Ottotettix, a New Katydid Genus and Species from the Rainforest of Southern Ecuador (Orthoptera, Tettigoniidae, Pseudophyllinae, Eucocconotini)

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Ottotettix, a new katydid genus and species from the rainforest of southern Ecuador (Orthoptera, Tettigoniidae, Pseudophyllinae, Eucocconotini)

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Abstract

Ottotettix smaragdopoda gen. et *sp. nov.*, a brachypterous katydid from the eastern Andean foothills of southern Ecuador, is described. It is moderately common in rainforest understory along creeks and in vales between 850 and 1300 m. The male's ultrasonic calling song, which is also described, is apparently performed only sporadically, and males seem also to use substrate-borne signals.

Resumen

Se describe *Ottotettix smaragdopoda gen. et sp. nov.* El Grillo de Patas Esmeraldas es un insecto delgado de 24-27 milímetros con alas muy reducidas. Como en las mucho más grandes especies de *Panoploscelis*, el único otro género braquíptero de Eucocconotini, las tegminas tienen aproximadamente la misma longitud que el pronoto. El color general es rojizo claro, con las rodillas negras, y en individuos vivos las tibias de verde luciente. Las tegminitas son oscuras con venas amarillentas. La distribución conocida incluye tres lugares entre la Cordillera Oriental y la Cordillera del Cóndor entre 850 y 1300 msnm en el sureste del Ecuador. Acá los insectos nocturnos se encuentran frecuentemente en la vegetación del sotobosque de la selva, a menudo cerca de quebradas o en cuencas. El canto del macho se encuentra completamente en el ultrasonido, entre 26 y 38 kHz. Al parecer los versos de 500-600 ms son emitidos muy escasamente, y aparentemente compensados a corta distancia por señales de vibración del sustrato.

Introduction

The neotropical tribe Eucocconotini (established by Beier in 1960) is one of the smaller tribes of the mostly tropical and very diverse subfamily Pseudophyllinae. This tribe is comprised of seven genera, each with only one to four species. Those 16 species are distributed over northern South America, with records from Panama, Colombia, Ecuador, Peru, Suriname, Guyana and northern Brazil (Eades *et al.*). Here is added a new species, first discovered in October 1997 and more recently found to be fairly abundant in valleys of the Amazonian slope of the Andes in southeastern Ecuador. Although its affiliation with the Eucocconotini is quite clear, this brachypterous katydid is very different from all described genera, and requires its own genus. The males produce a fairly complex calling song.

Investigation area and methods

Individuals of this species were observed in three areas in Zamora-Chinchipe province: in the Río Bombuscaro valley within Podocarpus National Park, 1000-1100 m (October 1997 – November 1998 and July 2002), in the upper Río Nangaritza valley near Las Orquídeas, 1200 – 1300 m (April 2009) and Maralí at the Río Zamora, 850 – 1300 m (a little upstream of El Pangui, east of the river, January 2009 and January 2010). All three sites are distinguished by virtually undisturbed rainforest. Searching was done from dusk to midnight (sometimes later), using a headlamp, walking along trails or following small creeks, closely examining the bordering vegetation up to two or, at most, three meters above ground.

The sound recordings were made (in November 1997) with a Laar Bridge Box XL (BVL von Laar, Klein-Görnow, Germany), which has an ultrasound sensitive microphone and a digital loop memory from which fragments of 5.12 seconds (at 400 kHz sampling rate), 10 times slowed down, were stored on DAT (digital audio tape TDK DA-RXG 90) using a Sony Walkman (model TCD-D7). The recorded individual was accommodated in a gauze cage for several weeks, provided with plant parts and fresh pieces of cucumber. A Mini-3 bat detector (Ultrasound Advice, London) was used for acoustic monitoring in the forest (along with the Laar detector, which, however, did not succeed in providing an acoustic field record of this species). Sound analysis was done with Avisoft-SASLab Pro (R. Specht, Berlin). Temperature was 21 °C, which comes close to the night temperature in the original habitat. All data refer to a single male, specimen cbt017s02 (according to personal observations, katydid songs usually show, at most, very little intraspecific variation).

Photographs of almost all collected specimens are available at Orthoptera Species File Online, subsequently abbreviated OSF (Eades *et al.*). A point map with the three localities can be found there as well. The new genus and species are also included in the identification key to all Pseudophyllinae in OSF. The Bombuscaro specimens were already photographed within the DORSA project (www.dorsa.de) and included in the SysTax database (www.biologie.uni-ulm.de/systax), filed under Eucocconotini (species code cbt017).

***Ottotettix* gen. nov.** (Eucocconotini)

Type species.—*Ottotettix smaragdopoda*, described below.

Etymology.— In memory of Otto von Helversen, to whom the author owes the opportunity to study tettigoniids in Ecuador in 1997. In that year the first three specimens were found.

Following the key to tribes in Beier 1960, several characters readily place this genus into the Eucocconotini: midcoxae are distinctly elongated tooth-like ventrobasally, so that the ventral contour appears two-tipped (in forecoxa only a very little), the lobes of meso- and metasternum are erect and pointed, the antennal scapes are spineless and the margins of the fastigium converge posteriorly. The diagnosis of the tribe also applies very well. *Ottotettix* is one of the smaller and more delicate members of the tribe and

the males have notably modified cerci. In the key to genera this species does not advance beyond the first couplet, and lacks the distinctive features of all the seven genera (modified mandibles, false tympanum in female tegmina, fully developed wings, dorsal spines on middle tibia, *etc.*). Besides the reduced wings, there are other major differences to the otherwise superficially similar type genus *Eucocconotus* (frons without black markings, forecoxae without distinct basal tubercle, femora without light pre-apical ring, male cerci completely different and subgenital plate not deeply incised).

Diagnosis.— *Ottotettix* is small to medium-sized (body length 24-30 mm) and slender, reddish brown, with tegmina about the same length as the pronotum (the only other brachypterous members of the Eucocconotini are the much bigger and more robust *Panoploscelis* species), and has exeedingly long antennae. Frontal ocellus prominent. The quite narrow fastigium, is in dorsal view, a little bit shorter than the margins of the antennal sockets, and dorsally sulcate (the furrow being enclosed by the margins of the fastigium itself which incorporate the lateral ocelli). Eyes are slightly dorsoventrally oblong, in life bright greenish with a dark vertical stripe. Mouthparts are not modified. The pronotum is wrinkled and fairly coarsely granulated (especially dorsally with sparse and delicate tubercules). The tegmina are very short: nearly the same length as the pronotum in males and a little shorter than the pronotum in females. They are very dark with light yellowish venation in both sexes, in males with a little translucent speculum behind the fairly strongly thickened upper part of the stridulatory vein on the left tegmen (the right tegmen has an almost transparent speculum). The prosternal spines are very short, only a little longer (and more acutely pointed) than the ventrobasal toothlets of the mid coxae, their length a little bit less than the diameter of the tips of the palps. The abdominal tergites have densely distributed lighter spots (as in several undescribed brachypterous Teleutiini from southern Ecuador). Further details are mentioned below in the description of the unique species.

***Ottotettix smaragdopoda* sp. nov.**
Emerald-legged Katydid

Braun 2002: 71 "Smaragdbeinschrecke" (Eucocconotini); Braun 2008: 219 gen. nov. "Smaragdbeinschrecke" (Eucocconotini).

Species page in OSF.—http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=75522

Type specimens.— From Bombuscaro around 1000 m: holotype male (cbt017s01, originally no. 44, 14 October 1997) and allotype female (cbt017s05, originally no. 184, 13 November 1998), both deposited in the Museum Alexander Koenig in Bonn, Germany; additionally seven paratypes: from Bombuscaro: 2 males (cbt017s02 with sound recordings, 14 October 1997 and cbt017s04, 3 November 1998) and 1 female (cbt017s03, 14 October 1997); from Maralí around 900 m: 1 male and 1 female (cbt017s06 and cbt017s07, 12/13 January 2009); from Alto Nagaritza 1200 – 1300 m: 1 male and 1 female (cbt017s08 and cbt017s09, 7 and 11 April 2009). One pair of paratypes has been deposited in the arthropod collection of the Universidad Técnica Particular de Loja, the others are currently in the collection of the author. Detailed specimen data are available in OSF. More individuals were observed at all three localities: in the Nangaritza area on six consecutive nights altogether at least 14 males, 15 females, and 2 nymphs; at Maralí during one nocturnal hike 6 males, 7 females and 3 nymphs.

Recordings.—original on tape: 2/39, 40, 44, 45, 46; WAV files in DORSA: cbt017s02r01, -r02, -r03.

Additional description.—Most details of this beautiful katydid are already mentioned in the genus diagnosis and are depicted in figure 1. The lucent green coloration of the tibia mostly fades in dead specimens. The bright orange of the frontal ocellus vanishes completely, as well as the bright coloration of the eyes, including a dark vertical stripe. On pleura and coxae there are a few blackish markings. The knee regions of all legs are blackened, particularly and extensively in the distal part of the hind femora. While in the middle and hind legs the tibiae are green from right below the black knees, in the front tibiae the ear region is light reddish brown, like most of the body, and below this region the tibiae are green (or very pale greenish in dead specimens). Each fore femur has 2 (rarely 1) black spines distally on the internal ventral margin. The middle femur also has 2 black spines distally on the ventral side (the more proximal one is sometimes very small; sometimes there are 3 spines). The hind femur bears 3-4 (mostly 4) black ventral spines on its distal half. All those spines increase in size from proximal to distal. The inner genicular lobe of the fore femur is slightly obtusely elongated. But only the inner one of the middle femur and both of the hind femur are developed as delicately pointed spines. The dorsal ridges of the foretibia are slightly undulated but spineless. Both ventral edges sport tiny spines. The middle tibia is dorsally spineless and sports tiny spines on both its ventral edges. On the hind tibia the basal half of the external ridge is spineless, otherwise both edges have spines, the internal ones mostly slightly larger. Details of male cerci and subgenital plate as well as the female ovipositor are shown in figure 1.

Measurements.—Males/females: body length 24-25/25-27 mm, pronotum length 5/5-5.5 mm, tegmen length 4-4.5 mm in both sexes, hind femur 15-16/16-18 mm, ovipositor 10 mm (for more details please refer to photographs with scales in OSF, in the dorsal view of specimen cbt017s04 the extraordinarily long antennae are visible).

Distribution.— So far *Ottotettix* is known from three localities in southern Ecuador between the eastern Andean Cordillera and the Cordillera del Cóndor (40 and 60 km air-line distance apart, see point map in OSF), and certainly occurs in between in undisturbed forest along Río Zamora and Río Nangaritza, as well as in tributary valleys. The known altitudinal range is 850-1300 m (Maralí 850-1200 m, Bombuscaro valley 1000-1100 m, Nangaritza valley 1200-1300 m), and might extend below 800 m. The species seems to perch fairly frequently on understory leaves close to creeks and vales in undisturbed mountainous rainforest.

Behaviour and bioacoustics.—As with all neotropical Pseudophyllinae known to the author, *Ottotettix smaragdopoda* is exclusively nocturnal. The male's calling song is fairly remarkable. The single call at 500-600 ms is very long, and consists of 12-15 syllables, with a distinct resolution of the impulses that probably corresponds to individual tooth-scraper contacts. The short and low-intensity half-syllables in between presumably correspond to the opening strokes of the tegmina. In accord with these rapid-decay impulses the frequency spectrum is very broad, from 25 to almost 40 kHz and entirely ultrasound. Most energy is emitted between 26 and 31 kHz. This call seems to be performed only sporadically. The recorded male, collected October 14 and extensively monitored with an ultrasound detector at night, was not heard calling until November (recorded November 6 and 18). The species could never be detected acousti-

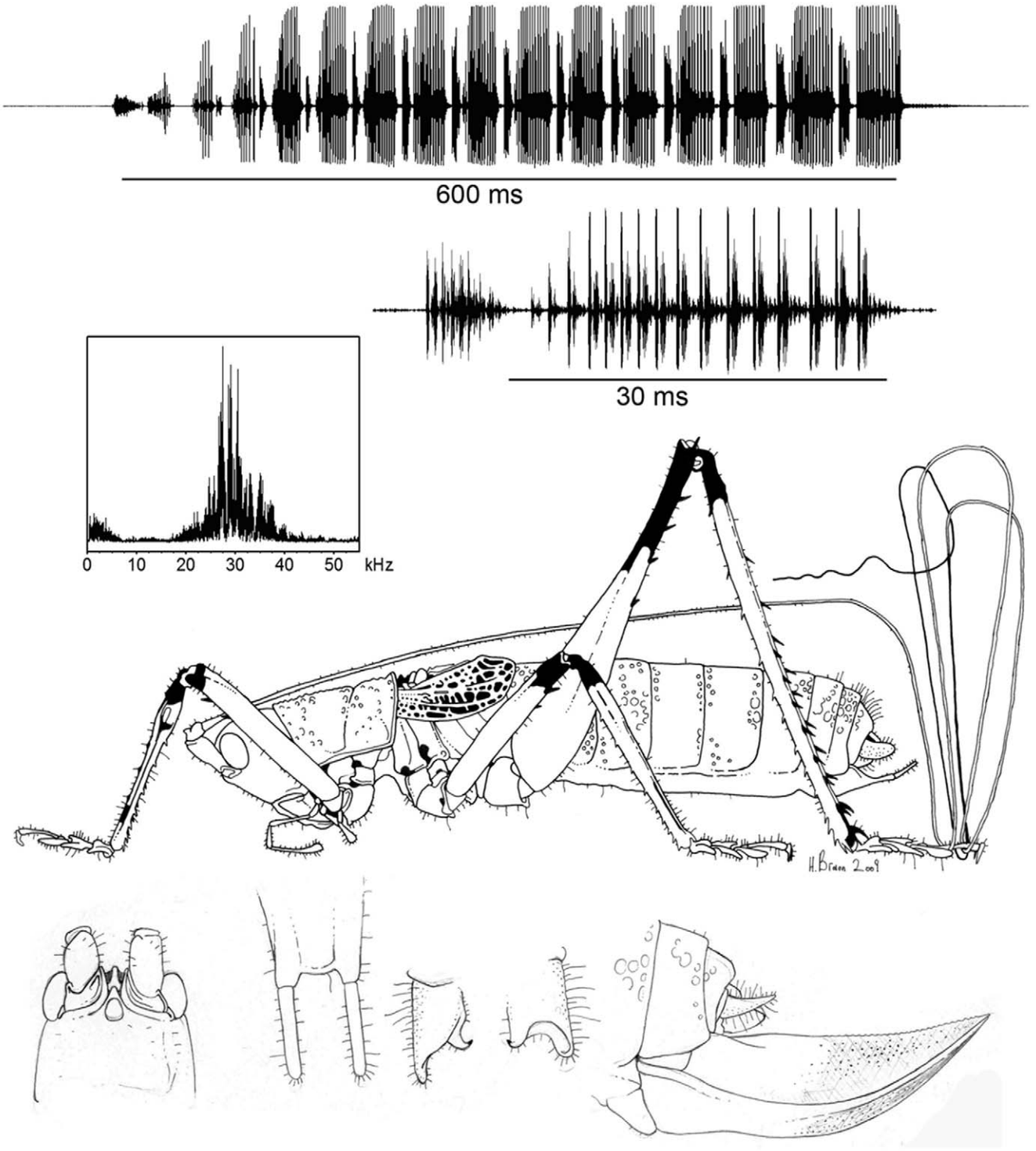

Fig. 1. Oscillograms of complete call and of one expanded syllable from the middle of it (at 21°C), linear power spectrum of sound frequency. Habitus of male (specimen cbt017s01, entire body length 25 mm) and below frons, subgenital plate in ventral view, left cercus in dorsal, and right cercus in dorso-medial views (terminalia same scale, styli 1 mm), and abdomen end of female (ovipositor length 10 mm).

Fig. 2. Male (individual cbt017s06). For color version, see Plate III.

cally in its habitat.

Once I observed a male and a female sharing a cage; both were in contact with their antennae, the male put itself, specifically its abdomen, into vertical vibration (tremulation). After this they mated. This indicates that the emerald-legged katydid may communicate by means of substrate vibration, as found for katydids in neotropical lowland rainforests (Belwood & Morris 1987, Morris *et al.* 1994, Römer *et al.* 2010). In such locales predation by eavesdropping bats has caused katydids to evolve strongly reduced calling activity. In Ecuador these foliage-gleaning bats are confined to lower elevations, with only one species occurring up to about 2000 m in the area at the northern edge of Podocarpus National Park, which has been comprehensively investigated from 1000 m to 3400 m (Braun 2002, 2008). There the calling activity of the different species occurring along the altitudinal gradient increases with elevation, with the mountain species calling quite perseveringly and conspicuously. In contrast the emerald-legged katydid, enjoying the tropical climate in lower elevations, has to be wary and call rarely.

Acknowledgments

I would like to mention first Otto von Helversen. It was a very sad notice in March 2009 that he is no longer there. His confidence in the author and DFG grant He 1180/12-1 made possible the discovery and early investigations on this katydid, one of numerous new species representing unknown genera. The investigations at Maralí were made possible by Sonia Angelita González and her family's hospitality, and aided by the company of her and Alfredo and José González on nocturnal hikes. Participation at the survey in the Nangaritza area I owe to Conservation International, and for field assistance and discovery of katydids I thank the herpetologists Silvia Aldás, Elicio Tapia, and Juan Manuel Guayasamin (Pontifica Universidad Católica del Ecuador, Quito), as well as the guides from the local community of Las Orquídeas, Edison and Milton Alberca.

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