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**NEW SPECIES OF THE FAMILY LOHMANNIIDAE
(ACARI, ORIBATIDA) FROM SOUTH AFRICA.**

by

LOUISE COETZEE*National Museum, P.O. Box 266, Bloemfontein 9300, South Africa.
acarol@nasmus.co.za*

ABSTRACT

Coetzee, L. 2001. New species of the Family Lohmanniidae (Acari, Oribatida) from South Africa. *Navors. nas. Mus., Bloemfontein* 17(3):53-67. Three new Lohmanniidae species from South Africa are described, one in the genus *Annectacarus* Grandjean, 1950 (*A. eksteeni spec. nov.*) and two in the genus *Paulianacarus* Balogh, 1960 (*P. grobleri spec. nov.* and *P. barlowi spec. nov.*). A key for the species of *Annectacarus* and a table summarizing the species of *Paulianacarus* are given. A new name is proposed for the *Paulianacarus* species described by Sarkar & Subias (1984) (*P. sarbias nom. nov.*). **Acari, Oribatida, Taxonomy, Lohmanniidae, Annectacarus, Paulianacarus, South Africa.**

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INTRODUCTION

While conducting a research project on fossil oribatid mites from Florisbad, a Quaternary research site near Bloemfontein, South Africa, species of Lohmanniidae were encountered in the Holocene sediments. In order to do biogeographical comparisons, the Lohmanniidae-collection of the National Museum was studied. This is the first report of Lohmanniidae from South Africa and three new species are described, one in the genus *Annectacarus* Grandjean, 1950 and two in the genus *Paulianacarus* Balogh, 1960.

Grandjean (1950) laid a stern foundation regarding the morphology and evolution of the family Lohmanniidae and together with the synopsis and keys presented by Balogh & Balogh (1987), the study of this family is much facilitated.

Descriptions are based on adult instars only. The mean of all measurements are given in μm followed by the minimum and maximum in brackets. The famulus is included in the number of tarsal setae on leg I.

DESCRIPTION OF SPECIES

ANNECTACARUS GRANDJEAN, 1950

The genus *Annectacarus* was erected by Grandjean (1950) for a species (*A. mucronatus*) from Venezuela, South America. Since then, thirteen species were added to the genus, mostly from the Oriental and Ethiopian Regions, but also from China and Thailand.

Generic diagnosis: Genital plates not divided by transverse suture; anal and adanal plates fused; pre-anal plate small, narrow; weak neotrichy present on epimeres I and II, subcapitulum and pygidial region of the notogaster; neotrichal setae setiform; two pairs of anal setae; four pairs of adanal setae.

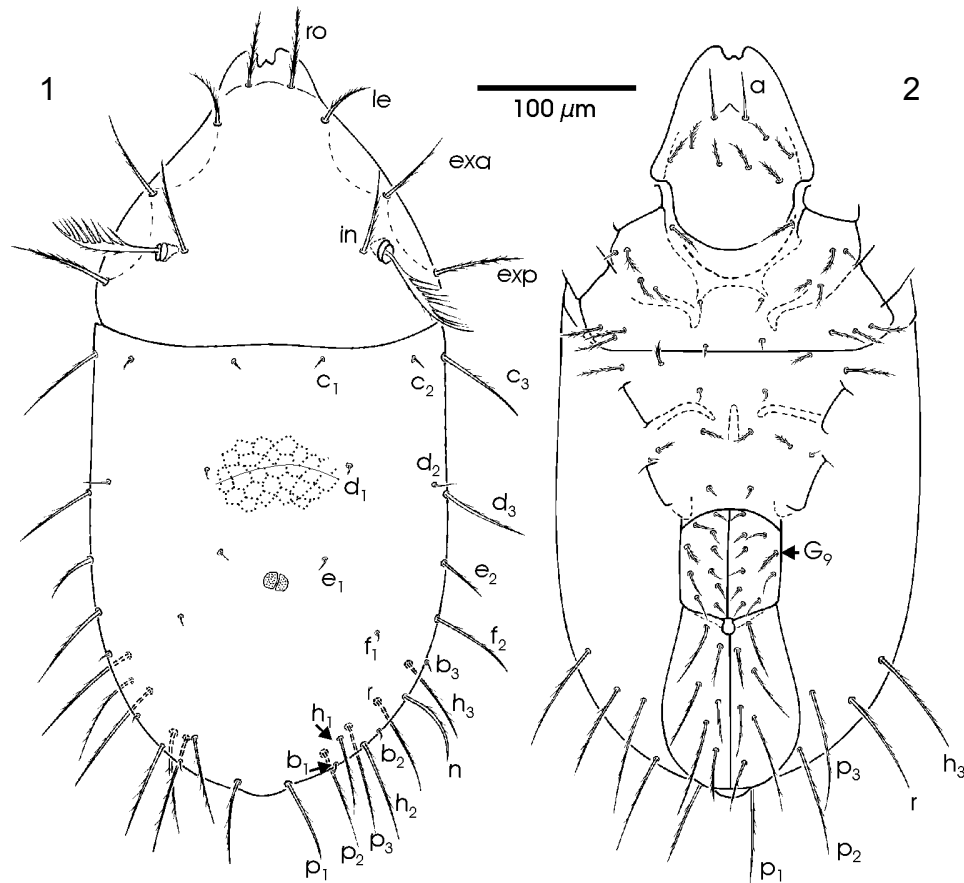
Annectacarus eksteeni spec. nov.

Specific diagnosis: Anterior rostral border broadly incised with medial point; notogastral setae c_1 , c_2 , d_1 , d_2 , e_1 and f_1 short, smooth; pygidial neotrichal setae b_{1-3} short, smooth.

Size: Length: 439 (418 - 455) Holotype: 445. Width: 221 (209 - 232) Holotype: 211.

Colour: Yellowish brown.

Dorsal side (Figure 1): Prodorsum: Prodorsal surface with indistinct reticulate pattern; rostral border antero-medially broadly incised, with medial point; lateral rostral tectum slightly transparent; rostral seta (*ro*) strong, straight, bilaterally barbed; lamellar (*le*), interlamellar (*in*) and anterior exobothridial (*exa*) setae unilaterally finely barbed; posterior exobothridial seta (*exp*) usually bilaterally barbed; sensillus pectinate, with seven to nine



Figures 1 – 2: *Annectacarus eksteeni* spec. nov. (1) Dorsal side, (2) Ventral side.

long branches on anterior side and a few short barbs on posterior side. Prodorsal setal lengths: $ro = 50$ (45 - 60), $le = 48$ (33 - 65), $in = 54$ (45 - 64), $exa = 57$ (45 - 73), $exp = 65$ (62 - 69). **Notogaster:** Notogastral surface with reticulate pattern; reticulation forms a fine line between left and right setae d_1 ; varying number of porose areas present in region posterior to left and right setae e_1 ; 21 pairs of notogastral setae present (occasionally an additional neotrichal seta (b_4) present on one or both sides of the notogaster), setae $c_1, c_2, d_1, d_2, e_1, f_1, b_1, b_2, b_3$ very short, smooth; all other notogastral setae long, unilaterally finely barbed; transverse notogastral bands absent. Notogastral setal lengths: $c_1 = 12$ (9 - 15), $c_2 = 16$ (15 - 20), $c_3 = 61$ (56 - 64), $d_1 = 10$ (9 - 13), $d_2 = 18$ (15 - 27), $d_3 = 66$ (64 - 71), $e_1 = 11$ (9 - 13), $e_2 = 36$ (29 - 40), $f_1 = 10$ (9 - 11), $f_2 = 58$ (55 - 60), $h_1 = 49$ (40 - 58), $h_2 = 60$ (51 - 67), $h_3 = 73$ (67 - 78), $p_1 = 61$ (53 - 71), $p_2 = 67$ (56 - 85), $p_3 = 74$ (67 - 80), $b_1 = 11$ (9 - 15), $b_2 = 13$ (9 - 18), $b_3 = 12$ (9 - 15), $n = 52$ (33 - 67), $r = 56$ (47 - 65).

Ventral side (Figure 2): **Gnathosoma:** Number of subcapitular setae 3 - 5 (mostly 4) on each side; setae a straight, smooth, rest of subcapitular setae short, barbed. **Gnathosomal appendages:** Cheliceral setae cha very short, thin; chb long, smooth. Chaetotaxy of palp (trochanter to tarsus, excluding solenidion) 0-1-0-1-10; solenidion ω long, ceratiform, inserted far proximally; femur and genu completely fused, no dorsal suture present (see *Paulianacarus*), only a fine line visible antiaxially. **Epimeral region:** Epimeral setal formula 6-4-3-4; paraxial setae short, smooth; antiaxial-most setae of epimeres I and IV very short, smooth; rest of epimeral setae longer, bilaterally barbed. **Ano-genital region:** Genital plates with 10 pairs of setae, paraxial setae smooth, short; antiaxial setae longer, smooth, except G_9 , barbed; anal setae longer than antiaxial genital setae, finely barbed; adanal setae longer than anal setae, finely barbed; pre-anal plate small, very narrow, almost quadrangular.

Legs: All femora with ventral blades; femur I with pronounced postero-lateral spur on anti-axial side; claws monodactyle with small basal tooth; solenidion ω_2 on tarsus II present (see Grandjean, 1950, p. 107); antiaxial fastigial seta (ft'') associated with solenidion ω_2 on tarsus I; dorsal seta (d) associated with solenidion σ on genu IV; solenidiotaxy (genu to tarsus) Leg I: 2-1-2; Leg II: 1-1-2; Leg III: 1-1-0; Leg IV: 1-0-0; chaetotaxy (trochanter to tarsus) Leg I: 0-5-3-5-17; Leg II: 0-6-3-5-13; Leg III: 2-4-2-2-10; Leg IV: 2-3-2-2-10.

Collection data (Figure 7): Sample 3772.14: coastal dune forest at St. Lucia, KwaZulu-Natal (28°22'S, 32°23'E), 44 specimens, J.P. Eksteen coll. (xi 1993); Sample 3671.49: natural beach vegetation at Mapelane, 2 km south of St. Lucia (28°22'S, 32°23'E), 4 specimens, J. Watson coll. (vii 1990).

The Holotype (NMB 3772.14.1) and 5 paratypes from the same sample are deposited in the Acarology collection of the National Museum, Bloemfontein, South Africa.

Discussion: In this genus neotrichy is present in the pygidial region of the notogaster (setae b_1, b_2, b_3, n, r), epimeres I (six or more pairs of setae), epimeres II (four pairs of setae) and on the subcapitulum (four or more pairs of setae apart from seta a). The degree of neotrichy, however, varies within a population and even in the same individual, where the left and right sides have different numbers of setae. This irregularity is mentioned by Wallwork (1962), Hammer (1973), and Corpuz-Raros (1979). Only *A. trivandricus* Haq, 1978 seems to have a definite set of additional neotrichous setae (pn_{1-3}) posteriorly on the

notogaster. Species are distinguished mainly on the basis of a combination of character states of the notogastral setae.

A. eksteeni **spec. nov.** is closest to *A. mucronatus* in having notogastral setae c_2 , d_2 and f_1 the same as c_1 , d_1 and e_1 respectively, but differs from it by seta h_1 being much longer and more slender than in *A. mucronatus* and the neotrichal notogastral setae b_{1-3} in *A. eksteeni* are very short and smooth, while in *A. mucronatus* they are barbed.

Etymology: The species is named after Mr J.P. Eksteen, who collected most of the St. Lucia-material in our collection.

A key for the determination of the species of the genus *Annectacarus* is proposed. Information for the key is taken from the original descriptions, except for *A. parallelus*, for which the information is taken from the redescription by Mahunka (1991); type localities are given in parentheses.

Key for the species of the genus *Annectacarus* Grandjean, 1950

1. Notogastral setae c_1 , d_1 , e_1 very short.....2
Notogastral setae c_1 , d_1 , e_1 long, barbed.....
..... *A. granditrichosus* Sengbush, 1984 (Micronesia)
2. Notogastral seta f_1 similar to c_13
Notogastral seta f_1 much longer and thicker than c_1 7
3. Notogastral seta c_2 similar to c_14
Notogastral seta c_2 twice as long and thicker than c_1 5
4. Notogastral seta h_1 similar to h_2 ; neotrichal notogastral setae b_{1-3} very short, smooth.....*A. eksteeni* **spec. nov.** (South Africa)
Notogastral seta h_1 much shorter than h_2 , densely barbed; neotrichal notogastral setae b_{1-3} barbed.....*A. mucronatus* Grandjean, 1950 (Venezuela)
5. Neotrichal notogastral setae b_{1-3} absent (18 pairs of notogastral setae).....
..... *A. krachan* Mahunka, 1995 (Thailand)
Neotrichal notogastral setae b_{1-3} present (21 pairs of notogastral setae).....6
6. Neotrichal notogastral setae b_{1-3} similar to c_1
..... *A. parallelus* (Berlese, 1916) (Somalia¹)
Neotrichal notogastral setae b_{1-3} longer and thicker than c_1
.....*A. hainanensis* Hu & Wang, 1989 (China)
7. Notogastral seta c_2 half the length of c_38
Notogastral seta c_2 longer than half the length of c_311
8. Notogastral setae bilaterally barbed9
Notogastral setae unilaterally barbed10
9. Neotrichal notogastral setae b_{1-3} similar to c_1
..... *A. sejugatus* Wallwork, 1962 (Ghana)
Neotrichal notogastral setae b_{1-3} longer than c_1 , barbed
..... *A. insculptus* Wallwork, 1962 (Ghana)
10. Neotrichal setae b_{1-4} barbed; b_4 present (22 pairs of notogastral setae).....

¹ See Van der Hammen 1959. p. 59

- *A. unilateralis* Hammer, 1973 (Tonga Islands)
 Neotrichal setae b_{1-3} smooth (21 pairs of notogastral setae).....
 *A. africanus* Balogh, 1961 (Tanzania)
 11. Additional neotrichal setae pn_{1-3} present (24 pairs of notogastral setae).....
 *A. trivandricus* Haq, 1978 (India)
 Additional neotrichal setae pn_{1-3} absent (18 / 21 pairs of notogastral setae) 12
 12. Anterior margin of rostral tectum incised.....
 *A. mahabaeus* Corpuz-Raros, 1979 (Philippines)
 Anterior margin of rostral tectum rounded..... 13
 13. Neotrichal notogastral setae b_{1-3} present (21 pairs of notogastral setae)
 *A. longisetosus* Bhattacharya *et al.*, 1974 (India)
 Neotrichal notogastral setae b_{1-3} absent (18 pairs of notogastral setae).....
 *A. aokii* Jaikumar *et al.*, 1994 (India)

PAULIANACARUS BALOGH, 1960

The genus *Paulianacarus* was instituted by Balogh in 1960 for three species collected from Madagascar. The species of the genus are distinguished mainly by differences in surface structure, transverse notogastral bands and setae.

Generic diagnosis: Genital plates not divided by transverse suture; anal and adanal plates fused; pre-anal plate as wide as genital opening; two pairs of anal setae; four pairs of adanal setae; neotrichy absent; porose areas dorsally and ventrally present.

At the same time, Balogh (1960) instituted the genus *Millotacarus*, also described from Madagascar, which he distinguished from *Paulianacarus* by the lack of dorsal porose areas, except for three pairs of round porose areas in transverse area five. In the description of the type species (*M. granulatus* Balogh, 1960), he mentions the presence of four porose areas on the subcapitulum and describes the notogastral setae as "lanceolate". Mahunka (1985) refers to the "alliance" of *Paulianacarus* and *Millotacarus*, and that the "differences between these two genera are problematic". Balogh & Balogh (1987) distinguish between the two genera by adding to the diagnosis of *Millotacarus*: "Notogastral setae phylliform. Areae porosae absent", despite the presence of porose areas on *M. granulatus*. In the description of *M. orientalis* Mahunka, 1988, no mention is made of porose areas. The possibility exists that *Millotacarus* is a synonym of *Paulianacarus*, but a study of the type material will first have to be undertaken. Table 1 summarises the species of *Paulianacarus* and *Millotacarus*.

Sarkar & Subias (1984) described the species *P. foliatus* from India (District Tripura), using a preoccupied name, which Mondal & Chakrabarti used for another species in 1983, also from India (District Darjeeling). The species differ with regard to adanal setae, notogastral setae and size. I therefore propose the name *P. sarbias* **nom. nov.** (a combination of the authors' names) for the species of Sarkar & Subias (1984).

Biogeography: Apart from *P. rugulosus* Mahunka, 1995 which was described from Thailand, the genus *Paulianacarus* is so far known only from Gondwanan regions, namely the south eastern part of the African continent, Madagascar and India. *P. rugulosus* differs markedly from the other species in the genus by the very short setae, rugose (striated)

surface, the presence of only nine pairs of genital setae and the presence of a crista posteriorly between the anal and adanal plates, which suggests the incomplete fusion of these plates. It is possible that *P. rugulosus* belongs to a different or probably new genus.

Paulianacarus grobleri spec. nov.

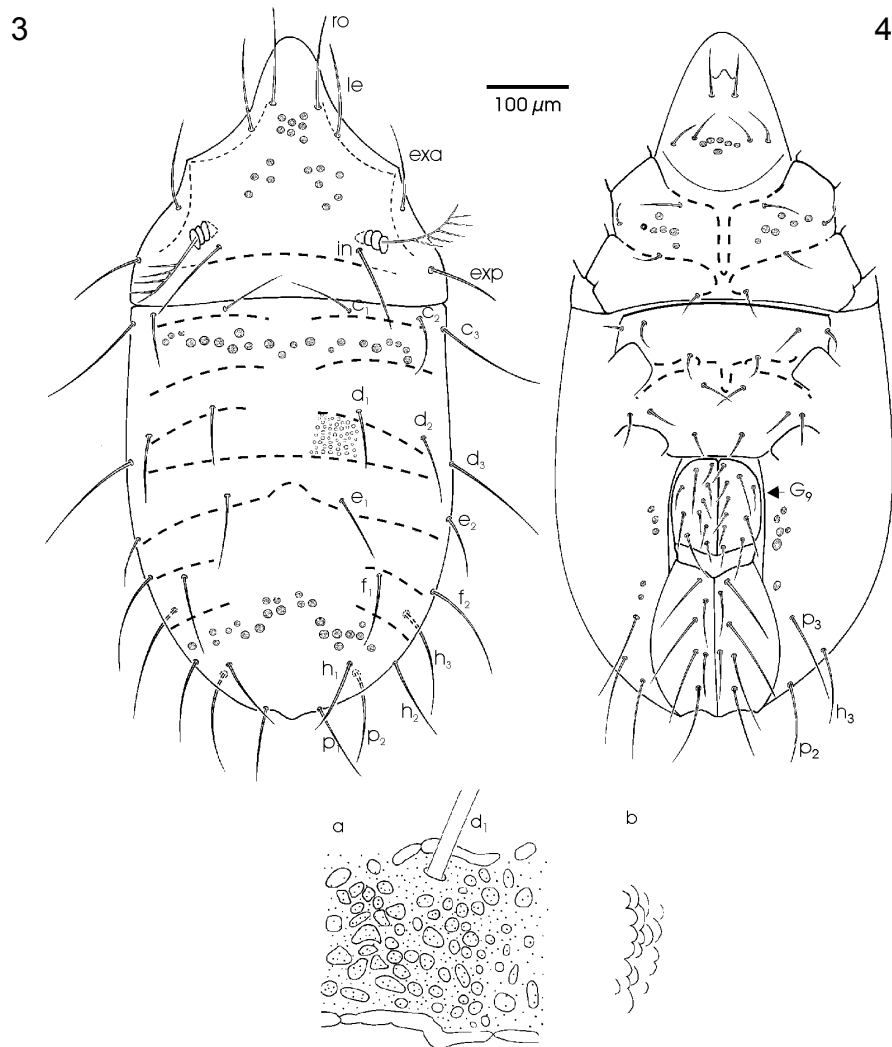
Specific diagnosis: Dorsal setae slender, smooth; tegument with elevations of uneven shape and size, entire surface punctated; transverse bands 4 and 5 complete, others interrupted.

Size: Length: 785 (755 – 818) Holotype: 818. Width: 388 (364 – 409) Holotype: 391.

Colour: Yellowish brown.

Dorsal side (Figure 3): **Prodorsum:** Prodorsal surface covered by small, low elevations, entire surface finely punctate; small, round porose areas present medially; antero-lateral surfaces roughened; transverse band with roughened surface situated behind bothridia and interlamellar setae (*in*); rostral tectum rounded; all prodorsal setae (*ro*, *le*, *in*, *exa*, *exp*) slender, smooth; bothridium lobed; sensillus pectinate, with four to eight long, slender branches. Prodorsal setal lengths: *ro* = 116 (108 - 131), *le* = 98 (85 - 112), *in* = 117 (104 - 127), *exa* = 113 (104 - 123), *exp* = 110 (100 - 127). **Notogaster:** Notogastral surface similar to prodorsal surface with small, low, round to oval to unevenly shaped elevations; entire surface finely punctate (Figure 3a, b); small, round porose areas present in region posterior to *c*-series of notogastral setae and in the central region anterior to notogastral setae *h*₁; 16 pairs of notogastral setae present, all setae similar, slender, smooth; setae *c*₁ mostly directed medially; indistinct transverse notogastral bands present, anterior three bands medially interrupted, fourth and fifth bands complete, fifth band jutting anteriorly between setae *e*₁, posterior bands medially interrupted, becoming more and more indistinct; transverse bands in oval segments, sometimes fused. (Punctuation and transverse bands visible under high magnification.). Notogastral setal lengths: *c*₁ = 68 (54 - 77), *c*₂ = 67 (58 - 81), *c*₃ = 126 (108 - 146), *d*₁ = 67 (58 - 77), *d*₂ = 72 (62 - 85), *d*₃ = 138 (115 - 158), *e*₁ = 82 (65 - 96), *e*₂ = 91 (69 - 108), *f*₁ = 90 (77 - 96), *f*₂ = 120 (100 - 146), *h*₁ = 83 (62 - 96), *h*₂ = 125 (112 - 146), *h*₃ = 125 (112 - 150), *p*₁ = 92 (77 - 115), *p*₂ = 130 (112 - 150), *p*₃ = 120 (112 - 131).

Ventral side (Figure 4): **Gnathosoma:** Three pairs of slender, smooth subcapitular setae present; subcapitular surface the same as dorsal surface; porose areas present on subcapitulum. **Gnathosomal appendages:** Cheliceral setae *cha* very short, thin; *chb* long, slender, smooth; chaetotaxy of palp (trochanter to tarsus, excluding solenidion) 0-1-0-1-10; lateral setae (*l*) on tarsus barbed; solenidion ω on tarsus thick, ceratiform, inserted far proximally on tarsus; femur and genu fused, suture only dorsally visible with a faint line antiaxially. **Epimeral region:** Number of setae on epimeres I - IV: 3-1-3-4; all setae more or less equal in length, smooth, slender; epimeral surface same as dorsal surface; porose areas present on epimeres I. **Ano-genital region:** Genital plates with 10 pairs of setae, paraxial setae and seta *G*₉ short, rest of antiaxial setae and anal setae longer; adanal setae about twice as long as anal setae; all setae smooth, slender; pre-anal plate as wide as genital opening; porose areas present laterally to genital - and ano-adanal plates.



Figures 3 – 4: *Paulianacarus grobleri* spec. nov. (3) Dorsal side, (3a) Structure of notogastral tegument – medially, (3b) Structure of notogastral tegument – laterally, (4) Ventral side.

Legs: Femora I and II with ventral blades, surface of all legs punctate, femora ventrally with ill-defined porose elevations; femur I without lateral spur; claws monodactyle, long, slightly extended, without basal tooth; setae smooth or minutely barbed; solenidion ω_2 on tarsus II absent; antiaxial fastigial seta (*fi''*) associated with solenidion ω_2 on tarsus I; famulus ϵ very short, conical; dorsal seta (*d*) associated with solenidion σ on all genua; paraxial proral seta on tarsi II - IV absent; antiaxial proral seta on tarsi II - IV very short; solenidiotaxy (genu to tarsus) Leg I: 2-1-2; Leg II: 1-1-1; Leg III: 1-1-0; Leg IV: 1-0-0; chaetotaxy (trochanter to tarsus) : Leg I: 0-5-3-4-16; Leg II: 0-6-3-4-12; Leg III: 2-3-2-3-11; Leg IV: 2-3-2-3-11.

Collection data (Figure 7): Sample 3302.17: soil and decomposed plant debris at Vernon Crookes Nature Reserve, KwaZulu-Natal (30°16'S, 30°35'E), D.J. Kok coll. (31 iii 1983). The holotype (NMB 3302.17.1) and 5 paratypes from the same sample are deposited in the Acarology collection of the National Museum, Bloemfontein, South Africa.

Discussion: The structure of the tegument of this species is very similar to that of *P. sarbias* **nom. nov.** in having tubercles (elevations) and punctuation on the whole surface, on the "hills" and "valleys" and the sectioned nature of the transverse bands. On the other hand, it differs markedly by the nature of the dorsal and adanal setae. The species corresponds with *P. barlowi* **spec. nov.** as well as the species from Madagascar regarding the slender, smooth dorsal setae, but is distinguished from these species by the structure of the tegument and nature of the transverse bands.

Etymology: The species is named after my colleague Miss Lorinda Grobler.

***Paulianacarus barlowi* spec. nov.**

Specific diagnosis: Dorsal setae slender, smooth; tegument with equidistant punctated knobs; all transverse bands medially interrupted.

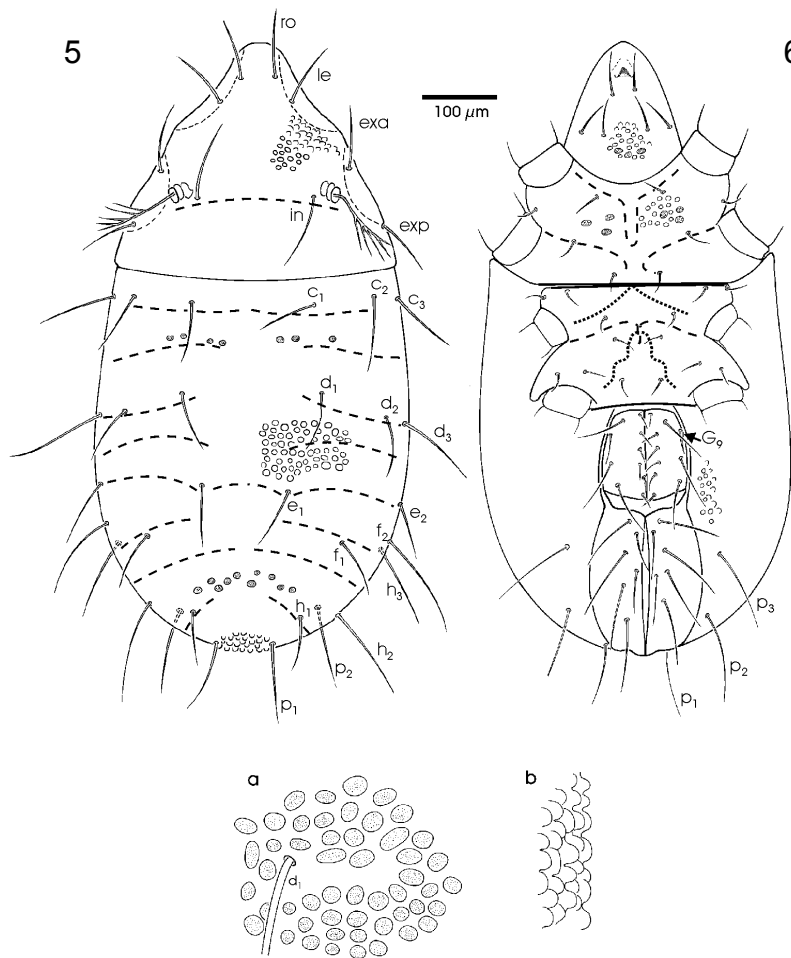
Size: Length: 749 (709 - 791) Holotype: 791. Width: 371 (345 - 400) Holotype: 373.

Colour: Yellowish brown.

Dorsal side (Figure 5): **Prodorsum:** Prodorsal surface with round to oval equidistant, protruding, punctated knobs, occasionally with a few porose areas; antero-lateral surfaces without knobs but roughened; transverse band with roughened surface situated across prodorsum posterior to bothridia and interlamellar setae (*in*); rostral tectum rounded; all dorsal setae (*ro*, *le*, *in*, *exa*, *exp*) smooth, slender; bothridium lobed; sensillus with five to eight long slender branches. Prodorsal setal lengths: *ro* = 105 (93 - 111), *le* = 99 (78 - 122), *in* = 120 (100 - 137), *exa* = 105 (93 - 133), *exp* = 89 (74 - 104). **Notogaster:** Notogastral surface similar to prodorsal surface (Figures 5a, b), with few porose areas present in region posterior to *c*-series notogastral setae and in central region anterior to notogastral setae *h₁*; 16 pairs of notogastral setae present; all setae slender, smooth; transverse notogastral bands present, all bands medially interrupted (1, 5, 7 narrowly interrupted) posterior bands becoming progressively more indistinct. Notogastral setal lengths: *c₁* = 87 (74 - 96), *c₂* = 98 (81 - 111), *c₃* = 133 (119 - 148), *d₁* = 90 (74 - 104), *d₂* = 109 (100 - 115), *d₃* = 127 (104 - 137), *e₁* = 97 (85 - 107), *e₂* = 91 (81 - 104), *f₁* = 120 (104 - 137), *f₂* = 131 (100 - 148), *h₁* = 97 (74 - 126), *h₂* = 119 (100 - 144), *h₃* = 119 (107 - 130), *p₁* = 92 (85 - 115), *p₂* = 120 (107 - 133), *p₃* = 114 (111 - 122).

Ventral side (Figure 6): **Gnathosoma:** Three pairs of slender, smooth subcapitular setae present; subcapitular surface same as dorsal surface; few porose areas present on subcapitulum. **Gnathosomal appendages:** Cheliceral setae *cha* very short, thin; *chb* long, smooth. Chaetotaxy of palp (trochanter to tarsus, excluding solenidion) 0-1-0-1-10. Solenidion ω of tarsus thick, ceratiform, inserted far proximally on tarsus; femur and genu fused, suture only dorsally visible. **Epimeral region:** Number of setae on epimeres I - IV:

3-1-3-4; all setae more or less equal in length, smooth, slender; surface same as dorsal surface, few porose areas present on epimeres I. **Ano-genital region:** Genital plates with 10 pairs of setae, paraxial setae short, antiaxial setae longer, except G_9 shorter; anal setae more or less as long as antiaxial genital setae (except G_9), adanal setae longer than anal setae; all setae smooth, slender; pre-anal plate as wide as genital opening.



Figures 5 – 6: *Paulianacarus barlowi* spec. nov. (5) Dorsal side, (5a) Structure of notogastral integument – medially (5b) Structure of notogastral tegument – laterally (6) Ventral side.

Legs: Femora I and II each with long (more or less the whole length of femur), narrow ventral blade; surface of all legs punctate, femora ventrally with ill-defined porose elevations; femur I without lateral spur; claws monodactyle, long, slightly extended, without basal tooth; setae smooth or minutely barbed; solenidion ω_2 on tarsus II absent;

antiaxial fastigial seta (fi'') associated with solenidion ω_2 on tarsus I; famulus ϵ very short, conical; dorsal seta (d) associated with solenidion σ on all genua; paraxial proral seta on tarsi II - IV absent; antiaxial proral seta on tarsi II - IV very short; solenidiotaxy (genu to tarsus) Leg I: 2-1-2; Leg II: 1-1-1; Leg III: 1-1-0; Leg IV: 1-0-0; chaetotaxy (trochanter to tarsus) : Leg I: 0-5-3-4-16; Leg II: 0-6-3-4-12; Leg III: 2-3-2-3-11; Leg IV: 2-3-2-3-11.

Collection data (Figure 7): All the specimens (261 adults and immatures) were collected by G. Nel between 4 April and 6 August 1965 from a cultivated sugar cane field near Mtunzini (28°59' S, 31°44' E), KwaZulu-Natal.

The holotype (NMB 496.1) and 5 paratypes from the same sample are deposited in the Acarology collection of the National Museum, Bloemfontein, South Africa.

Discussion: The new species is separated from its congeners by the structure of the tegument being equidistant punctate knobs covering the whole body, in addition to flat porose areas in the regions posteriorly to setae c_1 and anteriorly to setae h_1 . The porose knobs remind of the structure described for *P. nodosus* Balogh, 1960 and *P. foliatus* Mondal & Chakrabarti, 1983 but can be clearly separated from them by the absence of elevated ridges as in *P. nodosus* and the setiform setae as opposed to foliate setae in *P. foliatus*.

Etymology: The species is named after Miss Michelle Barlow, research assistant in the Acarology Department, National Museum, Bloemfontein.



Figure 7: Distribution of *Annectacarus*- and *Paulianacarus* species in South Africa.

Species	Distribution Habitat	Size (μm)	Tegument	Porose areas	Setae	Notogastral bands
<i>P. laevis</i> Balogh, 1960	Madagascar Forest soil	912 X 452	Tegument without protruding tubercles; transverse area 4 glabrous.	Flat or only slightly protruding; present on all transverse areas except 4.	Dorsal setae slender, smooth.	All transverse bands (10) complete.
<i>P. nodosus</i> Balogh, 1960	Madagascar Forest soil	1134 X 560	Tegument with large protruding tubercles; medially interrupted transverse ridges present posteriorly to setae d, f, h.	Situated on protruding tubercles in transverse areas (except where ridges are present).	Dorsal setae slender, smooth.	Transverse bands inconspicuous.
<i>P. rugosus</i> Balogh, 1960	Madagascar Forest soil	1160 X 670	Notogaster with medially interrupted elevated ridges.	Inconspicuous.	Dorsal setae long, thin, smooth.	Transverse bands inconspicuous.
<i>P. foliatus</i> Mondal & Chakrabarti, 1982	India, Darjeeling Soil from tea plantation	691 - 721 X 281 - 310	Tegument with distinct protruding ringshaped structures.	? Situated on protruding tubercles.	Dorsal setae foliate, with distinct midrib; ro, la, proximally serrated, distally smooth; all ventral setae setiform	Five transverse bands present.
<i>P. sarbias</i> nom. nov. (Sarkar & Subias, 1984)	India, Tripura ?	550 - 640 X 238 - 260	Tegument with tubercles close to each other; dense, fine punctations.	?	Dorsal and adanal setae foliate with dentate margins; rest of ventral setae setiform, smooth.	Anterior and three posterior transverse bands complete, others interrupted.
<i>P. simplisetosus</i> Mahunka, 1985	India, Kerala Forest soil	931 - 1015 X 535 - 579	Tegument foveolate.	?	Notogastral setae very long, thin, proximally barbed; adanal setae sparsely barbed; rest of ventral setae smooth.	? Anterior transverse band complete, 2 - 6 interrupted, posterior bands absent.

Species	Distribution Habitat	Size (μm)	Tegument	Porose areas	Setae	Notogastral bands
<i>P. rugulosus</i> ² Mahunka, 1995	Thailand	653 - 764 X 305 - 376	Tegument finely rugulose.	Scattered on notogaster.	All setae setiform, very short, minute; lateral branches of sensillus very short; 9 pairs of genital setae.	Anterior transverse band complete, 2 – 4 interrupted, others absent.
<i>P. grobleri</i> spec. nov.	South Africa Densely vegetated soil	785 X 388	Uneven elevations, entire surface punctate.	Present in regions posteriorly to <i>c</i> , and anteriorly to <i>h</i> ₁ .	Setae slender, smooth.	Transverse bands 4, 5 complete, others interrupted; posterior bands obsolete.
<i>P. barlowi</i> spec. nov.	South Africa Sugar cane plantation	749 X 371	Equidistant, punctated knobs.	Few porose areas present in regions posteriorly to <i>c</i> , and anteriorly to <i>h</i> ₁ .	Setae slender, smooth.	All transverse bands interrupted (sometimes very slightly), posterior bands obsolete.
<i>M. granulatus</i> Balogh, 1960	Madagascar Forest soil	725 X 295	Tegument with slightly elevated obtuse, spiniform, granules.	Three pairs of porose areas in transverse area 5.	Dorsal setae lancheolate / foliate, edges smooth.	Nine transverse bands present, 1, 2, 6, 8, 9 complete, 3, 4, 5, 7 interrupted.
<i>M. orientalis</i> Mahunka, 1988	Malaysia Forest soil	567 - 607 X 275 - 300	Tectum covered with secretion granules.	?	Setae phylliform, edges smooth; rostral setae phylliform, edges serrated.	Ten transverse bands present, 1, 3, 5 continuous; 2, 4, 6, 7 medially connected; 8, 9, 10 connected with longitudinal line.

Table 1: Summary of the species of Paulianacarus Balogh, 1960 and Millotacarus Balogh, 1960

² This species probably belongs to a different (?new) genus.

RESUMÉ

Trois espèces nouvelles de Lohmanniidae d'Afrique du Sud sont décrites, une dans le genre *Annectacarus* Grandjean, 1950 (*A. eksteeni* **spec. nov.**) et deux dans le genre *Paulianacarus* Balogh, 1960 (*P. grobleri* **spec. nov.** et *P. barlowi* **spec. nov.**). Une clé pour la détermination des espèces d'*Annectacarus* et un résumé des espèces de *Paulianacarus* sont présentées. Un nouvel nom est proposé pour l'espèce de *Paulianacarus* décrit par Sarkar & Subias (1984) (*P. sarbias* **nom. nov.**).

OPSOMMING

Drie nuwe Lohmanniidae-spesies van Suid-Afrika word beskryf, een in die genus *Annectacarus* Grandjean, 1950 (*A. eksteeni* **spec. nov.**) en twee in die genus *Paulianacarus* Balogh, 1960. (*P. grobleri* **spec. nov.** en *P. barlowi* **spec. nov.**). 'n Sleutel tot die spesies van *Annectacarus* word gegee en 'n opsomming van die *Paulianacarus*-spesies word in 'n tabel aangebied. 'n Nuwe naam word voorgestel vir die *Paulianacarus*-spesie beskryf deur Sarkar & Subias (1984) (*P. sarbias* **nom. nov.**).

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