



## CLSM anatomy of internal genitalia of *Mackiella reclinata* n. sp. and systematic remarks on eriophyoid mites from the tribe Mackiellini Keifer, 1946 (Eriophyoidea: Phytoptidae)

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### Abstract

A new mackielline mite, *Mackiella reclinata* n. sp., from a South African indigenous palm-tree, *Phoenix reclinata*, is described in detail using different microscopy techniques. A CSLM study of *M. reclinata* n. sp. internal genitalia shows that mites of this genus possess teardrop shaped spermathecae, sausage-like spermathecal tubes directed anteriorly and a sub-trapezoidal anterior genital apodeme with a peculiar apical plate, orthogonal to the anterior-posterior body axis. Pairwise angles between the spermatheca, spermathecal tube and the longitudinal bridge of *M. reclinata* n. sp. females were measured. The angle between the spermathecal tube and longitudinal bridge is a quite stable morphometric character and thus is considered to be appropriate for comparison of different eriophyoid taxa. LTSEM and CLSM study shows that *M. reclinata* n. sp. possesses a unique, broadened frontal lobe of the prodorsal shield comprised of apical and basal parts entirely covering the dorsal palpcoxae. The incompletely described mite species *Mackiella borasis* Mohanasundaram, 1981 does not conform to the diagnosis of *Mackiella* and herein is transferred to the subfamily Phytoptinae *incertae sedis*.

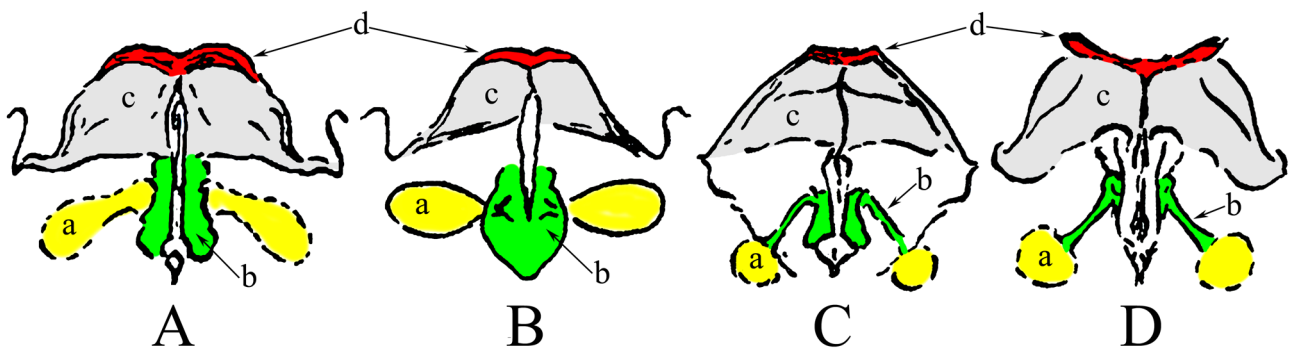
**Key words:** confocal microscopy, LTSEM, 3D modeling, Arecaceae, palm mites, Gondwana, Afrotropical region

### Introduction

Palms (Arecaceae) constitute an economically important group of plants distributed and cultivated mainly in areas with tropical, subtropical and warm temperate climates. Many invertebrate pests, including tiny mites of the superfamily Eriophyoidea, are associated with palms. A series of taxonomic papers on eriophyoids living on palms was recently published by Brazilian acarologists, including a comprehensive review by Navia *et al.* (2007; with other papers cited therein). Most eriophyoid species inhabiting palms have been described from tropical and subtropical South America due to intensive studies in Brazil and the high diversity of palms in that region.

During field surveys in South Africa in 2012–2013 we collected eriophyoid mites from an indigenous African palm, *Phoenix reclinata* Jacq., Senegal date palm or wild date palm. They are morphologically close to *Mackiella phoenicis* Keifer, 1939 described from *Phoenix dactylifera* L. in North America, but consistently differ in several morphological characteristics and thus should be assigned to a new species. The genus *Mackiella* Keifer, 1939 comprises two described species: *M. phoenicis* Keifer, 1939 and *Mackiella borasis* Mohanasundaram, 1981. During comparison of the original descriptions of *Mackiella* mites, we found that *M. borasis* did not conform to the diagnosis of *Mackiella*. In this paper we transfer this species to subfamily Phytoptinae *incertae sedis*; and we describe a new mite species, *Mackiella reclinata* n. sp., with special focus on the anatomy of its peculiar internal genitalia.

morphometric (CV=0.15), whereas angles *ST* and *SB* are considerably more variable (CV=0.34 and CV=0.41, respectively). Angles *ST* and *SB* might be so variable due to probably more flexible cuticle in the area of connection between the spermatheca and spermathecal tube resulting in more variable spermathecal angles in slide-mounted specimens. Contrary, the area of connection between the posterior longitudinal bridge and spermathecal tube comprises dense, thick cuticle, and thus angle *TB* is less prone to vary in slide-mounted specimens. Remarkably, *Mackiella reclinata* n. sp. has a very low value of this angle ( $TB=11.2^{\circ}\pm 1.72$ ) similar to those found in *Phytoptus hedericola* and *Phytoptus chamaebatia* (Chetverikov 2014a, Fig. 2). According to our preliminary estimations (obtained mostly from Keifer's descriptions and while studying eriophyoids from our reference slide collections), all the known phytoptids (excluding pentasetacines) have a *TB* angle  $< 70^{\circ}$ , whereas in eriophyids, diptilomiopids and pentasetacine genera, the *TB* angle is  $\geq 90^{\circ}$ . Considering these observations we suggest the angle *TB* to be a promising morphometric for future study and believe this character could be used for taxonomy including generic characterization<sup>5</sup>.



**FIGURE 10.** Spermathecal apparatus and anterior genital apodemes (in horizontal ventral aspect) of *Retracrus* (A,B) and *Propilus* (C,D) mites (redrawn from original descriptions and coloured). **A**—*Retracrus johnstoni* Keifer, 1965b; **B**—*Retracrus elaeis* Keifer, 1975; **C**—*Propilus gentyi* Keifer, 1975; **D**—*Propilus spinosus* Keifer, 1975. *Note:* spermathecae (a), spermathecal tube (b), horizontal part of anterior genital apodeme (c) and apical plates of the apodeme (d) are coloured in yellow, green, grey and red respectively.

## Acknowledgments

We sincerely thank Emeritus Prof. James W. Amrine (West Virginia University, Morgantown, USA), Prof. Radmila U. Petanović (University of Belgrade, Serbia) and Dr. Denise Navia (Embrapa Recursos Genéticos e Biotecnologia, Brazil) for their critical comments on earlier drafts of this manuscript. We would also like to thank Dr. Stefan Naser (retired, previously from the ARC-Plant Protection Research Institute) for being the first to discover the new species described in this manuscript. The first author is grateful to the ARC-PPRI and Dr. Isabel Rong for their support of the research visit to South Africa in 2013, and partial financial support for this visit. Collecting mites and LT SEM study of the second author were supported by the University of Pretoria and the Agricultural Research Council. All other steps of the study by the first author were supported by the Russian Science Foundation (RSCF grant #14-14-00621).

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5. For example in several genera (e.g. *Platyphytoptus*, *Loboquintus* and *Pentasetacus*) the angle *TB*  $\approx 90^{\circ}$  which is quite uncommon among eriophyoids.

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