Acarologia 57(4): 755-763 (2017)
DOI: 10.24349/acarologia/20174191

Ectoparasitic mites of the genus *Gigantolaelaps* (Acari: Mesostigmata: Laelapidae) associated with small mammals of the genus *Nephelomys* (Rodentia: Sigmodontinae), including two new species from Peru

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(Received 28 August 2016; accepted 13 February 2017; published online 04 July 2017; edited by Farid FARAJI)

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ABSTRACT — An extensive survey of small mammals and ectoparasites along an altitudinal transect in the Manu Biodiversity Reserve in Peru found the sigmodontine rodent genus *Nephelomys* infested by mites of the genus *Gigantolaelaps* Fonseca, 1939. Two distinct species co-occurred exclusively in the pelage of *Nephelomys keaysi*, *G. inca* Fonseca and *G. minima* **n. sp.** *Nephelomys levipes*, which replaces *N. keaysi* at higher elevations, was infested exclusively with a single new species, *G. nebulosa* **n. sp.** In this paper, we formally describe these new mite species, and provide more information on the morphology of *G. inca*.

KEYWORDS — ectoparasites; *Gigantolaelaps inca* Fonseca; *Gigantolaelaps minima* **n. sp.**; *Gigantolaelaps nebulosa* **n. sp.**; Laelapidae; *Nephelomys*; taxonomy

ZOOBANK — 1559C74D-E850-4FC7-86A6-352B16C752E1

INTRODUCTION

The genus *Gigantolaelaps* Fonseca, 1939 is comprised of a group of large ectoparasitic mites infesting New World rodents of the sigmodontine tribe Oryzomyini. Their mammalian hosts are primarily neotropical, with the exception of a single species, which ranges into the southeastern United States. The taxonomic key provided by Furman (1972) has continued to be a functional tool to separate the known species of neotropical *Gigantolaelaps*, although two new species have since been described (*G. galapagoensis* Gettinger *et al.* 2011; *G. scolomys* Gettinger and Gardner, 2015).

Fonseca (1939) and Furman (1972) defined the genus *Gigantolaelaps* based exclusively on the female stase (males are rare in collections) as very large mites with idiosoma well over 1000 μm; sternal shield with anteromedial projection; epigynial shield bearing a single pair of strong setae, posterior seta of coxa II longer than homologous setae of other coxae; leg chaetotaxy as described by Evans and Till (1965) for free-living dermanyssoid mites, except for having 10 setae on genu IV and either 10 or 11 setae on tibia IV; stigmata without posterior plate extensions (although when carefully dissected, a weakly sclerotized plate is evident; see Fig. 1B, 2B).

In this paper, we report on a distinct assemblage

of *Gigantolaelaps* associated with two congeneric rodent hosts in the Manu Biosphere Reserve along the eastern Verdant of the Andes in southern Peru. Although *Nephelomys keaysi* (Allen, 1900) and *Nephelomys levipes* (Thomas, 1902) are closely related phylogenetically (Patton *et al.* 1990), they were captured in close proximity at Manu, occasionally even at the same localities. However, they are generally thought to be "elevational replacement species", with *N. keaysi* occurring at lower elevation localities, from 1000 to 2460 meters, and *N. levipes* inhabiting higher altitudes, from 1700 to 3140 meters (Solare 2006). Two distinct species of *Gigantolaelaps* co-occurred exclusively in the pelage of *N. keaysi*: one was assigned to a known species, *G. inca* Fonseca, 1939, the other is described herein as *G. minima* **n. sp.** *Nephelomys levipes* was infested exclusively by a single, morphologically distinct *Gigantolaelaps*, described herein as *G. nebulosa* **n. sp.**. No host-switching of *Gigantolaelaps* was observed between *N. keaysi* and *N.levipes*.

The two new species described below agree with the definition of the genus *Gigantolaelaps*, and within this group are further characterized by: (1) Hypertrichy of the dorsal shield and opisthogaster; (2) Tibia IV with 11 setae; (3) Deutosternal groove with 6 rows of anteriorly directed denticles; (4) Posterior seta of coxa II less than 250 micrometres long; (5) Femur I with most apical dorsal setae consisting of a very long seta and a short one about 1/2 or less as long as the other; (6) Femur II with apicodorsal pair of setae subequal in length.

It is noteworthy that the same general habitus is found in all three species of *Gigantolaelaps* infesting species of *Nephelomys* and they share many characters that vary widely across the genus. However, the species (*G. minima*, *G. nebula*, and *G. inca*) can be easily diagnosed from all known species of the genus by the truncate posterior margin of the dorsal shield, which aligns the posterior circular glands, as well as terminal setae Z5 and S5, horizontally in the same lateral plane. In all three species, the postero-lateral S5 seta is distinctly longer than the terminal Z5. This appears to be an exclusive synapomorphy that is shared by the three known species of *Gigantolaelaps* associated with *Nephelomys*. Although hypertrichy obscures the normal chaetotaxy somewhat in all three species, the primary central setae are slightly longer and more robust, and can be discerned with careful examination. These three species associated with *Nephelomys* can be easily differentiated by general body size, the number and placement of setae on the dorsal shield and opisthogaster, and length of the moveable cheliceral digit (*G. inca* > *G. nebulosa* > *G. minima*).

MATERIALS AND METHODS

From 1999–2001, the Field Museum of Natural History, Chicago (FMNH) and the Museu de Historia Natural, Universidade Mayor de San Marcos, Lima conducted an intensive faunal survey of small mammals and their ectoparasitic arthropods along an altitudinal gradient of the Manu Biosphere Reserve in southeastern Peru. This project provided an exceptional collection of laelapine mites (Acari: Mesostigmata: Laelapidae), upon which this study is based. When neotropical rodents are captured alive, anesthetized, and brushed, these mites are generally the most diverse and abundant specimens of ectoparasites collected, and this is especially true for rodents of the tribe Oryzomyini (Cricetidae: Sigmodontinae), with each rodent species generally infested with from two to five distinct laelapine mite species (Tipton *et al.* 1966; Furman, 1972). The Manu faunal survey implemented a collecting protocol that focused on minimizing contamination of one host mammal with the ectoparasites of another, and then subsequently collecting each host individual as a museum voucher specimen. These methods provided reliable data for assessing host-mite association patterns within the Manu Reserve.

Mite specimens were mounted individually in Hoyer's medium, ringed with Glyptal, and measured with a stage-calibrated ocular micrometer. All measurements are in micrometres (μm). The measurements represent data taken directly from the holotype specimen with the range of the 12 paratypes shown in parentheses. We use the system of Lindquist and Evans (1965) for dorsal chaetotaxy. In our application of nomenclature for the mammals, we follow Weksler *et al.* (2006) for new genera of Neotropical oryzomyine rodents, and Wilson

and Reeder (2005) for species names. Mammal and ectoparasite collecting methods and a brief habitat description of the Manu localities are reported in Patterson *et al.* (2006).

RESULTS

Laelapidae Berlese, 1892; *Gigantolaelaps* Fonseca, 1939

Type Species: *Gigantolaelaps vitzthumi* Fonseca, 1939

Gigantolaelaps minima n. sp. (Figure 1)

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Diagnosis — Dorsal shield flattened terminally, with S5 at postero-lateral corner and level with shorter and medially inserted Z5. Small species for the genus, with dorsal shield length less than 950 μm and moderately hypertrichous, with 3 – 5 misplaced accessory setae on the central podosoma. Tibia IV with 11 setae. Sternal shield without accessory setae. This new species can be easily differentiated from co-associated *G. inca* by body size and dorsal setation.

Female

Dorsum — Dorsal shield (Fig. 1A) entire, oblong, with reticulate sculpturing, 882 μm long (843 – 920) and 531 μm wide (511 – 557), tapered cephalad to narrow apex fused with anterior terminus of peritrematic plates (Fig. 1B); rounded laterally from shoulders to a truncate, slightly convex posterior margin; hypertrichous, with primary 42 pairs of setae slightly longer and stronger than accessory setae which occur as additional misplaced pairs and solitary setae, 3 – 5 in the central part of the shield and 20 – 25 more in marginal series for total of 114 – 116 relatively long, simple setae (total of ca. 30 accessory setae); j2 145 (140 – 150) and S5 142 (134 – 150) similar in size and longest setae on the podonotum and opisthonotum, respectively; j5 101 (97 – 106), reaching well beyond level of insertion of z5 105 (100 – 112); J5 short 56 (52 – 60), just reaching level of posterior edge of shield; Z5 104 (99 – 111); seven distinct pairs of circular pores, other glands and lyrifissures as shown in Figure 1A.

Venter (Fig. 1D) — Tritosternal base rectangular, unornamented, bearing pair of pilose laciniae; seated in thickened cuticle anterior to narrow, slightly arched anteromedial projection of sternal shield. Sternal shield width 250 (243 – 255) greater at level of setae II than length at midline 208 (200 – 217); anteromedial projection slightly arched, extending well beyond level of first setae; sternal setae long, with first pair 179 (173 – 187) extending to, or slightly beyond posterior margin of shield; sternal setae III 217 (208 – 228); first 2 pairs of pores elongate lyriform, with first pair transverse, second pair inclined medially; third pair pores small, placed longitudinally on soft integument midway between sternal shield and endopodal shields at medial junction of coxae III and IV, which bear long metasternal setae 203 (197 – 211). Epigynial shield linguiform, very slightly expanded posterior to setae; epigynial setae 161 μm long (153 – 170), extending well beyond posterior margin of shield. Metapodal shields small and narrow. Soft integument of opisthogaster (1D) moderately setose, with 50 – 60 loosely paired setae posterior to epigynal shield (excluding the marginal setae). Peritremes (Fig. 1B) extend to point of attachment of peritremal shield with anterior end of dorsal shield. Anal shield pyriform, longer than wide; postanal seta 153 (134 – 169), much longer than paranal setae 72 (68 – 78).

Gnathosoma — Capitular setae separated by 73 (65 – 79), 67 (63 – 75) long, slightly shorter than inner hypostomal setae 85 (79 – 91). 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; fringed with small spines laterally and striated medially; deutosternal groove with 6 rows of denticles; epistome with a simple hyaline shelf. Chelicera (Fig. 1C) chelate dentate; fixed digit bifid at tip, with pilus dentilis setiform, tended by 2 blunt teeth; dorsal seta minute, acuminate; moveable digit 61 (60 – 62) with hooked tip and 2 teeth in anterior part of chela; basal arthrodium with coronet of thin spines. Palps with 5 free segments; basal medial margin of palp-tarsus with 2-tined apotele

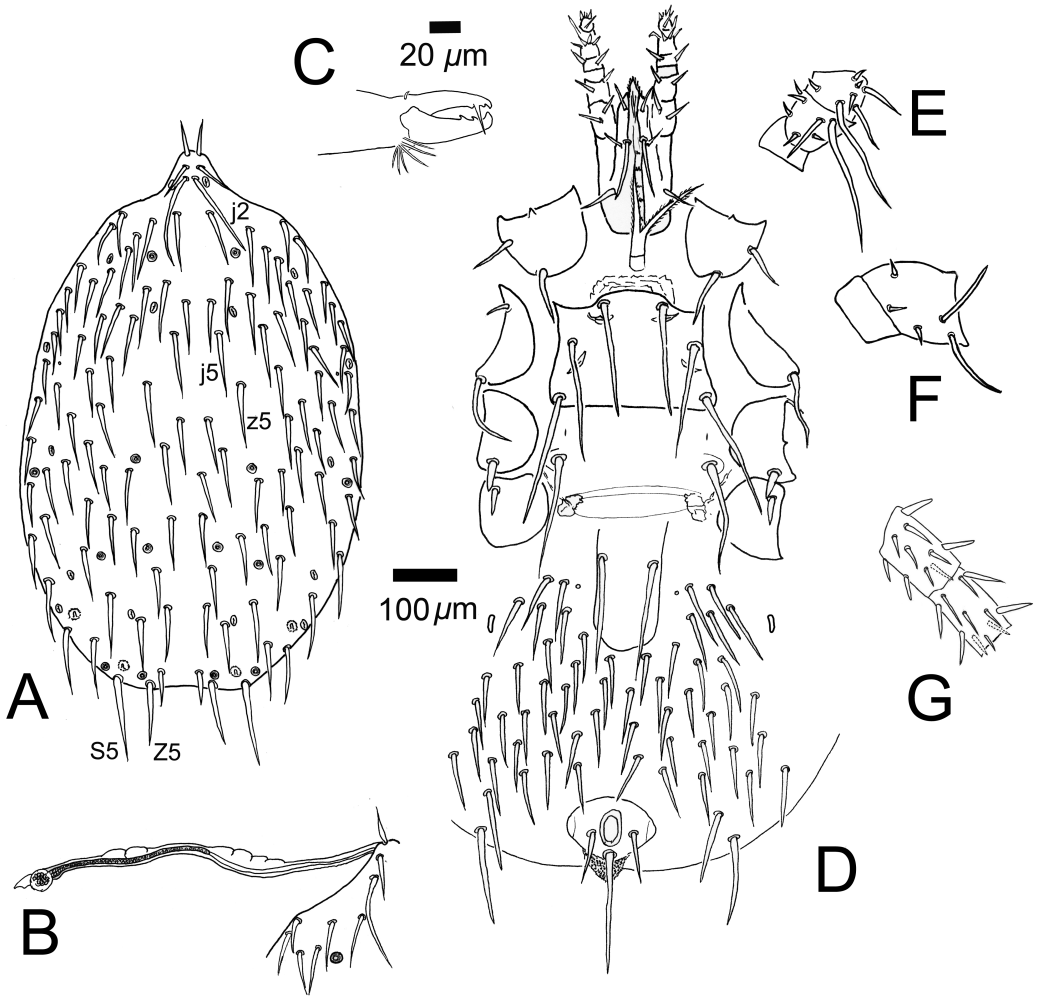

FIGURE 1: *Gigantolaelaps minima* **n. sp.**, adult female: A – Dorsal shield; B – Stigma and peritreme; C – Chelicera; D – Venter; E – Dorsal femur/genu I; F – Dorsal femur II; G – Genu/tibia IV. Scale Bar = 100 μm (except for the chelicera 20 μm).

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, IV, I, 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, 11, 18. Proximal seta of coxa I strong and setiform 89 (85 – 91) distal seta also setiform and shorter 74 (70 – 79); posterior seta of coxa II moderately long and setiform 127 (123 – 132); posterior setae of coxa III spiniform 50 (48 – 51); posterior seta of coxa IV weakly spiniform 44 (43 – 45). Femur I (Fig. 1E) with apicodorsal setal pair greatly different in length, 229 (219 – 235) and 89 (85 – 93) long respectively; genu I (Fig. 1E) with basidorsal setal pair also greatly different in length, 204 (192 – 214) and 88 (85 – 91) long respectively. Femur II (Fig. 1F) with apicodorsal setal pair subequal, less than 10% difference in length, anterior 123 (119 – 127) and posterior 111 (106 – 115) long respectively. Genu and tibia IV (Fig. 1G) with 10 and 11 setae respectively.

Taxonomic summary

Type host — *Nephelomys keaysi*, (Mammalia: Rodentia: Cricetidae: Sigmodontinae), specimen PMV#594 [FMNH172349], collected by P. M. Velazco on 8 April 2001 from the Manu Biodiversity Preserve, at 1480 m is designated as the holosymbiotype (see Frey *et al.* 1992) and is located in the mammal collections of the Field Museum of Natural History, Chicago, Ill (FMNH). The mites from all 12 paratype slides were collected from *N. keaysi*, specimen SS#2027 [FMNH172321], collected by S. Solari on 8 April 2001 from the Manu Biodiversity Preserve, at 1480 m. This voucher host specimen is located at the FMNH.

Type locality — Peru: Cusco, Manu Biosphere Reserve, 72 km. NE (by road) of Paucartambo, elevation 1480 m, "San Pedro"; 13°05'S, 71°55'W.

Specimens deposited — The type series was deposited in the following collections: Harold W. Manter Laboratory of Parasitology, University of Nebraska-Lincoln, Nebraska (holotype: HWML110057, paratypes: HWML110058-HWML110061); Instituto Butantan, Sao Paulo, Brazil (paratypes: IBSP13.156-IBSP13.159); Field Museum of Natural History, Chicago (paratypes: FMNHINS3721679-FMNHINS3721682).

Etymology — *Gigantolaelaps minima* is the smallest known species of the genus. The species name is a latin adjective, *minima*, agreeing in gender with the generic name.

Host Associations — *Gigantolaelaps minima* was a monoxenous phoretic associate of *N. keaysi* in southeastern Peru. Strongly female biased populations were encountered, many gravid or carrying a larval or protonymphal stage, and only rarely did there appear to be blood in the gut. *Gigantolaelaps minima* co-occurred with *G. inca* in the pelage of *N. keaysi*, although infestation data differed greatly at San Pedro (1480 m), where 38 of 43 (88%) sampled mammals were infested with both *G. inca* and *G. minima*. [*G. inca*, prevalence, 98%, intensity, 28.8; *G. mimima*, prevalence, 86%, intensity, 13.2]. However, at Suecia (1920 m), although host specificity was still complete, only 5 of 32 (16%) sampled rodents were infested with both species of *Gigantolaelaps*. [*G. inca*, prevalence, 97%, intensity, 21.8; *G. minima*, prevalence, 16%, intensity, 0.53].

Remarks — *Gigantolaelaps minima* can be differentiated from the hypertrichous congeners associated with other oryzomyine genera by general body size, best represented by length of dorsal shield, and by the number and placement of accessory setae. *Gigantolaelaps guimaraesi* Lizaso, 1968 is much larger, with dorsal shield >1700 μm, with accessory setae mainly along the anterolateral podonotal region; *G. boneti* with dorsal shield >1400 μm, with accessory setae mainly in the opisthonotal region.

Gigantolaelaps nebulosa n. sp. (Figure 2)

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Diagnosis — Dorsal shield flattened posteriorly, with S5 at postero-lateral corner and level with shorter and medially inserted Z5. Small species for the genus, with dorsal shield approximately 1000 μm long, strongly hypertrichous, especially the opisthonotum. Tibia IV with 11 setae. Sternal shield without accessory setae.

Female

Dorsum — Dorsal shield (Fig. 2A) entire, oblong, reticulate, 1034 μm long (984 – 1064) and 604 μm wide (568 – 620), tapered cephalad to narrow apex fused with anterior terminus of peritrematic plates (Fig. 2B); rounded laterally from shoulders to a truncate, slightly convex posterior margin. Dorsal chaetotaxy hypertrichous, with primary 42 setae present, slightly longer and stronger than accessory setae which occur as additional misplaced pairs and solitary accessory setae, 8 – 10 in the central part of podonotal region and 25 – 30 more in marginal series ; opisthonotal region is strongly hypertrichous, for a total of 200-215 relatively long, simple setae; j2 much longer than S5 and longest on shield (186 – 199); j5106 (100 – 114), reaching well beyond level of insertion of z5 116 (108 – 124); J5 short 70 (63 – 75), just reaching level of posterior edge of shield; Z5 119 (104 – 128); seven distinct pairs of circular pores, other glands and lyrifissures as shown in Figure 2A. Lateral cuticle of opisthonotum finely striated; cov-

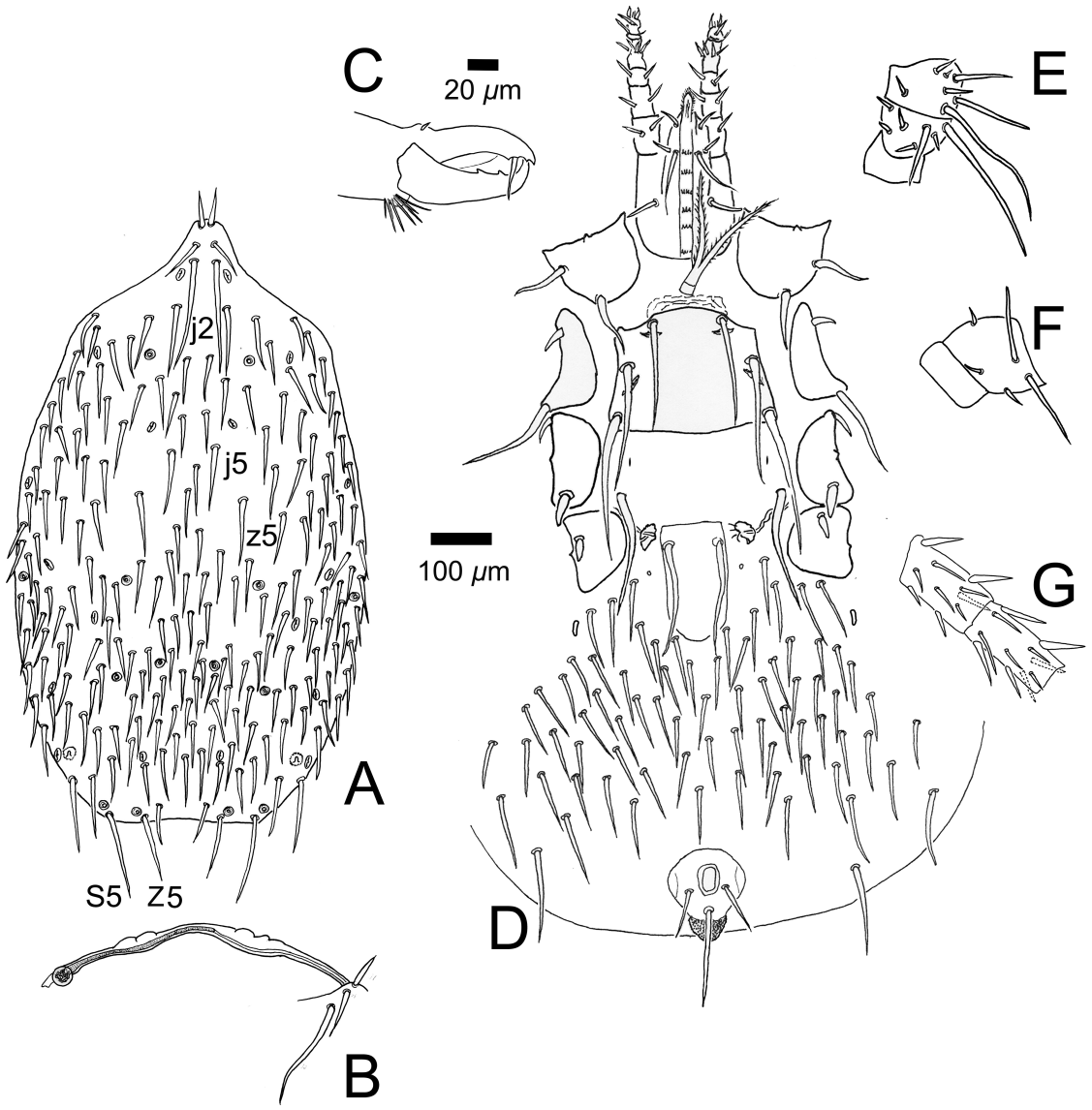

FIGURE 2: *Gigantolaelaps nebulosa* **n. sp.**, adult female: A – Dorsal shield; B – Stigma and peritreme; C – Terminal chelicera; D – Venter; E – Dorsal femur/genu I; F – Dorsal femur II; G – Genu/tibia IV. Scale Bar = 100 *m (except for the chelicera 20 μm).

ered with dense setation varying from 100 – 160 μm long.

Venter (Fig. 2D) — Tritosternal base rectangular, unornamented, bearing pair of pilose laciniae; positioned in thickened cuticle anterior to narrow, slightly arched anteromedial projection of sternal shield. Sternal shield width 287 (271 – 296) greater at level of setae II than length at midline 230 (223 – 235); anteromedial projection (unarched), extending well beyond level of first setae; sternal setae long, with first pair 199 (192 – 203) extending to, or slightly beyond posterior margin of shield; ster-

nal setae III 264 μm long (250 – 276); first 2 pairs of pores elongate lyriform, with first pair horizontal, second pair inclined medially; third pair pores small, placed vertically on soft integument midway between sternal shield and endopodal shields at medial junction of coxae III and IV, which bear long metasternal setae 259 (250 – 272). Epigynial shield linguiform, slightly expanded posterior to setae; epigynial setae 189 μm long (176 – 200), extending well beyond posterior margin of shield. Metapodal shields small and narrow. Soft integument of opisthogaster (Fig. 2D) moderately setose, with 70 – 80 loosely paired setae posterior to epigynal shield (excluding the marginal setae). Peritremes (Fig. 2B) extend to point of attachment of peritremal shield with anterior end of dorsal shield. Anal shield pyriform, longer than wide; postanal seta 141 μm long (130 – 156), much longer than paranal setae, 76 μm long (69 – 82).

Gnathosoma — Capitular setae separated by 84 (70 – 96), 65 (62 – 70) long, much shorter than inner hypostomal setae 110 (100 – 118). 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 broad at base, narrowing to slender tip; spiny fringe laterally and striated medially; deutosternal groove with 6 rows of denticles; epistome simple with hyaline shelf. Chelicera (Fig. 2C) chelate dentate; fixed digit bifid at tip, with setiform pilus dentilis, tended by 2 blunt teeth; dorsal seta minute, acuminate; moveable digit 87 (86 – 89) with hooked tip and 2 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.

Legs — Proximal seta of Coxa I strong and setiform 110 (107 – 113) distal seta also setiform and shorter 94 (84 – 99); posterior seta Coxa II moderately long and setiform 164 (148 – 175); posterior setae of Coxa III spiniform 59 (55 – 61); posterior seta of Coxa IV weakly spiniform 48 (45 – 50). Femur I (Fig. 2E) with apicodorsal setae greatly different in length, 263 (249 – 274) and 107 (111 – 120) long respectively; Genu I (Fig. 2E) with basidorsal setae also greatly different in length, 247 (244 – 258) and 134 (130 – 139) long respectively. Femur II (Fig. 2F) with apicodorsal setae subequal, less than 10% difference in length, anterior 135 (131 – 140) and posterior 130 (125 – 137) long respectively. Genu and Tibia IV (Fig. 2G) with 10 and 11 setae respectively.

Taxonomic summary

Type host — *Nephelomys levipes*, (Mammalia: Rodentia: Cricetidae: Sigmodontinae), specimen UPE#261 [FMNH175171], collected by U. Paredes on 28 October 2001 from the Manu Biodiversity Preserve, at La Esperanza, 2880 m is designated as the holosymbiotype and is located in the mammal collections of the Field Museum of Natural History, Chicago, Ill. The mites from 5 paratype slides were collected from the type host and 7 paratypes were collected from *N. levipes* BDP#4184 [FMNH175176], also from La Esperanza, 2880 m, by B. D. Patterson on 5 November 2001. This voucher host specimen is also located at the FMNH.

Type locality — Peru: Cusco, Manu Biosphere Reserve, 39 km NE (by road) Paucartambo, elevation 2880 m, "La Esperanza"; 13°10'S, 71°36'W.

Specimens deposited — The type series was deposited in the following collections: Harold W. Manter Laboratory of Parasitology, University of Nebraska-Lincoln, Nebraska (holotype: HWML110062, paratypes: HWML110063-HWML110066); Instituto Butantan, Sao Paulo, Brazil (paratypes: IBSP13.160-IBSP13.163); Field Museum of Natural History, Chicago (paratypes: FMNHINS3721683-FMNHINS3721686).

Etymology — The specific name is derived from the latin word *nebula*, meaning cloud, referring to the elevational distribution of these mites and their hosts.

Host associations — *Gigantolaelaps nebulosa* was a monoxenous phoretic associate of *N. levipes* in southeastern Peru. Strongly female biased populations were encountered, many gravid or carrying a larval or protonymphal stage, and only rarely did there appear to be blood in the gut. *Nephelomys levipes* is infested with a single, host specific species of *Gigantolaelaps*, *G. nebulosa* at two higher elevation localities, Pillahuata (2460 m) and La Esperanza (2880 m). [*G. nebulosa*, prevalence, 93%, intensity, 21.6 mites/host]

Remarks — *Gigantolaelaps nebulosa* can be differentiated from hypertrichous congeners associated with other oryzomyine genera by general body size, best represented by length of dorsal shield and by the position of the placement of accessory setae. *Gigantolaelaps guimaraesi* Lizaso, 1968 is much larger, with dorsal shield >1700 μm, with accessory setae mainly along the anterolateral podonotal region; *G. boneti* with dorsal shield >1400 μm, is larger, but very similar in general appearance.

Gigantolaelaps inca Fonseca 1960 (Figure 3)

This species is easily diagnosed from all other *Gigantolaelaps* by the dense hypertrichy of the dorsal shield (see Figure 3). As Fonseca (1960) notes in French, "le nombre de soies de l'écusson dorsal est extraordinairement élevé, atteignant plusieurs centaines, rappelant l'aspect d'un Haemogamasidae ou de certains *Eulaelaps*." Soft integument of opisthogaster also moderately setose, with 100 – 110 loosely paired setae posterior to epigynal shield (excluding the marginal setae). *G. inca* is larger than the other *Gigantolaelaps* associated with *Nephelomys* in Manu, clearly represented by the length of the dorsal shield 1220 (1164 – 1274) and the length of the moveable cheliceral digits 107 (105 – 108).

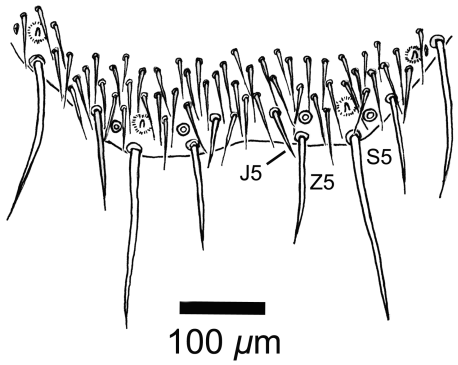

FIGURE 3: *Gigantolaelaps inca* Fonseca, 1939, adult female: Truncate posterior part of dorsal shield Scale Bar = 100 μm.

Diagnosis — Again, directly following Fonseca (1960), this species can be diagnosed from all other known species of *Gigantolaelaps* by the extreme hypertrichy of the dorsal shield, with more than 1000 accessory setae. Tibia IV with 11 setae. Sternal shield without accessory setae.

In the following list of measurements, the first number is Fonseca's holotype, (when available) followed by the range of 12 specimens measured from our collection of mites brushed from *N. keaysi* in the Manu Reserve. Dorsal shield length 1220 (1164 – 1274); dorsal shield width 715 (689 – 750); central podonotal setae obscured by hypertrichy, but slightly larger than accessory setae and in position typical of genus; j2 210 (215 – 240); j5 (101 – 113); z5 (103 – 116); on posterior margin, J5 56 (52 – 62); Z5 135 (118 – 129); S5 200 (207 – 230); gnathosomal seta (84 – 99); inner hypostomal seta (123 – 131); moveable cheliceral digit length (105 – 108); sternal shield length, 252 (249 – 270); sternal shield width, 295 (322 – 354); sternal seta I, 220 (260 – 286); sternal seta III, 260 (310 – 348); metasternal seta (288 – 323); epigynial shield length (179 – 189); greatest width epigynial shield (91 – 106); epigynial seta (204 – 250); paranal seta, 90 (101 – 120); postanal seta, 172 (173 – 189); greatest width anal shield, 150 (148 – 158); proximal seta coxa I (120 – 135); distal seta coxa I (133 – 150); posterior seta coxa II, 220 (218 – 266); posterior seta coxa III, 70 (65 – 74); posterior seta coxa IV, 45 (56 – 64); longest dorsal seta femur I, 320 (309 – 330); longest dorsal seta genu I, 320 (300 – 320).

DISCUSSION

Gigantolaelaps inca appears to be oligoxenous, species tracking several species rodents of the genus *Nephelomys*. Percequillo (2015) notes that the genus *Nephelomys* has not been revised since its original description (Weksler *et al.* 2006), but 13 species are presently recognized. The occurrence of the unique new species described here from both *N. keaysi* and *N. levipes* suggests that there may be other *Gigantolaelaps* associated with this host group.

ACKNOWLEDGMENTS

The biological survey and acarological collection upon which this study is based was supported by

the Field Museum of Natural History, Chicago, the Museo de Historia Natural, Universidad de San Marcos, Lima, Peru and a grant from the National Science Foundation (DEB–9870191) to B. D. Patterson, D. F. Stotz, and J. W. O. Ballard. Additional funding for work in the laboratory was provided by the National Science Foundation Grant Nos. BSR–9024816, DBI–06466356, and DBI–1458139.

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