

# FLORA OF THE GUIANAS

NEWSLETTER N° 14

SPECIAL WORKSHOP ISSUE



2003



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**Cayenne, February 2003**

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## In Memoriam

### Usha Pratima Devi Raghoenandan (1964-2004)

It is with great sadness that we, the members of the Flora of the Guianas Advisory Board, have learned of the tragic death of our representative from Suriname, Usha Raghoenandan, who was murdered on 22 January 2004 in the herbarium she curated.

Usha was the assistant curator of the National Herbarium of Suriname (BBS), a lecturer at the Faculty of Technology of the Anton de Kom University of Suriname, and a lecturer at the Teachers College. Usha was an active researcher on the Guianan flora with special interests in medicinal plants and the plants of inselbergs. Usha's special interest in medicinal plants was already shown when she was still a biology student in Suriname and wrote a study on the Ethnobotany of the Hindustani community in Suriname (1994). In that same year she received a UN Fellowship to accomplish her study in biology at the University of Utrecht, which successfully ended with a MSc degree in 1997. Since that time she was very much interested in inselberg vegetation and she dreamt of a PhD on those inselberg plants. One of her most important publications was on the inselbergs: U.P.D. Raghoenandan. The Guianas. In S. Porembski and W. Barthlott (eds.), *Inselbergs, Biotic Diversity of isolated Rock Outcrops in Tropical and Temperate Regions*, Ecological Studies 146. 315-338. 2000. Usha liked fieldwork and, apart from the many Suriname fieldtrips, she joined several botanical expeditions to Guyana in the framework of the Flora of the Guianas.

Her teaching qualities and good knowledge of the Guianan Flora was used by Tropenbos in Guyana where she was one of the teachers in a course on Neotropical Flora given in Georgetown in 2000. Nature conservation in Suriname was an important item for her, shown in her close coöperation with STINASU (nature conservation in Suriname) and the activities of Conservation International. Her last fieldtrip was to the Tafelberg in Suriname in the Central Suriname Nature Reserve.

She was a wonderful person to work with, very dedicated and cheerful. We will miss Usha terribly. Her death is a serious loss for the National Herbarium of Suriname. We express our sincere condolences to Usha's family, fiancé and friends.

(Advisory Board of the Flora of the Guianas).



Hans ter Steege, Usha Raghoenandan, Olaf Banki

## 1. INTRODUCTION

The Herbarium in CAY was pleased to host the meeting of the "Flora of the Guianas" from 15-25 February 2003. The program started with an excursion day to the "Trésor" Nature Reserve in the Kaw Mts. On February 17 there were a meeting of the Advisory Board and a general meeting, and on February 18, the workshop was held in the IRD Center in Cayenne. These days were attended by ca. 35 participants. After the workshop there was the possibility to join a 5 day fieldwork excursion to the Aratai Station, or to make a 1 day excursion to Devil's Island or just to work in the Herbarium.

The Advisory Board asked Scott Mori (NY) to be the chairperson for this meeting and the coming 2 years because of illness of Marga Werkhoven (BBS), who just was nominated in the previous meeting. The members of the Advisory Board present in Cayenne were: Marion Jansen-Jacobs (U), executive editor, Scott Mori (NY), Jean-Jacques de Granville (CAY), Usha Raghoenandan (BBS), Tsitsi McPherson (BRG), Larry Skog (US), Eve Lucas (K), Odile Poncy (P) and Harrie Sipman (B).

On both meetings an important issue was the rules and duties of the Board, the editorial process, and the contact with the authors about the status of their manuscripts. The next meeting was decided to be held in summer 2005 in Berlin (this is changed later in Vienna, because of the XVIIth International Botanic Congress which will be held in Vienna).

This Newsletter includes reports of the meetings and summaries of the contributions at the workshop.

## 2. ADVISORY BOARD MEETING

17 February 2003 (morning)

Participants : M. Jansen-Jacobs (U), Executive Editor; J. J. de Granville (CAY); H. Sipman (B), S. Mori (NY), L. Skog (US), H. ter Steege (U), O. Poncy (P.), E. Lucas (K), U. Raghoenandan (BBS), T. McPherson (BRG)

### 2. 1. Opening by Scott Mori

Scott regretted the absence of our Chairperson, Marga Werkhoven, caused by health problems and wishes her a speedy recovery. He agreed to act as the Chairperson for this meeting and thanked J.-J. de Granville for the excellent organization of the meeting and for arranging field trips to the Trésor Nature Reserve and Camp Arataye. He thanked the staff of the Cayenne Herbarium for their help in the organization of the meetings and the field trips. Scott pointed out that the CAY Herbarium is exceptionally well curated and stands among the best in the Neotropics. Moreover, the database of the CAY collections and the web accessibility of the data is as a model for other herbaria to follow.

### 2. 2. New Chairperson

M. Jansen-Jacobs informed the Board that Marga Werkhoven is no longer able to serve as Chairperson, and asks for a volunteer to accept this task. Odile Poncy recommends that the role of the Chairperson should be better defined and the Board agrees to make lists of the duties of the Chairperson, the Executive Editor, and the Board members. Scott Mori agreed to be the Chairman until the 2005 meeting.

### 2. 3. Acceptance of the minutes of the previous meeting

Larry Skog suggested that the reports of participating institutions should include the names of those providing the reports. As no other corrections were note, the minutes of the previous meeting were approved.

## **2. 4. Changes in the representatives from the five institutions: the new composition of the Board.**

With the exception of Tsitsi McPherson of BRG, all Board members at this meeting have agreed to the official representatives of their institutions. With the exception of BRG, the Board now consists of the following members:

- Kew : Eve Lucas (specialist in Myrtaceae) replaces E. NicLughada who is not able to continue in this position because of additional administrative responsibilities.
- Berlin : Harrie Sipman replaces P. Hiepko who retired in 2000.
- Utrecht : Hans ter Steege, recently appointed at U, replaces R. Ek.
- Paramaribo : Usha Rhaghoenandan replaces Marga Werkhoven.
- New York : Scott Mori replaces Piero Delprete.

## **2. 5. Changes in the staff of the editorial office at U.**

The Editorial office includes 3 persons :

- Marion Jansen-Jacobs, the Executive Editor
- Gea Zijlstra, an editorial assistant who checks manuscripts for nomenclatural correctness and proper literature citation.
- Hans ter Steege, manages the website.

Stimulated by a question from Hans ter Steege about involvement in editorial matters by Board members, a discussion about the role that Board members should take in the editorial process took place. Odile Poncy and Larry Skog suggested that the Board should be more active in the editorial process and Board members agreed that they would be willing to read manuscripts and make suggestions for manuscript improvement. A special concern was with making sure that only well prepared manuscripts entered the official review process. As a result of this discussion, the Executive Editor was instructed to call upon Board members to help with the editorial process, especially with preliminary reviews of manuscripts.

The Executive Editor was asked to develop a set of guidelines for initial reviews of manuscripts, i.e., things that should be checked before a manuscript is allowed to enter the official review process. These guidelines would include such things as making sure that generic descriptions are parallel, species descriptions are parallel, features in the keys match those given in the descriptions, specimens are properly cited, etc.

Once a manuscript has passed the pre-editorial review by a Board member, then it would be considered ready for review by two external referees.

It was also suggested that the review process could be made more efficient by placing the manuscripts on the Flora of the Guianas website.

In summary, the Board members agreed that a "pre-editorial" review by the Board members would make the entire publication process more efficient. One of the things that previously made the editorial process difficult is that manuscripts have been accepted for publication without insisting that authors carefully adhere to the guidelines of the Flora. As a result, the editor often ended up doing a lot of work that should be done by the authors.

## **2. 6. Report by the Executive Editor**

- Present state of contributions. An updated list of flowering plant family contributors is now available at the Flora of the Guianas website ([http://www.bio.uu.nl/~herba/Flora\\_of\\_the\\_Guianas/main.htm](http://www.bio.uu.nl/~herba/Flora_of_the_Guianas/main.htm)).

There is, however, no information about cryptogams or pteridophytes available at the website. Harrie Sipman agreed to make information available for the cryptogams. Information about the pteridophytes can be found in the Cayenne report. The pteridophyte section of that report was prepared by Georges Cremers, the coordinator for pteridophytes.

- New publications:

Dam J. A. C. van. 2002. The Guyanan plant collections of Robert and Richard Schomburgk. Flora of the Guianas Supplementary Series Fascicle 3: 1-211.

- Manuscripts in the publication process

Manuscripts being actively worked on are:

Caryophyllales (R. DeFilipps & S. Maina), Droseraceae (R. Duno de Stefano), and Sarraceniaceae (A. van Proosdij): publication expected at the end of 2003 or in early 2004.

Acanthaceae (D. Wasshausen): reviewed and comments returned to author, manuscript still with author.

Apocynaceae (L. Allorge): corrections still being made.

Gesneriaceae (L. Skog & C. Feuillet): manuscript submitted February 2003.

- Comments on other plant families

Myrtaceae: E. NicLughada is no longer able to serve as the coordinator, but. E. Lucas, currently working on *Myrcia*, will serve as the coordinator of the family.

Index of French Guiana plant collectors: O. Poncy and J.-J. de Granville will try to encourage the author, Michel Hoff, to complete this fascicle.

- Better communication as a way of getting authors and reviewers to speed up the publication process.

The Executive Editor suggests that a newsletter be placed on the website. In addition, it was suggested that communication should be done through e-mail messages rather than by regular mail. Scott Mori and Hans ter Steege agreed to work together to make the e-mail list.

## 2. 7. Publishing affairs

Eve Lucas has agreed to work with the Executive Editor as a liaison between the editorial office and the publisher at the Royal Botanic Gardens, Kew (see Kew report by E. Lucas).

The Board agreed that every effort should be made to make sure that botanical institutions and libraries in the Guianas be given priority for free copies of the Flora of the Guianas treatments.

The possibility of placing treatments on the Flora of the Guianas website was discussed. It was, however, decided that this would take a great deal of time and, in addition, be harmful to the relationship with our publisher.

## 2. 8. Related publications

The second part of the Guide to the Vascular Plants of Central French Guiana was published at the end of 2002.

Mori, S. A., G. Cremers, C. Gracie, J.-J. de Granville, S. V. Heald, M. Hoff, & J. D. Mitchell (eds.). 2002. Guide to the vascular plants of central French Guiana. Part 2. Dicotyledons. Mem. New York Bot. Gard. 76(2): 1-776.

## 2. 9. Publishing "Studies in the Flora of the Guianas"

At the previous meeting in Utrecht, it was announced that the compilation and distribution of articles in the "Studies in the Flora of the Guianas" series would be discontinued. This series was stopped with number 100, the publication of a new genus of Violaceae (*Hekkingia* by J. Munzinger & H. Ballard) in honor of Willem H. A. Hekking.

Nevertheless, the Editorial Office will continue to collect the papers and make the following available on the website :



- a regularly updated list of publications.
- copies of the articles as pdf files
- hard copies upon request for those without internet access

## 2. 10. Next meeting

Harrie Sipman offered to host the next meeting in Berlin in 2005. This meeting will take place just before or after the International Botanical Congress in Vienna (July 2005)

## 2. 11. Other business

### a. Wood chapters

Marion Jansen-Jacobs asked if every floristic treatment should include a chapter on wood anatomy. The Board recommended that wood anatomical treatments should be considered optional. Therefore, they will only be included when someone is willing to prepare the treatment in such a way that it is ready for publication at the same time as the floristic treatment.

### b. Flora of the Guianas website (H. ter Steege)

The site opened in January 2003. Additions will be included as they become available, many of which will come as a result of this meeting. The website manager, Hans ter Steeger encourages comments and suggestions for improving the website.

### c. Guide for contributors

The last version was edited in 1994 and these guidelines are now available on the website. Changes and updates to the guidelines will be made as needed by the Executive Editor in consultation with the Board.

## 3. GENERAL MEETING 17 February (afternoon)

### 3.1. Report of the afternoon session

#### a. Opening.

Scott Mori thanked our host institution, the Institut de Recherche pour le Développement (IRD-Cayenne) and J.-J. de Granville for organizing the meetings and the field trips.

Scott summarized the decisions made by the Board (pre-editorial reviews, distributing free copies, the discontinuance of "Studies of the Flora of the Guianas" series, decisions about wood anatomy treatments, etc.; see Board report above for more details).

#### b. State of affairs at the participating institutions

The Board members presented a summary of their reports about Flora of the Guianas activities at their institutions (see below).

The publication of part 2 of the "Guide to Vascular Plants of Central French Guiana" was applauded by those in attendance.

#### c. Publication affairs

See summary by M. Jansen-Jacobs in the report on the Board meeting.

#### d. Next meeting

The proposal to have the 2005 Flora of the Guianas meeting was announced and Harrie Sipman was thanked for extending this invitation to the Flora of the Guianas consortium.

Olaf Banki suggested that a program that would attract a more general and wider audience should be developed to accompany the meetings. One of the suggestions was that a symposium about the impact of the Flora of the Guianas on conservation be considered. Harrie Sipman and Scott Mori volunteered to develop this program.

#### **e. Other business : website**

The Flora of the Guianas website is now online at [http://www.bio.uu.nl/~herba/Flora\\_of\\_the\\_Guianas/main.htm](http://www.bio.uu.nl/~herba/Flora_of_the_Guianas/main.htm)

The website includes:

- information from the Editorial office
- an editorial checklist of treatments, regularly updated
- planned expeditions
- pictures of the new species (after publication)

Our website manager, Hans ter Steege, welcomes additions and suggestions for improving the website.

### **3.2. State of affairs at the participating institutions (October 2000 – February 2003)**

#### **[B] Botanischer Garten und Botanisches Museum Berlin-Dahlem**

During this period the activities for the Flora of the Guianas have been very limited, due to changes in the staff and competing, partly new fields of activities. In the past decade several of the Flora participants retired, and new staff has brought new interests or is engaged for special projects. Much activity went into Data Modelling for databasing and internet distribution of botanical information, and the Flora of Cuba, a project taken over from our sister institution in former East Berlin (DDR). Since our inclusion in the Free University of Berlin, we are expected to make more own income and therefore increased efforts are made to attract visitors in the garden and the public

museum. Music performances are being organized, several times a year new temporary exhibitions are presented, even weddings can now be celebrated in the Garden.

These activities have their spin-off for the Flora of the Guianas. All vascular specimens requested for loan are being scanned and made available in an internet image database, which now comprises over 12000 specimens, including some 70 Guianas plants [<http://ww2.bgbm.org/herbarium/AccessMenu.cfm>]. For the EHNSIN-project an experimental website was made, in which some 5000 Guianas lichen specimens are accessible [<http://www.bgbm.org/BioDivInf/projects/ENHSIN/default.htm>].

#### **Flora treatments (Cryptogams):**

Lichens: (Coordinator Harry Sipman)

- Parmeliaceae: no new information
- Thelotremataceae: no new information
- Cladoniaceae: no new information

Ferns:

Brigitte Zimmer is cooperating with George Cremers to finish the outstanding fascicles of pteridophytes.

#### **Flora treatments (Phanerogams):**

- Compositae: Contribution by H. W. Lack (Inuleae s.l., Tageteae and Lactuceae), status: preliminary.

- Menispermaceae: Contribution by Paul Hiepko, status: in progress.

- Zygophyllaceae: Contribution by Beat E. Leuenberger, status: in progress.

He welcomes Guianas cactaceae for study.

- Thomas Raus will treat his very small families if one of the neighbouring families is more or less finished: Caprifoliaceae, Pedaliaceae, Plantaginaceae, Punicaceae, Ranunculaceae.

## Publications (2001-2002):

Leuenberger, B. E. 2001: *Selenicereus extensus* (Cactaceae), new combination and taxonomic history. – Bot. Jahrb. Syst. 123: 47-62. (= Studies on the Flora of the Guianas no. 93).

## [BBS] National Herbarium of Suriname; Paramaribo, Suriname (November 2000 – February 2003)

### General

During this period, BBS has received several shipments of duplicates from U, US and MO. The specimens have been collected mainly in Guyana, Suriname and French Guiana; most of the material has been mounted and inserted in the herbarium and in the herbarium database.

In this period over 560 researchers, teachers and students visited the herbarium for botanical information. Ms. Ramharakh designed a folder about the BBS herbarium and its activities.

From November 2000 until March 2001 Ms. Werkhoven has been teaching 'Morphology and Determination of Surinamese Tree Species' to students in Agricultural Production at the University of Suriname, and Ms. Raghoenandan from November 2000 'Botany 1' and 'Botany 2' to students in Environmental Sciences, and since November 2002 also 'Biodiversity & Monitoring'. Ms. Raghoenandan trained the herbarium personnel in the collecting, the identifying and the recognizing of plant families, and she also instructed them in mounting and management.

From February 2001 until September 20, 2002, Mr. Soekhai, Mrs. Behari-Ramdas and Ms. Ramharakh put over 8,000 records of herbarium voucher specimens in the database. Since March 2002, the library of the herbarium is being computerized by Ms. Grant, who developed a database.

## Personnel

On 7 January 2002, Ms. Esmé Posetiko resigned from the herbarium. The personnel of the BBS herbarium consist at this moment of: Ms. Marga Werkhoven (Head/curator), Ms. Usha Raghoenandan (curator), Mr. Rishie Soekhai (assistant database manager, since January 2, 2001), Ms. Angela Grant (documentation-assistant, since March 11, 2002), Mrs. Joelaika Behari-Ramdas (herbarium assistant, since March 11, 2002, and since August 27, 2002 as assistant curator), and Ms. Sabitrie Ramharakh (herbarium assistant, since May 21, 2002).

## Projects

### ☞ *The Suriname Bioprospecting Initiative (International Cooperative Biodiversity Group – ICBG)*

In the scope of this project, MO donated a new computer and scanner, and also some literature, while they also paid for the Internet subscription for one year. Ms. Werkhoven identified the plants collected by Conservation International Suriname (CI-S).

### ☞ *State of the Environment Report of the Republic of Suriname 2000*

On request of the National Institute of Environment and Development in Suriname (NIMOS), Ms. Werkhoven collaborated with a team of specialists in writing this report.

### ☞ *Effects of logging and Celos Silvicultural treatments on forest biodiversity at Kabo, Suriname*

This project ended on 21 September 2001 with a one-day seminar. Ms. Raghoenandan presented the results of the research on '*Botanical Diversity at Kabo*', executed in 2000. The costs for this project were financed by World Wildlife Fund (WWF)-Suriname within the Guayana Forest & Environmental Conservation Project (GFCEP).

### ☞ *Petroglyph Research Kwamalasamutu*

In December 2000, Ms. Raghoenandan has been appointed by the Minister of Education & Human Development in a working

group 'Petroglyph Research Kwamalasamutu'. In this scope she participated in an expedition from 8-14 March 2001 to the petroglyph site Werehpai, while she also held a presentation at Kwamalasamutu about future botanical research at and around this site. This orientation expedition was organized and financed by CI-S. At the moment an amount of US\$ 25,000.- is available for botanical research at Werehpai.

✍ *Biological Assessment of the Central Suriname Nature Reserve (CSNR) and Development of a 5-year Research Plan and Monitoring Strategy and Program, and Implementation Program*

For this project Ms. Raghoenandan and Mrs. Behari-Ramdas (with assistance of Ms. Werkhoven, Ms. Grant & Ms. Ramharakh) collected data on plants occurring in the CSNR from published and unpublished literature. These data were put into a database developed by Mr. Soekhai. Ms. Raghoenandan composed a preliminary botanical bibliography for the CSNR of about 80 books and journals, with keywords, which was computerized by Ms. Grant.

✍ *Other projects*

- ? Ms. Raghoenandan provided information and advice, and assisted in writing projects like the above mentioned, as well as others, like 'Expedition to the Tafelberg', 'Aqua-RAP of the Upper Coppename River', 'Sipaliwini Nature Reserve Management Plan', 'Determination of often used medicinal herbs', 'Improvement of database services'.
- ? From October 2001 Ms. Werkhoven has been involved in supervising in a BSc. student project concerning medicinal plants and from February 2002 Ms. Raghoenandan concerning Non-Timber Forest Products – NTFP's.

### **Botanical Explorations**

- ? Ms. Raghoenandan participated in a 3-weeks expedition (October 14 – November 7, 2001) near the Kanuku Mts. in the *Conservation International Exploratory Permit Area in*

*Guyana*, together with A. Chanderbali, B. ter Welle and V. James. This fieldtrip was co-sponsored by the German Television (NDR) who will make a documentary of the expedition. About 280 collections were made.

- ? From April 10 – May 3, 2002, Ms. Behari-Ramdas joined an expedition to the *Brownsberg Nature Park, Suriname*, organized by Prof. Mark Engstrom (Canada); she collected plants with fruits eaten by bats.
- ? From April 12 - 21, 2002, Ms. Raghoenandan coordinated and participated in an expedition to the *Raleighvallen-Voltzberg-Van Stockumberg in the CSNR*, initiated by the Botanical Garden of München in collaboration with the National Herbarium of Suriname and that of the Netherlands, Utrecht Branch. Except for food, the institutions in München and Utrecht paid for this expedition. In total 114 collections were made.
- ? From August 14 – 23, 2002, Ms. Raghoenandan participated in a multidisciplinary orientation expedition to the *Sipaliwini Nature Reserve, southern Suriname*, organized and financed by CI-S. A collection of 52 numbers was made and a list of about 90 tree species compiled. Mr. A. Semmie, tree spotter of CI-S, provided the vernacular names. Of this expedition a documentary is being made by Mediavision.
- ? From January 24 to February 10, 2003, Ms. Behari (until February 3), Ms. Ramharakh, Ms. Grant, and Ms. Raghoenandan (from February 3) joined the Nassau Mountains Expedition organized by the National Herbarium of the Netherlands, Utrecht Branch. The expedition was financed by SURALCO (Surinam Aluminium Company) and the Utrecht University. Over 400 collections were made and about 3500 trees (including 400 tree species) were recorded in several plots of 5,5 hectare in total.

### **Future Botanical Explorations**

- ? From March to April 2003, BBS will join a multidisciplinary expedition on and along the Upper Coppename River (AquaRAP), organized and financed by CI Washington.

- ? In June 2003 a botanical-zoological expedition to the Tafelberg is being planned by the National Zoological Collection of Suriname (NZCS) and BBS, and financed by the Surinam Conservation Foundation (SCF).

### National and International Activities

- ? From December 7 – 15, 2000 Ms. Werkhoven participated in the CITES 2<sup>nd</sup> Joint Plants and Animals Committee and the 10<sup>th</sup> Meetings of the Plants Committee in Sheperdstown, West Virginia, USA.
- ? On April 4, 2001, Ms. Raghoenandan supervised and advised students of the Advanced Teachers Training College of Suriname (IOL) and Educational Faculty of Amsterdam, The Netherlands (EFA) within the Surilero project about the vegetation near Paramaribo.
- ? On May 22, 2001, Mr. Soekhai attended a demonstration of the Computer program '*Mediators*' given by the University of Suriname.
- ? On June 7, 2001, Ms. Raghoenandan participated in a meeting concerning activities of museum in Suriname organized by the Foundation '*Initiative of the Building of a New Museum*'.
- ? On June 22, 2001, Ms. Raghoenandan and Mr. Soekhai attended a lecture on computer networking at the University of Suriname.
- ? On August 23 and 24, 2001, Ms. Raghoenandan and Mr. Soekhai participated in a seminar '*Celos Management System Post-Harvest Silvicultural Interventions in Natural Productions Forest over the past 30 years. Adjustment or Application?*', followed by an excursion to the Celos permanent plots at Kabo, organized by Celos and financed by WWF-Suriname.
- ? On September 7, 2001, Ms. Werkhoven participated in the '*Guayana Shield Conservation Priority Setting Workshop*' organized by CI-Suriname.

- ? On September 21, 2001, Ms. Werkhoven and Mr. Soekhai attended the seminar '*The impact of logging and Celos Silvicultural Treatments on Biodiversity: Observations of Rainforest Biodiversity in Suriname* organized by BBS and NZCS.
- ? From October 7-11, 2001, Ms. Raghoenandan attended the symposium '*Biodiversity in Guyana*', Georgetown, Guyana, organized by Smithsonian Institution and financed by the German Television (NDR).
- ? On October 15, 2001, Ms. Werkhoven and Mr. Soekhai participated in a Stakeholders meeting organized by the Suriname Conservation Foundation (SCF).
- ? From November 20-23, 2001, Ms. Raghoenandan participated in the symposium '*Standards for Forest Management in Guyana*', organized by the Tropenbos-Guyana Programme in Georgetown Guyana, as a closing ceremony of their activities in Guyana. Tropenbos and the University of Suriname made funds available.
- ? On November 22, 2001, Ms. Posetiko and Mr. Soekhai attended a presentation of Dutch students about fish population and mercury contents in the Wetikreek (Brownsberg Nature Park).
- ? On January 24, 2002, Ms. Werkhoven, Ms. Raghoenandan, and Mr. Soekhai participated in the National Workshop '*Information Assembly*', organized by CI-Suriname and NARENA-CELOS, as preparation on the international '*Guiana Shield Priority Setting Workshop*' to be held in April 2002.
- ? From April 5-9, 2002, Ms. Raghoenandan and Ms. Werkhoven participated in the International '*Guiana Shield Priority Setting Workshop*', organized by CI and IUCN, in Paramaribo.
- ? On May 22, 2002, Ms. Werkhoven and Ms. Raghoenandan participated in a Stakeholders Consultation concerning the concept '*A 5-year Biological Research Plan and Monitoring Strategy for the Central Suriname Nature Reserve*'.

- ? On June 5 and 6, 2002, Mr. Soekhai followed a computer training for museum collections, an ADLIB Museum Plus database program (a certificate has been awarded), and on 11 and 12 June 2002, Mr. Soekhai and Ms. Grant followed as observers a computer training for libraries, ADLIB Catalogue, organized and financed by the UNESCO project '*Documentation of the Cultural Heritage*', coordinated by the Department of Culture of the ministry of Education and Human Development.
- ? On June 10, 2002, Ms. Werkhoven and Ms. Raghoenandan participated in the third Stakeholders Consultation Workshop concerning the Management Plan of the CSNR, organized by CI-S. Ms. Raghoenandan presented an overview of the biological database for this reserve.
- ? On June 12, 2002, Ms. Raghoenandan participated in the Stakeholders meeting concerning the formulation of the '*Management Plan of the Sipaliwini Nature Reserve*', organized by CI-Suriname.
- ? From June 28-30, 2002, Mrs. Behari-Ramdas and Ms. Grant participated in the '*Fifth International Symposium on Herbal Medicines in the Caribbean*', organized by CARAPA and held in Paramaribo. The symposium aimed at the ideas/possibilities of traditional use of medicinal plants throughout the world. Their participation was made possible by the Pharmacy Ausan in Paramaribo.
- ? On July 24, 2002, Ms. Raghoenandan, Ms. Grant and Ms. Ramharakh attended a workshop '*Capacity Building Strategy in Forest Certification*' organized by the Stichting Jan Starke Opleidings- en Ontspanningscentrum (JSOOC) at Zanderij I, in the scope of the EU project 'Inter-institutional Development of training in Forest Certification in ACP countries'.
- ? On August 22, 2002, Ms. Werkhoven participated in the Proposal Development Workshop '*Guianas Forests and Environmental Conservation Project*', organized by WWF-Guianas.

- ? On August 30, 2002 Ms. Raghoenandan made a one-day trip to the top of the Tafelberg for orientation, financed by UNDP.
- ? On September 9, 2002, Ms. Raghoenandan gave a short training at the JSOOC Training Center, Zanderij I, in collecting and preserving, including identifying plant specimens to personnel of STINASU (Foundation for Nature Conservation) and the Nature Conservation Department of the Forestry Service Suriname.

### Publications / Reports

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- ? Raghoenandan, U.P.D. 2000. Regional Floristics on Inselberg Vegetation, the Guianas (Guyana, Suriname, French Guiana). *In*: S. Porembski & W. Barthlott (eds.) *Vegetation of Inselbergs: Biotic Diversity of a tropical Ecosystem*. Springer-Verlag, Germany.
- ? Raghoenandan, U.P.D. 2001. Botanical Diversity Assessment at Kabo. *In*. H. Hiwat (ed.). *The impact of logging and Celos Silvicultural Treatments on Biodiversity: Observations of Rainforest Biodiversity in Suriname. Preliminary Findings*. Report National Zoological Collection of Suriname / National Herbarium of Suriname. World Wildlife Fund GFCEP (Guayana Forest & Environmental Conservation Project). Paramaribo.
- ? Abiamof, D., T. Jantz, S. Malone, B. Mitrasingh, E. Oochpatapo, Th. Podina, M. Pool, U. Raghoenandan, C. Wirokromo. 2001. *Interim Rapport Werkgroep Petrogliefen Werehpai, Kwamalasamutu, Zuidwest-Suriname*. November 2000-April 2001. Conservation International Suriname, Paramaribo.

- ? Werkhoven, M.C.M. 2001. *Report of participation in the CITES 2<sup>nd</sup> Joints Plants and Animals Committee (CITES Listing Criteria), December 7-9, 2000, and CITES 10<sup>th</sup> Meeting of the Plants Committee, December 11-15, 2000.* National Conservation Training Center, Sheperdstown, West Virginia, USA. Intern Report BBS.
- ? Welle, B.J.H. ter, A. Chanderbali, U Raghoenandan. 2001. *Botanical Exploration in Guyana. Conservation International Exploratory Permit Area / Essequibo River. October 14 – November 7, 2001.* University of Guyana Georgetown, in cooperation with the University of Suriname (National Herbarium).
- ? Abdel-Kader, M.J.M. Berger, C. Slebodnick, J. Hoch, S. Malone, J.H. Wisse, M.C.M. Werkhoven, S. Mamber and D.G.I. Kingston. 2002. *Isolation and Absolute Configuration of ent-Halimane Diterpenoids from Hymenaea courbaril from the Suriname Rain Forest.* Journal of Natural Products (65)1: 11-15.
- ? Seo, Y. J. Hoch, M. Abdel-Kader, S. Malone, I. Derveld, H. Adams, M.C.M. Werkhoven, J.H. Wisse, S.W. Mamber, J.M. Dalton and D.G.I. Kingston. 2002. *Bioactive Saponins from Acacia tenuifolia from the Suriname Rain Forest.* Journal of Natural Products (65) 2: 170-174.
- ? Behari-Ramdas, J. 2002. *Brownsberg Verslag.* Nationaal Herbarium, Universiteit van Suriname, Paramaribo.
- ? Raghoenandan, U.P.D. 2002. *Preliminary Botanical Bibliography of the Central Suriname Nature Reserve (CSNR) with Keywords.* Project 'Biological Assessment of the CSNR and Development of a 5-year Research Plan and Monitoring Strategy and Program, and Implementation Program'. National herbarium (BBS), Anton de Kom University of Suriname, under the auspices of Conservation International Suriname, Paramaribo.
- ? Jansen-Jacobs, M.J., A. Gröger, U.P.D. Raghoenandan, O.S. Bánki and Ch.C.I.E. van 't Klooster. 2002. *Botanical*

*Exploration in Suriname. Voltzberg-van Stockumberg, April 12-20, 2002.* University of Utrecht, Nationaal Herbarium Nederland (The Netherlands), Botanischer Garten München-Nymphenburg (Germany), Anton de Kom University, National Herbarium Suriname (Suriname).

**[BRG] University of Guyana – Herbarium Report**  
(February 2001 – February 2003 )  
T. McPherson and A. Chanderbali

The following report provides an update of activities at Guyana National Herbarium housed at the Centre for the Study of Biological Diversity (the Centre or CSBD) and where possible details as to the status of the Jenman collection.

**Staff and Training:**

At the University:

Andre Chanderbali has successfully completed his PhD in Biology at the University of Missouri-St. Louis. He is currently lecturing at the University of Guyana. We look forward to his inputs at the Guyana National Herbarium.

Additions and Changes:

Philip DaSilva, previously HOD Biology, has assumed the post of Dean, Faculty of Natural Sciences. He continues to play a vital role in matters at CSBD.

Calvin Bernard, with the promotion of Mr. DaSilva, has assumed the post of HOD Biology and assumes the role of Manager (ag.) of the Centre.

Tsitsi McPherson has joined the staff as a Scientific Officer I. She has duties in the National Herbarium and Museum, both housed at the Centre.

### Condolences:

Dyante Naraine, who served as the funds manager and in the capacity as the Centre's secretary/receptionist, sadly passed away in September 2002. She will be greatly missed as she managed a large percentage of the Centre's affairs.

### **Collecting Trips**

Collection trips are coordinated by and in collaboration with Centre Herbarium wherein it continues its role as a facilitator to plant expeditions, assisting in trip logistics.

*May 30 – July 10, 2001* ; H. D. Clarke, University of North Carolina, Asheville :

Mount Ayanagana Expedition (no.s 8897-9917)

*Oct. 14 – Nov. 7, 2001* ; Welle, B.J.H ter, A. Chanderbali, U. Raghoenandan :

Botanical Expedition to Conservation International Exploratory permit Area. Essequibo River. Completed in cooperation with the University of Suriname (National Herbarium). About 280 collections made.

*June 3 – July 7, 2002* ; Terry Henkle, Duke University :

Dried fungal specimens from Piabaraima Mountain (165 Vouchers).

*Oct. 14 – Nov. 11, 2002*; Karen Redden, George Mason University :

Mabura Hill and Purburi Forest and Iwokrama Centre (140 collections).

*Nov. 18 – Dec. 9, 2002* ; Karen Redden with Sara Price (Iwokrama volunteer), George Mason University :

Imbaimadai (1130 specimens)

### **Storage of Specimens.**

Storage has been a persistent problem, however, we are proud to report that the Centre for the Study of Biological Diversity, which houses part of the Guyana National Herbarium, is at present being expanded to double its current capacity. With increased space the Herbarium will be used to better accommodate the growing collection and, allow for a more amicable working environment for academic staff and a more productive environment for student volunteers.

As of the last FOG meeting, specimens have been received from the Smithsonian's Biological Diversity of the Guianas Program and from French Guiana. These specimens are still in the process of accessioning to be entered into the permanent collection.

### **Information Storage and Retrieval**

The collection at the Guyana National Herbarium has not been electronically databased, however accession logs are at present being compiled for all material in the Herbarium.

### **Merging of Herbaria**

No progress has been made in merging the collections of the Guyana National Herbarium and that housed in the Jenman Herbarium. The Jenman Herbarium faces the same limitations as that housed at the Centre. In addition, there is a lack of equipment to ensure the safety and preservation of the collection and to minimize damage by pests.

### **Educational Outreach:**

As the main repository of biological specimens, the Centre (specifically the Guyana National Herbarium) serves an educational function to local schools, other post-secondary institutions, students and interested individuals.



## Limitations

The primary limitations of the Guyana National Herbarium are:

- ? Limited Space (this we anticipate to be remedied by the current expansion project)
- ? Limited Staff, thereby making independent research and taxonomic treatments impossible.
- ? Fostering student interest in botany and as such few students are interested in volunteering at the National Herbarium or pursuing careers in Botany
- ? Financial Limitations of a Small University

## Conferences

“THE BIODIVERSITY OF GUYANA: A Global Perspective for the Future” Oct 7 – Oct 10, 2001 :

Symposium co-hosted by the University of Guyana (UG) and the Smithsonian Institution's Biological Diversity of the Guianas Program (BRG) in Georgetown, Guyana. V.A. Funk, C.L. Kelloff and T. Hollowell prepared a report. Proceedings of the symposium are to be published soon. Further information can be obtained from Biological Diversity of the Guianas Program, NMNH, Smithsonian Institution at:

<http://www.nmnh.si.edu/biodiversity/bdg/symposium/sympreport.html>

## Closing Remarks

The current expansion of the Centre will alleviate most of the spacing difficulties within the herbarium as we see in the immediate future. Although some spacing issues still remain we anticipate that members of staff and/or associated University persons will be able to contribute taxonomic treatments for the Flora of the Guianas. At present the CSBD continues to be a facilitating institution with a few staff members able to complete field work but unable to complete further scientific works.

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## [CAY] Herbar de Guyane, Institut de Recherche pour le Développement (IRD), Cayenne, France

### 1. Floristic treatments

ARECACEAE - Coord. J.-J. de Granville, 8 contributors, 1 fascicle, 95 taxa listed - and CARYOCARACEAE - J.-J. de Granville (CAY) -. No progress in the manuscript by lack of time, since J.-J. de Granville is in charge of the Herbarium.

PTERIDOPHYTES - Coord. G. Cremers (P), 12 contributors, 9 fascicles, 450-500 taxa – . No new fascicle has been published since the last meeting. The 6 fascicles still to be published are:

- o Fasc. 1 : *Danaea*. The manuscript is under discussion with M. Christenhusz who is studying the genus.

- Fasc. 2 (Cyatheaceae, Gleicheniaceae, Lygodiaceae, Marsileaceae, Metaxyaceae, Schizaeaceae) : Cyatheaceae is the most behind schedule manuscript. The family will be completely revised during summer 2003 in Paris herbarium
- Fasc. 5 : This fascicle is delayed because of the treatment of the genus *Adiantum*. B.Zimmer, in charge of this treatment, will probably never finalize it, being absorbed by other heavy research activities. Michel Boudrie and G. Cremers will deal with the *Adiantum* "complex" and prepare the manuscript.
- Fasc. 7 (Aspleniaceae, Blechnaceae, Lomariopsidaceae) : Treatments of all the genera are finished except *Elaphoglossum*, the manuscript of which, including drawings, is at the moment being completed by John Mickel. New taxa have to be added.
- Fasc. 8 : The manuscript on Polypodiaceae is in the process of being compiled. No reaction from the contributor in charge of the treatment of Grammitidaceae...
- Fasc. 9 : The manuscript on Lycopodiaceae is expected from the contributor. The Selaginellaceae are studied in collaboration with M.Boudrie. Carl Taylor is studying the collections of Isoetaceae and will prepare the treatment.

Since the first three fascicles have been published, many new taxa have been recorded in French Guiana as well as in Guyana. In consequence, G. Cremers is thinking of preparing an addenda.

HUMIRIACEAE (22 taxa), HUGONIACEAE (4 taxa), IXONANTHACEAE (3 taxa in the Guianas s.s.; 6 taxa if considering the bordering areas) - D.Sabatier, IRD Montpellier. The manuscript on LINACEAE s.l. (= HUGONICEAE + IXONANTHACEAE) is almost finished. The manuscript on HUMIRIACEAE, reviewed by M. Jansen-Jacobs and corrected by the author, will be submitted soon for publication after the last taxonomic problems are solved.

Taxonomic problems on three taxa have been identified :

- a) The study of the new and fertile specimens (collected by S. Mori during the Pic Matécho expedition, in September 2000) of a *Vantanea* expected to be *V. paraensis* revealed that the species was new to science. A description of this new species is in press (*Brittonia* 54 (4) ; "Studies on the flora of the Guianas n° 94"). The very nice plate was drawn by Bobbi Angell and granted by Scott Mori (both are warmly thanked).
- b) Another *Vantanea* species, a big canopy tree, considered by Sabatier as a variety of *Vantanea parviflora* in the first draft, retained attention because it differs greatly from this species by leaf shape and fruit. So far, a single location was known (Nancibo area near the Comte river FG). Unfortunately the small population was lost through forest clearings at the beginning of the 90s. Two new locations of this taxa have recently been discovered in FG. One during the study (2002) of the flora of two 1ha permanent plots near Montagnes Tortues (Aprouagues basin), a second when studying the Humiriaceae specimens collected by Denis Loubry along the Sinnamary river (Saut Dalles). Up to now, a single fertile (ripe fruits) specimen of this taxa was collected at Nancibo and flowers are needed for further investigations. We hope the 2 Mt Tortues' trees will soon provide this material !
- c) The third taxonomic problem is due to several collections of a *Sacoglottis* from Guyana first identified as *Sacoglottis mattogrosensis* and then treated as a new species in Sabatier's draft. Sabatier discovered that these specimens are closely related to a species described by Cuatrecasas from Central America (*Sacoglottis trichogyne*). Both have an adpressed - pilose ovary, a character not shared by other species in the genus. While differing somewhat by a few leaf characters, Guyanan and Central America specimens are probably conspecific ?

Finally, as a result of Sabatier's work on Humiriaceae for the "Flora of the Guianas", 4 species new to science or for the area have been discovered, an interesting improvement for this small family of mostly (excepted *Humiria balsamifera*) rare species.

TURNERACEAE - M. HOFF, P; (19 taxa). The manuscript is finished but it has been written in french! It is in the process of being translated in english.

## 2. The « AUBLET 2 » database

The database AUBLET2 stores information about botanical specimens collected in the Guianas, mainly in French Guiana, and hosted in "Herbier de Guyane (CAY)", in Cayenne, French Guiana. It aims to manage the herbarium, and to provide basic information to any user. Moreover, selected informations can be provided upon request. The database is managed and updated in Cayenne under the direction of J.-J. de Granville, Curator of the Herbarium

Exploitation and applications of the database is fast increasing due to many requests concerning floristic inventory, relative species richness of studied areas, floras and checklists, impact studies and conservation of biodiversity

Internet access to the database AUBLET 2 has been officially open in 2001 (<http://www.cayenne.ird.fr/aublet2>). Consulting taxonomic reference list with synonyms, as well as the list of specimens occurring at CAY (with updated identifications), the list of French Guiana localities and habitats will be free of charge. Extraction of species lists per locality or per habitat will be charged and will lead to particular agreements between IRD and the requesting institution.

The database has been improved in 2002 by modernizing the website and providing new requests. In particular, the species lists per localities, per quadrats and per "ZNIEFF". In the latest, "patrimonial" species are specified (rare,

endemic, protected...). A new high-performance server has been set in 2002.

## 3. Exploration program

J.-J. de GRANVILLE and F. CROZIER participated in June and July 2002 to 3 important collecting expeditions on granite outcrops of Southern French Guiana, financed and organized by the National Museum of Natural History of Paris (C.Sarthou, J.-P.Gasc) and the "Mission Parc Guyane" (P.Gaucher) :

- ✍ Monts Bakra and the Pic Coudreau in central French Guiana. Patches of submontane forest are extremely rich in orchids. A new genus, endemic to this mountain range will be soon published by L. SKOG and C. FEUILLET: *Cremersia platula* (Gesneriaceae). New collection have been made and material has been collected for DNA analysis.
- ✍ Monts d'Arawa, in South-Central French Guiana, an area never prospected before. The area is characterized by many small and flat granite outcrops covered by a shrubby vegetation. New and interesting taxa have been discovered, in particular a genus new to French Guiana, *Lafoensia* (Lythraceae)! Except 2 collections from Suriname the genus was known from the Brazilian Atlantic coast and Southern Brazil
- ✍ Mont Saint-Marcel, in South-Eastern French Guiana, a fairly big inselberg, where several rare and/or endemic species have been found, in particular *Cyclodium rheophyllum*, only known from the type locality. We also discovered *Philodendron werkhovenia* Croat, sp. Ined. , previously known by a specimen from Suriname

The team of plant ecology, under the direction of D.Sabatier, inventoried the trees of several new forest plots during the period :

- ✍ Counami : 16 0.12-ha forest plots have been studied to provide data for studies on soil – plant populations relationships. They are in an area close to Piste de St Elie (nearly 35 km westwards).
- ✍ Saül Plateau La Douane : 1-ha forest plot has been established for ecological and diversity studies in collaboration with INRA (French gov. ACI Ecologie Quantitative grant). This plot proved to be less diverse than the Mori's sample on La Fumée Mountain (point quarter method); also the area is less rich in Burseraceae.
- ✍ Mtgne Tortues : two 1-ha permanent forest plots have been set up for studies on forest dynamics in collaboration with INRA, Cirad-forêt and ONF (French gov. ACI Ecologie Quantitative grant). For floristic studies, our goal is to provide data for the study of diversity-perturbation relationships. The plots lay in a gentle slope at low elevation and are characterised by a rich species mixture (near or over passing 200 species / ha) and a relatively low tree density (500 tree/ha).
- ✍ Mtgne Plomb and Crique Plomb : two 1-ha permanent plots are samples of two very contrasted forest types lying in the hills of two different geological substrate east of the Petit-Saut dam (Sinnamary basin). They have been set up for studies on diversity – environmental factors relationships (French gov. Ecosystèmes Tropicaux grant). Several botanical collections from this area seem to be very interesting for systematic and floristic studies, specially an *Eschweilera* and a *Tabebuia*.

During these botanical inventories, vouchers were systematically made for all individuals expected to belong to poorly known or new species. Vouchers were made also for known species in order to document the local flora.

Data on the 1-ha plots will soon be integrated in the database "Amazon plots" used for studies on tree alpha and beta diversity at the continental scale (see ter Steege *et al.* 2000).

#### 4. Other scientific programs and research

##### The « ZNIEFF » program

The ZNIEFF (Zones Naturelles d'Intérêt Ecologique Faunistique et Floristique) are natural areas deemed worthy of protection because of their unique ecological, faunistic and floristic characteristics. These areas are selected throughout France, including overseas departments, based on information provided by inventories. A 2 years program aiming at improving the ZNIEFF network and redefining more accurate boundaries started in 2000 and ended in 2002. This new program is based on settling a global recognition method integrating all informations available, complementary flora and fauna inventories, identification of patrimonial species.

A scientific board, the C.S.R.P.N. (Conseil Scientifique Régional du Patrimoine Naturel) comprising specialists of flora and fauna in charge of the ZNIEFF program met several times in 2001.

##### Plant species submitted to protection by law in French Guiana

In the framework of an agreement between IRD and the DIREN (Direction Régionale de l'Environnement), 83 endangered or vulnerable plant species have been selected with the purpose of being protected by ministerial order. Each species is briefly described, illustrated, and its distribution is given in French Guiana. This work, requested by the C.N.P.N. (Comité National de la Protection de la Nature), has been carried out by B. Bordenave and V. Héquet, under the authority of J.-J. de Granville and M.Hoff. The list of species submitted to protection has been ratified by a board composed of 12 plant specialists from IRD, MNHN, CNRS and US. The declaration was signed in April 2002.

##### Researches on economically important plants

Following recent contracts, the herbarium staff participates to field prospections aiming at collecting native species of *Manihot* (agreement IRD / CNRS) and native species of *Dioscorea* (agreement IRD / INRA)

## 5. Visiting scientists

About 400 persons visited the Herbarium in 2001-2002°, 100 of them are scientists from other institutions and several, involved in scientific programs on French Guiana, came 2 or 3 times a year.

## 6. Miscellaneous

In March 2002, J.-J. de GRANVILLE participated to an important 6 days workshop organized by CONSERVATION INTERNATIONAL and IUCN in Paramaribo: "Guayana Shield Conservation Priority Setting Workshop"

A permanent position has been obtained from IRD for V. GUERIN, in charge of managing and exploiting the Aublet2 database

The herbarium new library, built at the 1<sup>st</sup> floor of the building in 2002 is operational since January 2003

Checking all the herbarium specimens and the corresponding records in the database started in 2001. This long and hard job will be carried out progressively during the coming years. So far, the following families have been checked and completed: Acanthaceae, Ebenaceae, Lecythidaceae, Monimiaceae, Piperaceae, Sapindaceae, Violaceae.

Classification of the collections has been improved in gathering all the specimens of a same species in a single blue folder. So far 10 000 new blue folders have been integrated in the herbarium.

## 7. Literature on the Guianas : reports, publications and lectures on the Guianas (2001 – 2002)

Charles-Dominique, P., Chave, J., Dubois, M.-A., Granville, J.-J. de, Riera, B. & Vezzolo, C. (2003).- Colonization front of

the understorey palm *Astrocaryum sciophilum* in a pristine rain forest of French Guiana. *Global Ecology and Biogeography, a Journal of Macroecology*, n° 00 : 29 pp

Couteron, P., Pélissier, R., Mapaga, D., Molino, J.-F. & Tellier, L. (2003).- Drawing ecological insights from a management-oriented forest inventory in French Guiana. *Forest Ecology and Management* 172: 89-108.

Granville, J.-J. de (2001).- Appendix : Practical guide to the palms found on Les Nouragues trail network. **In**: Nouragues, Dynamics and Plant-Animal Interactions in a Neotropical Forest. F. Bongers & al. Edit. Biological Monographs, Kluwer Academic Publisher, Dordrecht, Nederland : 343 - 350.

Granville, J.-J. de (2001).- Différents types de forêt. **In** : Guyane ou le voyage écologique ; C. Richerd-Hansen & R. Le Guen Edit.. , Editions Roger Le Guen, Lestéou, France : 38 – 45.

Granville, J.-J. de (2001).- Végétation. **In** : Atlas Illustré de la Guyane ; J.Barret ; CNES, IESG, IRD ; Région Guyane Edit.. Pl. n° 17 , 52-56

Granville, J.-J. de (2001).-L'Herbier de Guyane et la base de données AUBLET 2, Observatoire de la biodiversité végétale. **In** : Guyane ou le voyage écologique ; C. Richerd-Hansen & R. Le Guen Edit.. , Editions Roger Le Guen, Lestéou, France : 314 – 317.

Granville, J.-J. de (2001).-Les Palmiers. **In** : Guyane ou le voyage écologique ; C. Richerd-Hansen & R. Le Guen Edit.. , Editions Roger Le Guen, Lestéou, France :32 – 37.

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- Granville, J.-J. de (2002).- Les palmiers de Guyane française. *Acta Botanica Gallica, Bulletin de la Société Botanique de France* 149 (3) : 275 - 288, 3 fig..
- Granville, J.-J. de (2002).- Milieux et formations végétales de Guyane. *Acta Botanica Gallica, Bulletin de la Société Botanique de France* 149 (3) : 319 - 337., 9 fig.
- Granville, J.-J. de & Crozier, F. (2002).- Rétablissement de la R.N.3 à Cabassou ; étude botanique du site du nouveau tronçon. Report, Herbar de Guyane, IRD, 35 pp.
- Hoff, M. & Granville, J.-J. de (2002).- « Base de Données Herbar et gestion de la Biodiversité floristique. La base AUBLET 2 de Guyane française » Colloque AFCEV1, Lyon, novembre 2002.
- Hoff, M., Granville, J.-J. de & Lochon, S. (2002).- Une liste de plantes protégées pour la Guyane française. *La Garance Voyageuse*, 58 : 22 – 27.
- Hoff, M., Cremers, G. & Brulard, J.-F. (2002).- Les récoltes botaniques en Guyane française; géographie historique de la découverte de la flore de Guyane française. . *Acta Botanica Gallica, Bulletin de la Société Botanique de France* 149 (3) :245 – 274
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Sabatier, D. (200X).- *Vantanea ovicarpa* (Humiriaceae), a new species from French Guiana. *Brittonia*, 54(4) sous presse.

Steege H. ter, Sabatier, D., Castellanos, H., Andel, T. Duivenvoorden, J van., Oliveira, A.A. de, Ek, R.C., Lilwah, R., Maas, P., Mori, S. (2000).- An analysis of the floristic composition and diversity of Amazonian forests including those of the Guiana shield. *Journal of Tropical Ecology* 16 :801–828.

## [K] Royal Botanic Gardens, Kew.

### Flora treatments

Little progress has been made since the last FoG meeting in Utrecht in 2001. The status of the following families is as follows:

Meliaceae and Sapotaceae (T.D.Pennington) - It has been agreed that work on these treatments will be resumed under the supervision of Terry Pennington, assisted by a new RBGKEW staff member requiring training in taxonomic writing. This would see eventual completion of these families by an agreed time.

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

Lentibulariaceae (P.Taylor) – Author retired, current commitment to Flora unknown.

As legume co-ordinator, Gwilym Lewis reports that he has received no new Leguminosae manuscripts, but is anticipating

the updating of R. Barneby and J.Grime's Mimosaceae manuscript by O.Poncy (P). Gwilym also reports that Kew could provide assistance if required, for the production of a limited number of outstanding plates.

### **Publication at Kew**

The Supplementary fascicle 'The Guyanan plant collections of Robert and Richard Schomburgk' by J.A.C. van Dam was published in 2002. 350 copies were printed and are available to buy at a cost of £45 (EUR70). To date 80 copies have been sold.

There are currently no family treatments awaiting publication at Kew, although production of the Caryophyllales fascicle is anticipated by the Information Services Department. Kew ISD should be informed of progress of the manuscript in early summer 2003. Should the nuary manuscript be complete at this time, a tentative date for its publication would be January 2004.

Under a scheme designed to provide local herbaria running on tight budgets with relevant Kew published floras, Kew ISD can provide a limited number of copies of future fascicles to these herbaria at less than production cost. The financial deficit would be included in the retail price of fascicles on general sale. The discounted cost could be further reduced if all discounted copies were sent in a single consignment to a European herbarium for subsequent distribution (perhaps by hand?) to targeted herbaria. If the Flora of Guianas board are interested in pursuing this, Kew requires an estimation of how many discounted copies would be needed in order to calculate costs.

A flyer advertising existing Flora of Guianas fascicles has been produced for general distribution.

### **Other Institutional news**

The Iwokrama Forest bioprospecting project has been undertaken in collaboration with the University of Georgetown,

Guyana and the University of West Indies. Part of the 2 year project was to set up a natural product laboratory in Guyana. Dr Pingal who runs the laboratory has been extracting from fungal endophytes and these have been screened and profiled for biological activity at Kew. It is hoped that Iwokrama will now be able to explore both the ecological role these fungi have in plant-herbivore/pathogen interactions as well as potential commercial value. The project has provided training in mycology and natural product chemistry for scientists in Guyana.

Ivanilza Andrade, a PhD student from Feira de Santana State University is currently receiving training at Kew. Her project is to sample populations of Araceae in the Amazon and Mata Atlantica regions to investigate wider relationships of the humid forest island populations. The aim is to verify levels of differentiation between populations (do they exist?, how big are they?, do they get bigger with distance?), to see if there is genotype-phenotype correlation and to evaluate how resulting distinctions can be dealt with by conventional taxonomic species definitions. i.e. what is a taxonomic species in these cases? French Guiana is a very appropriate sampling point, with a number of the relevant species recorded (*Monstera adansonii*, *M. obliqua*, *Anthurium pentaphyllum*, *A. sinuatum*, etc.). Ivanilza and her Kew contact, Simon Mayo hope to visit French Guiana in collaboration with French Guianan botanists in order to collect these specimens.

**[NY] The New York Botanical Garden); New York, U.S.A.**

### **General**

Since the last meeting of the Flora of the Guianas, the Library of The International Plant Science Center has been completed. The library collection has been moved to the sixth floor of the new Herbarium and the offices and reading room are

now located on the sixth floor of the Museum Building. The Library's collections are computerized in a system called CATALPA which is available online at [www.nybg.org/bsci/libr/catalog.html](http://www.nybg.org/bsci/libr/catalog.html).

NYBG has raised much of the money needed for establishing the Pfizer Plant Research Laboratory. The lab will house the anatomy labs, the SEM, the molecular biology program, and the newly formed New York Plant Genomics Consortium, a joint effort of NYBG, Cold Spring Harbor Laboratory, and New York University. Construction is scheduled to begin within the next several years.

The NYBG specimen database system called CASSIA has been abandoned. NYBG has purchased a specimen management system called KE EMU ([www.kesoftware.com/emu/](http://www.kesoftware.com/emu/)) and data from our current databases are currently being transferred into this system. EMU has been adopted by several other museums, including the Smithsonian Institution.

The new Vice-President for Science at NYBG is Dr. Dennis Stevenson who is also the Director of the Institute of Systematic Botany. He has been appointed the first Rupert Barneby Curator of Botanical Science.

### **Treatments for the flora**

Lena Struwe has declined to provide a treatment of the Loganiaceae s.l. Although she was on last year's NYBG report as having volunteered to do so, she does not remember making this offer.

Enrique Forero, a former Director of the ISB at NYBG and now at COL, has reaffirmed his offer to prepare the Connaraceae.

### **Publications**

The *Guide to the Vascular Plants of Central French Guiana. Part 2. Dicotyledons* was published in December 2002. It is publication no. 92 in the *Studies on the Flora of the Guianas* series of the Flora of the Guianas Project. It is available for purchase from the New York Botanical Press ([www.nybg.org/bsci/spub/cat/](http://www.nybg.org/bsci/spub/cat/)).

#### Guide to the Vascular Plants of Central French Guiana

S. A. Mori, G. Cremers, C. Gracie, J.-J. de Granville, M. Hoff & J. D. Mitchell

The forests of northeastern South America represent one of the last tropical wilderness areas of the world. Since 1976, we have been collaborating with 74 other botanists in an inventory of the vascular plants of central French Guiana. The principal products of our effort are the publication of the two part *Guide to the Vascular Plants of Central French Guiana* (Mori et al., 1997, 2002), which include the description of 2111 species of gymnosperms, ferns, and flowering plants, and a searchable specimen database available on the Internet ([www.nybg.org/bsci/french\\_guiana/](http://www.nybg.org/bsci/french_guiana/)). A hard copy of the specimens documenting the occurrence of the flowering plant species in central French Guiana has been distributed to the libraries of the Flora of the Guianas consortium (Mori et al., 2002) and can also be printed out from the aforementioned web site.

We were motivated in this enterprise by our desire to: 1) learn all of the plants in an area of undisturbed tropical rain forest, 2) provide collections needed by specialists for their monographic studies of Neotropical plant families, 3) furnish the descriptions and keys needed for identifying plants, 4) promote more detailed ecological and evolutionary studies, especially those dealing with plant/animal interactions, in central French Guiana and 5) supply the baseline data needed for promoting the conservation of lowland rain forests in this area.



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## **[P] Museum National d'Histoire Naturelle, Paris, France**

### **Flora treatments**

Few new informations to be mentioned since the last meeting :

Ochnaceae: C. Sastre promised to complete the treatment before his retirement;

Cyclanthaceae: As P. Blanc did not study the collections at P and on loan (especially NY) since 1996, O. Poncy will try to stimulate progress and supervise a student for a 2 month voluntary training in summer 2003, aiming to (1) prepare a list of specimens, (2) start preparing morphological descriptions using a computer-assisted descriptor

Rhizophoraceae: not done (J.J. Floret retired 2001)

J. Munzinger (PhD), is willing to collaborate with H. Ballard for the treatment of Violaceae if he gets a position at MNHN. They both described Hekkingia, a new genus from French Guiana (in press)

## **Field work**

Botanical inventory of trees in the Natural Reserve "Montagnes de la Trinité" : Odile Poncy participated in the three field works scheduled by this programme in 2001 and 2002, as part of a collaboration between MNHN and IRD with ONF (Forest Office, in charge of the management of the Reserve). 3370 trees were recorded and identified, using both point-quadrate centered transect and plots (10 x 0,25 ha) in an area including high forest on slopes and top of the lateritic plateau. Specimens from tall trees were collected using gun shooting. Most collections from this inventory are sterile. The report will firstly emphasize on a comparison of the results obtained from the two methods; secondly a new set of quantitative data on floristic composition will become available. Several taxa are new records for the Guianas (genus *Caryodendron*, *Vigna caracalla*). Other participants IRD : F. Crozier (3/4 field work and specimen identification) ; J. Munzinger (MNHN, 1/4 field work)

Diversity and patterns of genetic diversification on inselbergs : Corinne Sarthou (MNHN) is actively involved in this project started in 2001. Field work includes collecting on several inselbergs (collaboration with Herbarium de Guyane : see report CAY)

### **"Colparsyst" :**

Through the programme « *Improving Human Potential: Access to Research Infrastructures* » (IHP/ARI), the European Commission has granted the Muséum National d'Histoire Naturelle (MNHN) with funds to provide access to European (and Associated States) researchers who project to undertake short visits for research purposes involving the collections and resources. Visits for up to one month are allowed on these funds. Travel costs will be covered and a daily allowance provided to meet living costs whilst in Paris. This program covers the period from 1st April 2002 to 30 June 2004. Four calls for application are scheduled. Applicants will be considered on a six-monthly basis. Read the information page on the website [www.mnhn.fr](http://www.mnhn.fr)

### **What about the near future ?**

In spite of the important changes in administrative structure at the MNHN, as well as of leading persons, there is no hope for improving the situation of taxonomy in the very near future, and especially to increase botanical activity in French Guiana. Funding fieldwork or expeditions became much easier, but lack of human resources still remain the insoluble problem. Six botanists left the Herbarium in the past 3 years; they have not been replaced yet; the most optimistic plan is to recruit one person per year starting end 2003; priorities will be given to other geographic areas, mainly Africa.

Recently IRD and MNHN discussed the opportunity to fuse FoG activity in a single project as part of a research program co-funded by both institutions. Such a project might improve collaboration and complementarity between the two french institutions ; it will be helpful only if IRD is really willing to support research in taxonomy and curating the Herbarium CAY in the near future.

## **[U] Nationaal Herbarium Nederland, Utrecht University branch; Utrecht, the Netherlands**

### **Flora treatments**

Gentianaceae	Marion Jansen-Jacobs	start 1994, continuation by P.J.M. Maas 2003
Piperaceae	Ara Görts-v. Rijn	start 1994, nearly finished
Polygalaceae	Arian Jacobs-Brouwer	start 1994, nearly finished
Annonaceae	Paul Maas et al.	start 1997, finish in 2003
Musci 4	Jeanne Florschütz -de Waard	start 1997, finish in 2003
Bromeliaceae pp.	Eric Gouda	start 1999, continueing
Marcgraviaceae	Ad de Roon & Stefan Dressler	start 1999, finish 2004
Marantaceae p.p.	Paul Maas with students	start on 2 genera in 2001

### **Wood and timber**

Caryophyllales	Jifke Koek-Noorman	in preparation
Phytolaccaceae	Jifke Koek-Noorman	in preparation
Acanthaceae	Bep Mennega	in preparation
Apocynaceae	Karel Bonsen, Pierre Détienne and Bep Mennega	Ms completed

### **Staff mutations**

Ara Görts-van Rijn retired from the Herbarium September 2002. She will continue with her work on Piperaceae, which is nearly completed.

Hans ter Steege joined the herbarium October 2002. Apart from teaching duties at the Faculty of Biology, his research work will focus on the use of diverse datasets for the analysis and use of biodiversity patterns in Amazonia and the Guiana Shield.

### **A new website**

A new website is under construction with downloadable lists and instructions for authors. It is intended that a template will be available soon.

A preliminary version can be checked at: [http://www.bio.uu.nl/~herba/Flora\\_of\\_the\\_Guianas/main.htm](http://www.bio.uu.nl/~herba/Flora_of_the_Guianas/main.htm)

### **Visit to Kew**

Marion Jansen-Jacobs visited Kew, fall 2002. To meet with the new Flora representative at Kew, Eve Lucas and to discuss publication affairs with John Harris.

### **The participation of the Utrecht Herbarium in the Tropenbos Programme in Guyana**

In the framework of the final year of the Tropenbos Guyana programme the Utrecht Herbarium continued to contribute research on floristic biodiversity.

In 2001 Dr. R.C. Ek continued her post-doctoral work for Tropenbos, funded by EU, on the project: Formulation of criteria and indicators of forest disturbance, using lianas. Mr. N. Raes was appointed within this project to assist Dr. R.C. Ek in carrying out fieldwork and designing a liana identification web-site. A first version was made available on the internet.

In 2002 Niels Raes and Roderick Zagt continued and finalized this work. The final report is expected mid 2003.

Dr. René Boot, new Director of Tropenbos International, visited Suriname for further discussions on the start of a Tropenbos-Suriname Programme. It is foreseen that the Utrecht University (Herbarium and Plant Ecology dept.) will play a major role in its execution.

#### **CI conservation priority setting workshop Paramaribo 2002**

Marion Jansen-Jacobs and Hans ter Steege visited the CI conservation priority setting work in Paramaribo as plant expert and workgroup leader, respectively.

#### **Index on Vernacular Suriname plant names**

In 2000 a project was started by Charlotte van 't Klooster to digitize and publish the data about local plant names in Suriname documented by Dr. J.C. Lindeman in handwritten notes. This manuscript is ready for publication now and will be published in *Blumea* in the Supplementary Series.

#### **A new vegetation map for Guyana**

Building on the compilation of plant diversity and vegetation data for Guyana's National Protected Area Strategy, Hans ter Steege constructed a new vegetation map for Guyana with the GIS department of the Guyana Forestry Commission. The new map at 1:1 mln scale can be downloaded from: <http://www.forestry.gov.gy/projects/vegproject/natvegmap.htm>

A digital forest type map at 1:250,000 was also produced, but is only available in printed form at request from the GFC.

#### **Fieldwork / Expeditions**

2001

Niels Raes and 2 students carried out fieldwork in the Mabura Hill area, Guyana.

Forthcoming fieldwork / Expedition:

2003

Renske Ek, a research assistant and a student will do fieldwork in the Trésor area in French Guiana.

2003

Marion Jansen-Jacobs, Hans ter Steege and Olaf Bánki, in cooperation with the Nationaal Herbarium of Suriname, LBB and Suralco, will carry out fieldwork in the Nassau Mts. in Suriname, and in cooperation with Renske Ek, and IRD in the Trésor area in French Guiana.

For Nassau a preliminary checklist was prepared on the basis of previous publication, which amounts to some 1700 collections with c. 800 species. Four hundred new collections were added. Six plots were inventoried and produced c. 3500 trees over 10 cm dbh, including just under 400 tree species.

#### **Schomburgk project**

In 1999-2000, Juul van Dam worked on the digitization of the data from the Schomburgk collections, based on the data collected by Dr. J.C. Lindeman. This book was published in 2002

#### **Publications**

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[www.annonaceae.net](http://www.annonaceae.net)

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This report combines the activities of the persons preparing treatments for the Flora of the Guianas along with the field and collecting activities recently undertaken. The field and collecting program is funded by the National Museum of Natural History (NMNH), Smithsonian Institution as the Biological Diversity of the Guianas Program, and combines both zoological and botanical fieldwork. Only the botanical portion is reported on below.

## 1. The Biological Diversity of the Guianas (BDG) Program

V.A. Funk, Director & Principal Investigator, BDG, Department of Botany, National Museum of Natural History, Smithsonian Institution

Progress Report for 2001-2002

The goal of the Biological Diversity of the Guianas program is to document, study, and preserve the biodiversity of the Guianas. To achieve this goal we not only provide the opportunity for excellent scientific projects on biodiversity to be conducted in the Guianas but also find ways to take the information generated by these studies and make it useful for conservation and education. In the past the program has been primarily active in Guyana. However, that has changed, at least for the Botany portion of the project. We have sponsored one collecting trip to Venezuela, one is planned for Surinam in March and one is in the planning stages for northern Brazil just south of the Venezuelan border. These areas have far fewer collections than Guyana and it seems that we will be adding to our knowledge of the Guiana Shield by working in other areas.

### Collections.

The Biological Diversity of the Guianas (BDG) Program continues to collect, sort, mount, inventory, and file all plant specimens collected by the program. In addition, we assist scientists from other departments in NMNH, other bureaus at the Smithsonian Institution, and we collaborate with nearly 100 scientists around the world.

### Summary of Specimen and Database work.

- ✍ The program's databases now contain **84,505** plant records, about half of them are recent collections. The older collections have not been verified or georeferenced.
- ✍ Plant specimens determined in 2001-2002: **2724**
- ✍ Specimens sent as gifts/loans for determination: **1869**
- ✍ Duplicates sent out as exchange **14,154**.

- ✍ Approximately **3854** single (new determinations) and ca. **19,796** duplicate labels have been prepared.
- ✍ **6660** sheets (new mounted specimens) have been barcoded and inserted into the U.S. National Herbarium. **23,306** sheets from the Guianas (historical collections from the U.S. National Herbarium) have been inventoried and barcoded.
- ✍ We have collected around **2203** plant numbers.

### Plant Expeditions (Guyana) 2001:

Clarke number series: (8897 - 9917) Upper Potaro River, Mt. Ayanganna with R. Williams, C. Perry, E. Tripp & J. Kelly, 24 June - 7 July 2001: 1,021 numbers and 5,100 sheets.

Henkel number series: (8000-8424) Mt Ayanganna, Upper Potaro River, with M. Chin, S. Miller, C. Andrew, 22 April - 1 July 2001: 424 species, 1,272 sheets - fungi.

Hollowell number series: (400-581) Waini Peninsula, Shell Beach mangrove ecological plots, Hossororo, and Barabina, with K. Redden, K. David, and N. Persaud, 31 March - 25 April 2001: 180 numbers, 537 sheets.

### Plant Expeditions (Guyana) 2002:

Hollowell number series: (582-754) Waini Peninsula, Mangrove plots, Kwebana and Wauna, with W. Hinds, A. James, and V. James, 15 October - 5 November 2001: 173 numbers, 492 sheets.

Henkel number series: (information incomplete) Mt. Ayanganna, with M. Chin, June 2002.

Redden number series: (1050 - 1454) Mabura Hill, Iwokrama, and Imbaimadai, with C. Perry, E. Forbes, R. Williams, Y. Hawker, H. Benedict, T. Lieu-Ken-Pen, S. Price, E. Andries, L. Campbell, J. Bischoff, 20 Oct - 8 Dec 2002: 405 numbers, 2,430 sheets.

Specimens returned to Guyana (2001) : 2,604 plant specimens (BDG): number of sheets in the Guyana National Herbarium - ca. 30,000

Specimens returned to Guyana (2002) : 3,250 plant specimens (BDG)

Other activities:

1) The mounting of plant specimens for the Guyana National Herbarium (BRG) continues at the Centre for the Study of Biological Diversity (CSBD, Guyana). The Program has supplied all mounting materials including paper, glue, thread, tape, and fragment pockets. Kelloff, while in Guyana, has filled in as herbarium curator during Ms. Simmons (Scientific Officer, UG) absence. Over 4,000 sheets have been accessioned and filed into the Guyana National Herbarium. The herbarium has also been reorganized into alphabetically order.

2) K. Redden (SI) was sent to Guyana and spent two months accessioning and filing the backlog of specimens at the Guyana National Herbarium (approx. 4,000 sheets) and helped reorganize the herbarium

3) Assisted the CSBD with revising the proposal for building expansion and collection improvements at CSBD.

4) C. Taylor (MO) visited US to work on unidentified Rubiaceae (plant) specimens for the BDG Program and other botany staff.

5) C. Chanderbali (MO) visited US to work on unidentified Lauraceae (plant) specimens for the BDG Program.

6) D. Pennys visited US to work on unidentified Melastomataceae (plant) specimens for the BDG Program.

7) S. Grose (WU) visited US to work on unidentified Bignoniaceae (plant) specimens for the BDG Program.

8) BDG program assisted the University in organizing a scientific meeting (see attached report).

9) BDG staff prepared a container of supplies and material that was shipped to the CSBD, University of Guyana. Contents: 2 gray drums – ca. 200 lbs of mothball flakes, 1 gray drum – 2 small boxes of calcium cyanide, 10 herbarium cases, 7 boxes of books donated from SI Library, 53 insect drawers, 9 boxes of mothball flakes packed in its original boxes from Sigma, 4 gray shelving units with hardware, 10 boxes of books and reprints, 33 boxes of books and journals donated from SI and MO libraries, 4 boxes of herbarium supplies, mounting paper, etc., 5 boxes of the Vegetation Map of Guyana (ca. 500 maps), 2 large boxes containing gray library document boxes (assorted sizes), 2 boxes of window screening, 2 boxes of small species boxes (shoe box style), 2 boxes of bulky fruit herbarium boxes. Total cost of supplies and equipment in this shipment was estimated at US\$16,541.00. This cost does not reflex actual shipping cost that is estimated to be an addition \$10,000 (all prices in US dollar amounts).

10) Organized and sponsored the 2001 Guyana Symposium: The biodiversity of Guyana: A global perspective for the future in Georgetown, Guyana. This international symposium hosted 31 speakers and displayed over 30 posters. The symposium was the first to examine Guyana's biodiversity from a global perspective and was deemed successful both by Guyana and the international institutions that attended.

11) T. Hollowell (SI) helped Guyanese students (15) prepare their posters in a Powerpoint format and worked with SI staff in photo services to have these posters printed for the Guyana Symposium.

12) H. Carnavalli (CICY) visited US to work on unidentified Orchidaceae specimens for the BDG Program and other botany staff.

13) D. Naraine (CSBD) was sponsored for 1 week in Washington, DC to work with BDG staff with collections management.

Numbered botanical publications for 2001 (2002 not available yet)

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Biological Diversity of the Guianas Website:

<http://www.mnh.si.edu/biodiversity/bdg/>

**2. Status of Flora of the Guianas treatments at US (including other information provided by specialists):**

- Acanthaceae (being prepared by D. Wasshausen): treatment completed and submitted
- Agavaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 5/7; text status: done, but waiting for preparation of illustrations, etc.
- Aizoaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; treatment completed and submitted, reviewed, and awaiting publication with related families.



Algae (parts) (being undertaken by M. Littler and J. Norris): no information on current activities.

Aloeaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Amaranthaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 10/24; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Apiaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/2; text status: done, but waiting for preparation of illustrations, etc.

Araliaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 4/15; text status: incomplete, and waiting for preparation of illustrations, etc.

Asteraceae (being prepared by V. Funk and H. Robinson at US, and W. Lack at B): no activity by Funk at US due to competing projects. However, Robinson will work on the Guianas treatment after completion of the Flora of Ecuador.

Basellaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/2; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Bataceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Boraginaceae (being undertaken by C. Feuillet): treatment underway and progress includes paper on three new species of *Cordia* from the Guianas submitted and accepted in Novon, submission of family treatment for the Mori, et al., Guide to the Vascular Flora of Central French Guiana, vol. 2, and databasing of specimens. Treatment expected to be completed in time for next meeting.

Brassicaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 5/7; text status: done, but waiting for preparation of illustrations, etc.

Cabombaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/3; text status: done, but waiting for preparation of illustrations, etc.

Campanulaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 3/4; text status: done, but waiting for preparation of illustrations, etc.

Canellaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Capparaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 4/25; text status: done; illus.: done, but waiting for completion of other parts of treatment.

Caricaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/3; text status: done, but waiting for preparation of illustrations, etc.

Caryophyllaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/2; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Celastraceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 3/12; text status: Incomplete, but waiting for preparation of illustrations, etc.

Ceratophyllaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, submitted and reviewed; waiting for preparation of illustrations, etc.

Chenopodiaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Clethraceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Commelinaceae (being undertaken by R. Faden): illustrations are completed, text, except for a newly collected species to be added, as well as the specimen citations and habitats to be added to the ends of the species accounts.

Crassulaceae (being prepared by J. McKnight, R.A. DeFilipps, and Shirley L. Maina): Genera & Species: 1/1; text status: done, submitted and reviewed; waiting for preparation of illustrations, etc.

Cunoniaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/4; text status: done, but waiting for preparation of illustrations, etc.

Cyperaceae (being coordinated by M. Strong): Genera & Species: 34/300. Several contributions have been completed, including the large genera *Rhynchospora* (80 taxa), *Cyperus* (60 taxa), and *Scleria* (40 taxa). A project to inventory all specimens of Cyperaceae from the Guianas at the U.S. National Herbarium has been completed.

Dilleniaceae (being prepared by C. Kelloff): fieldwork, but no activity on treatment due to competing projects.

Gesneriaceae (being undertaken by L. E. Skog and C. Feuillet): manuscript and illustrations complete, to be submitted. Treatment lacks only list of specimens studied, which will be submitted soon. A treatment of the family was published in the Guide to the Vascular Flora of Central French Guiana, vol. 2. Two papers of new genera and species to be published in Brittonia.

Hydrophyllaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/3; text status: done, but waiting for preparation of illustrations, etc.

Ixonanthaceae (being prepared by R.A. DeFilipps and Shirley L. Maina, with collaboration by Sabatier (CAY): Genera & Species: 2/3; text status: done and submitted, but waiting for preparation of illustrations, etc.

Lacistemataceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/3; text status: done, but waiting for preparation of illustrations, etc.

Lemnaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 4/8; text status: done, but waiting for preparation of illustrations, etc.

Lichens (parts being prepared by P. DePriest): No activity.

Liliaceae (incl. Amaryllidaceae) (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 10/18; text status: almost done, but waiting for preparation of illustrations, etc.

Malvaceae (being prepared by L. Dorr): no information.

Menyanthaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Molluginaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/2; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Moringaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Myoporaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Nelumbonaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Nyctaginaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 6/14; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Oleaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Pandanaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Passifloraceae (being prepared by C. Feuillet): treatment underway and progress includes publication of a new series and 4 new species in Novon, and submission of family treatment for the Mori, et al., Guide to the Vascular Flora of Central French Guiana, vol. 2, and databasing of specimens. At least 9 (4 illustrations have already been prepared) species must be described before the treatment can be submitted.

Peridiscaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Phytolaccaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 6/9; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Portulacaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/7; treatment has been completed, submitted, reviewed, and awaiting publication with related families.

Rhamnaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 5/16; text status: incomplete, but also waiting for preparation of illustrations, etc.

Rosaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 2/2; text status: done, but waiting for preparation of illustrations, etc.

Rutaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 20/45; text status: incomplete, but also waiting for preparation of illustrations, etc.

Sabiaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/3; text status: incomplete, but also waiting for preparation of illustrations, etc.

Sapindaceae (being prepared by P. Acevedo): Some progress.

Smilacaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/22; text status: incomplete, but also waiting for preparation of illustrations, etc.

Sphenocleaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Sterculiaceae (being prepared by L. Dorr): no information.

Taccaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

Thurniaceae (being prepared by M. Strong): treatment in process.

Typhaceae (being prepared by M. Strong): treatment completed, except for examination of critical types.

Velloziaceae (being prepared by R.A. DeFilipps and Shirley L. Maina): Genera & Species: 1/1; text status: done, but waiting for preparation of illustrations, etc.

## 4. WORKSHOP

18 February 2003

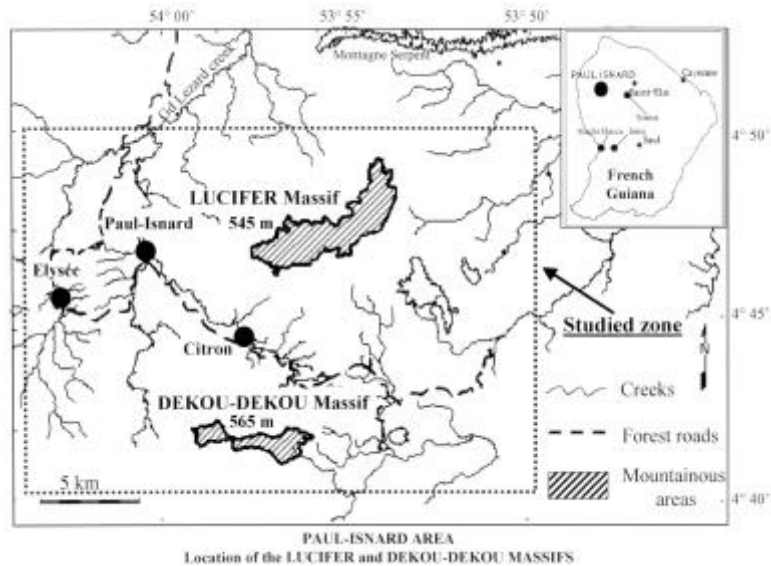
### 4.1. General survey of the Pteridophytes of the Paul-Isnard area (North-Western French Guiana)

Michel BOUDRIE

(Group of European Pteridologists)

#### Introduction – Description of the area

The Paul-Isnard area is located in the North-Western part of French Guiana, at 190 km from the town of Cayenne, and about 85 km from the Atlantic coast, south of the town of Saint-Laurent-du-Maroni. The studied zone is located between 53° 50' – 54° 05' W and 4° 40' – 4° 50' N and covers approximately 470 km<sup>2</sup>.



The region is entirely covered by lowland primary rainforest, reaching an elevation of 70 to 200 m and contains two major mountain massifs, the Lucifer Massif (545 m) to the north and the Dekou-Dekou Massif (565 m) to the south. The top of both massifs consists of horizontal plateaux, of a lateritic duricrust on which an impressive submontane rainforest grows. The flanks are cut by a large number of deep gullies and waterfalls, which are very favorable to the development of ferns.

The geology of the area mainly consists of metamorphic rocks, of volcano-sedimentary origin, and intrusive felsic and mafic rocks, belonging to the Lower Proterozoic Paramaca formation (2 billion years old). Whereas the Lucifer Massif is gabbroic, the Dekou-Dekou Massif is made of volcano-sedimentary rocks surrounded by various types of felsic to intermediate granitic rocks. The Lucifer and Dekou-Dekou lateritic plateaux, as well as the Trinité plateau 60 km to the east of them (and further South, the Atachi Bacca and Galbao plateaux), correspond to the remains of a peneplane surface which was developed over a large part of French Guiana at the Eocene (Choubert, 1957; Théveniaut & Freyssinet, 2002). Finally, the Paul-Isnard area is characterized by the presence of important alluvial gold resources, being currently extensively exploited along most of the main flat valleys which results in the destruction of alluvial forests.

Because of these mountainous terrains with various geological substrata, and the resulting favorable habitats, the Paul-Isnard area has a high biodiversity and is especially rich in ferns. About 170 taxa are presently recorded, representing about half of the French Guiana fern flora. Therefore, this area is classified by Hoff & Cremers (1994) as one of the four richest biodiversity zones of French Guiana. Recent exploration has led to the discovery of several species previously known only from the south of French Guiana or even previously unknown in French Guiana (Cremers & Hoff, 1990).

From November 1982 to the end of 2002, the number of Pteridophyte collections from this area has reached 605, including :

- 232 from the Lucifer Massif
- 250 from the Dekou-Dekou Massif
- 123 from various areas at low elevation

This number of collections now allows us to make a reasonable assessment of fern diversity in the area. However, because of the remoteness of the area, there are surely many more pteridophytes to be discovered.

The nomenclature follows the *Checklist of the Plants of the Guianas* (Boggan *et al.*, 1997), and abbreviations follow Brummitt & Powell (1992). See also table I in annex.

### New and rare Pteridophytes for the area

As a result of this study, a number of interesting and rare plants were discovered in isolated populations. They are :

- ✂ new to the Guianas : ***Thelypteris opposita***, at Dekou-Dekou,
- ✂ new to French Guiana (and only known from Paul-Isnard) : ***Asplenium cristatum*** and ***A. delitescens*** at Dekou-Dekou; ***Tectaria trinitensis*** and ***Thelypteris tristis*** at Lucifer; ***Adiantum paraense*** at Elysée in the North-Eastern part of the area,
- ✂ new (or very rare) for the North and the North-Western part of French Guiana : ***Adiantum lucidum***, ***A. macrophyllum***, *Antrophyum cajenense*, *Asplenium laetum*, *A. rutaceum*, *Ctenitis refulgens*, *Danaea nodosa*, *Hypolepis* sp., ***Lastreopsis effusa* subsp. *divergens***, *Lindsaea lancea* var. *leprieuri*, ***Marsilea polycarpa***, *Polybotrya fractiserialis*, ***P. osmundacea***, *Polypodium polypodioides* var. *burchelli*, *P. sororium* (= *P. dulce*), ***Pteris deflexa*** (= *P. polita*), *Selaginella epirrhizos*, *Thelypteris gemmulifera*, *T. nephrodioides*, ***Trichomanes angustifrons***, ***T. membranaceum***. In addition, at Paul-Isnard, the rare

***Asplenium pediculariifolium***, *Bolbitis serratifolia*, *Polypodium richardii*, ***Selaginella diffusa***, ***Thelypteris pennata*** were observed only at Lucifer, and ***Lonchitis hirsuta***, ***Pleopeltis astrolepis***, *Thelypteris biolleyi*, *T. holodictya* only at Dekou-Dekou.

### Ecological distribution of species

The fern flora of lowland primary forest in this area is composed of about 30 common species of pteridophytes, a diversity similar to that observed in the Saint-Elie area (Boudrie & Cremers, 2001). The Paul-Isnard area, however, is distinguished by the presence of species such as *Adiantum argutum*, *Diplazium cristatum*, *Thelypteris gemmulifera*, and, more occasionally, *Diplazium grandifolium*, *Elaphoglossum glabellum*.

Several interesting species, not very frequent in French Guiana, were observed at an elevation of about 100 m, along creeks, for example *Adiantum macrophyllum*, *Asplenium laetum*, *Asplenium rutaceum* (on quartz boulders), *Lastreopsis effusa* subsp. *divergens*, *Polybotrya osmundacea*, *Pteris deflexa* (= *P. polita*), or in forest, such as *Adiantum paraense*, *Asplenium auritum* var. *auritum*, *Thelypteris poiteana*, *Trichomanes tuerckheimii* and *T. vittaria*.

Slopes from 200 to 500 m show a greater diversity of about 50 relatively common ferns in primary forest. Among the most remarkable species were *Adiantum fuliginosum*, *Adiantum tetraphyllum*, *Diplazium grandifolium*, *Lomariopsis prieuriana*, *Pleopeltis percussa*, *Hemidictyum marginatum*. More rare are *Adiantum lucidum*, *Alsophila cuspidata*, *Asplenium abscissum*, *Ctenitis refulgens*, *Microgramma tecta*, *Pleopeltis astrolepis*, *Selaginella flagellata*, *Thelypteris holodictya*, *T. pennata*, as well as the very rare *Asplenium cristatum*, *A. delitescens*, *Tectaria trinitensis* and *Thelypteris tristis*.

The creeks and deep gullies with waterfalls host a number of pteridophytes, such as *Bolbitis nicotianifolia*,

*Dennstaedtia obtusifolia*, *Polybotrya fractiserialis*, *Pteris altissima*, *Stigmatopteris rotundata*, *Trichomanes radicans* var. *radicans*, with the rarest being *Adiantum macrophyllum*, *Lonchitis hirsuta*, and *Trichomanes membranaceum*, all of which grow on wet cliffs.

On the lateritic plateau above 500 m, the submontane primary rainforest is colonized by *Cyclodium inerme* at Lucifer and *C. guianense* at Dekou-Dekou. A few rare species were occasionally observed, such as *Cyathea cyatheoides*, *Elaphoglossum raywaense*, *Grammitis mollissima*, *Huperzia taxifolia*, *Polypodium sororium*, *Trichomanes diaphanum*, as well as the very rare *Trichomanes angustifrons*. At Lucifer, an ecological peculiarity is the presence of natural clearings (wet savannahs), surrounded by humid low forest, where *Polypodium triseriale*, *P. richardii*, *Asplenium pediculariifolium* and *Elaphoglossum* "sp. 1" grow as epiphytes.

The Paul-Isnard area has become more accessible because of gold exploitation. A large number of forest roads have been opened and the disturbed areas on the forestry slopes have been colonized by bamboos. The pteridophyte pioneer vegetation along these road cuts is characterized by *Dicranopteris pectinata*, *Gleichenia remota*, *Lycopodiella cernua* var. *cernua*, *Pityrogramma calomelanos* var. *calomelanos*, *Pteridium aquilinum* subsp. *caudatum*, *Cyathea microdonta* at low elevation, and *Thelypteris decussata* var. *decussata*, *T. hispidula* var. *hispidula* and *T. opposita* at higher elevation.

The marshes and ponds created by gold mining in the alluvial flats have been colonized by coastal species such as *Acrostichum aureum*, *A. danaeifolium*, *Blechnum serrulatum*, *Thelypteris interrupta*, *T. serrata*. These species occur at Paul-Isnard at more than 80 km from the Atlantic coast, a phenomenon that has also been observed at Saint-Elie for the same reasons. In addition, a second French Guianan locality of the rare and protected *Marsilea polycarpa* was discovered at Paul-Isnard around old gold exploitation ponds.

Most of the pteridophytes species are terrestrial (63 %), others are epiphytic (31 %), relatively few are terrestrial-climbing (6 %). One species (*Marsilea polycarpa*) is aquatic.

## Conclusions

The high diversity of pteridophytes in the Paul-Isnard area can at least partially be attributed to the great habitat diversity found in the area, ranging from lowland rainforest, to submontane rainforest on slopes with deep gullies and waterfalls, to submontane rainforest on the lateritic plateaux. As a result this area is one of the richest of French Guiana with 170 recorded. Although not far from the Trinité Massif where 15 rare species occur that are not found at Paul-Isnard, the Paul-Isnard area possesses its own unique species (see table II). The affinities of the Paul-Isnard pteridophytes appear closer to the Saül – Inini – Atachi Bacca areas (Cremers, 1991, 1997) than to the Trinité Massif where different habitats exist (inselbergs). These affinities can be explained by the fact that these plateaux are the remains of the same Eocene peneplane.



*Adiantum macrophyllum* Sw.

With one protected species (*Marsilea polycarpa*), seven patrimonial species [*Asplenium rutaceum*, *Lastreopsis effusa* subsp. *divergens*, *Microgramma tecta*, *Polypodium sororium* (= *P. dulce*), *Pteris deflexa* (= *P. polita*), *Thelypteris holodictya* and *T. tristis*], the Paul-Isnard encompasses a protected zone managed by the National Forestry Office and called the "Domanial Biological Reserve of Lucifer – Dekou-Dekou". Despite limited botanical expeditions to the area, enough pteridophytes have been collected to reveal the richness of this area and to suggest that further exploration will continue to yield interesting new discoveries.

#### Acknowledgements :

I am pleased to express my sincere gratitude to Mr. J.J. de GRANVILLE and to all the CAY herbarium staff (Cayenne, French Guiana), as well as to MM. K. CHAND (Cayenne, French Guiana), G. CREMERS (Mont-Saint-Aignan, France), J. FLORENCE, (Paris, France), P. FREYSSINET (Orléans, France), A.C. JERMY (Leominster, U.K.), S.A. MORI (New-York, U.S.A.) and A.R. SMITH (Berkeley, U.S.A.) for their help, cooperation and support.

**Table I - Nomenclatural list of taxa cited in the text**  
(after Brummitt & Powell, 1992, and Boggan et al., 1997)

#### LYCOPODIACEAE

*Huperzia taxifolia* (Sw.) Trevis.

*Lycopodiella cernua* (L.) Pic. Serm. var. *cernua*

#### SELAGINELLACEAE

*Selaginella diffusa* (C. Presl) Spring

*Selaginella epirrhizos* Spring

*Selaginella flagellata* Spring

#### ADIANTACEAE

*Adiantum argutum* Splitbg.

*Adiantum fuliginosum* Fée

*Adiantum lucidum* (Cav.) Sw.

*Adiantum macrophyllum* Sw.

*Adiantum paraense* Hieron.

*Adiantum tetraphyllum* Humb. & Bonpl. ex Willd.

*Pityrogramma calomelanos* (L.) Link var. *calomelanos*

#### ASPLENIACEAE

*Asplenium abscissum* Willd.

*Asplenium auritum* Sw. var. *auritum*

*Asplenium cristatum* Lam.

*Asplenium delitescens* (Maxon) L.D. Gomez

*Asplenium laetum* Sw.

*Asplenium pediculariifolium* St. Hil.

*Asplenium rutaceum* (Willd.) Mett.

#### BLECHNACEAE

*Blechnum serrulatum* Rich.

#### CYATHEACEAE

*Alsophila cuspidata* (Kunze) Conant

[= *Cyathea cuspidata* Kunze]

*Cyathea cyatheoides* (Desv.) K.U. Kramer

*Cyathea microdonta* (Desv.) Domin

#### DENNSTAEDTIACEAE

*Dennstaedtia obtusifolia* (Willd.) T. Moore

*Lindsaea lancea* (L.) Bedd.

var. *lepreurii* (Hook.) K.U. Kramer

*Lonchitis hirsuta* L.

*Pteridium aquilinum* (L.) Kuhn

subsp. *caudatum* (L.) Bonap.

#### DRYOPTERIDACEAE

*Cyclodium guianense* (Klotzsch) L.D. Gómez

*Cyclodium inerme* (Fée) A.R. Sm.

*Polybotrya fractiserialis* (Baker) J. Sm.

*Polybotrya osmundacea* Humb. & Bonpl. ex Willd.

*Stigmatopteris rotundata* (Humb. & Bonpl. ex Willd.) C. Chr.

#### GLEICHENIACEAE

*Dicranopteris pectinata* (Willd.) Underw.

*Gleichenia remota* (Kaulf.) Spreng.

#### GRAMMITIDACEAE

*Grammitis mollissima* (Fée) Proctor

#### HYMENOPHYLLACEAE

*Trichomanes angustifrons* (Fée) W. Boer

*Trichomanes diaphanum* Kunth

*Trichomanes membranaceum* L.

*Trichomanes radicans* Sw. var. *radicans*

*Trichomanes tuerckheimii* H. Christ

*Trichomanes vittaria* DC. ex Poir.

#### LOMARIOPSIDACEAE

*Bolbitis nicotianifolia* (Sw.) Alston

*Bolbitis serratifolia* (Mertens ex Kaulf.) Schott

*Elaphoglossum glabellum* J. Sm.

*Elaphoglossum raywaense* (Jenm.) Alston

*Elaphoglossum* sp. 1

*Lomariopsis prieuriana* Fée

#### MARATTIACEAE

*Danaea nodosa* (L.) Sm.

#### MARSILEACEAE

*Marsilea polycarpa* Hook. & Grev.

#### POLYPODIACEAE

*Microgramma tecta* (Kaulf.) Alston

*Pleopeltis astrolepis* (Liebm.) Fourn.

*Pleopeltis percussa* (Cav.) Hook. & Grev.

*Polypodium dulce* Poir.

[= *P. sororium* Humb. & Bonpl. ex Willd.]

*Polypodium polypodioides* (L.) Watt.

var. *burchellii* (Baker) Weath.

*Polypodium richardii* Klotzsch

*Polypodium triseriale* Sw.

#### PTERIDACEAE

*Acrostichum aureum* L.

*Acrostichum danaeifolium* Langsd. & Fischer

*Pteris altissima* Poir.

*Pteris deflexa* Link (= *P. polita* Link)

#### TECTARIACEAE

*Ctenitis refulgens* (Klotzsch ex Mett.) C. Chr. ex Vareschi

*Lastreopsis effusa* (Sw.) Tindale

subsp. *divergens* (Willd.) Tindale

*Tectaria trinitensis* Maxon

#### THELYPTERIDACEAE

*Thelypteris biolleyi* (H. Christ) Proctor

*Thelypteris decussata* (L.) Proctor var. *decussata*

*Thelypteris gemmulifera* (Hieron.) A.R. Sm.

*Thelypteris hispidula* (Decne.) C.F. Reed var. *hispidula*

*Thelypteris holodictya* K.U. Kramer

*Thelypteris interrupta* (Willd.) K. Iwats.

*Thelypteris nephrodioides* (Klotzsch) Proctor

*Thelypteris opposita* (Vahl) Ching

*Thelypteris pennata* (Poir.) C.V. Morton

*Thelypteris poiteana* (Bory) Proctor

*Thelypteris serrata* (Cav.) Alston

*Thelypteris tristis* (Kunze) R.M. Tryon

#### VITTARIACEAE

*Antrophyum cajenense* (Desv.) Spreng.

#### WOODSIACEAE

*Diplazium cristatum* (Desr.) Alston

*Diplazium grandifolium* (Sw.) Sw.

*Hemidictyum marginatum* (L.) C. Presl

**Table II – Pteridophyte species present at Paul-Isnard and showing phytogeographical relationships with other similar submontane areas of French Guiana (“patrimonial” taxa are bold)**

Taxa	Areas of French Guiana			
	Paul-Isnard		Trinité	Saül – Inini – Atachi Bacca
	Dékou-Dékou	Lucifer		
<i>Adiantum lucidum</i>		X		X
<i>Adiantum macrophyllum</i>	X	X		X
<i>Adiantum tetraphyllum</i>	X	X		X
<i>Asplenium cristatum</i>	X			
<i>Asplenium delitescens</i>	X			
<i>Asplenium pediculariifolium</i>		X		X
<b><i>Asplenium rutaceum</i></b>		X	X	X
<i>Bolbitis serratifolia</i>		X	X	X
<i>Ctenitis refulgens</i>	X	X		X
<i>Danaea nodosa</i>	X	X		X
<i>Elaphoglossum</i> sp. 1	X	X	X	X
<b><i>Lastreopsis effusa</i></b> subsp. <b><i>divergens</i></b>	X	X		X
<i>Lonchitis hirsuta</i>	X			X
<b><i>Microgramma tecta</i></b>	X		X	X
<i>Pleopeltis astrolepis</i>	X			X
<i>Polybotrya fractiserialis</i>	X	X	X	X
<i>Polypodium polypodioides</i> var. <i>burchellii</i>	X			X
<i>Polypodium richardii</i>		X	X	X



<i>Polypodium sororium</i> (= <i>P. dulce</i> )	X	X	X	X
<i>Pteris deflexa</i> (= <i>P. polita</i> )	X			X
<i>Selaginella diffusa</i>		X		X
<i>Tectaria trinitensis</i>		X		
<i>Thelypteris biolleyi</i>	X			X
<i>Thelypteris holodictya</i>	X		X	X
<i>Thelypteris opposita</i>	X			
<i>Thelypteris pennata</i>		X		X
<i>Thelypteris tristis</i>		X		
<i>Trichomanes angustifrons</i>	X	X		X
<i>Trichomanes membranaceum</i>	X	X		X

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## 4.2. Bromeliads of « Savane-Roche la Virginie »

**Joep Moonen**

Emerald Jungle Village

« Savane-roche la Virginie » is an inselberg in the north-eastern part of French Guiana. The granite mountain is about 130 m high and the surface is roughly 1000 x 200 m. Near the inselberg are 2 smaller granite platforms, called “satelite 1” and “satelite 2”.

Until the early 90's, the helicopter was the only way to get to “Savane-Roche la Virginie”. In 1993, Joep Moonen started eco-tours for selected naturalists to the inselberg, from a base camp on the Martaroni River. From the Mataroni to “La Virginie” is about 6 km, a 2 hours hike through primary forest covering 10 hills.



Savane-Roche La Virginie

During the many visits over 10 years, many observations and slides were made about the bromeliads of the area. In 1999, Joep took Eric Gouda (Utrecht Botanical Gardens) to the inselberg and several *Aechmea* species could be identified thanks to Eric. Still many questions remain since several groups of *Aechmea*'s on "La Virginie" and the two satellite rocks seem hybrids.

The extreme richness on especially *Aechmea*'s on the inselberg poses questions. Remarkable is that bromeliads of the genus *Pitcairnia* seem absent at "La Virginie". Are these *Pitcairnia*'s on other inselbergs (like Nouragues and Voltzberg) dominant species that leave no space for in general epiphytic *Aechmea*'s to settle on the granite?

Clear is that the government should immediately take action to protect "Savane-roche la Virginie", the two satellites and other inselbergs in the area between Régina and Saint-Georges.

Increasing visits by man are threatening the delicate habitat of "La Virginie". Trees are blown down by landing helicopters. Irresponsible tourists carve their names in the rocks. Campers make fires that, in the worse case, will destroy all transition forest around "La Virginie" (see what happened with "Savane-roche du 14 Juillet"). The new road to Régina will, by time, open "La Virginie" for orchid collectors who likely will take all *Cyrtopodium* and the many orchid species that grow in the transition forest, and hunters who will camp there and make fire, as happened at "Savane-roche du 14 Juillet", near Saint-Georges. Protection of "Savane-roche la Virginie" is a priority!

Bromeliad species shown in the slide presentation:

<i>Aechmea aquilegia</i>	ep + lit	bush islands at granite
<i>Aechmea eglariana x polyantha ?</i>	lit	edge transition forest
<i>Aechmea melinonii</i>	ep + lit	edge transition forest

<i>Aechmea melinonii x polyantha ?</i>	lit	bush islands at granite
<i>Aechmea moonenii</i>	ep + lit	bush islands at granite
<i>Aechmea polyantha</i>	lit	bush islands at granite
<i>Aechmea rodrigueziana</i>	lit	bush islands at granite
<i>Aechmea setigera</i>	ep	forest
<i>Aechmea sp.</i> ("Marijke white")	lit	bush islands at granite
<i>Aechmea sp.</i> ("sat. 1 var. 1")	lit	bush islands granite sat. 1
<i>Aechmea sp.</i> ("sat. 1 var. 2")	lit	bush islands granite sat. 1
<i>Aechmea sp.</i> ("sat. 1 var. 3")	lit	bush islands granite sat. 1
<i>Aechmea longifolia</i>	ep + ant	bank vegetation Mataroni River
<i>Araeococcus micranthus</i>	ep + ant	bank vegetation Mataroni River
<i>Bromelia granvillei</i>	ter	transition forest
<i>Catopsis berteroniana</i>	ep	transition forest
<i>Disteganthus basilateralis</i>	ter	forest
<i>Guzmania lingulata</i>	ep	bank vegetation Mataroni River
<i>Guzmania melinonis</i>	ep	forest
<i>Pitcairnia geyskesii</i>	lit	ABSENT at « La Virginie »
<i>Vriesea pleiosticha</i>	ep	transition forest
<i>Vriesea splendens</i>	ep	forest

### Bromeliad species not shown but present at "La Virginie"

<i>Tillandsia bulbosa</i>	ep	bush islands at granite
<i>Tillandsia flexuosa</i>	ep + ant	bush islands at granite
<i>Tillandsia paraense</i>	ep	edge transition forest



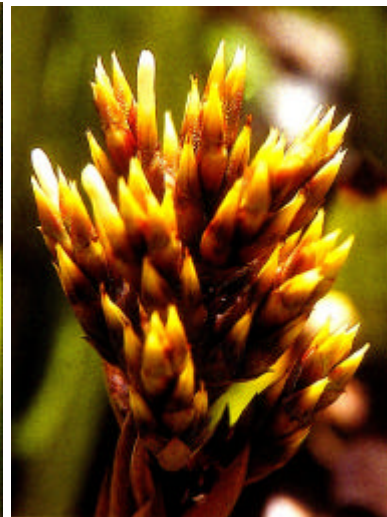
*Aechmaea egleriana*



*A. melinonii x polyantha*



*Aechmaea moonenii*



*Aechmaea* sp.

#### Orchids of importance on granite :

*Encyclia granitica*  
*Cyrtopodium andersonii*

Thanks to Eric Gouda, Ruben Makosi, Scott Mori and Franklon Sabajo

#### 4.3. Biodiversity in the Guianas and Venezuelan Guayana ; data from the Boraginaceae, Gesneriaceae, and Passifloraceae.

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The work being done on the Flora of the Guianas (FoG) and the Flora of the Venezuelan Guayana (FoVG; Amazonas, Bolivar & Delta Amacuro) during the last 20 years allows a comparison of the biodiversity of the two neighboring regions. This abstract of two separate presentations gives the examples for three families. The references and relevant literature are presented at the end sorted by subject (families and checklists).

In the tables the taxa are listed with the number of species in each flora, the species that are present in both and the percentage of the total they represent, the total number of species for the area considered, and the ratio defined as "number of species present in French Guiana, Guyana, and Surinam" / "number of species present in French Guiana, Guyana, but not Surinam". The table presentation is the same for the three families.

## 1) Boraginaceae

The Boraginaceae family in the New World tropics includes mostly woody species and a few herbaceous species. The diversity of Boraginaceae taxa above the rank of species is similar in the Guianas (Feuillet, unpublished) and the Venezuelan Guayana (Miller et al., 1997). Only the genus *Bourreria* is present in the FoVG with one species and lacking in the FoG. In table 1, despite more diverse habitats in the Venezuelan Guayana, the number of species is close to what it is in the Guianas, 47 and 46 respectively.

**Table 1: Diversity of the Boraginaceae in the Guianas and Venezuelan Guayana.**

	FoG	FoVG	In both	%	Total	SU (=/-)
<i>Bourreria</i> P. Browne	0	1	0	0%	1	-
<i>Cordia</i> L.	30	30	17	40%	43	10/1
sect. <i>Gerascanthus</i> (Browne) G. Don	3	2	1	25%	4	1/0
sect. <i>Myxa</i> (Endlicher) DC.	18	17	12	52%	23	7/1
sect. <i>Varronia</i> (Browne) G. Don	9	11	4	25%	16	2/0
<i>Heliotropium</i> L.	6	8	5	56%	9	2/0
<i>Lepidocordia</i> Ducke	1	1	1	100%	1	-
<i>Tournefortia</i> L.	9	7	7	78%	9	5/2
Total:	46	47	30	48%	63	17/3

The species common to both FoG and FoVG represent 48%, a high number compared to the two other families presented here, and more than anticipated. The treatment for

FoVG by Miller et al. (1997) added species to that number. A few species were also added to the list for Surinam, lowering the number of species unexpectedly absent from Surinam. The relatively low number of species known from Surinam is mostly the result of a difference between an eastern (French Guiana, lower Amazonia) and a western flora (Rio Negro, FoVG) in the Guianas.

## 2) Gesneriaceae

The Gesneriaceae family in the New World tropics includes herbs and subshrubs, and terrestrial and epiphytic plants. Extensive collections, studies of the Gesneriaceae, and checklists focusing on the Guianas (Leeuwenberg 1958, 1985, Cremers et al. 1988, Boggan et al. 1992 & 1997, Feuillet & Skog 2002, 2003a & b, Skog & Feuillet submitted) and on the Venezuelan Guayana (Feuillet & Steyermark 1999) have been completed during the last 50 years.



*Cremersia platula* Feuillet & Skog

Despite the presence of more diverse habitats in the Venezuelan Guayana, the number of species is similar to the Guianas, 58 and 60 respectively (table 2), but in each tribe the species in common remains below 42% of the total number, 28% for the largest tribe, the Episcieae, and for the whole family. The tribe Napeantheae has four species in the Guianas, but is missing in the Venezuelan Guayana.

Some hypothesis on causes for the differences can be proposed, but they are only partial explanations. In the case of the genus *Napeanthus*, high humidity along with excellent drainage (mostly steep rocky habitat) is required to maintain a population. While the genus prospers in French Guiana and western Venezuela, the species in Surinam, Guyana, Trinidad and central Venezuela are limited to a few localities because of well marked dry seasons. The same factor may explain the eastern distribution of *Columnnea calotricha*, *Drymonia antherocycla*, *D. psilocalyx*, *Paradrymonia campostyla* (all SU & FG) and *C. oerstediana* (FG), or a western distribution (stronger dry season) for *Alloplectus savannarum* (Bolivar, GU & SU). It seems likely that the nature of the substrate is essential for *Cremersia* (granite), *Lembocarpus* (lateritic boulders), and *Lampadaria*, *Rhoogeton*, and maybe *Tylopsacas* (sandstone).

**Table 2: Diversity of the Gesneriaceae in the Guianas and Venezuelan Guayana.**

	FoG	FoVG	in both	%	total	SU (+/-)
<b>Tr. BESLERIEAE</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>42%</b>	<b>12</b>	<b>3/1</b>
<i>Besleria</i> L.	7	8	4	36%	11	3/1
<i>Tylopsacas</i> Leeuwenb.	1	1	1	100%	1	-
<b>Tr. EPISCIEAE</b>	<b>43</b>	<b>44</b>	<b>19</b>	<b>28%</b>	<b>68</b>	<b>12/3</b>
<i>Alloplectus</i> Mart.	2	1	1	50%	2	-

<i>Chrysothemis</i> Decne.	2	2	1	33%	3	1/0
<i>Codonanthe</i> (Mart.) Hanst.	2	2	2	100%	2	2/0
<i>Codonanthesis</i> Mansfeld	1	2	1	50%	2	1/0
<i>Columnnea</i> L.	5	2	1	17%	6	1/0
<i>Corytoplectus</i> Oerst.	1	2	1	50%	2	-
<i>Cremersia</i> Feuillet & L.E. Skog	1	0	0	0%	1	--
<i>Drymonia</i> Mart.	4	2	2	50%	4	2/0
<i>Episcia</i> Mart.	3	5	2	33%	6	2/0
<i>Lampadaria</i> Feuillet & L.E. Skog	1	0	0	0%	1	-
<i>Lembocarpus</i> Leeuwenb.	1	0	0	0%	1	-
<i>Nautilocalyx</i> Linden	11	19	7	30%	23	1/2
<i>Paradrymonia</i> Hanst.	7	6	0	0%	13	2/1
<i>Rhoogeton</i> Leeuwenb.	2	1	1	50%	2	-
<b>Tr. GLOXINIEAE</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>20%</b>	<b>5</b>	<b>2/1</b>
<i>Diastema</i> Benth.	0	1	0	0%	1	-
<i>Gloxinia</i> L'Hérit.	2	0	0	0%	2	1/1
<i>Koellikeria</i> Regel	0	1	0	0%	1	-
<i>Kohleria</i> Regel	1	1	1	100%	1	1/0
<b>Tr. NAPEANTHEAE</b>						
<i>Napeanthus</i> Gardn.	4	0	0	0%	4	-
<b>Tr. SINNINGIEAE</b>						
<i>Sinningia</i> Nees	2	2	1	33%	3	1/0
<b>Total:</b>	<b>60</b>	<b>58</b>	<b>26</b>	<b>28%</b>	<b>92</b>	<b>18/5</b>

### 3) Passifloraceae

The Passifloraceae family in the New World tropics consists mostly of climbing species and a few shrubs. The diversity of Passifloraceae taxa above the rank of species is different in the Guianas (Feuillet, work in progress) and the Venezuelan Guayana (adapted from Tillett, 2003). In spite of more diverse habitats in the FoVG, the number of species is higher in the FoG.



*Passiflora serrato-digitata* L.

Contrary to the Boraginaceae and Gesneriaceae, the number of species of Passifloraceae that prosper in habitats with a strong dry season is much lower in the area considered than those growing in climates characterized by a shorter or milder dry season. That is probably a cause of the lower number in FoVG.

**Table 3: Diversity of the Passifloraceae in the Guianas and Venezuelan Guayana.**

	FoG	FoVG	In both	%	Total	SU (+/-)
<i>Ancistrothyrsus</i> Harms	1	1	0	0%	2	0/1
<i>Dilkea</i> Mast.	4	3	2	33%	6	1/0
<i>Mitostemma</i> Mast.	2	0	0	0%	2	-
<i>Passiflora</i> L.	65	56	34	39%	87	22/4
subg. <i>Astrophea</i> (DC.) Mast.	20	13	9	37%	24	5/2
subg. <i>Deidamioides</i> (Harms) Killip	1	1	1	100%	1	1/0
subg. <i>Decaloba</i> (DC.) Rchb.	12	13	6	32%	19	5/1
subg. <i>Passiflora</i>	32	29	18	42%	43	11/1
<b>Total:</b>	<b>72</b>	<b>60</b>	<b>36</b>	<b>37%</b>	<b>97</b>	<b>23/5</b>

More than half of the difference (seven out of 12) occurs in *Passiflora* subg. *Astrophea*, and an additional three in *P. subg. Passiflora* and the two species of *Mitostemma*. The difference between FoG and FoVG is nearly as strong as in the Boraginaceae with only 32% of species in common. This number reflects the influence of Colombian Amazonia in the composition of the flora of the Amazonas territory.

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##### 1) Boraginaceae

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#### 4.4. Distribution of Myrtaceae in the Guianas ; present knowledge and directions for future studies.

Eve Lucas,  
Royal Botanic Gardens, Kew.

##### Introduction

Five floristic treatments covering areas of different sizes in the Guianas were compared on the basis of numbers of Myrtaceae species and genera and by calculating relative diversity values for each area. The richness of Myrtaceae taxa in each area could therefore be used to provide comparable measures of diversity, factoring out the differences in the sizes of the areas. Table 1 lists the floristic treatments used and provides estimates of the areas covered by them.

**Table 1. Floristic treatments used and area estimates.**

Floristic treatment	Date	Author of Myrtaceae part.	Estimate of area
Flora of Surinam	1951 - updated 1986	Amshoff Lindeman	173,840 km <sup>2</sup>
Botany of the Guayana Highland	1969	Mc Vaugh	585,950 km <sup>2</sup>
Checklist of the plants of the Guianas	1992	Holst & Hiepko	+/- 500,000 km <sup>2</sup>
Vascular plants of Central French Guiana	2003	Holst & Kawasaki	1,402 km <sup>2</sup>
Flora of Venezuelan Guayana	2003	Holst, Landrum & Grifo	+/- 500,000 km <sup>2</sup>

The Checklist of the Plants of the Guianas lists which of the three Guianan countries a species occurs in. Species data per country was therefore also included. Area estimates for the countries are as follows: Guyana: 214,970 Km<sup>2</sup>, Surinam: 173,840 Km<sup>2</sup>, French Guiana: 91,000 Km<sup>2</sup>.

Numbers of species for each genus of Myrtaceae occurring in the Guianas are shown in figure 1. Many of the smaller genera have been monographed relatively recently (e.g. *Campomanesia* & *Blepharocalyx*; Landrum (1986), *Myrcianthes*; Grifo (1992)). The three remaining large and abundant genera, *Eugenia*, *Myrcia* and *Marlierea* are taxonomically complicated. This is due to problems of generic delimitation and nomenclatural confusion resulting from the treatment of the genera from separate geographic areas as opposed to the genera as a whole.

### Methods

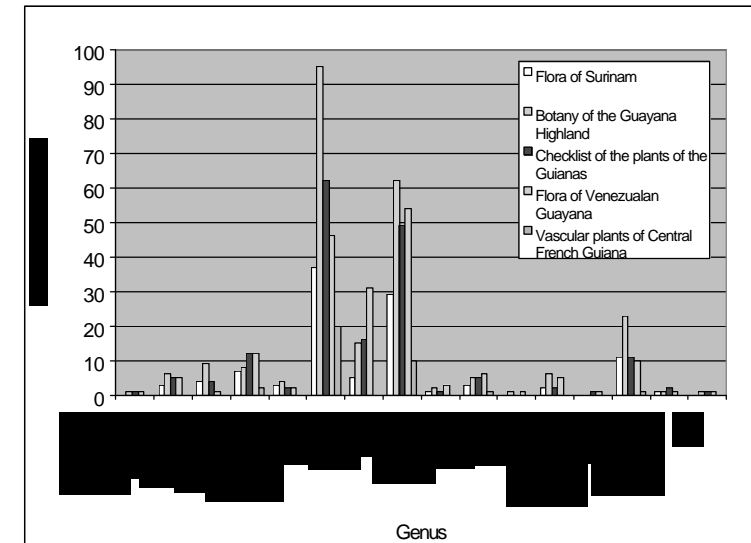
The relationship between the number of species in an area and the size of that area can be described by the equation:

$$S=cA^z$$

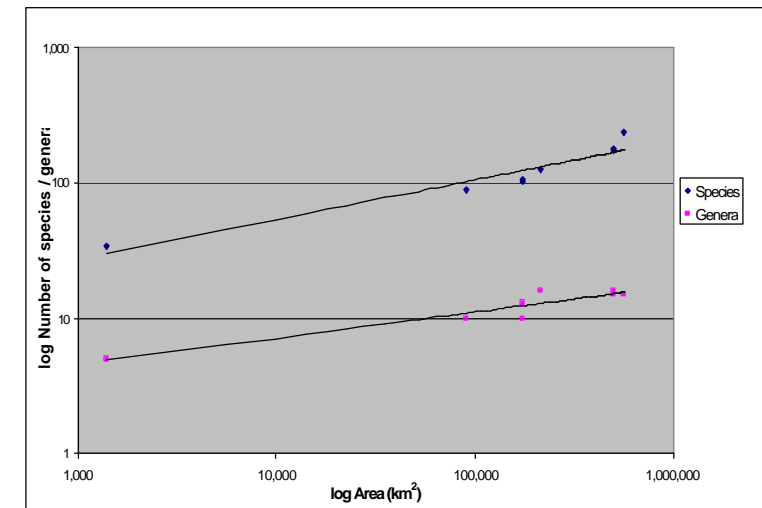
where *S* is the number of species, *A* is the size of the area and *c* and *z* are constants representing the intercept (*c*) and the slope (*z*) of a double logarithmic plot. *c* represents the ratio between species number and area to the power *z*, effectively giving a value of relative biodiversity of the area. In this study a value of 0.14 was used for the constant *z*. This value falls within the range of *z* values of 0.12 and 0.17 which are typical slopes of species-area relationship lines for continental areas (as opposed to islands) (MacArthur & Wilson, 1967). It can be seen from Figure 2 that the Guianan Myrtaceae data fit this model.

By transforming the species-area relationship equation in the following way: *c* (intercept)= *S/A<sup>z</sup>*, it is possible to calculate an area-independent estimate of relative diversity and thereby compare areas factoring out the effect of size. By counting the species in the three Guianan countries listed in the Checklist of the Plants of the Guianas, relative biodiversity values were also calculated for the individual countries. All values are listed in Table 2.

**Figure 1. Number of species per genus (Myrtaceae) in the Guianas**



**Figure 2. Linear relationship resulting from Log Myrtaceae species/genera vs. log area**



## Results

Table 2. and Figure 4. show relative biodiversity values based on Myrtaceae accounts for the areas of the Guianas used for this study, calculated by the method previously outlined. Figure 4 provides a comparison of the 'problem' genera *Eugenia*, *Myrcia* and *Marlierea* as discussed in the introduction.

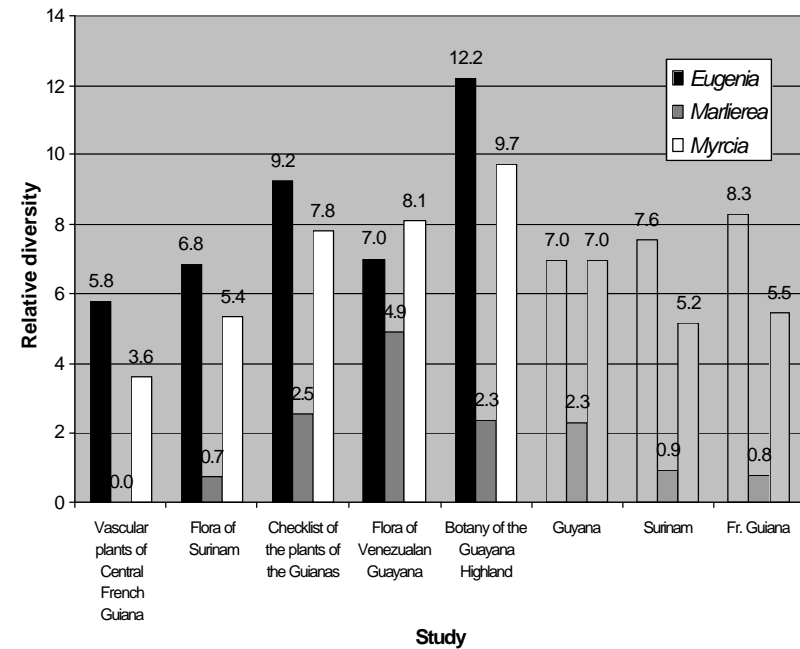
**Table 2. Relative biodiversity values for selected areas in the Guianas based on Myrtaceae accounts.**

	Vascular plants of Central French Guiana	Flora of Surinam	Checklist of the plants of the Guianas	Flora of Venezuelan Guayana	Botany of the Guayana Highland	Guyana	Surinam	French Guiana
Total species	34	106	174	180	239	126	102	89
Area (km <sup>2</sup> )	1402	173840	500000	500000	565950	214970	173840	91000
Relative diversity (Species)	12.33	19.57	27.71	28.67	37.41	22.59	18.84	17.99

## Discussion

Results from both the comparison of the floristic treatments and from the data broken down by country from the Checklist of the Plants of the Guianas suggest that irrespective of the size of the area, relative diversity of Myrtaceae species declines as one moves away from the Guayana Highlands. The high diversity in the Guayana Highlands may be due to the fact that more habitats are supported in this area, altitude and geology being more heterogeneous.

**Figure 4. Relative diversity values for selected areas in the Guianas based on accounts of selected genera.**



Alternative suggestions to explain these results based on limitations of this analysis follow. The high number of habitats covered by Guayana Highlands may be a product of the targeting of particularly diverse points by the many expeditions which collected the specimens on which this treatment is based. Additionally, increased collection density can produce an increase in the relative diversity of an area calculated by the method used here. This may contribute to the high value obtained from the Botany of the Guayana Highlands data. Effects of increased collection density can be taken into account by using a diversity calculation based on an asymptotic model which assumes the species area curve ultimately levels when all species in an area are collected. An example of such a model is that of Colwell and Coddington (1995), see also ter Steege et al., (2000). Space and time restrictions prevented the use of this

technique in this analysis, it would however, be a logical next step.

It is also worth noting that approx. 6% of the species McVaugh included in the Botany of the Guayana Highlands had not been found in the area but were predicted to be in the future. Possibly significantly, 35 years later many have yet to be recorded. As the heterogeneity of habitats in the Guayana highlands should be matched by the area covered by the flora of Venezuelan Guayana, similar relative diversities would be expected from the two areas, particularly as the areas are of similar sizes. It may be that the problems associated with collection density and sampling which have been discussed cause the relative diversity of the Botany of the Guayana Highlands to be artificially high relative to the Venezuelan Guayana area.

Support for the suggestion that the richest area studied here in terms of species is the Guayana highlands follows. A similar study (ter Steege et al., 2000) took collection density into account as described and found that the central Guyanan Pakaraima highlands have the highest relative diversity compared with five other major forest regions in Guyana. ter Steege et al. also conclude that despite the possible higher diversity of smaller plots within the areas used in their study (?-diversity) the total diversity of the larger areas analysed (?-diversity) is greatest in the Pakaraima Highlands. A similar scenario may be true of the various Guianan areas analysed here. Further support is lent to a trend of ?-diversity being greatest in Guyana compared to Surinam and French Guiana from the break down of the Checklist of the Plants of the Guianas data.

Overall, the 'problem' genera results support the trend obtained using the family data that diversity is highest in the area covered by the Botany of the Guayana highlands. Deviations from this trend are as follows: *Eugenia* diversity is higher than might be expected in the area covered by the Checklist of the Plants of the Guianas. This may be because *Eugenia* is a genus

adapted more to lowlands which has diversified particularly in the lower altitude habitats of French Guiana and Surinam. This is supported by the country data broken down from the Checklist of the Guianas. *Marlierea* is absent from the area covered by the Vascular Plants of Central French Guiana and diversity is lower than expected in the Guayana Highlands area. Its absence from central French Guiana may be explained by a lack of typical lowland *Marlierea* substrates in this region (e.g. sandy substrate scrub forests or lowland blackwater river forests - Holst, pers.com. -), it is not clear why the richness of this genus is so low in the Botany of the Guyana highlands.

## Conclusions

It appears that the Guayana Highlands area is the most diverse area in this study in terms of Myrtaceae species. Future collecting trips for general Guianan Myrtaceae collections should be targeted there. At the generic level, richness patterns vary little from family level patterns, however inferences can be made from these data as to likely areas of maximal species richness for the three problematic genera identified here.

It should be borne in mind that the Myrtaceae family may not be a good indicator for the diversity of these areas as a single family can not represent the diversity of all other families in a region. A study of all or carefully selected families would be necessary to compare the plant diversity of the areas accurately. In order to pursue a study of this nature based on a single family, more areas would need to be surveyed in order to provide more data points to strengthen patterns and clarify the picture of diversity of a given family.

However, an analysis of this nature provides an easily achievable estimation of the distribution and dynamics of a family and its key genera in the Guianas. This study will provide a useful starting point for further studies on *Myrcia*, one of the outstanding, large, regionally important and complex genera of the Myrtaceae identified here.

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## 4. 5. Protected plant species in French Guiana

Sylvia LOCHON (DIREN Guyane)  
& Jean-Jacques de GRANVILLE (IRD)

A list of plant species protected in French Guiana was established by ministerial order in April 2002. This declaration was signed jointly by the Ministry of Environment and the Ministry of Agriculture.

### Purpose is:

- ✍ To protect the genetic resources of economically important plants, e.g. the american oil palm, rosewood, agave, pineapple, etc.
- ✍ To protect species of ornamental plants from over-collecting, in particular orchids, bromeliads, and, in general, epiphytes.
- ✍ To protect rare and/or endemic plant species as well as plant species confined to limited and fragile habitats, for example species of granite outcrops, coastal savannahs, coastal swamps, sandy and rocky shores, vegetation on white sand, and rocks and rapids along streams.

### Elaboration of the list of protected species.

#### 1. Criteria used

- ✍ Information provided by the AUBLET2 database in which data on about the 5220 species of vascular plants known from French Guiana is available.
- ✍ Extraction from the database of ca. 700 species (“patrimonial species”) based on the following criteria:

- ✍ Species protected by global conservation conventions (1 species of orchid growing on granite outcrops)
- ✍ Rare, endemic and threatened plants, and
- ✍ Wild taxa related to cultivated crops
  
- ✍ Selection of 83 species (1.5% of the native flora of French Guiana), from the rarest and/or the most endangered “patrimonial species”: (i.e., plants known from less than 6 localities, rare species of fragile or limited habitats, species from coastal habitats, noticeably decreasing in number because of human activity)..

## 2. Selected species

A form has been filled for each species, in which brief descriptions, including habitat, distribution in French Guiana, justification and statutes for protection, and illustrations, when available, are provided.

These 83 species include :

- ✍ 10 trees, including the rosewood, *Aniba rosaeodora*
- ✍ 5 lianas and woody epiphytes
- ✍ 14 shrubs
- ✍ 5 palms, including the american oil palm, *Elaeis oleifera*
- ✍ 1 cactus, *Cereus hexagonus*.
- ✍ 3 vines.
- ✍ 5 epiphytic herbs (excluding aroids, bromeliads and orchids)
- ✍ 8 aquatic plants
- ✍ 5 aroids
- ✍ 6 bromeliads, including 4 wild pineapples
- ✍ 13 orchids
- ✍ 7 ferns

## 3. Implementation of the declaration

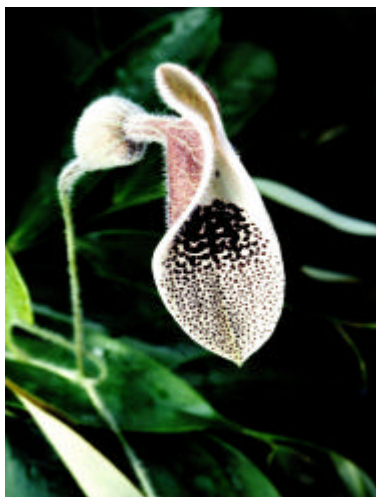
Destroying, cutting, mutilating, uprooting, picking, hawking, using, selling, or purchasing the protected plant species is prohibited unless the plants have been specifically cultivated for these purposes.

### Contributors

The work was carried out under the direction of M. HOFF, J.-J. de GRANVILLE, B. BORDENAVE and V. HEQUET. The following specialists contributed information:

Experts	Field	Institution	City
ALLORGE, L.	Botany (Apocynaceae)	MNHN	Paris
BORDENAVE, B.	Botany	MNHN	Paris
BOUDRIE, M.	Botany (ferns)	Group of European Pteridologists	Cayenne
CREMERS, G.	Botany (ferns)	IRD	Paris
FEUILLET, C.	Botany	Smithsonian Institution	Washington
FLEURY, M.	Ethnobotany	MNHN	Cayenne
GRANVILLE, J.-J. de	Botany	IRD	Cayenne
GRENAND, P.	Ethnology	IRD	Orléans
HOFF, M.	Botany	IRD	Paris
JEREMIE, J.	Botany	MNHN	Paris
MORETTI, C.	Medicinal plants	IRD	Orléans
MORI, S.A.	Botany	NYBG	New York
PIGNAL, M.	Botany	MNHN	Paris
PONCY, O.	Botany	CNRS	Paris
RAYNAL, A.	Botany	MNHN	Paris
SABATIER, D.	Botany	IRD	Montpellier
SARTHOU, C.	Botany	MNHN	Paris
SASTRE, C.	Botany	MNHN	Paris

CNRS : Centre National de la Recherche Scientifique  
 IRD : Institut de Recherche pour le Développement  
 MNHN : Muséum National d'Histoire Naturelle  
 NYBG : New York Botanical Garden



*Aristolochia guianensis* O. Poncy



*Heliconia dasyantha* Koch & Bouché.



*Calathea dilabens* Anderss. & Kennedy



*Cyrtopodium andersonii* (Lamb.) R. Brown

**Some protected plant species**

**4. 6. Guide to the Vascular Plants of Central French Guiana**

S. A. Mori, G. Cremers, C. Gracie, J.-J. de Granville, M. Hoff & J. D. Mitchell

The forests of northeastern South America represent one of the last tropical wilderness areas of the world. Since 1976, we have been collaborating with 74 other botanists in an inventory of the vascular plants of central French Guiana. The principal products of our effort are the publication of the two part Guide to the Vascular Plants of Central French Guiana (Mori et al., 1997, 2002), which include the description of 2111 species of gymnosperms, ferns, and flowering plants, and a searchable specimen database available on the Internet ([www.nybg.org/bsci/french\\_guiana/](http://www.nybg.org/bsci/french_guiana/)). A hard copy of the specimens documenting the occurrence of the flowering plant species in central French Guiana has been distributed to the libraries of the Flora of the Guianas consortium (Mori et al., 2002) and can also be printed out from the aforementioned web site.

We were motivated in this enterprise by our desire to: 1) learn all of the plants in an area of undisturbed tropical rain forest, 2) provide collections needed by specialists for their monographic studies of Neotropical plant families, 3) furnish the descriptions and keys needed for identifying plants, 4) promote more detailed ecological and evolutionary studies, especially those dealing with plant/animal interactions, in central French Guiana and 5) supply the baseline data needed for promoting the conservation of lowland rain forests in this area.

**Literature Cited**

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Mori, S. A., G. Cremers, C. Gracie, J.-J. de Granville, S. V. Heald, M. Hoff, & J. D. Mitchell. 2002. Guide to the vascular plants of central French Guiana. Part 2. Dicotyledons. Mem. New York Bot. Gard. 76(2): 1-776.

Mori, S. A., C. Gracie, M. Hoff & T. Kirchgessner. 2002. Checklist of the gymnosperms and flowering plants of central French Guiana. The New York Botanical Garden, New York. Pp. 1-219.

#### 4. 7. Patterns of alpha- and beta-diversity in the Guianas.

Hans ter Steege<sup>1</sup>, Daniel Sabatier<sup>2</sup>  
<sup>1</sup>NHN-Utrecht, <sup>2</sup>IRD-MAPA

In our talk we briefly outline the definition of biodiversity, what it might include, and the use of alpha-, beta-, and gamma-diversity.

We show that at present there are not enough plots in the Guianas to make an accurate map of tree alpha-diversity for the three countries. Especially plots in the south of the countries (esp. Suriname and Guyana) are lacking. However a more general impression can be obtained in a wider Amazonian context (ter Steege et al 2000, 2003). There is a continuous increase in tree alpha-diversity from central-Guyana, through Suriname into French Guiana.

We then discuss if beta-diversity can be best explained by neutral theory, including dispersal limitation, as suggested by Hubbell or if ecology still explains a significant portion. Neutral theories are certainly helpful as null-models and perhaps explain most of the mid-elevation peak in species richness found in many mountain systems.

Based on our preliminary data we conclude that both soil type and distance are important determinants of species composition. However, we lack proper statistical tests at the moment to test exactly the effect of each. This will be one of our future goals.

#### 4. 8. Forest and its management in French Guiana

Julien Demenois



French Guiana is part of France. It is one of the Overseas Departments (DOM), like Guadeloupe and Martinique in West Indies.

The moist tropical forest of French Guiana is the unique tropical forest which is part of the European Union. As this huge forest belongs to the State, the ONF (Office National des Forêts) has to control and manage this natural collective heritage.

The ONF benefits from several centuries of experience in forest management. Being a public national establishment under the supervision of the State (Ministry of Agriculture and Fisheries, and Ministry of Environment), the ONF manages 4,4 million hectares of public temperate forests in metropolitan France and 7,5 million hectares of tropical forests. In addition, the ONF plays a significant role within the public domain, such as the restoration of areas in mountain, fire defence and protection of coastal dunes. Within each of its territories, the ONF aims to preserve the natural environment while producing wood and catering for the visiting public. Benefiting from its experience in multi-functional management, in a wide diversity of environments, the ONF is developing its expertise in both France and abroad.

In French Guiana, the ONF has 3 particular missions :

- ✍ to elaborate multi-functional forest management, in order to produce wood, to protect environment and to fulfill the local social demand ;
- ✍ to preserve global balance and biodiversity ;
- ✍ to participate to the social welfare by creating trails, offering educational entertainments and being involved in touristic development.



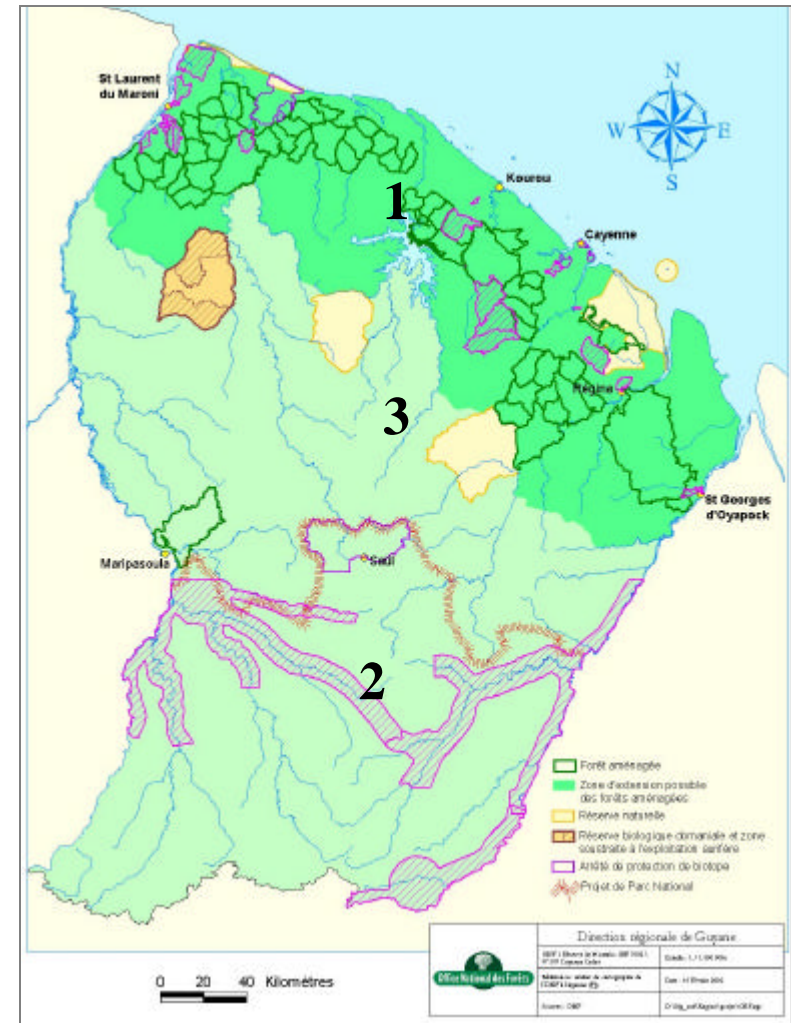
The biological diversity of forest in French Guiana is amazing : like in Central Amazonia, the Guianese vegetation is « an original pocket » where diversity is more than in other parts of the Guianas Shield. Indeed, the scientists suppose that there are more than 440 000 vegetal and animal species. Among them, one can find about 1200 different species of trees. Sapotaceae are mainly found among Guianese tree families, whereas Caesalpiniaceae, Lecythidaceae and Chrysobalanaceae are usually the most common families in the Guianas Shield. There is also a high diversity of forests. In the Guianese part of Guianas Shield, they are something like 9 different types of forest (mangrove, marshy forest, forest on flat, riverside forest, high forest on ferrallitic soils...).

Since more than 2 000 years, the Guianese forest has been the place of a scattered picking for fruits, game, balata gum (*Manilkara bidentata*), rosewood oil (*Aniba rosaeodora*) or slash-and-burn agriculture. With the settlement of the colony in 1817, a limited trade of colored woods and woods for ships appeared. But, forest logging really began in 1852 with the Prison Administration, especially in the western part of French Guiana.

The forest management of French Guiana is a part of the global territory management of the region. Thus, a global forest politics has been planned, based on the principles of sustainable management.

Three areas, with different long term goals, do exist :

- ✍ **1.** the coastal area (70 km depth) is managed in a multi-functional way in order to produce timber. There are 54 production forests and the total area is about 1 000 000 ha ;
- ✍ **2.** the southern part of French Guiana (3 000 000 ha) has been defined as a high protection of environment area ;
- ✍ **3.** in between, the protection of this forest area (3 000 000 ha) is focussed on a network of several reserves. Nevertheless, the development of French Guiana in the years to come will have to be included in this area.



#### 4. 9. The genus *Guatteria* (Annonaceae) in the Guianas.

Uwe Scharf\*, Paul Maas^, Wilfried Morawetz\*

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As part of both the Annonaceae and the Flora of the Guianas projects, a regional revision of the genus *Guatteria* for the Guianas (French Guiana, Guyana, Suriname) is in progress. This PhD was started in Leipzig and Utrecht under the supervision of Prof. P.J.M. Maas (Utrecht) and Prof. W. Morawetz (Leipzig) two years ago. Worldwide, the majority of the collections as well as the most active workgroup in the subject are located in Utrecht.

Work with the more than 1000 specimens (herbarium sheets) present and on loan in U and LZ yielded the first and most results. More than 80 % of the collections belong to less than 10 % of the species, including species-complexes. New species for the Guianas are almost always from remote areas and poorly collected.

A field study of seven weeks was carried out in September/October 2001 in all three Guianas as a collaboration between the herbaria in Leipzig (LZ) and Utrecht (U) and the national herbaria in Cayenne (CAY), Georgetown (BRG) and Paramaribo (BBS). Triplicate collections were made for the national herbaria and U and LZ. Of approximately 100 collections, 82 belong to the Annonaceae family, 32 to seven

species of the genus *Guatteria*. All were collected both as herbarium material and as samples on silica gel for molecular research. The trip contributed enormously to the understanding of Annonaceae, especially of *Guatteria*, their environment and flower biology.

An overview of the project and preliminary results can now be presented. To date, of the more than 40 names in the collections from the Guianas, 16 have been confirmed, five new species have been described (for French Guiana: *G. leucotricha* U. Scharf & P.J.M. Maas, *G. montis-trinitatis* U. Scharf, *G. pannosa* U. Scharf & P.J.M. Maas, for Guyana: *G. ayangannae* U. Scharf, *G. pakaraimae* U. Scharf & P.J.M. Maas), *G. cardoniana* R.E. Fries has been reinstated to and *G. recurvisepala* R.E. Fries removed from the list of the region, and at least 16 names have been declared as synonyms. Four difficult species-complexes have been recognised (*G. atra*, *G. brachypoda*, *G. punctata*, *G. schomburgkiana*). Their resolution (treatment) has been postponed. Thus, in the Guianas there are 26 species of *Guatteria*, including four species-complexes.

At the end of 2002, a first manuscript of the species descriptions was submitted in Utrecht and Leipzig. The thesis will be submitted in Leipzig in summer 2003, and defended a few months later.

## 5. LIST OF PARTICIPANTS

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