RAILLIETIA AURIS, R. FLECHTMANNI AND R. CAPRAE (ACARI: GAMASIDA). DIFFERENTIAL DIAGNOSIS UNDER SCANNING ELECTRON MICROSCOPY*

RAILLIETIA AURIS, R. FLECHTMANNI E R. CAPRAE (Acari: Gamasida). Diagnóstico diferencial sob Microscópico Eletrônico de Varredura

FERRY¹, F.R.A., FACCINI², J.L.H., INADA² T. & LANFREDI³, R.M.
(1) Laboratório de Histologia, ICB/UFRJ, Ilha do Fundão, Rio de Janeiro, Brasil, CEP 21941-590. E-mail: ferry@leao.bio.ufrj.br;
(2) Departamento de Parasitologia Animal, IB/UFRRJ, Km47, Antiga Rio-São Paulo, Seropédica, RJ, Brasil. E-mail: faccini@ufrrj.br;
(3) Instituto de Biofísica Carlos Chagas Filho/UFRJ, Ilha do Fundão, Rio de Janeiro, Brasil. E-mail: reylanf@ibccf.biof.ufrj.br.

SUMMARY: Seven stable morphological characters which aid in the diagnosis of the three species of Raillietia described in Brazil were studied under the Scanning Electron Microscopy. They were: position of the first and last pairs of setae associated with dorsal shield in both sexes, chaetotaxy of tibia IV in both sexes, movable digits of male chelicerae, morphology of setae AV of genua, tibia and tarsi II of male, ventral process of femora II of male, shape of gnathotectum in both sexes and cuticular spines on anal shields in both sexes.


INTRODUCTION

There are seven described species of Raillietia Trouessart. Three of them, R. auris (Leidy), R. caprae Quintero, Bassols and Acevedo and R. flechtmanni Faccini, Leite and Costa, have been recorded from the ear canals of cattle, goats and sheep and buffalo and cattle, respectively in Brazil (FACCINI et alii, 1992). The first two are cosmopolitan in distribution, the last one has only been recorded from Brazil.

Research carried out in the last decade in Brazil (LEITE et alii, 1989b) and elsewhere (JUBB et alii, 1993), has shown that these mites are pathogenic although the economic importance of the parasitism is still unknown.

As research progresses ease of correct species identification is essential. The purpose of this paper is to redescribe/describe selected morphological characters based on Scanning Electron Microscopy (SEM), that might be used in species diagnosis.

MATERIALS AND METHODS

The mites used in this study were obtained from the external ear canals of cattle from southern part of the State of Minas Gerais, MG, and goats from the city of Rio de Janeiro, State of Rio de Janeiro, by flushing water in to the ear canals of living hosts (LEITE et alii, 1989a). They were prepared for SEM according to FERRY et alii (1994). Briefly, 20 living mites of each species were cleaned in 10% commercial detergent solution, washed in water, killed and fixed in 70% ethanol, dehydrated in ethanol series, processed in a critical point drier with CO₂, sputter-coated with gold and examined in a Jeol JSM 25 SII operating at 15 kV.

RESULTS

Seven stable morphologic characters for diagnosing the three species were selected based on published informations and experience in using them as species diagnosis at the Departamento de Parasitologia Animal, UFRRJ, for the past 10 years. They are:

Gnathotectum

The gnathotectum (Fig. 1A) consists of a sclerotized portion and an elaborated distal fringed (Fig. 1C) structure less sclerotized than the basal portion, and it is dorsally convex whereas the ventral surface is concave. In R. auris...
Figure 1: Morphology of gnathotectum. A. General view of gnathotectum of *Raillietia caprae* (325X); B. *R. auris* (1.000X); C. *R. flechtmanni* (2,700X); D. *R. caprae* (1.200X).

Figure 2: Chelicerae of male. A. Ventral view of gnathosoma of *Raillietia flechtmanni* (1.990X). Movable digits of: B. *R. auris* (2.500X); C. *R. flechtmanni* (4.600X); D. *R. caprae* (5.000X).
the basal portion has a isosceles triangle shape (Fig. 1B), in *R. flechtmanni* a pentagonal shape (Fig. 1C) and in *R. caprae* it is rounded (Fig. 1D).

**Chelicerae of male**

The Fig. 2A shows a ventral view of the gnathosoma of the male of *R. flechtmanni*. The movable digit has two filamentous and a third smaller, digitiform projection, fused to form the spermatodactyl in *R. auris* and *R. flechtmanni* (Fig. 2B,C). In *R. auris* the ventral basis of the larger projection resembles a bulb (Fig. 2B). In *R. caprae* the projections are shorter and spine-like (Fig. 2D).

**First (anterior) and last (posterior) pairs of setae associated with the dorsal shield**

In *R. auris* and *R. caprae* they are implanted in the shield (Fig. 3A,B,C,D), but in *R. flechtmanini* these setae are located out of the shield (Fig. 3E,F).

**Setae AV, of genua, tibia and tarsi II of male**

In *R flechtmanni* they are peg-like (Fig. 4A,B) whereas in *R. auris* they are shorter and irregular (Fig. 4C,D). In both species longitudinal grooves were observed (Fig. 4B,D). Contrary to the above mentioned species, setae AV of *R. caprae* are not modified and is implanted in a reduced process-like protuberance (Fig. 4E,F).

---

**Figure 3:** Setae associated with dorsal shield. A and B. *R. auris* (720X; 460X); C and D. *R. caprae* (1.300X; 1.500X); E and F. *R. flechtmanni* (1.025X; F 460X). A, C, E (first pair); B, D, F (last pair).
Ventral process of the femora II of male
The ventral process of the femora II of male of *R. flechtmanni*, *R. auris* and *R. caprae* are pointed, rounded or absent, respectively (Fig. 4A,C,E).

Chaetotaxy of tibia IV
The chaetotaxy of tibia IV (Fig. 5A) in both sexes of *R. auris* (Fig. 5B), *R. flechtmanni* (Fig. 5C) and *R. caprae* (Fig. 5D) are as follows: 2 1/1 3/1 1 (scoring 9), 2 1/1 3/1 2 (scoring 10) and 2 2/1 3/1 2 (scoring 11).

Anal shield
The posterior region of the anal shield is covered with sharp papiliform processes that becomes quite visible with magnifications above 4,500X (Fig. 6A). In *R. auris* (Fig. 6B) and *R. caprae* (Fig. 6D) these papiliform structures are sparse and lesser developed. Otherwise, in *R. flechtmanni* (Fig. 6C) they are more dense and developed.

A summary of the hosts and morphological characters for diagnosing the three species is presented in Table 1.

Figure 5: Chaetotaxy of tibia IV. A. Male of R. auris showing tibia IV, arrow (120X); B. R. auris (1,000X); C. R. flechtmanni (700X); D. R. caprae (2,000X). AD₁,₂-anterdorsal; PL₁,₂-posterdorsal.

Figure 6: Anal shield. A. General view of anal shield of R. caprae (1,900X); B. R. auris (5,000X); C. R. flechtmanni (5,000X); D. R. caprae (5,550X).
Previous descriptions of six morphological characters (shape of the gnathotectum, chelicerae of male, first and last pairs of setae associated with the dorsal shield, setae AV of genua, tibia and tarsi II of male, ventral process of femora II of male and chaetotaxy of tibia IV) were confirmed by the SEM studies. In addition, the longitudinal grooves of setae AV were described for the first time in \textit{R. auris} and \textit{R. flechtmanni}.

Although the number of total setae in the dorsal shield instead of position of the first and last pairs have been used by POTTER & JOHNSTON (1978) and DOMROW (1979/80) to key the species of \textit{Raillietia}, we used the position of the first and last setae associated with dorsal shield due to intraspecific variation already observed in the setae of dorsal shield of both sexes in \textit{R. flechtmanni} (FACCINI et alii, 1992).

The arrangement of the anal shield papiliform processes can only be visible with magnifications above 4500x. This character has a slight granulated surface when observed under light microscopy (DOMROW, 1979/80).

ACKNOWLEDGMENTS

We are indebted to Dr. Sergio M. de Faria and the technicians Valeria Carneiro and Geraldo Cruz (EMBRAPA-CNPAB) for their help with the SEM procedures.

REFERENCES


