenberg Museum of Natural History, Görlitz, Germany; three paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. All specimens are preserved in 70% solution of ethanol with a drop of glycerol.

Etymology. The specific name *ghanensis* refers to the country of origin, Ghana.

Remarks. *Zetorchella ghanaensis* sp.n. is morphologically most similar to *Zetorchella sisiri* (Sanyal, Saha and Chakraborty, 2003) from India in the presence of long, bilaterally densely serrated notogastral setae (except *c*). *Zetorchella ghanaensis* sp.n. differs in the setiform, barbed (vs. bilaterally densely serrated in *Z. sisiri*) lamellar and interlamellar setae and in the same length of dorsal notogastral setae (vs. dorsal notogastral setae being of distinctly different lengths in *Z. sisiri*).

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Table 1

Leg setation and solenidia of *Zetorchella ghanaensis* sp.n.

Leg	<i>Tr</i>	<i>Fe</i>	<i>Ge</i>	<i>Ti</i>	<i>Ta</i>
I	<i>v'</i>	<i>d, (l), bv'', v''</i>	<i>(l), v', σ</i>	<i>(l), (v), φ₁, φ₂</i>	<i>(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l'', ε, ω₁, ω₂</i>
II	<i>v'</i>	<i>d, (l), bv'', v''</i>	<i>(l), σ</i>	<i>(l), (v), φ</i>	<i>(ft), (tc), (it), (p), (u), (a), s, (pv), ω₁, ω₂</i>
III	<i>l', v'</i>	<i>d, l', ev'</i>	<i>l', σ</i>	<i>l', (v), φ</i>	<i>(ft), (tc), (it), (p), (u), (a), s, (pv)</i>
IV	<i>v'</i>	<i>d, ev'</i>	<i>d, l'</i>	<i>l', (v), φ</i>	<i>ft'', (tc), (p), (u), (a), s, (pv)</i>

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.