The montane forest at San Martín

We concentrated our research in the dry forests of the Madidi Region in 2005, the plans for 2006 was to intensify the studies in the montane forests above the 1000 m cote. It was a natural progression and the montane forests are a very fragile ecosystem with high levels of endemism and potentially new species for science. They are located on pronounced slopes in an area with accelerated colonization, that frequently begins with the cutting down of trees without even taking advantage of the resources that are being destroyed, the cleared land is then converted into cultivation of crops or cattle ranching. The colonization have several negative effects, it causes fragmentation, diminishes the extension of the montane forest, sped up soil erosion, and may easily render extinct species that we yet to discover.

Organizing the load making it ready for the trip at Buena Hora, on the trail Azariamas-Saint Fermín. (L. Cayola)

The montane forest are extremely important, because of its ecological and economic function, particularly in controlling the erosion and down slope run off. They have received little attention and the studies that quantify and document their structure and diversity are few. Research in composition and structure has for the last decades been driven by high local (alpha) diversity and much less concerned with turnover rates (beta diversity).

The expedition lasted of 28 days (20 May–16 June 2006) with intense field work to reach the objectives. 15 temporary plots (0.1 ha) and 3 permanent plots (1 ha) were established (Table 1). All plots were located between 1000–1600 m elevation. We measured a total of 6731 stems and made 942 botanical collections.

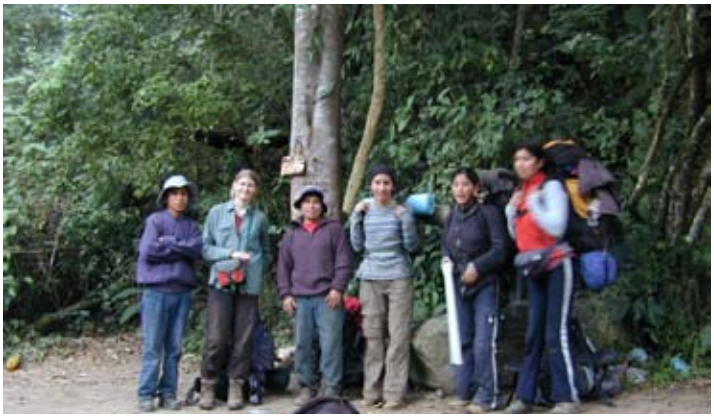
Base camp on the trail between Azariamas and Saint Fermín in the montano forest of the Madidi National Park (L. Cayola).

Table 1. List of plots established with there coverage, position, elevation and number of individuals.

Plots	Area (ha)	Coordinates	Altitude (m)	# Inventoried individuals
PTM 1	0.1	14°09'5.5''S 68°43'57.7''W	1219	287
PTM 2	0.1	14°08'52.6''S 68°44'09.5''W	1326	399
PTM 3	0.1	14°08'52.4''S 68°44'29.1''W	1248	436
PTM 4	0.1	14°08'41.5''S 68°44'41.8''W	1250	371
PTM 5	0.1	14°09'21.9''S 68°44'01.9''W	1297	225
PTM 6	0.1	14°04'38.2''S 68°44'14.7''W	1408	257
PTM 7	0.1	14°09'39.3''S 68°44'27.4''W	1580	439
PTM 8	0.1	14°09'51.5''S 68°44'26.7''W	1588	342
PTM 9	0.1	14°09'38.5''S 68°44'08.8''W	1351	332
PTM 10	0.1	14°09'13.1''S 68°43'36.7''W	1180	313
PTM 11	0.1	14°09'19.4''S 68°43'13.9''W	1145	322
PTM 12	0.1	14°09'21.3''S 68°43'01.7''W	1102	261
PTM 13	0.1	14°09'26''S 68°48'47.2''W	1124	299
PTM 14	0.1	14°09'26.3''S 68°43'23''W	1093	254
PTM 15	0.1	14°09'51.5''S 68°44'6.2''W	1392	391
PPM 1	1	14°09'42.05''S 68°43'27''W	1100	643
PPM 2	1	14°08'42''S 68°44'42.4''W	1250	507
PPM 3	1	14°09'30.3''S 68°44'23.9''W	1400	653

Participants

The people in charge of the expedition were Alejandro Araujo-Murakami and Leslie Cayola, investigators of the project. The students who captured data for their thesis were Isabel Loza that worked with the temporary plots and Edwin Ticona who worked with the permanent plots. We had the collaboration of the students Sandra Paredes and Vania Torrez. The volunteers in this expedition were Gualberto Chive and Karina Wilk, who work with lichens. Our guides were Edgar Segundo Villca and Cecilio Perez (main guides), Belisario Gonzales, Gerardo Jove, Augusto Urbano and Lisandro Molina. The cook of the expedition was Emilia de Sevillanos. In addition porters and mule drivers from the community of Azariamas participated.



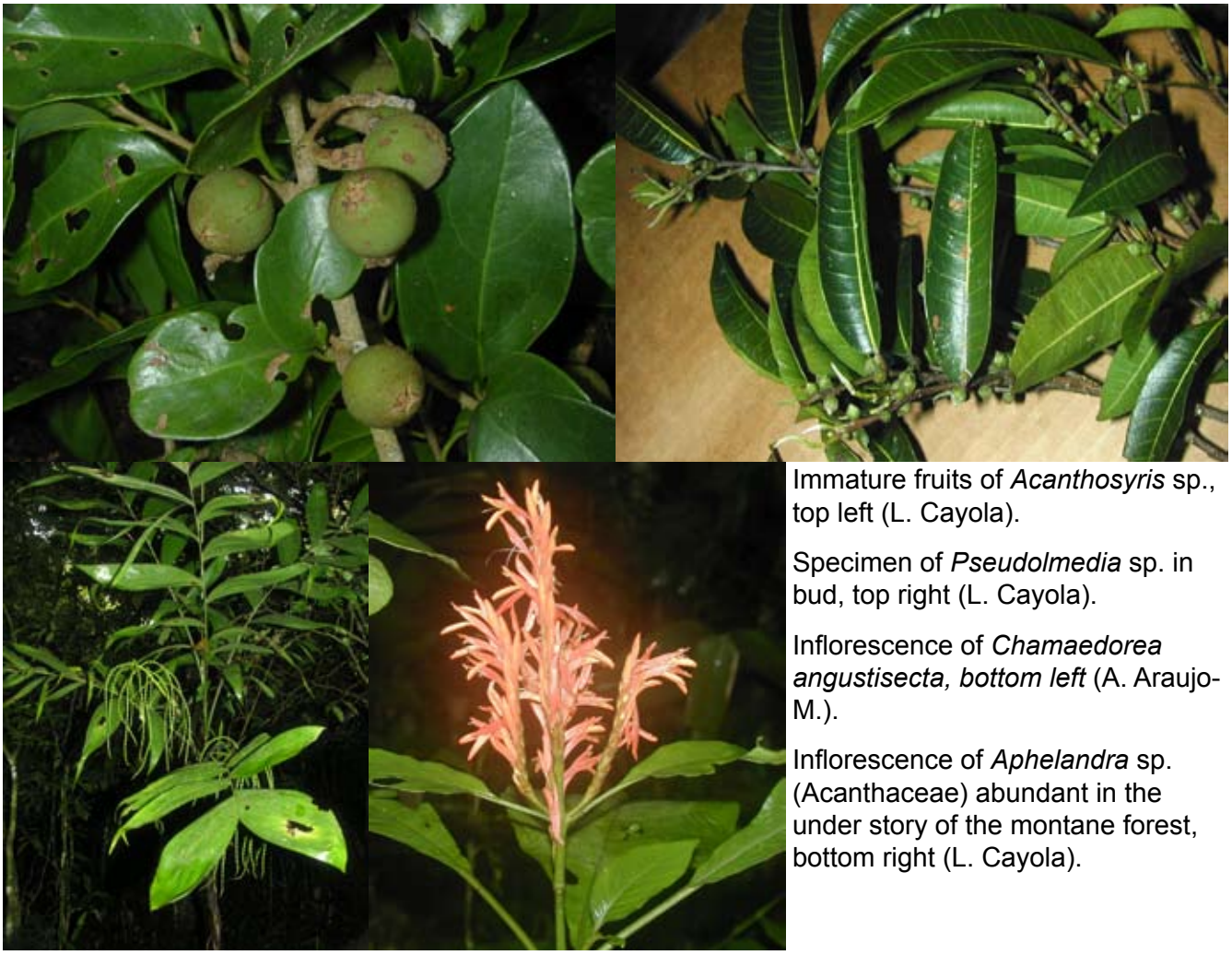
Members of the Madidi Project at the Buena Hora camp. From the left: Edwin Ticona, Karina Wilk, Gualberto Chive, Sandra Paredes, Vania Torrez and Isabel Loza (L. Cayola).

Notes from the expedition

We left in the morning from La Paz for Apolo, with the idea of spending the night there. We arrived at night (21:00). The following day we continued to Azariamas, a 4 hours drive. Once in Azariamas, we met with the community leaders, our guides for the expedition and decided to load the horses and the necessary porters immediately to transfer all the equipment and foods to the selected base camp.

To arrive at the base camp we crossed the dry forest by the trail connecting Azariamas and San Fermín; the road ends in Azariamas. The trail we followed is used almost exclusively by the military contingents that maintain an advance position at the Community of San Fermín, on the border between Bolivia and Peru. This trail first cuts through the dry forest, but as soon as we crossed the pass the seasonal montane forest was starting to dominate, as we descended we entered a sub-Andean forest with Amazonian influence in the vicinity of San Fermin. The forest around San Fermín is located in the Tambopata river basin, and no botanist has explored this area before so no collections exist from th is area; it was very interesting.

Arriving at the base camp was not an easy task, it was a 2 days walk. The trail however, had several places to rest and they were always close to a river or small stream, in addition the military personnel have establsihed campsites at San Juan, Buena Hora, Cafetal, La Cumbre,



Immature fruits of *Acanthosyris* sp., top left (L. Cayola).

Specimen of *Pseudolmedia* sp. in bud, top right (L. Cayola).

Inflorescence of *Chamaedorea angustisecta, bottom left* (A. Araujo-M.).

Inflorescence of *Aphelandra* sp. (Acanthaceae) abundant in the under story of the montane forest, bottom right (L. Cayola).

Los Mutunes and Rancho, place names rarely found on any map.

The first day was a long walk we passed San Juan and arrived at Buena Hora, where we camped. The following day we passed Cafetal late in the day and the members of the project and a pair of the guides reached our base camp just before La Cumbre. The mule drivers and the horses remained at Cafetal, they could not advance as fast because of the trails condition with many fallen trees and small landslides. The conditions of the trail delayed us a full 2 days, we had to return to Cafetal and transfer part of the equipment and foods and carry it in to the base camp. In the meantime two guides worked on improving the trail so that they could continue the ascent with the now less heavily loaded horses. Once all the equipment arrived, we finished setting up the camp and began evaluating the area.

Our scouting of this seasonal montano forest convinced us that we had found a suitable place for the installation of plots. The forest is limited to the Southeast by the dry forest and to the northwest by Amazonian rain forest. The forest extended along an altitudinal gradient from 1050 to 1600 m. We found the topography varied from valley bottoms with an undulated relief, slopes of varying height and step and pronounced slope and almost barren ridge tops. The canopy

A dense stand of *Guadua* sp. (A. Fuentes).

reached an average of 30 m, the most dominating species belonged to the families Sapotaceae and Moraceae, and the highest trees measure 40 m, *Juglans boliviana* and *Sapindus saponaria* stood out as characteristic species. The understory was poorly developed in some sites probably caused by the dense canopy. The bamboos (*Guadua* sp.) dominated the understory in the central part of the formation between 1200 and 1400 m, we found individuals of bamboo of up to 10 cm of DBH and 10 m tall, they were quite impressing. The woody vegetation was

Termites on a fallen trunk (L. Cayola)

dominated by species with latex, mainly members of the families Sapotaceae, Apocynaceae, Euphorbiaceae, and Moraceae. In addition we found numerous individual at higher elevation of Lauraceae and Melastomataceae. Also we registered the presence of at least 6 species of palms, known by our guides as chiñipalmito (*Prestoea acuminata*), chanta (*Geonoma* spp.), chima (*Bactris gasipaes*), chonta loro (*Astrocaryum murumuru*), lime (*Syagrus sancona*) and siyaya (*Chamaedorea angustisecta*). Unfortunately we made few fertile specimens; the only species that consistently was fertile were the tree ferns and one or another tree that were fruiting.

In our exploration for a trail to the ridge tops, we followed a trail of the spectacle bear, the trail connected clusters of chiñipalmito (*Prestoea acuminata*). We also had the surprise of seeing large groups of spider monkeys (*Ateles chamek*) and manechi monkeys (*Alouatta sara*) who got very excited by our presence fled quickly. Also we saw a "*Leoncito*" (small lion) monkey (*Saguinus fuscicollis*) tiny and curious. The *Manechi* monkeys got very upset when they saw our guides climbing their trees they began howling to warn the rest of the group and soon they

Accommodating the load at Estancia San Juan, top left (A. Araujo-M.). Estancia San Juan three hours walk from Azariamas, bottom left (L. Cayola). The last survivor in a cattle pasture, below (L. Cayola).

fled nervously. Also we found tracks of white lipped pig (*Pecari tajacu*) on the main footpath, not far from the base camp. During the entire stay we were under constant attack of the acaroids of all sizes that stuck to the clothes and skin when walking through the forest. We also noted the presence of the “rococos”, the sand fly vector of Leishmania.

The return was easy, the trail had been widened, the horses could pass without problems with a full load and we walked without difficulties. Our knees suffered from the long walks, the ascents and descents of the step slopes that we had to make inside the forest. We spend the night in San Juan, in the hacienda of the same name. This property has cattle and fruit trees, mainly orange, tangerine and grapefruit. We could finally satisfy our desire for fresh fruit. The following day we reached Azariamas, the two trucks were waiting for us, the return first to Apolo and later to La Paz was uneventful.

Dusk at Azariamas (A. Araujo).