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# Chapter 1

## Katydids of selected sites in the Konashen Community Owned Conservation Area (COCA), Southern Guyana

*Piotr Naskrecki*


### SUMMARY

The survey of katydids (Orthoptera: Tettigoniidae) of the Konashen COCA of southern Guyana revealed a high species diversity of these insects, resulting in a 130% increase of the katydid fauna of this country. Seventy-three species were recorded, 58 of which (79%) were new to Guyana, and at least seven were new to science. Combined with 44 species previously recorded, the known katydid fauna of Guyana now includes 101 species, yet this number probably represents only about 30% of the actual diversity of these insects. Virtually all species recorded during this survey are indicative of undisturbed forest habitats.


### INTRODUCTION

Despite the recent increase in the faunistic and taxonomic work on katydids (Orthoptera: Tettigonioidea) of the northern Neotropics, forests and savannas of the Guayana Shield remain some of the least explored, and potentially most interesting regions of South America. Collectively, over 190 species of the Tettigoniidae have been recorded from the countries comprising the Guayana Shield (Venezuela, Guyana, Suriname, and French Guiana), but this number clearly represents only a fraction of the actual species diversity in this area. Most of the known species were described in the monumental 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. Overall, forty-four species of katydids have been recorded from Guyana, but it is likely, based in part on the result of this survey, that at least 250-300 species occur there.

Katydids have long been recognized as organisms with a significant potential for their 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) thus 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 in the neotropical forests katydids are themselves a principal prey item for several groups of invertebrates and vertebrates, including birds, bats (Belwood 1990), and primates (Nickle and Heymann 1996). While no neotropical species of katydids has 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 species of nearctic katydids being threatened or even extinct (Rentz 1977).

The following report presents the results of a Rapid Assessment survey (RAP) of katydids conducted between October 7-27, 2006 at selected sites within the Konashen Indigenous District of southern Guyana. All collecting sites of the survey were located within the boundaries of the Community Owned Conservation Area (COCA), a protected area belonging to the Wai-Wai community. The katydid fauna of this area, similar to that of most of the country, has never been surveyed, and most species found during the RAP survey represent new records for Guyana.



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## METHODS AND STUDY SITES

During the survey three collecting methods were employed for collecting katydids: (1) collecting at mercury vapor (MV) and ultraviolet (UV) lights at night, (2) visual search at night, and (3) net sweeping of the understory vegetation during the day and at night. An ultrasound detector (Pettersson D 200) was also used to locate species that produce calls in the ultrasonic range, undetectable to the human ear. MV trapping was done for 10 nights (5 nights at each main site), for at least 3 continuous hours between 19:30 and midnight. UV trapping was done sporadically, and only at sites (Sites 3 and 4) where using a generator to power the MV lamp was not feasible (the UV lamp could be powered by a relatively small, rechargeable 12 V battery.) Visual searches were done every night, usually between 20:00 and 02:00, when the activity of virtually all katydid species was the highest. Vegetation sweeping was done only during the day, and only in places where the density of the vegetation permitted such an activity (e.g., grasslands near the Wai-Wai villages, and along river banks). Sweeping was standardized by performing five consecutive sweeps in a series before the content of the net was inspected.

Representatives of all encountered species were collected and voucher specimens were preserved in 95% alcohol, or as dry, pinned specimens. Upon completion of their identification, most of the specimens will be returned to the collection of the University of Guyana, Georgetown, while a small number of voucher specimens will be deposited in the collections of the Museum of Comparative Zoology, Harvard University, and the Academy of Natural Sciences of Philadelphia (the last will also become the official repository of the holotypes of possible 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 the Sony MZ-NHF 800 digital recorder and a Sennheiser shotgun microphone. These recordings are essential to establish the identity of potentially cryptic species, in which morphological characters alone are not sufficient for species identification.Virtually all encountered species were photographed, and these images will be available online in the database of the world's katydids (Eades et al. 2007).

The majority of specimens were collected at the following two sites:

1. Site 1: Acarai Mountains – Foothills of the Acarai Mountains, lowland, terra firme forest along Acarai creek, N01°23'12.2", W058°56'45.7", elevation ~270 m; collecting was done between October 6th and 17th, 2006. This site was characterized by sandy, oligotrophic soils, with lowland evergreen, deciduous forests. The DBH of most trees was small (less than 50 cm), although widely scattered emergents with very large DBH (more than 100 cm) were also present at the site. It appeared that the forest here did not inundate seasonally nor did it inundate every year. Consequently, the leaf litter layer in the forest was rich in soil mesofauna, including a number of species of katydid associated with leaf litter (e.g., *Uchuca* spp.). In addition to deciduous vegetation, this site also included a small patch of native bamboo forest (*Guadua* sp.).

2. Site 2: Kamoa River – A lowland, seasonally inundated forest along the Kamoa River, N01°31'52", W058°49'41.9", elevation ~250 m; collecting was done between October 18th and 27th. The forest at the site was annually inundated with areas of palm swamp and extremely oligotrophic clay soils. Inland from the river, the transition from inundated forest and palm swamp to terra firme moist forest (~300 m) was clearly demarcated. The DBH of most trees at the site was small, and the leaf litter layer was poorly developed.

Additionally, opportunistic collecting was done at two sites near the main RAP campsites:

3. Akuthopono (nr. Gunns landing strip) – Mostly savanna, with small patches of riparian forest, N01°39'04.2", W058°37'42.9", elevation ~230 m; collecting was done on October 3rd and 27th.

4. Sipu River campsite – A landing site on the Sipu River, inundated lowland forest, N01°25'06", W058°57'12.6", elevation ~250 m; collecting was done on October 3rd.

## RESULTS

The katydid fauna encountered during the Konashen RAP survey turned out to be exceptionally rich, both in terms of the numbers of species recorded (73), and species new to Guyana (58, or 79% of recorded species; Table 1.1). At least seven species have been confirmed to be new to science, but additional, yet unidentified species may prove to be new as well (although still unidentified, they are not conspecific with species previously recorded from Guyana). Combined with the 44 species already recorded from Guyana, the number of katydid species known from this country is now 101, nearly a 130% increase.

Virtually all species recorded during this survey are forest species, known only from undisturbed forests of the Guayana Shield. Only one species, *Neoconocephalus purpurascens,* is also associated with open, grassy habitats.

Most members of the Phaneropterinae, a subfamily that includes a large proportion of volant, canopy species, were collected with the use of the MV or UV light traps, whereas virtually all Pseudopyllinae, many of which are non-volant, were collected in the understory during visual night collecting. The Listroscelidinae were collected mostly by vegetation sweeping and at lights. The Conocephalinae include both volant and non-volant species, found in the canopy, the understory, or even in the leaf litter, and consequently were collected using all three main collecting methods.


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**Table 1.1.** A checklist of katydid species collected in the Konashen COCA, Southern Guyana.

| Species | Site 1 Acarai Mtns | Site 2 Kamoa River | Site 3 Akuthopono | Site 4 Sipu River | Likely new to science | New record for Guyana |
|---|---|---|---|---|---|---|
| **Conocephalinae** | | | | | | x |
| *Copiphora gracilis* | | | | | | x |
| *Daedalellus apterus* | | x | x | | | x |
| *Eschatoceras* sp. n. 1 | x | x | | | x | x |
| *Gryporhynchium acutipennis* | x | | | | | x |
| *Lamniceps* sp. 1 | | x | | | x | x |
| *Neoconocephalus purpurascens* | x | x | x | | | |
| *Paralobaspis gorgon* | x | x | | | | x |
| *Subria.grandis* | | x | | | | x |
| *Uchuca similis* | x | x | | | | x |
| *Vestria diademata* | x | x | | | | x |
| **Listroscelidinae** | | | | | | |
| *Listroscelis armata* | x | x | | | | x |
| *Phlugiola* sp. 1 | x | x | | | x | x |
| *Phlugis* cf, *bimaculatoides* | x | x | x | x | | x |
| **Phaneropterinae** | | | | | | |
| *Anaulacomera* sp. 1 | x | | | | | x |
| *Anaulacomera* sp. 2 | x | | | | | x |
| *Anaulacomera* sp. 3 | x | | | | | x |
| *Anaulacomera* sp. 4 | x | | | | | x |
| *Anaulacomera* sp. 5 | x | x | | | | x |
| *Ceraia* sp. 1 | x | x | | | | x |
| *Ceraia* sp. 2 | x | x | | | | x |
| *Ceraia* sp. 3 | | x | | | | x |
| *Euceraia subaquila* | x | | | | | x |
| *Euceraia* sp. 1 | x | | | | | x |
| *Ceraiaella* sp. 1 | x | | | | | x |
| *Euceraia rufovariegata* | x | | | | | x |
| Gen. 1 sp. 1 | x | | | | x | x |
| Gen. 2 sp. 1 | x | | | | | x |
| Gen. 3 sp. 2 | x | | | | | x |
| Gen. 4 sp. 1 | x | x | | | | x |
| *Hyperphrona bidentata* | x | | | | | x |
| *Ischyra* sp. 1 | x | x | | | | x |
| *Itarissa* sp. 1 | x | x | | | | x |
| *Paraphidnia verrucosa* | x | | | | | x |
| *Phylloptera* sp. 1 | x | x | | | | x |
| *Pycnopalpa* sp. 1 | x | | | | | x |
| *Steirodon dentiferoides* | x | | | | | x |



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| Species | Site 1 Acarai Mtns | Site 2 Kamoa River | Site 3 Akuthopono | Site 4 Sipu River | Likely new to science | New record for Guyana |
|---|---|---|---|---|---|---|
| *Steirodon maroniensis* | x | | | | | x |
| *Steirodon* sp. 3 | | x | | | | x |
| *Syntechna* sp. 1 | x | | | | | x |
| *Vellea cruenta* | | x | | | | x |
| *Viadana* sp. 1 | x | | | | | x |
| **Pseudophyllinae** | | | | | | |
| *Acanthodis longicauda* | x | | | | | |
| *Bliastes contortipes* | x | x | | | | |
| *Chondrosternum triste* | x | x | | | | |
| *Chondrosternum* sp. 1 | x | x | | | | x |
| *Cycloptera speculata* | x | x | | | | |
| cf. *Leptotettix* sp. 1 | x | x | | | | x |
| *Eubliastes adustus* | x | | | | | x |
| *Eumecopterus nigrovittatus* | x | x | | | | |
| Gen. 5 sp. 1 | x | | | | | x |
| *Gnathoclita vorax* | x | | | | | |
| *Leptotettix* sp. 1 | x | x | | | | x |
| *Leptotettix spinoselaminatus* | x | x | | | | |
| *Leurophyllum consanguineum* | x | x | | | | |
| *Leurophyllum* sp. 1 | x | | | | | |
| *Leurophyllum* sp. 2 | x | | | | | |
| *Panoploscelis scudderi* | x | | | | | |
| *Parapleminia* sp. 1 | x | | | | | x |
| *Pezochiton* sp. 1 | x | x | | | | x |
| *Platychiton brunneus* | x | x | | | | |
| *Platyphyllum* sp. 1 | x | | | | x | x |
| *Platyphyllum* sp. 2 | x | x | | | x | x |
| *Platyphyllum* sp. 3 | | x | | | x | x |
| *Pleminia* sp. 1 | x | | | | | x |
| *Pleminia* sp. 2 | | x | | | | x |
| *Pleminia* sp. 3 | | x | | | | x |
| *Pterochroza ocellata* | x | x | | x | | |
| *Rhinischia surinama* | x | | | | | |
| *Roxelana crassicornis* | x | | | | | x |
| *Scopioricus latifolius* . | | x | | | | x |
| *Diacanthodis granosa* . | x | | | | | |
| *Typophyllum rufifolium* | x | x | | x | | x |
| *Typophyllum flavifolium* | x | | | | | x |
| **Totals** | | | | | | |
| **73** | **62** | **39** | **3** | **3** | **7** | **57** |


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Of the two main collecting sites, Site 1 (Acarai Mtns.) yielded a higher species count (62) than Site 2 (Kamoa River) (39), but this difference should probably be attributed to less than optimal placement of the MV light trap at the second site, rather than differences in the habitat quality of vegetation (most species missing from Site 2 are volant, canopy species that can only be collected at lights). Below I discuss some of the most interesting finds of this katydid survey.

**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 graminivores (grass feeders), while others are strictly predaceous. A number of species are diurnal, or exhibit both diurnal and nocturnal patterns of activity. Ten species of this family were recorded.

*Eschatoceras* sp. n. 1 – Seven species of this genus are known, ranging in their distribution from Ecuador through Suriname and Brazil to Bolivia. The specimens collected at the sites within the Konashen COCA represent an additional, eighth species. They are similar to *E. bipunctatus* (Redtenbacher) but differ in the pattern of facial markings and the male genitalic structures.

*Neoconocephalus purpurascens* – Species of the genus *Neoconocephalus* are nearly always associated with open, grassy or marshy habitats. Most species are seed-feeders, and females lay their eggs in stems of grasses or reeds. Very few species of this large genus (120 valid species) are known to occur in forested habitats, and then only if there are openings or roads intersecting the forest. Finding *N. purpurascens* in continuous, pristine forests of the Konashen COCA adds an interesting element to the biology of this group of katydids.

**Subfamily Listroscelidinae**

Within the Neotropics this family is represented by over 70 species, all obligatory predators of other insects. With the exception of the genus *Phlugis*, some of which can be found in anthropogenic, grassy habitats, all species of this family appear to be associated with undisturbed, primary forests. During the present survey three species of this family were found.

*Phlugiola* sp. 1 – Three species of this genus are known from Peru and Suriname, all brachypterous. The individuals collected during this survey were fully winged, and represent a fourth, new species of the genus.

**Subfamily Pseudophyllinae**

Virtually all members of tropical Pseudophyllinae, or sylvan katydids, can be found only in forested, undisturbed habitats, and thus have a potential as indicators of habitat changes. These katydids are mostly herbivorous, although opportunistic carnivory was observed in some species (e.g., *Panoploscelis)*. Many are confined to the upper layers of the forest canopy, and never come to lights, making it difficult to collect them. Fortunately, many of such species have very loud, distinctive calls, and it is possible to document their presence based on their calls alone, a technique known well to ornithologists. Thirty-two species of this family were collected during the present survey.

*Gnathoclita vorax* – This spectacular species is a rare example of a katydid with strong sexual dimorphism represented by a strong, allometric growth of the male mandibles. It was found at Site 1 (Acarai Mtns.) in the patches of the native bamboo (*Gaudua* sp.), where males stridulated from within bamboo stems. Until now such an association with *Gaudua* has been known only in the katydid *Leiobliastes laevis* Beier from Peru (Louton et al. 1996).

*Platyphyllum* spp. – Three species of this genus were recorded during the survey, all appearing to be new to science. The genus *Platyphyllum* has never been recorded from the countries of the Guayana Shield, and finding three new species in Guyana hints at a high, undiscovered diversity of this taxon.

**Subfamily Phaneropterinae**

Twenty-eight species of this subfamily were recorded during the survey, most of them collected at MV and UV light traps. These katydids are almost always excellent fliers, and many reside exclusively in the canopy of the forest, completing their entire reproductive cycle there. All known species of this subfamily are strictly herbivorous.

The taxonomy of Neotropical Phaneropterinae lags behind other groups of katydids, and most genera require detailed revisions before identification of most of the collected species can be completed. Nonetheless, at least one species (Gen. 1 sp. 1) has been confirmed to be new to science, and all 28 are new to Guyana, thanks to the fact that no Phaneropterinae species have ever been reported in the literature from this country.

## CONSERVATION RECOMMENDATIONS

The sites visited by the RAP team in the Konashen COCA belong to some of the most pristine, least populated areas in South America. Currently, there are no known factors immediately threatening these forests, although the development of roads in the neighboring regions of Brazil may result in bringing in illegal logging or gold mining.

Based on the results of the katydid survey, I strongly recommend additional entomological surveys of the Konashen COCA, which are bound to yield many species of insects and other invertebrates that are new to science. Some of these, like the spectacular and rather common Peacock katydid *(Pterochroza ocellata)* or *Morpho* butterflies, have the potential to attract ecotourism as much as larger, better known animals. It is therefore important to continue training Wai-Wai parabiologists in recognizing some of the more



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iconic and "charismatic" invertebrates, which are becoming popular targets of the ecotourism industries in other parts of the world. At the same time, it would be beneficial to both the Wai-Wai community, and the scientific community in Guyana and elsewhere, to continue a biodiversity surveying and monitoring program in the Konashen COCA.

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