LOHMANNIIDAE SPECIES (ACARI, ORIBATIDA) FROM THE HOLOCENE DEPOSITS AT FLORISBAD, SOUTH AFRICA

by

Louise Coetzee

National Museum, Bloemfontein, South Africa
acarol@nasmus.co.za

ABSTRACT

Coetzee, Louise. 2001. Lohmanniidae species (Acari, Oribatida) from the Holocene deposits at Florisbad, South Africa. Navors. nas. Mus., Bloemfontein 17(5): 125-134. Three species of Lohmanniidae (Papillacarus brinki spec. nov.; Cryptacarus promecus Grandjean, 1950; Torpacarus cf. omittens Grandjean, 1950) were collected from the Holocene deposits of Florisbad Quaternary Research Station, South Africa. The new species is described and the two known species are briefly discussed. (Lohmanniidae, Fossil oribatids, Holocene, Florisbad)

ISBN 1 86847 065 2
INTRODUCTION

Florisbad is a Quaternary Research Station 45 km NNW of Bloemfontein in central South Africa. The Florisbad spring sequence is a well-studied fossiliferous Quaternary deposit (Rubidge & Brink 1985; Grobler & Loock 1988; Loock & Grobler 1988; Visser & Joubert 1991) which became known for an archaic human skull fragment discovered in 1935 (Dreyer 1935). Intensive studies were carried out on the mammalian fossils (Brink 1987, 1988), fossil pollen (Scott & Brink 1992; Nyakale 1999) and the Middle Stone Age archaeological material (Dreyer 1938; Kuman & Clark 1986; Henderson 1995; Brink & Henderson 2001).

Recently the oribatid remains from these deposits were investigated and reported on in Coetzee (in press). Three species of Lohmanniidae were encountered in the Holocene deposits and are discussed in this paper.

MATERIAL AND METHODS

Sampling

The Florisbad fossil site (28°46’S, 26°04’E) (Figure 1) consists of a sequence of Quaternary deposits associated with a thermal spring. Due to disturbances by spring action, sedimentary intrusions in the horizontal or sub-horizontal deposits were formed, contributing to a complex depositional history. In order to clarify the stratigraphy of the deposits and for dating purposes, a test pit was excavated down to the solid rock (8 m) on what is known as the Florisbad spring mound. These deposits were dated by Electron Spin Resonance (ESR) and Optically Stimulated Luminescence (OSL) by Grün, Brink, Spooner, Taylor, Stringer, Franciscus & Murray (1996). Samples were taken at 20 cm intervals from
the top to the base and tested for oribatid remains. Larger samples (400 – 500g) were taken from the deposits which showed signs of oribatid remains.

The spring section (70 m south of the test pit) is a localized feature not represented in the test pit and dated by radiocarbon (see Nyakale 1999). This section (previously known as Peat IV) consists of sediments with a high organic content. Nine samples (100g each) were taken from this section.

Seven modern soil samples were taken randomly from natural vegetation in the vicinity of the Holocene deposits to sample the extant fauna.

![South Africa map](image)

**Figure 1: South Africa**

**Extraction**

Fossil mites were extracted by the hyper saline flotation method described by Fain & Hart (1986). Extant mites were extracted by Berlese-Tullgren funnels.
RESULTS

From the Holocene oribatid mite assemblages, three species of Lohmanniidae were recovered. An unknown species of *Papillacarus* Kunst, 1959 (described below) was collected in the organic-rich spring section and in the upper layers of the brown aeolian sand of the test pit. A single specimen of *Cryptacarus promecus* Grandjean, 1950 was recovered from the spring section and two live specimens from the modern soil samples. One deutonymph and one adult *Torpacarus cf. omitens* Grandjean, 1950 were recovered from the brown aeolian sand deposit of the test pit (Table 1).

Table 1: Numbers of fossil and extant Lohmanniidae.

<table>
<thead>
<tr>
<th>Species</th>
<th>Organic rich sediment</th>
<th>Brown aeolian sand</th>
<th>Modern soil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring Section</td>
<td>Test pit</td>
<td></td>
</tr>
<tr>
<td>Depth below surface</td>
<td>0,2 – 1,7 m</td>
<td>0,2 – 1,0 m</td>
<td>0,1 m</td>
</tr>
<tr>
<td>Age</td>
<td>1700 – 6500 years BP</td>
<td>&lt; 2000 years BP</td>
<td>modern</td>
</tr>
<tr>
<td><em>Papillacarus brinki spec. nov.</em></td>
<td>24</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td><em>Cryptacarus promecus</em></td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Torpacarus cf. omitens</em></td>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*Papillacarus Kunst, 1959*

The genus *Papillacarus* was instituted by Kunst (1959) to accommodate Berlese’s subspecies *Lohmannia murcioides aciculata* (1905). The occurrence of neotrichy necessitated a separate genus diagnosed as 1) genital plates transversely divided, 2) anal- and adanal plates separate, 3) pre-anal plate forming a small wedge, 4) ventral blades on all femora, 5) rostrum wide and not indented, 6) weak neotrichy posteriorly on notogaster.

*Papillacarus brinki spec. nov.*


Colour: Yellowish brown.

Dorsal side: (Figure 2)

Prodorsum: Prodorsal surface densely punctate with faint, indistinct reticulation; rostral tectum rounded; sclerotized angular processions on lateral borders; rostral setae (*ro*) bilaterally barbed, other prodorsal setae slender, distally unilaterally finely barbed, proximally bilaterally barbed (ornamentation variable); bothridium (*bo*) as for the genus; sensillus (*ss*) with more or less 20 closely situated branches on posterior side of sensillus and few small barbs distally on anterior side.

Notogaster: Notogastral surface densely punctate, with faint reticulation, spiculate papillae on posterior third; setae *c1, d1, e1* short, smooth; *f1* short, barbed; setae *c2, d2* twice as long...
as $c_1$, $d_1$, barbed; setae $c_3$ about twice as long as $c_2$; pygidial neotrichal setae mostly unilaterally barbed, rarely bilaterally barbed; posterior normal setae proximally bilaterally barbed, distally unilaterally finely barbed.

Ventral side: (Figure 3)

Gnathosoma: Five pairs of subcapitular setae present; subcapitular surface densely punctate.

Epimeral region: Number of setae on epimeres I – IV: 9/8-4-3-4; setae of $a$-series short, fine, smooth, seta $l_c$ short and smooth, others bilaterally barbed; surface densely punctate.

Ano-genital region: Genital plates transversely divided, each section with five setae; antiauxial setae ($G_7, 8, 9$) barbed, paraxial setae smooth; aggenital plates small, triangular, situated antero-laterally of genital plates; anal and adanal plates separate; two pairs of anal
setae, barbed; four pairs of anal setae, longer than anal setae, barbed; pre-anal plate very narrow, small, posteriorly bifid; surface of genital-, anal- and anal plates densely punctate.

**Appendages:** Legs and gnathosomal appendages absent or badly damaged on most specimens.

**Collection data:** Fossil specimens were collected in the Holocene deposits of the spring section (samples A1 – A9; 1700 – 6500 years BP) (see Nyakale 1999) and the brown aeolian sand of the test pit (samples B1, B2, B3, B4; < 2000 years BP) (Grün *et al.* 1996) at Florisbad. So far, no live specimens were found.

The Holotype (NMB 4117.1), a specimen from the deepest sample of the spring section (sample A9) and two paratypes (NMB 4103.4) from the upper layer (sample B1) and two paratypes (NMB 4104.3) from the second layer (sample B2) of the test pit are deposited in the Acarology collection of the National Museum, Bloemfontein, South Africa.

**Discussion:** The species of this genus can be distinguished by the shape of the notogastral setae and are divided into two groups by the characters of setae c1, d1 and e1. This new species belongs to the group of species with notogastral setae c1, d1, and e1 short and smooth, comprising *P. chamartinensis* Pérez-Iñigo, 1967, *P. simplirostratus* Bhattacharya, Bhaduri & Raychaudhuri, 1974 and *P. undirostratus* Aoki, 1965. *P. chamartinensis* and *P. brinki* spec. nov. are unique in having spiculate (aciculate) papillae only on the posterior third of the notogaster. Thus, *P. brinki* is closest to *P. chamartinensis*, known from Spain, but can be distinguished from it by the shape of the notogastral and genital setae, sensillae and degree of pygidial and epimeral neotrichy (see Table 2).

### Table 2: Distinguishing characters between *P. chamartinensis* Pérez-Iñigo, 1967 and *P. brinki* spec. nov.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>P. chamartinensis</em></th>
<th><em>P. brinki</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notogastral setae</td>
<td>All setae bilaterally well barbed “du type plumeux”</td>
<td>Proximal third of p-series, h-series, n, r bilaterally finely barbed, distal two-thirds unilaterally finely barbed; other setae unilaterally finely barbed.</td>
</tr>
<tr>
<td>Genital setae</td>
<td>Most genital setae (paraxial and antiaxial) barbed.</td>
<td>Only antiaxial setae (G7, 8, 9) barbed.</td>
</tr>
<tr>
<td>Sensillus</td>
<td>Bilaterally with short branches of equal length.</td>
<td>Posterior side with long branches, distal end of anterior side with few short barbs.</td>
</tr>
<tr>
<td>Pygidial neotrichy</td>
<td>Strong neotrichy</td>
<td>Weak neotrichy.</td>
</tr>
<tr>
<td>Epimeral neotrichy</td>
<td>Number of setae on epimere I = 7</td>
<td>Number of setae on epimere I = 9</td>
</tr>
</tbody>
</table>
**Etymology:** The species is named after James Brink, Quaternary Paleontologist at Florisbad.

*Cryptacarus Grandjean, 1950*

Grandjean (1950) instituted the genus *Cryptacarus* for a species *C. promecus* collected from Algeria. The genus is characterized by 1) genital plates transversely divided, 2) pre-anal plate very narrow, 3) anal and adanal plates fused, 4) two pairs of anal setae, 5) four pairs of adanal setae, 6) neotrichal setae arboriform.

The genus *Cryptacarus* is represented by four species. Three of these *viz.* *C. dendrisetosus* Bhattacharya et al., 1974; *C. schauenbergi* Mahunka, 1977 and *C. tuberculatus* Csiszar, 1961 occur in the Oriental Region (Aoki, Yamamoto, Wen, Wang & Hu 1997; Bhattacharya et al. 1974; Corpuz-Raros 1979; Corpuz-Raros 1992; Csiszar 1961; Hu & Wang 1990; Mahunka 1977; Mahunka 1988; Sanyal & Bhaduri 1986) while *C. promecus* Grandjean, 1950 has been recorded from the Palaeartic and Ethiopian Regions (Aoki 1971; Bayoumi & Al-Khalifa 1985; Bernini 1984; Karppinen, Krivolutsky, Tarba, Stanchaeva & Gordeeva 1987; Pérez-Iñigo 1967).

*Cryptacarus promecus* Grandjean, 1950

The specimens collected at Florisbad match the description of Grandjean (1950). This species has not been found elsewhere in South Africa yet.

**Collection data:** Two live specimens and one fossil specimen of *C. promecus* were collected at Florisbad. The fossil specimen (NMB 4110.2) was collected from the organic-rich Holocene sediment in the spring section, more or less 2180 years old (see Nyakale 1999) (sample A2). Two live specimens (NMB 3915.12) were collected from natural grassland at Florisbad, near the excavations.

*Torpacarus Grandjean, 1950*

The genus *Torpacarus* Grandjean, 1950 is distributed mainly in the Neotropical and Afrotropical regions (see Stary 1998). It is characterized by 1) genital plates without transverse suture, 2) pre-anal plate wide, 3) anal and adanal plates fused, 4) anal setae absent, 5) five pairs of adanal setae present.

*Torpacarus cf. omitens* Grandjean, 1950

Only two specimens (one deutonymph and one adult) were collected from the upper layers of the aeolian sand deposit at Florisbad. The deutonymph is more or less intact, but the adult specimen is broken. It is possible that these specimens belong to a new subspecies because the rostral setae are much longer than those depicted by Grandjean (1950) and the lengths of notogastral setae $c_2$ and $f_1$ also differ from the nominate form. Due to the incomplete state of the specimens, I refrain from describing a new subspecies.
Collection data: Both specimens were collected from the aeolian sand deposit of the test pit. This is a Holocene deposit of which the age was determined at <2000 years BP (Grün et al. 1996). The deutonymph (NMB 4103.5) was recovered from the uppermost layer (sample B1) at a depth of 0.2 m below the modern surface and the adult (NMB 4104.4) at 0.5 m below the modern surface (sample B2).

OPSOMMING


ACKNOWLEDGEMENTS

I would like to thank James Brink and Lloyd Rossouw for collecting the material and for information on the Florisbad deposits; Michelle Barlow for helping with the extractions; Prof W. Niedbala (A. Mickiewicz University, Poznán, Poland) and Dr H. Schatz (Institute of Zoology and Limnology, Innsbruck, Austria) for critically reading the manuscript and making helpful suggestions.

REFERENCES


EDITORIAL COMMITTEE

Editor: J. Haasbroek, D.Phil. (UFS); Co-editors (Natural Sciences): R.I. Nuttall, M.Sc. (Natal); P.C. Zietsman, Ph.D. (UFS); Co-editor (Human Sciences): D.A. van der Bank, Ph.D. (UFS).

Consulting Editors: Dr J. Deacon (South African Heritage Resources Agency, Cape Town, South Africa - retired); Prof. O.J.O. Ferreira (University of Pretoria, Pretoria, South Africa - retired); Prof. W.D. Hammond-Tooke (University of the Witwatersrand, Johannesburg, South Africa); Dr A. Kemp (Northern Flagship Institution, Museum of Natural History, Pretoria, South Africa); Dr M.-L. Penrith (Onderstepoort Research Institute, Pretoria, South Africa); Dr M.A. Raath (Bernard Price Institute, Johannesburg, South Africa); Dr D.T. Rowe-Rowe (Natal Parks Board, Pietermaritzburg, South Africa - retired); Prof. A.E. van Wyk (University of Pretoria, Pretoria, South Africa).

Orders to: National Museum, P.O. Box 266, Bloemfontein 9300, Republic of South Africa. E-mail: library@nasmus.co.za