

## **A Rapid Biological Assessment of Katydids of the Kwamalasamutu Region, Suriname (Insecta: Orthoptera: Tettigoniidae)**

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Source: A Rapid Biological Assessment of the Kwamalasamutu region, Southwestern Suriname: 104

Published By: Conservation International

URL: <https://doi.org/10.1896/054.063.0109>

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## Chapter 6

### A rapid biological assessment of katydids of the Kwamalasamutu region, Suriname (Insecta: Orthoptera: Tettigoniidae)

*Piotr Naskrecki*

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#### SUMMARY

Seventy-eight species of katydids (Orthoptera: Tettigoniidae) were recorded during a rapid biological assessment of lowland forests of the Kwamalasamutu Region, Suriname. At least seven species are new to science, and 29 species are recorded for the first time from Suriname, bringing the number of species of katydids known from this country up to 85. The current survey confirms that the katydid fauna of Suriname is exceptionally rich, yet still very poorly known. Although no specific conservation issues have been determined to affect the katydid fauna, habitat loss in Suriname due to logging and mining activities constitute the primary threat to the biota of this country.

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#### INTRODUCTION

Katydid (Insecta: Orthoptera: Tettigoniidae) have long been recognized as organisms with a significant potential for use in conservation practices. Many katydid species exhibit strong microhabitat fidelity, low dispersal abilities (Rentz 1993), and high sensitivity to habitat fragmentation (Kindvall and Ahlen 1992) thereby making them good indicators of habitat disturbance. These insects also play a major role in many terrestrial ecosystems as herbivores and predators (Rentz 1996). It has been demonstrated that katydids are a principal prey item for several groups of invertebrates and vertebrates in Neotropical forests, including birds, bats (Belwood 1990), and primates (Nickle and Heymann 1996). While no Neotropical katydids have been classified as threatened (primarily because of the paucity of data on virtually all species known from this region), there are already documented cases of some Nearctic katydids becoming threatened or endangered, or even extinct (Rentz 1977.)

Despite the recent increase in the faunistic and taxonomic work on katydids of the Neotropics, forests of the Guiana Shield remain some of the least explored and potentially interesting areas of South America. Collectively, over 190 species of the Tettigoniidae have been recorded from countries comprising the Guiana Shield (e.g., Venezuela, Guyana, Suriname, and French Guiana), but this number clearly represents a small fraction of the regional species diversity, and at least 300–500 species can be expected to occur there. Fifty-six species have been reported from Suriname (Eades et al. 2011). Virtually all of these records are based on material collected in the 19<sup>th</sup> century, and no targeted survey of the katydid fauna of the country has ever been conducted. Most of the species from Suriname were described in the monographic works by Brunner von Wattenwyl (1878, 1895), Redtenbacher (1891), and Beier (1960, 1962). More recently Nickle (1984), Emsley and Nickle (2001), Kevan (1989), and Naskrecki (1997) described additional species from the region.

The following report presents preliminary results of a survey of katydids conducted between 17 August and 9 September 2010 at selected sites in the Kwamalasamutu region of southern Suriname.

## METHODS AND STUDY SITES

During the survey, three methods were employed for collecting katydids: (1) collecting at an ultraviolet (UV) light at night, (2) visual searching at night and during the day, and (3) detection of stridulating individuals using an ultrasound detector (Pettersson 200) at night. Representatives of all encountered species were collected and voucher specimens were preserved in 95% ethanol or as dry specimens layered between thin paper tissue and desiccated with silica gel. Voucher specimens of all collected species will be deposited in the National Zoological Collection of Suriname, while remaining specimens will be deposited in the collections of the Museum of Comparative Zoology at Harvard University, and the Academy of Natural Sciences of Philadelphia (the latter will also become the official repository of the types of new species encountered during the present survey upon their formal description.)

In addition to physical collection of specimens, stridulation of acoustic species was recorded using a Marantz PMD661 digital recorder with a Sennheiser directional microphone. Virtually all species encountered were photographed, and these images will be available online in the database of the world's katydids (Eades et al. 2011).

Simpson's Index of Diversity (Ds) was calculated for each site using the formula:

$$D_s = 1 - \sum_i [n_i(n_i-1)]/[N(N-1)]$$

where  $n_i$  = number of individuals of species  $i$ , and  $N$  = number of all collected individuals.

Katydids were surveyed at the following five sites:

1. **Camp 1: Kutari, Site 1** (2°10'31.3"N, 56°47'14.1"W); 18–25 August 2010
2. **Iwana Samu** (2°21'46.6"N, 56°45'17.9"W); 25–26 August 2010
3. **Camp 2: Sipaliwini, Site 2** (2°17'24.1"N, 56°36'25.6"W); 27 August – 2 September 2010
4. **Inselberg nr. Sipaliwini river** (2°17'56.4"N, 56°36'37.3"W); 31 August 2010
5. **Camp 3: Werehpaï, Site 3** (2°21'47.1"N, 56°41'51.5"W); 2–8 September 2010

## RESULTS

The katydid fauna documented during this survey was exceptionally interesting and rich in species. Seventy-eight species were recorded during the survey, of which at least seven species are new to science, and one of these will likely be placed

in a new genus of sylvan katydids. Twenty-nine species are recorded for the first time from Suriname, bringing the total number of species known from this country to 85 (a 52% increase). A complete checklist of species collected during the survey is presented in the Appendix.

It is worth mentioning that the abundance of katydids encountered during this survey was often exceptionally low (although no formal structured sampling was conducted, the rate of katydid collection was often only one individual/hour, and during most nights no individuals were attracted to the UV light.) This low abundance is well reflected in the species richness indices of the three main camps, with Simpson's Indexes of Diversity (Ds) for Camps 1, 2, and 3 being 0.969030969, 0.999625047, and 0.997416324, respectively. These results indicate very high species richness, combined with low abundance of individual species, a situation typical of tropical habitats with low levels of disturbance.

Many of the recorded species appeared only as nymphs, often in early developmental stages, which indicates a strong seasonality in their development. It seems that in such species egg hatching must take place in the last weeks of the rainy season, and maturation takes place during the dry season.

Of the three main camps, the first site (Kutari) had the lowest number of both species (25) and specimens (78) collected, presumably because of the heavy rains that still affected the activity of katydids at the end of the rainy season, when the survey began. Werehpaï had the highest number of species (54), followed by Sipaliwini (46).

Below I discuss the most interesting taxa of katydids recorded during the survey.

### Conehead katydids (subfamily Conocephalinae)

The Conocephalinae, or the conehead katydids, include a wide range of species found in both open, grassy habitats, and high in the forest canopy. Many species are obligate semivivores (seed feeders), while others are strictly predaceous. A number of species are diurnal, or exhibit both diurnal and nocturnal patterns of activity. Sixteen species of this family were recorded.

*Vestria* sp. n. — Four species of this genus are known from lowland forests of Central and South America. These insects, known as Crayola katydids because of their striking coloration, are the only katydids known to employ chemical defenses, which are effective at repelling bird and mammalian predators (Nickle et al. 1996). Specimens of *Vestria* collected at Sipaliwini and Werehpaï represent a species new to science.

*Eschatoceras* sp. 1 — A single female specimen of this species was retrieved from a spider web at Werehpaï. The insect was already partially digested, but its diagnostic characters, such as the unique shape of the fastigium of vertex and the subgenital plate, allow me to conclude that it most likely represents a yet unnamed species of this genus.

*Subria* cf. *amazonica* — Ten specimens of this species were recorded at the Sipaliwini and Werehpaï camps. They

resemble *S. amazonica* Redtenbacher, a species known from the unique female holotype from “Alto Amazonas”, but differs in the degree of the development of the wings, and likely represent a yet unnamed species of the genus. These predaceous insects were represented by two distinct, green and orange, color morphs.

*Loboscelis baccatus* Nickle & Naskrecki — This arboreal, most-likely predaceous species was previously known only from Amazonian Peru (Nickle and Naskrecki 2000), but a single individual was found at Werephai. This record represents a significant extension of its range, and the first record of the genus *Loboscelis* in the Guiana Shield.

#### Leaf katydids (subfamily Phaneropterinae)

The Phaneropterinae, or leaf katydids, represent the largest, most species-rich lineage of katydids, with nearly 2,700 species worldwide, and at least 550 species recorded from South America. All species of this family are obligate herbivores, often restricted to a narrow range of host plants. Probably at least 50–75% of species found in lowland rainforests are restricted to the canopy layer and never descend to the ground (females of many species lay eggs on the surface of leaves or stems, and the entire nymphal development takes place on a single host plant.) For this reason, these insects are difficult to collect, and the only reliable method for their collection is a UV or mercury-vapor lamp, or canopy fogging. Very few species can be encountered during a visual or acoustic search in the understory of the forest.

Twenty-five species of leaf katydids were recorded during the present survey, virtually all attracted to the UV light at the camps.

*Euceraia* sp. n. — A single individual of an undescribed species of this genus was collected at the Sipaliwini camp at the UV light at night. It is a member of a genus of canopy katydids, known to deposit their eggs between the layers of the leaf epidermis; they are rarely encountered at the understory level of the forest.

*Meneghelia carlotae* Piza — This is the first record of this species from Suriname and the first specimen collected since its original description (Piza 1980) from “Territ. do Amapá” in Brazil. The morphology of the female ovipositor in this species is unique among katydids, and suggests that the eggs are laid in some unusual, yet unknown substrate.

*Polichmodes americana* Giglio-Tos — Two individuals of this species were collected at the Sipaliwini camp at the UV light. They represent the first records of this species outside its type locality in Ecuador and a substantial extension of its range; they are also the first specimens collected since its original description over a century ago (Giglio-Tos 1898).

#### Sylvan katydids (subfamily Pseudophyllinae)

Virtually all members of tropical Pseudophyllinae occur only in forested, undisturbed habitats, and thus have a potential as indicators of habitat changes. These katydids are mostly herbivorous, although opportunistic carnivory has been observed in some species (e. g., *Panoploscelis*). Many are

confined to the upper layers of the forest canopy and never come to lights, and are therefore difficult to collect. Fortunately, many species have very loud, distinctive calls, and it is possible to document their presence based on their calls alone, a technique well known to ornithologists. Thirty-five species of this family were collected during the present survey.

*Gnathoclita vorax* (Stoll, 1813) — This spectacular species is a rare example of a katydid with strong sexual dimorphism manifested in strong, allometric growth of the male mandibles. It was found at Werephai, although all collected specimens were nymphal. This species is known only from southern Guyana and southern Suriname.

*Eubliastes* cf. *adustus* — Three individuals of this large katydid species were collected at Sipaliwini. Although superficially similar to *E. adustus* Bolívar known from Ecuador, the morphology of the male external genitalic structures indicates that these specimens may represent a species new to science. If these specimens do represent *E. adustus*, this would be the first record of this species anywhere outside of Ecuador.

Gen.\_Homalaspidini sp. 1 — This highly unusual katydid was collected from among leaves of yucca plants growing on the inselberg near the Sipaliwini camp, and another individual was found on similar vegetation at the Werephai camp. The body of this insect is extremely elongated, adapted to live among long, stiff leaves of yucca and related plants.

#### CONSERVATION RECOMMENDATIONS

The results of this survey confirm that the fauna of katydids of southern Suriname is exceptionally rich, even by the standards of lowland tropical forests, and that a large proportion of it remains unknown and unnamed. More sampling surveys, combined with comprehensive taxonomic and phylogenetic reviews, are badly needed in order to understand its true magnitude.

As with most groups of tropical insects, the principal threat to the survival of katydids in Suriname comes from habitat loss, especially from logging and mining. While species-level conservation recommendations are currently impossible to make, protecting the existing habitats, or at least major, connected fragments of them, is the most effective way of ensuring their survival.

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**Appendix.** List of katydids (Orthoptera: Tettigoniidae) recorded during the Kwamalasamutu RAP survey.

Species	Camp 1 (Kutari)	Camp 2 (Sipaliwini)	Camp 3 (Werehpai)	Iwana Samu	Inselberg nr. Camp 2	New for Suriname	New to science
<b>Conocephalinae</b>							
<i>Agraecia viridipennis</i>		x	x			x	
<i>Eschatoceras bipunctatus</i>			x				
<i>Eschatoceras</i> sp. 1			x				x
<i>Subria</i> cf. <i>amazonica</i>		x	x				x
<i>Subria grandis</i>		x	x			x	
<i>Uchuca amacayaca</i>			x			x	
<i>Uchuca</i> sp. 1	x	x	x	x			x
<i>Conocephalus</i> (X.) <i>cinereus</i>					x	x	
<i>Acantheremus elegans</i>		x					
<i>Acantheremus</i> sp. 1		x	x				
<i>Copiphora longicauda</i>	x	x	x				
<i>Graminofolium castneri</i>	x	x	x	x		x	
<i>Loboscelis bacatus</i>			x			x	
<i>Neoconocephalus punctipes</i>			x				
<i>Neoconocephalus</i> sp. 2			x		x		
<i>Vestria</i> sp. 1	x	x	x				
<b>Listroscolidinae</b>							
<i>Phlugis teres</i>			x				
<i>Listroscolis</i> sp. 1	x	x	x				
<b>Phaneropterinae</b>							
<i>Dysonia</i> (D.) <i>fuscifrons</i>	x					x	
<i>Steiroidon</i> (P.) <i>dentatum</i>		x	x			x	
<i>Anaulacomera</i> sp. 1	x	x	x				
<i>Anaulacomera</i> sp. 2	x	x	x				
<i>Anaulacomera</i> sp. 5			x				
<i>Anaulacomera</i> sp. 6			x				
<i>Anaulacomera</i> sp. 7			x				
<i>Anaulacomera spatulata</i>			x			x	
<i>Euceraia atryx</i>			x				
<i>Euceraia</i> sp. 1		x					x
<i>Hetaira smaragdina</i>		x	x				
<i>Hyperphrona gracilis</i>		x	x			x	
<i>Ligocatinus</i> cf. <i>punctatus</i>			x				x
<i>Meneghelia carlotae</i>			x			x	
<i>Microcentrum marginatum</i>		x				x	
<i>Microcentrum</i> sp. 1		x					
<i>Microcentrum</i> sp. 2		x	x				
<i>Parableta</i> sp. 1		x					
<i>Phylloptera festae</i>		x				x	
<i>Phylloptera laevis</i>	x	x					
<i>Phylloptera</i> sp. 1	x	x					

table continued on next page

Species	Camp 1 (Kutari)	Camp 2 (Sipaliwini)	Camp 3 (Werehpai)	Iwana Samu	Inselberg nr. Camp 2	New for Suriname	New to science
<i>Phylloptera</i> sp. 3		x	x				
<i>Polichnodes americana</i>		x				x	
<i>Theia unicolor</i>		x				x	
<i>Viadana</i> sp. 1	x	x	x				
<b>Pseudophyllinae</b>							
<i>Bliastes contortipes</i>			x				
<i>Eubliastes adustus</i>		x				x	
<i>Meroncidius</i> sp. 1	x						
<i>Schedocentrus</i> (S.) <i>basalis</i>		x					
<i>Schedocentrus</i> (S.) <i>vicinus</i>			x				
<i>Gnathoclita vorax</i>			x				
<i>Panoploscelis scudderi</i>	x	x	x			x	
<i>Gen_Homalaspidini</i> sp. 1			x		x		x
<i>Chondrosternum</i> sp. 1	x	x	x	x			
<i>Chondrosternum triste</i>	x	x	x	x		x	
<i>Leptotettix falconarius</i>		x	x				
<i>Platychiton surinamus</i>	x	x					
<i>Aemasia</i> sp. 1	x	x					
<i>Platyphyllum</i> sp. 2	x						
<i>Triencentrus amoenus</i>		x				x	
<i>Triencentrus nigrospinosus</i>			x			x	
<i>Triencentrus</i> sp. 1		x					x
<i>Acanthodis</i> sp. 1	x	x	x				
<i>Acanthodis unispinulosa</i>		x	x				
<i>Ancistrocercus truncatistylus</i>			x			x	
<i>Diacanthodis granosa</i>	x					x	
<i>Leurophyllum consanguineum</i>			x			x	
<i>Rhinischia regimbarti</i>			x			x	
<i>Sphyrophyllum malleolatum</i>		x				x	
<i>Cycloptera speculata</i>	x						
<i>Pterochroza ocellata</i>	x	x	x				
<i>Roxelana crassicornis</i>			x			x	
<i>Typophyllum erosum</i>			x			x	
<i>Typophyllum</i> sp. 1	x	x	x				
<i>Typophyllum</i> sp. 2		x	x				
<i>Diophanes salvifolius</i>		x	x			x	
<i>Eumecopterus incisus</i>	x	x	x				
<i>Teleutias aduncus</i>	x					x	
<i>Teleutias surinamus</i>		x					
<i>Teleutias vicinissimus</i>			x	x		x	
<b>Total</b>	<b>25</b>	<b>46</b>	<b>54</b>	<b>5</b>	<b>3</b>	<b>29</b>	<b>7</b>