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New Records of Brazilian Cicadas Including the Description of a New Species (Hemiptera: Cicadoidea, Cicadidae)

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Nuevos Registros de Cigarras Brasileñas Incluyiendo la Descripcion de una Nueva Especie (Hemiptera: Cicadoidea, Cicadidae)

RESUMEN - Una nueva especie de *Proarna* Stål se describe en el sur de Brasil. *Proarna gianucai* sp. nov. se distingue por su coloración y genitalias. La especie habita en ambientes de dunas costeras y se asocia con la hierba perenne *Panicum racemosum* (P. Beauv.) Spreng. Los adultos son activos desde Diciembre a Marzo. Los primeros registros de *Carineta durantoni* Boulard, *Carineta gemella* Boulard, *Carineta pilifera* Walker, *Fidicina christinae* Boulard & Martinelli, *Fidicina torresi* Boulard & Martinellli, *Fidicinoides determinata* (Walker), *Fidicinoides distanti* (Goding), *Fidicinoides glauca* (Goding), *Majeorona truncata* Goding, y *Zammara columbia* Distant, en el Brasil son descritos en este estudio. Contando la nueva especie y los nuevos registros presentados aqui, la diversidad de la cigarras alcanza un total de 146 especies en el Brasil.

PALABRAS-CLAVE: *Proarna gianucai*, cigarra, taxonomía, Auchenorrhyncha, Brasil

ABSTRACT - A new species of *Proarna* Stål is described from southern Brazil. *Proarna gianucai* sp. nov. is distinguished by its coloration and genitalia. The species inhabits coastal dune environments and is associated with the perennial grass *Panicum racemosum* (P. Beauv.) Spreng. Adults are active from December to March. The first records of *Carineta durantoni* Boulard, *Carineta gemella* Boulard, *Carineta pilifera* Walker, *Fidicina christinae* Boulard & Martinelli, *Fidicina torresi* Boulard & Martinellli, *Fidicinoides determinata* (Walker), *Fidicinoides distanti* (Goding), *Fidicinoides glauca* (Goding), *Majeorona truncata* Goding, and *Zammara columbia* Distant for Brazil are provided. The new species and new records bring the total cicada diversity of Brazil to 146 species.

KEY WORDS: *Proarna gianucai*, taxonomy, Auchenorrhyncha, Brazil

Cicadas are large insects obvious in their environment because of their mating calls. However, they receive relatively little attention because they are often difficult to catch and there are few individuals who can identify insects of the group.

The identification of undetermined material from institutional collections has led to an increase in the known cicada fauna of several countries in the New World (Sanborn 2001a,b, 2004, 2005, 2006a,b, 2007a,b; Sanborn *et al*. 2005). In addition, specimens sent to tettigologists for identification have also turned out to be undescribed species. Specimens obtained by the author in these manners are the source of the data presented in this paper.

The genus *Proarna* Stål is a Neotropical genus currently containing 20 species distributed from Mexico to Argentina (Metcalf 1963, Duffels & van der Laan 1985).

A new species of the genus *Proarna* is described here along with the first records of eight species of cicadas for Brazil.

Material and Methods

Specimens of the new species were collected in the field by Norton Gianuca as part of his environmental studies of dune ecology. The holotype is deposited in the Florida State Collection of Arthropods (FCSA) with paratypes retained in the author's collection. Terminology and higher taxonomy follows Moulds (2005). Specimens representing new records were located in the collections of the FCSA, University of Minnesota Insect Collection (UMSP), and Mississippi Entomological Museum, Mississippi State University (MEMU), A.J. Cook Arthropod Research Collection, Michigan State University (MSUC), University of Nebraska (UNSM), Monte L. Bean Life Sciences Museum, Brigham Young University (BYUC), C.P. Gillette Museum of Biodiversity, Colorado State University (CSUC), Bohart Museum of Entomology, University of California - Davis (UCDC), University of California - Riverside Entomology Research Museum (UCRC), Utah Sate University (EMUS),

Carnegie Museum of Natural History (CMNH) and the author was given a specimen by Charles Covell. Measurements were made with Vernier calipers.

Results and Discussion

Family Cicadidae Leach, 1815
Subfamily Cicadinae Latrielle, 1802
Tribe Fidicinini Distant, 1905

***Proarna gianucai* Sanborn, sp. nov.** (Figs. 1-6)

Type material. HOLOTYPE: male (FSCA), "BRAZIL, 28 km South of Cassino Beach, 20-XI-1992, N.M. Gianuca coll., ex. *Panicum racemosum* (P. Beauv.) Spreng." PARATYPES: four males (AFSC) same data as holotype, three males (AFSC) same data as holotype except 11-XII-1991.

Type locality. The type series was collected Brazil, Rio Grande do Sul, 28 km South of Cassino Beach in December 1991 and November 1992.

Etymology. The new species is described in honor of Prof. Dr. Norton Gianuca (Secretary for Environmental Affairs, Rio Grande, RS) who collected the type series and provided information on the biology of the species.

Description. Description is based on a series of males. The female is unknown.

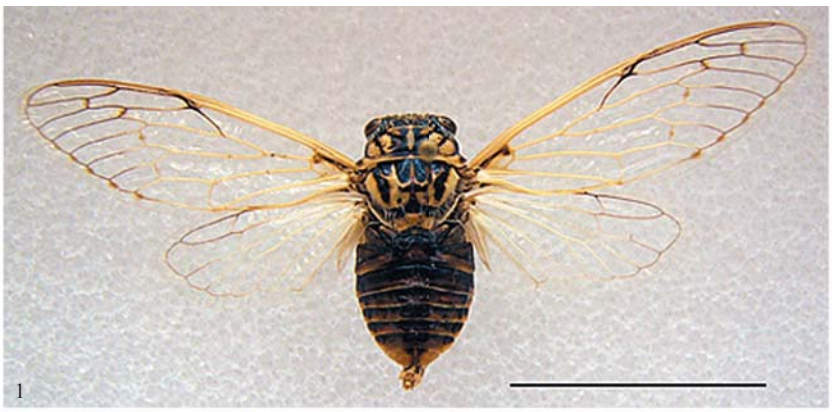
Coloration. Ground color of head and thorax ochraceous marked with fuscus, abdomen castaneous marked with tawny and fuscus (Fig. 1).

Head (Fig. 2)**.** Fuscus except for transverse band between lateral portions of supra-antennal plates along frontoclypeal suture to anterior median ocellus, a spot between the transverse band and compound eye on anterior head, triangular spot medial to compound eye on posterior head in which there is a small fuscus spot, small spot anterior-lateral to lateral ocelli, small spot on posterior epicranial suture, gena posterior to level of antennae, and anterior third of lorum all ochraceous. Long silver pile on head, very thick posterior to eye. Postclypeus fuscus within transverse grooves and medially except for ochraceous medial stripe dorsally which extends laterally along frontoclypeal suture. Anteclypeus with medial castaneous stripe on anterior two thirds, along entire length in some paratypes and other paratypes with central ochraceous line in posterior third of complete castaneous stripe. Rostrum ochraceous with fuscus tip. Long white pile on lorum, gena, anteclypeus and ventral to eye. Short white pile medially, laterally and withing transverse grooves of postclypeus. Scape and proximal pedicel castaneous, remaining antenna fuscus.

Thorax (Fig. 2)**.** Pronotum ochraceous with fuscus marks in ambient fissure, lateral fissure and anterior half of paramedian fissure. Mark in paramedian fissure extends posteriorly and terminates in a lateral curve anterior to ambient fissure. Fuscus mark on either side of midline which expands medially anteriorly before curving laterally posterior to anterior margin and curving back to midline parallel to paramedian fissure. Medial mark expands posteriorly forming a roughly triangular mark on ambient fissure expanding onto pronotal collar and to level of hooked mark from paramedical fissure meeting medially in ambient fissure. Small fuscus spots on plates between fissures, variable in size and number in paratypes. Lateral margin of pronotal collar fuscus. Castaneous spot on medial half of paramedian fissure between medial fuscus mark and hooked mark. Sparse white pile medially, in posterior ambient fissure and lateral margin of pronotal collar. Mesothorax with four obconical spots and two lateral fasciae fuscus. Lateral obconical spots and lateral fasciae fuse in some paratypes. Medial obconical spot covers most of submedian sigilla, lateral obconical spot half the length of medial spot, lateral fasciae extend to level of scutal depression. Medial triangular castaneous spot beginning between medial obconical spots, expanding anterior to anterior arms of cruciform elevation. Fuscus band on posterior mesothorax extending medially across anterior arms of cruciform elevation to medial castaneous mark. Transverse fuscus mark with anterior depression posterior to medial obconical spot connecting medially to castaneous line, connecting anteriorly to medial obconical spots in some paratype and posteriorly to transverse band on cruciform elevation in another paratype. Scutal depression fuscus. Metanotum ochraceous. Fuscus marks on posterior trochantin 2, medial meron 2, and medial epimeron 2. Central portion of basisternum 2 and 3 fuscus.

Legs. Ochraceous marked with fuscus. Fore coxae striped with fuscus, distal fuscus mark medially. Fore trochanters tawny laterally, fuscus medially. Fore femora ochraceous striped with fuscus, medial half mainly testaceouss, dark fuscus mark distally. Primary and secondary spines upright, testaceous with fuscus tips. Fore tibia testaceous, lighter at ends. Fore tarsi testaceous. Middle and hind coxae with testaceous lateral mark proximally, middle coxae with distal fuscus spot. Middle and hind femora and tibiae striped with fuscus, anterior side testaceous. Middle tarsi tawny, hind tarsi ochraceous. Pretarsal claws with fuscus tips. Tibial spurs fuscus. Legs with erect white pile.

Tegmina and wings (Fig. 1)**.** Hyaline with light infuscation. Tegmina with eight apical cells. Fuscus spot on basal membrane. Anterior half of basal cell ochraceous, fuscus mark along anterior margin expanding to fuscus spot in anterior distal portion of basal cell. Basal venation ochraceous except testaceous distal median vein along proximal ulnar cell 2, distal two-thirds of radius posterior, radius anterior, radius anterior 1, radius anterior 2, radial crossvein, radiomedial crossvein, median vein 1, distal two-thirds of median veins 2 and 3, distal half of median vein 4 and ambient vein from two-thirds distal apical cell 3 to junction with radius anterior 1. Light infuscation on proximal radius anterior 2, radial, radiomedial, medial and mediocubital crossveins, and ambient vein in apex of apical cell 1, middle distal portion of apical cells 3-7 and distal portion of apical cell 8. Venation



Figs. 1-6. *Proarna gianuca* sp. n. 1. Dorsal view of holotype male; bar = 2 cm; 2. Holotype dorsum illustrating head and thoracic markings; 3. Holotype male timbal cover; 4. Holotype male operculum; 5. Lateral view of holotype male genitalia; 6. Posterior view of holotype male genitalia.

of wings ochraceous except testaceous radius anterior, radius posterior, distal median vein 1 and ambient vein between radius anterior and median vein 2. Fuscus spot at base. All but apex of anal cell 3, anal cell 2 along anal vein 3 and along the sides of proximal half of anal vein 2 ochraceous.

Operculum (Fig. 4)**.** Ochraceous not reaching to sternite II. Fuscus mark on anterior quarter of lateral margin and base of meracanthus. Fine white pile on surface, longer and more dense next to lateral fuscus mark. Sinuate lateral margin, smoothly curved, not meeting along midline.

Abdomen (Figs. 1, 3)**.** Dorsal abdomen castaneous, anterior margin fuscus, posterior margin testaceous except fuscus tergite 2. Testaceous band expands laterally on tergite 2, and increasingly on middle lateral tergites from tergite 4-8 so most of tergite 8 becomes testaceous. Fine silvery pile on tergites, dense on posterior borders of tergites 3-6. Timbal cover small, triangular, edged with fuscus, castaneous spot in testaceous background in some paratypes. Timbal white, semitransparent with four long and one short testaceous ribs and a testaceous spot between posterior pair of long ribs which fuse dorsally. Sternites tawny except for fuscus mark on lateral half of anterior border of sternite 2, fuscus region between sternites II and III and ochraceous posterior of sternites III-VII. Sternite VIII ochraceous.

Male genitalia (Figs. 5, 6)**.** Pygofer ochraceous, lateral surfaces fuscus. Fuscus mark dorsally on each side of midline connecting posteriorly across midline forming a U-shape. Uncus ochraceous with lateral fuscus mark, mostly fuscus laterally in some paratypes. Median uncus lobe recurved dorsally. Lateral uncus lobes bent at right angle with sinuate lateral border.

Measurements (in mm)**.** N = 8 males, mean (range). Length of body: 19.6 (17.2-22.2); length of tegmina: 26.2 (22.8-30.2); width of tegmina: 9.0 (7.5-10.7); length of head: 2.7 (2.5-3.0); width of head including eyes: 7.1 (6.5-7.9); width of pronotum including suprahumeral plates: 8.1 (7.2-8.9); width of mesonotum: 7.2 (6.5-8.0).

Taxonomic notes. The species is distinguished from other members of *Proarna* by the coloration pattern and structure of the genitalia. The most similar species is *Proarna uruguayensis* Berg. The author received specimens of *P. uruguayensis* collected at Cassino Beach, 10 km south of Cassino Beach and 15 km south of Cassino Beach from *Panicum racemosum* (P. Beauv.) Spreng., the proposed host of *Proarna gianucai* (see below). However, in *P. uruguayensis* the ground coloration is castaneous rather than ochraceous, the prothoracic markings are reduced, the abdomen is completely castaneous, the timbal cover has a more oblique angle anteriorly, and the infuscation in the wings is lighter and reduced in number. The genitalia also differ significantly in that the lateral lobes of the pygofer of *P. uruguayensis* diverge and the termini are angled laterally rather than arching smoothly parallel to the midline as in *P. gianucai*.

Biological notes. The biological notes were compiled from the field notes of Norton M. Gianuca (pers. comm.). The southernmost part of the Brazilian littoral zone is characterized by extensive coastal dunes above exposed sandy beaches. The dunes are stabilized partially by autochthonous herbaceous vegetation which acts as a host plant for *P. gianucai*. Both nymphs and adults of *P. gianucai* were associated with *P. racemosum*, a native perennial, dune-building rhyzomatosus grass which is the dominant plant species of the foredune habitat. Nymphs were found between 0.2-1 m depths throughout the year, adults and nymphal skins were found between December and March 0.3-0.5 m above the ground on *P. racemosum*.

Sedentary *P. gianucai* were preyed upon by the Sand Toad (*Bufo arenarum* Hensell) and the Common Miner (*Geositta cunicularia* [Vieillot]) from the sand surface as well as vegetation. Cicadas in flight were preyed upon by the robber fly *Eccritosia rubreventris* (Macquart) and the Gray-breasted Martin (*Progne chalybea* [Gmelin]).

The encroachment of cattle pasture on the sand grass is a potential threat to the survival of *P. gianucai*. Expansion of pastureland into the foredune zone reduces the plant cover and height and thus substrate stability resulting in erosion and sand transport by the wind.

New Records

Family Cicadidae Leach, 1815
Subfamily Cicadinae Latrielle, 1802
Tribe Zammarini Distant, 1905

Zammara columbia Distant – the FSCA has specimens from Rondonia, 62 km SW Ariquemes, near Fazenda Rancho Grande, 3-15-XII-1996. The species was transferred to *Orellana* Distant (Distant 1905) then back to *Zammara* Amyot and Serville (Boulard 1975). It has been reported previously only from Colombia (Distant 1881b).

Tribe Fidicinini Distant, 1905
Sub-tribe Fidicinina Boulard & Martinelli, 1996

Fidicina christinae Boulard & Martinelli – the CUIC has a female from Mato Grosso del Sur, Corumba, Uracum (illegible), 23-29-XII-1919. The species has been reported previously only from Argentina (Boulard & Martinelli 1996).

Fidicina torresi Boulard & Martinellli – the CUIC has females from Minas Gerais, Lassance, 9-19-XI-1919. The species has been reported previously from French Guiana (Boulard and Martinelli 1996) and Venezuela (Sanborn 2007a).

Fidicinoides determinata (Walker) – UMSP has specimens from Rondonia, Fazenda Rancho Grande, Lote 23, Linhe C20, 60 km SE Arequemes, near Cacaulandia, 15-25-IX-1992. The species was transferred to *Fidicinoides* Boulard and Martinelli with the erection of the genus (Boulard and Martinelli 1996) and has been reported previously from Venezuela (Walker 1858a), Guatemala (Boulard and

Martinelli 1996), El Salvador, Honduras (Sanborn 2006a), and Mexico (Davis 1941). Distant (1881a) synonymized *F. determinata* and *F. pertinax* Stål, 1862 to *F. picea* Walker, 1850. However, *F. picea* and *F. determinata* were both determined to be valid species (Boulard and Martinelli 1996). There are references to *F. picea* being collected in Brazil (Jacobi 1907) which may include specimens of *F. determinata*.

Fidicinoides distanti (Goding) – the FSCA has specimens from Rondonia 62 km S Ariquemes, linea C-20, 7 km E B-65, 165m, Fazenda Rancho Grande, 10°32'S 62°48'W, 14-22-III-1990; and Rondonia, 60 km S Ariquemes, 17-24-III-1989. The author received a specimen from C. Covell collected in Rondonia, Fazenda Rancho Grande, vicinity of Cacaulandia, 15-III-1991. The species has recently been transferred to *Fidicinoides* Boulard and Martinelli (Sanborn 2007a) and was reported previously only from Ecuador (Goding 1925) and Venezuela (Sanborn 2007a).

Fidicinoides glauca (Goding) – the FSCA has specimens from Rondonia, Rancho Grande, VII-1993; Rondonia, 7 km NE Cacaulandia, Fazenda Rancho Grande, 6-15-XII-1993; Rondonia 62 km SW Ariquemes, near Fazenda Rancho Grande, 5-17-X-1993; and Rondonia, 62 km SE Ariquemes, near Fazenda Rancho Grande, 6-15-XII-1990. MEMU has specimens from Rondonia, vicinity of Caucalandia, 10°32'S 62°48'W, 160-350 m, 28-X-1991. The MSUC has specimens from Rondonia, Cacaulandia, 10-22-VIII-1993. UMSP has specimens from Rondonia, Fazenda Rancho Grande, Lote 23, Linhe C20, 60 km SE Arequemes, near Cacaulandia, 15-25-IX-1992. UNSM has specimens from Rondonia, 62 km SE Arequemes, Fazenda Rancho Grande, 10°32'S 62°48'W, 5-15-X-1993. The species has recently been transferred to *Fidicinoides* (Sanborn *et al*. 2008) and was reported previously only from Ecuador (Goding 1925).

Sub-tribe Guyalnina Boulard & Martinelli 1996

Majeorona truncata Goding – the BYUC has a specimen from Mato Groso, Xingu River, summer 1962. The species was reported previously only from Ecuador (Goding 1925) and Honduras (Sanborn 2006a).

Subfamily Cicadettini Buckton 1889
Tribe Carinetini Distant 1905

Carineta durantoni Boulard – the CSUC has specimens from Rondonia 62 km S Ariquemes, linea C-20, 7 km E B-65, 165 m, Fazenda Rancho Grande, 10°32'S 62°48'W, 14-22-III-1990. The species was reported previously only from French Guiana (Boulard 1985).

Carineta gemella Boulard – the FSCA has specimens from Rondonia, 7 km NE Cacaulandia, Fazenda Rancho Grande, 6-15-XII-1993; Rondonia, 62 km SW Ariquemes, near Fazenda Rancho Grande, 5-17-X-1993; and Amazonas, vicinity of Manaus, Reserva Ducke, 29-30-VII-1981. MEMU has specimens from Rondonia, vicinity of Caucalandia, 10°32'S 62°48'W, 160-350 m, 31-X-1991. The MSUC has specimens from Rondonia, 65 km S Ariquemes, vicinity of Fazenda Rancho Grande, near Cacaulandia, 7-19-XI-1995. UMSP has specimens from Minas Gerais, Parque Nacional Peruaçu, Rio Peruaçu, 15° 06.674'S 44° 14.487'W, 590m, 16-XI-2001. UNSM has specimens from Rondonia, 62 km S Arequemes, Fazenda Rancho Grande, 10°32'S 62°48'W, 11-22-XI-1991. UCDC has specimens from Rondonia, 62 km S Arequemes, Fazenda Rancho Grande, 11-22-XI-1991. UCRC has specimens from Rondonia, 62 km S Arequemes, Fazenda Rancho Grande, 187 m, 10°32'S 62°48'W, 8-17-XI-1990. EMUS has specimens from Roraima, Serra Grande, 21-30-VII-1981. CMNH has specimens from Hyutandaha, Rio Purus, IV-1922. The species was reported previously only from Venezuela (Boulard 1985).

Carineta pilifera Walker – the FSCA has a specimen from Santa Catarina, Mafra 10, 16-IV-1990. The species was reported previously only from Colombia (Walker 1858b), Ecuador (Goding 1925) and Venezuela (Sanborn 2007a).

The addition of the new species and new records brings the known cicada diversity in Brazil to 146 species. This diversity is second only to the United States in the New World (Sanborn unpublished). However, the primarily tropical latitudes of Brazil, the greater diversity of the cicada fauna in temperate North America and Australia, and based on the area and diversity of habitats within Brazil, one would expect a diverse fauna (Macarthur and Wilson 1967). Perhaps the difficulty in navigating and collecting within the interior of the country has meant much of the cicada fauna remains to be identified and new species will continue to be added to the Brazilian cicada fauna as evidenced by this study.

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