

Phylogenetic analysis and redefinition of the *maculata* species group of *Epicauta* (Meloidae: Meloinae: Epicautini)

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Abstract

A cladistic analysis based on 81 morphological characters was performed in order to determine the phylogenetic relationships of 11 species of *Epicauta* from South America. We find that the 11 South American species constitute a monophyletic group together with all the North American species of the *Epicauta maculata* group. Within this clade, the 11 species from South America conforms an apical monophyletic group within the *E. maculata* group. We propose to maintain the validity of the *Epicauta maculata* group, but also to redefine it with new characters. The South American species of the *Epicauta maculata* group are also described and illustrated. We propose the following nomenclatural changes: *Epicauta rosilloi* Martínez, junior synonym of *Epicauta minutepunctata* Borchmann; *Epicauta fourcadei* Denier, junior synonym of *Epicauta fulvicornis* (Burmeister), and *Epicauta breyeri* Denier, junior synonym of *Epicauta nigropunctata* Blanchard. We provide an identification key, new host plant associations, and updated geographic distribution.

Keywords

Epicauta; taxonomic revision; cladistic analysis; *Epicauta maculata* group

Introduction

Epicauta Dejean (1834) is one of the largest genera of Meloidae with about 400 recognized species, distributed in the Old and New World. This genus is found all over the continents, excepting Australia (Pinto & Bologna 1999). Only two subgenera are currently recognized: the nominate subgenus of worldwide distribution, and *Macrobasis*, a primarily Mexican subgenus, with several species also occurring in the southwestern United States and Central America. The North and Central American species of the nominotypic subgenus were subdivided in several species groups by previous workers

(Horn 1873; Werner 1944, 1945, 1955; McSwain 1956; Selander & Mathieu 1969; Pinto 1972a,b, 1975, 1980, 1984; Adams & Selander 1979; Agafitei & Selander 1980).

However, most species of *Epicauta* from South America were treated individually and only a few of them were included into two species groups, *E. bella* and *E. vittata* (Campos-Soldini & Roig-Juñent 2011, Campos-Soldini 2011), with the remaining species not included in any of the formal species groups. Eleven of these South American species show some characters, such as maculae in the tegument that could indicate their membership to the *E. maculata* group. However, these taxa show some morphological differences with North American species of the *E. maculata* group as were defined and revised by Pinto (1975, 1980, 1991). Historically, most of the currently recognized species with relatively small maculae were identified as *E. maculata* until Werner (1944, 1945) was the first to examine morphological characters other than maculae.

The purpose of the present paper is to determine if the inclusion of the South American species that present maculae in the tegument is supported in a hypothesis of phylogenetic relationship based on other external and internal (male and female genitalia) characters of the adult morphology. We redescribe these 11 species, including the information on male and female genitalia for the first time. We also provide an identification key for these taxa, updating their geographic distribution and find new host plant associations. We propose the following nomenclatural changes: *Epicauta rosilloi* Martínez 1952, junior synonym of *Epicauta minutepunctata* Borchmann 1930; *Epicauta fourcadei* Denier 1940, junior synonym of *Epicauta fulvicornis* (Burmeister 1843), and *Epicauta breyeri* Denier 1934, junior synonym of *Epicauta nigropunctata* Blanchard 1843.

Material and methods

Taxa

The ingroup terminal taxa were 11 species of *Epicauta* from South America: *E. adspersa* (Klug 1825), *E. atomaria* (Germar 1821), *E. cavernosa* (Courbon 1855), *E. dilatipennis* Pic 1916, *E. fulvicornis* (Burmeister 1881), *E. kobeleri* Denier 1940, *E. lizeri* Denier 1934, *E. minutepunctata* Borchmann 1930, *E. nigropunctata* (Blanchard 1843), *E. pluvialis* Borchmann 1930 and *E. rubella* Denier 1940, and the 13 species of the *Epicauta maculata* group previously proposed by Pinto 1991. As for outgroup taxa, two South American species from the family Meloidae (*Tetraonyx seminiger* Borchmann 1930 and *Pyrota wagneri* Denier 1934) and 15 species corresponding to each one of the groups proposed by Pinto (1991) were included: *E. albolineata* Dugès 1877 (*E. albolineata* group), *E. candidata* Champion 1892 (*E. candidata* group), *E. carmelita* (Haag-Rutemberg 1880) (*E. carmelita* group), *E. caustica* Rojas 1857 (*E. caustica* group), *E. caviceps* (Horn 1873) (*E. caviceps* group), *E. cinctipennis* (Chevrolat 1834) (*E. cinctipennis* group), *E. cinerea* (Forest 1771) (*E. cinerea* group), *E. conferta* (Say 1824) (*E. conferta* group), *E. corvina* (LeConte 1858) (*E. corvina* group), *E. costata* (LeConte

1854) (*E. costata* group), *E. cupreola* (Dugès 1889) (*E. cupreola* group), *E. curvicornis* (Haag-Rutemberg 1880) (*E. curvicornis* group), *E. nigritarsis* (LeConte 1853) (*E. nigritarsis* group), *E. oregona* Horn 1875 (*E. oregona* group), *E. sericans* LeConte 1866 (*E. sericans* group). For the two species groups present in South America we included three species of the *E. vittata* group (*E. monachica* (Berg 1883), *E. leopardina* (Haag-Rutemberg 1880), and *E. vittata* (Fabricius 1775) (Adams & Selander 1979; Campos-Soldini & Roig-Juñent 2011) and four species from the *E. bella* group of South America (*E. bella* Mäklin 1875, *E. brunneipennis* (Haag-Rutemberg 1880), *E. diagrapha* (Burmeister 1881) and *E. zebra* (Dhorn 1876)).

The studied materials were deposited in the following Argentinian collections: CICyTTP-CONICET (María Paula Campos-Soldini), Centro de Investigaciones Científicas y Transferencia de Tecnología a la Producción (Entre Ríos-Argentina); IADIZA, CCT-CONICET (Sergio Roig-Juñent), Instituto Argentino de Investigaciones de las Zonas Áridas (Mendoza-Argentina); FIMLA (Gustavo Scrocchi), Fundación Instituto Miguel Lillo (Tucumán-Argentina); MLPA (Analía Lanteri), Museo de La Plata (La Plata-Argentina); MCNFA (Carlos Virasoro), Museo Provincial de Ciencias Naturales “Florentino Ameghino” (Santa Fe-Argentina); MACN (Arturo Roig-Alsina), Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (Buenos Aires-Argentina).

Specimens were submerged in warm water with a little liquid detergent to soften and relax their anatomical structures. Subsequently, the abdomen was removed and cleared using a 10% KOH solution for approximately 12 h. Genital structures were dissected from the abdomen, washed in water and placed in 80% ethanol. After examination, dissected structures were placed in glycerin in a plastic microvial, and the vial was pinned directly under each specimen.

We coded a total of 81 characters from the adult stage, 61 from external morphology, 11 from male genitalia and 9 from female genitalia. The distribution of states in the terminal taxa is indicated in the data matrix in Table 1. A list of changes in the *E. maculata* group is given in Table 2.

The ranges used in the character analysis correspond to maximum and minimum values for each measure. Head measurements were recorded from a hypognathous position. Measurements taken from 10 specimens for most of the taxa studied and were expressed as follows: body length (mm) was measured from the occiput to the elytral apex; length and width ratio of the head (LH/WH) referred to the length from the frontoclypeal suture to the top of the occiput and the greatest head width, which usually occurs at the eyes or slightly above; antennomere length and width ($L_{\text{ant}}/W_{\text{ant}}$) represented maximum observable dimension, except for the length of antennomere I and antennomere II, these two antennomeres were visibly narrower at base and then flare noticeably at the apex; length of antennomere I was taken from the point of maximum basal constriction to the apex, not including the basal flare; length of antennomere II was taken from the apex to the abruptly narrowed point basally; length vs. width ratio of pronotum (L_p/W_p) referred to the length from the base to the apex on the midline, and the width at widest point at middle; diameter of the largest elytral maculae was compared to the length of pedicel (approaches 1 in cases of large

Table 1. Data matrix.

Taxon	Characters
<i>P. wagneri</i>	01-110121100000021000--001221002112-00020001-0100011100011-2-00-1011110110011
<i>T. seminger</i>	02-1001-0000-----100012002-0111000001000112100-1132-0--110110011
<i>E. albolineata</i>	010700000013-??0?-?00110-2??00--01010212002??111??1??000??0??1100??0??0???
<i>E. candidata</i>	0107000000130??0?0?000-002?00?0101011002?111?1?10-0??0??0??0??0??0???
<i>E. carmelita</i>	010100000013020001002000-00202001010000110000101010000101??0??011??0??0???
<i>E. cauceps</i>	00100000001302000000-010-0010101001?0-00112000101101112000010??0??0??0?1--00000
<i>E. caustica</i>	0130001000030??1?0?01110100?1101??0??2110??1111?1120000??0??0??0??0??0???
<i>E. cincipennis</i>	0110000000333210021-201100000001010001110002211100011010000131010020011110100012
<i>E. cinerea</i>	0111000000133000010-001100012100101000101100000110110100001??0??0??0?110101111
<i>E. conferta</i>	0100000000132??0?0?000-0021100??010001120011?111?1??00??0??0??0??0??0???
<i>E. corvina</i>	021000000013200001102000-0010100100000101120001-11100110100001310-0-20011?0??0???
<i>E. costata</i>	0107000000??0??0?0?000-0021100??01010-1110011?011?1?2000??0??0??0??0??0???
<i>E. cupreola</i>	0107000011??01??0?0101100020100??0100??00000?011??0??00??0??0??0??0??0??0???
<i>E. curvicornis</i>	0110000000133000021310110000010010100000110001101110011010001130010-10000110110012
<i>E. nigritarsis</i>	011000022013000000000201000001?1000112100001110110100??0??0??0??0??0??0???
<i>E. oregona</i>	011002001113010001002000-0001001010000011200111111110100011??0??0??0?110110011
<i>E. sericans</i>	01110000001301000001000-001010011101-01100001011100111000011310101100-1100000011
<i>E. vittata</i>	01301213111301000102101110200100001011000011111110000002101010000110100111
<i>E. abeona</i>	0101000002200000001000-1220100011101011200000110011000110200020000111100000
<i>E. andersoni</i>	0001000002201000001000-3220100011101011210000111001101000100210001000111100000
<i>E. apache</i>	0101000002202000001000-1221100011101011100000110011010010002000110001101100000
<i>E. horni</i>	01010000002 200000001000-122010001110101120000001100110100??0??0??0??0??0???
<i>E. jeffersi</i>	000100000022010000001000-12201000111010110100000110011010000000100110001101100001
<i>E. maculata</i>	01110000002201000000000-1200000--00010110000101110001010001102010110000100100100
<i>E. magnomaculata</i>	0111100000022010000002100-222010001110101101000001000110000011021000100000111100000
<i>E. normalis</i>	000100000022020001001010-122010001110101121000011100110100000001001100001101100001
<i>E. ocellata</i>	000100000022010000001000-222010001110101121000001100110100000102100010000111010000
<i>E. pardalis</i>	000100000022020001001010-322010001110101101000001100110100010021000100001111100000
<i>E. phoenix</i>	000100000022020000001000-1220100011101011110000011001101000002110010000??0??0??0???

<i>E. proscripta</i>	000100000022010000001000-1220100011101011010000110011010001102000020000111100000
<i>E. venralis</i>	01010000002201000100111-2220100011101011210000110011000011102100110001????????
<i>E. adpersa</i>	010100000022000001002101-12100100010101010010110010010001002100010001111100000
<i>E. atomaria</i>	01010000002200000002100-22100100010101010010110010010001000100010001111100000
<i>E. bella</i>	000100011013100000200110001000001111002120011001100100100102100102100121100??????
<i>E. brunneipennis</i>	000100000013120001021011000101001102000210002100110010000010000100011100100100010
<i>E. caverosa</i>	01010000002200000200-00-3211000011010101010010110011000010002000110001101100000
<i>E. diaganma</i>	0001000111131000002001000011010110001001100100100010011001000000210101101100000000
<i>E. dilatipennis</i>	010100000022000001002101-12111000010101010102110010000000102100110000111100000
<i>E. fulvicornis</i>	010112011122-000-1-001-121101002101000010101011001001000102110010000111100000
<i>E. koheleri</i>	010100000022000001002101-221211002101000110110000110011010000002110010000????????
<i>E. leopardina</i>	012021131113320001012010100102101000011001200301011110100000120001110001100100111
<i>E. lizeri</i>	010112011122000001002101-22102000110100001200110110010000011102100010000111100000
<i>E. minutepunctata</i>	010100000022000001002101-22102000010101011210010110011010010100110010001101100000
<i>E. monachica</i>	0120121111130000010100102101000011021000301111110210000132011120001101000012
<i>E. nigropunctata</i>	000100000022000001002101-2210200001010002101110110011010000000100110001101100001
<i>E. pluvialis</i>	01010002202000001002101-22102000110100011211000110010010000102100010001110100000
<i>E. rubella</i>	010102011122000001002001-121000001101010112101100110010010001102100010000111000000
<i>E. zebra</i>	0101000111131000000200100001200001102010110001100110010010001002100111101100000000

Non-applicable characters were coded as '?' and unknown character states were coded as '?' (Strong and Lipscomb 1999).

Table 2. List of changes in the *E. maculata* group.

Node	Character	Change
74	10	1→2
	11	3→2
	25	0→1
	26	0→2
	56	0→1
73	43	0→1
	61	1→0
	75	0→1
83	13	1→0
	17	0→1
72	27	1→2
	35	0→1
	46	1→0

maculae; less than 1 if the maculae are small). With regard to scaling, the only measure that was used as such was body length; all the remaining characters were expressed as ratios.

Illustrations were made with a camera lucida adapted to a stereo-microscope. Photographs were taken using a Leica 8SAPO stereo-microscope equipped with a Leica DFC 295 digital camera. Scale bars represent 1 mm.

Morphological terminology followed Torre Bueno (1937), Tuxen (1970), Lawrence & Newton (1995) and Lawrence et al. (2011). Pubescence density was defined as follows: minimal (6–9 setae per mm), sparse (13–19 per mm) or dense (28–34 setae per mm). Surface was defined as follows: foveolate-punctulate (with small deep pits; finely pitted); areolate (divided into a number of circular and concave spaces).

Phylogenetic analysis

Characters 1, 17, 22, 27 and 42 were treated as additive (Strong & Lipscomb 1999). Non-applicable characters were coded as ‘-’ (Strong & Lipscomb 1999) and unknown character states were coded as ‘?’ (e.g., in absence of male or female).

To obtain the shortest cladograms, the data matrix (Table 1) was analyzed using parsimony software (TNT): Tree Analysis Using New Technology, vers 1.0 by Goloboff et al. (2003). The dataset was studied using equal (EW) and implied weight (IW) methods (Goloboff 1993); different concavity values were applied ($K=3-15$) in order to obtain the most optimal tree for IW analysis. From all of them, $K=8$ was chosen because it was the most conservative one for the taxonomy of this group.

The analysis was performed using traditional heuristic search that generated 100 Wagner trees with random addition sequence. The topology of the trees was rearranged using tree-bisection reconnection (TBR), and cladograms were kept in memory for each tree (hold/100). A second TBR round was used to each of the optimal trees in order to increase confidence of finding all minimum-length topologies. It was

determined that 10 000 was the maximum number of trees that could be held in the memory (hold/10 000).

Branch support was measured using two different methods: jackknifing using $p=36$ (p =removal probability) and symmetric resampling using $p=36$ (p =change probability). All support numbers were outputted as relative values. In resampling methods 250 replicates were used. Characters in the text are referred to as a number with states as superscript (i.e., 16¹).

List of morphological characters used in the cladistic analysis

1. Body length: small (<10 mm) (0); moderate (11–16 mm) (1); large (>17 mm) (2).

Tegument and Pubescence

Tegument

2. Head color: uniform (0); with patch on frons (1); with patch on forehead, and two supra-ocular patches (2); with a couple of patches on frons (3).
3. Distinct pale semicircular, central-apical spot in the labrum: present (0); absent (1).
4. Maxillary palpi: dark (0); pale (1); pale, with apical third of segment IV dark (2).
5. Antennae: dark (0); dark, with antennomere I, II and basal third of antennomere III pale (1); complete pale (2).
6. Vittae of the elytra expressed on underlying cuticle: absent (0); present (1).
7. Femora: dark (0); pale (1); pale, with apex or apical third dark (2); pale, with dark in the back ventral border and apex (3).
8. Tibiae: dark (0); pale (1); pale, with apex or apical third dark (2).
9. Tarsus: dark (0); pale (1).
10. Head and pronotum sculpturing: punctulate (sparsely punctuate with very fine, widely spaced punctures) (0); punctuate (set with fine, impressed points or punctures appearing as pin-sticks) (1); foveolate-punctulate (2); foveolate (with small deep pits) (3).
11. Elytra sculpturing: punctulate (0); foveolate (1); areolate (divided into a number of small irregular spaces) (2); granulous (covered with very small grains or granules) (3).

Pubescence

12. Pubescence color of head: pale (0); pale, with dark midline vitta (1); dark (2); dark, with ventro-lateral setae pale (3).
13. Setae (direction in relation to the midline of the head): parallel (0); parallel from the base to the occiput, then oblique in the margin (1); oblique (2).
14. Ventral pubescence of head: with short setae (0); with elongate setae (1).

15. Labrum: with short setae (0); with elongate setae only in the 2/3 apical (1).
16. Segments I and II of maxillary palpi: with short setae (0); with elongate setae near the apex (1).
17. Pubescence of head and pronotum: dense (28–34 setae on 1 mm) (0); sparse (13–19 setae on 1 mm) (1); minimal (6–9 setae on 1 mm) (2).
18. Pore width in relation to the width of the base of setae in head and pronotum: with basal pore as wide as the base of the seta (0); with a basal pore wider than the seta base (1).
19. Pronotum color: uniform (0); with a pair of dark longitudinal bands on disk (1); with black vitta on the midline and two marginal dark vittae or two lateral dark patches (2); with cross pale vittae in the anterior and posterior border (3).
20. Setae (direction on the pronotal disc): parallel (0); oblique towards borders and backwards (1); transversal near the midline and swirled in the basal third (2).
21. Denuded spot of the pronotum: absent (0); present (1).
22. Pubescence of elytra: dense (28–34 setae on 1 mm) (0); sparse (13–19 setae on 1 mm) (1); sparse, with one or two longitudinal bands of dense setae (2).
23. Bands of the elytral pubescence: absent (0); present (1).
24. Bands of the elytral pubescence: coincident with color pattern of tegument (0); not coincident with color pattern of tegument (1).
25. Elytra maculae: absent (0); small not confluent with short and erect setae at centre (1); big, not confluent with short and erect setae at centre (2); big, confluent, without short and erect setae at centre (3).
26. Abdomen revetment: uniform (0); in the distal margin of sternite (1); distributed irregularly, marking different denuded spots (2).

General Morphology

27. Head: subcircular head (L/A 1–1.09) (0); transversal (L/A 0.5–0.99) (1); very transversal (L/A 0.40–0.49) (2); longitudinal (L/A >1.10) (3).
28. Occiput: convex (0); concave (1); plane (2).
29. Head sides behind eyes: subparallel (0); divergent backwards (1); convergent backwards (2).
30. Distance between eyes: closely separated (AOL/AF 0.60–0.99) (0); widely separated (ALO/AF 1–1.30) (1).
31. Male head: not excavated (0); excavated longitudinally from the occiput to the clypeus (1).
32. Segment IV of maxillary palpi: short (L/A <2) (0); elongated (L/A >2) (1).
33. Segment IV of the maxillary palpi: widening towards apex (maximum width at apical third) (0); divergent at basal third, subparallel in to the 2/3 apical (maximum width at 2/3 apical) (1); subcylindrical (maximum width in the middle) (2).
34. Segment III of the labial palpi: widening towards apex (maximum width at apical third) (0); divergent at basal third, subparallel in the 2/3 apical (maximum width at 2/3 apexes) (1); subcylindrical (maximum width in the middle) (2).

35. External border of mandible: strongly curved (0); smoothly curved (1).
36. Eyes convexity: flattened (0); convex (1); very convex (2).
37. Emargination of eyes in front of antennal insertion: wide and deep (0); narrow and very deep (1).
38. Ventral lobe of eyes: rounded to the apex (0); tapered to the apex (1).
39. Relative length of antennomeres IV–X (males): short ($L/A > 0.90$) (0); elongated ($L/A > 0.10$) (1).
40. Antennomeres IV–X (males): bulged (0); subcylindrical (1); flattened dorso-ventrally (2).
41. Length of antennomere I with respect antennomere III (males): antennomere I twice longer than antennomere III (0); antennomere I as long as, or shorter than antennomere III (1).
42. Pronotum: subquadrate ($L/A 1-1.09$) (0); longitudinal ($L/A > 1.10$) (1); transversal ($L/A < 0.90$) (2).
43. Midline of pronotum disk: absent (0); present (1).
44. Pair of depression at basal third of pronotum: absent (0); present (1).
45. Lateral border of pronotum: divergent at apical third, subparallel at basal 2/3 (0); curved, with maximum width in the middle (1); strongly curved, with maximum width in the apical third (2); sinuous (3).
46. Pronotal disc: depress at apical third (0); convex (1); plane (2).
47. Longitudinal stria of scutellum: absent (0); present (1).
48. Lateral border of elytra: subparallel (0); progressively divergent from base to the apex (1); markedly divergent at 2/3 apicals (2).
49. Costate of elytra: present (0); absent (1).
50. Apicoventral excavation with silky pubescence in the profemur: absent (0); present (1).
51. Marked depression in proximal region of protibia: absent (0); present (1).
52. Protibial mucro: absent (0); present (1).
53. Protibial spurs (males): simple (with one curved spur) (0); double (with two straight spurs) (1).
54. Protibial spurs (females): double and subparallel (0); double and divergent (1).
55. Metatibial spurs (in both sexes): double and spiniform (0), double and spatulate with apex truncated (1); double and spatulate, with apex acuminate (2).
56. Metatibial spurs (in both sexes): double and subparallel (0); double and divergent to the apex (1).
57. Tarsal claws: dorsal and ventral blades curved, with same width (0); dorsal blade thick and much curved, ventral blade straight and sticklike (1).
58. Inferior border of dorsal claw: smooth (0); sawed (1).
59. Distal margin of last abdominal sternite: rounded (0); acuminate (1); strongly acuminate (2).
60. Apex of last abdominal sternite: emarginated (0); not emarginated (1).
61. Apex of last abdominal sternite: projected forwards (0); not projected forwards (1).

Male genitalia

62. Spiculum gastrale (lamina): bilobed (0); tridentate (1); rounded and with two small lateral projections (2); emarginated (3); multidentate (4).
63. Spiculum gastrale (apodema): curved the right (0); curved the left (1); straight (2).
64. Phalobase: a third wider than the parameral lobes (0); the same width than parameral lobes (1).
65. Parameral lobes: same width throughout (0); tapering to the apex (1).
66. Parameral lobes: entirely sclerotized with apical setae (0); membranous at 2/3 apical, without setae (1).
67. Parameral lobes: separated from the basal third (0); separated from the apical third (1).
68. Dorsal hook of aedeagus: short and width (L/A 1× its length) (0); moderate (L/A 1.1–2× its length) (1); lengthy and thin (L/A 2.1× its length) (2).
69. Endophallic hook of aedeagus: thin (0); robust (1).
70. Apex of endophallic hook: curved (0); strongly curved (1).
71. Proximal extreme of median lobe: short (0); elongated (1).
72. Proximal extreme of median lobe: curved (0); straight (1).

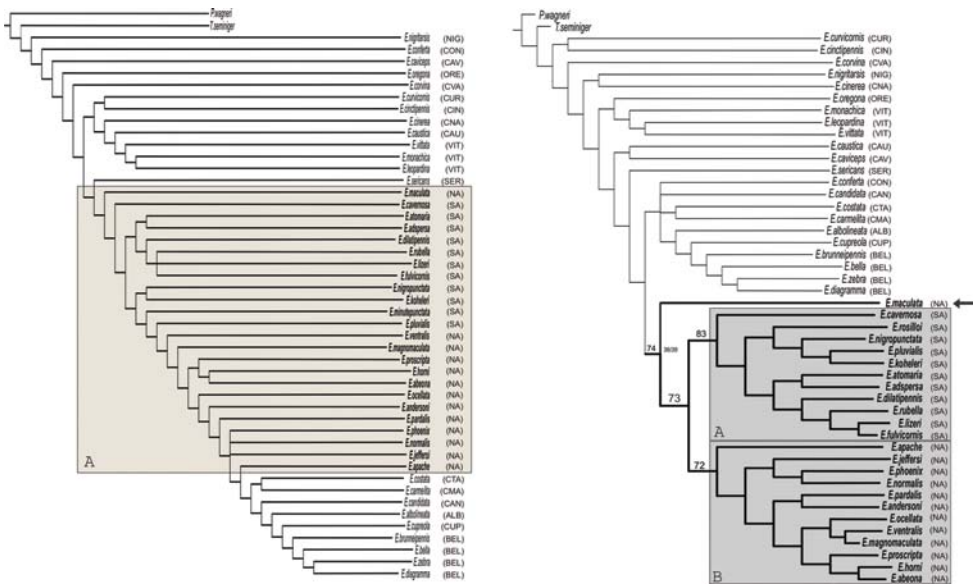
Female genitalia

73. Valvifers: absent (0); present (1).
74. Ventrolateral basal stem of valvifers: short (0); lengthy (1).
75. Ventrolateral basal stem of valvifers: straight (0); curved (1).
76. Stylus: with setae uniformly distributed (0); with setae distributed only in apical third (1).
77. Spermathecal diverticulum: absent (0); present (1).
78. Spermathecal basal swelling: absent (0); present (1).
79. Accessory gland: tubular (0); bulged at apical third, then tubular (1).
80. Spermathecal duct: short and wide (0); lengthy and thin (1).
81. Vagina: the same width than spermathecal duct (0); twice wider (1); four times wider (2).

Results

The cladistic analysis using EW methods provided six most parsimonious trees of 115 steps, RI = 0.58 and CI = 0.26. The differences between these trees were mainly in the position of *E. fulvicornis*, *E. rubella* and *E. lizeri* within the clade; with *E. dilatipennis* as sister species, and the relationship between *E. phoenix*, *E. normalis* and *E. jeffersi*. The American species treated in this paper (*E. maculata* to *E. apache*) were included in the same clade stepwise manner between the *E. sericans* and the *E. costata*-*E. diagramma* clade. The consensus tree is presented in Fig. 1.

Due to the unresolved relationships of the taxa and the low value of the indexes, we proposed a second analysis using IW methods, which assigned lower weight to those



Figs. 1–2 (1) The consensus tree obtained using EW analysis indicates the unresolved relationships between taxa. Square A indicates the position of the species treated in this paper (*E. maculata* to *E. apache*). (2) Consensus tree obtained using IWA analysis. Jackknife and Symmetric resampling values are shown only for *E. maculata* group in parentheses. Node number is underlined. Square (A) South American species (*E. cavernosa*-*E. fulvicornis*). Square (B) North American species (*E. apache*-*E. abeona*). Acronyms of species groups: CUR, *curvicornis*; CIN, *cinctipennis*; CVA, *corvina*; CON, *conferta*; NIG, *nigritaris*; CAU, *caustic*; CAV, *caviceps*; ORE, *oregona*; VIT, *vittata*; CAN, *cinerea*; SER, *sericans*; CTA, *costata*; CMA, *Carmelita*; CAN, *candidate*; ALB, *albolineata*; CUP, *cupreola*; BEL, *bella*; MAC, *maculata*. NA, North America; SA, South America.

characters that produced more homoplasies. We analyzed using different values for *K*, from 3 to 18, and the results with *K*=8 were the most conservative for the taxonomy of this group, yielding three cladograms (fit=23.17). The strict consensus tree is shown in Fig. 2.

The main differences between the EW and IW analysis were: the EW analysis presented most of the species with unresolved relationships and the *E. maculata* group as a non-monophyletic unit (Fig. 1, see square A); in IW analysis the relationships between the taxa were better resolved and the 11 species from South America (*E. adspersa*, *E. atomaria*, *E. cavernosa*, *E. dilatipennis*, *E. fulvicornis*, *E. koheleri*, *E. lizeri*, *E. minutepunctata*, *E. nigropunctata*, *E. pluvialis* and *E. rubella*) (Fig. 2, see square A) and the 13 species of *E. maculata* group previously proposed by Pinto (1991) were conformed as a monophyletic unit (Fig. 2, see square B).

Although the taxa *E. maculata*-*E. abeona* presented low support values (Symmetric Resampling 36 and Jackknife 39), this group was stable and was supported by five exclusive synapomorphies (10², 11², 25¹, 26² and 56¹) (Fig. 2, node 74). Within this group, the North and South American species were located in two different clades, with

E. maculata as sister species (Fig. 2, see square A, B and see arrow). The South American species were located in the clade I: *E. cavernosa* to *E. fulvicornis* supported by two synapomorphies (13⁰ and 17¹) and the North American species were located in the clade II: *E. apache*-*E. abeona* supported by three synapomorphies (27², 35¹ and 46⁰) (Fig. 2, nodes 83 and 72, respectively).

Taxonomic revision

Epicauta maculata group (Fig. 6a–n).

Diagnosis. Body, or at least elytra, usually with macula, with or without short and erect setae at center; if obvious maculae are absent, then the maxillary palpi of the male are greatly elongate. Pronotum with vestiture posteriorly or laterally directed near the midline, with or without two denuded spots adjacent to the midline or with sparsely maculae. Head and pronotum foveolate-punctulate; elytra areolate.

Redescription. Moderate to large blister beetles, maximum body length 6–19 mm. Body with dark brown to black tegument, head with small orange spot on frons (e.g., *E. pardalis*); antennae and legs orange as in *E. fulvicornis*, or antennae dark-brown and legs orange as in *E. pluvialis*, or antennae, palpi and legs orange as in *E. rubella*; head and pronotum foveolate-punctulate, elytra areolate. Body vestiture, sparse or dense, cinereous, yellowish grey, or pale brown; meso- and metathoracic terga and abdominal tergae I–V subglabrous above or completely setose; pronotum with vestiture posteriorly or laterally directed near the midline, with or without two denuded spots adjacent to the midline or with sparsely maculae; femora with setae uniformly distributed or with denuded spots; elytra with maculae of different sizes with or without short and erect setae at centre, or without maculae as in *E. proscripta* Pinto (1980); abdominal sterna only with denuded spots or with denuded spots and anterolateral patch of dark setae; pygidium, antepygidium, and tergum VI maculate or with a patch of dark setae at basE. Abdominal sterna are usually with sparse maculae or anterolateral patches of dark setae.

Head subquadrate to suboval; occiput with a longitudinal emargination at midline; frons surface impressed or not; eye subreniform, slightly to distinctly bulging, slightly raised over the cephalic capsule, mildly anteriorly emarginate, ventral lobe tapered at base or rounded; antennae submoniliform to subfiliform, typically tapering to the apex; labrum with anterior margin emarginate or straight; maxillary palpi gradually enlarging towards apex (maximum width at apical third) or widened at basal third and afterwards subparallel; labial palpi widened at basal third and subparallel at apical 2/3; mandibles robust, evenly curved towards apex. Pronotum usually longer than wide; lateral margins moderately divergent to widest point, then subparallel, or gradually posteriorly convergent; distinctly convex in lateral view. Protibial spurs: foretibiae with a single, curved spur in male and double in female; or double tibial spurs in both sexes; empodium with two to three setae; tarsal pads forming two longitudinal rows of robust setae, or protarsal pads with setae uniformly distributed and meso- and metatarsal pads

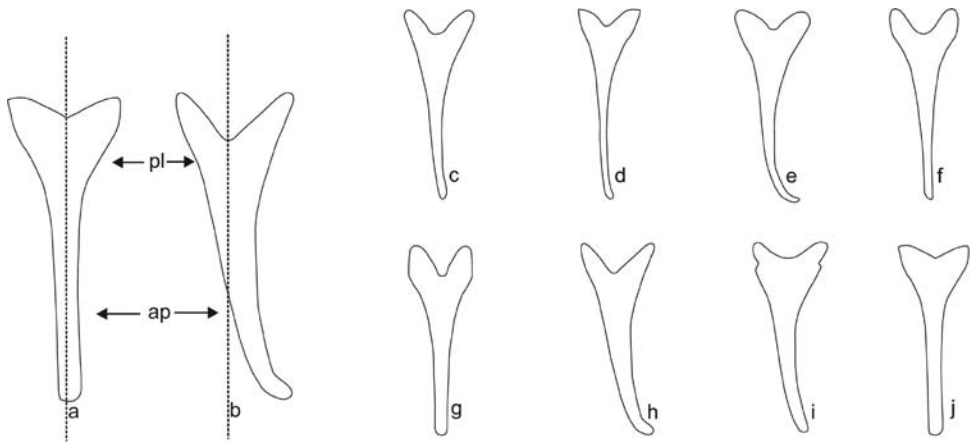


Fig. 3. Male genitalia spiculum gastrale. (a-b) plate (pl) biarmed; apodema (ap) a=straight, b=curved, see arrows; (c) *E. adspersa*; (d) *E. atomaria*; (e) *E. cavernosa*, *E. minutepunctata*, *E. rubella*; (f) *E. dilatipennis*; (g) *E. fulvicornis*; (h) *E. koheleri*; (i) *E. nigropunctata*; (j) *E. pluvialis*.

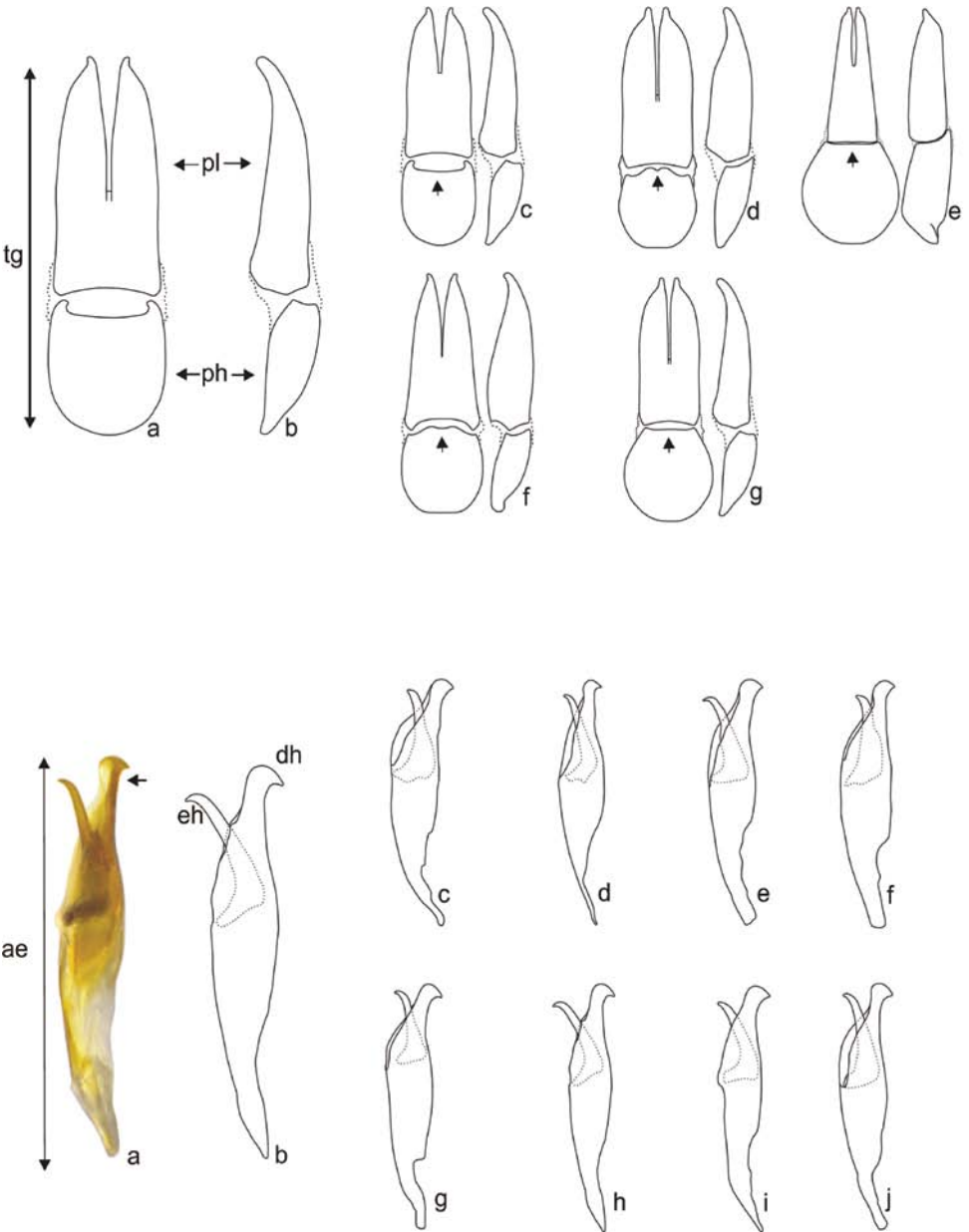
forming two longitudinal rows of robust setae. Elytra are moderately convex in dorsal view; sides slightly or markedly widening from base to apex.

Female genitalia. Spermathecal capsule well developed; spermathecal duct short and wide; width of vagina equal to width of spermathecal duct. Accessory gland tubular or expanded at proximal third and then tubular. Gonocoxite with distal lobe curved or straight; stylus is completely setose or with setae distributed on apical third.

Male genitalia spiculum gastrale plate-like (pl) bilobed, apodema (ap) straight or curved (Fig. 3a,b). Tegmen (tg) completely sclerotized, parameral lobes (pl) with setae at apical third, width consistent throughout or tapering at apex; phallobase (ph) sub-oval, similar in width to base of parameral lobes or 1.3× wider (Fig. 4a,b). Aedeagus (ae) as in figures 5 a-j.

Courtship and behavior. Courtship and behavior of nine species of the *E. maculata* group from North America (*E. andersoni*, *E. apache*, *E. jeffersi*, *E. maculata*, *E. magnomaculata*, *E. normalis*, *E. pardalis*, *E. phoenix* and *E. ventralis*) were described in detail by Pinto (1980). Courtship and behavior are unknown for the remaining North and South American species.

Economic importance. Pinto (1980) indicated that the species of the *E. maculata* group from North America have been reported as damaging Amaranthaceae: *Beta vulgaris*, *Spinacia oleracea*; Brassicaceae: *Brassica oleracea*; Fabaceae: *Glycine max*, *Medicago sativa*, *Phas2oelolus vulgaris*, *Trifolium* sp., *Solanum tuberosum* (Solanaceae). Adults of several species from South America discussed in this paper have been reported as damaging several species of different families, e.g., Amaranthaceae, Asteraceae, Brassicaceae, Fabaceae, Mimosaceae, Portulacaceae, Solanaceae and Zygophyllaceae (Bosq 1934;



Figs. 4–5. (4) Male genitalia tegmen (tg) (dorsal and lateral view). (a-b) parameral lobes (pl), phalobase (ph) (see arrows); (c) *E. adspersa*, *E. atomaria*, *E. cavernosa*, *E. minutepunctata*, *E. rubella*; (d) *E. dilatipennis*, *E. pluvialis*; (e) *E. fulvicornis*; (f) *E. koheleri*; (g) *E. nigropunctata*. (5) Male genitalia. (a) Aedeagus (ae); (b) dorsal hook (dh), endophalic hook (eh); (c) *E. adspersa*, (d) *E. atomaria*, (e) *E. cavernosa*, (f) *E. dilatipennis*, (g) *E. nigropunctata*, (h) *E. pluvialis*, *E. fulvicornis*, *E. rubella*, (i) *E. koheleri*, (j) *E. minutepunctata*. This figure is published in colour in the online version of this journal, which can be accessed via <http://book-sandjournals.brillonline.com/content/journals/1876312x>.

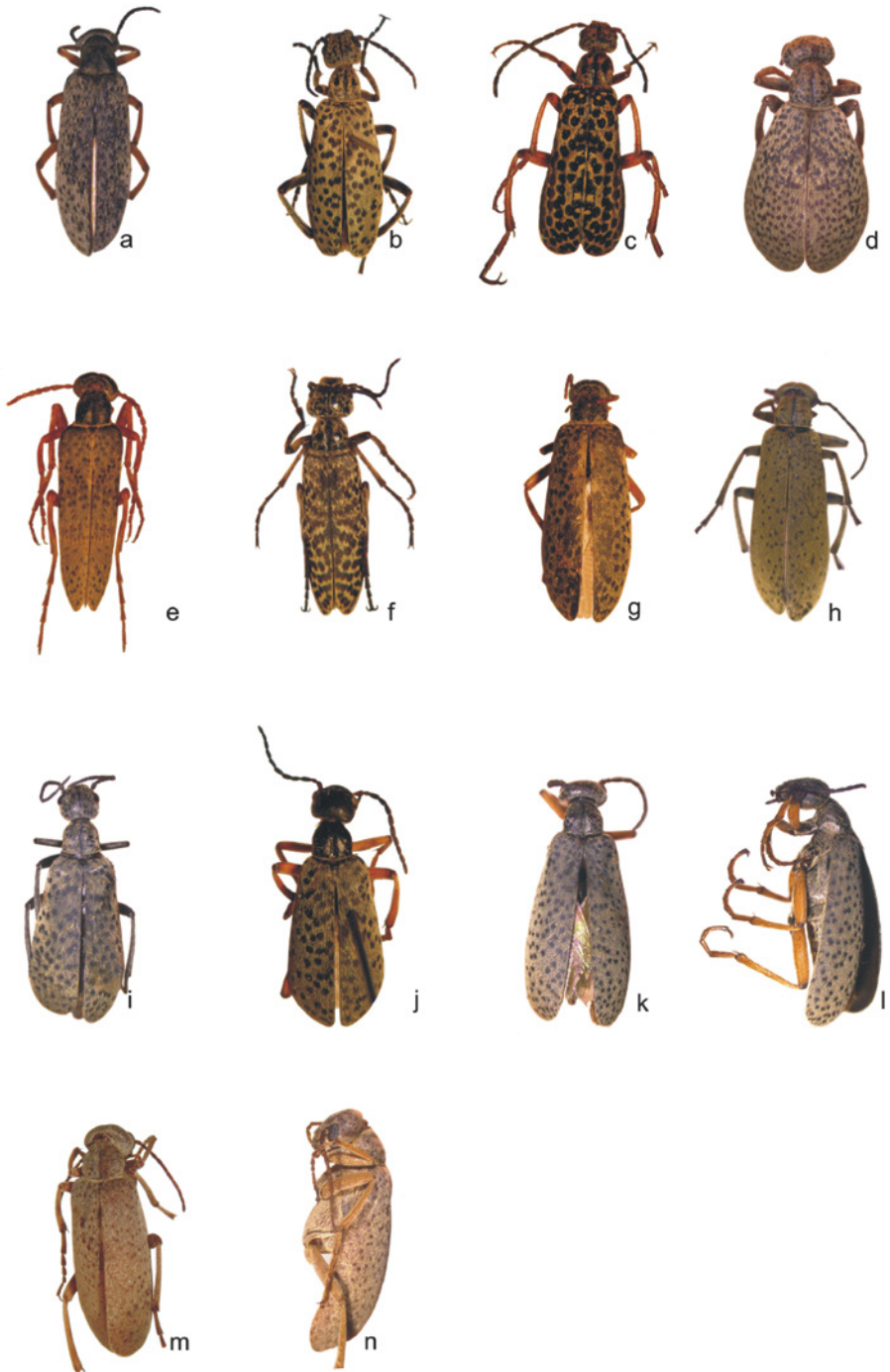
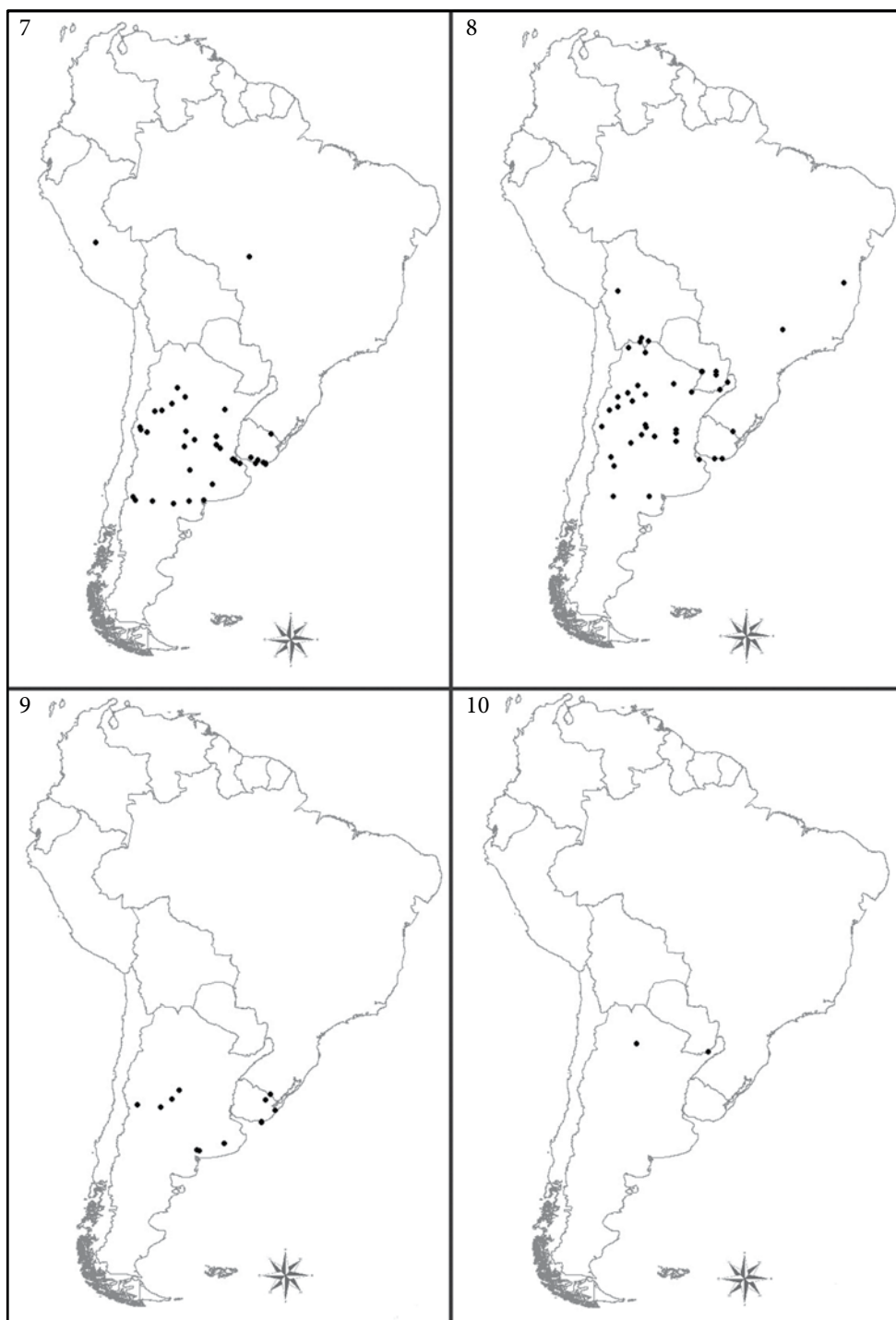
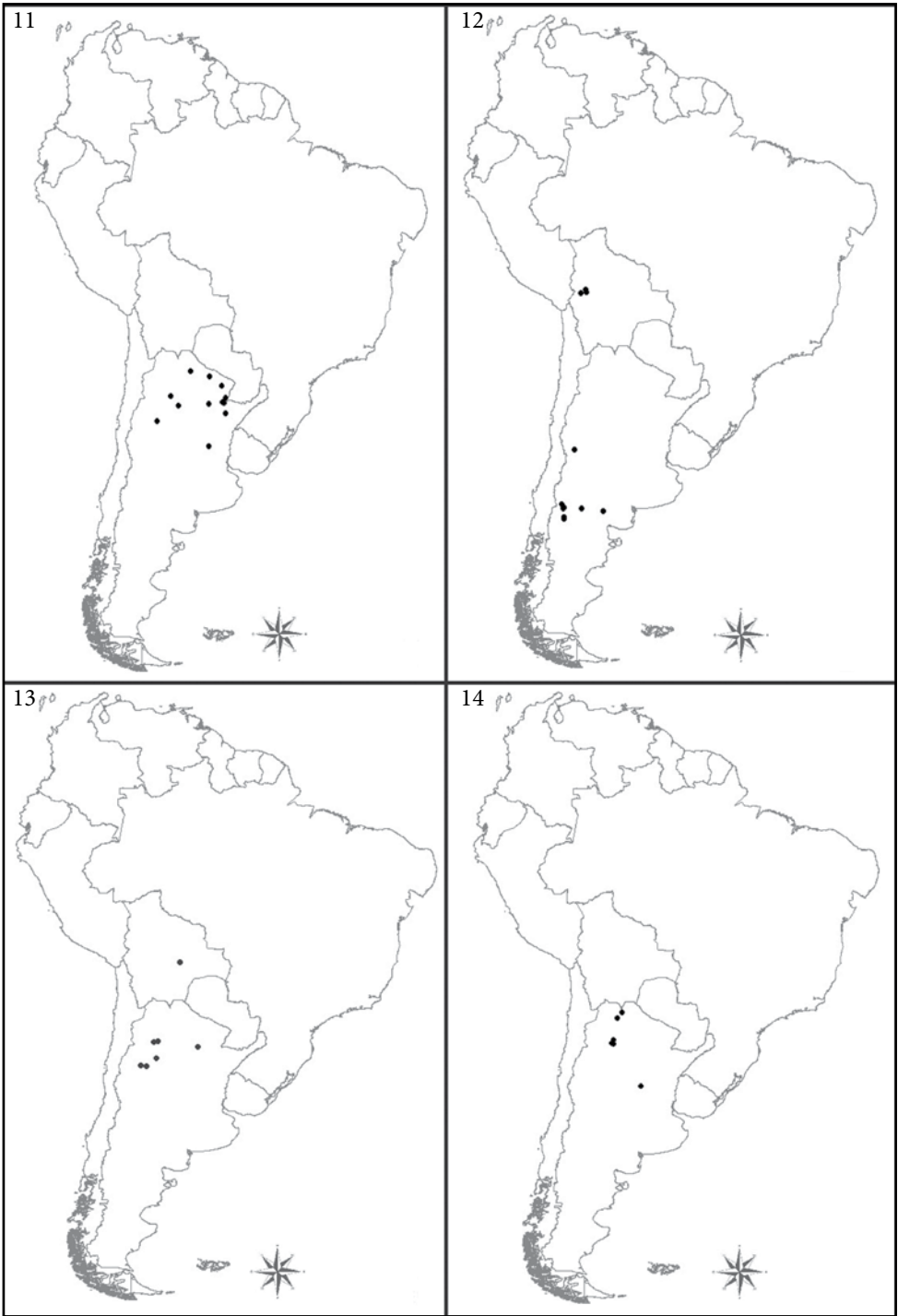
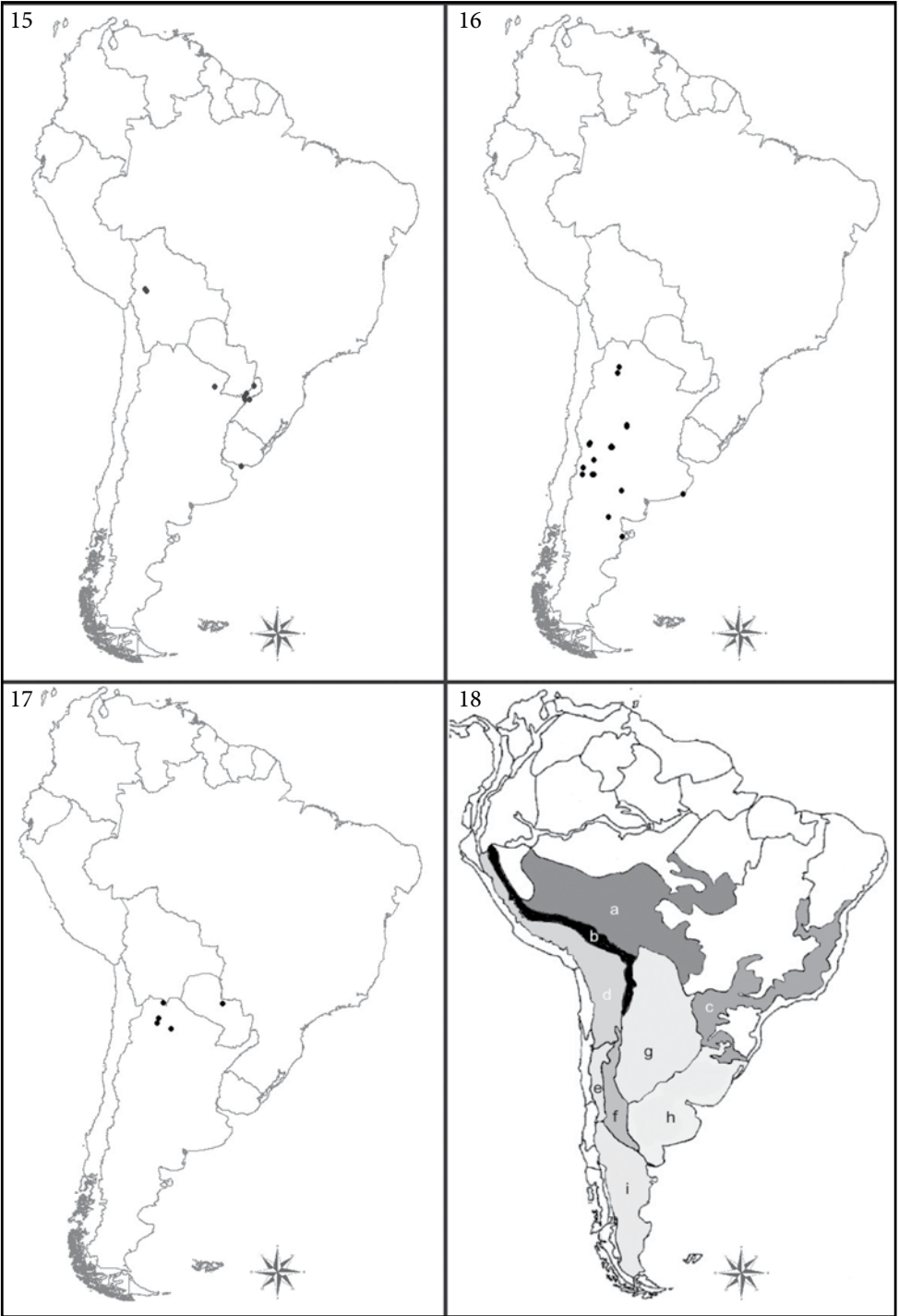


Fig. 6. (a) *Epicauta adpersa*; (b) *E. atomaria*; (c) *E. cavernosa*; (d) *E. dilatipennis*; (e) *E. fulvicornis*; (f) *E. kobeleri*; (g) *E. lizeri*; (h) *E. minutepunctata*; (i) *E. nigropunctata*; (j) *E. pluviialis* (male); (k) *E. pluviialis* (female); (l) *E. pluviialis* (lateral view); (m) *E. rubella* (dorsal view); (n) *E. rubella* (lateral view). This figure is published in colour in the online version of this journal, which can be accessed via <http://booksandjournals.brillonline.com/content/journals/1876312x>.



Figs. 7–18. Distribution maps of (7) *Epicauta adspersa*, (8) *E. atomaria*, (9) *E. cavernosa*, (10) *E. dilatipennis*, (11) *E. fulvicornis*, (12) *E. kobeleri*, (13) *E. lizeri*, (14) *E. minutepunctata*, (15) *E. nigropunctata*, (16) *E. pluvialis*, (17) *E. rubella*, (18) Distribution range. Modified from Morrone (2006).





1942; Hayward 1960; Di Iorio 2004). New host Amarantaceae: local name: yuyo Colorado (*Amaranthus quitensis*).

Distribution range. The American species of the *E. maculata* group are distributed in all the American regions and transition zones: Nearctic Region, Mexican Transition Zone, Neotropical Region, South American Transition Zone, and Andean Region (Figs. 7–18).

Species of the *E. maculata* group from South America are located in several biogeographic provinces proposed by Morrone (2001, 2006), such as (a) Pantanal: southern and central Brazil, northwestern Bolivia, and northern Paraguay; (b) Yungas: western slopes of the Andes, from northern Peru to northwestern Argentina; both provinces belong to the Amazonian Subregion; (c) Chaco: southern Bolivia, western Paraguay, southern Brazil, and north-central Argentina; (d) Pampa: central and western Argentina (between 30° and 39° S of latitude), Uruguay, and the south of the Brazilian state Rio Grande do Sul (South-Eastern Brazil); both belong to the Chacoan Subregion (Morrone 2001a,b); (e) Parana Forest: (Parana Subregion) southeastern Brazil, northeastern Argentina, and eastern Paraguay; (f) Puna: eastern Bolivia, northern Argentina and Chile, and southern Peru; (g) Prepuna central and northwestern Argentina; and (h) Monte: central Argentina, between 24° and 43° S, all belonging to the South American Transition Zone. Finally, few species are distributed in Central Patagonia province, which extends on southwestern Argentina, from central Mendoza, widening through and occupying the eastern part of the southern tip of South America; this province belongs to the Andean Region (Morrone 2001c).

Key to the species of the *E. maculata* group from South America

The species of this group are clearly differentiated from the remaining South American *Epicauta* species by the presence of maculae in the elytra (Fig. 6a–n).

- 1 Elytra clearly convex (Fig. 6d), sides markedly widening at apical third
..... *Epicauta dilatipennis* Pic.
- Elytra not distinctly convex (Fig. 6a–c, e–n), sides progressively widening from base to the apex 2
2. Elytra with markedly sub-depressed maculae; maculae lacking the single, short, erect and central setae *Epicauta cavernosa* (Courbon) (Fig. 6c).
- Elytra with mildly concave maculae of different sizes, with single, short, erect and central setae 3
3. Elytra with small maculae 4
- Elytra with big maculae confluent or not 7
4. Tegument and pubescence pale brown
..... *Epicauta rubella* Denier (Fig. 6m–n).
- Tegument mostly black, or both black and other color 5.
5. Pubescence yellowish gray; tegument black
..... *Epicauta minutepunctata* Borchmann (Fig. 6h).

- Pubescence cinereous; tegument of head, pronotum, elytra and abdomen black; antennae, palpi and legs differently colored 6
- 6. Pubescence very sparse (6–9 setae per mm); with sexual dimorphism: male with very short erect and spiniform setae on the head and pronotum, and elongate piliform setae on the sides of head and pronotum; female with short decumbent setae on head and pronotum. Tegument of antennae, palpi and legs orange
..... *Epicauta fulvicornis* (Burmeister) (Fig. 6e).
- Pubescence sparse (13–19 setae per mm); without sexual dimorphism, with short recumbent setae on the head and pronotum. Tegument of antennae and palpi dark brown; legs orange with femora and tibiae with apex dark brown, tarsi dark brown *Epicauta adspersa* (Germar) (Fig. 6a).
- 7. Tegument of head, pronotum, elytra and abdomen black, antennae, palpi, and legs with different color 8
- Tegument mostly black 9
- 8. Antennae, palpi, and legs dark orange *Epicauta lizeri* Denier (Fig. 6g)
- Antennae and palpi dark brown, legs orange with the femur-tibiae junction dark brown, tarsi with apex dark brown
..... *Epicauta pluvialis* Borchmann (Fig. 6j–l).
- 9. Pubescence dense (28–34 setae per mm), setae elongate and piliform, not recumbent on the head and pronotum
..... *Epicauta atomaria* (Germar) (Fig. 6b).
- Pubescence sparse (13–19 setae per mm), setae short and recumbent 10
- 10. Elytra with confluent maculae; meso- and metafemora with glabrous spots uniformly distributed *Epicauta koheleri* Denier (Fig. 6f).
- Elytra with maculae not confluent, separated by pubescence; femora with pubescence uniformly distributed
..... *Epicauta nigropunctata* (Blanchard) (Fig. 6i).

Species redescriptions

Epicauta adspersa (Klug 1825)

Lytta adspersa Klug, 1825: 434.

Epicauta conspersa Curtis, 1845: 472.

Cantharis adspersa: Burmeister, 1881: 29; Berg, 1881: 307; Gemminger & Harlod, 1870: 2147.

Epicauta adspersa: Bruch 1914: 403; Borchmann 1917: 70; Denier 1935: 152; Bosq 1942: 10; Blackwelder 1945: 482; Di Iorio 2004: 165.

Material examined

ARGENTINA: 2♂♂ Córdoba: Villa María (Coll. A. Parko 1939); 1♀ La Pampa: Anzoátegui (Coll. Biraben 26.XI.1941); 1♀ San Juan: Calingasta (Coll. N. Miranda

1939). 167 (sex not determined) from Buenos Aires: (Coll. Denier P 14.III.1934), Base Naval-Puerto Belgrano (Coll. Biraben 2.II.1938), Las Martinetas (Coll. Biraben 5.II.1941), La Plata (Coll. Bezzi A. R), Flores (6.I.1919), Garin Coll. Argent III. 1957), San Nicolás (Coll. Biraben II.1937), Tandil (Coll. Torres 25.II.1957); Córdoba: Departamento de Calamuchita “El Sauce” (XII.1938), Río Cuarto (15.IV.1937), Villa María (13.II.1938); Entre Ríos: Diamante (Coll. Zapata A 11.II.2011), Federación (Coll. Biraben y Bezzi 3.XII.1941); Mendoza; Neuquén: Las Lajas (XI.1932), Río Agrio (Coll. Köheler 17.XII.1932), Zapala (Coll. Köheler 17.XII.1932); La Pampa: General Pico (Coll. Bosq); La Rioja: Cuesta de Miranda (Coll. Biraben 22.II.1939), Villa Sanagasta (Coll. Biraben-Scott 26.II.1939); Río Negro: Choel Choel; Salta; San Juan: Calingasta (Coll. Miranda 1939), Villa Nueva (Coll. Lieb J 13.I.1939), Zonda (Coll. Biraben); Santa Fe: Reconquista (Coll. Biraben-Bezzi XII. 1936 and 26.XI.1939), Rosario (Coll. Denier P 14.III.1932); Santiago del Estero; Tucumán.

Diagnosis

Head, pronotum, elytra and abdomen with black tegument; antennae brown; femora and tibiae orange with distal third dark brown, tarsi dark brown. *Epicauta adspersa* is similar to *E. lizeri* in the color of pubescence (cinereous) and tegument (mostly black). These species differ in the tegument color of legs and antennae, as well as in the size of maculae.

Redescription

Body length 8–16 mm (Fig. 6a). Pubescence sparse; setae short and recumbent; head, pronotum and elytra cinereous; femora and tibiae with dark brown setae near apex, tarsi with dark brown setae; pronotum with two denuded spots adjacent to the midline; elytra with small sub-depressed maculae, with single short and erect setae at centre; abdominal sterna sparsely to densely spots; abdominal sternae I–V with or without a anterolateral patch of dark setae. Tegument of head, pronotum, elytra and abdomen black; antennae brown; femora and tibiae orange with distal third dark brown; tarsi dark brown or dark brown near apex.

Habitus. Head 0.69× as long as wide; eyes scarcely bulging, with mild emargination in front of antennal insertion, ventral lobe tapered at base; labrum with foremargin emarginated; ratios length vs. width of antennomeres in both sexes ($L_{\text{Sant}}/W_{\text{Sant}}$): 1.6 (I), 1.5 (II), 3.5 (III), 2.5 (IV–X), 3 (XI). Pronotum 0.89× as long as wide, sides moderately divergent towards widest point, then subparallel behind. Legs with tarsal pads well developed, usually longitudinally divided. Elytra with sides slightly widening from base to apex.

Female genitalia. Spermathecal capsule with a swelling near base; spermathecal duct thin, 1.5 × longer than vagina; vagina diameter 2 × wider than spermathecal duct; accessory gland tubular. Gonocoxite with ventrolateral basal lobe with curved projection; stylus with setae at apical third.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema with apex slightly curved (Fig. 3c). Parameral lobes uniformly wide; phallobase of the same width than

the parameral lobes base, foremargin markedly emarginated (Fig. 4c, see arrow). Aedeagus as in Fig. 5c.

Intraspecific variation

The variation occurs mainly in the color of tarsi. Some specimens have tarsi dark brown or dark brown only at apex.

Distribution

Argentina, Brazil, Perú and Uruguay. From Argentina *E. adpersa* was recorded from following provinces: Buenos Aires, Córdoba (Villa María), Catamarca (Bruch, 1914); Neuquén, Río Negro, Santa Fe, Santiago del Estero, Tucumán (Bosq, 1934). BRAZIL: Matto Grosso. Perú: Río Negro. Uruguay: Canelones, Maldonado, Montevideo, Peñarol, Piriapolis, Punta del Este and San José. New records for provinces are: Entre Ríos; San Juan; La Rioja; Mendoza (Fig. 7).

Host plants

Amaranthaceae: *Amaranthus cruentus*, *A. hybridus* var. *hypochondriacus*, *A. mantegazzianus*, *A. quitensis*; *Amaranthus* sp.; *Beta vulgaris* var. *cucla*, *B. vulgaris* var. *rapacea*; *Chenopodium album*; *Spinacia oleracea*. Asteraceae: *Cichorium endivia*. Brassicaceae: *Brassica oleracea*; *B. oleracea* var. *acephala*. Fabaceae: *Medicago sativa*; *Phaseolus vulgaris*; *Prosopis* sp. Solanaceae: *Capsicum annum*; *Glycine max*; *Lycopersicon esculentum*; *Salpichora organifolia*; *Nicotiana tabacum*; *Senecio grisebachii*; *Solanum melongea*; *S. tuberosum* (Blanchard 1843; Bosq 1934; Hayward 1942, 1960; Rizzo 1977; Di Iorio 2004).

Epicauta atomaria (Germar 1821)

Lytta atomaria Germar, 1821: 154; Burmeister, 1881: 29; Berg, 1881: 307.

Lytta punctata Germar, 1824: 287.

Cantharis germari Fischer, 1827: 24.

Cantharis atomaria: Gemminger & Harold, 1870: 2148.

Epicauta atomaria: Bruch, 1914: 403; Borchmann, 1917: 70; Denier, 1935: 152; Bosq, 1942: 10; Hayward, 1942: 22; Blackwelder, 1945: 482; Viana & Williner, 1974: 15; Martínez, 1992: 5; Di Iorio, 2004: 167.

Material examined

ARGENTINA: 2♂♂ from Córdoba: Villa María (Coll. Parko A); 2♀♀ and 3♂♂ from La Pampa: Anzoátegui (Coll. Birabén A 26.XI.1941); 2♀♀ from Mendoza: San Rafaela (Coll. Roig-Juñent, Sergio 31.I.1979), Los Pejecitos (Coll. Roig-Juñent, Sergio 31.I.1979); 1♂ and 1♀ from Misiones: El Dorado (Coll. Denier III.1942 y X.1958) (MLP). 537 (sex not determined) Buenos Aires: (Coll. Rothier R), La Plata (1) (Coll. Bezzi A. R); Catamarca: (Coll. Bruch C, 30.XI. 1907); Córdoba: (Coll. Ritcher R);

Corrientes: (Coll. Bruch C); Chaco: (Coll. Rothier R); Entre Ríos: Diamante (Coll. Noriega-Campos J. and Tóffolli-Campos N 5–6.III.2009; Zapata A 11.02.2011); Jujuy: (Coll. Ritcher R); La Rioja: Chilecito ; Mendoza: (Coll. Ritcher R); Misiones: (Coll. Ritcher R), San Ignacio (24.X.1929); Neuquén: (Coll. Bruch C); Salta: (Coll. Ritcher R), Orán (IX. 1939); San Juan: Calingasta (Coll. Miranda N 1939); San Luis: Dique Las Carretas (Coll. Roig Sergio 21–26.II.1993; Flores G. 5.II:1994); Santa Fe: (Coll. Ritcher R); Santiago del Estero: (Coll. Wagner); Tucumán: (Coll. Ritcher R). BOLIVIA: Chulumani: (Coll. Denier 30.III.1930), Río Negro 2600m (Coll. R. Golbach 24–27.III.1960), Tarija (Coll. R. Golbach 14–28.II.1969), Río Bermejo (Coll. Ritcher R). BRAZIL: Encrucilhada (Coll. Cuezco 11.II.1948), Río Prado (Coll. Cuezco 11.II.1948). PARAGUAY: Asunción (Coll. Golbach R 1–28.II.1974), Departamento de San Pedro Carumbé (Coll. R. Golbach I.1971), Villa Rica (without indication of date and collector), Río Negro (Coll. Golbach R 10.I-10.II.1973). URUGUAY: Montevideo, Peñarol (13.II.1930); Piriapolis (17.II.1909); Cerro Largo, Cuchilla de Melo (15.XI.1915).

Diagnosis

Head, pronotum, and elytra with yellowish gray pubescence; abdomen with pubescence cinereous; femora and tibiae with dark setae on basal third, basitarsus with cinereous setae on apical half, tarsi with dark brown setae; setae elongate and recumbent; femora and tibiae with dark setae on basal third. *Epicauta atomaria* is easily confused with *E. adpersa*, *E. nigropunctata* and *E. lizeri*. They are distinguished primarily by the color of pubescence and tegument.

Redescription

Body length 7–14 mm (Fig. 6b). Pubescence dense; setae elongate not recumbent on head an pronotum, elytra with short and recumbent setae; head, pronotum, and elytra yellowish gray; abdomen cinereous; femora and tibiae with dark setae on basal third, basitarsus with cinereous setae on apical half, tarsi with dark brown setae; antennomere I and II with cinereous setae on ventral surface; pronotum with two denuded spots adjacent to the midline; elytra with big sub-depressed maculae, maculae with single, short, and erect setae at centre. Tegument black.

Habitus. Head 0.80× as long as wide; eyes not protuberant, with slight emargination in front of antennal insertion, ventral lobe tapered at base; labrum with foremargin emarginated; ratios length vs. width of antennomeres in both sexes ($L_{\text{SAnt}}/W_{\text{SAnt}}$): 1.6 (I); 1.3 (II); 4 (III); 1.6 (IV–VIII); 1.4 (IX); 1.4 (X); 3.5 (XI). Pronotum 1.06× as long as wide; sides moderately divergent to widest point, then gradually convergent behind. Legs with protarsal pads uniformly distributed setae, meso- and metatarsal pads conforming in two longitudinal rows of robust setae. Elytra with base 2× wider than base of pronotum; sides slightly widening from base to the apex.

Female genitalia. Spermathecal duct, same length and width than vagina; accessory gland expanded at proximal third. Gonocoxite with ventrolateral basal lobe with curved projection; stylus with setae distributed at apical third.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema with apex slightly curved (Fig. 3d). Parameral lobes same width throughout; phallobase with the same width than base of parameral lobes, foremargin markedly emarginated (Fig. 4c, see arrow). Aedeagus as in Fig. 5c.

Distribution

Argentina, Bolivia, Brazil, Paraguay and Uruguay. In Argentina recorded from the following provinces: Buenos Aires; Catamarca; Córdoba; Corrientes; Jujuy; La Pampa; Mendoza; Misiones; Neuquén; Río Negro; Salta; San Luis; Santa Fe; Santiago del Estero; Tucumán (Burmeister 1881; Bruch 1914; Bosq 1942; Hayward 1942; Viana & Williner 1973; Martínez 1992). In Uruguay recorded from Montevideo (Burmeister 1881). New records are from Entre Ríos and San Juan provinces (Argentina), Tarija (Bolivia), Encrucilhada (Brazil) and Asunción (Paraguay) (Fig. 8).

Host plants

Amaranthaceae: *Amaranthus quitensis* (locally named “yuyo colorado”), *A. cruentus*, *A. hybridus*, *A. mantegazzianus*, *Amaranthus* sp., *Anoda cristata*, *Chilonodia hybridus* var *hypochondriacus*. Asteraceae: *Cichorium endivia*, *Senecio grisebachii*. Brassicaceae: *Brassica oleracea*. Chenopodeaceae: *Beta vulgaris*, *Spinacea oleracea*. Fabaceae: *Medicago sativa*, *Glycine max*, *Phaseolus vulgaris*, *Prosopis nigra*. Malvaceae: *Anoda cristata* (new host). Solanaceae: *Capsicum annum*, *Lycopersicum esculentum*, *Solanum melongena*, *S. tuberosum*, *N. tabacum*. Zygophyllaceae: *Tribulus terrestris* (Hayward 1942; Bosq 1943; Viana & Williner 1973; Martínez 1992; Di Iorio 2004).

Epicauta cavernosa (Courbon 1855)

Cantharis cavernosa Courbon, 1855: 1006; Gemminger & Harold, 1870: 2148; Berg, 1881: 306.

Cantharis nigropunctata Burmeister, 1881: 28 (partim); Berg, 1881: 306; Bruch, 1914: 404; Borchmann, 1917: 72.

Epicauta cavernosa: Bruch, 1914: 404; Borchmann, 1917: 72; Blackwelder, 1945: 482; Viana & Williner, 1974: 15.

Material examined

ARGENTINA 1♂ and 2♀♀ from Buenos Aires: Torquinst “Sierra de la Ventana” (Coll: Bachmann & Rossi 8.II.1974), Cerro Tres Picos (Coll: Bachmann & Rossi 24.I.1947); 1♂ Córdoba: Villa Ciudad de América “Dique los Molinos” (Coll: Willink A I.1981); 1♀ San Luis: Cortaderas (Coll. Roig A. I.1969). 19 (sex not determined) from Mendoza: Chacras de Coria (Coll. Willink A 31.I.1947). San Luis: Merlo (Coll. Willink-Tomsic 27.I.1958). URUGUAY: Maldonado, Cerro Pelado (26.XII.12); Cerro Largo, Cuchilla de Melo (25.XII.07), Fraile Muerto (20.XII.07); Punta del Este (Coll. Sterrenin); Chuy, Departamento de Rocha (III.1964).

Diagnosis

Elytra with big and markedly sub-depressed maculae, broadly confluent or not; denuded spots lacking the single, short, erect and central setae. *Epicauta cavernosa* is easy to distinguish from the remaining species of the group mainly because of the elytra with markedly concave glabrous spots, which lack the single, short, erect and central setae.

Redescription

Body length 7–14 mm (Fig. 6c). Pubescence of head and pronotum minimal distributed uniformly with short and recumbent setae, or at margin with elongate setae; pubescence of elytra dense with small to big markedly sub-depressed maculae, broadly confluent or not; maculae lacking the single, short, erect, and central setae. Tegument mainly dark and shiny or with head, pronotum and elytra black, antennae dark brown, legs dark reddish-brown to pale reddish-brown with apex of femora and tibiae dark brown.

Habitus. Head $0.8 \times$ as long as wide, eyes scarcely bulging, with ample emargination in front of antennal insertion, ventral lobe tapered at base; labrum with foremargin subrectilinear; ratios length vs. width of antennomeres in female (L_{Ant}/W_{Ant}): 2 (I); 1.5 (II); 3 (III); 2.5 (IV–X); 3 (XI); male 1.6 (I); 1.5 (II); 4.5 (III); 3 (IV–X); 4 (XI). Pronotum $0.88 \times$ as long as wide, sides moderately divergent to widest point, then subparallel. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra with sides slightly widening from base to apex.

Female genitalia. Spermathecal duct $1.5 \times$ longer than vagina; same width than vagina; accessory gland expanded at proximal third. Gonocoxite with ventrolateral basal lobe with straight projection; stylus with setae distributed at apex.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema with apex markedly curved at apex (Fig. 3e). Parameral lobes uniformly width; phalobase with the same width than base of parameral lobes, foremargin markedly emarginated (Fig. 4c, see arrow). Aedeagus as in Fig. 5e.

Intra-specific variation

Occurs mainly in the range of size, tegument color of legs and antennae, distribution of pubescence on head and pronotum, and size of denuded spots. Also, some specimens double the size of others (7–14 mm); tegument dark reddish-brown on legs and dark on antennomeres, or legs pale reddish-brown and antennae with antennomere I and II orange, then dark-brown; elytra with glabrous small spots, separated by pubescence, or wide and confluent to each other.

Distribution

Argentina, Brazil and Uruguay. In Argentina it was recorded from Buenos Aires and Córdoba (Bruch 1914). New records of provinces are from Mendoza and San Luis (Argentina), and Cerro Largo, Rocha and Maldonado (Uruguay) (Fig. 9).

Epicauta dilatipennis Pic 1916

Epicauta dilatipennis Pic, 1916: 8; Denier, 1935: 154; 1940: 419; Blackwelder, 1945: 483.

Material examined

ARGENTINA 1♀ and 1♂ from Misiones: San Ignacio (Coll. Werner, date not indicated); 2♀♀ from Santiago del Estero: Río Salado (Coll. Werner, date not indicated).

Diagnosis

Elytra in lateral view very convex, lateral sides in dorsal view markedly widening at apical third. *Epicauta dilatipennis* is easy to distinguish from the other species of the group mainly by the elytra, which are clearly convex with sides evidently enlarging after 2/3 from base. The other species of the group have elytral sides progressively enlarging from base to apex.

Redescription

Body length 10–13 mm (Fig. 6d). Pubescence sparse cinereous, with short and recumbent setae; pronotum with two denuded spots adjacent to the midline; elytra with small maculae, with single short, and erect setae at centre. Tegument of head, pronotum, elytra and abdomen dark; antennae dark brown; legs dark-reddish mixed dark brown.

Habitus. Head $0.86 \times$ as long as wide, eyes only slightly bulging, mild emargination in front of antennal insertion, ventral lobe tapered at base; labrum with foremargin emarginated; last segment of maxillary palpi gradually divergent towards to the apex; ratios length vs. width of antennomeres in female ($L_{\text{SAnt}}/W_{\text{SAnt}}$): 2(I); 1.5 (II); 3 (III); 2.5 (IV–X); 3 (XI); male 1.66 (I); 1.5 (II); 4.5 (III); 3 (IV–X); 4.5 (XI). Pronotum $0.91 \times$ as long as wide, sides moderately divergent to widest point, then gradually convergent behind. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra in lateral view very convex; sides markedly widening at apical third.

Female genitalia. Spermathecal capsule with a swelling near the base; spermathecal duct with the same length and width than vagina; accessory gland tubular. Gonocoxite with ventrolateral basal lobe with curved projection; stylus with setae distributed on apical third.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema straight (Fig. 3f). Parameral lobes uniformly width; phalobase suboval with the same width than base of parameral lobes, foremargin bisinuous (Fig. 4d, see arrow). Aedeagus as in Fig. 5f.

Distribution

In Argentina recorded from Misiones and Santiago del Estero (Fig. 10).

Epicauta fulvicornis (Burmeister 1881)

Cantharis fulvicornis Burmeister, 1881: 29; Berg, 1881: 307.

Epicauta fulvicornis: Bruch, 1914: 404; Bosq, 1934: 11; Denier, 1935: 155; Hayward, 1942: 22; Blackwelder, 1945: 483; Martínez, 1992: 6; Di Iorio, 2004: 168.

Epicauta testaceicornis Pic, 1916: 8; Denier, 1935: 155.

Lytta fulvicornis Borchmann, 1917: 94.

Epicauta fourcadei Denier, 1939: 179; Blackwelder, 1945: 483. New synonymy.

Type material

There are two type specimens of *Cantharis fulvicornis* (Nos 4169 and 4170) deposited at MACN (Buenos Aires, Argentina). The holotype of *Epicauta fourcadei* (No. 566/1–3) is deposited at MLPA (La Plata, Argentina).

Taxonomic remarks

Epicauta fulvicornis is similar to *E. fourcadei* in several features as color, male, and female genitalia. For these reasons I consider these species, *E. fourcadei* and *E. fulvicornis*, as a single specific entity whose valid name is *Epicauta fulvicornis* by priority.

Material examined

ARGENTINA 8♀♀ from Chaco: General Vedia (Coll. Denier 25.XI.1936); 2♂♂ La Rioja: (Coll. Breyer, without indication date of); 3♂♂ Formosa: Las Lomitas (Coll. Denier 12.XII.1936); 1♀ Santa Fe: Reconquista (Coll. Masera X.1942). 26 (sex not determined) Chaco: Fontana (Coll. Denier J. D, 27.XI.1942); Resistencia (Coll. P. Denier X.1935), Villa Ángela (15.II.1937); Corrientes: San Roque (Coll. Bosq II.1920); Entre Ríos: Diamante (Coll. J. Noriega-Campos 5–10.III.2009); Formosa: Pirané (Coll. Biraben M 15.XI.1942); Santa Fe: Villa Ana (Coll. Hayward 21–30.X.1933).

Diagnosis

Head, pronotum, elytra and abdomen with tegument black; antennae, palpus, and legs pale orange. *Epicauta fulvicornis* is easy to distinguish from the remaining species of the group mainly by antennae, palpus, and legs pale orange.

Redescription

Body length 10–12 mm (Fig. 6e). Pubescence minimal or sparse, cinereous; elytra with small sub-depressed denuded spots, with single short and erect setae at centre. Tegument of head, pronotum, elytra and abdomen black; antennae, palpus and legs pale orange.

Habitus. Head 1.0× or 0.78× as long as wide; eyes evidently bulging, with mild emargination in front of antennal insertion, ventral lobe rounded at base; last segment of maxillary palpi divergent on basal third, then subparallel in 2/3 apical; labrum with foremargin emarginated; antennae subcylindrical or bulged; ratios length vs. width of

antennomeres in female ($L_{\text{SAnt}}/W_{\text{SAnt}}$): 2 (I); 1.5 (II); 2.5 (III); 1.5 (IV–XI); male 5 (I); 4 (II); 7 (III); 5 (IV–X); 7 (XI). Pronotum 1.06× as long as wide, sides moderately divergent to widest point, then subparallel. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra with sides progressively divergent from the base to the apex.

Female genitalia. Spermathecal duct with the same length and width than vagina; accessory gland expanded at apical third. Gonocoxite with ventrolateral basal lobe with curved projection; stylus with setae distributed on apical third.

Male genitalia. Spiculum gastrale plate-like bilobed; apodema straight (Fig. 3g). Parameral lobes tapering to the apex; phalobase 1.3× wider than base of parameral lobes, foremargin subrectilinear (Fig. 4e, see arrow). Aedeagus as in Fig. 5h.

Intra-specific variation

The intra-specific variation occurs mainly in head (transverse or subquadrate), antennomeres (subcylindrical, bulged or bulged only from antennomeres IV–XI), form of the eyes (very convex, markedly projected over the surface of the head capsule or convex, slightly projected over the surface of the head capsule).

Distribution

Argentina and Paraguay. In Argentina was recorded from Corrientes, Formosa, Santiago del Estero, Salta, and Tucumán (Denier 1940; Martínez 1992). New records from provinces are Chaco, Entre Ríos and Santa Fe (Fig. 11).

Host plants

Malvaceae: *Gossypium hirsutum*. Solanaceae: *Solanum tuberosum* (Denier 1935; Hayward 1942, 1960; Bosq 1943; Viana & Williner 1974). Amarantaceae: *Amaranthus quitensis* (new host).

Epicauta koheleri Denier 1940

Epicauta koheleri Denier, 1940: 420; Bosq, 1942: 11; Viana & Williner, 1974: 11; Di Iorio, 2004: 168.

Material examined

ARGENTINA 5 ♂♂ from Mendoza: (Coll. Marsoner I-II.1945). 313 (sex not determined) Mendoza: Potrerillo (Coll. Marsoner I-III.1945); Neuquén: La Negra (25. II.1964), Las Lajas (Coll. Köehler E XII.1932); Piedra del Águila (Coll. Gain A. 10. XI.1955); Río Agrio (Coll. Köelher); Zapala; Santa Cruz; Río Negro: Choele Choele. BOLIVIA Nor Yungas (IV.1931), La Paz, Chulumani (Coll. Denier P 30. III.1930).

Diagnosis

Head and pronotum with tegument dark and shiny. Profemur with pubescence uniformly distributed, meso- and metafemur with small maculae. *Epicauta koheleri* is easy to distinguish from the other species of the group mainly by the dark shiny tegument, pubescence yellowish gray and meso- and metafemur with small maculae.

Redescription

Body length 8–13 mm (Fig. 6f). Pubescence sparse yellowish gray; femora and tibiae with dark brow setae at apical third, profemur with setae uniformly distributed, meso- and metafemur with small maculae; tarsi with dark brown setae; pronotum with two denuded spots adjacent to the midline; elytra with big sub-depressed maculae, with short and erect setae at centre. Tegument head and pronotum dark and shiny.

Habitus. Head 0.75× as long as wide; eyes slightly bulging, with mild emargination in front of antennal insertion, ventral lobe tapered at base, last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third); labrum with foremargin subrectilinear; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third); ratios length vs. wide antennomeres in both sexes (L_{SAnt}/W_{SAnt}): (1.6 (I); 2 (II); 3 (III); 2 (IV–X); 3 (XI), antennomeres IV–XI compressed dorso-ventrally. Pronotum 0.88× as long as wide, sides moderately divergent to widest point, then subparallel. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra with base 1.5× wider than posterior base of pronotum; sides progressively widened from base to the apex.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema markedly curved (Fig. 3h). Parameral lobes tapering to apex; phalobase suboval, with the same width than base of parameral lobes, foremargin bisinuous (Fig. 4f, see arrow). Aedeagus as in Fig. 5i.

Distribution

Argentina and Bolivia. In Argentina it is recorded from Buenos Aires; Chubut; Mendoza; Neuquén; San Juan; Santa Cruz; Santa Fe; Río Negro (Denier 1940; Bosq 1942; Viana & Williner 1974) (Fig. 12).

Host plants

Solanaceae: *Solanum tuberosum*. Fabaceae: *Vicia sativa*, *Vicia faba* (Bosq 1942; Di Iorio 2004).

Epicauta lizeri Denier 1934

Epicauta lizeri Denier, 1934: 271; Denier, 1940: 421; Blakwelder, 1945:483.

Type material

The holotype, allotype, and eight paratypes (N° 571/1; 571/2; 571/3–6) are deposited at MLPA (La Plata-Argentina); two paratypes (N° 4183; 4184) are deposited at MACN

(Buenos Aires-Argentina). They were collected in Bolivia (Lagunillas) and in several provinces of Argentina (Catamarca, Chaco, La Rioja, Jujuy, Santiago del Estero, and Tucumán).

Material examined

ARGENTINA 3♀♀ from Tucumán: Lagunita 3000m (Coll. Breyer C.A I-1903). BOLIVIA 1♂ from Santa Cruz de la Sierra: Lagunillas (Coll. Pedro Denier XI.1917) 49 (sex not determined) Catamarca: Lorohuasi (Coll. Weiser V I.1924), Villa Santa María; Salta: El Tunal (XI. 1933); Metán (Coll Köelher 1935); Tucumán: Amaicha del Valle (Coll. R A III. 1927).

Diagnosis

Head, pronotum, elytra and abdomen with tegument black; antennae, palpi and legs dark orange. *Epicauta lizeri* is easily confused with *E. adspersa*, *E. atomaria* and *E. nigropunctata*. They are distinct mainly in the color of pubescence and tegument.

Redescription

Body length 13–14 mm (Fig. 6g). Pubescence sparse cinereous; pronotum with two denuded spots adjacent to the midline; elytra with big maculae, with short and erect setae at centre. Tegument of head, pronotum, elytra and abdomen dark; antennae, palpi, and legs dark orange.

Habitus. Head 0.86× as long as wide; eyes only slightly bulging, with mild emargination in front of antennal insertion; last segment of antennal insertion divergent at basal third and subparallel at 2/3 apical; labrum with foremargin emarginated; ratios length vs. wide of antennomeres in both sexes ($L_{\text{Sant}}/W_{\text{Sant}}$): 2 (I); 1.5 (II); 3 (III); 1.66 (IV–X); 3 (XI), antennomeres III–X slightly divergent at apex; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third). Pronotum 0.95× as long as wide, then gradually convergent behind. Legs with tarsal pads conforming two longitudinal rows of setae. Elytra with sides slightly widened from the base to the apex.

Female genitalia. Spermathecal capsule with a swelling near the base; spermathecal duct thin, with the same length than vagina; vagina 1.3× wider than spermathecal duct. Gonocoxite with ventrolateral basal lobe with straight projection; stylus with setae distributed at apex.

Distribution

Argentina and Bolivia. In Argentina it is recorded from Catamarca (Valle de Catamarca and Loro Huasi); Chaco (Charata); Jujuy; La Rioja (Huanchín and Nonogasta); Santiago del Estero (Bruch 1914; Bosq 1942; Hayward 1942; Viana & Williner 1973; Martínez 1992). New recorded is from ARGENTINA: Tucumán (Lagunita) (Fig. 13).

Epicauta minutepunctata Borchmann 1930

Epicauta minutepunctata Borchmann, 1930: 94; Denier, 1935: 157; Blackwelder, 1945: 483.

Epicauta rosilloi Martínez, 1952: 255. New synonymy.

Type material

The holotype of *E. minutepunctata* (No. 4187) and one part of types of *E. rosilloi* (No. 4213–4259) are deposited at MACN (Buenos Aires-Argentina). One Syntype of *E. rosilloi* is deposited at MLPA (La Plata-Argentina) (No. 582/1).

Taxonomic remarks

After the examination of the types, I conclude that *Epicauta minutepunctata* is equal to *E. rosilloi* in several features as color, male and female genitalia. Therefore I consider these two species, *E. minutepunctata* and *E. rosilloi*, as a single specific entity whose valid name is *Epicauta minutepunctata* Borchman 1930 for priority.

Material examined

ARGENTINA 2♂ and 1♀ from Salta: Orán “Agua Blanca” (Coll. Monrós F 24. XI.1948) 1♀ from Jujuy: 1250 m (Coll. Weyrauch 4.I.1962). 8 (sex not determined) from Jujuy: Ledesma (Coll. Monrós 1–2.XII.1948); Salta: Orán “Agua Blanca” (Coll. Monrós 24.XI.1948); San Luis: San Francisco (Coll. Willink & Tomsic 6.III.1958); Tucumán: Raco (Coll. Stange L 18.I.1973), Taficillo 1700 m (Coll. De la Sota I.1959), Departamento de Trancas “Tacanas” (Coll. Monrós & Golbach III.1948).

Diagnosis

Pubescence yellowish gray, setae short and decumbent; pronotum with two big denuded spots adjacent to the midline; elytra with small sub-depressed maculae, maculae with single, short, and erect setae at centre. *Epicauta minutepunnctata* is easily to distinguish from the other species of the group mainly the color of tegument: head, pronotum, elytra, and abdomen black, legs dark brown; pubescence yellowish gray; elytra with small maculae.

Redescription

Body length 10–13 mm (Fig. 6h). Pubescence sparce yellowish gray; femora and tibiae with dark brown setae in distal third, tarsi with dark brown setae; pronotum with two denuded spots adjacent to the midline; elytra with small sub-depressed maculae, with short and erect setae at centre. Tegument of head, pronotum, elytra, and abdomen black; legs dark brown.

Habitus. Head 0.55× as long as wide; eyes only slightly bulging, with mild emargination in front of antennal insertion, ventral lobe tapered at base; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third);

labrum with foremargin emarginated; ratios length vs. wide of antennomeres in both sexes ($L_{\text{Sant}}/W_{\text{Sant}}$): 1.6 (I); 2 (II); 3 (III); 2.5 (IV–X); 3 (XI). Pronotum 0.95× as long as wide, sides moderately divergent to widest point, then gradually convergent behind. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra with sides slightly divergent from base to apex.

Female genitalia. Spermathecal duct with the same width and 1.2× longer than vagina; accessory gland expanded at apical third. Gonocoxite with ventrolateral basal lobe with curved projection; stylus with setae distributed on apical third.

Male genitalia. Spiculum gastrale plate-like bilobed; apodema with apex markedly curved (Fig. 3e). Parameral lobes uniformly width; phalobase with the same width than base of parameral lobes, foremargin markedly emarginated (Fig. 4c, see arrow). Aedeagus as in Fig. 5j.

Distribution

In Argentina is recorded from Catamarca; Jujuy; Salta (Coronel Moldes, Orán); San Luis (San Francisco); Tucumán (El Cadillal, El Siambón, Departamento de Trancas, Raco, Tafi Viejo, Taficillo, Villa Nogués) (Fig. 14).

Host plants

Solanaceae: *Nicotiana tabacum*, *Nicotiana rustica*, *Nicotiana glauca* (locally named palan palan) (Martínez 1952).

Epicauta nigropunctata (Blanchard 1843)

Cantharis nigropunctata Blanchard, 1843: 200; Geminger & Harold, 1870: 2152.

Cantharis nigropunctata: Burmeister, 1881: 28 (partim).

Epicauta nigropunctata: Borchmann, 1917: 79; Denier, 1935: 158; Blackwelder, 1945: 483; Bosq, 1942: 11; Di Iorio, 2004: 170.

Epicauta breyeri Denier, 1934: 273; 1935: 154; Blackwelder, 1945: 482. New synonymy.

Type material

The holotype and two paratypes (556/1; 556/3–4) of *Epicauta breyeri* are deposited at MLPA (La Plata-Argentina).

Taxonomic remarks

After the examination of the types, it results that *Epicauta nigropunctata* is equal to *E. breyeri* in several features as color, male and female genitalia. Therefore I consider *E. breyeri* and *E. nigropunctata* as a single specific entity whose valid name is *Epicauta nigropunctata* Blanchard, 1843 for priority.

Material examined

ARGENTINA 1♂ and 1♀ from Misiones: El Dorado (X.1958; and III. 1942). BOLIVIA 2 ♂♂ from Chulumani (Coll. Denier P 30.III.1930). 13 (sex not

determined) Chaco: El Zapallar (Coll. Biraben M 10.XI. 1941); Misiones: Apóstoles (Coll. Biraben M and Bezzi 6.XII.1942), San Ignacio (15–23.1927), San Javier (Coll. Biraben M 16.XII.1942), Pindapoy (X.1935). BOLIVIA Coroico.

Diagnosis

Pubescence cinereous. Tegument black. *Epicauta nigropunctata* is easily confused with *E. adspersa*, *E. atomaria* and *E. lizeri*. They are distinct principally in the color of pubescence and tegument.

Redescription

Body length 8–11 mm (Fig. 6i). Pubescence sparse cinereous; pronotum with two denuded spots adjacent to the midline; elytra with big sub-depressed maculae, with short and erect setae at centre. Tegument black.

Habitus. Head 0.87× as long as wide; eyes scarcely bulging, with mild emargination in front of antennal insertion, ventral lobe tapered at base; ratios length vs. wide of antennomeres in both sexes (L_{SAnt}/W_{SAnt}): 1.6 (I); 1.5 (II); 3.5 (III); 1.6 (IV–X); 3.5 (XI); compressed dorso-ventrally; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third); labrum with fore margin subrectilinear. Pronotum 1.2× as long as wide, sides moderately divergent to widest point, then subparallel. Legs with tarsal pads conforming two longitudinal robust rows of setae. Elytra with base 1.8× wider than base of pronotum, sides progressively widening from base to the apex.

Female genitalia. Spermathecal duct with the same width and 1.2× shorter than vagina; accessory gland expanded at apical third. Gonocoxite with ventrolateral basal lobe with straight projection; stylus with setae distributed on apical third.

Male genitalia. Spiculum gastrale plate-like bilobed; apodema with apex curved (Fig. 3i). Parameral lobes (in dorsal view) uniformly width; phalobase subcylindrical 1.3× wider than base of parameral lobes, foremargin emarginated (Fig. 4g, see arrow). Aedeagus as in Fig. 5g.

Distribution

Epicauta nigropunctata is cited for Argentina, Bolivia and Uruguay. In Argentina it is recorded from Córdoba and Misiones, in Uruguay it is recorded from Montevideo (Burmeister 1881; Bosq 1942) (Fig. 15).

Host plants

Fabaceae: *Crotalaria* sp. Solanaceae: *Nicotiana tabacum* (Bosq 1942; Di Iorio 2004).

Epicauta pluvialis Borchmann 1930

Epicauta pluvialis Borchmann, 1930: 95; Denier, 1935: 158; Bosq, 1942: 11; Blackwelder, 1945: 484; Viana & Williner, 1973: 14; 1974: 11; Martínez, 1992: 7; Di Iorio, 2004: 171.

Type material

Two syntypes and one paratype of *E. pluvialis* are in the part of the Borchmann collection, deposited at MACN (Buenos Aires, Argentina) (Nos 4201–4203).

Material examined

ARGENTINA 10♂♂ from Buenos Aires: Miramar (Coll. Sergio Roig I.1977); 10♀♀ from Mendoza: Agua Escondida (Coll. Roig S. 29.I.1979). 55 (sex not determined) Chubut: Puerto Madryn (Coll. Cheli G. 22.XII.2005); Mendoza: Malargüe, Azufre (Coll. Roig S. 28.I.1979), Puerto la Aguadita (Payunia) (Coll. Roig S. 6.I.2003); Challao (Coll. Roig A. II.1975), Chacras de Coria (Coll. Willink 31. I. 1974); Las Heras: 14 km NE Est. Tambillos (Coll. Roig S. 13.I.1999); Luján: Barrancas (Coll. Claver S. 3.I.1993; and Coll. Roig S. 3.X.1993); Villavicencio (Coll. Flores G. 6.I.1997).

Diagnosis

Tegument shiny; head, pronotum, elytra, and abdomen black; legs orange with femur-tibiae junction dark, tarsi with apex dark-brown; disk with sexual dimorphism, female with a pair of foveolas in the basal third, on both sides of the midline; male normal. Pubescence with sexual dimorphism; female pubescence sparse, male minimal distributed mainly in ventro-lateral region.

Redescription

Body length 8–13 mm (Fig. 6j–l). Pubescence with sexual dimorphism, female pubescence sparse (Fig. 6k–l), male minimal distributed principally in ventro-lateral region (Fig. 6j); cinereous; elytra with big sub-depressed maculae with single, short, and erect setae at centre. Tegument dark; legs orange, femur-tibiae junction dark color, tarsi with apex dark-brown.

Habitus. Head 0.8× as long as wide; eyes only slightly bulging, with mild emargination in front of antennal insertion, ventral lobe rounded; frons surface impressed; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third); labrum with foremargin emarginated; ratios length vs. width in females ($L_{\text{Sant}}/W_{\text{Sant}}$): 1.6 (I); 2 (II); 3 (III); 2.5 (IV–X); 3 (XI); male 1.6 (I); 2 (II); 3.5 (III); 2.5 (IV–X); 3 (XI). Pronotum 0.97× as long as wide, sides moderately divergent to widest point, then subparallel; disk with sexual dimorphism, pronotal surface in female with a pair of foveolas adjacent to the midline; pronotal surface in male normal; midline slightly marked, impressed on apical third. Legs with tarsal pads conforming two longitudinal rows of robust setae. Elytra with sides progressively widened from base to apex.

Female genitalia. Spermathecal duct with the same length and width than vagina; accessory gland expanded at proximal third. Gonocoxite with ventrolateral basal lobe with straight projection; stylus with setae distributed at apex.

Male genitalia. Spiculum gastrale plate-like bilobed, apodema straight (Fig. 3j). Parameral lobes uniformly width; phalobase with the same width than base of parameral lobes, foremargin bisinuous (Fig. 4d, see arrow). Aedeagus as in Fig. 5h.

Distribution

In Argentina *E. pluvialis* is recorded from Buenos Aires; Córdoba (Los Cocos, La Falda and La Cumbre); La Pampa; Mendoza (El Sosneado, Las Chacritas and San Rafael); San Luis (Carolina, Potrero de los Funes and El Volcán); Río Negro (Bosq 1942; Viana & Williner 1973; 1974). Salta (Departamento Cerrillos, La Viña) (Martínez 1992). New records are from ARGENTINA: Chubut (Puerto Madryn) (Fig. 16).

Host plants

Solanaceae: *Caspicum* sp., *Caspicum annum* sp., *Lycopersicum esculentum*, *Solanum tuberosum* (Martínez, 1992). Amaranthaceae: *Amaranthus* sp., *Chenopodium* sp. (Bosq 1942; Di Iorio 2004).

Epicauta rubella Denier 1940

Epicauta rubella Denier, 1940: 182; Blackwelder, 1945; Martínez, 1992: 8.

Type material

Holotype and allotype are deposited at MLPA (La Plata-Argentina). Additional types were deposited in the entomological collection of Fritz Borchmann (Hamburg), which was destroyed during the Second World War.

Material examined

ARGENTINA 3♀♀ from Salta: Departamento Salta Forestal (Coll. Golbach, R. 15–22.I.1980). PARAGUAY 2♂♂ from Puerto Max: (labels without indication of collector and date collection).

Diagnosis

Tegument pale brown. Pubescence pale brown.

Redescription

Body length 11–16 mm (Fig. 6m–n). Pubescence sparse pale brown; pronotum with two denuded spots adjacent to the midline; elytra with small sub-depressed maculae and a single, short, erect setae at centre. Tegument pale brown.

Habitus. Head 0.86× as long as wide; eyes only slightly bulging, with mild emargination in front of antennal insertion, ventral lobe tapered at base; last segment of maxillary palpi gradually divergent towards apex (maximum width at apical third); labrum with foremargin emarginated; ratios length vs. width in both sexes ($L_{S_{Ant}}/W_{S_{Ant}}$):

2.33 (I); 1.5 (II); 4 (III); 1.6 (IV–X); 4 (XI). Pronotum 0.73× as long as wide, sides moderately divergent to widest point, then subparallel. Legs with tarsal pads conforming two longitudinal robust rows of setae. Elytra with sides progressively widened from base to apex.

Male genitalia spiculum gastrale plate-like bilobed, apodema with apex markedly curved (Fig. 3e). Parameral lobes uniformly width, foremargin markedly emarginated (Fig. 4c, see arrow); phalobase suboval with the same width than base of parameral lobes. Aedeagus as in Fig. 5h.

Distribution

Argentina and Paraguay. In Argentina it is recorded from Salta (Serro San Bernardo, Esteco, Güemes, San Martín); in Paraguay from Puerto Max (Fig. 17).

Host plants

Martínez (1992) recorded this species on Mimosoidea (Fabaceae).

Discussion and Conclusion

The tree obtained in the IW analysis shows that the *E. maculata* group, as defined by Pinto (1980, 1991), was not a monophyletic unit because it excluded the South American species (*E. adspersa*, *E. atomaria*, *E. cavernosa*, *E. dilatipennis*, *E. fulvicornis*, *E. koheleri*, *E. lizeri*, *E. minutepunctata*, *E. nigropunctata*, *E. pluvialis* and *E. rubella*) (Fig. 2, see square A).

Among the five synapomorphies that support this group (from *E. maculata* to *E. abeona*), only the *elytra maculae* (25¹) had been used by previous authors (Werner 1944, 1945; Pinto 1975, 1980, 1991), the remaining characters, here recovered as synapomorphies (10², 11², 26² and 56¹), had not been previously considered. Thus, we propose these new characters to define the group: head and pronotum sculpturing foveolate-punctulate (10²), elytra sculpturing areolate (11²), abdomen revetment distributed irregularly marking different denuded spots (26²) and metatibial spurs in both sexes 56¹.

Pinto (1980) grouped most of the North American species belonging to *E. maculata* group into two subgroups: the *E. pardalis* subgroup (*E. andersoni*, *E. magnomaculata*, *E. pardalis* and *E. ventralis*) and the *E. maculata* subgroup (*E. apache*, *E. jeffersi*, *E. maculate*, *E. normalis* and *E. phoenix*). *Epicauta abeona*, *E. ocellata*, *E. proscripta* were treated as *inserta sedis* and *E. horni* was included later (Pinto 1991). Since then, the 11 species from South America have been treated individually and never placed in any species group.

In our analysis, we observe that the North American (from *E. apache* to *E. abeona*) and South American taxa (from *E. cavernosa* to *E. fulvicornis*) are grouped into two different clades (Fig. 2, squares A and B) with *E. maculata* as the sister species (Fig. 2, see arrow); and the clade conformed the species-group originally proposed by Pinto

Table 3. Homoplasy for each character.

	0	1	2	3	4	5	6	7	8	9
0	–	0.88	0.57	0.25	0.40	0.25	0.40	0.63	0.63	0.57
10	0.25	0.00	0.40	0.82	–	–	–	1.20	0.25	0.25
20	0.77	0.40	0.70	0.70	0.25	0.67	0.25	1.07	0.75	0.80
30	0.67	0.00	0.57	0.70	0.40	0.50	0.63	0.25	0.73	–
40	0.67	–	1.67	0.57	0.25	0.75	0.75	0.50	0.75	0.00
50	0.25	0.25	0.40	–	0.57	0.67	0.75	–	–	0.67
60	0.80	0.73	0.25	0.75	0.25	0.67	0.25	0.75	0.63	0.40
70	0.00	0.25	0.73	–	0.63	0.25	0.50	0.50	–	0.40
80	0.40	0.57								

(1980) (from *E. apache* to *E. abeona*) includes different clades with *E. apache* as the sister species (Fig. 2, square B). Despite these results, the clades show low support, principally because they have many homoplasious characters (Table 3). For this reason we maintain the validity of the *E. maculata* group, but redefine it to include the South American species, considering that further subdivisions of this species-group are unnecessary.

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