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Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
A NEW SPECIES OF LARVAL CHARLETONIA (PARASITENGONA: ERYTHRAEIDAE) AND NEW RECORDS OF LARVAL ERYTHRAEIDAE PARASITIZING ORTHOPTERA AND PHASMIDA FROM COSTA RICA

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ABSTRACT — A total of 36 larvae were captured parasitizing 4 species of Tettigoniidae (Orthoptera, Ensifera) and two phasmids (Phasmatodea) in the "Reserva Biológica Alberto Manuel Brenes" in Costa Rica. Here, we report the second capture of two species of mites since their original descriptions Leptus nikanori Haitlinger, 2000 (Erythraeidae) from Costa Rica and Charletonia domawiti Haitlinger, 2004 (Erythraeidae) from Brazil and each only known from a single specimen. We also describe and illustrate Charletonia salazari sp. nov. captured parasitizing Scopiorinus mucronatus (Saussure and Pictet, 1898) (Orthoptera, Tettigoniidae, Pseudophyllinae). A key for the species of the genus Charletonia from the New World is provided.

KEYWORDS — Acari; Erythraeidae; Leptus nikanori; Charletonia domawiti; Charletonia salazari sp. nov.; Central America

INTRODUCTION

We are presenting the data of mites parasitizing orthopteroids that were collected in a 15 days field trip in "Reserva Biológica Alberto Manuel Brenes (R.B.A.M.B.)" and the surrounding areas of the preserve. The preserve is located in Sierra de Tilarán, Cantón of San Ramón, Alajuela Province in Costa Rica. The specimens were captured under the auspices of the grant "Inventory of the arthropods of the Reserva Biológica Alberto Ml. Brenes" (INVARTRAB) and developed by the collaboration between the University of Costa Rica and I.N.I.A. (Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria) (Spain).

Several orders of arthropods were collected by different specialists. Approximately, five hundred orthopteroids were sampled, either manually from vegetation or using light traps. From over these orthopteroids sampled only six were parasitized. A total of 36 larvae were removed from 4 species of Tettigoniidae (Orthoptera, Ensifera) and two phasmids (Phasmatodea) (one Planudes sp. nymph and one Brizoides sp. adult): Scopiorinus mucronatus (Saussure and Pictet, 1898) (Tettigoniidae, Pseudophyllinae), Lophaspis scabricula Brunner von Wattenwyl, 1895 (Tettigoniidae, Pseudophyllinae) (Figure 1), Idiarthron hammuliferum (Saussure and Pictet, 1898) (Tettigoniidae, Pseudophyllinae), Neoconocephalus triops Linnaeus, 1758 (Tettigoniidae, Conocephallinae).
All the parasites captured belong to Erythraeidae Robineau-Desvoidy, 1828 and they are grouped into two genera, *Leptus* Latreille, 1796 and *Charletonia* Oudemans, 1910. These two genera are distributed world-wide but what is known for Central America is very scarce. Here, we report the second capture of two species since their original descriptions *Leptus nikanori* Haitlinger, 2000 from Costa Rica and *Charletonia domawiti* Haitlinger 2004 from Brazil and both known from a single specimen; also, we describe a new species belonging to *Charletonia* and parasitizing *Scopiorinus mucronatus*.

** MATERIALS AND METHODS**

Mites were captured during a sampling field trip in Costa Rica while they were parasitizing different species of orthopterans. The complete list of Orthoptera identified has been published in two papers (Barranco, 2010a; Barranco, 2010b). Katydid were collected and identified, and the parasites were carefully removed in the laboratory under a stereomicroscope. Measurements and illustrations were made after clearing the specimens in 50% lactic acid and mounting them in PVA medium (Krantz and Walter, 2009) using a Nikon Optiphoto-2 compound microscope with a drawing attachment. All the measurements are given in micrometers. Terminology and abbreviations for the description of the new species follow Saboori et al., (2009) and Sedghi et al., (2010).

**FAMILY ERYTHRAEIDAE**

**ROBINEAU-DESVOIDY, 1828**

**Subfamily Leptinae Southcott, 1957**

**Genus Leptus** Latreille, 1796

**Leptus nikanori** Haitlinger, 2000

Figure 2: Charletonia salazari sp. nov. (larvae). A – idiosoma dorsal view; B – idiosoma ventral view. Scale bar 200 µm.
Figure 3: Charletonia salazari sp. nov. (larvae). A – Leg I; B – Leg II; C – Leg III. Scale bar 100 μm.

Mayoral J. G. and Barranco P.


Remarks — We found L. nikanori in two areas sampled, inside the R.B.A.M.B. and in the surrounding area of Colonia Palmareña. This species was relatively common inside of the preserve. These two areas differ in the type of vegetation and in the species of orthopterans present (Barranco, 2010a, 2010b). Leptus nikanori was found on the two different hosts Phasmda and Orthoptera. We captured a total of 16 larvae parasitizing 3 species of katydids and 11 larvae parasitizing 2 species of phasmids. This species was originally described from Irazú, Costa Rica on plants (Haitlinger, 2000) from a unique larva; since morphometric data is
only known for the holotype, we are presenting the
metric information for the 27 exemplars we cap-
tured from San Ramón, Alajuela, Costa Rica (Ta-
ble 1). This is the second time that this species is
captured and it is only known from Costa Rica.

Table 1: Metric data (in micrometers) for Leptus nikanori (larvae)
from Costa Rica.

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</tr>
<tr>
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Subfamily Callidosomatinae Southcott, 1957

Genus Charletonia Oudemans, 1910

Charletonia domawiti Haitlinger, 2004

Material examined — Holotype, larva, Colonia Palmareña, San Ramón, Alajuela, Costa Rica. 21-
IX-2006. P. Barranco leg. On Scopiorinus mucronatus. P. Barranco det. (R-249A); Paratypes, 5 lar-
vae, same location, collector and host as holotype (R-249E, F, J, K, L). Holotype and one paratype are
deposited in the Museum of Universidad de Costa Rica, two paratypes are deposited in “Museo Na-
cional de Ciencias Naturales de Madrid” (MNCN-CSIC) in Spain; two paratypes are deposited in the
author’s collection.

Description based on holotype — Color in life red. Idiosoma ovoid, 560 µm long and 420 µm wide,
total length of the animal from the tip of the che-
llicerae to posterior pole of idiosoma 682 µm.

Dorsum — Bears 52 idiosomalae, apically
pointed, lightly barbed and arranged in transverse rows across idiosoma (Figure 2). One eye on each side of the idiosoma, cornea circular, 20 µm across.
Dorsal scutum wider than long, with a concave anterior border, convex posterior border and antero-
and posterolateral angles rounded. Three pairs of scutalae (AL > ML = PL) and two pairs of sensillae
with fine setules in only distal half. Anterior pair of sensillae (AM) shorter than the posterior ones (S).

Venter — Idiosoma with a pair of setae between coxae I, with long ciliations as figured; between
coxae II a pair of pointed ciliate setae; in the area be-
tween coxae II and III four setae, tapering, pointed
and ciliate (Figure 2). Measurements for these setae
are included in Table 2. Behind coxae III, 20 setae,
arranged approximately in three rows 8 (2+4+2), 8
(3+2+3), 4.

Gnathosoma — Galeala spiniform, nude, 31 µm
long. Anterior hypostomala slender, nude, 16 µm
long; posterior hypostomala with setules, 34 µm

References found between the specimens from Costa Rica and Brazil are a slightly shorter BFe I (148-158
vs. 172) and BFe III (153-166 vs. 180). This is the second report of C. domawiti, the first out of Brazil.
The host is also wide-spread from south of North America to Peru and Brazil (Barranco, 2010a).

Charletonia salazari sp. nov.
Figs. 2-4, Table 2

Material examined — Holotype, larva, Colonia Palmareña, San Ramón, Alajuela, Costa Rica. 21-
IX-2006. P. Barranco leg. On Neoconocephalus triops. P. Barranco det. (R-249A); Paratypes, 5 lar-
vae, same location, collector and host as holotype (R-249E, F, J, K, L). Holotype and one paratype are
deposited in the Museum of Universidad de Costa Rica, two paratypes are deposited in “Museo Na-
cional de Ciencias Naturales de Madrid” (MNCN-CSIC) in Spain; two paratypes are deposited in the
author’s collection.

Description based on holotype — Color in life red. Idiosoma ovoid, 560 µm long and 420 µm wide,
total length of the animal from the tip of the che-
llicerae to posterior pole of idiosoma 682 µm.
long. Chelicerae bases rounded, chelicerae blades curved with a tiny secondary tooth at the apical end. Palpal supracoxala present, 9 μm long. Palpal setal formula: 0-B-B-BBB2-4NBwζ (Figure 4).

Leg setal formula — Leg I: Ta-1ω, 2ζ, 1κ, 1Cp, 25B, 2N; Ti-2ϕ, 1κ, 1Cp, 15B; Ge-1σ, 1κ, 12B; TFe-5B; BFe-4B; Tr-1B, Cx-1B, Sx (Figure 3A). Leg II: Ta-1ω, 1ζ, 26B, 2N; Ti-2ϕ, 16B; Ge-1κ, 12B; TFe-5B; BFe-4B; Tr-1B, Cx-2B (Figure 3B). Leg III: Ta-, 1ζ, 28B, 2N; Ti-1ϕ, 16B; Ge-12B; TFe-5B; BFe-2B; Tr-1B, Cx-2B (Figure 3C).

IP=775+721+854=2350

Measurements for the holotype and paratypes are given in Table 2.

Remarks — Charletonia salazari sp. nov. belongs to the group of species with four setae between coxae II-III. This group includes species described from Europe, Africa, Asia, Australia and America. The genus Charletonia is barely known from the New World and there are 7 species reported, one from Central America, two from South America and 4 from North America (Southcott, 1991; Haitlinger, 2000; Haitlinger, 2004; Treat and Flechtmann, 1979).

All of them belong to the group with four setae between coxae II-III. The new species belongs to the species group with four setae between coxae II-III, two hypostomalae, solenidion placed distally on Ge I, fn Ge 12,12,12 and Ti III 200 – 255 μm. In this group the following species are included, C. enhoffi Southcott, 1991, C. froggatti Oudemans, 1910, C. feideri Southcott, 1966, C. rageaui Southcott 1966, C. paolii Southcott, 1966, C. aerolata (Tragardh 1908), C. banksi Southcott, 1966, C. grandpopensis Haitlinger, 2007 and C. hunanensis Zheng, 1996 (Southcott, 1966; Southcott, 1991; Zheng, 1996; Haitlinger, 2007). It is possible to distinguish all these species from C. salazari sp. nov. because of its unique tibia setae formula (fn Ti). Also, they differ from the new species in the following characters.

It differs from C. enhoffi in the number of dorsal setae (52 vs. 76), ventral setae (28 vs. 40), the number of barbed seta on Ti I (15 vs. 17), Ti II (16 vs. 18) or Ti III (16 vs. 18) and posterior hypostomata with setules vs. nude; by shorter AW (72 – 81 vs. 86 – 91), ISD (54 – 63 vs. 73 – 77), L (86-97 vs. 105 – 110), AM (42 – 52 vs. 70 – 75), S (72 – 90 vs. 116 – 129), Ti I (162 vs. 192).
Table 2: Metric data (in micrometers) for Charletonia salazari sp. nov. (larvae) and C. domawiti (larvae). H: holotype, P1-P5: paratypes 1-5.

<table>
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It differs from *C. froggati* in the number of dorsal setae (52 vs. 64), ventral setae (28 vs. 37), the number of barbed seta on Ti I (15 vs. 14), Ti II (16 vs. 14) or Ti III (16 vs. 18); by larger PW (106 – 117 vs. 99 – 100), AAS (23 – 29 vs. 16 – 17), W (115 – 126 vs. 107 – 109), ML (54 – 60 vs. 42 – 49), Ta I (158 – 162 vs. 129); by shorter ISD (54 – 63 vs. 61 – 71), short DS (36 – 40 vs. 54 – 60), long DS (56 – 60 vs. 73 – 77).

It differs from *C. fidei* in the number of dorsal setae (52 vs. 86), ventral setae (28 vs. 54), the number of barbed seta on Ti I (15 vs. 18), Ti II (16 vs. 17), Ti III (16 vs. 19) and the number of setae on palpal tarsus (8 vs. 7); by larger PW (106 – 117 vs. 98 – 99), W (115 – 126 vs. 104), AL (67 – 72 vs. 57 – 59), ML (54 – 60 vs. 48 – 54), Ge I (126 – 140 vs. 112 – 125), Ti I (162 – 175 vs. 138 – 159), Ta I (158 – 162 vs. 129 – 140) and Ge III (135 – 144 vs. 121).

It differs from *C. rageai* in the number of dorsal setae (52 vs. 94), ventral setae (28 vs. 54), the number of barbed seta on Ti I (15 vs. 17), Ti II (16 vs. 17), Ti III (16 vs. 19) and the number of setae on palpal tarsus (8 vs. 7); by larger PW (106 – 117 vs. 97 – 102), W (115 – 126 vs. 103 – 107), PL (54 – 60 vs. 44 – 47) and Ta I (158 – 162 vs. 142 – 149).

It differs from *C. paolii* in the number of dorsal setae (52 vs. 98), ventral setae (28 vs. 62), the number of barbed seta on Ti I (15 vs. 18), Ti II (16 vs. 18) or Ti III (16 vs. 19), the number of setae on palpal tarsus (8 vs. 7), nude galeala vs. galeala with ciliaitions, posterior hypostomala with setules vs. nude; by larger PW (106 – 117 vs. 91), W (115 – 126 vs. 98), PL (54 – 60 vs. 36 – 43), Ta I (158 – 162 vs. 137) and Ta III (150 – 162 vs. 133).

It differs from *C. aerolata* in the number of dorsal setae (52 vs. 97), ventral setae (28 vs. 42), the number of barbed seta on Ti I (15 vs. 18), Ti II (16 vs. 18) or Ti III (16 vs. 19), the number of setae on palpal tarsus (8 vs. 7), nude galeala vs. galeala with several ciliaitions; AM (45 – 52 vs. 51 – 66), Ge I (126 – 140 vs. 157), Ti I (162 – 175 vs. 199), Ge III (135 – 144 vs. 167), Ti III (203 – 225 vs. 259), Ta III (150 – 162 vs. 173) and by longer AP (67 – 72 vs. 39 – 46).

It differs from *C. banksii* in the number of dorsal setae (52 vs. 97), ventral setae (28 vs. 46), the number of barbed seta on Ti I (15 vs. 18), Ti II (16 vs. 19) or Ti III (16 vs. 19), the number of setae on palpal tarsus (8 vs. 7), nude galeala vs. galeala moderately ciliated; by larger AL (67 – 72 vs. 52 – 60), PL (54 – 60 vs. 43 – 52), Ta I (158 – 162 vs. 146), Ge III (135 – 144 vs. 125), Ta III (150 – 162 vs. 142), Leg I (744 – 797 vs. 725), Leg II (703 – 754 vs. 660), Leg III (821 – 866 vs. 790) and by shorter S (72 – 90 vs. 90 – 95).

It differs from *C. grandpensii* in the number of dorsal setae (52 vs. 60), ventral setae (28 vs. 43), the number of barbed seta on Ti I (15 vs. 18), Ti II (16 vs. 17) or Ti III (16 vs. 17), the number of setae on palpal tarsus (8 vs. 6) and AM with fine setules in distal half vs. nude; by larger W (115 – 126 vs. 100 – 104), GL (148 vs. 96 – 108), long DS (40 – 60 vs. 68 – 72), 2a (63 – 67 vs 52 – 56), 1b (82 – 92 vs. 62 – 76), 2b (77 – 85 vs. 54 – 72), Cx I (72 – 85 vs. 58 – 68), Cx II (81 – 90 vs. 64 – 720, Cx III (81 – 94 (62 – 72), BFe I (90 – 112 vs. 76 – 86), BFe II (90 – 94 vs. 58 – 64), BFe III (98 – 103 vs. 82 – 88), Ta I (158 – 162 vs. 130 – 134), Ta II (144 – 157 vs. 118 – 126), Ta III (150 – 162 vs. 138), Tr III (63 – 69 vs. 48 – 54) and Ge III (135 – 144 vs. 112 – 122).

It differs from *C. hunanensis* in the number of dorsal setae (52 vs. 73), ventral setae (28 vs. 47), the number of barbed seta on TFe I (5 vs. 6), on Ti I (15 vs. 18), Ti II (16 vs. 21 ), Ti III (16 vs. 18), the presence of solenoidala on Ti II (2 vs. 0), the presence of solenoidala on Ti III (1 vs. 0), the number of vestigiala on genu I (1 vs. 2), the presence of vestigiala on tibia I (1 vs. 0), the presence of vestigiala on Ti I (1 vs. 0) and the absence of vestigiala on Ti II (0 vs. 1); by larger W (115 – 126 vs. 106), 2a (63 – 67 vs. 59), 3b1 (63 – 72 vs. 54), Ge III (134 – 144 vs. 125) and by shorter 3b2 (45 vs. 52).

**Key to the Charletonia species of the New World**

- **Neotropis and Neartic**

1. Ti I with 15 normal setae .......................... 2
   — Ti I with 17 normal setae .......................... 3
   C. cardinalis (USA, Europe, Turkey, Malasia, Australia)
   — Ti I with 18 normal setae .......................... 3

2. Ti II, III with 16, 16 normal setae ............... C. salazari **sp. nov.** (Costa Rica)
   — Ti II, III with 18, 18 normal setae ............... C. philometra (USA)
3. Ti III with 18 normal setae ................. 4
— Ti III with 19 normal setae ................. 5

4. Ti I < 200 µm / IP=1795 ............. C. rocciai (Brazil)
— Ti I > 200 µm / IP=3594. C. domawiiti (Costa Rica)

5. Ti II with 18 normal setae ....... C. alvedae (Peru)
— Ti II with 19 normal setae ............... 6

6. Ge I with 11 normal setae/ Ti I < 200 µm .......... ................................................................. C. wrightii (USA)
— Ge I with 12 normal setae/ Ti I > 200 µm ........... ................................................................. C. nishidai (USA)

Etymology — The new species is named after Mr. Alberto Hámer Salazar Rodríguez, director of the biological preserve in Costa Rica “Reserva Biológica Alberto Manuel Brenes” at the time that the captures were performed.

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