A new species of *Adrodamaeus* (Acari, Oribatida, Gymnodamaeidae) from South Africa

by

Elizabeth A. Hugo-Coetzee
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Cover: Androdamaeus ermilovi spec. nov. Dorsal view with cerotegument.
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**ABSTRACT**


(Oribatida, Gymnodamaeidae, *Adrodamaeus*, new species, South Africa)

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INTRODUCTION

The genus *Adrodamaeus* Paschoal, 1984 in the family Gymnodamaeidae comprises 16 species, collectively with a mostly Holarctic and Paleotropical distribution (Subías 2004 [2013]). Only one species is known from the Ethiopian region, namely *A. johanni* (Hugo, 2010) from South Africa (Hugo 2010).

Some of the main characteristics of *Adrodamaeus* are: anal and genital plates separated by an ano-genital bridge, under which the preanal organ lies; tarsus, tibia and genu of all legs articulate in sockets; notogaster flat to convex; sensillus with barbs; medium to large species (length 390–890 μm); with or without discidium; number of setae on epimeres (from I–IV): 3–1–3–3, (*A. italicus* (Berlese): 3–1–3–2, *A. mongolicus* (Bayartogtokh & Weigmann): 3–1–2–3); seven pairs of genital, one pair of aggenital, two pairs of anal, three pairs of adanal (two pairs in *A. mongolicus* and possibly in *A. haradai* [Aoki] setae; two to five pairs of notogastral setae on posterior edge; legs tridactylous; famulus inside a pit close to solenidia on leg I; cerotegument on body, legs and setae (Aoki 1984; Paschoal 1984; Choi & Aoki 1985; Bayartogtokh & Weigmann 2005; Walter 2009; Hugo 2010).

There is debate among oribatologists about the taxonomic status of *Adrodamaeus* and *Arthrodamaeus* Grandjean, 1954 (Woas 1992; Subías et al. 1997; Ermilov & Anichkin 2011), since in both genera the anal and genital plates are separated from each other and the leg segments articulate in sockets. The only difference between the two genera, which is accepted in this paper, is in the surface structure of the notogaster: foveolate or reticulate in *Arthrodamaeus*, but smooth in *Adrodamaeus* (Subías et al. 1997; Bayartogtokh & Weigmann 2005). Additionally, *Arthrodamaeus* occurs in the western Mediterranean region, whereas *Adrodamaeus* is widespread (Subías 2004 [2013]).

In this paper *Adrodamaeus ermilovi* spec. nov. is described from South Africa and its distribution is discussed. A key to known *Adrodamaeus* species of the world is presented.

MATERIALS AND METHODS

All measurements are in micrometres (μm). Body length was measured in dorsal view from the tip of the rostrum to the posterior edge of the notogaster. Body width was measured in dorsal view at the widest part (in most cases just behind legs IV). Leg and setae measurements are of the holotype only. Legs were measured in lateral view. Setae were measured in the view in which they were best observed. The gnathosoma and associated
setae were not measured since they were from a dissected specimen and not the holotype. General terminology follows that of Norton & Behan-Pelletier (2009) and Walter (2009).

**Type material**
The holotype and nine paratypes were collected in soil under indigenous trees in the grassland biome in the Free State Province of South Africa, near Excelsior, on the south-eastern slope of an inselberg called Korannaberg (28°52’S, 27°14’E) by T. Farkas on 25 November 1981. The holotype (NMB 1684.6.1) and six paratypes (NMB 1684.6) are deposited in the acarology collection of the National Museum (Bloemfontein); while three paratypes (NMSA-Aca 20001, type no. 4023) are housed in the collection of the KwaZulu-Natal Museum (Pietermaritzburg).

**DESCRIPTION OF NEW SPECIES**

Superfamily: Gymnodamaeoidae Grandjean, 1954  
Family: Gymnodamaeidae Grandjean, 1954  
Genus: *Adrodamaeus* Paschoal, 1984

*Adrodamaeus ermilovi* spec. nov.  
(Figures 1-6)

Figure 1: *Adrodamaeus ermilovi* spec. nov. Dorsal view with cerotegument (legs removed).  
Scale bar: 100 μm
Specific diagnosis
The most important characteristics of *Adrodamaeus ermilovi* spec. nov. are: the presence of partial exuviae of previous instars (notogastral scalps) in 80% of individuals, four pairs of notogastral setae, discidium, curved ridge between the genital plates and acetabulum IV, longitudinal ridge on anal plates, thin, slender sensillus, and long notogastral seta *h*₁ that curves laterally.

Measurements
Holotype (male): length 858, width 568. Nine paratypes: mean 788 (range 727–853); width: mean 520 (range 479–556).

Integument
Notogastral scalps present in most individuals (Fig. 3), loosely attached, individuals without scalps covered by thick cerotegument (Fig. 1); prodorsum with cerotegument between bothridia; body, legs, setae, and sensillus covered with spherical and stringy cerotegument (Figs 1, 2, 5, 6); body surface smooth.

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**Figure 2: Adrodamaeus ermilovi** spec. nov. Ventral view with cerotegumental granules on setae (legs removed). Scale bar: 100 μm
Prodorsum (Figs 1 & 3A)
Rostrum round in dorsal view, projecting forward in lateral view; rostral seta ro (120), lamellar seta le (219) slender, smooth, curving inward; le inserted dorsolaterally, slightly posterior to ro in lateral view; interlamellar seta in (20) spiniform, inserted on tubercle; exobothridial seta ex (49) thin, anterior to bothridium; sensillus ss (270) slender, barbed, barbs denser and longer distally; ridge between bothridium and tubercle of in.

Notogaster (Figs 1 & 3A)
Notogaster convex in lateral view; lyrifissures ia, im, ip, ih and ips thin, distinct, of similar length (12); four pairs of notogastral setae on posterior edge, not on tubercles, seta h₁ longest (243), thickest, curving laterally, followed by p₂ (90), p₁ (71), p₃ (50).

Gnathosoma (Figs 2 & 4)
Subcapitulum longer than wide, hypostomal setae a, m lightly barbed, thickened, seta h smooth, thin; chelicera chelate-dentate, seta cha strongly barbed, longer than weakly barbed chb; palpal setation 0–2–1–3–9 (+1ω), solenidion not attached to eupathidium, setae on first three segments weakly barbed.
Epimeral region (Fig. 2)
Sejugal border (bo. sj.) well developed; number of setae on epimeres (from I to IV) 3–1–3–3, 1a and 2a in close proximity, all epimeral setae very thin, smooth, slight depressions around alveoli, setae 1b, 3c, 4b, 4c longer (74–135) than 1a, 1c, 2a, 3a, 3b, 4a (34–66), 4c longest, 3a shortest; parastigmatic tubercles (Sa, Sp) absent.

Anogenital region (Fig. 2)
Genital and anal plates in close proximity, separated by ano-genital bridge; all setae smooth, genital setae in more or less straight longitudinal row, g1 closer to inner margin than others, g1 (39), g2 (31) slightly longer than the rest (20–26), seta g2 on posterior edge of genital plate, anal setae an spiniform, of similar length (33), aggenital seta ag slender (76), similar to epimeral setae, anal setae ad slender, different in size, ad1 (79) longer than ad2 (63), ad3 (59); ag and ad with slight depression around alveoli; lyrifissure iad not evident; longitudinal ridge antiaxial to anal setal row on anal plate; discidium present; curved ridge present halfway between genital plate and acetabulum IV.

Legs (Figs 5 & 6; Table 1)
Middle claw shorter, thicker than lateral claws, claws of leg I very small; leg I, IV longer than body, leg IV (1210) > leg I (1162) > leg III (858) > leg II (653); leg setal formula I–IV (solenidia in parenthesis, including famulus (ε), Trochanter (Tr) – Femur (Fe) – Genu (Ge) – Tibia (Ti) – Tarsus (Ts)): Leg I: 1–5–4(1)–5(2)–20(2), Leg II: 1–5–4(1)–5(1)–16(2), Leg III: 2–3–3(1)–4(1)–15, Leg IV: 1–2–3–4(1)–13; solenidia on Ts I close together, ω1 longer than ω2, ω1 baculiform, ω2 piliform; seta d on Ti I coupled with solenidion φ1, φ1 tactile, φ2 on Ti I piliform, solenidia ω1 and ω2 on Ts II both baculiform, similar in length, short, close together; setae on legs barbed, except setae d on Ti I, v" and bv" on Fe I and II, setae ev’ on Fe III and IV, and setae on trochanters; setae v’ and I’ on Tr III and IV long; ornamental lines and stripes on tarsi of all legs.
Figure 5: Adrodamaeus ermilovi spec. nov. Legs with cerotegumental granules. A. leg I, left, paraxial view; B. leg II, right, antiaxial view. Scale bars: 50 μm
**Etymology**

The species is named for Dr Sergey G. Ermilov from Tyumen State University, Russia, for his contributions to oribatid taxonomy.

**Remarks**

Although this species retains the partial exuviae of the previous instars, its other characteristics clearly distinguish it from *Aleurodamaeus* of the family Aleurodamaeidae (of which the main characteristic is the retention of the exuviae [Grandjean 1954; but see Hugo-Coetzee 2013]).

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Figure 6: *Adrodamaeus* *ermilovi* sp. nov. Legs with cerotegumental granules. A. leg III, left, antiaxial view; B. leg IV, left, paraxial view. Scale bars: 50 μm
Adrodamaeus ermilovi spec. nov. shares a number of characteristics with other species. Adrodamaeus johanni (Hugo 2010) and A. hispanicus (Grandjean 1928) have four pairs of notogastral setae, A. mongolicus (Bayartogtokh & Weigmann 2005) and A. woonhahi (Choi & Aoki 1985) have a curved ridge between the genital plates and acetabulum IV, and A. decemsetiger (Choi & Aoki 1985) has a ridge on the anal plates. However, A. ermilovi spec. nov. differs from these species in having all of these characteristics.

Collection data
This species occurs in the Grassland and Albany Thicket Biomes (for definitions of the different biomes see Rutherford et al. 2006; Hugo-Coetzee 2013). For distribution of A. ermilovi spec. nov., see Fig. 7.
Grassland Biome: Between Weenen and Greytown, KwaZulu-Natal (28°57’S, 30°18’E, very dry soil and decomposed plant material); Van der Kloof Dam, Northern Cape (30°07’S, 24°50’E, leaf litter under thorn trees); Colesberg, Northern Cape (30°43’S, 25°05’E, dry soil and decomposed leaf litter under grasses and Rhus sp.); Montrose, Mpumalanga (25°27’S, 30°43’E, dry red loam soil with decomposed leaf litter); Maritsbos near Sabie, Mpumalanga (25°05’S, 30°47’E, moss from trees in indigenous forest); Albany Thicket Biome: Olifantskop Pass, near Patterson, Eastern Cape (33°19’S, 25°57’E, slightly damp soil and decomposed leaf litter under dense indigenous shrubs); Cookhouse, Eastern Cape (32°45’S, 25°47’E, dry soil and decomposed leaf litter under Rhus sp.).

<table>
<thead>
<tr>
<th>Leg</th>
<th>Trochanter</th>
<th>Femur</th>
<th>Genu</th>
<th>Tibia</th>
<th>Tarsus</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>$v'$</td>
<td>$d, (l), v'' , bv''$</td>
<td>$d, (l), v', \sigma$</td>
<td>$d, (l), (v), \varphi_1, \varphi_2$</td>
<td>$(fi)$, $(tc)$, $(it)$, $(p)$, $(u)$, $(a)$, $s$, $(pv)$, $v'$ $(pl)$, $l''$, $e$, $\omega_1$, $\omega_2$</td>
</tr>
<tr>
<td>II</td>
<td>$v'$</td>
<td>$d, (l), v'' , bv''$</td>
<td>$d, (l), v', \sigma$</td>
<td>$d, (l), (v), \varphi$</td>
<td>$(fi)$, $(tc)$, $(it)$, $(p)$, $(u)$, $(a)$, $s$, $(pv)$, $l''$, $\omega_1$, $\omega_2$</td>
</tr>
<tr>
<td>III</td>
<td>$l', v'$</td>
<td>$d, l', ev'$</td>
<td>$d, l', v', \sigma$</td>
<td>$d, l', (v), \varphi$</td>
<td>$(fi)$, $(tc)$, $(it)$, $(p)$, $(u)$, $(a)$, $s$, $(pv)$</td>
</tr>
<tr>
<td>IV</td>
<td>$v'$</td>
<td>$d, ev'$</td>
<td>$d, l', v'$</td>
<td>$d, l', (v), \varphi$</td>
<td>$(fi)$, $(tc)$, $(p)$, $(u)$, $(a)$, $s$, $(pv)$</td>
</tr>
</tbody>
</table>
Key to Adrodamaeus species of the world

Note: Adrodamaeus rossicus (Bulanova-Zachvatkina, 1967) from Russia and A. starki (Bulanova-Zachvatkina, 1967) from Crimea were omitted from the key, since adequate information about them could not be found. The only information available was size, absence of a discidium, and prodorsum elongated in A. starki and wide in A. rossicus (Ghilarov & Krivolutsky 1975).

1a. Two or three pairs of notogastral setae ................................................................. 2
1b. Four or five pairs of notogastral setae ...................................................................... 5

2a. Two pairs of notogastral setae; anterior border of notogaster with an angulation medially from which a short longitudinal thickening extends posteriorly. Korea ..........
......................................................................................................................... A. haradai (Aoki, 1984)
2b. Three pairs of notogastral setae; anterior thickening on notogaster absent ............ 3
3a. Rostrum rounded; interlamellar setae minute, slender and setiform; notogastral setae of medium length. Japan ........................................... A. striatus (Aoki, 1984)
3b. Rostrum truncate with or without an incision, interlamellar setae thickened, notogastral setae long or short ................................................................. 4

4a. Rostrum truncate; discidium absent; notogastral setae long; a small tubercle present anterolaterally on notogaster (just behind bothridium); ventrally a curved ridge present close to acetabulum IV. Korea ........................................... A. woonhahi (Choi & Aoki, 1985)
4b. Rostrum truncate with a medium incision; discidium present; notogastral setae short; anterolateral tubercle on notogaster absent; curved ridge near acetabulum IV absent. Germany ............................................................ A. femoratus (Koch, 1839)

5a. Four pairs of notogastral setae .................................................................................. 6
5b. Five pairs of notogastral setae .................................................................................. 8

6a. Small anterolateral tubercle present on notogaster, behind bothridium; sensillus thickening distally; two of the four pairs of notogastral setae very long. Spain ................................................................. A. hispanicus (Grandjean, 1928)
6b. Anterolateral tubercle on notogaster absent; sensillus not thickening; fewer than two pairs of long notogastral setae .................................................................................. 7

7a. One pair of notogastral setae very long, others of medium length; discidium present; no transverse ridge anteriorly on notogaster; curved ridge present near acetabulum IV; longitudinal ridge present on anal plate; seta d on Ti 1 present. South Africa ................................................................. A. ermilovi spec. nov.
7b. Notogastral setae all very short; discidium; transverse ridge present anteriorly on notogaster; ridges on anal plate and near acetabulum IV absent; seta d on Ti 1 absent. South Africa ................................................................. A. johanni (Hugo, 2010)

8a. Discidium present .................................................................................................... 9
8b. Discidium absent .................................................................................................... 11

9a. Notogastral margin with many undulations, one pair of longitudinal ridges posteriorly on notogaster. Italy ................................................................. A. siculus (Berlese, 1910)
9b. Notogastral margins without undulations, either lobed posteriorly or convex anteriorly. .................................................................................................................. 10

10b. Anterior margin of notogaster medi ally convex, posterior edge round, smooth; anal plates with strong sculpture. Italy ................................................................. A. italicus (Berlese, 1916)

11a. Sensillus slender; anterolateral tubercle present on notogaster behind bothridium (see Walter 2009) or absent (see Paschoal 1984). USA A. magnisetosus (Ewing, 1909)
11b. Sensillus thickens distally ........................................................................................ 12
12a. Longitudinal ridge paraxial to setal row on genital plate and antiaxial to setal row on anal plate; epimeral setae 3c, 4b, 4c each associated with a ridge. Korea .................................................. A. decemsetiger (Choi & Aoki, 1985)

12b. Ridges on genital and anal plates absent; ridges associated with epimeral setae absent ................................................................. A. decemsetiger

13a. Notogaster strongly undulating posteriorly. Italy ......................... A. pusillus (Berlese, 1910)

13b. Notogaster smooth posteriorly .......................................................... A. pusillus

14a. Anterolateral tubercle present on notogaster behind bothridium; prodorsal apophyses poorly developed. Mongolia ............. A. mongolicus (Bayartogtokh & Weigmann, 2005)

14b. Anterolateral tubercle on notogaster absent; prodorsal apophyses well developed. USA .......................................................... A. musci Paschoal, 1984

ACKNOWLEDGEMENTS

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