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## Additions to the acridoid grasshopper fauna of El Salvador

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### Abstract

Based upon a week's field work in northwestern El Salvador, we add 14 species to the list of grasshoppers known from the country, increasing the count to 24 species. Habitat notes and photos are presented for some.

### Key words

El Salvador, grasshopper, acridoid fauna, Oedipodinae, Gomphocerinae, Romaleinae, Episactinae

### Introduction

Among the Latin American countries, El Salvador has not had the best press recently in Western media. Most of us have learnt negative connotations: poverty and over-population, gang violence, illegal immigration to the USA, earthquake disasters and consequent landslides—the last usually attributed to widespread deforestation.

We are happy to be able to present a much more cheerful picture of at least one area of the country. In 2010 we received photographs of grasshoppers from Sra Silvia Figueroa, which she had taken around the town of Metapán, Department of Santa Ana, near the Guatemalan border in northwestern El Salvador. These showed a variety of interesting taxa, several of which appeared to be either unreported for the country or even undescribed species. After much correspondence, we were able to take advantage of Sra Figueroa's hospitality and local knowledge. Together with two colleagues who were interested primarily in dragonflies and butterflies, we spent the last week of August 2011 collecting and photographing in the Metapán area. Metapán itself transpired to be a pleasant and friendly old colonial city located close to a variety of habitats worthy of investigation.

The town of Metapán (elevation *ca* 470 m asl) is in Santa Ana, the most northwestern of the country's 14 departments. Temperatures are warm, with nearly all rainfall occurring between May and October. Near Metapán are extensive forests of oak (*Quercus*), pine (*Pinus*), and sweetgum (*Liquidambar*) with widespread cultivation of coffee. This habitat seems to represent "subtropical moist forest" or "low montane wet forest" (Holdridge 1967). Much of the region is volcanic tableland that abuts the borders of Guatemala and Honduras, but there are extensive deposits of limestone that support quarrying activities for building blocks and the production of cement. Besides mining, the countryside has been extensively modified by ranching and farming. Nonetheless, we had no trouble finding attractive sites that were populated by diverse assemblages of Orthoptera and other insects. Most of our effort was expended in either lowland (400-500 m asl) cattle ranching country, or in a forested coffee *finca* (farm) sited in oak/pine montane forest at

1000-1500 m asl. We were also able to visit several patches of relict lowland forest. Most of these areas were situated on privately owned land where the vegetational history was relatively well known. Elevations for the sites we visited extended from just below 400 m at La Apuzunga to more than 1300 m at the coffee plantation.

### Previously Published Records

Whereas our colleagues were able to produce a list of over 80 published records of dragonflies (Odonata) from El Salvador, and work from that basis, we found that the grasshoppers had been severely neglected by previous workers. The neighboring countries of Mexico, Guatemala and even Honduras have been visited by foreign orthopterists who have published at least a rough picture of the grasshopper fauna, and Mexico has some orthopteran specialists of its own. El Salvador, by contrast, is almost absent from the relevant literature. Professor Carlos Carbonell, in Uruguay, has for years combed the literature for information about the geographical distribution of acridoids in Latin America, and he kindly made available to us his list for El Salvador. Amazingly, this included only eight previously recorded taxa:

<i>Prospheia scudderi</i> Bolivar, 1884	Pyrgomorphidae
<i>Lactista punctata</i> (Stål, 1873)	Oedipodinae
<i>Silvitettix thalassinus</i> Jago, 1971	Gomphocerinae
<i>Cibotopteryx variegata</i> Rehn, 1905	Romaleinae
<i>Tropidacris cristata</i> (Linn, 1758)	Romaleinae
<i>Stenacris minor</i> (Bruner, 1906)	Leptysminae
<i>Schistocerca nitens</i> (Thunberg, 1815)	Cyrtacanthacridinae
<i>Apoxitettix salvadorae</i> (Descamps, 1975)	Eucopiocerae

To this meagre list we were able to add two El Salvadorean eumastacid species which one of us (Rowell) had described earlier from museum collections:

<i>Paraletthus insolitus</i> Rowell & Perez-Gelabert, 2006	Episactinae
<i>Episactus</i> sp. nr <i>tristani</i> Rehn & Rehn, 1934	Episactinae

In view of the rich fauna recorded from Southern Mexico and Guatemala, it was obvious this list must be seriously incomplete. Of the above taxa, only *Paraletthus* is thought to be an endemic, but even this may merely reflect inadequate collecting in neighboring countries.



Fig. 1. *Lempira metapanensis* (male). El Limo coffee plantation, ca 15 km N of Metapán. 1 December 2010. Original image (see Rowell 2012, JOR 21(1) p. 20, Plate X) rotated 90° left. Silvia Figueroa. For color version, see Plate VIII.

## Results

As expected, we found a number of grasshopper species that were not on the above list, and we present these as being possibly new records for the country:

<i>Abracris flavolineata</i> (De Geer, 1773)	Ommatolampinae
<i>Aidemona azteca</i> (Saussure, 1861)	Melanoplinae
<i>Chromacris colorata</i> (Serville, 1838)	Romaleinae
<i>Heliastus sumichrasti</i> (Saussure, 1861)	Oedipodinae
<i>Lactista pellepidus</i> Saussure, 1884	Oedipodinae
<i>Lethus</i> sp. nr. <i>nicaraguae</i> Descamps, 1974	Episactinae
<i>Lempira metapanensis</i> Rowell, 2012	Bactrophorinae
<i>Machaerocera mexicana</i> Saussure, 1859	Oedipodinae
<i>Orphula azteca</i> (Saussure, 1861)	Acridinae
<i>Orphulella punctata</i> (De Geer, 1773)	Gomphocerinae
<i>Phaneroturis cupido</i> Bruner, 1904	Gomphocerinae
<i>Proctolabus</i> Saussure, 1859, n. sp	Proctolabinae
<i>Taeniopoda stáli</i> Bruner, 1907	Romaleinae
<i>Xyleus discoideus mexicanus</i> (Bruner, 1906)	Romaleinae

Along with the 14 species mentioned above, we were able to confirm all the previously recorded species, with the exceptions only of *Paraletthus*, *Tropidacris* and *Apoxittettix*. *Prospheana*, *Lethus*, *Episactus* and *Cibotopteryx* were especially conspicuous in woodlands, and *Silvitettix* and *Abracris* were not uncommon.

## Comments on selected species

Most of the listed genera and species are widely distributed in Central America or in Southern Mexico, and their presence in El Salvador caused us no surprise. The new species we found, *L. metapanensis*, was especially interesting.

## *Lempira metapanensis*

This bactrophorine (Fig. 1) is only the third described species of its genus. Two others have been described from Northern Honduras (Rehn 1938) and another two from Guatemala await description in the Paris Museum. This genus is the most northerly member of the *Rhcnoderma* genus group, which is found in forested environments from Panama to Southern Mexico. They are all apterous insects, usually bark-colored, with a concave thoracic sternum that enables them to fit snugly onto the twigs of forest trees and bushes. Their hair-fringed hind femora are arranged at rest to allow their profile to merge with that of their supporting twig, and they are thus extremely cryptic and correspondingly rare in collections. They are astonishingly convergent with the completely unrelated East African lentulid genera *Mecostibus* and *Mecostiboides*, which have a similar way of life. Surprisingly, the El Salvadorian *Lempira* species was relatively common in moist, montane forest, though unfortunately most specimens were larval. It seems to be found most commonly on herbaceous understory plants such as the ginger *Costus* and the nettle *Urera*, rather than on woody plants.

## *Episactus* and *Lethus*

Most eumastacoid grasshoppers on the American continent belong to the family Eumastacidae. The exceptions are grouped in the family Episactidae, which embraces the Episactinae of Central America (of which *Episactus* is the type genus) as well as the exclusively Antillean Espagnolinae and the Mexican Teicophryinae. Surprisingly, this assemblage seems to be most closely related to the Old-World family Chorotypidae, characteristic of S.E. Asia and W. Africa. This puzzling distribution is thought to be the result of the great antiquity (Jurassic) of the Eumastacoidea, which has subjected them to major displacements due to continental drift.

The genus *Episactus* is recorded from Costa Rica, Guatemala, Mexico, and El Salvador. Very probably it occurs in Honduras and Nicaragua as well, but has not yet been recorded.

Fig. 2. *Episactus* nr *tristani* (pair). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate VIII.

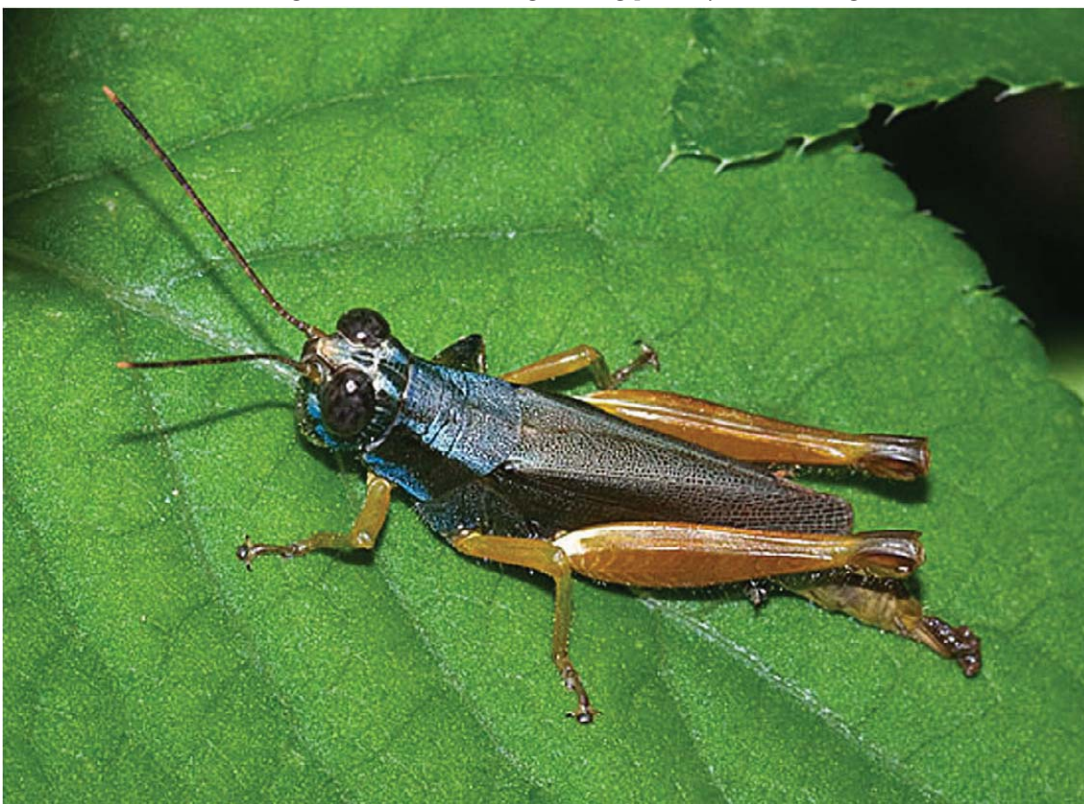


*E. tristani* is the most widely distributed species, extending from El Salvador to central Costa Rica (the type locality). It is an unmistakable species (Fig. 2): small, apterous, striped longitudinally in black and white or yellow or iridescent pale green, with an orange-red tip to the abdomen, a dark blue and black head, and pale blue thoracic pleura. The larvae, in contrast, are dull brown and very cryptic. *E. tristani* is unusual among grasshoppers in that females are often more brightly colored than the males, these tending towards

a predominantly black and white coloration.

*E. tristani* seems to have a preference for Compositae, and in Costa Rica is sometimes clearly associated with *Verbascina turbescens*. Unlike many Eumastacinae it shows no association with ferns — which is also true of the related Antillean Espagnolinae (D. Pérez pers. comm.) — and refuses them in captivity. It occurs at a variety of elevations and is sometimes abundant on vegetation to about 2 m in height along partially shaded hedgerows, montane forest

Fig. 3. An undescribed species of *Proctolabus* (female). Hacienda Guameru, ca 3.5 km NW of Metapán, 27 August 2011. Robert A. Behrstock. For color version, see Plate VIII.



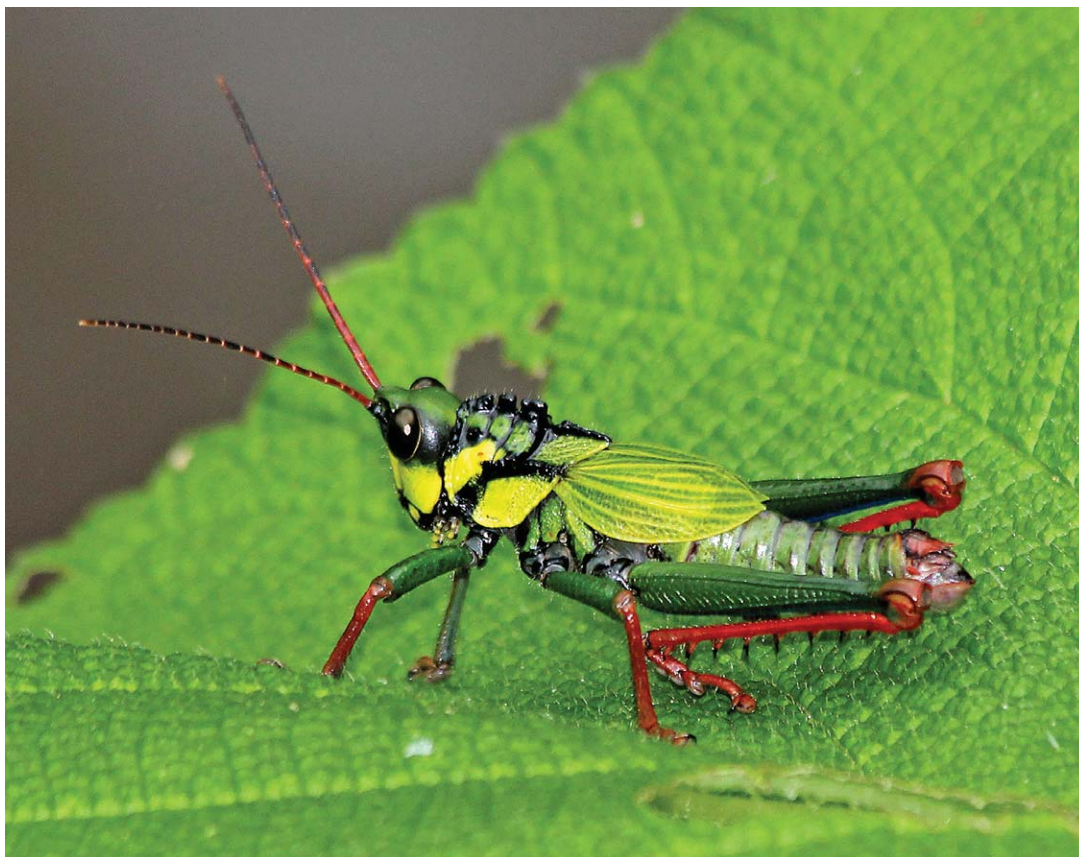


Fig. 4. *Cibotopteryx variegata* (male). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Doug Danforth.

paths, at forest edges, in forest light gaps, and in coffee plantations with shade trees. Several other episactid genera (e.g., *Lethus*, *Paralathus*, and the Antillean genera) are cryptically colored and live on the surface of the soil. *Episactus* and *Gymnotettix* (Guatemala and Honduras) appear to be the exceptions (other than the ground-dwelling *E. eremites* in Mexico), being brightly colored and living

in vegetation.

Courtship in *E. tristani* is elaborate and apparently visual; the male takes up a position with his long axis at 90° to the female (Fig. 2) and about 30 mm removed from her and opposite her pterothorax, and makes vigorous and accelerating "stridulatory" movements of the hind femora which, however, produce no audible



Fig. 5. *Cibotopteryx variegata* (female). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Doug Danforth.

Fig. 6. *Taeniopoda stáli*. Hacienda La Portada, 17 km W of Metapán. 23 June 2011. Silvia Figueroa. For color version, see Plate VIII.



sounds. The male follows retreating females, apparently guided by her red "tail-light" marking.

The episactid *Lethus* was extremely abundant along montane forest paths, but in August we did not find a single adult. For this reason, the species is uncertain, as the distinctions are based on phallic characters. *L. nicaraguae* is a plausible guess.

Fig. 7. *Chromacris colorata*. La Apuzunga, ca 18 km S Metapán, 25 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate VIII.



*Proctolabus*

The genus *Proctolabus* was thought to be confined to Mexico. Other genera of the subfamily extend throughout Central America and are an important component of the arboreal grasshopper fauna of Amazonia. The new (undescribed) El Salvadorian species (Fig. 3) is alate, smaller than most of the Mexican ones, but very fetchingly colored in dark blue, with golden brown femora and red hind



Fig. 8. *Silvitettix thalassinus* (male). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate IX.

tibiae. It appears to be close to the Mexican species *P. gracilis*. We are hoping to collect more specimens before describing it. All our localities were in or at the margins of relatively low-lying woodland, at around 500m elevation.

*Cibotopteryx*, *Chromacris* and *Taeniopoda*

The most spectacular species on our list are undoubtedly the large romaleines, such as *Cibotopteryx variegata* (Figs 4 and 5) and *Taeniopoda stáli* (Fig. 6). These are brightly colored insects of imposing size, especially the females, which are squat and heavily built and very different from the more slender males. *Chromacris* is another brightly colored romaleine genus, whose species extend from Mexico to South America. *C. colorata* (Fig. 7) is the most northerly of these, extending as far south as northern Costa Rica. Unlike most romaleines, it is a moderate food plant specialist, mostly eating Solanaceae, with some Bignoniaceae and Asteraceae. The larvae, and to some extent the adults too, live in groups that are maintained by visual attraction between the brightly colored (dark green and yellow or orange) individuals. The vivid coloration is very probably aposematic too, as the adults when physically persecuted will assume a "dymantic" posture with the red or orange hindwings exposed, and produce a foul-smelling froth of blood and air from the thoracic spiracles. Adults of *Taeniopoda stáli* were found in hedgerows in the lowlands at around 500 m., adult *Chromacris* on vines of Bignoniaceae in lowland woodland, whereas *Cibotopteryx* was found quite commonly in woodland from 500 to 1500 m. and was present as both larvae and adults.

*Silvitettix* and *Phaneroturis*

The Gomphocerinae are almost all specialized feeders on grasses (Poaceae), and are typically found in open grasslands. A few genera, however, have colonized wet, usually montane, forest environments. *Silvitettix* and *Phaneroturis* are both examples of this.

The genus *Silvitettix* consists of small, flightless gomphocerines with sexually dichromatic adults. Its members are found from southern Mexico to northern Brazil, with about a dozen species inhabiting Central America. Some have curiously disjunct distributions, which may well reflect faulty taxonomy. The males may be rather brightly colored and patterned, while females are cryptic brown. In Metapán *Silvitettix thalassinus* (Fig. 8) eats low-growing bambusoid grasses (such as *Oplismenus* spp.) along forest paths at a variety of elevations. The name *thalassinus* appears to be a junior synonym of the Costa Rican *S. biolleyi* (Rowell, in prep.). Both adults and larvae were present in lowland woodland at around 500m.

*Phaneroturis cupido* (Fig. 9) is a small gomphocerine with remarkably modified venation on its reduced hind wings. Previous collections were from southern Mexico and Guatemala (Otte 1981). It recalls *Silvitettix* in its habitus and natural history. We found adults



Fig. 9. *Phaneroturis cupido*. El Limo coffee plantation, ca 15 km N of Metapán. 25 June 2011. Silvia Figueroa. For color version, see Plate IX.

**Fig. 10.** *Machaerocera mexicana* (male and overlaid right hindwing). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate IX.



*Machaerocera mexicana*

living in damp grass along paths through montane woodland at around 1200 m at Finca El Limo, Metapán. Males are beautifully colored, very unusually for a gomphocerine, in bright blue, green, yellow, and red. The larger females are cryptically colored and patterned in browns.

*Machaerocera mexicana* (Fig. 10) is an earthen-brown oedipodine with strikingly deep blue hindwings. Unlike most members of its subfamily, it associates more with understory vegetation at forest edges than open ground. In Middle America, it has been recorded in Mexico, Belize, and Guatemala (Otte 1984), from near sea level to montane settings, in both riparian habitats and on more open

**Fig 11.** *Orphula azteca* (male). Hacienda los Puentes, 11.3 km W of Metapán. 22 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate IX.







Fig. 12. *Orphula azteca* (male). El Limo coffee plantation, ca 15 km N of Metapán. 23 August 2011. Doug Danforth. For color version, see Plate X.

*Orphula azteca*

slopes. In the United States, it has been taken at several sites in southeastern Arizona where it is confined to margins of riparian woodland (Rentz 1962, Behrstock & Sullivan 2011). We found *Machaerocera* a common resident in moist higher-elevation forest (800-1500 m), inhabiting low vegetation at trail sides and in clearings. We encountered both adults and larvae. A last instar female larva was seen/photographed giving what appeared to be a legs-up rejection display to an adult male.

*Orphula* is a genus represented by six species distributed from Northern Mexico through Central America to Colombia and Venezuela, and again in Paraguay, Argentina and Brazil. The El Salvadorian species *O. azteca* (Fig. 11) is the common Central American member. It belongs to a New World group (the Hyalopterygini) of the subfamily Acridinae. These are suspected of actually being aberrant Gomphocerinae which have lost the diagnostic stridulatory mechanisms, but still have a hind wing modified to radiate the sound they no longer produce. *Orphula* can also be distinguished from several similar looking genera by the obliquely truncated tip



Fig. 13. *Abracris flavolineata*. San Diego La Barra Nat. Park, ca 10 km SW Metapán. 29 August 2011. Robert A. Behrstock/Naturewide Images. For color version, see Plate X.

to its folded forewings. In El Salvador, some males and females are darkly pigmented, generally appearing as black insects with a green dorsal stripe (Fig. 12). Elsewhere, and in some Salvadorian individuals, the colors are lighter, and the hind femora are typically golden brown. In flight, the males often make a loud clicking noise, possibly using the modified rear wings, or maybe their mandibles, as some authors have suggested. Feeding on grass, they are found in pasture and at forest edges, and can be very numerous in Central American habitats, especially on the Pacific drainage. We found it most commonly along paths in medium elevation (800-1000 m) woodland, but also less frequently at lower and higher altitudes.

#### *Abracris flavolineata*

*Abracris flavolineata* (Fig. 13) is one of the commonest and most widely distributed of Central American grasshoppers. It is universal wherever there is regenerating vegetation in previously cut wet forest, and shows a strong preference for asteraceous herbs as its foodplant. The larvae are green/brown polymorphic, while the adults are invariably brown with prominent yellow lines. In most areas, as in Metapán, the hind wings are pale yellow, but in South America (and, curiously, also in Belize) they are pale blue, which gave rise to the now-synonymized specific name *violaceus* (Thunberg 1824). Both adults and larvae were encountered.

#### Acknowledgements

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