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SOME LAELAPINE MITES (ACARI: LAELAPIDAE) ECTOPARASITIC ON SMALL MAMMALS IN THE GALAPAGOS ISLANDS, INCLUDING A NEW SPECIES OF *GIGANTOLAELOPS* FROM *AEGIALOMYS GALAPAGOENSIS*

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ABSTRACT: A collection of laelapine mites from small mammals in the Galapagos Islands are identified and their host distributions reviewed. Two species of native rodents, *Aegialomys galapagoensis* and *Nesoryzomys narboroughii*, were infested only with laelapine species typical of Neotropical oryzomyine rodents; *Rattus rattus* was infested with *Laelaps nuttalli*, a host-specific ectoparasite endemic to Old World *Rattus*. A synopsis of *Gigantolaelaps* Fonseca is provided and we describe a new laelapine mite, *Gigantolaelaps aegialomys* n. sp., from the pelage of the rodent *A. galapagoensis* on Santa Fe Island. The new species has strong morphological affinities with a subgroup of *Gigantolaelaps* associated with a group of semiaquatic oryzomyine rodents (*Holochilus*, *Nectomys*, *Sooretamys*, *Pseudoryzomys*, *Oryzomys palustris*). The other nominal species of this group, *Gigantolaelaps mattogrossensis* (Fonseca, 1935) and *Gigantolaelaps goyanensis* Fonseca, 1939, are characterized by 10 setae on Tibia IV, large metapodal shields, and spiniform setae on Coxae I. *Gigantolaelaps aegialomys* is distinguished from these species by a lack of clearly spiniform setae on Coxa I, with setiform distal seta longer than the proximal; metapodal shields about the same size as the stigma; less than 100 µm separating the first pair of sternal setae.

Prior to the introduction of *Rattus rattus* (Linnaeus, 1758) and *Mus musculus* Linnaeus, 1758, the endemic rodent fauna of the Galapagos Islands was far more diverse, and there is evidence that at least 6 species representing at least 2 genera of Neotropical oryzomyines lived there (Clark, 1980). Populations of only 3 species remain, and are thought to exist on 3 islands (*Nesoryzomys fernandinae* Hutterer and Hirsch, 1979 on Fernandina, *Aegialomys galapagoensis* [Waterhouse, 1839] on Santa Fe, and a small population of *Nesoryzomys swarthii* Orr, 1938 on Santiago Island). The 3 endemic rodents are listed as Vulnerable on the IUCN Red List. *Rattus rattus* has not been found on Fernandina and Santa Fe islands yet, but co-occurs with *N. swarthii* on Santiago Island.

One hypothesis for the extirpation of the native rodents in the Galapagos Islands is that epidemic zoonotic diseases were introduced with the invasion of species of peridomestic *Rattus* and *Mus* (Brosset, 1963; Courchamp et al., 2003). Because ectoparasitic arthropods can serve as vectors of diseases, the sharing of ectoparasites among these host groups may be of epidemiological importance. We address this question here by examining the associations of ectoparasitic mites collected from endemic rodents on Santa Fe, Santiago, and Fernandina islands, and those associated with *R. rattus* on Santa Cruz Island.

The Harold W. Manter Laboratory of Parasitology received a small collection of laelapine mites sampled from the skin and pelage of small mammals in the Galapagos Islands. Here, we document the mite species encountered, and the host relationships of the laelapine mites associated with rodents on the Galapagos. The prevalence and intensity of these infestations are not reported because the sample sizes are small. A new mite species of the genus *Gigantolaelaps* Fonseca, 1939 is described from the pelage of the oryzomyine rodent, *A. galapagoensis*, from Santa Fe Island.

Laelapine mites (Acari: Mesostigmata: Laelapidae) are prominent associates of both New World (Cricetidae: Sigmodontinae: Oryzomyini) and Old World (Muridae: Murinae) rodents. Species of *Gigantolaelaps* are known primarily by the adult female, which

is characterized by large body size (dorsal shield generally greater than 1,200 µm), sternal shield with anteromedian projection, 1 pair of setae on the epigynial shield, posterior seta of coxa II much longer than all other coxal setae, tectum a triangular flap, peritreme without apparent extension posterior to the stigma, genu IV with 10 setae, and 10 or 11 setae on tibia IV (Fonseca, 1939; Furman, 1972). The genus is exclusively associated with sigmodontine rodents of the Tribe Oryzomyini (Gettinger, 1987).

MATERIALS AND METHODS

Mite specimens were mounted individually in Hoyer's medium, ringed with Glyptal, and measured with a stage-calibrated ocular micrometer. All measurements are in micrometers (µm). The measurements represent the holotype specimen; in parentheses, the range of 10 measured paratypes. We use the system of Lindquist and Evans (1965) for dorsal chaetotaxy. In our application of mammalian nomenclature, we follow Weksler et al. (2006) for new genera of Neotropical oryzomyine rodents, and Wilson and Reeder (2005) for species names.

DESCRIPTION

Gigantolaelaps galapagoensis, n. sp.

(Figs. 1–3)

Dorsum (Fig. 1): Dorsal shield entire, oblong, tapered cephalad from lateral edges over coxae II ("shoulders") to narrow, extended apex fused with anterior terminus of peritrematic plates; rounded posteriorly from shoulders to flattened posterior margin, surface reticulate. Dorsal chaetotaxy essentially normal, with accessory setae in marginal series for total of 45 pairs of relatively long, simple setae; j2 setae longest on shield (>300 µm); j5 reaches well beyond level of insertion of z5; J5 short, just reaching level of posterior edge of shield; visible pores as shown in Figure 1; lateral cuticle finely striated; covered with dense setation varying from 100 to 160 µm long.

Venter (Fig. 2): Tritosternal base rectangular, unornamented; seated in thickened cuticle anterior to sternal shield; bearing pair of pilose laciniae. Sternal shield width greater at level of setae II than length at midline; anteromedial projection strong, extending well beyond level of first setae; sternal setae long, with first pair extending well beyond slightly concave posterior margin of shield; first 2 pairs of pores elongate lyrriform, with first pair horizontal, second pair inclined medially; third pair pores small, placed vertically on unarmed integument midway between sternal shield and endopodal shields at medial junction of coxae III and IV, which bear long metasternal setae. Epigynial shield linguiform, very slightly expanded posterior to setae; epigynial setae long, extending beyond posterior margin. Metapodal shields large, approximately same size, or larger than

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FIGURES 1-3. *Gigantolaelaps galapagoensis* n. sp., female. (1) Dorsal shield. Scale bar = 220 μ m. (2) Ventral shields. Scale bar = 220 μ m. (3) Chelicera. Scale bar = 250 μ m.

stigma. Unarmed opisthogaster moderately setose, with about 80 setae on each side (excluding the marginal setae). Peritremes extend to point of attachment of peritremal shield with anterior end of dorsal shield. Anal shield pyriform, longer than wide; postanal seta long, much longer than paranal setae.

Legs: All of moderate length and thickness; legs I and IV subequal in length, longer than legs II and III; legs III shortest (in descending order, I, IV, II, III). Chaetotaxy (from coxa to tarsus I): I = 2, 6, 13, 13, 13, --; II = 2, 5, 11, 11, 10, 18; III = 2, 5, 6, 9, 8, 18; IV = 1, 5, 6, 10, 10, 18. Proximal seta of Coxa I spiniform; distal seta longer and setiform; posterior seta Coxa II long and setiform (>300); anterior and posterior setae of Coxa III spiniform, similar in size; posterior seta of Coxa IV weakly spiniform.

Gnathosoma (Fig. 3): Deutosternal groove with 11-12 rows of teeth (2-4 teeth per row); chaetotaxy of venter normal; gnathosomal setae long, subequal in length with anterior hypostomal setae; inner hypostomal setae longest; outer hypostomals shortest. Hypostomal processes fringed

apically, terminating at level of palpal femora; external malae (corniculi) strong and sclerotized; internal malae with lateral membranous lobe and medial fringed appendage; labrum wide at base, narrowing to slender tip; spiny fringe laterally and striated medially; epistoma simple, membranous shelf. Chelicera (Fig. 3) chelate dentate; fixed digit bifid at tip, with pilus dentilis long (ca. 28), setiform, tended by 2 blunt teeth; dorsal seta minute, acuminate; moveable digit with hooked tip and 2 small teeth in anterior part of chela; basal arthrodium with coronet of thin spines. Palps with 5 free segments; basal medial margin of palptarsus with 2-tined apotele.

Measurements (10 specimens): Dorsal shield length, 1,564 (1,510-1,610); dorsal shield width, 690 (919-988); j5, 213 (208-219); z5, 188 (179-196); J5, 83 (76-89); Z5, 225 (203-238); gnathosomal seta, 91 (86-97); inner hypostomal seta, 131 (125-134); sternal shield length, 284 (274-295); sternal shield width, 348 (340-359); sternal seta 1, 321 (313-326); sternal seta 3, 351 (340-365); sternal seta 4, 331 (319-340); epigynial shield length, 226 (219-233); greatest width epigynial shield, 252 (248-261); epigynial

seta, 277 (263–295); paranal seta, 157 (150–164); postanal seta, 230 (224–235); greatest width anal shield, 206 (193–216); proximal seta coxa I, 77 (74–80); distal seta coxa I, 125 (117–137); posterior seta coxa II, 322 (310–334).

Taxonomic summary

Type hosts: *Aegialomys galapagoensis* (= *Oryzomys bauri*) (Mammalia: Rodentia: Cricetidae: Sigmodontinae), specimen ASNHC-10617 (ASK-5597, RCD-3618), collected 16 July 1999 from Isla Santa Fe, Galapagos Islands, Ecuador, is designated as the holosymbiotype and is located in the Angela State Natural History Collection, San Angelo, Texas 76909.

Type locality: Ecuador: Galapagos Islands, Isla Santa Fe, 0°48.21'S, 90°2.45'W.

Specimens deposited: The type series was deposited in the following collections: Harold W. Manter Laboratory of Parasitology, University of Nebraska–Lincoln, Nebraska (holotype, 3 paratypes); Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (2 paratypes); Instituto Butantan, Brazil (2 paratypes); Field Museum of Natural History, Chicago (2 paratypes).

Etymology: The specific epithet is a noun in apposition representing the genus of the host mammal, *Aegialomys* Weksler.

Remarks

Of the known species of *Gigantolaelaps*, only 5, including *Gigantolaelaps mattogrossensis* (Fonseca, 1935), *Gigantolaelaps goyanensis* Fonseca, 1939, *Gigantolaelaps vitzthumi* Fonseca, 1939, *Gigantolaelaps wolffsohni* (Oudemans, 1910), and *Gigantolaelaps peruviana* (Ewing, 1933), have the following set of characters: femur I with 2 most apical dorsal setae both very long; posterior seta of coxa II long (over 300); and tibia IV with 10 setae; gnathosomal groove with 10–11 rows of spines. Only in *G. mattogrossensis*, *G. goyanensis*, and the new species described here, is the metapodal shield as large or larger than the stigmata.

Gigantolaelaps aegialomys is distinguished from these closely related species by the following characters: (1) proximal seta of coxa I only mildly spiniform; distal seta clearly longer, and setiform (proximal seta of *G. mattogrossensis* and *G. goyanensis* are the same or longer than the distal seta); (2) metapodal shields about the same size as the stigma (not clearly larger, as in *G. goyanensis*/*G. mattogrossensis*); (3) dorsal shield length/width less than 1,620/1,000 µm (*G. mattogrossensis* and *G. goyanensis* are both greater than 1,620/1,000 µm); and (4) distance between first pair of sternal setae less than 100 µm (over 100 µm in *G. mattogrossensis* and *G. goyanensis*). This species does not fit well within the taxonomic key provided by Furman (1972), but does resemble the *G. goyanensis*/*G. mattogrossensis* couplet.

DISCUSSION

The associations of laelapine mites associated with small mammals on Santa Fe, Fernandina, and Santa Cruz islands were

host species-specific. *Laelaps nuttalli* Hirst, 1915, exclusively infested the primary host, *R. rattus*, and was not collected from the native rodents in the Galapagos. *Nesoryzomys narboroughii* was infested by a single species near *Laelaps ovata* Furman, 1972. *Aegialomys galapagoensis* was infested by a single species of *Gigantolaelaps* Fonseca, *G. aegialomys* (described above), and a small laelapid mite, near *Laelaps manguihosi* Fonseca, 1936.

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