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Endemic insects from the Yungas of Argentina

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Abstract

Until now, biogeographic unit of the Yungas was almost exclusively characterized by its floristic taxa. Presence of other taxonomical groups, in this case arthropods, were poorly recorded besides implicit mention of arthropods to characterizeYungas as a natural region. We present herein a species checklist of the holometabolous insects considered as endemics of the Yungas in Argentina. This checklist is a result of a rigorous endemicity analysis (Navarro *et al*, en prep.) Comments about altitudinal gradients of distribution for these endemic species are made. Results reveal a total of 23 endemic insects species of Yungas, representing 13 families of Lepidoptera, Diptera and Hymenoptera.

Keywords: endemism, montane forest, biogeography, Argentina

Resumen

Hasta el presente, la unidad biogeográfica de las Yungas ha sido caracterizada casi exclusivamente por sus componentes florísticos. La presencia de otros grupos taxonómicos, como los artrópodos, para caracterizar a las Yungas como una región natural ha sido pobremente documentada a pesar de alguna mención implícita y esporádica de especies de artrópodos. Nuestro objetivo es brindar una lista de especies de insectos holometábolos endémicas de las Yungas de la Argentina, resultado de un análisis de endemicidad riguroso (Navarro *et al*, en prep.). Comentarios sobre la distribución altitudinal de estas especies son realizados. Los resultados revelan la existencia de 23 especies de insectos endémicas de Yungas repartidas en 13 familias de Lepidoptera, Diptera e Hymenoptera.

Palabras clave: endemismo, selva montana, biogeografía, Argentina

Introduction

The recognition of endemic species (those that are found in a specific place and nowhere else) is important not only in terms of conservation and management of the biodiversity, but also from a biogeographical point of view, allowing characterization of a particular biogeographical region. On the other hand, rich areas of endemism can be active places of speciation or refuges of ancient species. Judging by the recent available literature, insects were been rarely taken into account at the moment of characterizing biomes or biogeographical regions, except for some sporadic references or citing species registered only from its type locality.

Montane forests are very important as repositories of biodiversity and as a result are increasingly important for tourism and recreation as well as hunting and fishing. Because mountain forests are usually isolated from similar ecosystems by steep terrain and intervening lowlands with contrasting climates, they are fre-

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quently areas with high species endemism. Local distribution tends to make species more vulnerable to extinction, and this combined with increasing pressures on mountain ecosystems has led to the inclusion of many mountain forest species on the lists of the world's most critically endangered species.

The Yungas, a territory which covers over 4000 km from Venezuela to north-western Argentina, which has been characterized almost exclusively by its flora (Cabrera 1971; Hueck 1978) whereas other taxonomic groups have been assumed to have a similar distribution.

Some authors (Cabrera & Willink 1973; Brown 1995; Graham 1995; Prado 1995) sustain that the Yungas are not a homogeneous unit, whose major differences regarding fauna and flora are the result of climatic and historic factors. According to Cabrera & Willink (1973), its fauna, unlike its flora, is mostly composed by taxa from nearby areas. A clear example is the north-west of Argentina where the Yungas display a combination of Arid and semiarid Chaco and Misiones Forest. Morrone (2000, 2001, 2006) compiled a list that includes characteristic taxa, such as insects (only four species), birds and mammals, which are exclusively present in this province. Under closer examination, however, some of the taxa in this list are present only in small sectors of the Yungas.

Herein we present a list of endemic species belonging to some families of holometabolous insects from Yungas of Argentina. Comments on its altitudinal spread are provided.

Materials and methods

Study region.—Yungas (Cabrera & Willink 1980) lie between Venezuela and northern Catamarca province in Argentina, on the oriental slopes of the Andes, between 300 and 3500 m of altitude (Cabrera 1971; Cabrera & Willink 1973; Brown 1995; Morales et al., 1995; Morrone 2000, 2001, 2006). In Argentina it spans from north to south along over 600 km, occupying near 4.5 million hectares (in the provinces of Salta, Jujuy, Tucumán and Catamarca), and has an altitudinal range of 400 m to 3000 m.

Regarding its flora and landscape, three altitudinal levels can be recognized:

a)premontane forest (300–600 m) (PF, also “Transitional forest”),

b)montane forest (MF, 600–1500 m) [With two distinct forest types: basal forest (BF, 900-1200 m) and Myrtaceae forest (MiF, 1200–1600 m)] and

c)montane cloud forest (MCF, 1500–3000 m) (Cabrera 1971; Brown 1995; Prado 1993).

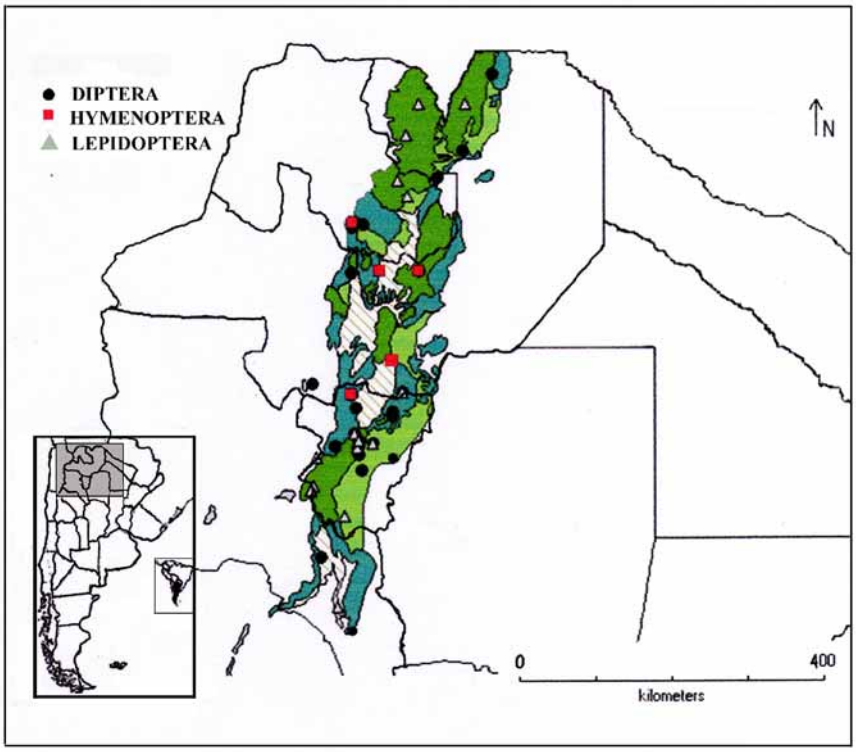
Over 150,000 hectares of Argentinean Yungas are protected in national parks like El Rey, Calilegua, Baritú, San Javier, etc. but only the Montane Forest is represented there (Brown & Grau 1993).

Other authors (Brown & Ramadori, 1989; Morales et al., 1995) divide the Argentinean Yungas latitudinally into three sectors: north, center and south. The northern and central Yungas have three protected areas respectively and the southern Yungas have six. Unfortunately, the central part of the Argentinean Yungas includes no protected areas.

Examined material: Material analyzed herein belongs to three holometaboluos insect orders: Lepidoptera (31 species belonging to two families), Diptera (140 species from 24 families) and 119 species of Formicidae (Hymenoptera). A total of 290 species were used in the preliminary stage of this study.

Sources of data: We used data associated to material deposited on the entomological collection of the Instituto-Fundación Miguel Lillo (IFML, Tucumán, Argentina) and bibliographic references from recent reviews, catalogues and faunistic lists.

All the records were converted to its georeference (plane coordinates); the information was supplied by the Instituto Geográfico Militar (www.igm.gov.ar) and Biolink (www.biolink.csiro.au). Original and detailed records are available upon request to the first author. Subsequently those data were submitted to an analysis of endemicity (AE) (Szumik et al. 2002, Szumik & Goloboff 2004) whose results constitute the body of another work (from Navarro *et al*. in prep). Map 1 was made using DIVA-GIS software (Hijmans *et al* 2002).



MAP 1: Yungas in the north of Argentina, showing distributional patterns of insects, by order, mentioned in this paper. Streeped area shows a part of "Chaco Serrano" vegetation. ■= Yungas in broad sense; ■= Yungas *sensu stricto*; ■= Cultivated areas of Yungas; ■ = Modified areas with some elements of Yungas.

Results and conclusions

From the analysis carried out, a total of 26 areas of endemism referred to the Yungas were obtained, which are detailed in Navarro *et al*. (in prep). The same study has revealed the presence of 23 endemic species of insects of Yungas distributed in 13 families and three orders (Table 1, map 1). These species represent 8% of the total of insect species registered to the Yungas.

Formicidae (Hymenoptera), Noctuidae and Geometridae (Lepidoptera), Micropezidae and Bibionidae (Diptera) have endemic species in all the altitudinal levels of Yungas (Table 1). According to the evidence, the montane forest is the best characterized altitudinal level by endemisms of studied groups (see Table 1). On other hand, the montane forest is the best conserved level of Yungas, with more than 150,000 has of preserved areas (such as reserves, national parks, etc). This is an excellent criterion for prioritizing areas for conservation.

From the 23 species found as endemic, only two species of ants (Hymenoptera: Formicidae) were registered inhabiting exclusively the first floor of Yungas (*Crematogaster euterpe* and *Probolomymrex brujitae*), and seven other species were found only on the superior level of Yungas.

Future investigations, with emphasis on both altitudinal levels (premontane and montane forest), will allow possible corroboration with these results. These results are based in data mainly relieved from entomological collections. Nevertheless, they constitute the first rigorous contribution to the knowledge and delimitation of the Argentinean Yungas, using insects and a formal criterion (AE).

In the latitudinal view, as we can see in the map 1, Formicidae are better represented in the central part of Yungas, and Diptera and Lepidoptera are better represented to define the north and south parts of Yungas. The central and southern sectors appear to be better defined by the insects analyzed herein.

In the light of these results, further steps should be taken to undertake similar analyses using a reduced number of insects in other groups to test the validity of this approach and to possibly corroborate the significance of the Yungas as a biogeographic unit.

TABLE 1. List of endemic species of insects from argentine yungas: ordered by order, family, species and altitudinal level in which each species is present. PF= Premontane forest; BF= basal forest; MiF= Myrtaceae forest; MCF= montane cloud forest.

Order	Family	species	Altitudinal Distribution			
			PF	BF	MiF	MCF
Diptera	Asilidae	*Lastaurus tricolor*	x	x		
	Asteiidae	*Tucumyia pollinosa*	x	x		
	Bibionidae	*Bibio wulpi*	x	x	x	x
	Bombylidae	*Systropus conopoides*	x	x		
	Fanniidae	*Fannia coxata*		x	x	
	Micropezidae	*Micropeza dorsalis*		x	x	
		Micropeza maculiceps	x	x	x	
		Micropeza marginatus	x	x	x	
	Pipunculidae	*Metadorylas tucumanus*	x			
	Stratiomyidae	*Gowdeyana vitrisetosus*	x	x	x	
	Syrphidae	*Baccha titania*	x	x		
		Epistrophe roburoris	x	x	x	x
	Tachinidae	*Adejeania andina*	x	x		
Hymenoptera	Formicidae	*Crematogaster euterpe*	x			
		Pheidole subaberrans		x	x	
		Wasmannia sulcaticeps		x	x	x
		Probolomyrmex brujitae	x			
Lepidoptera	Geometridae	*Bassania jocosa*		x	x	x
		Bassania schreiteri	x	x	x	
		Bassania tucumana		x	x	x
		Hygrochroma subvenusta		x	x	x
	Noctuidae	*Coxina turibia*	x	x	x	
		Matigramma nitida	x			x

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