

EPIPHYTE ORCHID DIVERSITY IN A YUNGAS MONTANE FOREST IN THE COTAPATA NATIONAL PARK AND INTEGRATED MANAGEMENT NATURAL AREA, LA PAZ – BOLIVIA

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Introduction

In Bolivia the works focused on the study of the epiphyte vegetation are few and recent. This lack of knowledge is being filled by investigations like those of Ibsch (1996) about the flora and epiphyte vegetation; Acebey & Krömer (2001), Acebey *et al.* (2003), Altamirano & Fernandez (2003) and Miranda (2005), who worked in the diversity and ecology of vascular and not vascular epiphytes.

In Bolivia a total of 20.000 species of angiosperms has calculated (Beck 1998), Vásquez *et al.* (2003) estimates between 2000 to 3000 of these plants are orchids, actually there is a list with approximately 1500 species, of which near 1200 have been identified (Vásquez *et al.* 2003). Sixty percent of the species and 80% of the endemic orchids are concentrated in the region of the Yungas that does not occupy more than 4% of the surface of the country (Vásquez *et al.* 2003).

The area of the Yungas in La Paz is one of the most explored places of Bolivia (Beck 1993). A continuous work has contributed to a great, but non total knowledge of the flora, for example, a study of epiphytes in the montane forests of the Cotapata National Park and Integrated Management Natural Area (PN-ANMI) has a total of 292 species in an inventory of three parcels of 0,32 ha. each one, of which the orchids with a 44% represent the most important family (Krömer & Gradstein 2003).

Since May of 2005 is developed the project: “Study of the potential of sustainable use of epiphytes in the PN-ANMI Cotapata”, with the initial objective of know more on the diversity of epiphytes orchids in the montane forests of Yungas of this protected area. This work presents the preliminary results of the inventories developed in this project.

Study area

The Cotapata PN-ANMI (fig. 1) is located in the provinces Murillo and Nor Yungas of the department of La Paz, with a surface of 40.000 ha and goes from the 1100 to 5600 m of altitude (Ribera 1995). This wide altitudinal gradient originates a great variety of climates and types of vegetation in an area of heterogenous topography; also affected from old times by human activities. The principal forest formations are the cloudy forest (2400-3400 m) characterized by a cool and very humid climate and the humid forest of Yungas (2400-1200 m) which has a conspicuous dry time (Ribera 1995). Bach *et al.* (2003) report 3000 mm and 10,1 °C for the cloudy forest and 2550 mm and 13-17,2 °C for the humid forest of Yungas. In the south sector of the protected area starts two pre-Columbian paths; these are constructed across the core of both forests:

- Chojllapata, which mostly crosses the crest of the mountains (3400-1300 m) until arriving at the locality of El Chairó;
- Sillutinkara, which crosses in its beginning the valley of the Coscapa river (3400-2000 m) and meet the path of El Choro, in the proximities of Sandillani.

Bajo Hornuni (1800 m), located at the bottom of the Hornuni hill, in front of Sandillani, this is covered by a humid montane forest of Yungas.

Methods

The field work was conducted from July 2005 to May 2006, in zones of non- disturbed forest. For the inventory of epiphyte orchids of understory and canopy, 3 to 5 non-permanent plots of 20 x 20 m was installed each 100 altitudinal meters (modified of Krömer

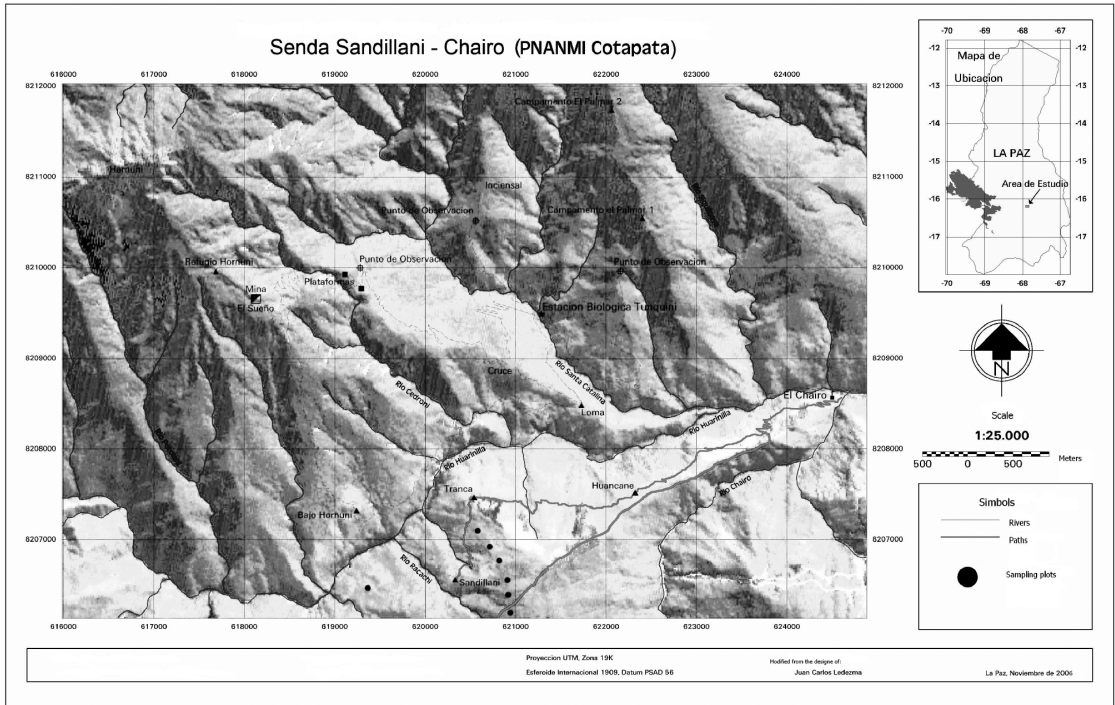


FIGURE 1. Ubication map of the sampling zones inside Cotapata Nacional Park.

2003) and a representative tree for each altitudinal range of 100 m, inside or near to a plot, which was evaluated using the techniques described by Perry (1978). Fertile and sterile orchids were collected and used for the analysis. Sterile individuals or with fruits were marked with marking tapes and respective code of collection. These plants were transplanted to a single trunk (called: storing zones) inside or close the surveyed plot, with the purpose of maintaining alive collections and obtaining fertile material that helps its identification. To complete the floristic inventory, general collections were made throughout the pre-Columbian paths. In addition orchid flowers were collected and preserved in small bottles with a solution of 70% of alcohol. All the samples are deposited in the Herbario Nacional of Bolivia (LPB).

Results and discussion

From the evaluation of 47 non permanent plots, 13 phorophyts and general collections we registered 255 species of epiphyte orchids. The most representative genera are *Stelis* Sw. (19%), *Pleurothallis* R.Br. (15%), *Epidendrum* L. (14%), and *Maxillaria*

Ruiz & Pav. (13%) (Fig. 2). Acebey & Krömer (2001) in foodmontane forests of Bolivia and Nowicki (2001), in a cloudy forest of Ecuador, found similar proportions. On the other hand Vasquez *et al.* (2004) indicates that in Bolivia the genera *Pleurothallis* and *Epidendrum* constitutes the most diverse taxa.

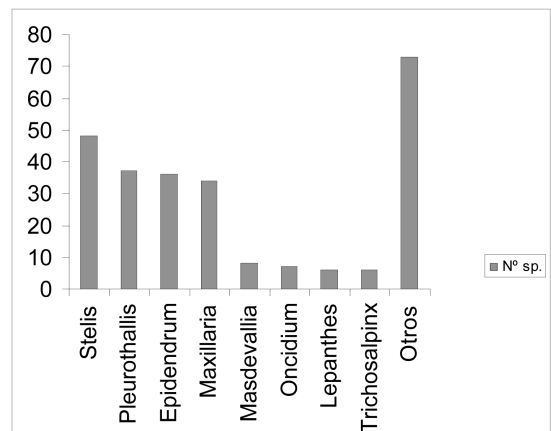


FIGURE 2. Diversity of the most important genera in the study zone.

From our results is clear to point out that in the genera *Epidendrum* and *Maxillaria* there are a great proportion of unidentified species; the same happens in the preliminary list of orchids of Bolivia (Vasquez *et al.* 2003), this unidentified orchids could represent new species or new registries for Bolivia.

In addition, new records at local and regional level stand out, for example *Odontoglossum vierlingii* Senghas, considered endemic to the department of Cochabamba, was found in the study area. Similarly, *Prostecchia pulchra* Dodson & W.E. Higgins, found in dispersed populations, until now has been only recorded in the humid montane forests of Ecuador and Peru (Higgins & Dodson 2001); now we found it in our study zone, in a moderately disturbed montane forest, on the edge of the Silluntinkara path, at 2100 m approximately. In the genus: *Epidendrum* L., *Maxillaria* Ruiz & Pav., *Cyrtorchilum* Kunth, *Stelis* Sw. and *Masdevallia* Ruiz & Pav. we found many unidentified specimens, therefore is highly probable that exist new species (Vásquez R., pers. comm. 2006). With more sampling we hope to find new registries for the zone and new species for science.

Our results show a great diversity in a relatively wide gradient. For example Krömer *et al.* (2005) in a altitudinal range of 350 to 4000 m above sea level, registered 314 species of orchids. Also compared with the study of Krömer (2003) for the region, we registered the double of species but in a wide altitudinal range. These highlight the importance of the zone for the diversity of orchids. The high diversity of the study zone could be explained for the interaction between heterogeneous topography and the wide altitudinal gradient, both generating a variety of climates and different habitats able for support diverse vegetation. Still more, the deforestation originated for the continuous use of this forest from pre-Columbian time to recent times has a negative impact on the diversity of orchids (Krömer 2003); although this large diversity is an indicator for the high resilience of the forest.

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