

Notes on *Magnolia* Field Work in Colombia, South America

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Of the roughly 75 or so magnolias native to the pan tropical Americas, 33 can be found in Colombia, South America. Nearly all are rare and local (allopatric) species distributed sparingly in similar types of ecosystems in remote cloud forests of the Andean Mountains range. Originally, these magnolias had been classified under two different genera: *Dugandiodendron*, which lacks a stipule scar on the leaf petiole, and *Talauma* which has scarred petioles. Other characters were cited as well (Gustavo Lozano-Contreras, 1975), but Nootboom (1984) argued that these characters were too minor (and in

certain cases erroneously described) to separate *Dugandiodendron* and *Talauma* from *Magnolia*. Later, cpDNA studies supported Nootboom's view and the two groups were placed as subsection *Dugandiodendron* and subsection *Talauma* of the genus *Magnolia* (Figlar & Noot., 2004). However, a couple of problems remained. Some of the characters used to delimit subsection *Talauma* are also found in a few subsection *Dugandiodendron* species. These inconsistencies fascinated me, and since 14 of the 15 known species of subsection *Dugandiodendron* are found in Colombia, I decided to further explore the relationships between species of subsections *Talauma*, *Dugandiodendron*, and *Cubenses* (the latter group is a closely related subsection from the Greater Antilles) and simultaneously assess its implications for conservation priorities for *Magnolia* in Colombia. This study formed the basis for my Masters Thesis in the Forest and Environment Conservation Graduate Program of the National University of Colombia, Medellín, Colombia.

My project plan was to determine whether all the species of the subsection *Dugandiodendron* form a distinct (monophyletic) group separate from those of subsection *Talauma*, or if some of those *Dugandiodendron* species actually belong to the subsection *Talauma* group. My approach to



Fieldwork locations

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this project involved many steps, including selection of taxa to be studied, determination of morphological characters to be considered, making the actual morphological observations, and then tabulating the data for use in a cladistic analysis program, thus producing a phylogenetic tree. So my first step was to review the magnolia collections of the main Colombian herbaria.

During this review of herbarium specimens, it became apparent that for many species there were insufficient collections; that is, those collection vouchers did not contain enough plant parts (such as flowers and fruits) to cover all of the morphological characters required. I needed to do my own fieldwork. Since this would require difficult travel (as well as guides) to accessible mountain locations, I applied for – and was granted – a Magnolia Society Research Grant in March 2005 to do this fieldwork.

Ultimately, I was able to collect specimens of *Magnolia mahechae*, *M. katiolum*, *M. sambuensis*, *M. colombiana*, and *M. henaoi* from among three different provinces: Valle, Antioquia, and Huila (see map).

The first one, *Magnolia mahechae* of subsection *Dugandiodendron*, is endemic to Valle province in the Cordillera Occidental where I found it near the village of Queremal (#1 on map). This locality is famous for its “quereme plants”. Here, there are many species of Ericaceae, including *Cavendishia quereme*, which is said to help make people fall in love.



M. mahechae

This area, which is 1800 m in elevation, has a “cool” cloud-forest climate which maintains temperatures in a narrow range, 14°C to 26°C (57°F–79°F), year round, resulting in an average annual temperature of ca. 20°C (68°F).

There are few remnant fragments of the forest, most of which have been replaced now by crops and

cattle. I was able to find only one tree in a small fragment of secondary forest. The tree was large and in good condition. I did not encounter any additional trees or seedlings. I think this species has the narrowest leaves of any in the *Dugandiodendron* group I have ever seen in the field. Leaves have a silvery pubescence as in *M. guatapensis*, but the leaves are thicker and the leaf apices are acuminate instead of rounded or emarginate as they typically are in many *Dugandiodendron* species. Only one individual of *M. mahechae* was collected with flowers.



Flower and pre-dehiscent fruit of *M. sambuensis*.

Next, my field work brought me back to my home province, Antioquia (#2 on map), but in the northwestern part of it, not far from Panama and the Urabá Gulf. Here, scattered in what is left of the low elevation forest (60–340 m), is the only place in the world where *Magnolia katiolum* can be found. Perhaps *M. katiolum* is the most elusive *Magnolia* species in Colombia. It was so difficult for me to find. It took three visits! During my first visit to the type locality, the local people did not seem to be familiar with this tree. So I then went to nearby villages of Chigorodó and Mutatá where I thought I had encountered it. Excitedly, I collected a lot of specimens. Then later, when I got back to the lab, it became apparent that I had actually collected *Magnolia sambuensis*, a somewhat similar looking species that is also native to that area. Among others things, *M. sambuensis* differs from *M. katiolum* by its stipule scar which extends the full length of the petiole, instead of partially as in *M. katiolum*. *M. sambuensis* is an attractive magnolia with its large, cream-colored flowers of up to 17 cm (7 in.) in diameter when open flat.

I was now even more determined to find *M. katiolum*, so I went back again to Mutatá municipality and further discussed the issue with the local people. It turns out that when I had earlier asked about the location of *M. katiolum*, I had used the vernacular name, “almanegra tree”. However, in this particular area that vernacular name refers to a completely different plant, *Orphanodendron bernalii*. Finally, a few days later, a peasant told me that he knew the tree I was looking for, but that its local name is “guacharaco”. That seemed odd to me because “guacharaca” is also a Colombian vernacular name for *Crax* birds (*Crax albertii*, *C. panxi* etc.), known for their appetite for seeds and fruits of trees. Perhaps *Crax* birds eat the seeds of *M. katiolum*!



M. katiolum

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After all this confusion was settled, the local started to walk in a long way and I then proceeded to follow him up to the highest part of the mountain and began to search for the tree in a small forest fragment. I was beginning to think I would not find the tree, but then I saw a leaf on the road. Suddenly, right nearby was a single – beautiful - tree of *M. katiorium*. Unfortunately, there were no flowers or fruits. But I made some collections, took some photos and some material from the forest floor. The tree seemed to be young, but its trunk was about 40 cm (16 in.) in diameter. There was also disturbing evidence that someone had attempted to cut it! The forest was very dark, so I could not take good pictures. The peasant went on to tell me that I would need to spend at least three days going through pristine forest if I wanted to encounter more “guacharaco” trees. I could not do it. I had to search other species, so I returned to Mutatá. Leaves of this species are huge! Maybe they are the biggest of all the Colombian *Magnolia* species.

My last collections took me far to the south in Colombia, to Cordillera Central in Huila province (#3 on the map) and the “Cueva de los Guácharos”, Natural National Park. This park has approximately 9000 ha consisting of cloud forest, although some areas are affected by different land uses like livestock grazing and small crop agriculture. However, there are important populations of *Quercus humboldtii* and *Colombobalanus excelsa*, which are other endangered species, present there as well.



M. colombiana



Habitat of *M. colombiana* and *M. henaoi* in cloud forest at 1900 m elevation.

I found *M. colombiana* and *M. henaoui* trees inside the park. I collected some fallen flower buds from the soil around the only two trees (only one individual of each species was found).

M. colombiana is appreciated by inhabitants of this region because its wood is very valuable in the market, which is one of the reasons it is an endangered tree. Locally, this tree is known as "cobre" (copper) due to the brown-red leaf coloration of leaves when they abscise. Along the park road, only young, flowerless, trees were observed. Finally, one individual tree in flower was found just outside the park and I was able to collect some flower parts. Additional younger trees were observed nearby, as well. This species has characters, such as rounded or emarginate leaf apices and yellowish pubescence, that are similar to those of some other *Dugandiodendron* species, such as *M. yarumalensis*. Flowers and leaves of *M. colombiana* are larger than in *M. mahechae*, and its pubescence and leaf shape is quite different.

I found one big tree of *M. henaoui* along the road from the park house to the "cueva del indio" place, which is a cave inside the forest. The tree was too tall (ca. 40 m) to make collections, but some fallen flower parts were gathered from the forest floor around the tree. With its small flowers, this species is very similar to *M. espinalii*. But *M. henaoui* has glabrous leaves and flower buds, while in *M. espinalii* these parts are pubescent. It was difficult to find *M. henaoui* and I did not encounter any other individuals or seedlings.

This was not the first time I found two species in the same habitat. It is also possible to find *M. yarumalensis* and *M. jardinensis* in the same locality, and this is also true for *M. polyhypsophylla* and *M. guatapensis*. It would be very interesting to study more about biogeography of all species in Colombia among the three cordilleras.

All of this fieldwork confirms what many already knew – that all five species are seriously endangered in Colombia. Not only do these magnolias mostly occur in very restricted populations (sometimes just one population), but they are also uncommon in these habitats. In addition, such forests are constantly being cleared for other uses. Further compounding the problem is that the inhabitants in these areas sometimes know little or nothing about the magnolias, how to identify them and don't understand why they are worth saving.

These collections provided the remaining information required to complete the character matrix for the phylogenetic analysis. Initially, 42 morphological characters from 45 Magnoliaceae taxa were compiled into a matrix, which was then analyzed using a sophisticated cladistic analysis

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program called NONA. Based on this morphological data the preliminary results indicate that subsection *Dugandiodendron* is a polyphyletic group, with most species belonging to a clade that includes subsection *Cubenses*, while four other are placed in the clade of subsection *Talauma*. Molecular analysis will be required in order to confirm these preliminary results. At the present time (November 2009) preparations are underway to do just that.

Also, a phylogenetic diversity index provided by the NONA program for the 45 taxa indicated that *M. kationum* and *M. sambuensis* deserve special priority for conservation in Colombia, based on their primitive (basal) position in the subsection *Talauma* clade as well as the fact that both species occur together in the same habitat near the Mutatá municipality in northwestern Antioquia province.

Acknowledgment

I wish to thank the many people and organizations who helped make this project a success; in particular, Wilson Devia and Eduardo Calderon who accompanied me in the field in Valle province. Wilson provided me with some beautiful photographs of *M. mahechae*. I really appreciate the Magnolia Society International for awarding me the research grant. I especially want to thank Richard Figlar for his many suggestions, help in obtaining reference material and in reviewing this manuscript.

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