

**FLORA OF THE GUIANAS  
NEWSLETTER N° 17  
SPECIAL WORKSHOP ISSUE**



**Washington, DC, November 2010**

The Flora of the Guianas is a cooperative project of the Botanischer Garten and Botanisches Museum Berlin-Dahlem, Berlin; Institut de Recherche pour le Développement, Cayenne; University of Guyana, Georgetown; Herbarium, Royal Botanic Gardens, Kew; New York Botanical Garden, New York; National Herbarium, University of Suriname, Paramaribo; Muséum National d'Histoire Naturelle, Paris; Nationaal Herbarium Nederland, Leiden branch, Leiden; and Department of Botany, Smithsonian, Institution, Washington, D.C.

For further information see the website

<http://www.nationaalherbarium.nl/FoGWebsite/index.htm>

Flora of the Guianas Newsletter 17. Compiled and edited by M.T. Strong, Department of Botany, Smithsonian Institution, MRC-166, PO Box 37012, Washington, DC., July 2011.

<http://botany.si.edu>

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## Preface

This issue of the Flora of the Guianas Newsletter is dedicated to the Workshop meeting in Washington, DC. in November 2010. It includes the minutes of the board meeting, reports of the participating institutions, memorandum of understanding, and abstracts of the presentations made during the symposium.

The editor



Participants of the workshop. From right to left Christian Feuillet, Eve Lucas, Piero Delprete, Dorothy Traag, Pedro Acevedo, Tinde van Andel, Odile Poncy, Marion Jansen-Jacobs, and Phillip da Silva. (photo by Allan Whitmore, during tour to the U.S. National Arboretum)

## New personnel



Sylvia Mota de Oliveira has joined the Flora of the Guianas team! She is funded for three years from the Alberta Mennega and Van Eeden Foundations and the National Herbarium of the Netherlands in L. She will edit treatments, beginning with the Dilleniaceae, and investigate funding and support for authors. Born in Aracaju, Brazil, she recently got her doctoral degree from Utrecht University, working with diversity of epiphytic bryophytes in the Amazon. Since beginning her studies, she has dedicated herself to botany, working with bryophyte phenology and population biology in the Atlantic forests of Brazil. During her Bachelor and MSc studies from 1995 to 2000, she participated in activities and projects of the Herbarium UFP -Geraldo Mariz, in Recife. Later she worked with hydrochemistry of small catchments at INPA in Manaus. At that time, her frequent trips to the forest brought her research interests back to botany. During her stay in the Utrecht branch of the National Herbarium of the Netherlands (NHN), she became familiar with the Flora of the Guianas project. Her dissertation work involved identifying many plants

from the Amazon region of Brazil, a task she found enjoyable yet difficult, considering there is no modern flora which covers the whole region. She is very pleased and enthusiastic about editing FoG and getting an opportunity to work among botanists tackling such an important issue for research in the Amazon forest: the production of floras. [s.motadeoliveira@uu.nl](mailto:s.motadeoliveira@uu.nl)

# 1. THE MEETING PROGRAM

WEDNESDAY 3 November

Informal welcome

THURSDAY 4 November

Board Meeting

- Agenda:
1. Participants
  2. Opening
  3. Board personnel changes
  4. Report executive editor, Oct. 2010
  5. State of affairs at the participating institutions
  6. Publishing Affairs
  7. Next meetings
  8. Other business

General Meeting

- Agenda:
1. Participants
  2. Summary

FRIDAY 5 November

Workshop

SATURDAY 6 November

Sightseeing trip to United States National Arboretum



## **2. Minutes of the Advisory Board Meeting, 4 November 2010 (morning)**

### **2.1. Participants**

Pedro Acevedo (US), Phillip da Silva (BRG), Piero Delprete (CAY), Marion Jansen-Jacobs (U), Eve Lucas (K), Odile Poncy (P), Benjamin Torke (NY), Dorothy Traag (BBS), Tinde van Andel (L).

Apologies: Harrie Sipman (B) is retiring but new director Dr. Thomas Borsch is committed to continue to participation of the Botanical Museum of Berlin in the FoG consortium.

### **2.2. Opening**

Pedro Acevedo welcomed delegates and encouraged them to visit current exhibits at NMNH and other Smithsonian museums; Eve Lucas thanked Pedro and the Smithsonian for organizing the meeting, and commented on previous meeting at Paramaribo (2008).

### **2.3. Board personnel changes**

Piero Delprete replaces Sophie Gonzalez as the representative of the **Institut de Recherche pour le Developpement in Cayenne (CAY)**; Benjamin Torke replaces Scott A. Mori as the representative for the New York Botanical Garden; Dorothy Traag replaces Caroline Raha-Chin in representing the National Herbarium at the **University of Suriname**; and the Nationaal Herbarium Nederland at Leiden University (L) became a new member of the FoG consortium as the National Herbarium of the Netherlands in Utrecht was absorbed by it.

### **2.4. Report executive editor, Oct. 2010**

New publications:

2008: Series A, Fasc. 26, pp.136

155. **Gesneriaceae** by L.E. Skog & C. Feuillet

2009: Series A, Fasc. 27, pp.212

71. **Cyrtillaceae** by J.C. Yesilyurt/ 79. **Theophrastaceae** by B. Ståhl / 86. **Rhabdodendraceae** by G.T. Prance / 90. **Proteaceae** by G.T. Prance / 100. **Combretaceae** by C.A. Stace / 113. **Dichapetalaceae** by G.T. Prance / 167. **Limnocharitaceae** and 168. **Alismataceae** by R.R. Haynes & L.B. Holm-Nielsen, including Wood and Timber by F. Lens, I. Poole and J. Koek-Noorman.

2011: Series A, Fasc. 28, pp. 384

87. **Mimosaceae** by R.C. Barneby(†), J.W. Grimes, O. Poncy & G.P. Lewis, including Wood and Timber by P. Détienne et al.

In the editorial process:

Series C, Fasc. 2: **Musci IV** by J. Florschütz-de Waard & H.R. Zielman & M.A. Bruggeman-Nanninga. (nearly ready to send to the publisher).

Series A, Fasc. 29: 131. **Meliaceae** by T.D. Pennington & N. Biggs. (ca. 90 pages + 13 pages illustrations) (checked by P. Delprete and send back to the authors with comments).

Submitted manuscripts:

163. Rubiaceae, to be published in 3 parts: *part I*, A-L by P. Delprete (ca. 250 pages), currently in update by Delprete; *part II*, M-Z expected end 2011; *part III*, Wood anatomy of the Rubiaceae by I. Poole, J. Koek-Noorman, L. Westra & P.G. Delprete (ca. 55 pages text + 67 pages illustrations).

40. Dilleniaceae by G.A. Aymard & C.L. Kelloff (ca. 50 pages).

41. Ochnaceae by C. Sastre (incomplete).

For a complete overview, see the website of the Flora of the Guianas:

<http://www.nationaalherbarium.nl/FoGWebsite/index.htm>

## 2.5. State of affairs at the participating institutions

- **Report from Botanischer Garten und Botanisches Museum Berlin-Dahlem (B), 2008-2010**

- Harrie Sipman

### General situation

The past two years have not been favourable for the participation of our institution in the FoG Project. In the first place I have to mention the sad loss of our collaborator Beat E. Leuenberger, our most productive contributor to the Project, who died on 20 May 2010 from cancer. After my compulsory retirement, all affiliated scientists with the FoG are now out of active service, though fortunately three continue as volunteers: Paul Hiepko, Brigitte Zimmer and myself. Less fortunate (for the FoG project), in a reorganisation of the research programme of our institution, Cuba has become our focal area for the Neotropics. As background information: the island is an interest inherited from our former East Berlin sister institution and it receives considerable interest in political Germany. Our leading director, Thomas Borsch, ensures however, that he is much interested in a continuation of our commitment in the FoG project. Caryophyllales or Asterales are orders in which we house considerable expertise. A new representative will probably become available when new staff is available; vacancies to be filled soon. Meanwhile our facilities for the study of tropical botany are continuously improved and expended, and currently a large new laboratory for DNA analyses is being installed.

### Flora treatments

#### **Cryptogams:**

Lichens:

- **Parmeliaceae:** work is being continued with preliminary investigations of the genus *Usnea*.
- **Thelotremataceae:** the preparation of backlog collections essential for this volume is in progress.

- **Cladoniaceae:** preparation of the manuscript is in an advanced stage and its finalisation is scheduled for 2011.

Ferns:

- Brigitte Zimmer is cooperating with George Cremers and Michel Boudrie to finish the outstanding fascicles of pteridophytes.

**Phanerogams:**

- **Compositae:** Contribution by H. W. Lack (Inuleae s.l., Tageteae and Lactuceae), status: preliminary.
- **Menispermaceae:** Contribution by Paul Hiepko, status: in progress.
  
- **Report from National Herbarium of Suriname, University of Suriname, Paramaribo (BBS)** (no report submitted, based on notes from the meeting).
  - Marga Werkhoven, Director of BBS, plans to retire this year.
  - Dorothy Traag replaces Caroline Raha-Chin as the FoG representative at BBS.
  - New students are being trained in botany.
  
- **Report from Guyana National Herbarium, University of Guyana, Georgetown (BRG), 2008-2010.**

- Phillip Da Silva

## **Introduction**

This report is a synopsis of the work regarding herbarium activities that have been ongoing at the University of Guyana over the past two years. Work related to Flora of the Guianas and the herbarium have been very limited. This was primarily due to limited staffing and funding. To date, there is only one staff

member in the herbarium assigned to work with herbarium specimens. While a programme exists to have students work along with this staff member and offer assistance to curate specimens, there is often little time for students to become engaged in such work. Efforts are currently being sought to improve on this aspect.

### **Collecting Trips**

A number of flora collecting trips were conducted by foreign scientists and researchers to various locations in the country. Most of these collectors were either working through collaborative arrangements with the Smithsonian Institution or through their own institutions. Below is a summary of the research expeditions that have been conducted during the last two years.

- Revision of *Solanum* section *Micracantha*, Stephen Stern, University of Utah, December 17- 23, 2008.
- Floristic studies of the rainforests of the Upper Mazaruni, Guyana, vascular plant collections from the Upper Mazaruni and Kako Rivers, Dr. Karen Redden and Dr. Kenneth Wurdack, Smithsonian Institution, Washington, DC. May 2 to June 10, 2009.
- Bromeliad monocots (specimen fresh tissue and DNA). Kaieteur National Park, Mr. Thomas J. Givnish, University of Wisconsin-Madison, August 25-26, 2009.
- Macrofungal diversity of the Pakaraima Mountains, Dr. Terry Henkel, Humboldt State University, December 17 2009 to January 3, 2010.
- Evolutionary research of Podostemaceae in Guyana, Dr. Koi Satoshi and Ms. Natsu Katayama,

Nara Institute of Science and technology, Kanazawa University, March 3-10, 2010.

- Above and below ground survey of ectomycorrhizal fungi of the Upper Potaro Basin, Dr. Terry Henkel, Humboldt State University, May 12, 2010 to June 11, 2010.

The Centre for the Study of Biological Diversity (CSBD) continued to offer support to overseas collectors and scientists in terms of facilitating the permitting process at the Environmental Protection Agency.

### **Programme of Collections**

There is no ongoing programme of collections that is operational between collaborating institutions. It is recommended that such an activity be revisited and re-introduced if possible. This would enable continued collaboration that meaningfully involves University of Guyana staff and identified personnel. This will also allow for early planning and identification of field staff early in the process. This is still very much a difficulty due to the lateness of requests for local counterparts. In addition, the timing of collecting trips is sometimes inconvenient to facilitate the identification of field staff for the collaboration. Very often, the university is interested in having students involved so that they can be trained in the techniques. However, the timing often coincides with the teaching semester and so this opportunity is usually lost. Pre-planning will help to allow for early identification of available personnel. Furthermore, it should be brought to the attention of collectors to try their best to obtain replicates instead of unicates, which can then be shared among collaborating member institutions.

### **Storage and Mounting of Specimens**

The herbarium at the Centre for the Study of Biological Diversity (CSBD) now houses ninety-seven (97)

cabinets. There are over 46,000 mounted plants and 3,000 un-mounted plants in the herbarium. There are insufficient funds to sustain the programme of mounting in respect of materials (sheets, folders, etc.) and for semi-skilled labour. Mounting of specimens is done by the Scientific Officer and student volunteers under the direct supervision of the Scientific Officer. The Smithsonian Institution must be commended for their continuous donation of materials for mounting and for their staff expertise, especially in the persons of Dr. Vicki Funk and Dr. Carol Kelloff. Through their intervention, the work on plant collections and often times faunal collections at the Centre for the Study of Biological Diversity (CSBD) has been ongoing.

At the CSBD, mounting of plant specimens by students has continued. The Scientific Officer is continuously engaged in cataloguing and incorporating specimens into the collections. Merging of the herbaria is still a work in progress that needs to be completed.

### **Jenman Herbarium Project**

This project was supported by Conservation International and sought to provide an electronic inventory and database of the collections in the Jenman Herbarium. The database is complete and this information is to be analysed and the necessary integration of the collection with the collection at the CSBD should be completed to fully realize the merging of the two herbaria. The Jenman collection remains a largely unused collection apart from the database work done there in the recent past.

The following were completed:

- Comparative analysis of the collections in the Jenman Herbarium: Botanic Gardens vs Kanuku Mountains. This research project was conducted by Ms. Ulanda Haynes.

- A comparison of plant specimens collected by Harrison and Williams in the Jenman Herbarium. This research project was conducted by Ms. Latoya Fordyce.
- Guyana's Lichens, an initial database and analysis of collections in the Jenman and CSBD Herbaria. This research was conducted by Mr. Clydon Thierens.
- Completion of the input of data from 23,591 Herbarium labels into a computer database system, which included both scientific cross-referencing and geo-referencing.

### **Staffing and Training**

Ms. Kaslyn Holder, Scientific Officer assigned to the herbarium, was able to access and participate in two training programmes during the past three years. This indeed is a boost and has sparked a renewal of interest in the work that she is interested in undertaking in the herbarium.

There is a need to identify other training opportunities for current staff to be exposed to so that they can be better equipped to undertake the tasks expected of them. Training at the more advanced member institutions is something that may be considered. It may be time to also plan a local based training programme to expose more students and other institutions like the Guyana Forestry Commission staff to herbarium techniques. This would further enhance capacity and widen scope of interest in this type of work.

### **Closing Remarks**

The Flora of the Guianas project has always been a very useful one for the three Guianas in respect to taxonomic studies and



documenting the plant species of the region. It has led to a better understanding of the flora of the region and also of local scenarios. However, in respect to capacity building, both human and institutional, it is hoped that there can be a bit more focus on these two aspects. These are important elements in the sustainability of the outputs and the significance of the work that has been achieved.

- **Report from Herbar de Guyane, IRD (CAY), 2008 - 2010**

- Piero Delprete

### **Introduction**

Starting from January 2009, the Herbarium of French Guiana (Herbier de Guyane, CAY) and the Herbarium of New Caledonia (Herbier de Nouvelle Calédonie, NOU) have been integrated with the UMR AMAP (Unité Mixte de Recherche - botanique et bioinformatique de l'Architecture des Plantes - CIRAD - CNRS - INRA - IRD - UM2) of the IRD (Institut de Recherche pour le Développement). This assures the support from a multi-institutional and interdisciplinary research unit, and confirms the central role of the herbarium in plant research in French Guiana and surrounding regions, especially the Guayana Shield.

In September 2008, Piero G. Delprete was recruited at the IRD, and worked at the Montpellier center until November 2009, date when he moved to Cayenne as botanist and head of research of the Herbar de Guyane (CAY). He is continuing with his research on Neotropical Rubiaceae (systematics, taxonomy, floristics), as well as several floristic projects in the Neotropics.

### **Flora Treatments**

#### **Cryptogams:**

Pteridophytes (630 taxa): - George Cremers (Coord., P), 12 contributors, 9 fascicles - No new fascicle has been published since last meeting. The 6 fascicles still to be published are:

- **Fasc. 1** (Generalities, Dicksoniaceae, Marattiaceae, Ophioglossaceae): Marattiaceae. Due to other occupation, M.

- Christenhusz (BM) had to stop his work on the revision of the genus *Danaea*. This revision has been taken over by H. Tuomisto (TUR) and is currently in progress.
- **Fasc. 2** (Cyatheaceae, Gleicheniaceae, Lygodiaceae, Marsileaceae, Metaxyaceae, Schizaeaceae). Cyatheaceae: the general work has not yet been carried out, but the information on this family for the Guianas is updated with permanent contact with M. Lehnert (STU). Gleicheniaceae : this family is waiting for the revision in Flora Neotropica by J. Gonzales (NY). Schizaeaceae : waiting for revision, currently in progress, of the genus *Anemia* by J.T. Mickel (NY). Other families are completed.
  - **Fasc. 5** (Pteridaceae, Vittariaceae) : Pteridaceae : This family is now in progress with M. Boudrie and G. Cremers dealing with the *Adiantum* complex and preparing the manuscript, in collaboration with J. Prado (SP) and B. Zimmer (B). The *Adiantum* material from CAY has been revised. *Doryopteris* is currently under revision by J. Yesilyurt (BM).
  - **Fasc. 7** (Aspleniaceae, Blechnaceae, Elaphoglossaceae, Lomariopsidaceae): All families are almost completed by M. Boudrie and G. Cremers, as well as by J.T. Mickel (NY) for the Elaphoglossaceae. A few issues remain to be solved in the *Blechnum* group. The completion of this fascicle is expected in 2011, and the text has already been reviewed by Neotropical pteridologists. Drawings are in progress.
  - **Fasc. 8** (Grammitidaceae, Polypodiaceae): Grammitidaceae: the texts of this family has been completed by C. Kelloff (US) and drawings are in progress. Polypodiaceae: Still under compilation, due to a recent revision on Neotropical Polypodiaceae.
  - **Fasc. 9** (Azollaceae, Isoetaceae, Lycopodiaceae, Psilotaceae, Salviniaceae, Selaginellaceae): Isoetaceae: This family is still under treatment by Hickey (MU). The publication on the French Guiana plants is in progress. Lycopodiaceae: The family treatment is in progress by B. Øllgaard (AAU). Selaginellaceae: currently studied in collaboration with M. Boudrie.
  - Addendum. Since the publication of the first three fascicles, many new taxa have been recorded in French Guiana as well as

in Guyana; therefore, George Cremers has planned to prepare an addendum.

Related work in progress:

- M. Boudrie, G. Cremers & C. Feuillet: Revision of the pteridological data of the "Checklist of the Plants of the Guiana Shield" (Funk et al., 2007). Work in progress. Publication expected for 2011.
- M. Boudrie: Revision of the pteridological data (taxonomy, determination of specimens) of the *Flora of Central French Guiana* from the NYBG website. Data transmitted to S. Mori in 2010, still to be integrated in the NYBG database.

### **Phanerogams:**

- **Arecaceae** (96 species) - Coordinator: J.-J. de Granville (Cayenne), 8 contributors: Checklist for the Guianas ready. *Acrocomia*, *Asterogyne*, *Bactris*, *Chamaedorea*, *Elaeis*, *Lepidocaryum*, *Manicaria*, *Mauritia*, and *Mauritiella* to be treated by J.J. de Granville. He says that he has the information about most genera. There is a necessity to separate a new species from *Elaeis oleifera* (J.-C. Pitaud, pers. comm.). The main problem is *Bactris*, because Granville does not agree with the species concepts and synonymisations made by Henderson. *Astrocarium* to be treated by F. Khan (IRD, Montpellier). *Attalea* s.l. (including *Maximiliana*, *Orbignya* and *Scheelea*) contribution received by S.F. Glassman (F) many years ago, but Granville indicated that he described too many new species; he suggests that maybe Pitaud (IRD Montpellier) could review this genus. *Desmoncus*, to be treated by J.T. Medeiros Costa (Recife, Brazil), he agreed to treat this genus about 10 years ago but never did; he identified CAY specimens, but his determinations are not consistent with the nomenclatural list produced by Henderson; Granville suggest that maybe we should look for another contributor for this genus. *Dictyocarpum*, *Iriartella* and *Socratea* contributed by Henderson, manuscript received many years ago. *Euterpe* and *Prestonea* to be contributed by J.J. Strudwick, he committed to contribute these genera a long time ago but never did, so Granville suggest that we should look for another specialist. *Hyospathe* (1 sp.), manuscript received a long time

- ago by F. Skov (AAU). *Oenocarpus* s.l. (incl. *Jessenia*), manuscript received a long time ago by M.J. Balick (NY). *Geonoma*, provisional manuscript received from R. Read (US, deceased), including two new species to be published in co-authorship with Granville (but not yet submitted); also, Granville does not agree with the species circumscription proposed by Henderson, and suggests that maybe we should look for a new contributor. The two main problems for finishing the manuscripts are *Attalea* and *Desmoncus*.
- **Cariocaraceae** (2 species) - J.-J. de Granville (Cayenne): Esteemed submission date 2012.
  - **Rubiaceae** (76 genera, ca. 450 species) - Coordinated and mostly contributed by P.G. Delprete (IRD, Herbar de Guyane, Cayenne), with 7 contributors (T. McDowell, *Appunia* and *Morinda*, submitted; C.B. Costa, *Coccocypselum*, submitted; R. Cortés-B., *Retiniphyllum*, submitted; C. Gustafsson & C. Persson, tribe Gardenieae, submitted the genera of first volume; E.B. Souza, *Mitracarpus*, submitted; D. Zappi, *Rudgea*, submitted; S. Khan, *Sabicea*, submitted):
    - Part 1** - Introduction and genera A-L: (submitted in 2008; ca. 250 pages), it has been reorganized and updated, according to recent generic re-delimitations - it will be submitted in February 2011; **Part 2** - Genera M-Z: Most genera finished, it remains *Palicourea*, the *Psychotria* complex, *Sipanea*, and *Spermacoe* (incl. *Borreria*) to be treated - most likely it will be submitted in 2012; **Part 3** - Wood anatomy: by I. Poole, J. Koek-Noorman, L. Westra & P.G. Delprete (submitted in 2008; ca. 55 pages text + 67 pages illustration): It needs a quick revision to make it parallel to the new generic re-delimitation proposed in Part 1 and 2 - it will be submitted in February 2011.
  - **Humiriaceae** (22 taxa), **Hugoniaceae** (4 taxa) and
  - **Ixonanthaceae** (3 taxa in the Guianas; 6 taxa if considering bordering areas) - D. Sabatier, IRD Montpellier: Draft manuscripts, little progress.

Related work in progress:

**Index of French Guiana Collectors** - M. Hoff (Université Louis Pasteur, Strasbourg) & P.G. Delprete: In progress, to be submitted in 2011 or 2012.

## The Aublet2 Database

The CAY herbarium houses about 170,000 specimens, most of them from French Guiana, and the remainder from Suriname, Guyana, Venezuela, and Amazonian Brazil. As of October 2010, the data of about 140,000 specimens were included in the “Aublet2” database, and are available for consultation in the internet (<http://www.cayenne.ird.fr/aublet2>). In addition, the digital images of 615 type specimens housed at CAY were included in the database, and are also available in the internet. The database is very useful for a variety of plant studies, and a key source for floristic, ecology and conservation projects. In 2011, the entire database and included images will be migrated to the “PI@ntnet” database (see below).

## PI@ntnet

The PI@ntNet initiative (<http://www.plantnet-project.org/papyrus.php?langue=en>) is an international consortium coordinated by three core teams with complementary skills: UMR AMAP (see above; <http://amap.cirad.fr/en/index.php>), the IMEDIA Project Team (<http://www-rocq.inria.fr/imedia/>), and the Tela Botanica Network (<http://www.tela-botanica.org/site:accueil>). The main objectives of the “PI@ntnet” database are: 1) to develop interdisciplinary research integrating botany and computational sciences, using large datasets, and general knowledge in plant morphology, anatomy, agronomy, genetics, taxonomy, ecology, and biogeography; 2) to provide free, web-based and easy-access software tools and methods for plant identification, management, sharing of all kinds of plant-related data; 3) to promote citizen science as a powerful means to enrich databases with new information on plants and to meet the need for capacity building in agronomy, botany and ecology. Regarding the flora of the Guianas, this initiative will contribute complementary information from the CAY herbarium database and the construction of interactive identification keys of the plants of French Guiana.

## **Exploration Program**

This period has been transitional for general botanical explorations, due to the retirement of J.J. de Granville in 2008, and the arrival of P. Delprete at the CAY herbarium at the end of 2009. Most collections made during the last couple of years originated from botanical surveys and impact studies by herbarium staff and local NGOs, and tree hectare-plot studies performed by J.-F. Molino, D. Sabatier (IRD, Montpellier), and C. Baralotto (INRA, Kourou).

An important four-week exploration trip was done by a large team, in May 2010, at Mount Itoupé (Summit Tabulaire), gathering more than a thousand collections that are still in the process of being identified.

## **Floristic Inventory of Coastal Savannas of French Guiana**

Field work in the coastal savannas of French Guiana, from November 2009 to August 2010, produced more 1200 collections. For more information, see abstract by P.G. Delprete, R.E. Bone & G. Lolli (this publication).

## **Main Scientific Programs and Research**

BRIDGE Project (Bridging information on tree diversity in French Guiana and a test of ecological theories) - the project ended in 2010.

XYLOTECH (Enhancing the value of sawmill waste and of underexploited forest products in French Guiana - estimation of molecular extraction potential for the industry) - the project ended in 2010, and it was re-submitted for another three-year period.

Compilation of a list of determinant species for creation of ZNIEFFs (Zone Naturelle d'Intérêt Écologique, Faunistique et Floristique; Natural Areas with Ecological, Faunistic and Floristic Interest). A large team was assembled, to re-evaluate a list of determinant species to be used to indicate protected areas in French Guiana.

## France-Brazil Cooperation Program

Many studies have pointed out that one of the least known regions in the Amazon basin, with one of the lowest density of botanical collections, and where biodiversity is expected, is in southern French Guiana (and southern Suriname) and the Brazilian states of Pará and Amapá. The main factors for the little knowledge about this area are the difficulty of access and the lack of funds for such expensive expeditions. The region includes the *Parc Amazonien de la Guyane* (3.4 million hectares, French Guiana) and the *Parque Nacional Montanhas do Tumucumaque* (3.8 million hectares, Amapá, Brazil); the two parks together form the largest protected area in the World, and the least botanically known in South America. With this in mind, a Franco-Brazilian network has been established named GAP (Guyane-Amapá-Pará), coordinated by staff of IRD (France), IEPA (Macapá, Amapá, Brazil) and Museu Goeldi (Belém, Pará, Brazil). Research projects of this network will be concentrated in taxonomy, floristics, phytosociology, plant ecology, ethnobotany and genetics. As of today, the network has grown with about 40 scientists and nine French and Brazilian institutions. A French-Brazilian fund is expected to be launched in the near future.

## Visiting Scientists

With support from the BRIDGE Program, three specialists came to CAY:

- Terry Pennington (K), to study Elaeocarpaceae, Meliaceae and Sapotaceae (August-September 2008).
- Bruce Holst (SEL), to study Myrtaceae (September 2008).
- Henk Van der Werff (MO), to study Lauraceae and *Tachigali* (Leguminosae) (March 2010).
- Christian Feuillet (US), visited CAY in 2008 and 2009, to study specimens of Passifloraceae, Gesneriaceae and Boraginaceae.

In addition, from July 2008 to October 2010, the herbarium recorded 650 entries of persons that consulted the collection for vegetation studies of French Guiana, most of them in the areas of floristics, taxonomy, ecology, conservation, and environmental impact assessments. Among them, many scientists came from

the following institutions: National Museum of Natural History of Paris (P, France), National Herbarium of the Netherlands (U and L), NY (USA), IRD (France), CIRAD (France), ENGREF (France), ONF (France), Universidad de Los Andes (Colombia), Florida Institute of Technology (USA), IESG (France), RFO (France), Suisse Academy (Switzerland), University of Brasilia (UB, Brazil), CNRS (France), ETH Zurich (Switzerland), IEPA (HAMAB, Amapá, Brazil), and Museu Goeldi (MG, Belém, Brazil).

## **Selected Publications**

### **Publications on Pteridophytes of the Guianas (2007-2010)**

- Boudrie, M. (2010). Fern diversity in French Guiana. *Pteridologist* 5: 153-157.
- Boudrie, M. & Cremers, G. (2008). Une variété nouvelle de *Blechnum gracile* Kaulf. (Blechnaceae) pour les Guyanes et le Venezuela. *Adansonia*, sér. 3, 30: 31-39.
- Christenhusz, M.J.M. (2007). *Dracoglossum*, a new Neotropical fern genus (Pteridophyta). *Thaiszia* 17: 1-10.
- Cislinski Yesilyurt, J. (2008). A new species of *Doryopteris* (Pteridaceae) from Suriname. *Brittonia* 60: 63-68.
- Cremers, G. & Boudrie, M. (2007). Les Ptéridophytes des Guyanes – Les spécimens de référence de Aublet (1775) à nos jours. *J. Bot. Soc. Bot. France* 40: 3-111.
- Cremers, G. & Boudrie, M. (2007). Two new species of *Selaginella* subgenus *Heterostachys* (Selaginellaceae) from the Guianas. *Fern Gaz.* 18: 41-52.
- Gibby, M. (2008). Two new species of *Selaginella* subgenus *Heterostachys* (Selaginellaceae) from the Guianas – A correction. *Fern Gaz.* 18: 100.
- Mickel, J.T. (2008). Three new species of *Elaphoglossum* (Dryopteridaceae) from the Guianas. *Brittonia* 60: 213-216.
- Prado, J. & Moran, R.C. (2008). Revision of the neotropical species of *Triplophyllum* (Tectariaceae). *Brittonia* 60: 103-130.
- Rojas-Alvarado, A.F. (2008). Two new species, a new combination and an amended name in *Blechnum* (Blechnaceae) from the Neotropics. *Mét. Ecol. Sistem.* 3: 36-42.



Zimmer, B. (2007). *Adiantum krameri* (Pteridaceae), a new species from French Guiana. *Willdenowia* 37: 557-562.

**Publications on Angiosperms of the Guianas (2008-2010)**

Cortés-B., R., Delprete, P.G. & Motley, T.J. (2009). Phylogenetic placement of the tribe Retiniphyllae among the subfamily Ixoroideae (Rubiaceae). *Ann. Missouri Bot. Gard.* 96: 61-67.

Delnatte, C. (2010). Le gradient altitudinal sur les sommets tabulaires de Guyane, basé sur l'étude des Arecaceae, des Melastomataceae et des Ptéridophytes. Doctoral Thesis, defended on 15 Oct 2010, Cayenne, Université des Antilles et de la Guyane.

Delprete, P.G. (2008). Three new species of *Ixora* (Rubiaceae) from the state of Tocantins, Brazil. *J. Bot. Res. Inst. Texas* 2: 455-462.

Delprete, P.G. (2008). Revision of *Tocoyena* (Rubiaceae: Gardenieae) from the states of Goiás and Tocantins and a new species endemic to the white-sand areas in the Brazilian Cerrado. *J. Bot. Res. Inst. Texas* 2: 983-993.

Delprete, P.G. (2008). A new species of *Chomelia* (Rubiaceae, Guettardeae) from the Brazilian Planalto. *Blumea* 53: 393-398.

Delprete, P.G. & Kirkbride, J.H. (2008). Clarification of *Borreria gymnocephala*, *Diodia gymnocephala*, *Diodia schumannii*, *Borreria flavovirens*, and *Spermacoce schumannii* (Rubiaceae). *J. Bot. Res. Inst. Texas* 2: 305-308.

Delprete, P.G. (2009). Taxonomic history, morphology, and reproductive biology of the tribe Posoquerieae (Rubiaceae, Guettardeae) from Central America, the Guianas and the Amazon Basin. *Ann. Missouri Bot. Gard.* 96: 79-89.

Delprete, P.G. (2010). Rubiaceae. In: J.A. Rizzo (Coord.), *Flora de Goiás e Tocantins - Coleção Rizzo*, Vol. 40, parte 1: Introdução, Gêneros A - H. pp. 1-580. UFG-IRD, Goiânia, GO, Brazil.

Delprete, P.G. (2010). Rubiaceae. In: J.A. Rizzo (Coord.), *Flora de Goiás e Tocantins - Coleção Rizzo*, Vol. 40, parte 2: Gêneros I - R. pp. 581-1098. UFG-IRD, Goiânia, GO, Brazil.

Delprete, P.G. (2010). Rubiaceae. In: J.A. Rizzo (Coord.), *Flora de Goiás e Tocantins - Coleção Rizzo*, Vol. 40, parte 3:

- Gêneros S - W, índices. pp. 1099-1610. UFG-IRD, Goiânia, GO, Brazil.
- Delprete, P.G., Achille, F., Mouly, A. (2010). Four new combinations in *Chomelia* and *Stenostomum* (Rubiaceae, Ixoroideae). *Ann. Missouri Bot. Gard.* 96: 79-89.
- Duputie, A., Delêtre, M., Granville, J.-J. de & McKey, D. (2009). Population genetics of *Manihot esculenta* ssp. *flabellifolia* gives insight into past distribution of xeric vegetation in a postulated forest refugium area in northern Amazonia. *Mol. Ecol.* 18: 2897-2907.
- Haripersaud, P., ter Steege, H., Granville, J.-J. de, Chevillotte, H., Hoff, M. (2010).-Species abundance, distribution and diversity in time and space after centuries of botanical collecting in the Guianas. *Taxon* 59: 592-597.
- Léotard, G., Duputié, A., Kjellberg, F., Douzery, E.J.P., Debain, C., Granville, J.-J. de & McKey, D. (2009). Phylogeography and the origin of cassava: new insights from the northern rim of the Amazonian basin. *Mol. Phylog. Evol.* 53: 329-334.
- Pintaud, J.-C., Galeano, G., Baslev, H., Bernal, R., Borchsenius, F., Ferreira, E., Granville, J.-J. de, Mejia, K., Millan, B., Moraes, M., Noblick, L., Stauffer, F.W. & Kahn, F. (2008). Las palmeras de America del Sur: diversidad, distribución y historia evolutiva. *Rev. Per. Biol.* 15 (suppl. 1): 7-29
- Rova, J.H.E., Delprete, P.G. & Bremer, B. (2009). The *Rondeletia* complex (Rubiaceae): an attempt to use ITS, rps16, and trnL-F sequence data to delimit Guettardeae, Rondeletieae, and sections within *Rondeletia*. *Ann. Missouri Bot. Gard.* 96: 182-193.

- **Report from The Royal Botanic Gardens (K), Kew, UK, 2008-2010.**

- Eve Lucas

The status of the following families is as follows:

- **Labiatae** (R.M.Harley) – Author retired, current commitment to Flora unknown.

- **Lentibulariaceae** (P.Taylor) – Author retired and not active. Suggest the family is assigned elsewhere
- **Meliaceae** (N.Biggs, T.D.Pennington) **and Sapotaceae** (S.Edwards, T.D.Pennington) - work on these treatments has been resumed under the supervision of Terry Pennington. The Meliaceae manuscript was submitted in 2008. The Sapotaceae manuscript (c. 115 species, 10 genera) is underway with roughly half of *Pouteria* (c. 40 species) written and a tentative completion date of 2012.
- The **Mimosaceae** manuscript compiled by R. Barneby, J.Grimes and O.Poncy, edited and indexed by Gwilym Lewis and Eve Lucas, was submitted in 2009. After delays due to compilation of illustrations and those imposed by a brief UK government publishing ban at Kew, the document is in proof and is scheduled for publication in late 2010 or early 2011.
- Work has begun on *Myrcia* s.l. (Myrtaceae).

### **Publication at Kew**

Published or received since the last FoG meeting:

- Fascicle 26 (Gesneriaceae); received March 2008; published in September 2008
- Fascicle 27 (Cyrillaceae etc.); received December 2008; published in October 2009
- Fascicle 28 (Mimosaceae); received March 2009

### **Publishing affairs**

Trade distribution was transferred to Marston Book Services Ltd in August 2009 for all regions excluding United States, Canada and Mexico. The University of Chicago Press now distribute for K in United States, Canada and Mexico (since November 2009). We now supply the files direct to the distributors who print on demand. The fascicles are set digitally which means that we can no longer produce a fold out map of the Guianas. A double spread is proposed instead. I think this is a pity, but unavoidable.

Publication was briefly stopped in May/June after a government freeze. This led to a delay to publication of Fascicle 28. Otherwise, publication is running smoothly with manuscripts

being processed through the type setting and proof stages quickly.

- **Report from the Nationaal Herbarium Nederland (L), Leiden Branch, 2009 – 2010**

- Tinde van Andel

### **General**

The collections of the Utrecht Herbarium moved to the Leiden Herbarium (L) in the beginning of 2009 where they are housed separately from the L collections. The collections are accessible. Within a few years a new building will arise where all the Dutch botanical collections will be integrated. Since 2009 is the editorial office officially based in L. The executive editor has for the moment a working place at the Botanic Gardens in Utrecht, but travels regularly to L.

### **Taxonomic research for Flora of the Guianas**

Annonaceae: Prof. P.J.M. Maas (WAG) and co-workers continued the taxonomic revision of this family. Mr. U. Scharf (Leipzig), continued to work on the species of *Guatteria* of the Guianas.

Bromeliaceae: Mr. E.J. Gouda (Utrecht Botanical Gardens) continued his studies on Pitcairnioideae.

Gentianaceae: The treatment of this family was continued by Prof. P.J.M. Maas, Ms. H. Maas-van de Kamer and Ms. M.J. Jansen-Jacobs, in close cooperation with Dr. L. Struwe (Rutgers University, New Brunswick, NJ, herbarium CRHB) and co-workers.

Marcgraviaceae: Dr. A.C. de Roon and Dr. S. Dressler (Forschungsinstitut Senckenberg, Frankfurt, Germany) continued working on the treatment of this family.

Rubiaceae: The manuscript on Wood and Timber was finished in 2008 by I. Poole, J. Koek-Noorman, L. Westra & P.G. Delprete (ca. 55 pages text + 67 pages illustrations) and is

waiting on the finishing of the taxonomical treatment of *P. Delprete*.

**Editorial activities** mainly focused on:

- Fasc. 27 with Cyrillaceae, Theophrastaceae, Rhabdodendraceae, Proteaceae, Combretaceae, Dichapetalaceae, Limnocharitaceae and Alismataceae, including a chapter on Wood and Timber (published in 2009).
- Fasc. 28 with Mimosoideae, including a chapter on Wood and Timber (in press 2010).
- Fasc. 29 with Meliaceae (in the editorial process).
- Series C, fasc. 2 with Musci IV (ready to send to the publisher).

**Other FoG related research and news at U/L.**

In 2009, Tinde van Andel finished her postdoc project 'Medicinal plants of Suriname: changes in plant use after migration to the Netherlands'. This research aimed to clarify the role medicinal plants play in the traditional health care of various ethnic groups in Paramaribo and to assess the principal factors influencing people's choice to use traditional medicine (in both Suriname and the Netherlands). Data collected during this research project are now compiled in an illustrated field guide of medicinal and magic plants of Suriname, to be published in 2011.

Paddy Haripersaud successfully finished her PhD project in 2009: *Collecting Biodiversity: Developing theory for the use of botanical specimen data in biodiversity research*.

Olaf Bánki successfully finished his PhD project in 2010: *Neutrality, Ecology and Tree-Diversity in the Guianas*.

Hans ter Steege and co-workers measured again in Guyana the 1-ha plots of Mabura and Pibiri and made new ones in Iwokrama.

Bruce Hoffman started in 2010 at L with finishing his illustrated field guide of woody climbers of Suriname, with funds from the Van Eeden, Alberta Mennega and Hugo de Vries Foundations.

At the end of 2010, Chequita Bikhie will start a botanical inventory on the islands and along the shore of the Brokopondo Lake (Suriname). This project is funded by UTSN the Netherlands.

Sylvia Mota de Oliveira, [s.motadeoliveira@uu.nl](mailto:s.motadeoliveira@uu.nl) will start in March 2011 in L as successor of the editor of the Flora of the Guianas. As start funds are made available for 3 years by the Alberta Mennega and Van Eeden Foundations, and the National Herbarium of the Netherlands in L. The Van Eeden Foundation encourages and supports research projects in the fields of botany, ecology, and ethnobotany or with a conservation viewpoint, that are conducted in the Guianas, Netherlands Antilles, and Aruba, For more information go to: [www.vaneeden-fonds.nl](http://www.vaneeden-fonds.nl)

### **Selected publications 2008 – 2010**

- Andel, T.R. van (2010). African rice (*Oryza glaberrima* Steud.): Lost crop of the enslaved Africans discovered in Suriname. *Economic Botany* 64 (1): 1-10.
- Andel, T.R. van (2010). How African-based Winti belief helps to protect forests in Suriname Chapter 13, In: B. Verschuuren, R. Wild, McNeely, J. and G. Oviedo (eds.). *Sacred natural sites: Conserving nature and culture*. IUCN. Earthscan Publishers, London, pp: 139-145.
- Andel, T.R. van, B. Hoffman, S. Ruyschaert & P. Haripersaud (2009). *Botanische diversiteit in Zuid-Oostelijk Suriname*. CEDLA, University of Amsterdam. Online: [http://www.cedla.uva.nl/20\\_research/pdf/vDijck/suriname\\_project/Botanische.pdf](http://www.cedla.uva.nl/20_research/pdf/vDijck/suriname_project/Botanische.pdf)
- Andel, T.R. van, S. Ruyschaert, K. vande Putte, & S. Groenendijk (2009). What makes a plant magic? Symbolism and sacred herbs in Afro-Surinamese rituals. 50th Annual Meeting of The Society for Economic Botany, Charleston, SC., May 30 – June 8, 2009, pp. 60-61.
- Andel, T.R van & P. Westers (2010). Why Surinamese migrants in the Netherlands continue to use medicinal herbs from their home country. *Journal of Ethnopharmacology* 127 (3): 694–701.

- Bánki, O.S. (2010). Neutrality, ecology and tree-Diversity in the Guianas. PhD thesis, Utrecht University.
- Ek, R.C., M.J. Jansen-Jacobs, K. Pineau, J.A.C. van Dam, A.S.J. van Proosdij & C. Briand (2009). The Trésor Reserve, extended version. Report, 39 pp.
- Gloor, M., Phillips, O.L. Malhi, Y., Lloyd, J.J., Lewis, S.L., Baker, T.R., Lopez-Gonzalez, G., Peacock J., Almeida, S., Alvarez, E., Alves de Oliveira, A.C., Amaral, I., Andelman, S., Arroyo, L., Aymard, G., Bánki, O.S., Blanc, L., Bonal, D., Brando, P., Chao, K.-J., Chave, J., Davila, N., Edwin, T., Espejo, J., di Fiore, A., Feldpausch, T., Freitas, A., Herrera, R., Higuchi, N., Honorio, E., Jiménez, E., Killeen, T., Laurance, W., Mendoza, A., Montegudo, H., Nascimento, D., Neill, D., Nepstad, P., Núñez Vargas, J., Olivier, M.C., Penuela, C., Peña Cruz, A., Prieto, A., Pitman, N., Quesada, C., Salamá, R., Schwarz, M., Stropp, J., Ramírez, F., Ramírez, H., Rudas, A., ter Steege, H., Silva, N., Torres, A., Terborgh, J., Vásquez, R. & van der Heijden. G. (2009). Does the disturbance hypothesis explain the biomass increase in basin-wide Amazon forest plot data? *Global Change Biology* 15: 2418-2430.
- Haripersaud, P.P. (2009). Collecting Biodiversity: Developing theory for the use of botanical specimen data in biodiversity research. PhD thesis, Utrecht University. Online available at: <http://igitur-archive.library.uu.nl/dissertations/2009-0924-200146/UUindex.html>
- Haripersaud, P., H. ter Steege, J.J. de Granville, H. Chevillotte, & M. Hoff (2010). Species abundance, distribution and diversity in time and space after centuries of botanical collecting in the Guianas. *Taxon* 59 (2): 592-597.
- Hubbell, S.P., F. He, R. Condit, L. Borda-de-Água, J. Kellner & H. ter Steege (2008) How many tree species are there in the Amazon and how many of them will go extinct? *PNAS* 105: 11498-11504.
- Jansen-Jacobs, M.J. (Ed.) (2008). *Flora of the Guianas Fasc. 26*. Royal Botanic Gardens, Kew. ISBN 978 1 84246 393 2.
- Jansen-Jacobs, M.J. (Ed.) (2009). *Flora of the Guianas Fasc. 27*. Royal Botanic Gardens, Kew. ISBN 978 1 84246 418 2.

- Jansen-Jacobs M.J. & P.J.M. Maas. *Moutabea arianae*, a new species of Polygalaceae from French Guiana and adjacent Brazil. *Blumea* 55: 86-87. 2010.
- Koek-Noorman, J., I. Poole, L.Y.Th. Westra & J. Maas (2009). Wood and Timber – Combretaceae. In: M.J. Jansen-Jacobs (Ed.) *Flora of the Guianas* 27:162-175. Royal Botanic Gardens, Kew. ISBN 978 1 84246 418 2.
- Mota de Oliveira, S., H. ter Steege, J.H.C. Cornelissen & S.R. Gradstein (2009). Assembly of epiphytic bryophyte communities in the Guianas: a regional approach. *Journal of Biogeography* 36: 2076-2084.
- Poole, I & J. Koek-Noorman (2009). Wood and Timber – Cyrillaceae, Rhabdodendraceae, Proteaceae and Dichapetalaceae. In: M.J. Jansen-Jacobs (Ed.) *Flora of the Guianas* 27:145-147, 152-154, 155-161 and 176-182. Royal Botanic Gardens, Kew. ISBN 978 1 84246 418 2.
- Ruyschaert, S., van Andel, T.R., Van de Putte, K. and Van Damme, P. (2009). Bathe the baby to make it strong, healthy: Plant use and child care among Saramaccan Maroons in Suriname. *Journal of Ethnopharmacology* 121 (1): 148-170.
- Saatchi, S., W. Buerman, H. ter Steege, S. Mori & T.B. Smith (2008). Modeling distribution of Amazonian tree species and diversity using remote sensing Measurements. *Remote Sensing of the Environment* 112: 2000-2017.
- Steege, H. ter (2010). Will tropical biodiversity survive our approach to global change? *Biotropica* 42: 561-562.
- Steege, H. ter, ATDN, RAINFOR. (2010). Contribution of current and historical processes to patterns of tree diversity and composition of the Amazon. Pages 349-359 in: Hoorn, C., F. Wesselingh & H. Vonhof (eds.). *Amazonia: Landscape and Species Evolution*. Wiley-Blackwell, UK.
- Steege, H. ter, P. Haripersaud & O. Bánki (prov. accepted). Never the same species twice: a simple model of botanical collector's behaviour in the field. *American Journal of Botany*.
- Stropp, J., H. ter Steege & Y. Malhi, ATDN, RAINFOR. (2009). Disentangling regional and local tree diversity in the Amazon. *Ecography* 32: 46-54.



Steege, H. ter, ATDN, RAINFOR. (2010). Contribution of current and historical processes to patterns of tree diversity and composition of the Amazon. Pages 349-359 in: Hoorn, C., F. Wesselingh & H. Vonhof (eds.). Amazonia: Landscape and Species Evolution. Wiley-Blackwell, UK.

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Stropp, J., H. ter Steege & Y. Malhi, ATDN, RAINFOR. (2009). Disentangling regional and local tree diversity in the Amazon. Ecology 32: 46-54.

- **Report from the New York Botanical Garden (NY), Bronx, NY, 2008-2010.**

- Benjamin Torke

After many years of service, Scott A. Mori is stepping down as the NYBG representative on the Flora of the Guianas Board. I am honored to replace Scott on the Board. I am an Assistant Curator of Botany in the Institute of Systematic Botany at NYBG. My primary interests are in plant diversity and phytogeography in Amazonia and the systematics of neotropical Leguminosae, with current focus on the genus *Swartzia*. At the meeting, I conveyed my willingness to help with the coordination of ongoing legume treatments for the Flora of the Guianas and gave a brief update of activities related to the Flora at NYBG.

In the past three years, The New York Botanical Garden has hired six new curators. In addition to myself, several of the new faculty work on groups that are represented in the Guianas: Paola Pedraza (neotropical Ericaceae), Greg Pluncket (Araliaceae), Rob Naczi (Cyperaceae and Sarraceniaceae), and Ken Karol (green algae).

The Herbarium continues in its efforts to make specimen data and images available online (<http://sciweb.nybg.org/science2/VirtualHerbarium.asp>). New and

ongoing cataloging initiatives will make electronic data available from all of our Brazilian collections, as well as the groups of Leguminosae that were monographed by Rupert Barneby (<http://sweetgum.nybg.org/legumes/barneby>). NYBG scientists are producing electronic monographs for a number of large neotropical plant groups, including Lecythidaceae, Ericaceae, tribe Miconeae of Melastomataceae, the genus *Swartzia* (Leguminosae), as well as the fern genera *Megalastrum* and *Elaphoglossum*. We also have a grant to produce electronic monographs based on Barneby's major works in Leguminosae. (For a full list of electronic catalogues at NYBG, see: <http://sciweb.nybg.org/science2/VirtualHerbarium.asp>).

The following is a status update for ongoing FoG treatment commitments at NYBG:

- **Simaroubaceae** (including Picramniaceae) (Wayt Thomas): Not actively working on a manuscript, but says he intends to do it; recommitted to produce manuscript within five years (2016).
  - **Burseraceae** (Douglas Daly): Not actively working on a manuscript, but says he intends to do it; recommitted to produce manuscript within five years (2016).
  - **Solanaceae** and **Cucurbitaceae** (Mike Nee): Actively working on treatments; recommitted to finish both manuscripts within five years (2016).
- 
- **Report from P, Herbar National, Muséum National d'Histoire Naturelle, Paris, France**

- Odile Poncy

The following is a status update for ongoing FoG treatment commitments at P:

- **Ochnaceae** (Sastre) text is completed and illustrations are in process.
- **Apocynaceae** (Allorge) in process.
- **Monimiaceae** (Pignal) in process.
- **Cyclanthaceae** (Poncy) in process.

- **Report from US, Smithsonian Institution, Washington, DC**

- Pedro Acevedo

## **Flora Treatments**

### **Cryptogams:**

- **Grammitidaceae** (Kelloff finished her part and sent it off to George Cremers and Michael Boudrie (co-authors) for review, illustrations are being prepared.

### **Phanerogams:**

- **Gesneriaceae** (Skog & Feuillet) published in October 2008 (Six papers describing new species of the Guiana Shield have been published.
- **Boraginaceae** (Feuillet) 90% completed (Two papers have been published adopting new generic delimitations). *Heliotropium* to *Myropus*, *Cordia* to *Varronia*, etc.
- **Passifloraceae** (Feuillet) 75% completed (Six papers have been published and three are in press describing new species of the Guiana Shield).
- **Dilleniaceae** (Kelloff & Aymard). Manuscript submitted, including the last illustrations needed.
- **Commelinaceae** (Faden, essentially completed but needs updating during this year).
- **Sapindaceae** (Acevedo, manuscript finished; 10 illustrations to be made before July of 2011, novelties still to be published, e.g., a new genus; 3 new combinations; 6 species (1 *Matayba*, 4 *Paullinia*, 1 *Vouarana*).
- **Cyperaceae** (Strong) 80% completed, still waiting for treatments of the Mapanioid genera and *Eleocharis* from collaborators.

### **Other Publications**

Christian Feuillet published *Checklist of the Plants of the Guiana Shield. 1. An Update to the Angiosperms*. 718 additions, corrections, and synonymies, with a gain of 52 species.

## **Biodiversity of the Guianas Program at SI**

In October of 2009 we developed a Google Earth video tour about the biodiversity of the Guiana Shield and about the BDG program. It was posted on the *Google Earth Outreach Showcase* and selected by *GE Sightseer* in its “Top Content” for October. But most important is that the tour has generated comments on the *GE Blog* which shows that it is being viewed and discussed by the public.

### **Google Earth Outreach program:**

[http://earth.google.com/outreach/showcase.html#kml=Biological\\_Diversity\\_of\\_the\\_Guiana\\_Shield\\_Program](http://earth.google.com/outreach/showcase.html#kml=Biological_Diversity_of_the_Guiana_Shield_Program)

### **The Checklist Projects**

(<http://botany.si.edu/bdg/whatsnew.html>)

Continue to move forward. The *Fishes of the Guiana Shield* (Vari et al. 2009) was published in September 2009 (Bull. Biological Soc. Washington. Vol. 17).

### **Website**

“What’s New” link <http://botany.si.edu/bdg/whatsnew.html> .

### **Geo-referencing Plants of the Guiana Shield**

- Types from the Guiana Shield (3400) at US. Type collections were geo-referenced and their images (previously done by the Department of Botany) linked in order to produce distribution maps collecting itineraries. In 2009 a paper was submitted on how Google Earth can be used to improve geo-referencing.
- *Mapping the BDG Expeditions*, focused on making the data from the BDG funded expeditions available on-line. Publication of resident collectors in Guyana are still under preparation.
- *Images*, taken during expeditions.
- *Future efforts*: to geo-reference all Guianian collections and images of representative collections.

### **Expeditions in 2009**

**Karen Redden** (SI Post-doc), (6378-6752) and **Ken Wurdack**, (4804 – 5168) traveled to Imbaimadai and the Kato River area, Guyana with K. Wurdack; C. Perry; D. Hunter; T. Hunter; V. Roland. Date: 3 – 23 May 2009. The botanical expedition

## **2.6. Publishing Affairs**

- Assignments: Board members should evaluate the current list of family contributors for progress and the possibility of reassigning inactive families to possible new contributors.
- APG classification will be adopted with authors requesting exceptional permission to follow an alternative taxonomy or to review each remaining family.
- Look at the possibility of:
  - Parallel electronic publishing and to increase the diffusion of FoG fascicles by participating in botanical meetings and by sending fascicle out for review in prominent journals.
  - Making FoG available through Biodiversity Heritage Library
  - Production of e-floras by beefing-up current website

## **2.7. Next meetings**

2012 University of Leiden (Summer?)

2014 Georgetown, Guyana.

## **2.8. Other Business**

- Piero noted that there was a lack of awareness of Flora of the Guianas fascicles by Brazilian institutions. Reviews of fascicles in Brazilian journals was suggested.
- It was decided that it was strictly up to the author whether to publish novelties in the Flora.
- The possibility of publishing an electronic complement to the Flora was discussed. Eve to investigate copyright with Kew Publishing. Sylvia to contact Koeltz
- To raise awareness/sales of FoG, it was suggested that one page ads could be put in journals; Kew Publishing could do email bombardments; there should be a link to FoG from the Kew website (Eve to investigate), and FoG should feature on institutional blogs.

- Interaction of FoG with Guiana shield and other Guianas groups was discussed.
- A new Memorandum of Understanding was agreed by all to summarize institutional commitments to the flora. Each representative and Eve Lucas (as chair) signed a copy, agreeing to have it countersigned at their institution and to return by post or to the next meeting (see page 33).
- Future funding for FoG and over-arching projects was discussed. The possibility of EU funding was discussed.
- Format of the Reports – pdf/hard copy was discussed. It was agreed that these could continue as PDF's to be printed and stored by institutions as required.

### **3. Minutes of the General Meeting, 4 November 2010 (Afternoon)**

#### **3.1. Participants**

Pedro Acevedo (US), Tinde van Andel (L), Phillip da Silva (BRG), Piero Delprete (CAY), Larry Dorr (US), Christian Feuillet (US), Marion Jansen-Jacobs (U), Eve Lucas (K), Scot Mori (NY), Odile Poncy (P), Benjamin Torke (NY), Dorothy Traag (BBS).

#### **3.2. Summary**

Discussions and decisions from the Board meeting were summarised. Additional turnout was low.

### 3.3. Memorandum of Understanding

The members of the Advisory Board of the Flora of the Guianas of

- Botanischer Garten und Botanisches Museum Berlin-Dahlem, *Berlin*
- Institut de Recherche pour le Développement, IRD, Centre de Cayenne, *Cayenne*
- University of Guyana, *Georgetown*
- Herbarium, Royal Botanic Gardens, *Kew*
- Nationaal Herbarium Nederland, Leiden branch, *Leiden*
- New York Botanical Garden, *New York*
- Nationaal Herbarium, University of Suriname, *Paramaribo*
- Muséum National d'Histoire Naturelle, *Paris*
- Department of Botany, Smithsonian Institution, *Washington, D.C.*

at the meeting in Washington, 4 November 2010, agree:

1. to continue to cooperate in the Flora of the Guianas (FoG) project which is aiming at the publication of a Flora dealing with the plant taxa (phanerogamic as well as cryptogamic) of the territories of Guyana, Suriname and French Guiana.
2. to provide through their staffs and in collaboration with other interested specialists in their and other institutions critical treatments of their plant families for publication in the FoG over a period of 20 years.
3. to draft their treatments in agreement with the guide-lines of the FoG, aiming at a scientific flora based on original research and with consultation of all available documentation.
4. to make available to other participants in the project all plant and manuscript material relevant to their share in preparing family treatments.
5. to have their manuscripts published as they become available in separate fascicles numbered in accordance with

a pre-arranged order; the fascicles in general comprising a single family (or several small families).

6. to entrust the publication of the FoG to the publisher The Trustees of The Royal Botanic Gardens, Kew, according to the agreement between the Advisory Board of Fog and the Board of Trustees of the Royal Botanic Gardens, Kew of 21 February 1996.
7. to delegate one representative per participating institution to the Advisory Board of the FoG.
8. to assign the executive editor of FoG with the task to coordinate the publication of the Flora and to serve in all respects as the first responsible for the editorial aspects of the project.
9. to have regular meetings of the Advisory Board, preferably every 2 years.
10. each to find their own financial administrative support.
11. to carry out an exploration program to increase collections.
12. each to try to obtain material support for travelling and exploration.

Washington, 4 November 2010

Signed for the Advisory Board of the Flora of the Guiana:

.....  
Function and name .....  
Date .....

Signed for the participating institution:

.....  
Function and name .....  
Place .....Date .....



## 4. WORKSHOP, 5 November 2010

### 4.1. What makes a plant magic? Symbolism and sacred herbs in Afro-Surinamese rituals.

T. van Andel, S. Ruysschaert and S. Groenendijk  
Netherlands Centre for Biodiversity Naturalis, Leiden University,  
the Netherlands.

Although sharing many aspects with Candomblé, Vodou and Obeah, the Surinamese winti religion is probably the least syncretic of all Afro-Caribbean beliefs. Magic plants are essential ritual ingredients used by Surinamese Creoles and in particular by Maroons, descendants of escaped slaves that formed autonomous communities in the country's rainforest. Much research has been done on the various winti spirits, their origin and preferences, but little has been documented about the plants associated with these deities. Why are certain plants thought to have magic power? Do they share certain characteristics? How did Surinamese plants, which must have been unknown to the Africans at first, become magic during the course of history? During a 7-month ethnobotanical survey in 2006, we collected all magic species mentioned to us, and interviewed several winti priests, vendors and collectors of magic plants. Additional information was obtained from interviews with 10 Surinamese traditional healers in the Netherlands.

We recorded 269 plant species that were used in winti rituals, varying from herbal baths and protective amulets, to offerings for the ancestors. Some trees and epiphytes were considered sacred and never cut down, or planted in yards as protection. A small number of species (or closely resembling relatives) is still used ritually in West Africa, so they must have been known as magic plants among the newly arrived Africans. Some plants were introduced by slaves and became magic *because* of their ancestral origin. The bulk of the magic plants, however, were native to the Surinamese rainforest. Some of them (mostly hunting or love charms) must have been popular among local Indians, but the majority was only used for Afro-Surinamese rituals. Sweet-smelling leaves are key elements to strengthen

one's spiritual well-being, while foul-smelling ones are used to expel witchcraft. Spiny plants are needed to chase away spirits of the dead, whereas leaves with certain colours are associated with corresponding deities. Finally, certain forest products (e.g., water-containing herbs, ignitable resins, seeds for ammunition) became magic because they once allowed escaped slaves to survive in the forest and win their struggle against the Dutch plantation owners. Finding out what makes plants magic reveals some unknown history of this interesting case of African Ethnobotany in the Americas.

#### **4.2. Progress towards a floristic inventory of the coastal savannas of French Guiana**

Piero G. Delprete, R.E. Bone & G. Lolli  
IRD–Herbier de Guyane (CAY), French Guiana.

The coastal savannas of French Guiana occupy a narrow strip (ca. 4-7 km wide) along a 150 km stretch of coastline from Cayenne to Organabo. They represent the most endangered habitat in French Guiana due to increasing human pressure, as the vast majority of the population is concentrated along the coast. These savannas are commonly assumed to have low biodiversity and the flora has historically been estimated to comprise 250-300 plant species. However their floristic composition remains poorly known, as most botanical and ecological studies in French Guiana are concentrated in forested areas. In late 2009 we began a floristic inventory of this threatened habitat with the main aims of producing a comprehensive checklist of the angiosperm and pteridophyte flora, and a regional conservation assessment. Additional aims include the development of a floristic field manual, a project website and a book of landscape photographs and representative species for a general audience. The work to date has included a study of the specimens (most of them annotated by specialists) present at the Cayenne Herbarium (CAY) and six months of field work which has produced 1,200 additional geo-referenced collections and associated high-resolution digital images. As a direct result of detailed exploration of the

savannas, areas not previously visited by botanists have been collected, and many new species records. The resulting database has a current total number of 4,230 entries, and includes 60 families, 120 genera and 630 species. Our preliminary checklist therefore more than doubles the estimated number of plant species reported in the historical literature, emphasizing the rich biodiversity of this often neglected habitat, which is in urgent need of protection.

### **4.3. Linnaeus and the Flora of the Guianas**

Laurence Dorr  
Smithsonian Institution, Washington, DC.

The Guianas figured prominently in the life of Linnaeus. In 1737, he was offered the post of physician with the Dutch West India Company but declined and recommended Johann Bartsch. Bartsch was murdered six months after assuming the post in Suriname and while Linnaeus expressed remorse at the death of his friend, his own travels in the more salubrious Europe helped established the course of his career. Linnaeus drew on an extensive literature to inform his taxonomy of South American plants, yet the immediate sources of his knowledge of the flora of the Guianas came from a relatively small set of specimens, books, manuscripts, and correspondence. Bartsch is cited several times in the *Species plantarum* (1753); the information abstracted from correspondence. Maria Sibylla Merian's *Metamorphosis insectorum Surinamensium* (1705) also is cited in the same work; the information derived from the 60 copperplates in her book that show insect food plants. In 1755-56, Linnaeus sent Daniel Rolander to collect in Suriname, but the two had a falling out and Rolander sold his manuscripts and collections to Christian Friis Rottböll. In 1770, Linnaeus received a brief manuscript and several specimens that Frédéric Louis Allamand collected in Suriname, and in 1774, Linnaeus received a gift of Suriname plants from King Gustav III. The plants, many preserved in alcohol, were collected by Carl Gustaf Dahlberg and are the basis of the dissertation *Plantae Surinamenses* (1775). French Guiana is scarcely mentioned in Linnaeus's publications. Pierre Barrère's *Essai sur l'Histoire naturelle de la*

*France équinoxiale* (1741) is noted, but there are no specimens from Barrère's three years in Cayenne. Venezuela, however, is frequently mentioned. Pehr Loeffling, a Linnaean disciple, was attached to a Spanish expedition sent to South America to survey the disputed boundary between Spain and Portugal. He arrived in Cumaná and eventually traveled to the Río Caroni in the Venezuelan Guayana where he died. Linnaeus cobbled together information on the plants of this region taken from correspondence and manuscripts salvaged and returned to Europe, and Linnaeus published it posthumously as Loeffling's *Iter Hispanicum* (1758). In at least once instance it appears that Linnaeus tied a Rolander specimen from Suriname to one of Loeffling's (Linnaeus's?) descriptions in the *Iter Hispanicum*.

#### **4.4. Taxonomic novelties in a few families and affinities of the Guiana Shield species**

Christian Feuillet  
Smithsonian Institution, Washington, DC.

The novelties are briefly introduced for the Aristolochiaceae, Boraginaceae, Gesneriaceae, and Passifloraceae. The area covered by the Flora of the Guianas is part of the Guiana Shield, a region with a high level of endemism for a territory that is not geographically isolated. Several taxa recently described, transferred, or recently identified in the Boraginaceae, Gesneriaceae, and Passifloraceae are presented as well as their distribution and affinities outside the Shield. The affinities of the Boraginaceae are mainly with the Amazonia Basin with only a few widely distributed species, for example *Cordia alliodora* (Neotropics) and *Varronia curassavica* (Central America & West Indies). In the Gesneriaceae and Passifloraceae there are more taxa with wider distribution in the West Indies and Central and South America, among them *Besleria laxiflora* (Mexico to Brazil), *Columnea oerstediana* (Central America), *Drymonia serrulata* (West Indies & Mexico to Brazil), *Sinningia incarnata* (Mexico to Brazil), *Passiflora auriculata* (Central & South America), *Passiflora rubra* (West Indies to Bolivia), *P. serrato-digitata* (West Indies to Bolivia) and *P. suberosa* (Florida to Argentina).

#### **4.5. Using Biodiversity and Systematics to Understand Evolution on the Guiana Shield**

Vicki Funk  
Smithsonian Institution, Washington, DC.

The Guiana Shield region sits on some of the oldest rocks in South America and has long held a fascination for biologists because of its unique habitats, i.e., tabletop mountains, tropical savannas, and broad expanses of rainforest. These areas are home to many endemic taxa, as well as to unique ecosystems such as the Greenheart forests and montane savannas. The Biological Diversity of the Guiana Shield Program of the Smithsonian Institution (BDG) has been in operation for over 20 years and partial funding has been renewed for the next three years. It is a good time to examine the accomplishments of the program and examine the future directions the program might take. Over the years we have worked with over 800 people in the course of our research, education/training, and outreach efforts. These efforts have resulted in tens of thousands of new collections that have been used for over 530 papers addressing a variety of questions from basic “What is it?” and “Where does it live/grow?” to synthetic ones such as “What is it related to?”, “What are the levels of endemism?”, and “Are there adaptive radiations?”. Using the plant data from recent publications and ongoing research we can look more broadly at the biota of this interesting area. The plant checklist includes 256 families 2,070 genera, and ca.14,784 subgeneric names. Approximately 6,788 species are listed from Amazonas, 6,668 from Bolívar, 1,651 from Delta Amacuro, 7,117 from Guyana, 4,995 from Surinam, and 5,433 from French Guiana. There is a 45% species overlap between the Venezuelan part of the shield and the three Guianas. The top 15 families have over 7,000 species which represents over half of the species in the Guiana Shield area. The vast majority of families have no more than 50 species; 41 families are represented by only one species. The figures for different groups of vertebrates show different results but the overall pattern is the same. The largest plant family on the Shield is the Leguminosae with 1035 species. We now know enough

about the phylogeny of the larger families to begin to ask questions that combine biodiversity and systematics. For instance, we can explore patterns of species radiation on the Guiana Shield among members of two of the three largest families of flowering plants; the Compositae (Asteraceae) and the Leguminosae (Fabaceae). Both of these families are well represented in South America and have groups of species that are endemic to this region. BDG has an extensive database containing over 22,000 records of plant collections of these two families and both families have current generic phylogenies based on morphological and/or molecular characters. Although there are holes in the data and more information needs to be obtained we have gained insight into these questions as we continue to gather data. To truly understand the Shield biodiversity we need more taxonomic coverage, and thus we plan to expand our collecting to include selected groups of insects. We envision a future BDG program with two main research objectives: 1) *Synthesis of broad biodiversity patterns, and 2) Expanding biodiversity documentation* in poorly known taxonomic groups and unexplored regions. These objectives capitalize on established BDG strengths and extend them in novel and synthetic ways.

#### **4.6. The Grammitid ferns of the Guianas**

Carol Kelloff

Smithsonian Institution, Washington, DC.



Grammitidaceae is a pantropical – subtropical family of ferns with approx 500-750 species. The circumscription of the genera is still unsettled but the genera will certainly exceed 10 as a

result of studies by L. E. Bishop, M. Sundue, A.R. Smith, P.H. Labiak and others. The grammitid ferns are generally small epiphytic or epipetric plants. They tend to resemble miniature polypodiums in habit and in the lack of an indusium. They are thought to belong with the Polypodiaceae sensu stricto, but that has been open to question. Distinctions between the polypodioid and the grammitid ferns have been the habit of the rhizomes, articulation of the frond, and the nature of the scales. In the Guianas there are ca. 57 species in what were five genera: *Ceradenia*, *Cochlidium*, *Enterosora*, *Grammitis*, and *Zygophlebia*. Recent studies have segregated at least four new genera out of the genus, *Grammitis*: *Melpomene*, *Terpsichore*, *Lellingeria*, and *Micropolypodium*. This study will examine the morphological characters of the grammitid ferns found in the Guianas with a focus on the new segregate genera of *Grammitis*.

#### **4.7. *Myrcia s.l.* (*Myrcia*, *Calyptanthes* and *Marlierea*) in the Guiana Shield – taxonomy, conservation, the last decades and the future.**

Eve Lucas  
Royal Botanic Gardens, Kew

#### **Abstract**

Recent molecular phylogenetic studies indicate the second largest Neotropical Myrtaceae genus, *Myrcia s.l.*, (c. 700 spp) to encompass three other traditionally recognized genera, *Calyptanthes* (c. 270 spp), *Gomidesia* (c. 50 spp) and *Marlierea* (c. 100 spp). The first two of these are monophyletic clades; *Gomidesia* does not occur on the Guiana shield. c. 120 species of *Myrcia s.l.* are found on the Guiana shield. All of these species were subject to preliminary IUCN conservation assessments based on their area of occupancy (AOO) and extent of occurrence (EOO) and full assessments incorporating habitat assessments have been carried out on those endemic to the shield. Species distributions have been linked to the WWF ecoregions within the Guiana shield; resulting numbers and patterns of threatened species are presented.

## Introduction

Myrtaceae is currently accepted to comprise 15 tribes (Wilson et al., 2005). Of the c. 2500 species of Myrtaceae in South America, all but one monospecific, capsular fruited genus (*Tepualia*) are in tribe Myrteae and have fleshy fruits. Myrteae can be divided into nine informal groups based on well-supported clades (Lucas et al., 2007). One of these groups, the 'Myrcia group' or *Myrcia s.l.* is defined by its foliaceous cotyledons and soft seed coat combined with bi- or trilobular ovaries containing two ovules and inflorescences usually in panicles. Molecular data indicate that the four traditional genera of *Myrcia s.l.* (*Calypttranthes*, *Gomidesia*, *Marlierea*, *Myrcia*) to comprise a single clade. *Calypttranthes* and *Gomidesia* appear monophyletic, embedded in a larger *Myrcia* clade including with paraphyletic *Marlierea*. There are c. 750 species of *Myrcia s.l.* (World Checklist of Selected Plant Families, 2010), many of which occur on the Guianan shield.

The aims of this project were to list those species of *Myrcia s.l.* occurring on the Guiana shield, to prepare IUCN conservation assessments for these species and to use WWF ecoregions to explore trends according to vegetation types and patterns of threat.

## Methods

Collection coordinates of 7577 georeferenced *Myrcia s.l.* herbarium specimens from Kew's database of *Myrcia s.l.* (Murray-Smith et al., 2009) were mapped using ArcGis (9.3) and joined to an outline map of the Guiana shield (Guiana Shield Initiative, 2010). Species occurring on the Guiana shield were listed and endemic species recorded. Preliminary IUCN (2001) conservation assessments of Guiana shield species were produced using IUCN (2001) range parameters and the algorithm of Willis et al. (2003). Threatened species were those identified by the International Union for the Conservation of Nature (IUCN 2001) as critically endangered (CR), endangered (EN), or vulnerable (VU). Species location data was then joined to a map of the World Wildlife Fund (WWF) terrestrial ecoregions



(2010) to record how many and which species occurred in each ecoregion. Results were analysed for correlation of threat level and vegetation type.

## Results

114 species were recorded on the Guiana shield of which 60 are endemic based on this data (Fig.1).

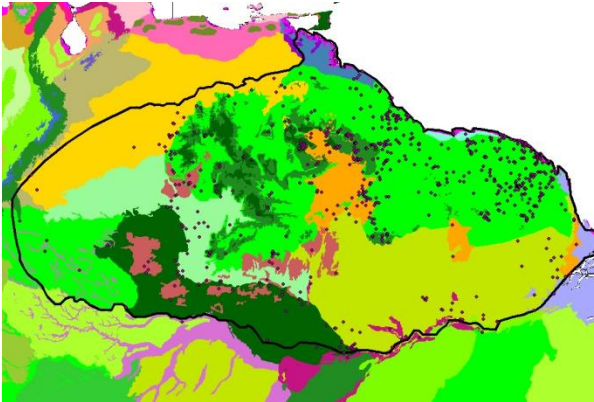


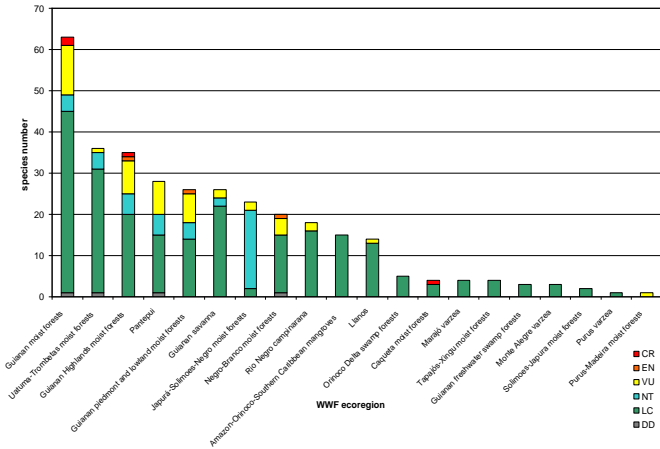
Figure 1. Collection coordinates of 7577 *Myrcia s.l.* herbarium specimens delimited by a map of the Guiana shield, overlaid onto a map of the World Wildlife Fund ecoregions.

Specimen density was found to correlate with eco-region area (Table 1). Most species and most threatened species were recorded from moist forests (Fig.2) with a particularly high number of species recorded from the Guianan moist forests. Number of species and threatened species also correlate to the size of the ecoregion with the exception of the Pantepui and Guianan Highlands moist forests regions in which particularly high numbers of each are found. Levels of threat appear lower in drier habitats with fewer species than expected from the Campinarana and Llanos regions.

**Table 1. *Myrcia s.l.* specimens per WWF ecoregion listed by size**

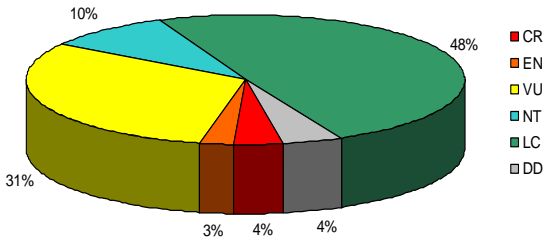
Eco-region	Area	Specimens
Guianan moist forests	476,000	869
Uatuma-Trombetas moist forests	470,000	134
Llanos	376,000	24
Tapajós-Xingu moist forests	335,000	12
Japurá-Solimoes-Negro moist forests	268,000	85
Guianan piedmont and lowland moist forests	230,000	62
Negro-Branco moist forests	201,000	36
Caqueta moist forests	183,000	4
Purus varzea	177,000	1
Purus-Madeira moist forests	173,000	1
Solimoes-Japura moist forests	167,000	2
Guianan Highlands moist forests	146,000	99
Guianan savanna	105,000	71
Rio Negro campinarana	96,000	24
Marajó varzea	88,000	5
Monte Alegre varzea	66,500	4
Pantepui	51,000	62
Amazon-Orinoco-Southern Caribbean mangroves	41,000	69
Orinoco Delta swamp forests	28,000	5
Guianan freshwater swamp forests	7,700	2

**Fig. 2. Species number and conservation assessments per WWF ecoregion**



48% *Myrcia s.l.* species receive some level of threat of extinction under the IUCN (1994) criteria (Fig. 3). A broad survey of other plant groups (Legumes, Gymnosperms, monocots; Brummitt & Bachman, 2010) found that on average, 20% of species received a level of threat, considerably lower than found for *Myrcia s.l.* on the Guiana shield.

**Fig. 3. Threat levels of *Myrcia s.l.* species across all biomes.**



## Discussion

Most species of Guianan shield *Myrcia s.l.* occur in moist forests, especially those at higher altitudes. Most threatened species occur in the same areas. Species number and threat are roughly correlated with area size with key exceptions in the Pantepui and Guianan Highlands moist forests that are disproportionately rich in species and the Llanos and Tapajos-Xingú regions that are disproportionately poor. This is in line with the finding that most Myrtaceae species on the Guianan shield have been found in the Guianan highlands (Lucas et al., 2003); the dearth of species in the lower lying Amazon regions tallies with preliminary findings of Lucas et al., (2007) who found this area relatively poor in species and collections.

The extremely high numbers of threatened species is likely due to an artificially high number of endemics with extremely restricted populations. Currently 24 of the 35 given a 'Vulnerable' category fit criterion D2 (AOO <20 km<sup>2</sup> or number of locations < 5). It is likely that further study will bring the number of species in this area down and expand the ranges of existing ones; this will reduce the number of vulnerable species. Myrtaceae are

inconsistently documented on the Guiana shield and modern, inclusive systematic treatment is necessary.

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#### **4.8. E-flora of the Osa: A Model for the Flora of the Guianas**

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The Osa Peninsula is located in Central America in the southwestern corner of Costa Rica in the province of Puntarenas. To the north and west it is limited by the Pacific Ocean, to the east by the Golfo Dulce, and to the northeast by the Costa Rican mainland (Fig. 1). Altitude on the peninsula ranges from sea level to 745 meters at Mt. Rincón (Grayum et al., 2004). The climate of the Osa Peninsula is hot and humid, with an average temperature of 25°C, an annual average rainfall of 6,000 mm, a rainy season from August to December, and four months of reduced precipitation from January to April (Herrera, 1985; Carrillo et al., 2000). According to Holdridge (1967), the Osa Peninsula has moist, wet, and pluvial life zones in tropical to premontane altitudinal belts. Among them, the wet forest life zone is predominant and encompasses 92.48 % (=1,445.28 Km<sup>2</sup>) of the Osa project area.

#### **Vascular Plants of the Osa Peninsula, Costa Rica**

Technology that enables botanists to manage botanical collections electronically, and to prepare electronic species pages and identification keys, has been available for several decades. User-friendly software, that allows botanists without extensive computer expertise to prepare electronic monographs and floras is, however, a fairly recent innovation. We used two of the improved software packages, KE Emu, an object-oriented data management system for museums [KE Software, 2009] and Lucid, an electronic key program [Lucid, 2009]) to prepare and maintain the electronic flora of the Osa Peninsula. This flora, available at <http://sweetgum.nybg.org/osa/index.php>, is generated from the KE Emu data base. A brief summary of the taxonomic features available on this website follows below.

### **Species checklist**

Our first goal has been accomplished by providing a working checklist of the vascular plants of the Osa Peninsula. The checklist now includes 2200 native species and is based on 9353 collections, most of which were collected by Reinaldo Aguilar. This is a specimen-based checklist which means that each species included must be represented by one or more collections. When a species name in the checklist is accessed, the data of collections representing that species become available. In addition, the 12246 images vouchered by Aguilar collections are attached to the collection record.

### **Species pages**

The next step was to provide model pages for the species of Capparidaceae and Lecythidaceae known to occur on the Osa. The species pages include the accepted name, synonyms, links to type collections, a morphological description, common names, ecological data, a narrative description of distribution, a Google generated distribution map based on geo-referenced collections, field characters, taxonomic notes, etymology, conservation status, links to specimens representing the species, links to all available images of the species, and selected images showing the diagnostic features of the species.

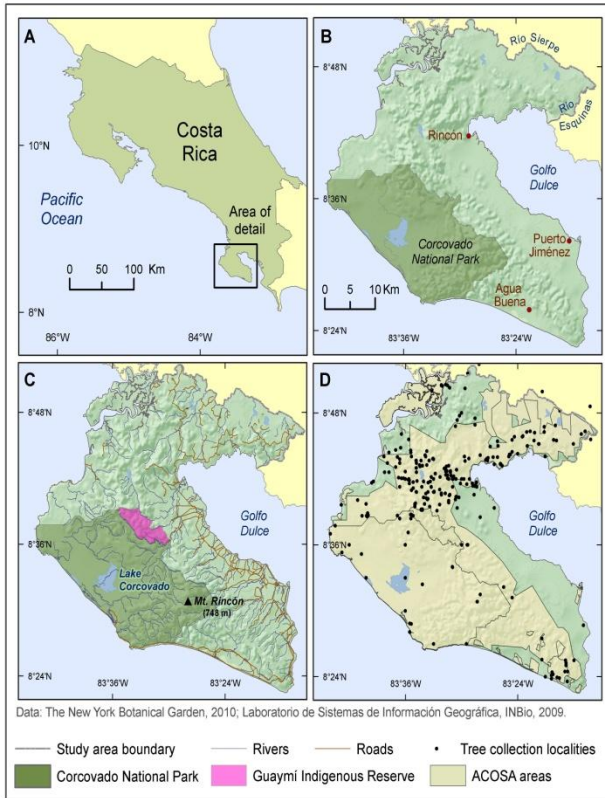


Fig. 1. The Osa Peninsula, Costa Rica. A. Location in Costa Rica. B. Major towns and the Corcovado Nacional Park. C. Roads and the Guaymí Indigenous Reserve. D. Tree collection localities indicated by black symbols. The light green area represents the part of ACOSA that occurs within the area of this study.

## **Glossary**

The glossary provides definitions of the terms needed to understand the terminology used in the morphological descriptions and the keys on the website. The two main advantages of an electronic glossary are the ability to 1) illustrate terms with unlimited drawings and field images and 2) attach the glossary records to the keys.

## **Keys**

Identification keys to the genera and species within genera of Lecythidaceae are provided as models for treatments of other families. The advantages of electronic over hard copy keys are that the former 1) can be used no matter what information is available in contrast to hard copy keys which can only be entered in a predetermined sequence, 2) characters can be linked to glossary records defining them, 3) identifications can be confirmed by links to images of the species, and 4) additions are added easily in contrast to hard copy keys which have to be rewritten when new characters and taxa are added to the keys.

## **Flora of the Guianas**

Because electronic publication is superior to hard copy publication, we propose that it is time for the Flora of the Guianas consortium to consider publishing its flora electronically. We do not, however, suggest completely abandoning hard copy publication. Because new knowledge is continually being discovered for the flora of the Guianas, we suggest that the electronic flora be developed with the possibility of printing a hard copy version on demand. The hard copy version, however, would have to be accompanied by a CD on which the electronic keys are available.

The selection of the software is difficult because proprietary software, such as KE Emu, is expensive to maintain. On the other hand, free software often does not have the technical support needed by most botanists to manage their systems. We suggest that the solution to this problem is the development of a software package that would be made available on the "cloud." This system, however, would work only if a centralized hub with software, servers, and IT staff were available to manage the system and provide support for a worldwide network of users. So



far attempts to establish such a system have failed because 1) there is no single software package that includes all of the functions needed for research in systematics, 2) funding has not been found to support such an ambitious endeavor, and 3) it is extremely difficult to get systematics to agree what software packages to use and to where the hub would be located. Meanwhile, biodiversity throughout the world is being lost, sometimes even before some of the species on their way to extinction are known to science!

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#### **4.9. A Tale of Two Hybrids: Systematics, Biogeography and Diversity of Caesalpinoid Legumes of the Guiana Shield**

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The Leguminosae (650 genera/~18,000 species) is the third largest family of flowering plants and the second most economically important family. Among the three subfamilies, understanding relationships among the genera of Caesalpinioideae is critical for establishing a family-level evolutionary framework as they constitute the early branches of legume phylogeny. Of further interest, Caesalpinioideae also contain many of the most morphologically diverse within the family; these are little studied relative to other subfamilies. Tribe Detarieae contains many of these genera that are rarely collected large rainforest trees. The Brownea Group as traditionally circumscribed contains nine genera. Previous morphological and molecular phylogenetic analyses found that most of these genera form a monophyletic group, the Brownea clade, that includes *Brachycylix*, *Brownea*, *Browneopsis*, *Heterostemon*, *Ecuadendron*, *Elizabetha*, *Paloue*, *Paloveopsis* and part of *Macrolobium*. Our most recent phylogeny of the Brownea clade based on 125 morphological characters and sequence data from the plastid *trnL* intron and nuclear ITS regions confirmed the monophyly of this clade and found that the monophyletic genus *Macrolobium* is included in this clade. However, generic and species boundaries of some taxa were unclear. The results of this study necessitated further examination of intergeneric and species-level hybridization issues. To date, we have identified two hybrids between species of *Elizabetha* and *Paloue*. We cloned multiple copies of ITS from these hybrids, which sorted with their putative parents suggesting a recent origin of these hybrids. Here we present these results, suggest taxonomic revisions to the genera and examine the utility of chloroplast *psbA-trnH* and the low copy nuclear CNGC4 for species level delimitations. Total evidence analyses combining molecular and morphological data allow us to provide a more comprehensive phylogenetic hypothesis for the Brownea clade.

## 5. Posters

### 5.1. Diversity and Preliminary Systematics of the genus *Dicymbe* (Leguminosae; Caesalpinioideae)

Sewalem Mebrate, Karen Redden, and Gabe Johnson, University of the District of Columbia.

Members of the tribe Deteriae (Leguminosae; Caesalpinioideae) are of special interest because they are morphologically diverse, economically important and grossly understudied. Like other members of Deteriae, *Dicymbe* (20 spp.) occurs only on the Guiana Shield, one of the oldest geological formations in South America. Some species of *Dicymbe* have ectomycorrhizal associations, can form monodominant stands, and exhibit mass synchronized flowering/fruitleting events. The genus contains both widely distributed taxa and narrow endemics found only on the tepuis. The biogeographic interest of *Dicymbe* is enhanced as its sister group, *Polystemonanthus*, is restricted to West Africa. No comprehensive monographic revision has been done for *Dicymbe*, and species boundaries remain unclear. This study examines the distributional disjunctions between the species of *Dicymbe* in a phylogenetic context. Using a total evidence approach combining morphological and sequence data, radiation patterns of these Shield endemics are explored and compared with those of other species in the closely related Brownea clade of South America. Morphological characters are explored and reevaluated for species identification.

### 5.2. Diversity and Preliminary Systematics of the genus *Eperua* (Leguminosae; Caesalpinioideae)

Bertrand Ndzelen, Karen Redden, and Gabe Johnson, University of the District of Columbia

Of the three subfamilies of Leguminosae (Papilionoideae, Mimosoideae and Caesalpinioideae), the more basal is the Caesalpinioideae (150 genera/~2,700 species). It has received relatively little attention compared to the other two subfamilies and the status of the taxa and the relationships among them are

uncertain. In this study we focus on morphological diverse genus *Eperua* (14 spp). *Eperua* is an economically important timber tree and is used to make electric poles and roof shingles. The genus contains both widely distributed riparian taxa and narrow endemics found only specific regions. The sister group relationship of *Eperua* and *Eurypetalum* is similar to other members of Detarieae; *Eperua* is a Shield endemic and its sister group is restricted to Africa. No recent comprehensive monographic revision has been done for *Eperua* and at least one new species has been identified. This study combines morphological and sequence data in a total evidence approach to explore hypotheses of evolution of *Eperua*. Patterns in floral evolution are examined in a phylogenetic context.

### **5.3. Medicinal plants of Suriname**

Tinde van Andel, National Herbarium of the Netherlands, Leiden University

From 2005-2009, the research project: Medicinal Plants of Suriname: changes in plant use after migration to the Netherlands was carried out at the Utrecht University branch of the National Herbarium of the Netherlands. Various aspects are presented: medicinal plants in trade, the use of genital steam baths by Maroon women, the sustainability of commercial medicinal plant harvest, the use of magic plants in traditional religion and the preparation of an illustrated field guide of medicinal, magic and religious plants of Suriname.

### **5.4. Mangroves in Guyana: What species are there to conserve?**

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