RESEARCH NOTE


Kátia Maria Famadas/+++++
Reinalda Marisa Lanfredi */+++ Nicollau Maués da Serra-Freire **/+++ 

Laboratório de Ixodides, Departamento de Entomologia, Instituto Oswaldo Cruz, Av. Brasil 4365, 21045-900 Rio de Janeiro, RJ, Brasil 
*Programa de Biologia Celular e Parasitologia, Instituto de Biofisica Carlos Chagas Filho, CCS, Bloco G, UFRJ, Ilha do Fundão, Rio de Janeiro, RJ, Brasil 
**Laboratório de Morfofisiologia e Patogenia de Carrapatos, Departamento de Parasitologia Animal/ 
Sanidade Animal, km 47 Antiga Rodovia Rio-São Paulo, 2385 I-970 Rio de Janeiro, RJ, Brasil

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Several types of cuticular structures on ticks have been observed by scanning electron microscopy (SEM) (TA Wooley 1972 Trans Amer Microsoc Sot 91: 35-47, E Hess & M Vlimant 1984 p. 253-260. In DA Griffiths & CE Bowman (eds) Acarology Ellis Horwood Ltd, Chichester, UK, KM Famadas et al. 1984 Mem Inst Oswaldo Cruz 89: 571-573). One of them, described by Hess and Vlimant (loc. cit.), was named the distal tarsal slit sense organ (DTSSO) since exteriorly it resembles the slit sense organ of spiders. The common house spider has a tarso-metatarsal lyriform organ on each of its eight legs (C Walcott 1969 Am Zoologist 9: 133-144).

Slits were also described on the legs of adult ticks of Ixodes ricinus (Linnaeus), mainly associated with eudesmatic or adesmatic articulations (L Van der Hammen 1983 Zoologische Meded Leiden 57: 209-242).

Since the first description of the slit in spiders by Berktou (1878, in JWS Pringle 1955 J Exp Biol 32: 270-278) different terms have been used to designate it. The term lyriform organ has been used to describe a compound organ of spiders, it is marked mainly by a group of slits. Single slits are common in Acari, referred to as lyrifissures (Van der Hammen loc. cit., TA Wooley 1988 Acarology - Mites and human welfare J Weylie & Sons, New York, USA 484 pp.).


Recent advances in electrophysiology, electron microscopy and experimental models with spiders have shown many sensorial functions attributed to this organ, also indicating that the slit acts as a mechanoreceptor sensitive to pressure upon the cuticle (EA Seyfarth & FG Barth 1972 J Comp Physiol 78: 176-191, FG Barth 1972 J Comp Physiol 78: 315-336), or vibration receptor (Walcott loc. cit.), Seyfarth and Barth (loc. cit.) and Barth (loc. cit.) have proved its role on the kinetic direction. Besides these functions, Hess and Vlimant (loc. cit.) supposed that it could also play a role as a gravity receptor in ticks.

Knowledge of a new sense structure of ticks is an important step for the development of better methods, based on the ticks’ need to find suitable feeding host.

The aim of this paper is to record the presence of slits on the dorsal surface of telotarsus II, III, IV in larvae, nymphs and adults of Amblyomma cajennense (Fabricius, 1787).

Engorged larvae and nymphs of A. cajennense, collected on horses, were kept under laboratory conditions (25-29°C, 80 ± 10% RH), until.ecdisis. Larvae aged 15 days, nymphs and adults for 24 hr after hatching, unfed, were killed and preserved in 70% ethanol (Famadas et al. loc. cit.). A sample of 30 larvae, 30 nymphs, 20 males and 20 females of A. cajennense was prepared for optical microscopy (MO) according to KM Famadas’ (1993 Universidade Federal Rural do Rio de Janeiro, RJ, Brasil xx + 86pp.; 1996 Mem Inst Oswaldo Cruz 91: 139-140) method. Another batch of 20 larvae, 10 nymphs, 5 males and 5 females was prepared for SEM using the method of JE Keirans et al. (1976 Acarologia 18: 217-225).

*Corresponding author. Fax: +55-21-290.9339
**CNPq research fellows
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The electron micrographs were carried out on a Stereoscan 200 SEM at 16 Kv.

All measurements are expressed in millimeters. The average is followed by standard deviation and the variation interval, representing a sample of right-legs II-IV of specimens measured on an Olympus BH2 optical microscope.

In order to compare regression and correlation means, T tests were applied.

A slit on the dorsal telotarsus face of walking legs of larvae, nymphs and adults of _Amblyomma cujennense_ was observed through MO and SEM. Although Hess and Vlimant (Zoc. cit.) only have depicted the adult slit of _A. variegatum_ (by SEM micrography), based on their description of DTSSO, we think it would be the same structure in _A. cujennense_.

The slit can be easily observed through optical microscopy (200×) in larvae (Figs 1, 2) and nymphs, rather than in adults of _A. cujennense_ (≥400×) in which this structure appears to be inconspicuous. Moreover, Hess and Vlimant (loc. cit.) pointed out that specimens untreated by chloroform method, may present wax, dirt, or secretions covering the slit, which may be confused with non-sensory cuticular folds.

As also observed by M’Indoo (loc. cit.) and Kaston (loc. cit.), in Arachnida, the slits in each stage of _A. cujennense_ are located on a slight elevation of the cuticle (Figs 1-8). In MO it is seen as a thick orange brown area darker than other areas (Figs 1, 2). This slit is constituted of a larger proximal and distal border (Fig. 2) and it is arranged crosswise to the segment axis. Through SEM, in dorsal and lateral views, the slit resembles a mouth (Figs 3-6).

Based on statistical analysis of data presented on the Table, it was seen that the slit would not range in size between tarsus II, III, IV and among stages, even with the great increase of tarsal segment length.

The size of the slit seems relatively constant about the taxa up to now reported (Ixodes ricinus, Van der Hammen loc. cit.; A. variegatum, Hess & Vlimant Zoc. cit.; spiders, Kaston Zoc. cit.).

The slits present on the tibia and femur of spiders legs have an important role in the kinestethic orientation and they are specifically adapted to change the stimulus on cuticle surface deformations into a stimulus carried via sense cells. In addition the deformation of a single slit is greatest in its middle region and decreases towards its ends; the deformability of the slit increases according to its length (Barth Zoc. cit.).

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**TABLE**

Morphometric data on the walking leg tarsus of _Amblyomma cujennense_ (Fabricius, 1787) (Arachnida Ixodidae) larva, nymph and adults

<table>
<thead>
<tr>
<th>Stage</th>
<th>Value</th>
<th>Larva</th>
<th>Nymph</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min. (m ± s)</td>
<td>Max.</td>
<td>Min. (m ± s)</td>
<td>Max.</td>
</tr>
<tr>
<td>Tarsi II</td>
<td>Length</td>
<td>0.131 ± 0.142</td>
<td>(0.138 ± 0.003)</td>
<td>0.201 ± 0.286</td>
<td>(0.238 ± 0.023)</td>
</tr>
<tr>
<td></td>
<td>Wide</td>
<td>0.032 ± 0.085</td>
<td>(0.046 ± 0.004)</td>
<td>0.069 ± 0.909</td>
<td>(0.079 ± 0.006)</td>
</tr>
<tr>
<td></td>
<td>Slit</td>
<td>0.021 ± 0.032</td>
<td>(0.027 ± 0.003)</td>
<td>0.016 ± 0.027</td>
<td>(0.019 ± 0.003)</td>
</tr>
<tr>
<td>Tarsi III</td>
<td>Length</td>
<td>0.0140 ± 0.152</td>
<td>(0.147 ± 0.003)</td>
<td>0.212 ± 0.292</td>
<td>(0.254 ± 0.021)</td>
</tr>
<tr>
<td></td>
<td>Wide</td>
<td>0.040 ± 0.054</td>
<td>(0.049 ± 0.003)</td>
<td>0.069 ± 0.95</td>
<td>(0.085 ± 0.006)</td>
</tr>
<tr>
<td></td>
<td>Slit</td>
<td>0.022 ± 0.038</td>
<td>(0.027 ± 0.003)</td>
<td>0.016 ± 0.27</td>
<td>(0.022 ± 0.003)</td>
</tr>
<tr>
<td>Tarsi IV</td>
<td>Length</td>
<td>---</td>
<td>(0.238 ± 0.025)</td>
<td>0.238 ± 0.339</td>
<td>(0.304 ± 0.025)</td>
</tr>
<tr>
<td></td>
<td>Wide</td>
<td>---</td>
<td>(0.069 ± 0.95)</td>
<td>(0.085 ± 0.006)</td>
<td>(0.242 ± 0.031)</td>
</tr>
<tr>
<td></td>
<td>Slit</td>
<td>0.016 ± 0.027</td>
<td>(0.022 ± 0.003)</td>
<td>0.022 ± 0.043</td>
<td>(0.030 ± 0.007)</td>
</tr>
</tbody>
</table>

m: middle value; s: standard deviation; a: number of examined specimens for slits in tarsus II, III and IV, was 11, 11, and 9, respectively; b: data on the tarsal slits were not analyzed.
Amblyomma cajennense, micrographs of leg II of larva. Fig. 1: distal portion. TI: tibia; BTA: basitarsus; TTA: telotarsus; arrow, slit cuticular structure. Fig. 2: detail of slit cuticular structure. PTA, pretarsus.

Amblyomma cajennense, electron micrographs of leg II. Figs 3, 4: Larva. Figs 5, 6: nymph. Figs 7, 8: adult. Arrow, slit cuticular structure; TTA: telotarsus; BTA: basitarsus.