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Some insect prey consumed by *Peropteryx kappleri* Peters, 1867 (Chiroptera: Emballonuridae) in Northern Venezuela

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Abstract

In Venezuela the bats of the genus *Peropteryx* have been poorly studied. The data for the species that inhabit the country are limited to information strictly on taxonomy and geographic distribution. As a contribution to the knowledge of the natural history of *Peropteryx kappleri*, we report data concerning its diet, obtained in a colony formed by four specimens, in a fragmented evergreen forest ubiquitous in the Sierra de Aroa, Yaracuy state, Venezuela. In 2007, four daytime trips were conducted monthly (March, April, May and June). For the analysis on the feeding habits, we collected the fecal samples, using a 1 x 1.5 m polyethylene sheet located approximately 0.5 m above the ground. In the laboratory, the samples were processed and identified to order level, but in some case were identified further to family level. The results show a high percentage of prey of the class Hexapoda (six orders) in the fecal samples. Hymenoptera and Coleoptera were the orders with the highest percentage of individuals and frequency of occurrence in the study. The remaining orders recorded (Lepidoptera, Homoptera, Trichoptera and Diptera)

obtained the lowest percentages. The fragmented insects found in the cave that were not consumed by the colony could indicate a high fidelity to the refuge and a feeding behaviour not previously documented in *Peropteryx kappleri*.

Key words: Diet, *Peropteryx kappleri*, Sierra de Aroa, Venezuela.

Algunos insectos presa consumidos por *Peropteryx kappleri* Peters, 1867 (Chiroptera: Emballonuridae) en el Norte de Venezuela

Resumen

En Venezuela los murciélagos del género *Peropteryx* han sido pobremente estudiados. Los datos documentados para las especies presentes en nuestro país, están relacionados sólo con información taxonómica y geográfica. Como un aporte al conocimiento de la historia natural de *Peropteryx kappleri*, se registran datos de la dieta obtenidos en una colonia conformada por cuatro individuos, de un bosque siempreverde fragmentado ubicado en la Sierra de Aroa, estado Yaracuy, Venezuela. Las visitas fueron realizadas una vez al mes en horas diurnas por cuatro meses (marzo, abril, mayo y junio) de 2007. Para el análisis de la dieta se recolectaron muestras fecales, utilizando una lámina de polietileno de 1 x 1.50 m, colocado a una altura de 0.5m sobre el suelo. En el laboratorio las muestras de restos de invertebrados en las heces fueron procesadas e identificadas a nivel de orden y para algunos casos hasta nivel de familia. Los resultados indican un alto porcentaje de individuos de la clase Hexapoda (seis órdenes) en las muestras fecales. Hymenoptera y Coleoptera resultaron ser los órdenes con los mayores porcentajes de individuos y frecuencias de ocurrencia en todo el estudio. El resto de los órdenes registrados (Lepidoptera, Homoptera, Trichoptera y Diptera) obtuvieron los porcentajes menores. El hallazgo en el refugio de fragmentos de insectos no consumidos por la colonia, durante el estudio, indicaría una alta fidelidad al refugio y un comportamiento de alimentación no documentado en *Peropteryx kappleri*.

Palabras clave: Dieta, *Peropteryx kappleri*, Sierra de Aroa, Venezuela.

Peropteryx is a Neotropical genus of insectivorous bats and it is represented by four species in Venezuela (Simmons, 2005). These bats roost in shallow caves, rocky crevices, hollow trees, fallen logs, and manmade structures (Dunlop, 1998). To date, data on natural history for *Peropteryx* are scarce (*e.g.*, Bradbury & Vehrencamp, 1976; Dunlop, 1998) and research topics studied in Venezuela are restricted to taxonomy and geographic information (*e.g.*, Handley, 1976).

During a study of bat communities in Northern Venezuela, we found one diurnal roost used by *Peropteryx kappleri* in the Sierra de Aroa, Yaracuy State. The colony consisted of an adult couple with two young, living together. Our study provides some additional data on diet and thus contributes to ecological information of the family Emballonuridae.

The roost (10° 26'N; 68° 51'W) was located at a rocky crevice in a disturbed riparian forest near small farms and pastures by the river "Cumaraguita", sector Papelón, Sierra de Aroa, Yaracuy State. This sierra has a surface of 114.103 ha. (Bevilacqua *et al.*, 2006) and an altitudinal range between 100–1920m. The average annual precipitation is between 800–1500 mm and the range of annual temperature is between 10–26.5°C (Alvarado, 2008).

We carried out four visits to the roost: two in the dry season (March and April, 2007) and two in the wet season (May and June, 2007). We fully extended a piece of polyethylene plastic below the roost, ca. 0.5m above the ground over the surface where shed feces of the bats could be caught. This procedure was implemented to both quantify the faecal material and avoid samples being removed by arthropods and vertebrates.

Samples were collected once a month during diurnal hours, with bats present, and during each month, observations to verify suspected absence of other bat species were carried out, to verify that *P. kappleri* individuals were not living with other species as previously reported (Yee, 2000). In the laboratory, samples were dried and diluted in Petri dishes with ethanol 70%. Insect prey remains found (*e.g.*, heads, antennae, legs, scales) were separated into vials using a stereo microscope. We counted individuals on the basis of insect remains following procedures from Lasso and Jarrin (2005). Identifications were made at the order level and in some cases at the family level, using entomological keys in Borror and White (1987).

Despite some insect prey remains in our samples being sufficiently digested making identifications difficult; we were able to identify 45 individuals of the class Hexapoda (Table 1). Six orders with temporal variation of occurrence in months were recorded. Hymenoptera and Coleoptera had the highest percentage of individuals and were present all four months. Species of Lepidoptera were found in both dry and wet months. The greatest diversity of prey items occurred in March (dry season).

Table 1. Orders and families of the class Hexapoda recorded in fecal samples of *Peropteryx kappleri* individuals from river "Cumaragueta", sector Papelón, Sierra de Aroa, Yaracuy-State, Venezuela. Percent contributions of each family or order in the diet throughout the entire survey are reported. Individuals are recorded for each month of the survey.

Order	%	March	April	May	June
Hymenoptera					
Vespidae	48.9	10	7	2	3
Coleoptera					
Chrysomelidae	24.4		6	4	1
Scarabeidae	8.9	1	2	2	
Carabidae	2.2	1			
Curculionidae	2.2	1			
Dermestidae	2.2				1
Homoptera					
Cicadellidae	2.2	1			
Lepidoptera					
Lepidoptera	4.4	1		1	
Trichoptera					
Trichoptera	2.2	1			
Diptera					
Diptera	2.2				1

Yee (2000) reported small beetles and flies for *P. macrotis*. This bat is sympatric with *P. kappleri* in our study area and their body masses and roosts are similar (Linares, 1998). Although, we documented preferences of *P. kappleri* to consume vespids wasps (48.9%), it was also evident of its high consumption of small beetles of the families Chrysomelidae (24.4%) and Scarabeidae (8.9%). Likewise, we

recorded a dipteran prey item in June, coinciding with data for *P. macrotis* reported by Yee (2000).

Bradbury and Vehrencamp (1976) stated that *P. kappleri* would be more specialized to feed on a particular prey type, and for this reason they hypothesized that insect prey consumed by *P. kappleri* might be restricted to a limited number of taxa. Our study does not support this hypothesis and we found that *P. kappleri* successfully feeds on a variety of taxa, though long-term studies that include greater sampling and duration of insect fauna in feeding areas are important to fully estimate the availability of prey resources which may be preferred or avoided by *P. kappleri*.

It is interesting to note the documentation in all sampled months of *intact* abdomen and wings fragments of Vespidae and elytra of Scarabeidae on the polyethylene plastic, together with faecal pellets in which we also documented antenna, head, and leg remains of these families. Such evidence makes us to presume that *P. kappleri* individuals may consume some prey directly at the roost, possibly those prey items whose hard exoskeletons would be avoided for consumption during flight, adopting a foraging behavior documented in insectivorous gleaning bats (*e.g.*, Kalka & Kalko, 2006; Lasso & Jarrin, 2005).

There is a possibility that during the time that *P. kappleri* individuals were foraging (20–40 minutes reported by Bradbury & Vehrencamp in 1976 for Costa Rica), the roost may have been used by other insectivorous gleaning bats. It has been demonstrated in studies with bats of the subfamily Phyllostominae (*e.g.*, Kalko *et al.*, 1999) that some of their representatives (*e.g.*, *Lophostoma silvicolum*) use a variety of roosts at night to feed. However, there are exceptions (*e.g.*, *Micronycteris microtis* and *M. megalotis*) that maintain a high fidelity in their nightly roosts (Kalka & Kalko, 2006; Lasso & Jarrin, 2005) and the presence of Scarabaeidae and Vespidae fragments in *P. kappleri* pellets found on the polyethylene plastic, along with the high fidelity at nightly roosts for insectivorous gleaning bats with similar body masses (Kalka & Kalko, 2006, Lasso & Jarrin, 2005), would indicate an unusual foraging behavior not yet recorded in *P. kappleri*.

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