SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

Ronderosia ommexechoides: a New Species of Brazilian Dichroplini (Orthoptera: Acrididae, Melanoplinae)

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Neotropical Entomology 35(5):632-637 (2006)

Ronderosia ommexechoides: uma Nova Espécie de Dichroplini Brasileira (Orthoptera: Acrididae: Melanoplinae)

RESUMO - Uma nova espécie do gênero *Ronderosia* Cigliano, 1997 é descrita. Ilustrações em cor de fêmea e macho, desenhos de fêmea e genitália externa do macho, assim como desenhos da estrutura fálica e fotografias de seus cromossomos são incluídos.

PALAVRAS-CHAVE: Gafanhoto neotropical, táxon novo, Caelifera, cromossomo

ABSTRACT - A new species of the genus *Ronderosia* Cigliano 1997 is described. Color illustrations of the female and male, drawings of female and male external genitalia as well as drawings of its phallic structures and photographs of the chromosomes are included.

KEY WORDS: Neotropical grasshopper, new taxon, Caelifera, chromosome

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The genus *Dichroplus* was considered by several entomologists to be an assemblage of several genera provisionally gathered under a single genus. Consequently, many of the species originally or secondarily assigned to *Dichroplus* have been recently transferred to other genera. These changes are reported as follow:

In 1977, Rowell & Carbonell erected the genus *Baeacris*, for *D. talamancensis.*

In 1981, Correa & Alves undertook a numerical phenetic classification scheme, based on external structural characters comprising 33 species of *Dichroplus* from the collection of the Biological Department of the UNESP Campus in Rio Claro.

In 1991, Ronderos & Cigliano described the news genus *Ponderacris,* including in it the following species of *Dichroplus*: *auriventris* (Bruner, 1913); *bolivianus, cuzcoensis* and *inca* (Ronderos & Carbonell, 1971) and *peruvianus* (Stål, 1878) and transferred the *Dichroplus punctulatus* species group to the genus *Baeacris.*

More recently, Cigliano (1997) erected the genus *Ronderosia* transferring from *Dichroplus* to that genus the following species: *bergi* (Stål, 1878), *cinctipes, dubius, paraguayensis* and *robustus* Bruner, 1906, *forcipatus* Rehn, 1918, *gracilis,* Bruner, 1911, *malloi* Liebermann, 1966 and *piceomaculatus* Carbonell, 1972.

According to Cigliano (1997) the following and unique combination of characters from both the phallic complex and the external morphology characterize the genus *Ronderosia*: body robust; head subglobose; pronotum expanded in metazona; apical valves of penis stout, cylindrical in cross section, sharply diverging caudally with their sclerotization reduced distally, sheath of penis narrow with prominent apical lobes.

The generic characters assigned to *Ronderosia* by Cigliano justify the inclusion of the new species described below in that genus. The specimens were collected in “cerrado” vegetation near the cities of Itirapina and São Carlos, in the State of São Paulo, Brasil. Due to its size, color pattern and length of tegmina, which only cover half of the abdomen, the species looks superficially similar to *Ommexecha virens* and for that reason we named it *ommexechoides.*

***Ronderosia ommexechoides* Carbonell & Mesa n. sp.**

Material Examined

Holotype - Male nº 2 (Fig. 1). Locality: Brazil (SP), 11 km N of Itirapina, “Cerrado” vegetation, opposite to Broa dam, 20/XI/95, A Mesa, P. García (22°10’35"S-47°53’01"W).

Paratypes - Sixteen females and five males collected as follows:

A) From Brazil (SP) 11 km N de Itirapina, “cerrado” vegetation, opposite to Broa dam 22°10’35"S-47°53’01"W: ♀nº

Fig. 1. *R. ommexechoides* a) female. b) male. Enlargement bar = 5mm

17, 24-X-88, A. Mesa; ♀ nº 6, 5-V-89, A. Mesa; ♀ nº 15, 17-XI-89, A. Mesa; ♀♀ nº 1, 3, 4, 5, 7, 8, 9, 19; ♂♂ nº 21, 22; 20-XI-95, A. Mesa, P. García; nº 16, 16-III-90, A. Mesa.

B) From Brazil (SP) 8 km W of Itirapina in “cerrado” vegetation, 22°15’40"S-47°53’50"W. ♀nº 14, ♂ nº 19, 18-II-90, A. Mesa, C. S. Carbonell; ♀♀ nº 10, 11, ♂ n° 20, 6-X-93, A. Mesa; ♀ nº 12, ♂ nº 23, 30-IX-95, A. Mesa.

Male holotype and female paratype deposited at the Museu Nacional of Rio de Janeiro. Paratypes kept in the insect collections of the Biology Department of UNESP (Universidade Estadual Paulista Julho de Mesquita Filho, Rio Claro, SP) an in the Laboratory of Entomology of the College of Sciences, Universidad de la República, Montevideo, Uruguay.

Diagnosis. Small for the genus, head globose, brevialate, integument mat on upper surface and legs, shiny ventrally; dorsally cream-colored mottled with fuscous, ventrally cream-colored; lower surface of hind femora and apical 3/5 of hind tibiae scarlet. Males XY, with Y showing a short pericentric inversion.

Description

Body morphology and coloration. (Figs. 1, 2 and 3) Size rather small within the genus (Table 1). Robust, brevialate. Integument mat, strongly pilose particularly on the legs, becoming slightly shiny on abdomen and ventral surface of body. Head: eyes prominent but not surpassing the level of

Table 1. Body measurements.

N	BL	HFL	PDL	MMW	MPW	MDE	TL
♀♀ 16	20.0 ± 1.04	11.7 ± 0,42	5.2 ± 0.17	5.29 ± 0.18	4.16 ± 0.18	3.8 ± 0.17	6.3 ± 0.75
♂♂ 6	15.8 ± 0.61	9.6 ± 0.65	4.2 ± 0.21	4.0 ± 0.18	3.3 ± 0.17	3.3 ± 0.13	4.6 ± 0.32

BL = body length; HFL = hind femur length; PDL = pronotal dorsal length; MMW = maximum metazonal width; MPW = maximum prozonal width; MDE = Maximum distance between eyes external borders; TL = Tegmina length

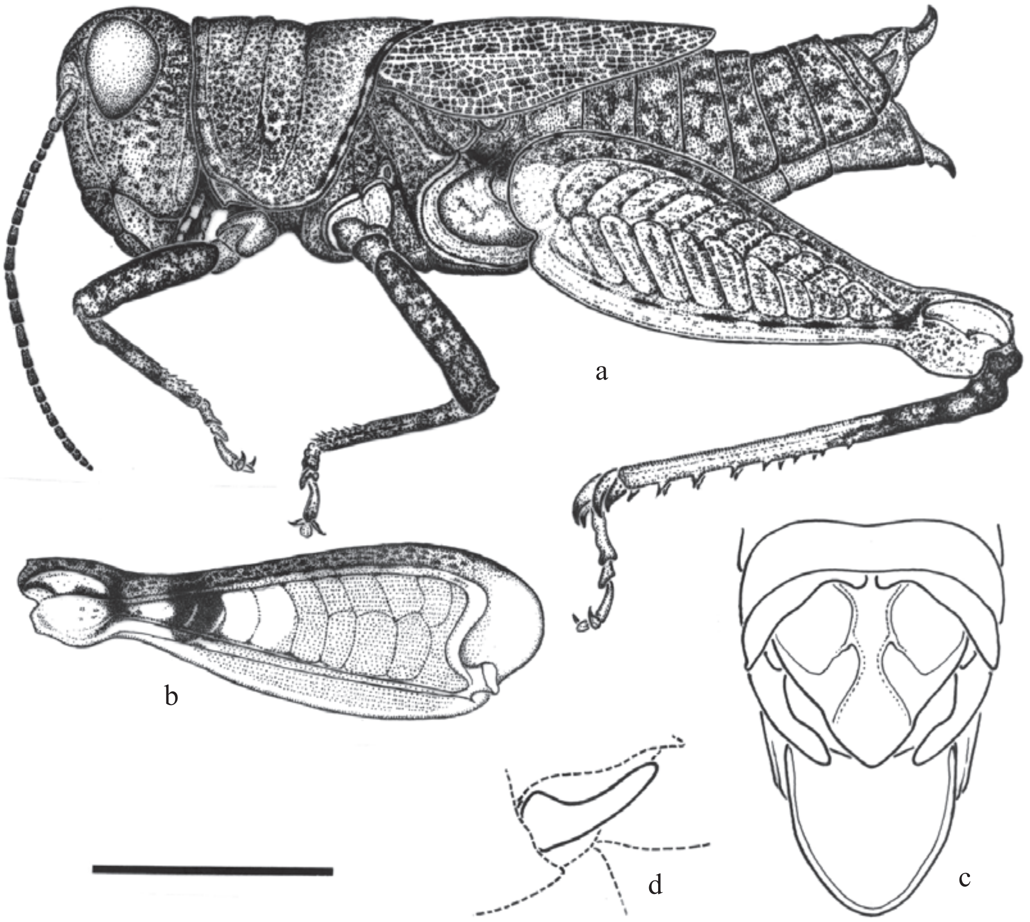

Fig. 2. *R. ommexechoides.* a) female. b) inner face of right femur. c) male dorsal view of last segments of abdomen. d) male lateral view of circus. Enlargement bar = 5mm

the vertex in lateral view; vertex strongly convex, roundly curving into fastigium and frons; fastigium with lateral carinae marked but not very prominent; frontal costa with edges parallel to median ocellus, then diverging slightly downwards in male, in the female they diverge very slightly from their inception downwards; in both sexes they become indistinct towards the epistomal suture; antennae in males and females slightly longer than head and pronotum together. Tegmina in both sexes approximately as long as head and pronotum together, apically acute, reaching the middle of abdomen. Pronotum in dorsal view: **metazoan** slightly longer than **prozona** in females, of equal length in males: anterior edge straight, posterior one projecting **caudad** in a right angle. Male cerci upcurved, its apical third tapering to a pointed apex.

Chromatic characters [color names according to Smithe (1975)]. Cream-color profusely mottled with fuscous on dorsal and lateral surfaces, including tegmina. Ventral surface of body uniformly cream-color. Antennae: scape and pedicel cream-colored; flagellum inferiorly fuscous; superiorly the first four basal segments and the five or six apical one fuscous, those in between alternately cream and fuscous. Internal side of hind femora: base cream-color; anterior part of region of pinnae and most of its lateral-inferior surface scarlet; apical half transversally banded, cream-color and fuscous; base of rotular area fuscous, apical part cream-color inferiorly, clay-color above. Hind tibiae: inside with basal 2/5 banded cream-color and chestnut, apical 3/5 scarlet. On the outside the scarlet part slightly longer; tibial spines mostly scarlet with black apices.

Dorsal phallic apical valves diverging laterally and tapering towards apices. Phallic sclerites as in Fig. 3.

Chromosomes. (Fig. 4) The chromosome number in *R. ommexechoides* is 2n ♂ = 20A + neoXY – 2n ♀ = 20A + 2neoX. The autosomes include two long, five medium size and three small pairs of acrocentric chromosomes. The sex chromosomes are of the neoXY(♂) type originated in a centric fusion between the original X with an autosome belonging to a long pair.

During early diplotene (Fig. 4d) the XL (the original X) remains wholly heterochromatic while XR (the autosomal component) appears euchromatic, but with its distal end slightly heterochromatic. The Y chromosomes instead, even than strongly heterochromatic it is less condensed than XL. A single chiasma connects the distal

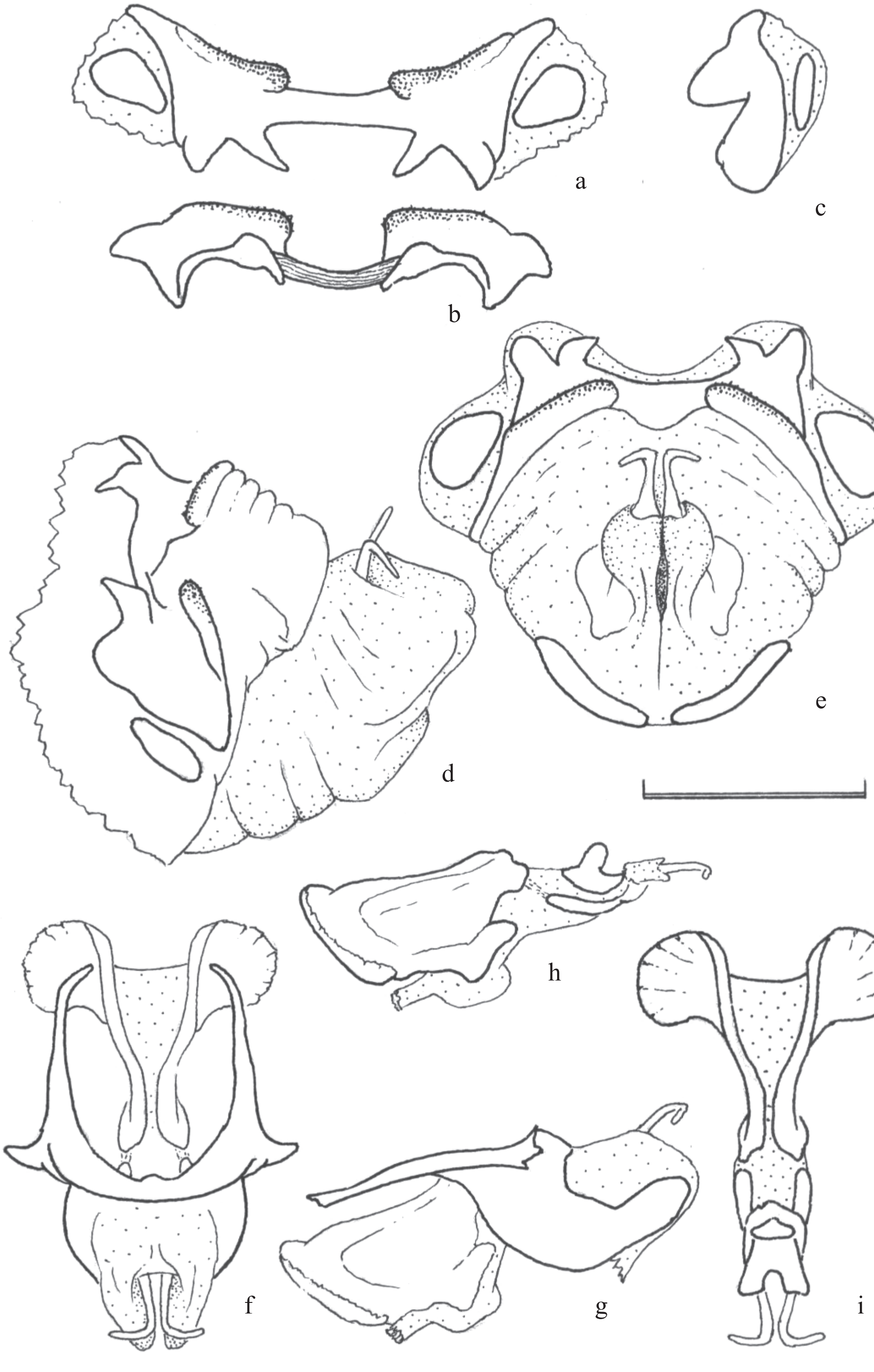

Fig. 3. *R. ommexechoides* phallic structure. Epiphallus in dorsal view. b) idem in rear view. c) idem in lateral view. d) dorso-lateral view of the phallus before removing the membranes. e) idem in rear view. f) cingulum and dorsal valves with diverging ends. g) idem, in lateral view. h) endophallic plates and dorsal and ventral valves in lateral view. i) idem in dorsal view. Enlargement bar = 1mm

end of XR with the distal end of Y. During diakinesis the two large bivalents show in general a proximal and a distal chiasma, but sometimes one chiasma is interstitial as in Fig. 4a. The median pairs have a single chiasma and rarely two chiasmata as in Fig. 4b. During this stage, XR shows a similar condensation than the autosomal bivalents (Fig. 4 a, b).

At first metaphase, the two long bivalents appear with a proximal and a distal chiasma while the remaining pairs have a single either distal or instersticial chiasma. The centromeric construction of Y it is located at a considerable distance from the proximal end as observed in Fig. 4c and e. This constriction is easily detected during the diakinetics stages as seen in Fig. 4a, b.

The species closest to *R. ommexechoides* is apparently *R. dubia* (Bruner, 1906).

Discussion

In Cigliano's (1997) key to the species of the genus *Ronderosia*, the present species would fall into the second alternative "head and pronotum without post-ocular dark band", which includes *forcipata* (Rehn, 1918), *paraguayensis* (Bruner, 1906), *dubia* (Bruner, 1906), *gracilis* (Bruner, 1911), *piceomaculata* (Carbonell, 1972), and *robusta* (Bruner, 1906). Like the present species, all of them have the inner and ventral sides of hind femora totally or partially of a red (scarlet) color. However, *R. ommexechoides* is clearly different from all these species in its being brevialate (the rest of them are long-winged). Also, it is the only species in this group which has the apical 3/5 of the hind tibiae scarlet, none of the others having any scarlet on their hind tibiae. Other minor differences in morphology and coloration can be clearly deduced from the text and figures of the above mentioned paper of Cigliano.

The ancestral karyotype in species of Acridoidea of the Cryptosacci group of families is 2n = 23♂- 24♀ with a X0 (♂) / XX(♀) chromosomal mechanism of sex determination. The great majority of living grasshoppers exhibits this karyotype. In more than a hundred Australian species analyzed (Mesa, unpublished) in the period 1965-70 only two species showed derived karyotypes (*Percassa rugifrons* with an A-A centric fusion and *Stenocantantops angustifrons* with a recent and partially spread X-Y centric fusion). Some of the neotropical species of grasshoppers as the Romaleidae and the Gomphocerinae and Acridinae follow this pattern of karyologycal stability, but in some other groups as in the Melanoplinae, a surprising amount of species have derived

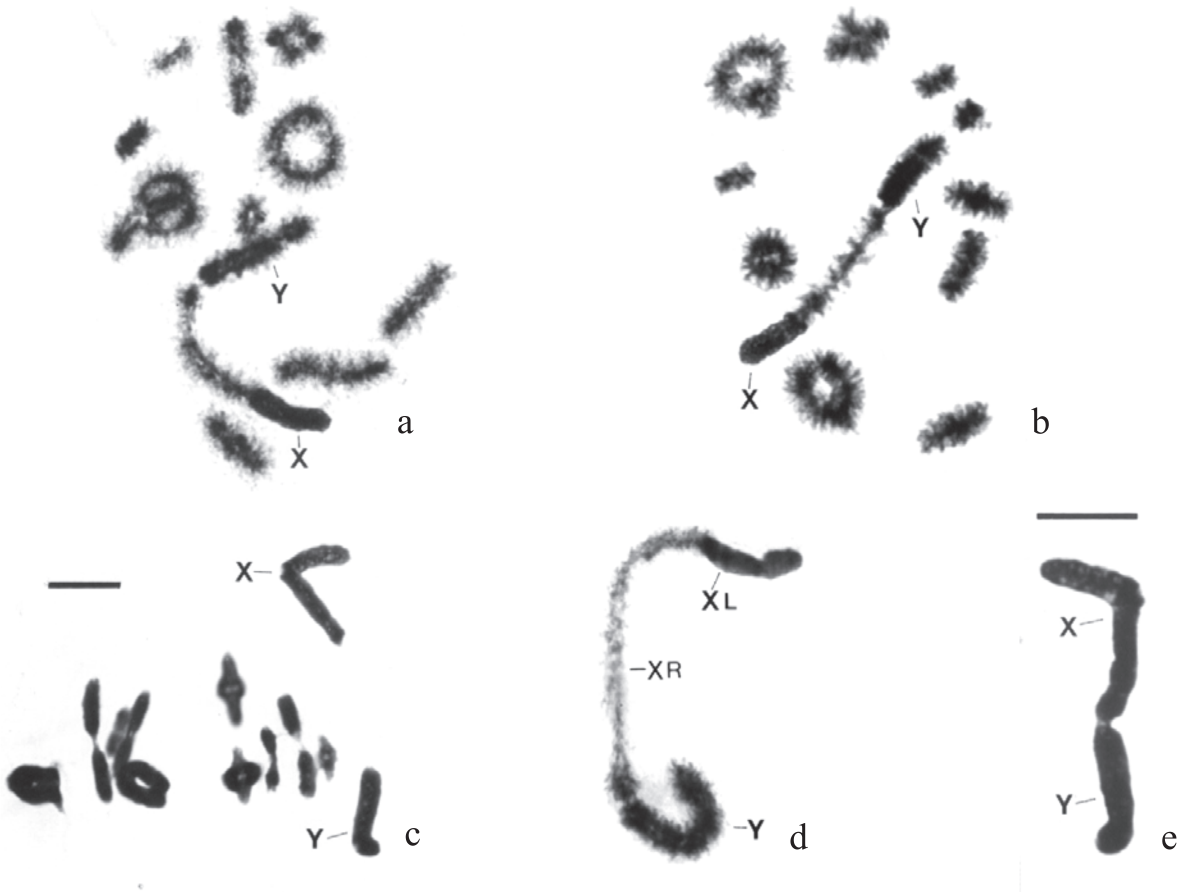

Fig. 4. *R. ommexechoides.* a) diakinesis. b) idem. c) first metaphase. d) neo XY pair with distal contact between Y and XR during diplotene stage. e) idem, during first metaphase. Enlargement bar = 10 µm (In "c", valid for that figure; in "e" valid for the remaining figures).

karyotypes, the reason for this high degree of chromosomal mutation remaining unknown. Mesa *et al*. (1982) reported basic information on the karyotypes of nearly three hundred neotropical species. Within Melanoplinae, 93 species were studied and 47% of them had derived karyotypes. If only the Dichroplini is considered the percentage is even higher with nearly 75% of species (39 in 53) being derived. Ten species have been included within the *Ronderosia* genus and six of them were cytologically studied (*bergi, dubia, paraguayensis, piceomaculata, robusta and ommexechoides)* all of them with derived karyotypes (Mesa *et al*. 1982 and this paper). It is relevant to point out that more than fifty Neotropical species have neo XY males and a dozen of them X1X2Y sex determining mechanisms. The difference in age of this mechanisms and its corresponding degree of differentiation allowed the interpretation advanced by Mesa *et al.* (2001) in relation to a probable extinction of those species at the end of the differentiation process when the XR arm become wholly heterochromatic at the beginning of the first prophase.

The alteration of the ancestral acridid (Cryptosacci) karyotype due to a X-A centric fusion and the removal of the Y centromeric region from a near terminal position, giving rise to a well developed small arm in consequence of a short pericentric inversion contribute to clearly characterize the species *R. ommexechoides.*

Acknowledgments

The authors are grateful to Paula García-Novo who collaborated collecting specimens and typing the manuscript.

References

Bueno, O.C. & R.A. da Cunha. 1981. Fenética de algumas espécies do gênero *Dichroplus* (Orthoptera, Acrididae). Ver. Bras. Entomol. 22: 217-226.

Cigliano, M.M. 1997. *Ronderosia,* a new genus of South American Melanoplinae (Orthoptera, Acrididae). J. Orthopt. Res. 6: 1-19.

Mesa, A., A. Ferreira & C.S. Carbonell. 1982. Cariología de los acridoideos neotropicales: Estado actual de su conocimiento y nuevas contribuciones. Ann. Sac. Entomol. Fr. (N. S.) 18: 507-526.

Mesa, A., C.S. Fontanetti & P. García-Novo. 2001. Does an X-autosome centric fusion in Acridoidea condemn the species to extinction? J. Orthop. Res. 10: 141-146.

Ronderos, R.A. & M.M. Cigliano. 1991. The Andean Dichroplini: Cladistic analysis with description of *Keyacris* n. gen. and *Ponderacris* n. gen. (Orthoptera: Acrididae: Melanoplinae). Trans. Amer. Entomol. Soc. 117: 167-191.

Rowell, C.H.F. & C.S. Carbonell. 1977. *Baeacris talamancensis* genus and sp nov. (Acrididae, Melanoplinae) a neotropical montane grasshopper, its implications for the origin of the Dichroplini and the Costa Rican paramo. Acrida 6: 55-74.

Smithe, F.B. 1975. Naturalist's color guide. American Museum of Natural History, N. York, 8p. (unnumbered) + 19 color plates (unnumbered).

Received 29.IV.2005. Accepted 31.I.2006.