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Article

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A new *Discotrachytes* species (Acari: Uropodina) from a banana plantation in Yemen with notes to the genus *Discotrachytes* Berlese, 1903

JENŐ KONTSCHÁN

Plant Protection Institute, Centre for Agricultural Research, H-1525 Budapest, P.O. Box 102, Hungary.

E-mail: kontschan.jeno@agrar.mta.hu

Abstract

Discotrachytes vanharteni sp. nov. is discovered and described based on females, males and deutonymphs collected in a banana plantation in Yemen. The new species differs from its congeners in the shape of the genital shield and the sternal setae of the females. A diagnosis of the genus *Discotrachytes* Berlese is presented with a list of the known species. Ten *Uropoda* species are moved to the genus *Discotrachytes*: *D. ehimensis* (Hiramatsu, 1979) **comb. nov.**; *D. granata* (Hiramatsu & Hirschmann, 1978) **comb. nov.**; *D. grandis* (Hiramatsu & Hirschmann, 1979) **comb. nov.**; *D. granosa* (Hiramatsu & Hirschmann, 1978) **comb. nov.**; *D. orbis* (Vitzthum, 1925) **comb. nov.**; *D. ornata* (Hiramatsu & Hirschmann, 1978) **comb. nov.**; *D. procera* (Hiramatsu & Hirschmann, 1979) **comb. nov.**; *D. procerasimilis* (Hiramatsu & Hirschmann, 1979) **comb. nov.**; *D. regia* (Vitzthum, 1921) **comb. nov.**; *D. regiasimilis* (Hirschmann, 1972); and *D. verrucosa* (Hiramatsu, 1980) **comb. nov.** A new key to the known *Discotrachytes* species is also presented.

Key words: Taxonomy, new taxa, Middle-East.

Introduction

The diversity and species composition of soil dwelling mites in agricultural areas are rarely studied in acarology, especially with respect to Uropodina. Despite more than 2000 described and named species, Uropodina mites are not intensively studied mesostigmatans, and little information about their diversity and role in agricultural ecosystems has been presented. Recently, numerous subtropical and tropical plantations (like Japanese cedar, Monterey pine, cacao, coffee and banana) were investigated and some new species were described from these habitats (Kontschán 2014, 2015, 2016; Kontschán & Starý 2015; Kontschán *et al.* 2015). During the previous year, I investigated the mite collection of the Natural History Museum of Geneva (Muséum d'histoire naturelle de la Ville de Genève) and found numerous male, female and deutonymph specimens of *Discotrachytes* in one unsorted soil sample collected in Yemen, in a banana plantation. Currently Yemen is one of those countries from which no Uropodina species have been reported (Wiśniewski 1993).

Material and methods

The numerous male, female and deutonymph specimens of the new species were cleared in lactic acid for a week and afterwards, the specimens were investigated on half-covered deep slides with a Leica 1000 microscope. Drawings were made with the aid of a drawing tube on a Leica 1000 microscope. All specimens are stored in ethanol and deposited in the Natural History Museum in

Geneva. Abbreviations: *h* = hypostomal seta, *st* = sternal seta, *ad* = adanal seta, *lf* = lyriform fissure, *p* = pore. All measurements and the scales in the figures are given in micrometres (μm).

Taxonomy

Family Uropodidae Kramer, 1881

Genus *Discotrachytes* Berlese, 1916

Eutrachytes (*Discotrachytes*) Berlese, 1916: 28.

Type species

Discotrachytes splendidiformis Berlese, 1916: 28. by original designation.

Diagnosis

Idiosoma oval-shaped, its posterior margin rounded. Dorsal shield covered by sculptural pattern in adults. Central area of dorsal shield elevated from neighboring regions, margins of elevated area without any grooves, humps and others. Some pilose setae situated on row *j-J* on elevated area. Marginal shield reduced on caudal part of idiosoma. Smooth and pilose setae situated on small platelets on membranous cuticle of caudal dorsum. Genital shield of female scutiform with or without anterior process. Leg pedofossae reduced or absent. Genital shield of male with one pair of eugenital setae. Peritreme with long poststigmatid part. Leg I without claws, palp trochanter setae *v2* situated on process.

Remarks

Hirschmann (1963a, b) created a new system which radically changed the family and genus concepts within Uropodina mites. Hirschmann's genera (Stadiengattungen, Teilgattungen, etc.) are large, catch-all genera based on only a few characters, especially gnathosomal ones. Some of the previously mentioned genera were discussed in Hirschmann's studies only as species groups without any systematic or morphological analysis of whether or not these groups are closely related to each other. One of the earlier described genera, *Discotrachytes*, was presented in Hirschmann's system as the *Uropoda regiasimilis*-group (Wiśniewski & Hirschmann 1993) under the subgenus *Phaulodinychus* Berlese, 1904 within the very large *Uropoda* genus. When Hirschmann and his co-authors received numerous criticisms to their system, he presented a new one (see Hirschman 1979) in which the genus *Discotrachytes* was mentioned again with the type species. The other species belonging to this genus were not discussed and were not moved to *Discotrachytes*. Unfortunately, the new system was never used again and the species were mentioned only as the members of *Uropoda regiasimilis*-group (see Wiśniewski & Hirschmann 1993). For this reason, all species from the *Uropoda regiasimilis*-group need to be transferred to the genus *Discotrachytes*.

This genus is widely distributed; the majority of species were collected in the tropics, but some are also listed from the temperate climatic zone.

List of the species of this genus

Discotrachytes ehimensis (Hiramatsu, 1979) **comb. nov.**

Uropoda (*Phaulodinychus*) *ehimensis* Hiramatsu, 1979: 59–60.

Occurrence: Japan.

Discotrachytes granata (Hiramatsu & Hirschmann, 1978) **comb. nov.**
Uropoda (Phaulodinychus) granata Hiramatsu & Hirschmann, 1978: 87–88.
Occurrence: New Guinea.

Discotrachytes grandis (Hiramatsu & Hirschmann, 1979) **comb. nov.**
Uropoda (Phaulodinychus) grandis Hiramatsu & Hirschmann, 1979: 23–24.
Occurrence: Mexico.

Discotrachytes granosa (Hiramatsu & Hirschmann, 1978) **comb. nov.**
Uropoda (Phaulodinychus) granosa Hiramatsu & Hirschmann, 1978: 87.
Occurrence: New Guinea.

Discotrachytes orbis (Vitzthum, 1925) **comb. nov.**
Discopoma (Discopoma) orbis Vitzthum, 1925: 33–35.
Occurrence: Cameroon.
Notes. This species was described on the basis of deutonymphs, the adults are unknown.

Discotrachytes ornata (Hiramatsu & Hirschmann, 1978) **comb. nov.**
Uropoda (Phaulodinychus) ornata Hiramatsu & Hirschmann, 1978: 86–87.
Occurrence: New Guinea.

Discotrachytes procera (Hiramatsu & Hirschmann, 1979) **comb. nov.**
Uropoda (Phaulodinychus) procera Hiramatsu & Hirschmann, 1979: 22–23.
Occurrence: Mexico.

Discotrachytes procerasimilis (Hiramatsu & Hirschmann, 1979) **comb. nov.**
Uropoda (Phaulodinychus) procerasimilis Hiramatsu & Hirschmann, 1979: 23.
Occurrence: Mexico.

Discotrachytes regia (Vitzthum, 1921) **comb. nov.**
Discopoma regia Vitzthum, 1921: 53–58.
Occurrence: Bolivia.
Notes. This species was described on the basis of deutonymphs, the adults are unknown.

Discotrachytes regiasimilis (Hirschmann, 1972)
Uropoda (Phaulodinychus) regiasimilis Hirschmann, 1972: 83–85.
Occurrence: Brazil.

Discotrachytes splendidiformis Berlese, 1916
Discotrachytes splendidiformis Berlese, 1916: 28.
Occurrence: East-Africa.

Discotrachytes verrucosa (Hiramatsu, 1980) **comb. nov.**
Uropoda (Phaulodinychus) verrucosa Hiramatsu, 1980: 53
Occurrence: New Guinea.

Discotrachytes vanharteni sp. nov.

Diagnosis

Dorsal shield with numerous needle-like and four pairs of pilose setae. Caudal area of dorsal idiosoma with two pairs of pilose and five pairs of needle-like setae situated on small platelets. Central area of dorsal shield with large irregular pits. Genital shield of female with a spine-like apical process. Sternal setae *st3*, *st4* and *st5* six times longer than *st1* and *st2*. Pedofossae of legs completely absent.

Material examined

Holotype. Female. Yemen, Khamis bani sa'd. 15°11' 05" N, 43°30' 36" E, in leaf litter in banana plantation, 23 June 1999, A. van Harten coll. *Paratypes*. 40 females, 8 males, 5 deutonymphs, with same collection data as those for the holotype.

Description

Female (n=31)

Idiosoma yellowish-brown, 550–570 long and 340–350 wide (n=41), oval-shaped, with a rounded posterior margin.

Dorsal idiosoma (Figure 1). Dorsal (ca 455–467 long and ca 215–230 wide) and marginal shields fused anteriorly. Majority of dorsal setae needle-like, ca 17–21 long, setae *J2* and *J4* longer (ca 39–42). Setae *j1*, *j5*, *J1*, *J3* pilose and ca 27–30 long. Central area of dorsal shield with large (9–10×7–8) irregular pits, marginal area covered by numerous smaller (3–5×3–5) oval pits. Marginal shield reduced, not reaching to caudal margin of dorsal shield, bearing 16–18 pairs of short (ca 15–22), needle-like setae and covered by oval pits. Caudal area of dorsal idiosoma with two pairs of pilose (ca 25–35 long) and five pairs of needle-like setae (ca 32–35 long) situated on small platelets.

Ventral idiosoma (Figure 2). Base of tritosternum narrow, with three smooth branches (Figure 3). Surface of sternal shield smooth. Sternal setae (*st1*–*st2*) minute (ca 5–7), smooth and needle-like, *st3*–*st5* long (ca 16–21). Setae *st1* situated at level of posterior margin of coxae II, *st2* at level of central area of coxae III, *st3* at level of posterior margin of coxae III, *st4* at level of anterior margin of coxae IV and *st5* close to basal line of genital shield. Genital shield pentagonal, ca 86–90 long (excluding apical process), and ca 60–70 wide (at level of setae *st4*), with long apical process (ca 19–21), its surface smooth. Seven pairs of ventral setae needle-like, central three pairs of ventral setae shorter (ca 18–20) than lateral ones (ca 26–32). All ventral idiosoma covered by oval pits. Stigmata situated close to coxae III; prestigmatic part of peritremes S-shaped, poststigmatic part long and straight. Anal opening small, *ad1* short (ca 7–8), *ad2* longer (ca 17–20), postanal seta absent. Leg grooves absent.

Gnathosoma (Figure 4). Corniculi horn-like, internal malae apically pilose longer than corniculi and apically pilose. Hypostomal setae *h1* long (ca 27–30 in length), smooth and needle-like; *h2* and *h4* shorter (ca 14–17) and serrate; *h3* as long as *h1*, but serrate. Seta *v1* of palp trochanter short and smooth, *v2* long, serrate and situated on protuberance, other setae on palp smooth and needle-like. Epistome apically serrate (Figure 5). Chelicerae with one tooth on central part on fixed digit, fixed digit longer than movable digit and bearing a hole-like sensory organ subapically, movable digit without tooth. Internal sclerotized node absent (Figure 6).

Legs (Figures 7–10). Legs I 190–200, legs II 180–195, legs III 175–190, and legs IV 200–215 long. Legs I without tarsal claws. Leg setae mostly smooth and needle-like, those on dorsal part pilose.

Male (n=8).

Idiosoma. 560–575 long and 340–350 wide.

Dorsal idiosoma. As in female.

Ventral idiosoma. Intercoxal area, with sternal setae and genital shield, as in Figure 11. Majority of surface of sternal shield smooth, only some oval pits situated between *st1* and *st3*. Sternal setae needle-like and short (ca 6–8). Setae *st1* situated at level of anterior margin of coxae II, *st2* at level of posterior margins of coxae II, *st3* at level of central area of coxae III, *st4* at level of anterior margin of genital opening, *st5* at level of posterior margin of genital opening. Genital shield rounded, anterior margin somewhat straight, shield situated between coxae IV and bearing one pair of long (ca 26–30) needle-like eugenital setae (Figure 11). Femur II with large, robust and horn-like ventral setae (Figure 12). Other characters as in female.

Deutonymph (n=5).

Idiosoma. 390–420 long and 290–300 wide.

Dorsal idiosoma (Figure 13). Dorsal shield oval-shaped, central area with 36–39 pairs of long (ca 30–35) and needle-like setae, margins with 33–35 pairs of shorter setae long (ca 11–15). Its surface covered by small oval pits. Five pairs of lyriform fissures situated close to margins.

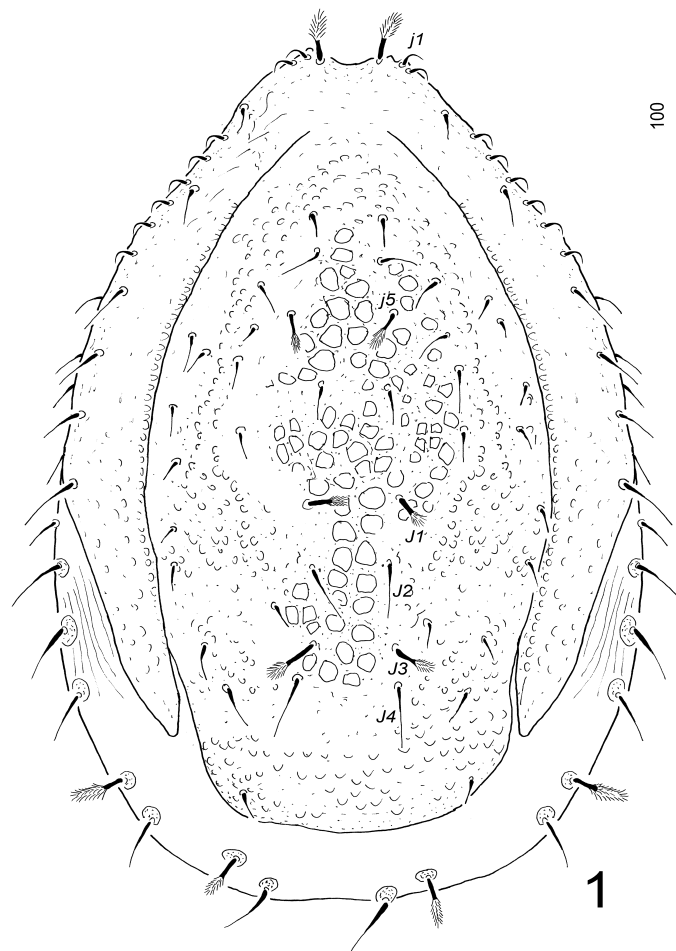


FIGURE 1. *Discotrachytes vanharteni* sp. nov., female holotype, dorsal idiosoma.

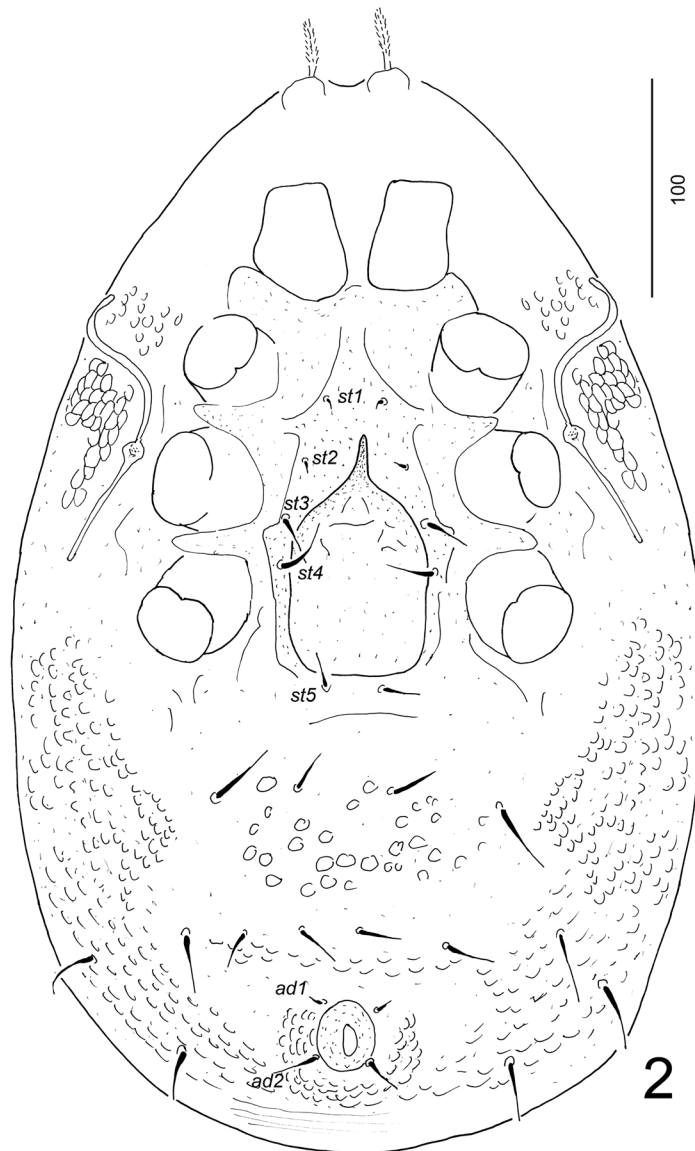


FIGURE 2. *Discotrachytes vanharteni* sp. nov., female holotype, ventral idiosoma.

Ventral idiosoma (Figure 14). Sternal shield narrow and smooth. Sternal setae *st1*–*st3* minute (ca 5–7 long), *st4*–*st5* longer (ca 9–13 long), all sternal setae smooth. Setae *st1* situated at level of median level of coxae II, *st2* at level of anterior margin of coxae III, *st3* at level of median level of coxae III, *st4* at level of anterior margin of coxae IV, and *st5* behind posterior level of coxae IV. Surface of peritrematal and metapodal shields with some oval pits, surface of anal shield smooth. One pair of lyriform fissures situated close to anterior margin of sternal shield, two pairs of pore-like gland opening close to setae *st2* and *st4*. Anal shield trapezoid, bearing two pairs of long (ca 26–30) and one pair of short (ca 6–8) needle-like setae, anal opening situated on a small process, adanal setae short (ca 5–7) and needle-like. Poststigmatid part of peritreme absent, prestigmatid part long with one bend. Base of tritosternum narrow, tritosternal laciniae subdivided into three smooth branches (Figure 15).

Gnathosoma (Figure 15). Corniculi horn-like, internal malae apically pilose and longer than corniculi. Hypostomal setae *h1*, *h2* and *h3* ca 23–25 long and smooth, *h4* serrate, ca 8–10 long. Seta *v1* of palp trochanter short and smooth, *v2* long, serrate and situated on robust protuberance, other setae on palp smooth and needle-like.

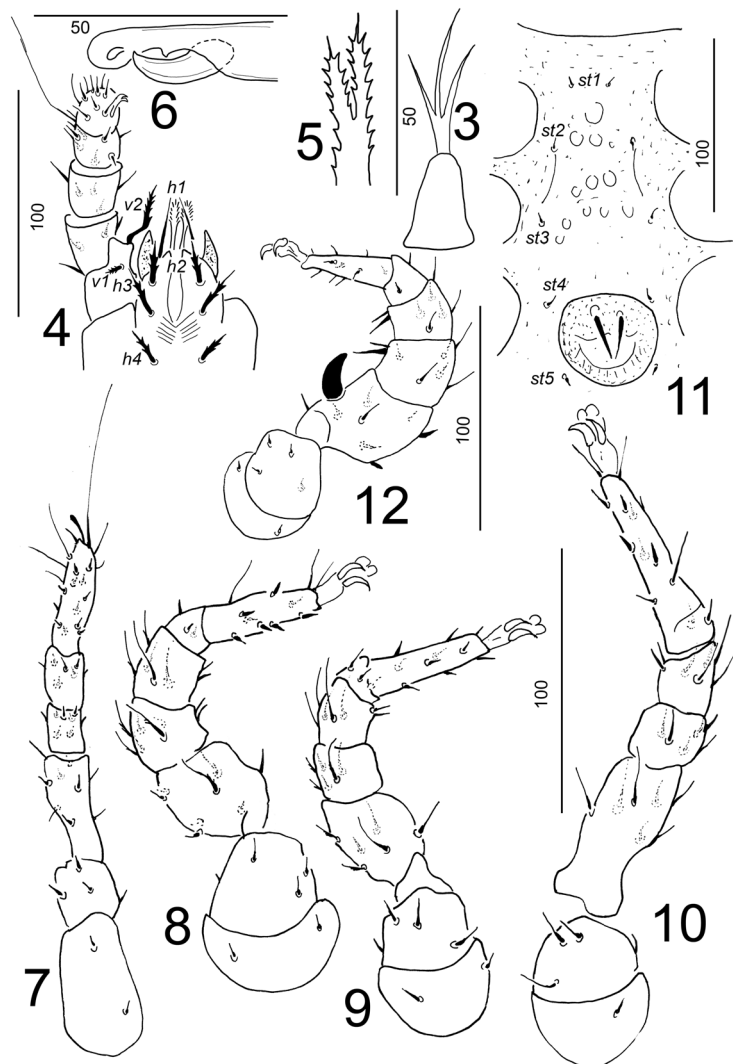
Protonymph and larvae. Unknown.

Etymology

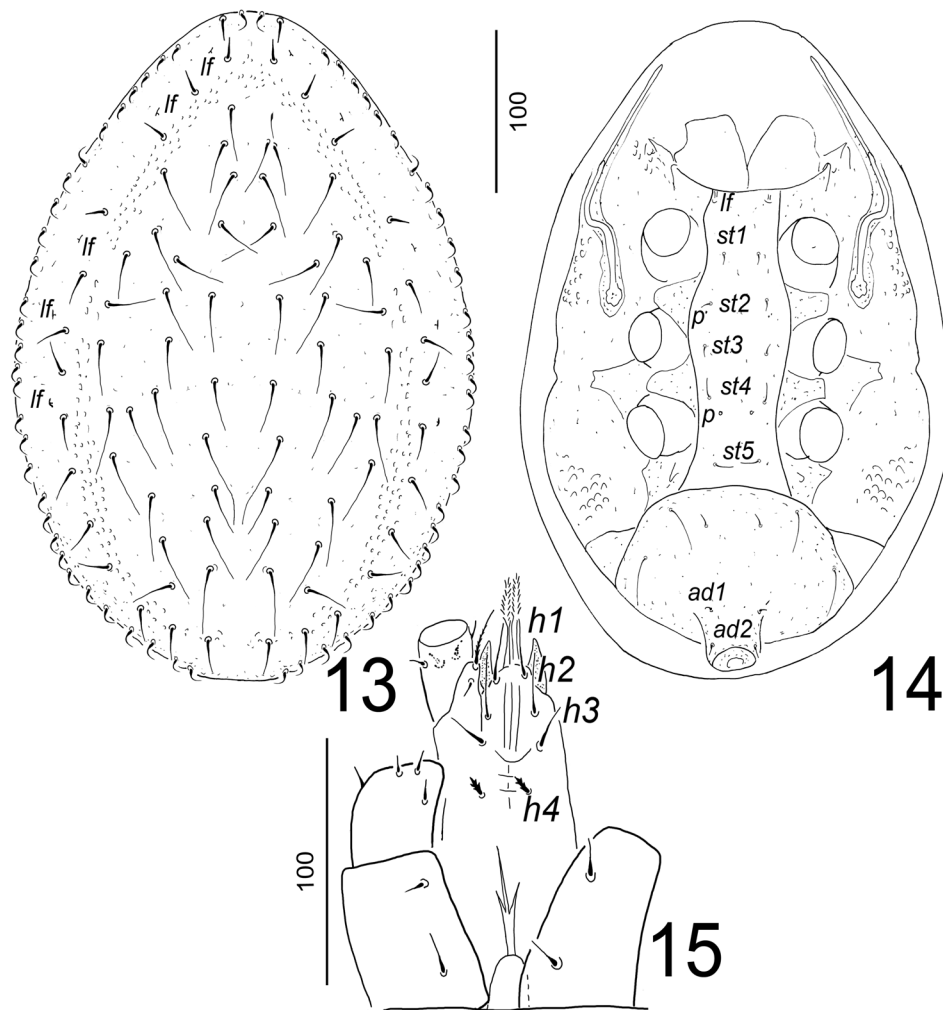
The new species is dedicated to Antonius van Harten, who organized the study of the fauna of the Arabic-peninsula and collected this new species.

Remarks

The new species differs from the congeners in the shape of pits on the dorsal shield, the shape of the genital shield of the female and the length of the sternal setae in the females.



FIGURES 3–12. *Discotrachytes vanharteni* sp. nov., female holotype. 3. Tritosternum; 4. Ventral view of gnathosoma and palp; 5. Apical part of epistome; 6. Lateral view of chelicera; 7–10. Legs I–IV, respectively, ventral view. Male. 11. Intercoxal area; 12. Lateral view of leg II.



FIGURES 13–15. *Discotrachytes vanharteni* sp. nov., deutonymph. 13. Dorsal idiosoma; 14. Ventral idiosoma; 15. Ventral view of gnathosoma.

Key to the females of the known *Discotrachytes* species

1. One pair of strongly sclerotized rings with two long setae situated on dorsal shield *D. verrucosa*
- Strongly sclerotized rings absent 2
2. Female genital shield without anterior process 3
- Female genital shield with anterior process 4
3. Female genital shield ornamented by web-like sculptural patterns; setae *st1* and *st2* short, similar in shape and length to other sternal setae *D. grandis*
- Female genital shield without sculptural pattern; setae *st1* and *st2* longer and more robust than other sternal setae *D. regiasimilis*
4. Anterior process of female genital shield bifurcate *D. procera*
- Anterior process of female genital shield simple, not bifurcate 5
5. Sternal setae wide, leaf-like; apical process of female genital shield short and spine-like *D. ornata*
- Sternal setae narrow, needle-like; apical process of female genital shield long and sword-like 6
6. All sternal setae short 7
- Sternal setae *st1* and *st2* short, other sternal setae long *D. vanharteni* sp. nov.

7. Pilose setae on dorsal shield two or three times longer than needle-like dorsal setae *D. granata*
 – Pilose setae on dorsal shield as long as needle-like dorsal setae 8
 8. Dorsal shield only with oval (ca 8–9×9–10) pits *D. ehimensis*
 – Dorsal shield with some large (ca 18–20×16–18) and irregular pits *D. granosa*

Notes for the key

Four species are not presented in the key, because *D. orbis* and *D. regia* are known only from their deutonymphs and *D. procerasimilis* and *D. splendidiformis* from the male only. Although shape of the pits on the dorsal shield in male of *D. procerasimilis* is somewhat similar to those in *D. vanharteni* **sp. nov.**, they are not large in the new species. Also, the sternal shield in the male of *D. procerasimilis* has a very dense web-like sculptural pattern, whereas the sternal shield of the new species bears only some pits. Additionally, the movable digit of the chelicera in male of *D. procerasimilis* has a small median tooth, vs. the edentate movable digit of the chelicera in *D. vanharteni* **sp. nov.**, and also there are five pairs of setae in posterior soft cuticle behind the dorsal shield in *D. procerasimilis*, vs. only two pairs of setae in this region in the new species. Berlese (1916) gave a very brief description of *D. splendidiformis* and later Hirschmann (1961) presented a small, but low quality illustration of this species (see Figure 449). Based on Hirschmann's (1961) illustration, the male of the new species differs from *D. splendidiformis* because the pygidial shield is illustrated on this figure (vs. absent in the new species). On the other hand, *D. splendidiformis*, as illustrated by Hirschmann (1961), does not have irregular pits on the dorsal shield, unlike *D. vanharteni* **sp. nov.** where this character state is visible. Hirschmann (1961) marked by dashed line a character at the tip of leg I, but this illustration is of very poor quality and it is not easy to decide whether he illustrated a pair of claws or some setae including a long seta at the tip of leg I. Unfortunately, neither Berlese (1916) nor Hirschmann (1961) described this in the text, therefore I cannot decide about the state of this character.

Discussion

Up to now, only 13 *Discotrachytes* species have been described. The species were found in New Guinea (4 spp.), Mexico (3 spp.), Bolivia, Brazil, Cameroon, Japan, Yemen (each with 1 sp.), and an unknown species from East-African country. On the basis of the occurrence of the described species this is a widely distributed group of Uropodina mites, but the majority of the world seems to have been barely investigated with respect to *Discotrachytes*. On the other hand, species of the genus were collected in natural habitats, in mosses, leaf litters and mushrooms and nymphs of some species are known as phoretic instars on beetles from the families Brentidae, Staphylinidae, Platypodidae, Passalidae (Wiśniewski & Hirschmann 1993). However, no species from this genus was previously mentioned from disturbed habitats, like agroecosystems.

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