

# INSECTA MUNDI

A Journal of World Insect Systematics

---

0114

Preliminary report on the Myrmeleontidae  
(Neuroptera) of Paraguay

Lionel A. Stange  
Florida State Collection of Arthropods  
P.O. Box 147100  
Gainesville, Florida, 32614-7100, U.S.A.

Date of Issue: January 22, 2010

Lionel A. Stange  
Preliminary report on the Myrmeleontidae (Neuroptera) of Paraguay  
Insecta Mundi 0114: 1-14

**Published in 2010 by**

Center for Systematic Entomology, Inc.  
P. O. Box 141874  
Gainesville, FL 32614-1874 U. S. A.  
<http://www.centerforsystematicentomology.org/>

**Insecta Mundi** is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod taxon. Manuscripts considered for publication include, but are not limited to, systematic or taxonomic studies, revisions, nomenclatural changes, faunal studies, book reviews, phylogenetic analyses, biological or behavioral studies, etc. **Insecta Mundi** is widely distributed, and referenced or abstracted by several sources including the Zoological Record, CAB Abstracts, etc.

As of 2007, **Insecta Mundi** is published irregularly throughout the year, not as quarterly issues. As manuscripts are completed they are published and given an individual number. Manuscripts must be peer reviewed prior to submission, after which they are again reviewed by the editorial board to insure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

**Managing editor:** Paul E. Skelley, e-mail: [insectamundi@gmail.com](mailto:insectamundi@gmail.com)

**Production editor:** Michael C. Thomas, e-mail: [insectamundi@gmail.com](mailto:insectamundi@gmail.com)

**Editorial board:** J. H. Frank, M. J. Paulsen

**Subject editors:** J. Eger, A. Rasmussen, F. Shockley, G. Steck, A. Van Pelt, J. Zaspel

**Printed copies deposited in libraries of:**

CSIRO, Canberra, ACT, Australia  
Museu de Zoologia, São Paulo, Brazil  
Agriculture and Agrifood Canada, Ottawa, Ontario, Canada  
The Natural History Museum, London, England  
Muzeum i Instytut Zoologii Pan, Warsaw, Poland  
National Taiwan University, Taipei, Taiwan  
California Academy of Sciences, San Francisco, CA, USA  
Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA  
Field Museum of Natural History, Chicago, IL, USA  
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA

**Electronic copies in PDF format:**

Printed CD mailed to all members at end of year.

Florida Center for Library Automation: <http://purl.fcla.edu/fcla/insectamundi>

University of Nebraska-Lincoln, Digital Commons: <http://digitalcommons.unl.edu/insectamundi/>

**Author instructions** available on the Insecta Mundi page at:

<http://www.centerforsystematicentomology.org/insectamundi/>

Printed Copy	ISSN 0749-6737
On-Line	ISSN 1942-1354
CD-ROM	ISSN 1942-1362

## Preliminary report on the Myrmeleontidae (Neuroptera) of Paraguay

Lionel A. Stange

Florida State Collection of Arthropods  
P.O. Box 147100  
Gainesville, Florida, 32614-7100, U.S.A.  
stangel@doacs.state.fl.us

**Abstract.** Ten species of antlions are confirmed as present in Paraguay and seven additional species are suspected to be present there. All of the species are found also in Argentina and Brazil except for *Eremoleon pulchra* (Esben-Petersen) which is endemic to Paraguay. A key to the adults is provided as well as distributional data for Paraguay with two new country records (*Ameromyia dimidiata* Navás and *Austroleon dispar* (Banks)).

**Resumen.** Se documentan diez especies de Myrmeleontidae en Paraguay con otras siete especies conocidas de países limítrofes probablemente también presentes en Paraguay. Todos las especies están presentes también en Argentina y Brazil salvo *Eremoleon pulchra* (Esben-Petersen) que parece ser endémica. Se presenta una clave para las especies y también datos sobre distribución en Paraguay con dos registros nuevos *Ameromyia hirsuta* Navás y *Austroleon dispar* (Banks).

### Introduction

Little is known about the antlions of Paraguay. One endemic species, *Eremoleon pulchra* (Esben-Petersen) was described from Paraguay and only the holotype is known. Two species, *Austroleon dispar* Banks and *Ameromyia dimidiata* Navás are new records. Ten species are verified for Paraguay. Seven other species [*Dimares elegans* (Perty), *Dimarella riparia* (Navás), *Elachyleon punctipennis* Esben-Petersen, *Vella fallax* (Rambur), *Ameromyia hirsuta* Navás, *Ameromyia protensis* (Gerstaecker) and *Austroleon immitus* (Walker)] are known from Argentina and Brazil and probably occur in Paraguay. A key to these seven species along with the ten verified species in Paraguay is provided. Relatively little antlion collecting has been done in Paraguay, especially for the larvae which are usually easier to find than the adults. Additional species probably occur in Paraguay which has quite diverse habitats, including Chaco and tropical rainforest.

### Materials

Materials studied are deposited in the following list of institutions with acronyms based on Arnett et al. (1983).

BMNH — The Natural History Museum, London, England.

EMAU — Ernst-Moritz-Arndt Universität Greifswald, Zoologisches Institut und Museum, Greifswald, Germany.

FSCA — Florida State Collection of Arthropods, Gainesville, Florida.

MCZC — Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

MNHN — Museum National d'Histoire Naturelle, Paris, France.

MZBS — Museo Zoología, Barcelona, Spain.

NHMW — Naturhistorisches Museum, Vienna, Austria.

ZMHB — Museum für Naturkunde der Humboldt Universität zu Berlin, Bereich Zoologisches Museum, Berlin, Germany.

ZMUC — Zoologisk Museum, University of Copenhagen, Copenhagen, Denmark.

ZSMC — Zoologische Sammlung des Bayerischen Staates, Munich, Bayern, Germany.

### SUBFAMILY PALPARINAE

#### TRIBE DIMARINI

##### 1. *Dimares elegans* (Perty) 1833

(Figure 1)



**Figure 1-4.** Habitus photographs. **1)** *Dimares elegans* (Perty) [holotype female of *Myrmeleon conicollis* Walker]. **2)** *Dimarella riparia* Navás lectotype male. **3)** *Dimarella praedator* (Walker) holotype female. **4)** *Eremoleon pulchra* (Esben-Petersen) holotype female. **5)** *Glenurus peculiaris* (Walker) [holotype of *Glenurus brasiliensis* Navás]. **6)** *Ameromyia hirsuta* Navás [holotype female of *Ameromyia longiventris* Navás]. **7)** *Argentoleon longitudinalis* (Navás) holotype female. **8)** *Austroleon immitus* (Walker) holotype female.

*Dimares elegans* (Perty) 1833: 125, Plate xxv, figure 5 (color drawing of female). **Holotype female**, Flumen S. Francisci (Brazil) (ZSMC).

**Further description.** Walker 1853: 395; Navás 1923b: 768; Markl 1954: 196, 203, 204, 217, figure 10, 41, 44, 65 (venation); Riek 1976: 301, figure 5 (nota, base wings); Stange 1989: 453, figure 2, 4, 10 (hind tarsus, male genitalia), 6-7 (photo wings).

**Biology.** Stange 1989: 458, figure 15 (larva); Stange and Miller 1990: 153, figure 1 (photo larva).

**Known distribution.** Argentina; Bolivia; Brazil; Paraguay.

**Diagnosis. Adult:** Labial palpus elongate, thread-like, with palpimacula extending around the apex and nearly reaching opposite side; fore femoral and mid femoral sense hair absent; tarsal claws well developed, more than 3x longer than width of tarsomere; pretarsal claws of hind leg much longer than hind basitarsus; male paramere with long hook, tooth apically, no teeth along mesal margin; male pilula axillaris absent. **Coloration:** Sexual dichromatism present, males with essentially unmarked wings, females usually with numerous brown spots or bands. **Larva:** Mandible with three blunt-tipped teeth; sternite VIII with well-developed submedian tooth; sternite IX with two pairs of highly modified digging setae.

#### SUBFAMILY MYRMELEONTINAE TRIBE NEMOLEONTINI

##### 2. *Dimarella praedator* (Walker) (Figure 2)

*Myrmeleon praedator* Walker 1853: 391. **Holotype female**, Santarem, Brazil (BMNH).

= *Nobra martinsi* Navás 1915b: 6, figure 2 (base fore wing) (after Miller and Stange 1989: 26). **Syntype females**, Río Purus, Brazil, 1904 (MNHN).

= *Nobra silvaticus* Navás 1918: 6, figure 13 (tarsus; base fore wing) (after Miller and Stange 1989: 26). **Holotype female**, Mato Grosso, Brazil (La Plata).

**Further description.** Miller and Stange 1989: 26, figure 40 (abdomen).

**Biology.** Miller and Stange 1989: 26, figure 42 (labial palpus, larva).

**Known distribution.** British Guiana; Paraguay; Perú; Surinam; Venezuela.

**Diagnosis. Adult:** Antennal fossa separated from ocular rim by more than greatest width of pedicel; mid leg shorter than fore leg which is shorter than hind leg; mesoscutum with white bristles; subcostal and radial veins closely approximated by much less than diameter of subcostal vein well before their fusion at stigmal area; postventral lobe of male ectoproct less than one-half length of eighth abdominal segment. **Coloration:** Abdomen usually mostly dark brown with pale markings. **Larva:** Distal palpomere of labium pale brown with sensory opening weakly swollen; pronotum with about ten peg-like setae in a row from anterior margin of posterior dark brown spot to anterior margin; setae near middle of dorsal head capsule not obviously expanded from base and less than four times longer than greatest width; ventral head capsule with submedian dark brown spot near middle; base of pale brown fore coxa with small dark brown area; area between fore coxae pale brown.

**Material studied. PARAGUAY. Alto Parana:** Estancia Dimas, 650'. 25°32' S, 55° 13' W, 7-10.II.2008, U. Dreschel, (3f, FSCA). **Caazapá:** Golondrina, 660', 25° 32'S, 55° 29' W, 14-19.III.2009, U. Dreschel, (4f, FSCA); **Kanindayí:** Carapa, 230', 24°22'S, 54° 25'W, 1-10.XII.2007, U. Dreschel (1f, FSCA). **San Pedro:** Carumbé, I.28.2005, R. Golbach (1f, FSCA).

**3. *Dimarella riparia* (Navás)**

(Figure 3)

*Nobra riparia* Navás 1918: 16. **Lectotype male**, Santa Fe, Argentina, 19.I.1917 (MZBS), designated by Stange 1967: 59.

= *Dimarella pallida* Navás 1933: 89 (after Stange 1967: 59). **Holotype female**, San Miguel, Argentina, 25.XI.1932 Bridarolli (MZBS).

**Further description.** Miller and Stange 1989: 23.

**Known distribution.** Argentina; Brazil; Uruguay.

**Diagnosis. Adult.** Body length 21 to 24 mm (females) or 24 to 26 mm (males); fore wing length 24 to 27 mm., antennal fossa separated from ocular rim by more than greatest width of pedicel; mid leg shorter than fore leg which is shorter than hind leg; subcostal and radial veins in both wings widely separated by at least diameter of subcostal vein well before their fusion at stigmal area; postventral lobe of male ectoproct longer than eight abdominal segment. **Coloration:** Head mostly pale brown, with extensive reddish brown vertex scars, submedial dark spots at posterior margin of vertex, shiny fuscous band above antennal fossae, broken by pale brown medially, above which separated by pale area; narrow shiny fuscous band below antennal fossa; pronotum gray brown, paler. **Larva:** unknown.

**4. *Elachyleon punctipennis* Esben-Petersen**

*Elachyleon punctipennis* Esben-Petersen 1927: 348. **Holotype**, St. Augustine, Trinidad, 20. V.1925 (BMNH).

= *Elachyleon punctipennis pulchellus* Esben-Petersen 1933: 113, figure 4 (wings). **Syntype female**, Las Mercedes, Costa Rica, 27.IV.1922, Nevermann (Hamburg, destroyed).

**Further description.** Markl 1954: 199, figure 27 (venation); Stange 1963: 815, figure 1, 5, 14, 15 (front view of head; fore wing; male genitalia).

**Known distribution.** Argentina; Brazil; Costa Rica; Mexico; Surinam; Trinidad.

**Diagnosis. Adult:** Pretarsal claws capable of closing against setal brush on distal tarsomere with tips of setae bent at nearly 90 degree angle; distal tarsomere of fore leg shorter than basal four tarsomeres together; fore wing less than 25 mm. long; fore wing radial sector arises well before cubital fork; antenna with about 36 flagellomeres with the basal 25 flagellomeres longer than wide; legs extremely long and pale brown with numerous black spots. Male abdomen shorter than wings; male parameres flat plates with cobblestone pattern.; Female posterior gonapophysis less than 1.5 times longer than wide, strongly narrowed apically. **Coloration:** Pronotum mostly pale yellow with long erect setae; fore wing with many dark brown marks; hind wing with prominent hypostigmal dark brown spot; wing venation mostly pale brown with dark brown streaks at many of the cross veins and a prominent dark spot where the posterior fork of CuA approaches the hind margin of the fore wing. **Larva:** unknown.

**5. *Eremoleon pulchra* (Esben-Petersen)**

(Figure 4)

*Joergenia pulchra* Esben-Petersen 1933: 118, figure 89 (wings). **Holotype female**, Paraguay, II.1932, P. Joergensen (ZMUC)

**Known distribution.** only Paraguay.

**Diagnosis. Adult:** Antennal flagellomere III as long as wide or longer than wide; fore wing costal area narrowing toward stigma, costal cells before stigma about one-half as high as above radial sector (Figure

4); wing veins nearly all pale brown; fore wing and hind wing with prominent dark spot; antennal flagellomere 3 wider than long; hind wing abruptly narrowed toward apex, lanceolate (Figure 4), with two well-separated dark brown spots. **Coloration:** Pronotum and mesoscutellum nearly completely bright yellow. **Larva:** unknown.

### 6. *Glenurus peculiaris* (Walker)

(Figure 5)

*Myrmeleon peculiaris* Walker 1860: 194. **Holotype female**, Brazil (BMNH)  
= *Glenurus brasiliensis* Navás 1920b: 416, figure 2 (hind wing) (after Stange 2004: 178). **Lectotype female**, Jaragua, Brazil (not located); lectoparatype female, S. Paulo, 1919, Barbellini (MZBS), designated by Navás 1923b: 771.

**Further description.** Costa Lima 1943: 99, figure 73 (wings); Markl 1954: 245, figure 83 (wings).

**Known distribution.** Argentina; Brazil; British Guiana; Paraguay; Surinam.

**Diagnosis. Adult:** Antennal fossa separated from ocular rim by less than greatest width of pedicel; mid leg as long or longer than fore leg; male ectoproct without postventral lobe; pretarsal claws not capable of closing against setal brush; all setae tapered; posterior gonapophysis of female terminalia weakly produced as a swelling; hind basitarsus longer than distal tarsomere. Mesoscutellum with moderately long, white setae laterally near posterior margin, some of which are longer than postnotum. **Coloration:** Pterothoracic pleura dark brown above, pale brown below; apical one-fifth of fore wing and hind wing with predominant brown suffusion in marked contrast to basal one-fifth; fore wing cross veins between CuP+1A and hind margin not margined except sometimes toward cubital fork (Figure 5); scape light brown to dark brown on both anterior and posterior surfaces. **Larva:** Mandible with two teeth; labial palpus 2-segmented; mesothoracic scoli with posterior pair longer than wide, about three times larger than anterior pair which are about equal in size to metathoracic scoli; abdominal segments I-VIII with lateral scoli, first pair about as long as wide, rest smaller; abdominal segment IX about as long as wide.

**Material studied. PARAGUAY. Paraguari:** Sapucay, II, 1900, Foster (1f, FSCA)

## TRIBE BRACHYNEMURINI

### 7. *Ameromyia dimidiata* Navás

*Ameromyia dimidiata* Navás 1915a: 464. **Holotype female**, Chaco de Santa Fe, Argentina (MNHN).  
= *Ameromyia baronei* Navás 1921: 49, figure 1 (base hind wing) (after Stange 1967:45). **Holotype female**, Santa Fe (Rep. Argentina), I. 1920, S. Carmelo Barone (MZBS).

**Known distribution.** Argentina; Brazil; Paraguay.

**Diagnosis. Adult:** Frons with dark brown setae; fore wing vein 2A runs in a fairly even curve toward 3A; fore wing vein CuP+1A parallels posterior branch of CuA for a distance, about equal to that between hind wing CuA and posterior branch of MP2; tarsal claws as long as distal tarsomere; hind wing not abruptly narrowed apically. **Coloration:** Fore wing radial and subcostal veins nearly concolorous before origin of radial sector; fore wing mediocubital area before medial fork with cells nearly completely suffused; fore wing vein MP1+2 and hind wing vein MP1 pale brown colored the same as radial and subcostal veins; vertex mostly pale brown at middle. **Larva:** unknown.

**Material studied. PARAGUAY. Hayes:** Puerto Galileo, 230' 25", 04'S 57°, 52'W. 5.III.2008, U. Dreschel (3m, 8f, FSCA).

**8. *Ameromyia hirsuta* Navás**

(Figure 6)

*Ameromyia hirsuta* Navás 1914a:50. **Holotype female**, Río Grande do Sul, Brazil, Sieglmayr (ZSMC). = *Moza longiventris* (Navás) 1917: 194, figure 4 (vertex, pronotum). **Holotype male**, Tehuel Malal, Río Negro, Argentina, 3.II.1915, R. Lehmann-Nitsche (La Plata). **New Synonym**. = *Ameromyia stevensi striolata* Navás 1922: 360 (after Stange 1967: 46). **Holotype female**, no data given (type not located).

**Known distribution.** Argentina; Brazil; Uruguay.

**Diagnosis. Adult:** Fore wing vein 2A runs in a fairly even curve toward 3A; fore wing vein CuP+1A parallels posterior branch of CuA for a distance, about equal to that between hind wing CuA and posterior branch of MP2; frons with numerous dark brown setae; tarsal claws as long as distal tarsomere. Greatest ocular width less than interocular distance; hind wing not abruptly narrowed apically. **Coloration:** Fore wing radial and subcostal veins with alternating dark brown and light brown areas; fore wing mediocubital area with dark brown spots covering only about one-half cell area; female hind wing with irregular dark brown streak through middle of narrowed apex (Figure 6); fore wing with prominent dark brown spots along radial vein. **Larva:** unknown.

**9. *Ameromyia protensis* (Gerstaecker)**

*Myrmeleon protensis* (Gerstaecker) 1893: 138. **Holotype female**, São Paulo, Brazil (EMAU). = *Foya trapezia* Navás 1914a: 54, figure 4 (base hind wing) (after Stange 1967: 47). **Holotype male**, Brazil (NHMW). = *Ameromyia alterna* Navás 1919: 296 (after Banks 1943: 163). **Syntypes male, female**, Banda Oriental, Uruguay (not located). = *Ameromyia decarloi* Navás 1923a: 189 (after Stange 1967: 47). **Holotype male**, Corrientes, Argentina, I.1921, De Carlo (not located).

**Taxonomy.** Esben-Petersen 1920: 193 (*trapezia* = *pubiventris* and *tendinosus*); Stange 1967: 47 (in *Ameromyia*).

**Known distribution.** Argentina; Brazil; Uruguay.

**Diagnosis. Adult:** Fore wing vein 2A runs in a fairly even curve toward 3A; fore wing vein CuP+1A parallels posterior branch of CuA for a distance, about equal to that between hind wing CuA and posterior branch of MP2; frons with numerous dark brown setae; tarsal claws as long as distal tarsomere. Posterior area of fore wing higher than prefork area below radial sector with cells that are about 1.5 times higher than long; posterior area of hind wing narrow, subequal in height to costal area at radial sector; hind wing cross veins between CuA and hind margin delimit cells that are much longer than high. **Coloration:** Fore wing radial sector mostly dark colored in contrast to all pale brown subcostal vein. **Larva:** unknown.

**10. *Argentoleon irrigatus* (Gerstaecker)**

*Formicaleo irrigatus* Gerstaecker 1893:133. **Holotype female**, São Paulo, Brazil (EMAU). = *Brachynemurus meridionalis* Banks 1909: 2 (after Stange 2004: 229). **Holotype female**, Sapucay, Paraguay, 30.I. (MCZC). = *Brachynemurus argentinus* Banks 1910:146 (after Stange 1967: 53). **Lectotype male**, Mendoza, Argentina, Jensen-Haarup (MCZC), designated by Stange 1961: 675. = *Clathroneuria amazonica* Navás 1914a:215 (after Esben-Petersen 1920b:193). **Holotype male**, Amazon, Brazil (NHMW).

- = *Austroleon clavatus* Navás 1915c: 126 (after Stange 1967:53). **Lectotype female**, Tapilique, Río Negro, Argentina, 5.III.1915, L. Nink (MACN).
- = *Austroleon alienus* Navás 1915b: 9 (after Navás 1935: 362; Stange 1967: 53). **Holotype female**, Alto Pencoso, San Luis (Argentina), II.1914, C. Bruch (La Plata).
- = *Austroleon antennatus* Navás 1919: 295 (after Stange 1967: 53). **Holotype male**, Puerto Madryn (Mastryln!), Chubut (Zaragoza, destroyed).
- = *Austroleon sectorius* Navás 1920c: 58 (after Stange 1967: 53). **Syntypes**, La Granja, Alta Gracia, Cordoba, 1-8.IV.1920, C. Bruch (not located).
- = *Austroleon stictogaster* Navás 1913: 13 (after Stange 2004: 229). **Holotype**, San Bernardino, Paraguay, 28.II., K. Fiebrig (MZBS).
- = *Austroleon latipennis* Banks 1922: 60 (after Stange 2004: 229). **Holotype**, Chapada, Brazil, H.H. Smith (MCZC).
- = *Austroleon graphonotus* Navás 1934: 15, figure 27 (vertex, nota) (after Stange 1967: 53). **Holotype female**, Arroyo Sanchez, Río Negro, Argentina (MZBS).

**Known distribution.** Argentina; Bolivia; Brazil; Paraguay; Uruguay; Venezuela.

**Diagnosis. Adult:** Frons without setae; antenna short, same length in both sexes, about 30 flagellomeres; antennal fossae separated by about width of pedicel; fore femur without clavate setae; ocular rim without setae; fore femoral sense hair as long as fore femur and mid femoral sense hair; mesonotum without blade-like setae; tibial spurs present; pretarsal claws large, longer than one-half length of distal tarsomere; pilula axillaris large; fore wing vein 2A runs in a fairly even curve toward 3A; posterior area of hind wing narrower than presectoral area, CuA bends to hind margin at or before origin of medial fork; anterior banksian line weakly developed; postventral lobe of male ectoproct more than eight times longer than middle diameter, without secondary lobes; male paramere platelike, without hinge; genital sac with lateral lobe-like sclerite; mediuncus smooth; female terminalia with pregenital plate membranous, without median tooth; gonapophyseal plate narrow, short, not transverse; lateral gonapophyses separated, with strong digging setae; ectoproct with digging setae; posterior gonapophyses without scraping setae. **Coloration:** Fore wing without dark brown stripe in mediocubital area. **Larva:** Head capsule with dolichasters; mandible with distance between base and basal tooth about equal to that between teeth; mesothoracic spiracle borne on tubercle that is longer than basal width; abdominal spiracles weakly raised; submedian tooth on sternite VIII longer than basal width.

**Material studied. PARAGUAY. Caazapá:** Colonia Neufeld, 26°28'S, 55°55'W, 24.IX.-2.XI.2008, U. Dreschel (1m, 2f, FSCA). **Cordillera:** San Bernardino, 28.II, Fiebrig (MZBS) (Holotype *Austroleon stictogaster* Navás); **Kanindeyu:** Carapa 230, 24°22'S 54°23'W, 1-10.XII.2007, U. Dreschel (1f, FSCA). **Paraguarí:** Sapucay, 30.I. (MCZC). **San Pedro:** Carumbé, II.1.1966, R. Golbach (1m, FSCA).

### 11. *Argentoleon longitudinalis* (Navás) (Figure 7)

*Moza longitudinalis* Navás 1914b:206. **Holotype female**, Chaco de Santa Fe, Las Garzas, Bords du Río Las Garzas, 25 km. d'Ocampo, Argentina, 1903, E. Wagner (MNHN).

**Known distribution.** Argentina; Paraguay; Uruguay.

**Diagnosis. Adult:** Frons without setae; antenna short, same length in both sexes, about 30 flagellomeres; antennal fossae separated by about width of pedicel; fore femur without clavate setae; ocular rim without setae; fore femoral sense hair as long as fore femur and mid femoral sense hair; mesonotum without blade-like setae; tibial spurs present; pretarsal claws large, longer than one-half length of distal tarsomere; pilula axillaris large; hind wing shorter than fore wing, in repose apices of wings nearly coincide; costal area of fore wing with one series of cells; posterior area of hind wing narrower than presectoral area, CuA bends to hind margin at or before origin of medial fork; anterior banksian line weakly developed; postventral lobe of male ectoproct more than eight times longer than middle diameter, without secondary lobes; male

paramere plate-like, without hinge; genital sac with lateral lobe-like sclerite; mediuncus smooth; female terminalia with pregenital plate membranous, without median tooth; gonapophyseal plate narrow, short, not transverse; lateral gonapophyses separated, with strong digging setae; ectoproct with digging setae; posterior gonapophyses without scrapping setae. **Coloration:** Fore wing with prominent dark brown stripe in mediocubital area extending well beyond cubital fork (Figure 7). **Larva:** unknown.

**Material studied. PARAGUAY. San Pedro:** San Estanislao, I. 1943 Bridarolli (1m, FSCA)

### 12. *Austroleon dispar* Banks

*Austroleon dispar* Banks 1909:3. **Lectotype female**, Pedregal, Mendoza, Argentina, 27.II.1907 (MCZC), designated by Stange 1961: 675.

**Known distribution.** Argentina; Bolivia; Paraguay.

**Diagnosis. Adult:** Fore wing vein 2A runs in a fairly even curve toward 3A; frons without setae; tarsal claws as long as distal tarsomere; mid femoral sensory hair longer than tarsus and subequal to that of fore femur; pilula axillaris weakly developed; posterior area of hind wing for most of distance much higher than length of fringe setae on posterior vein; male ectoproct without postventral lobe. **Larva:** unknown.

**Material studied. PARAGUAY. Hayes:** Lolita, Yaragui, 390' 23°, 06'S 59°, 38'W, 23-27.XI.2007, U. Dreschel (2m, 9 f, FSCA).

### 13. *Austroleon immitus* (Walker)

(Figure 8)

*Myrmeleon immitus* Walker 1853: 331. **Lectotype female**, Santarem, Brazil ("a" of Walker) (BMNH). = *Formicaleo ephemerinus* Gerstaecker 1893: 134 (after Stange 2004: 231). **Holotype male**, São Paulo, Brazil (Griefswald).

= *Austroleon compar* Banks 1909: 3 (after Stange 1967: 52). **Lectotype male**, Pedregal, Mendoza, Argentina, XII.17.1906, Jensen Haarup (MCZC), designated by Stange 1961: 671.

= *Moza nubilis* Navás 1912: 35, figure 1 (wings) (after Stange 1967: 52). **Holotype**, Mendoza, Argentina (?Copenhagen).

= *Correa expansus* Navás 1914: 218, figure 6 (fore wing) (after Stange 1967:52). **Syntype male**, Amazon, 1860 Stevens (NHMW!); **Syntype female**, Solidade, 1903 Exped. Penther (NHMW).

= *Guipa columbiana* Navás 1927:4, figure 45 (base fore wing) (after Stange 2004: 231). **Holotype female:** Villavicencio, Colombia, 1925, F. Apollinaris Maria (not located).

= *Austroleon stictogaster stigmata* Navás 1929:221, figure 17 (apex fore wing) (after Stange 1967:51). **Lectotype male**, La Granja, Alta Gracia, Córdoba, 15.II.1927, Bruch (MACN), designated by Stange 1967:52.

**Known distribution.** Argentina; Brazil; ?Colombia; Uruguay; Venezuela.

**Diagnosis. Adult:** Frons without setae; tibial spurs present; mid femoral sensory hair much shorter than tarsus and that of fore femur; pilula axillaris well developed; posterior area of hind wing for most of distance much lower than length of fringe setae on posterior vein (Figure 8); male ectoproct without postventral lobe. **Larva:** unknown.

## TRIBE MYRMELEONTINI

### 14. *Myrmeleon (Nehornius) obscurus* (Navás)

*Balaga obscurus* Navás 1912: 94. **Holotype**, San Bernardino, Paraguay, 4.II, K. Fiebrig (ZSMC).

**Known distribution.** Bolivia; Brazil; Paraguay.

**Diagnosis. Adult:** Fore wing with costal area greatly expanded at stigma, over twice as broad as above radial sector, with several interconnected cross veins basad to stigma. **Coloration:** Mesoepisternum as dark brown ventrally as dorsally; wings with stigma small, light brown color; distal tarsomere light brown in color. **Larva:** Mandible with three sharp pointed teeth, with some setae on exterior margin as long or longer than greatest mandibular width; labial palpus shorter than basal width of mandible; mesothoracic spiracle not borne on tubercle; head without dolichasters; sternite VIII with pair of inconspicuous submedian teeth near posterior margin; sternite IX without fossoria; fast backward movement only; make pitfall traps.

**Material studied. PARAGUAY. Cordillera:** San Bernardino, 4. II. Fiebrig (ZSMC)

### 15. *Myrmeleon (Myrmeleon) argentinus* Banks

*Myrmeleon argentinus* Banks 1910: 147. **Holotype**, Mendoza, Argentina, Jensen-Haarup (MCZC).

**Known distribution.** Argentina; Bolivia; Brazil; Paraguay; Uruguay.

**Diagnosis. Adult:** Tergite IX ventrally produced into lobe; secondary sclerotized Adult under sternite IX; fore wing with radial cells not especially lengthened, at most twice as long as high; basal radial cell not much longer (at most) than longest presectoral cell; male ectoproct produced ventrally; ventral process bifurcate. **Coloration:** legs dark brown and pale brown. **Larva:** Mandible with three sharp pointed teeth, with some setae on exterior margin as long or longer than greatest mandibular width; labial palpus shorter than basal width of mandible; mesothoracic spiracle not borne on tubercle; head without dolichasters; sternite VIII with pair of inconspicuous submedian teeth near posterior margin; sternite IX without fossoria; fast backward movement only; make pitfall traps.

**Material studied. PARAGUAY. Caazapá:** Golondrina, 660' 25°, 32'S, 55° 29' W, 14-19.III.2009, U. Dreschel (1m, FSCA). **Hayes:** Puerto Galileo, 230,' 25° 04'S 57° 52'W., 5.III.2008, U. Dreschel, 1m, FSCA). **Kanindeyu:** Carapa, 230' 24°22'S, 54°23'W, 1-10.XII.2007, U. Dreschel (1f, FSCA).

### 16. *Porrerus famelicus* Navás

*Porrerus famelicus* Navás 1913: 15. **Holotype male**, San Bernardino, Paraguay, 2.IV.-21.V, K. Fiebrig (ZSMC).

**Known distribution.** Brazil; Paraguay; Uruguay.

**Diagnosis. Adult:** origin of radial sector more than hind wing width (at that point) from CuA fork; usually seven or more presectoral cross veins. **Coloration:** Fore wing and hind wing (at least) with white cloud below white stigma; meso- and metapleura not sharply divided in color, usually mostly dark brown but with considerable pale brown ventrally; in hind wing, origin of radial sector more than hind wing width (at that point) from CuA fork; usually seven or more presectoral cross veins. **Larva:** Mandible with three sharp pointed teeth, with some setae on exterior margin as long or longer than greatest mandibular width; labial palpus shorter than basal width of mandible; mesothoracic spiracle not borne on tubercle; head without dolichasters; sternite VIII with pair of inconspicuous submedian teeth near posterior margin; sternite IX without fossoria; fast backward movement only; make pitfall traps.

**Material studied. PARAGUAY: Cordillera:** San Bernardino. V. K. Fiebrig (ZSMC).

## TRIBE ACANTHACLISINI

### 17. *Vella fallax* (Rambur)

*Myrmeleon fallax* Rambur 1842: 385. **Type**, “La Guyane” (not located).

**Biology.** Hagen 1873: 266-269, Redtenbacher 1884: 17; Stange and Miller 1985: 39, figure 10, 21 (larva).

**Known distribution.** Argentina; Brazil; Costa Rica; Guatemala; Honduras; Mexico; U.S.A.; Venezuela.

**Diagnosis. Adult:** Fore femur and mid femur with two equal and elongate sense hairs; hind femur with elongate sense hair; hind wing vein CuA unites with posterior fork of MP2 shortly after fork; hind wing without indication of Banksian line; tarsal claws strongly arched near base; tibial spurs strongly curved; male abdomen with hair pencils. **Coloration:** Hind wing subcostal area not marked; fore wing costal area mostly dark brown at basal one-half. **Larva:** Mandible with three sharp pointed teeth, with longest setae on exterior margin less than one-half greatest mandibular width; labial palpus shorter than basal width of mandible; mesothoracic spiracle not borne on tubercle; head without dolichasters; sternite VIII without teeth on subapical margin; pitfall traps absent; backward movement only.

### Key to species of Paraguay antlions

#### ADULTS

1. Labial palpus elongate, thread-like, with palpimacula extending around the apex and nearly reaching opposite side; fore femoral and mid femoral sense hair absent; tarsal claws well developed, more than 3x longer than width of distal tarsomere; hind wing vein CuA curves forward to united with vein MP2 (Figure 1) ..... *Dimares elegans* (Perty)
- Labial palpus usually short and not thread-like, palpimacula not extending around the apex toward opposite side; fore femoral and mid femoral sense hair present; hind wing vein CuA usually runs to hind margin, connected to vein MP2 by cross veins (except *Vella*) ..... 2
- 2(1). Hind femur with elongate sense hair; hind wing vein CuA united with posterior fork of MP2 shortly after fork; tarsal claws strongly arched near base; tibial spurs strongly curved; male abdomen with hair pencils (Acanthaclisini) ..... *Vella fallax* (Rambur)
- Hind femur without sense hair; hind wing vein CuA connected to posterior fork of MP2 by cross veins **or** not reaching fork; tibial spurs and tarsal claws various, usually not strongly arched; male abdomen without hair pencils ..... 3
- 3(2). Fore wing vein 2A runs in a fairly even curve toward 3A (Brachynemurini) ..... 4
- Fore wing vein 2A runs close to 1A for short distance, then bends at sharp angle toward 3A . 10
- 4(3). Fore wing vein CuP+1A parallels posterior branch of CuA for a distance, about equal to that between hind wing CuA and posterior branch of MP2; frons with numerous setae; tarsal claws as long as distal tarsomere (*Ameromyia*) ..... 5
- Fore wing vein CuP+1A runs to posterior margin at or before posterior fork of MP2; frons without conspicuous setae; tarsal claws shorter than distal tarsomere ..... 7
- 5(4). Posterior area of hind wing narrow, subequal in height to costal area at radial sector; hind wing cross veins between CuA and hind margin delimit cells that are much longer than high ..... *Ameromyia protensis* (Gerstaecker)
- Posterior area of hind wing broader, higher than costal area at radial sector; hind wing cross veins between CuA and hind margin delimit cells that are as high or higher than long ..... 6
- 6(5). Fore wing radial and subcostal veins nearly concolorous before origin of radial sector; fore wing mediocubital area before medial fork with cells nearly completely suffused ..... *Ameromyia dimidiata* Navás

- Fore wing radial and subcostal veins with alternating dark brown and light brown areas; fore wing mediocubital area with dark brown spots covering only about one-half cell area ..... *Ameromyia hirsuta* Navás
- 7(4). Male ectoproct with postventral lobe at least eight times longer than middle diameter; fore femur without row of long white bristles ..... 8
- Male ectoproct without postventral lobe **or**, if short lobe developed, then less than twice as long as wide; fore femur with row of long white setae ..... 9
- 8(7). Fore wing with prominent dark brown stripe in mediocubital area extending well beyond cubital fork (Figure 7) ..... *Argentoleon longitudinalis* (Navás)
- Fore wing without dark brown stripe in mediocubital area ..... *Argentoleon irrigatus* (Gerstaecker)
- 9(7). Mid femoral sensory hair longer than tarsus and subequal to that of fore femur; posterior area of hind wing for most of distance much higher than length of fringe setae on posterior vein ..... *Austroleon dispar* (Banks)
- Mid femoral sensory hair much shorter than tarsus and that of fore femur; posterior area of hind wing for most of distance much lower than length of fringe setae on posterior vein (Figure 8) ..... *Austroleon immitus* (Walker)
- 10(3). Hind wing with four or more presectoral cross veins; male pilula axillaris present; ventral surface of distal tarsomere with all setae reduced to less than one-third width of tarsomere (except *Porrerus*); (Myrmeleontini) ..... 11
- Hind wing with one (rarely two or three) presectoral cross veins; male pilula axillaris always absent; ventral surface of distal tarsomere with setae at least one-half as long as width of tarsomere (Nemoleontini) ..... 13
- 11(10). Distal tarsomere with ventral setae at least one half length of tarsomere diameter; interantennal distance less than 1.5 times longer than greatest scape diameter; male ectoproct with short postventral lobe ..... *Porrerus famelicus* Navás
- Distal tarsomere with ventral setae less than one fourth length of tarsomere diameter; interantennal distance at least twice as long as greatest scape diameter; male ectoproct without postventral lobe ..... 12
- 12(11). Fore wing with costal area greatly expanded at stigma, over twice as broad as above radial sector, with several cross veins basad to stigma interconnected; male ectoproct not produced ventrally; ventral process not bifurcate (subgenus *Neohornius*) ..... *Myrmeleon obscurus* Navás
- Fore wing with costal area not greatly expanded at stigma, at most one and one-half times wider than costal area above radial sector, without interconnected cross veins (rarely 1 or 2) basad to stigma (subgenus); male ectoproct produced ventrally; ventral process bifurcate (Subgenus *Myrmeleon*) ..... *Myrmeleon argentinus* Banks
- 13(10). Antennal fossa separated from ocular rim by more than greatest width of pedicel mid leg shorter than fore leg which is shorter than hind leg; male ectoproct with postventral lobe ..... 14
- Antennal fossa separated from ocular rim by less than greatest width of pedicel; mid leg as long or longer than fore leg; male ectoproct without postventral lobe ..... 15
- 14(13). Subcostal and radial veins in both wings widely separated by at least diameter of subcostal vein well before their fusion at stigmal area (Figure 2); postventral lobe of male ectoproct longer than eighth abdominal segment ..... *Dimarella riparia* (Navás)
- Subcostal and radial veins closely approximated by much less than diameter of subcostal vein well before their fusion at stigmal area (Figure 3); postventral lobe of male ectoproct less than one-half length of eighth abdominal segment ..... *Dimarella praedator* (Walker)

- 15(14). Pretarsal claws capable of closing against setal brush on distal tarsomere with tips of setae bent at nearly 90 degree angle ..... *Elachyleon punctipennis* Esben-Petersen  
 — Pretarsal claws not capable of closing against setal brush; all setae tapered ..... 16
- 16(15). Apical one-fifth of fore wing and hind wing with predominant brown suffusion in marked contrast to basal one-fifth (Figure 5); posterior gonapophysis of female terminalia weakly produced as a swelling ..... *Glenurus peculiaris* (Walker)  
 — Apical one-fifth of wings predominately translucent (Figure 4); posterior gonapophysis of female terminalia well developed, digitiform ..... *Eremoleon pulchra* (Esben-Petersen)

## LARVAE

1. Labial palpus shorter than basal width of mandible; mesothoracic spiracle not borne on tubercle; head without dolichasters; backward movement only (many genera) or backward and forward movement ..... 2  
 — Labial palpus longer than basal width of mandible or mesothoracic spiracle borne on tubercle; head often with dolichasters; backward and forward movement ..... 4
2. Mandible with three blunt tipped teeth; antenna short, flagellomeres all wider than long; sternite IX with fossoria; slow backward and forward movement ..... *Dimares elegans* (Perty)  
 — Mandible with three sharp pointed teeth; antenna longer, some flagellomeres at least as long as wide; sternite IX without fossoria; fast backward movement only ..... 3
3. Mandible with some setae on exterior margin as long or longer than greatest mandibular width; sternite VIII with pair of inconspicuous submedian teeth near posterior margin; make pitfall traps ..... *Myrmeleon* Linnaeus; *Porrerus* Navás  
 — Mandible with longest setae on exterior margin less than one-half greatest mandibular width; sternite VIII without teeth on subapical margin; pitfall traps absent .....  
 ..... *Vella fallax* (Rambur)
4. Mandible with distal tooth shorter than middle tooth and set at different angle than other teeth (Brachynemurini) ..... *Austroleon* Banks; *Argentoleon* Stange  
 — Mandible with distal tooth as long as or longer than middle tooth or only two teeth (Nemoleontini) ..... 6
5. Mandible with two teeth; live in decayed logs ..... *Glenurus peculiaris* (Walker)  
 — Mandible with three teeth; live in sand ..... *Eremoleon pulchra* (Esben-Petersen)

## Acknowledgments

Thanks are due to Kevan Williams for the donation of Paraguayan antlion specimens and to Dr. Charles C. Porter, Dr. Gary Steck, Robert B. Miller and Judith Lotti for critical review of the manuscript.

## Literature Cited

- Arnett, R. H., G. A. Samuelson, and G. M. Nishida. 1983. The insect and spider collections of the world. Second Edition. Sandhill Crane Press Inc.; Gainesville. 306 p.
- Banks, N. 1909. New genera and species of tropical Myrmeleonidae. Journal of the New York Entomological Society 17: 1-4.
- Banks, N. 1910. New South American neuropteroid insects. Proceedings of the Entomological Society of Washington 12: 146-160.
- Banks, N. 1922. South American *Glenurus* and some other Myrmeleonidae. Canadian Entomologist 54: 58-60.

- Costa Lima, A. M. 1943.** Insectos do Brazil. 4<sup>th</sup> Tomo. Capitulo XXIV-XXVII. Panorpatos-Suctorios-Neuropteros-Tricopteros. Escuela Nacional de Agronomia, Serie Didatica Nr. 5 (Rio de Janeiro): 73-108, 96 fig.
- Esben-Petersen, P. 1920.** Revision of some of the type-specimens of Myrmeleonidae, described by Navás and placed in the Vienna Museum, Annales de la Société Entomologique de Belgique 60: 190-196.
- Esben-Petersen, P. 1927.** New and little-known species of Neuroptera in British Collections. Part III. Annals and Magazine of Natural History (9)20: 343-350, 2 pl., 8 fig.
- Esben-Petersen, P. 1933.** New and little-known Neuroptera. Meddelelser fra Dansk Naturhistorisk Forening (Kjobehaven) 94: 109-123, fig. 1-13.
- Gerstaecker, C. E. A. 1893.** Ueber neue und weniger gekannte Neuropteren aus der Familie Megaloptera Burm. Mitteilungen des Naturwissenschaftlichen Vereins für Neu-Vorpommern u. Rugen in Greifswald 25: 93-273.
- Hagen, H. 1873.** Die Larven von *Myrmeleon*. Stettiner Entomologische Zeitung 34: 249-295.
- Markl, W. 1954.** Vergleichend-morphologische Studien zur Systematik und Klassifikation der Myrmeleoniden. Verhandlungen Naturforschenden Gesellschaft in Basel 65: 178-263.
- Miller, R. B., and L. A. Stange. 1989.** Revision of the genus *Dimarella* Banks (Neuroptera: Myrmeleontidae). Insecta Mundi 3(1): 11-40, 43 fig.
- Navás, L. 1912.** Notas sobre Mirmeleónidos. Broteria (Serie Zoológica) 10: 29-97.
- Navás, L. 1913.** Bemerkungen über die Neuropteren der Zoologischen Staatssammlung in München. V. Mitteilungen der Münchener Entomologischen Gesellschaft 4: 9-15.
- Navás, L. 1914a.** Neurópteros sudamericanos (Serie 1). Broteria (Serie zoológica) 12: 45-56, 215-234, 5 and 6 fig.
- Navás, L. 1914b.** Neurópteros nuevos o poco conocidos (Tercera series). Memorias de la Real Academia de Ciencias y Artes (3)11(13): 193-206, fig. 1-14.
- Navás, L. 1915a.** Neurópteros nuevos o poco conocidos. Memoria della R. Academia Ciencias y Artes Barcelona (3) 11: 373-398, 455-480.
- Navás, L. 1915b.** Neurópteros sudamericanos. Segunda Serie. Broteria 13: 5-13.
- Navás, L. 1915c.** Neurópteros nuevos o poco conocidos. Memoria della R. Academia Ciencias y Artes Barcelona (3) 12: 119-136, 9 fig.
- Navás, L. 1917.** Algunos insectos Neurópteros de la Argentina. Serie I. Physis. Revista de la Sociedad Argentina de Ciencias Naturales (Buenos Aires) 3: 186-196, fig. 1-4.
- Navás, L. 1918.** Insecta nova. IV serie. Memorie dell'Accademia Pontifica dei Nuovi Lincei (Rome) (2)4: 4-23, fig. 10-19.
- Navás, L. 1919.** Algunos insectos neuropteros de República Argentina. Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales de Madrid 17: 288-305.
- Navás, L. 1920a.** Insectos Sudmericanos (1a-3a series). Annales de la Sociedad Científica Argentina 90: 52-72, fig. 4-11.
- Navás, L. 1920b.** Algunos insectos del Brazil I.a.serie (as 3.a.serie 3 (sic). Revista do Museu Paulista (Sao Paulo) 12: 411-416, fig. 1-2.
- Navás, L. 1921.** Algunos insectos de Santa Fe (R. Argentina). Estudios (Buenos Aires) 21: 49-53, fig. 1-3.
- Navás, L. 1922.** Insectos de la Argentina y Chile. Estudios. Revista Mensual (Academia Literaria de La Plata) (Buenos Aires) 22(5): 358-368, 4 fig.
- Navás, L. 1923a.** Estudis sobre Neuròpters (Insectes). Arxius de l'Institut d'Estudis, Catalans, Seccio de Ciencias (Barcelona) 7: 179-203, 2 fig.
- Navás, L. 1923b.** Algunos Insectos del Brazil. 2.a série. Revista do Museum Paulista (São Paulo) 13: 767-774, 1 fig.
- Navás, L. 1927.** Insecta nova (Series XII). Memorie dell'Accademia Pontifica dei Nuovi Lincei, Rome 10: 1-10.
- Navás, L. 1929.** Insectos de la Argentina. Quinta (V) serie. Revista de la Sociedad Entomologica Argentina 10: 219-225, fig. 16-19.
- Navás, L. 1933.** Insectos de la Argentina. Revista de la Academia Ciencias Exactas Físicas-Químicas y Naturales de Zaragoza 16: 87-120, fig. 1-22.
- Navás, L. 1934.** Insectos suramericanos (8 Serie). Revista de la real Academia de Ciencias Exactas, Físicas, y Naturales de Madrid 31: 9-28.

- Navás, L. 1935.** Insectos suramericanos Décima (X) serie. Revista de la Academia de Ciencias Exactas Físicas y Naturales de Madrid 32: 360-375, fig. 56-62.
- Rambur, J. P. 1842.** Historie Naturelle des insectes. Névroptères. Librairie encyclopédique de Roret. Fain et Thunot; Paris. 534 p., 1 black and white plate, 11 color plates.
- Riek, E. F. 1976.** The family Stilbopterygidae (Neuroptera) in Australia. Journal of the Australian Entomological Society 15: 297-302, 6 fig.
- Stange, L. A. 1961.** Lectotype designations in the New World Myrmeleontidae. Canadian Entomologist 93: 674-677.
- Stange, L. A. 1963.** The Dimarellini of Mexico with the descriptions of two new species of *Dimarella*. Annals of the Entomological Society of America 56: 810-816.
- Stange, L. A. 1967.** Catálogo de Neuroptera de Argentina y Uruguay. Acta Zoológica Lilloana 22: 5-86.
- Stange, L. A. 1989.** Review of the new world Dimarini with the description of a new genus from Perú (Neuroptera: Myrmeleontidae). Florida Entomologist 72(3): 450-461, fig. 1-15.
- Stange, L. A. 1994.** Reclassification of the New World antlion genera formerly included in the tribe Brachynemurini. Insecta Mundi 8: 67-119.
- Stange, L. A. 2004.** A systematic catalog, bibliography and classification of the world antlions (Insecta: Neuroptera: Myrmeleontidae). Memoirs of the American Entomological Institute 74: 1-565
- Stange, L. A., and R. B. Miller. 1985.** A generic review of the Acanthaclisine antlions based on larvae (Neuroptera: Myrmeleontidae). Insecta Mundi 1(1): 29-42, fig. 1-26.
- Stange, L. A., and R. B. Miller. 1990.** Classification of the Myrmeleontidae based on larvae. p. 151-169. *In*: M. W. Mansell, H. Aspöck, and P. J. J. Steyn (eds). Advances in Neuropterology. Proceedings of the Third International Symposium on Neuropterology (Berg en Dal, Kruger National Park, 1988). Department of Agricultural Development; Pretoria. 298 p.
- Walker, F. 1853.** List of the specimens of neuropterous insects in the collection of the British Museum. Part II (Sialidae-Nemopterides). Trustees; London. p. 193-476.
- Walker, F. 1860.** Characters of undescribed Neuroptera in the collection of W. W. Saunders. Transactions of the Entomological Society of London (N.S.) 5: 176-199.

**Received November 23, 2009; Accepted December 31, 2009.**