

BIOLOGICAL DIVERSITY OF THE GUIANA SHIELD (BDG)

www.mnh.si.edu/biodiversity/bdg

An Overview

The goals of the Biological Diversity of the Guiana Shield (BDG) program are:
to document, study, and preserve the biodiversity of the Guiana Shield,
to provide the opportunity for excellent scientific research, and,
to make information generated by these studies useful for conservation and education.

WHY THE GUIANA SHIELD? The Guiana Shield is a distinct geological unit that underlies the northeastern corner of South America and includes much of the area east and south of the Orinoco River and east and north of the Rio Negro and Rio Amazonas. The area includes Bolívar, Amazonas, and Delta Amacuro states in Venezuela; most of Guyana, Surinam, and French Guiana; parts of northern Brazil; and parts of southeastern Colombia. The area has many unusual ecosystems including the famous tepuis of Sir Arthur Conan Doyle's "The Lost World" and the unique "Greenheart" forests of Guyana, both of which are known to have high diversity; for many groups of organisms the Shield serves as a center of species diversity.



The Shield's igneous-metamorphic basement was laid down in several events from 3.6 to 0.8 billion years ago (Mendoza 1977; Schubert and Huber 1990). This granitic basement is easily observed in the many black "hills" of granite that dot the landscape across the Guiana Shield and is also exposed on some of the mountains and massifs. Between 1.6 and 1 billion years ago, sedimentary covers of sand were successively laid down and cemented during thermal events (Huber 1995). The resulting quartzite and sandstone rocks are known today as the Roraima formation. Some recent work has suggested that the eastern rocks are the oldest (Huber 1995); this would make the Pakaraima Mountains of Guyana and the eastern parts of Venezuela older than the remainder of the Roraima formation. Over the last 200 to 600 million years, intrusions of diabbases and granite have penetrated both the granitic basement and sedimentary layers.

The most distinctive features of the Guiana Shield are the *tepuis*, the steep-walled table mountains prominently featured in photos and films. For many groups of organisms the tepuis support a unique flora and fauna. Tepui elements begin to appear in the biota at around 300-1000 meters in elevation, but predominate above 1500-1800 meters. The easternmost peaks reach heights around 2000 meters and include Mt. Ayanganna and Mt. Wokomung in Guyana. The highest tepui, Sierra de la Neblina, exceeds 3000 meters and is located in the western part of the Shield on the border of Venezuela and Brazil. Many other tepuis have summits between 2000 and 2400 meters. A large, mid-elevation, sandy plateau between 400 and 1500 meters, the Gran Sabana, occupies southeastern Venezuela and adjacent parts of Guyana (where it is named the Rupununi Savana) and Brazil. There are also variously-sized areas of lowland white-sand savanna scattered throughout the Guiana Shield (e.g., Berbice Savannas of Guyana).

Only a few parts of the Guiana Shield have well known floras, such as Mount Roraima (Venezuela), the Iwokrama-Mabura Hill area and Kaieteur (Guyana), Tafelberg (Surinam), and Saül (central French Guiana). Most areas, such as the lowland forests and tepui slopes, are very poorly known. Hollowell et al. (2001) recently published a checklist for about half of the flowering plants of the Guiana Shield

(families from A to L). Using this publication and subsequent online updates (up through Plumbaginaceae; www.mnh.si.edu/biodiversity/bdg) as a guide, there are approximately 12,500 species of flowering plants currently known for the Guiana Shield (excluding Brazil and Colombia). In addition, the Venezuelan Guayana includes 682 species of ferns and fern allies (Berry et al. 1995), while there are 629 species in the three Guianas. The estimated overlap of these two areas is 73%, so that the total number of ferns is predicted to be close to 900 species (not including the Brazilian and Colombian parts of the Shield). Thus, a conservative estimate of the total number of vascular plant species (ferns + flowering plants) from the Guiana Shield is 13,500-14,500 species. Berry et al. (1995) calculated that 40% of the plant species found in the Guiana Shield do not occur outside of the area. A close analysis of the flora of Kaieteur Falls, Guyana (Kelloff & Funk, 2004), showed that 43% of the plant species found there are endemic to the Guiana Shield. Consequently, we can estimate that about 6,000 species of vascular plants may be restricted to the Guiana Shield. Considering just the plants of the **Pantepui area** (over 1,500 m elevation), Berry et al. (1995) found that the percentage of endemics increases to 65%. This level of endemism must be one of the highest for non-insular floras and documents the existence of a “Guiana Shield flora” that is separate from other floras such as the Andean, Amazonian, and Brazilian Shield floras.



Tamandua tetradactyla
(Linnaeus, 1758)

The “**Checklist of the Terrestrial Vertebrates of the Guiana Shield**” (Hollowell & Reynolds, eds.) is in final edit; when it is finished similar statistics can be calculated for the terrestrial vertebrates. A draft checklist of the fishes of Guyana exists, and we hope to correct and expand it to include the whole Shield this coming summer.

With a few exceptions, such as cities along the Río Orinoco, the Rupununi savanna (Guyana), and the coastal areas of the Guianas, the Guiana Shield has benefited from its isolation and low population density, and much of the vegetation is still relatively undisturbed by human activities. This has led to its designation as a “tropical wilderness” (Mittermeier et al. 1998). Unfortunately, the pace of disturbance has recently accelerated because of logging by Asian and local companies, **gold and diamond mining**, oil drilling, bauxite mining, dams for hydroelectric power, wildlife trade, burning, grazing, and agriculture. If these trends continue, the Guiana Shield will lose its place as part of one of the three remaining “tropical wilderness” areas in the world.

Efforts to conserve this interesting and unique region vary according to country. Since 1962 Venezuela has set up seven national parks, 29 natural monuments, and two biosphere reserves covering 142,280 km² which comprises almost 31% of the Shield that lies in Venezuela and about 15% of the country. In Guyana the totals are much lower, with only one major national park, the expanded Kaieteur National Park (627 km² or about 3% of the country). Surinam has 12 conservation areas encompassing 20,000 km² (www.stinasu.com);

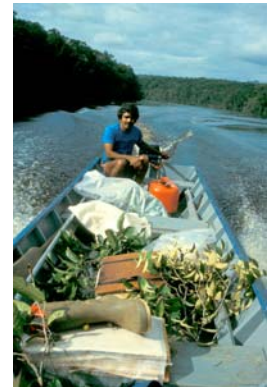


12% of the country. French Guiana has no designated protected areas but there are 18 proposed sites that total 6,710 km² and make up 7.5% (Lindeman and Mori 1989). However, an indication on the map of a park or reserve does not mean that the area will actually be protected. As with many countries in the tropics, areas in the Guiana Shield that are designated as parks are often only “paper” parks, and lack

the infrastructure and financial backing necessary for effective protection. As a result, parks often host gold mining, hunting, wildlife trade, and other disruptive activities. Currently, Venezuela and Guyana have the most pressure on the diversity of their respective biotas, while French Guiana's environment is probably the least threatened.

Each of the five countries of the Guiana Shield has a different administrative structure and official language(s), and there are a number of border disputes. The borders are generally porous to drug, gold, and wildlife trafficking, and there are serious political and environmental issues in regards to the native peoples of the region. All of these problems will have to be dealt with in order to design and maintain a viable reserve system for the Guiana Shield. The efforts of the BDG program are important as a major part of the process of gaining an understanding of the flora and fauna so that informed decisions can be made on critical areas with a high priority for conservation, and so data can be collected from areas that may ultimately be degraded. Also, because this region was long neglected by biologists, it is often an area of "missing information" for many biological analyses. The BDG program is designed to provide specimens and data to address biodiversity questions across many groups. The assembled information is being used to produce checklists, vegetation maps, floristic and faunistic studies as well as to address the more theoretical aspects of spatial biodiversity models.

ABOUT THE PROGRAM. The "Biological Diversity of the Guiana Shield" (BDG) is a field-oriented program of the National Museum of Natural History that has been operating since 1983 (federally funded since 1987). The goal of the BDG is to "study, document and preserve the biological diversity of the Guiana Shield." Originally confined to botany and Guyana, the least well-known, most biologically diverse of the three Guianas, the program has since been expanded to include faunal studies and field work in the other parts of the Shield (see Appendix A for a full list of collaborators). In Guyana, the BDG operates under the auspices of the University of Guyana (UG). There is a signed *Memorandum of Understanding* with the University of Guyana and with the Guyana EPA. These memoranda stipulate that a set of all collections be deposited in the "Centre for the Study of Biological Diversity" in Guyana and the second set in the NMNH; additional exchange material is sent around the world.



From 1986-1998 the BDG maintained full-time plant collectors in Guyana. These individuals organized **collecting expeditions** (see pictures of an expedition by Richard Spruce – 1849-1863 – on the left and a recent BDG expedition on the right) and assisted with the field work of visiting scientists. Each year approximately six major expeditions were organized, and other expeditions, involving a total of 20-30 visiting scientists, were assisted. The budget cuts of the 1990's made it impossible to continue the practice of full-time field work, and we currently send resident collectors to Guyana for 4-6 months each year or we have a series of targeted expeditions. In recent years we have had resident collectors for butterflies & moths, ants, birds, and plants. Modern day field work is easier on both ends of the trip (e.g., airplanes) and we collect new types of data (e.g., DNA samples, GPS coordinates) but the major part of field work is essentially the same as it was during the time of Spruce. The scientists and their assistants haul supplies



by dugout canoe and by foot, sleep in hammocks or tents, cook over open fires, and live for four to six weeks with frequent rains and constant insect infestations.

From the start of the BDG, all collections made were data based and geo-referenced. This decision, made in the early 1980's, has been central to our operation and the types of data collected expanded over the years. The result is a great legacy of data. In addition, beginning in the early 1990's, the BDG began to database specimens held by the US National Herbarium. Two recent grants (Department of Systematic Biology and ADRC) allowed the acceleration of this work, which is now complete for the Guianas (except for a single family where specimens are unavailable). Over 60,000 of our specimens from the three Guianas have been databased and we are well along on our quest to database those from the Venezuelan portion of the Guiana Shield.

In addition to collecting and research, the BDG Program has helped build the infrastructure necessary for housing Guyana's own natural history collections via the construction and enlargement of the "Centre for the Study of Biological Diversity" located on the campus of the University of Guyana; funded by the Royal Bank of Canada and USAID. We also help in the training of students and scientists both in the US and Guyana, assisting them in their research, and establishing or maintaining collections for them to use. We have organized training classes for Amerindian guides, provided lectures to the public, taught short intense taxonomy classes on various groups, and helped organize the first international scientific meeting held in Guyana in recent memory (October 2001).

The BDG program fulfills the goals of the Smithsonian Institution by gathering new information and distributing it to those who use it to produce checklists, floras and faunas of a relatively unknown area, by supplying data for the identification and preservation of biologically diverse areas for conservation activities, by providing specimens that are used in systematic studies both within the institution and throughout the world, by building infrastructure in the host countries, and by providing training for university students and Amerindians.

BDG staff (Washington, D.C.)



V. A. **Funk** is a Curator of Compositae at the US National Herbarium, Senior Research Scientist in the Department of Botany, and Director of BDG. She is responsible for the oversight and direction of the Program and the generation of new research projects. She deals with the few problems that cannot be handled by the Assistant Director and offers advice (sometimes when it is not needed). As director she is responsible for most interactions with other scientists, agencies, and organizations. She spends about 1/4-1/2 time on the program.

C. **Kelloff** is the Assistant Director of BDG. She is in charge of the day to day administration of the Program and the budget. Carol is the first point of contact for all activities, personnel and problems. She has a PhD and conducts research related to BDG issues; she is the expert on the flora of Kaieteur National Park. She is critical to the management and implementation of the Program and acts as Director when Funk is out of town. She is Funk's full-time assistant but spends 95% of her time with BDG.





T. Hollowell (Term appointment) is the Data Manager and Web Master for BDG. He maintains the data bases, coordinates all information flow to and from collectors and collaborators, supervises data-entry contractors, interns, and volunteers, coordinates the checklist projects, is responsible for all efforts involving graphics and GIS technology, and frequently improves the website. He is just about to finish his PhD and he conducts research related to BDG issues; he is an expert on the mangrove ecosystems of Shell Beach, which is proposed as a national park. His efforts are crucial for the reliability of the data bases and to our efforts to make information available to scientists and the public. He acts as Assistant Director when Kelloff is out of town.

Dodge, J., Brandan, D., and M. Sewell (p/t contractors) – data basing and specimen processing

Hansel, M. (p/t contractor) – data basing, specimen filing and label typing

Skinner, M. (p/t contractor) – off site plant mounting for US

Field biologists associated with BDG

Redden, K. - Karen is a graduate student in systematics at George Washington University. She organizes expeditions into remote areas and trains staff & students. In 2004 she collected ca. 1,860 numbers in three expeditions. In 2005 Redden will collect in Venezuela in collaboration with Venezuelan botanists and Guyanese field assistants. BDG processes and databases her specimens and keeps track of the identifications. In exchange, we get a set for US and all of the duplicate material for exchange. Redden's salary and most of the expenses for her field work are paid by George Washington University and NSF. [Karen is shown with two of our long-time field assistants, Romeo Williams and Claudis Perry (Patamona)].



Clarke, H.D. - David was the last full time collector in Guyana, 1995-1997. He spent 1997-2000 as an SI Postdoctoral fellow and subsequently has been an Assistant Professor at University of North Carolina, Asheville. David usually goes on one 6 week field trip to the Guiana Shield each year (with 2-4 undergraduates and many Amerindians). He travels into difficult areas that are unknown to science and specializes in climbing the tepuis of Guyana. He is an expert in the Bean family (Leguminosae). This past year David collected 1403 numbers in Surinam and Guyana. David's salary is paid by UNCA, and his field expenses are covered by grants and funds raised by students. [David (right) is famous for his difficult field work; here he is with Mark Robbins (birds, Univ. Kansas), Claudis Perry (Patamona) and James (WaiWai).]



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Passiflora candida (Poepp. & Endl.) Mast., from the Wassari Mountains.
H.D. Clarke 8520, the first collection of this species in Guyana.

REPORT

Biological Diversity of the Guiana Shield (BDG)

Activities 1 January to 31 December, 2004

The Biological Diversity of the Guiana Shield Program (BDG) 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 (Zoology, Entomology, Anthropology), other bureaus at SI (STRI, NZP, NMAH, NASM, CRC), and we collaborate with nearly 100 scientists around the world. In 2004 we awarded six grants for field expeditions and provided logistical support to twelve specialists who traveled to NMNH to identify specimens. Highlights of the year include:

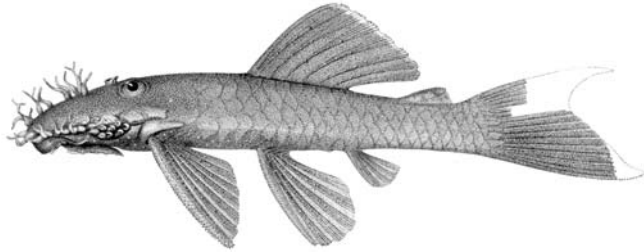
1. Most important is probably the completion of the data basing and bar coding of the plant specimens in the US National Herbarium that were collected in the three Guianas (minus one family we cannot finish because someone has it squirreled away). The total no. of records is 108,845, which consists of 46,125 BDG collections, and 62,720 historical specimens all databased and barcoded by BDG.
2. We helped move and organize the plant and animal collections in the **new addition to the Biodiversity Centre** in Guyana.
3. The “Phytogeography of the Kaieteur Falls, Potaro Plateau, Guyana; floral distributions and affinities” (Kelloff & Funk, 2004), Smithsonian Plant Collections, Guyana: 1990-1991, Tim McDowell (Hollowell et al., 2004) were published.
4. The “Checklist of the Terrestrial Vertebrates of the Guiana Shield” is in final edit.



The program's databases now contain 108,845 plant records and 10,439 fish records. Bird, Mammal, Herpetofauna, and Lepidoptera records, although supported by BDG, are maintained by the respective units here at NMNH. In 2004 we focused on reducing our plant and animal specimen backlog. Various specialists were invited to identify specimens in their area of expertise. Tactics for reducing the plant backlog have been to sort the collections with less than a case of specimens to the family level and to identify the specimens in-house. The backlog of specimens has been reduced from over 30 to 19 cases. The bulk of the plant backlog is attributed to our last two resident collectors (Henkel and Clarke) and to recent collectors who continue to gather plant specimens in the Guianas and Venezuela, often using their own funds. Contract money was made available to identify previously collected Lepidoptera specimens and to sort and identify ant specimens.

In the coming year our collecting activities will continue to expand within the Guiana Shield area increasing our knowledge in this region. In the summer/fall of 2005 we are sending three expeditions to French Guiana: ants, spiders, and birds. Each of these trips will focus on 3-5 areas where we do not have sufficient collections of these organisms but where we do have data on plants. These trips will provide information for comparison of diversity patterns among these groups. In addition, we plan to collaborate on an expedition to Surinam (ants in collaboration with CI). We have an invitation to start a collecting program in terrestrial gastropods, but that is dependent on funding. All of the collectors who

work through the BDG are required to process their collections as quickly as is reasonably possible and to provide agreed upon specimens and copies of reports and publications for the host country, as well as



Ancistrus lithurgicus Eigenmann 1912.

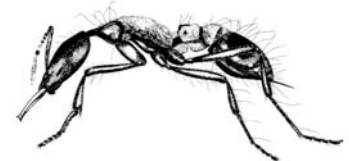
training for students and public lectures. We plan on having an intern work on the checklist of the **fishes** of the Guiana Shield, something we can do now that the new book on South American Fishes has been published (pictured is a catfish endemic to the Guiana Shield). Finally, one NSF proposal that we were included in was turned down last year and two NSF proposals that include field work in the Guiana Shield area in collaboration with BDG

should be submitted this year.

Specimen work and Databases.

Lepidoptera To date **8235** lepidoptera specimens have been barcoded, databased, and sorted to family, **1800** microlepidoptera have been pinned, identified and barcoded and are ready for data basing; approximately **3000** microlepidoptera are pinned and waiting for identification. After this year (2005) all Lepidoptera collected in Guyana under the BDG Program will have been processed, databased, and identified (to species where possible).

Ants BDG to assisted in the processing of the nearly **75,000** specimens collected in leaf-litter during 2002. The results of the sorting to date, has produced **25,927** worker specimens from **44 genera** and **230 species**. This material is being databased as processing proceeds.



Strumigenys

Plants Specimens determined: **1,913**; specimens sent as gifts/loans for determination: **1,055** (this count does not include determinations from curators and specialist at the U.S. National Herbarium); duplicates sent out as exchange: **2,480** and **3,513** returned to the host institution. Approximately **3,309** single (new determinations) and ca. **9,811** duplicate labels have been prepared. **1,773** sheets (new mounted specimens) have been barcoded and inserted into the U.S.

National Herbarium. **13,023** sheets (historical collections from the U.S. National Herbarium) have been inventoried and barcoded. Total plant specimens collected for 2004: approximately **3,263** (ca. **16,416** sheets). The BDG Program continues to barcode and database US plant specimens from the *Venezuelan Guayana* area. To date 105, or about 46%, of the families have been processed. Based on funding, the expected completion of this project is 2006.

Summary of Plants Collected and Processed by BDG
prepared by CLK 31 December 2004

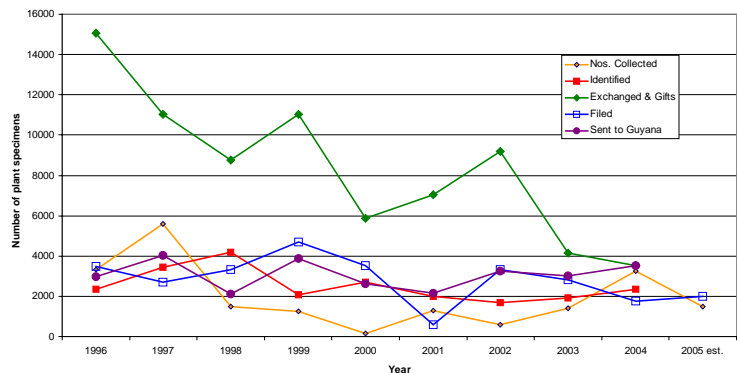


Figure 1: Summary of plants collected and processed by BDG

Expeditions (Surinam): Clarke plant number series: (11036 – 11384) Central Suriname Nature Reserve, with J. Rhodes and the CI RAP team, 22 February – 22 March; 349 numbers, 2,094 sheets.

Expeditions (Guyana): Clarke plant number series: (11385 - 12438) Mt. Maringma (2110 m) Ataro River, with students Erin Tripp, Stephen Stern, Josh Kelly, as well as Claudius Perry (Patamona), Diana Gittens (Guyanese counterpart), 1 June – 12 July 2004: 1,054 numbers; 3,162 sheets.

Redden plant number series: (1455 - 3193) Imbaimadai, Pakaraima Mts, Mazaruni River, Marshall Falls, Gunns Landing with M. Lyle, Romeo Williams, Claudius Perry, C. Paul (Guyanese counterpart), 20 January – 4 May 2004: 1,739 numbers, 10,434 sheets

Redden plant number series: (3194 - 3314) Mazaruni River, with Romeo Williams, R.S. Williams; L. Williams; E. Boodram (Guyanese counterpart), 28 September – 18 October 2004: 121 numbers, 726 sheets.

Specimens returned to Guyana:

3,513 **plant** specimens (BDG)

280 **fungi** specimens (Henkel)

11 species (numerous individuals) of **ants**; **3** holotypes of *Acropyga* and **2** holotypes of Mealybug species

163 specimens of Noctuidae and Lycaenidae (**moths and butterflies**)

120 **fish** collections sent to NMNH for identification

Post-Doctorial Fellowship:

The BDG and the Department of Entomology co-sponsored Dr. John LaPolla as a post-doctorial fellow to work on the ant collections from the Guiana Shield beginning in October.

Other Activities:

1) Two *publications central to BDG activities* were produced: Phytogeography of the Kaieteur Falls, Potaro Plateau, Guyana; floral distributions and affinities” (Kelloff & Funk, 2004), and Smithsonian Plant Collections, Guyana: 1990-1991, Tim McDowell (Hollowell et al., 2004).

2) The *Checklist of the Terrestrial Vertebrates of the Guiana Shield* (Hollowell & Reynolds, eds.) is in final edit. This is the result of a collaboration of specialists from Smithsonian, the Royal Ontario Museum, the Museo de Historia Natural La Salle, Caracas, Venezuela, the Museo Paraense Emílio Goeldi, Belém, Brazil, and the University of Guyana.

3) In FY04 Phillip DaSilva, Dean, Faculty of Natural Science, University of Guyana was brought to NMNH to work on his *mangrove research*.

4) Kelloff assisted the Centre for the Study of Biological Diversity (CSBD), Guyana, with developing the *new area for wet collections*. With help from UG students and staff she painted, built shelving units, moved the fish collections into the new space (18 shelving units, ca. 500 jars), and moved the field collected buckets of fish into the new prep room (ca. 20 5-gal. buckets and 2 45-gal drums).

5) The mounting of plant specimens for the Guyana National Herbarium continues at the Centre for the Study of Biological Diversity (CSBD, Guyana). UG pays for the mounters but BDG supplies all mounting materials.



Currently the Guyana National Herbarium has about 41,000 mounted and filed specimens. This is the largest and best maintained collection in the country.

6) Kelloff, with help from UG students and staff, *cleaned up the herbarium*. They had the herbarium cases painted, locks replaced, and countertops fitted in the Guyana National Herbarium (CSBD). They cleaned out old storage areas and removed broken cases, furniture, and cardboard boxes. Kelloff processed 350 fungi collections and filed them in the GNH.

7) H. Carnvali (CICY) visited US to work on unidentified *Orchidaceae* (plant) specimens for the BDG Program and other botany staff.

8) At the *Botany 2004 meeting* in Snowbird, Utah, BDG was well represented. Kelloff presented a paper on Kaieteur National Park, Guyana; M. Strong presented one on the species of *Rhychospora* in the Guianas; Funk presented a poster co-authored with T. Hollowell, K. Richardson, and S. Ferrier on the Survey Gap Coding method.

9) Hollowell presented a *talk at NZP* on “GIS as a Biodiversity Collections Tool in the Guiana Shield” as part of a session organized by the National Zoo’s Amazon GIS team for the Inter-American Development Bank’s (IDB) Environment Week meetings in the Washington area.

10) Clarke and a few of his students visited US and *identified general collections* from plant families collected by the Clarke expeditions.

11) Redden (George Washington U.) *identified Fabaceae* (beans) family for the BDG Program from the Redden / Lyle expedition.

12) M. Sewell identified Aquifoliaceae.

13) Hollowell and E. Farr met with the *staff from CRIA* (Sao Paulo, Brazil) to discuss the development of a web-based format for collection data, 22-26 June 2004. During their trip they made presentations to students and faculty at the University of Sao Paulo, Campinas, and upon their return they presented their findings to staff at NMNH.

14) A *container of supplies*, material, and specimen shelving/herbarium cases was sent to the Guyana. This shipment contained: 25 herbarium cases; 13 boxes of *National Geographic* (complete set: 1960-2003); 32 boxes of *Biological Abstracts*; 10 boxes of other journals and books

donated from the NMNH Library; 1 box of reprint storage boxes; 2 boxes of “genus” covers for herbarium specimens; 7 wooded glass slide storage units; 14 gray metal shelving units (includes: 70 shelves, 56 uprights, and hardware); and 12 herbarium bulky fruit boxes. All the material in the container was donated by scientists or administrative units at NMNH.

15) Kelloff gave an invited talk on the flora and fauna of Kaieteur National Park to the “Friends of Kaieteur” during her November visit to Guyana.

Collaborations

1) *USAID*: USAID provided the funding for the building extension of the Centre for the Study of Biological Diversity, University of Guyana. This expansion has doubled the collection space of the Centre allowing for at least another 10 - 15 years of growth.

2) *Flora of the Guianas*: The BDG is one of the major sources of recent collections relied on by specialists preparing family treatments for the Flora of the Guianas project. The Flora of the Guianas project, which started in 1984, aims at publishing treatments of plant families occurring in the region. It is a cooperative project involving organizations focusing on systematic botany including Berlin, Cayenne (IRD), Georgetown (Guyana), Kew Gardens, New York Botanical Garden, Paramaribo, Paris,



Utrecht, and the US National Herbarium (Smithsonian). The Editorial Office in charge of publication is housed at the NHN-Utrecht and the volumes are published by Kew. Larry Skog serves as the BDG representative to the Flora project and he attended the annual meeting.

3) *Preliminary Checklist of the Plants of the Guiana Shield*: This checklist is the product of a collaboration between the Biological Diversity of the Guiana Shield Program and the Flora of the Venezuelan Guayana Project (Missouri Botanical Garden - MO). The database for the *Checklist of the Plants of the Guianas* (Boggan *et al.*, 1992, 1997) and the database drawn from treatments published in the *Flora of the Venezuelan Guayana* (Steyermark, Berry, and Holst, 1995 – 2003) were used to produce a preliminary combined checklist for all flowering plant families from Acanthaceae through Lythraceae. The BDG Program has currently completed and placed on the web all families through Plumbaginaceae. The last two volumes will be added when they are available, probably during 2005 or early 2006.

4) *Public Service*: Father Charles L. Roland takes care of an orphanage in Imbaimadai, a remote region of Guyana. Because of its isolation and the difficulties of getting anything to this area, the children of the orphanage are sometimes forgotten. The Biological Diversity of the Guiana Shield Program has facilitated the collection of food, clothes, toys, and books (ca. 15 boxes) and have sent them to Imbaimadai for the children of the orphanage and the people of Father Roland's parish that were in need. Our efforts were well received and as Father Roland writes "Those gifts have meant so much to us, as the children here never receive any gifts".

5) *Teaching/Training*: Fifteen students from the University of Guyana participated in a special three-day course in bird taxonomy and taxidermy as part of the collaboration between UG and the Smithsonian Institution's Biological Diversity of the Guiana Shield Program.



PUBLICATIONS 2004: (see web site for a full list: www.mnh.si.edu/biodiversity/bdg/bdgpublish.html)

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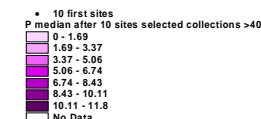
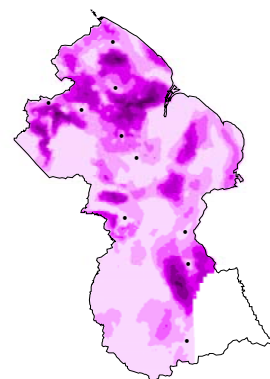
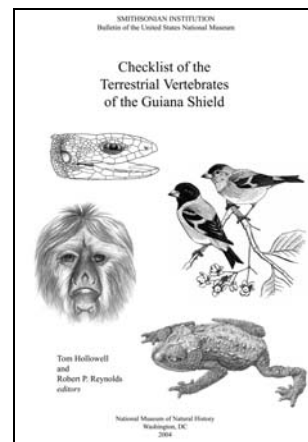


Figure 2: 10 recommended plant collecting sites based on past collections and environmental factors (Funk, Richardson & Ferrier, in press).

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APPENDIX A: List of collaborators

PLANTS:

- Dr. Pedro Acevedo, NNMH, Smithsonian Institution
Dr. T. Ahti, University of Helsinki, Finland
Mr. Mac Alford, Cornell University, Ithaca, New York
Dr. Lucile Allorge, Museum National d'Histoire Naturelle, Paris, France
Dr. Frank Almeda, California Academy of Sciences
Dr. Christiane Anderson, University of Michigan, Michigan
Dr. William Anderson, University of Michigan, Michigan
Dr. Daniel F. Austin, Arizona-Sonora Desert Museum, Tuscon
Dr. Gerardo Aymard C., UNELLEZ-Guanare, Venezuela
Dr. Michael J. Balick, New York Botanical Garden, New York
Dr. Harvey Ballard, Ohio University, Athens OH
Dr. C.C. Berg, the Norwegian Arboretum and Botanical Garden, Norway
Dr. Paul Berry, University of Wisconsin, Madison
Mr. Bruno Bordenave, Museum National d'Histoire Naturelle, France
Dr. J. Brandbyge, Denmark
Dr. Ricardo Callejas, Universidad de Anitoquia, Colombia
Dr. Germán Carnevali, Centro de Investigación Científica de Yucatán, Mexico
Dr. Andre Chanderbali, University of Florida, Gainesville
Mr. Christopher Chin, Brandeis University
Dr. Eric Christenson, Sarasota, Florida
Dr. H. David Clarke, University of North Carolina at Asheville
Dr. George Cremers, Centre ORSTOM-Cayenne, French Guiana
Dr. Thomas Croat, Missouri Botanical Garden, St. Louis
Dr. Douglas Daly, New York Botanical Garden, New York
Mr. Phillip DaSilva, University of Guyana
Dr. Alfonso Delgado-Salinas, Instituto de Biología, UNAM, Mexico
Dr. Piero Delprete, National Herbarium of the Netherlands
Dr. Paula DePriest, NNMH, Smithsonian Institution
Dr. Pierre Detienne, Centre Technique Forestier Tropical, France
Dr. Laurence J. Dorr, NMNH, Smithsonian Institution
Dr. Robert Faden, NMNH, Smithsonian Institution
Dr. Paul R. Fantz, North Carolina State University, North Carolina
Dr. Christian Feuillet, NMNH, Smithsonian Institution
Dr. J. Floreschütz-de Waard, Institute of Systematic Botany, Utrecht, The Netherlands
Dr. James P. Folsom, Huntington Botanical Gardens, California
Dr. Renee H. Fortunato, Instituto de Recursos Biologicos, Argentina
Dr. S.F. Glassman, Field Museum of Natural History, Illinois
Dr. Paul Goetghebeur, Laboratory of Plant Morphology, Systematics, and Ecology, Belgium
Mr. Aaron Goldberg, NMNH, Smithsonian Institution
Dr. Peter Goldblatt, Missouri Botanical Garden, St. Louis
Dr. Eric Gouda, Institute of Systematic Botany, The Netherlands
Dr. S.R. Gradstein, Institute of Systematic Botany, The Netherlands
Dr. J.J. de Granville, Centre ORSTOM-Cayenne, French Guiana
Ms Susan Grose, University of Washington, Seattle
Dr. Micheline Guerlesquin, Laboratoire de Biologie vegetate et de Phytogeographie, Institut de Recherche, Angers, France
Dr. Eric Hagsater, Asociacion Mexicana de Orquideologia, A.C., Mexico
Dr. Bertel Hansen, Botanical Museum and Herbarium, Denmark
Dr. Robert Haynes, University of Alabama, Alabama
Dr. Andrew Henderson, New York Botanical Garden, New York
Dr. Pat Herendeen, George Washington University, Washington, DC
Dr. Terry Henkel, Humboldt State University, California
Dr. S. Hill, Illinois Natural History Survey, Champaign, Illinois
Dr. Michel Hoff, Centre ORSTOM-Cayenne, French Guiana
Mr. Bruce Hoffman, University of Hawaii
Dr. Lauritz B. Holm-Nielsen, University of Aarhus, Denmark
Mr. Bruce Holst, Selby Botanical Garden, Florida
Dr. Charles Horn, Newberry College, South Carolina
Ms Deidre Jafferally, Guyana
Dr. M.J. Jansen-Jacobs, Institute of Systematic Botany, The Netherlands
Dr. C. Jeffrey, Royal Botanic Gardens, England
Dr. E.J. Judziewicz, University of Wisconsin, Stevens Point
Dr. Jacquelyn Kallunki, New York Botanical Garden, New York
Dr. Helen Kennedy, University of British Columbia, Canada
Mr. Josh Kelly, University of North Carolina at Asheville
Dr. Robert Kiger, Hunt Institute for Botanical Documentation, Pennsylvania
Dr. Robert Kral, Botanical Research Institute of Texas, Fort Worth

- Dr. W. John Kress, NMNH, Smithsonian Institution
 Dr. Job Kuijt, University of Victoria, Canada
 Dr. B.E. Leuenberger, Botanischer Garten und
 Botanisches Museum Berlin-Dahlem, Germany
 Mr. Ronald Liesner, Missouri Botanical Garden, St. Louis
 Dr. J.C. Lindeman, Institute of Systematic Botany, The
 Netherlands
 Dr. E. Lleras-Perez, Centro Nacional de Recursos
 Geneticos, Brazil
 Dr. Pierre-Andre Loizeau, Conservatoire et Jardin
 Botaniques, Switzerland
 Dr. A. Lucking, University of Ulm, Germany
 Dr. R. Lucking, University of Ulm, Germany
 Dr. James L. Luteyn, New York Botanical Garden, New
 York
 Dr. P.J.M. Maas, Institute of Systematic Botany, The
 Netherlands
 Dr. H. Maas-van de Kamer, Institute of Systematic
 Botany, The Netherlands
 Dr. Luis Marcano-Berti, The Netherlands
 Dr. Richard H. Maxwell, Indiana University Southeast,
 Indiana
 Mr. Greg McKee, NMNH, Smithsonian Institution
 Ms Krista McGuire, University of Michigan
 Ms Tsitsi McPherson, University of Connecticut
 Dr. Willem Meijer, T.H. Morgan School of Biological
 Sciences, Kentucky
 Dr. Fabian Michelangeli, American Museum of Natural
 History, New York
 Dr. James Miller, Missouri Botanical Garden, St. Louis
 Dr. J.D. Mitchell, New York Botanical Garden, New
 York
 Dr. Scott Mori, New York Botanical Garden, New York
 Dr. Gilberto Morillo, Instituto Botanico, Venezuela
 Dr. Thomas Morley, University of Minnesota, Minnesota
 Dr. Michael Nee, New York Botanical Garden, New York
 Dr. Angela Newton, The Natural History Museum,
 London
 Dr. Dan H. Nicolson, NMNH, Smithsonian Institution
 Dr. T.D. Pennington, Royal Botanic Gardens, England
 Mr. Darin Pennys, University of Florida, Gainesville
 Dr. Paul Peterson, NMNH, Smithsonian Institution
 Dr. John J. Pipoly, Fairchild Tropical Garden, Florida
 Dr. Odile Poncy, Museum National d'Histoire Naturelle,
 France
 Dr. G.T. Prance, Royal Botanic Gardens, England
 Dr. W. Punt, Institute of Systematic Botany, The
 Netherlands
 Dr. Indarjit Ramdass, Guyana EPA
 Ms Karen Redden, George Washington University,
 Washington DC
 Dr. Susanne Renner, Botanische Institute, Ludwig-
 Maximilians-Universität, Munich, Germany
 Dr. Harold Robinson, NMNH, Smithsonian Institution
 Dr. N.K.B. Robson, British Museum (Natural History),
 England
 Dr. Wm. A. Rodrigues, Universidade Federal do Parana,
 Brasil
 Dr. A.C. de Roon, Institute of Systematic Botany, The
 Netherlands
 Dr. Daniel Sabatier, Centre ORSTOM-Cayenne, French
 Guiana
 Dr. Claude Sastre, Museum National d'Histoire Naturelle,
 France
 Ms Coralie Simmons, UNDP, Guyana
 Dr. B. Simpson, University of Texas, Austin
 Dr. H.J.M. Sipman, Botanischer Garten und Botanisches
 Museum Berlin-Dahlem, Germany
 Dr. L.E. Skog, NMNH, Smithsonian Institution
 Dr. F. Skov, National Environmental Research Institute,
 Denmark
 Dr. J. Spatafora, Oregon State University, Corvallis
 Dr. Chelsea Specht, Post-Doctoral Fellow, NMNH,
 Smithsonian Institution
 Dr. C.A. Stace, University of Leicester, England
 Dr. F.W. Stauffer, Herbario Nacional de Venezuela,
 Caracas
 Dr. Bruce Stein, The Nature Conservancy, Virginia
 Dr. S.K. Stenroos, University of Turku, Finland
 Mr. Stephen Stern, University of North Carolina at
 Asheville
 Dr. D.W. Stevenson, New York Botanical Garden, New
 York
 Dr. Mark T. Strong, NNMH, Smithsonian Institution
 Dr. Charlotte Taylor, Missouri Botanical Garden, St.
 Louis
 Dr. W. Wayt Thomas, New York Botanical Garden, New
 York
 Dr. Carol A. Todzia, University of Texas, Texas
 Ms Katarina Topalov, University of Novi Sad, Yugoslavia
 Ms Erin Tripp, Duke University
 Dr. Rytas Vilgalys, Duke University, North Carolina
 Dr. Dieter Wasshausen, NNMH, Smithsonian Institution
 Dr. Anna Weitzman, NMNH, Smithsonian Institution
 Dr. Henk van der Werff, Missouri Botanical Garden, St.
 Louis
 Dr. Marga Werkhoven, National Herbarium of Suriname,
 Paramaribo
 Dr. D.R. Windler, Towson State University, Maryland
 Dr. John Wiersema, USDA ARS, Beltsville, Maryland
 Ms Rebecca Yahr, Archbold Biological Station, Florida
 Dr. E.M. Zardini, Missouri Botanical Garden, St. Louis
- ANIMALS**
Birds:
 Dr. Michael Braun, LMS, Smithsonian Institution
 Mr. Christopher M. Milensky, NMNH, Smithsonian
 Institution

Mr. Brian O'Shea, The Field Museum, Chicago, Illinois
Mr. Nathan Rice, Natural History Museum, University of
Kansas
Dr. Mark Robbins, Natural History Museum, University
of Kansas
Mr. Brian K. Schmidt, NMNH, Smithsonian Institution

Mammals:

Dr. Louise Emmons, NMNH, Smithsonian Institution
Dr. Mark Engstrom, Royal Ontario Museum, Toronto,
Canada
Dr. Burton Lim, Royal Ontario Museum, Toronto, Canada
Dr. Robert Sussman, Washington University, St. Louis,
Missouri
Dr. Don Wilson, NMNH, Smithsonian Institution
Dr. Barth Wright, Post-Doctoral Fellow, NMNH,
Smithsonian Institution
Ms Kristin Wright, University of Illinois, Champaign,
Illinois

Fish:

Ms Jackie Arjoon, University of Guyana
Dr. Johathan W. Armbruster, Auburn University,
Alabama
Dr. Godfrey Bourne, University of Missouri, St. Louis
Mr. Michael Hardman, University of Illinois, Champaign,
Illinois
Mr. Jason H. Knouft, Natural History Survey, Champaign,
Illinois
Dr. Lawrence M. Page, Florida Museum of Natural
History, Gainesville, Florida
Dr. Michael E. Retzer, Illinois Natural History Survey,
Champaign, Illinois
Mr. Mark H. Sabaj, Illinois Natural History Survey,
Champaign, Illinois
Dr. Robert Schmidt, Simon's Rock Bard College,
Barrington, Massachusetts
Mr. Mike Tamassar, Guyana
Dr. Richard Vari, NMNH, Smithsonian Institution
Dr. Stan Weitzman, NMNH, Smithsonian Institution

Amphibians and Reptiles:

Dr. Godfrey Bourne, University of Missouri, Saint Louis
Dr. Maureen Donnelly, Florida International University
Dr. Traci Hartsell, NMNH, Smithsonian Institution
Dr. Ross MacCulloch, Royal Ontario Museum, Toronto,
Canada
Mr. Waldyke Prince, Iwokrama International Centre,
Guyana
Dr. Robert Reynolds, NMNH, USGS Patuxent Wildlife
Research Center
Mr. Mike Tamassar, University of Guyana
Dr. Graham Watkins, Charles Darwin Foundation,
Galapagos, Ecuador

Ms Cynthia Watson, University of Missouri, Saint Louis

Insects:

Mr. Marc A. Branham (fireflies) Ohio State University
Mr. Keith David, (Lepidoptera) University of Guyana
Dr. Don Davis (micro-Lepidoptera), NNMH, Smithsonian
Institution
Dr. Paul Eggleton (termites), Natural History Museum,
London
Dr. Oliver Flint (Trichoptera, caddisflies), NNMH,
Smithsonian Institution
Mr. Steve Fratello (Lepidoptera: butterflies), West
Babylon, New York
Dr. Donald Harvey (Lepidoptera: swallowtail butterflies),
NNMH, Smithsonian Institution
Dr. T.J. Henry (Orthoptera: grasshoppers and crickets),
NMNH, USDA ARS
Dr. Volker Hollmann-Schirmacher (Diptera), NMNH,
Smithsonian Institution
Dr. Norman Johnson (Parasitic Hymenoptera: wasps),
Ohio State, University, Columbus, Ohio
Dr. Matthew Kane (termite gut flora & fauna), National
Science Foundation
Dr. John LaPolla (ants), Post-Doctoral Fellow, NMNH,
Smithsonian Institution
Dr. J.A. Lewis (nonparasitic Hymenoptera), NMNH,
USDA ARS
Dr. Wayne Mathis (Diptera; flies), NMNH, Smithsonian
Institution
Dr. Ulrich Mueller (ants), University of Maryland
Dr. D.A. Nickle (Isoptera: termites), NMNH, USDA ARS
Dr. Virginia Power (Lepidoptera: swallowtail butterflies),
NMNH, Smithsonian Institution
Dr. Ted Schultz (ants), NMNH, Smithsonian Institution
Dr. M.A. Solis (Lepidoptera: moths), USDA ARS,
Beltsville, Maryland
Dr. Mike Sharkey (Hymenoptera), University of
Kentucky
Dr. John W. Wenzel (social wasps), Ohio State University

Spiders:

Mr. Todd A. Blackledge, Ohio State University
Dr. J. Coddington, NMNH, Smithsonian Institution
Dr. Gustavo Hormiga, George Washington University,
Washington DC
Mr. S. Larcher, NMNH, Smithsonian Institution
Dr. Jeremy Miller, NMNH, Smithsonian Institution
Dr. Dawn Southard, NMNH, Smithsonian Institution

Zoological Parks:

Dr. Ilze Bergins, National Zoological Park, Smithsonian
Institution
Dr. James Murphy, National Zoological Park,
Smithsonian Institution

Mr. Charles Seigel, National Zoological Park,
Smithsonian Institution

ANTHROPOLOGY:

Ms Janette Bulkan, Yale School of Forestry and
Environmental Science
Ms Stephanie Huelster, University of Wisconsin, Madison

CONSERVATION:

Dr. Leeanne Alonso, Conservation International,
Washington DC
Ms Lisa Famolare, Conservation International,
Washington DC
Dr. Simon Ferrier, New South Wales National Parks and
Wildlife Service, Australia
Dr. Karen Richardson, University of Queensland,
Australia
Gen. Joseph Singh (Ret.), Conservation International,
Guyana

**GUYANA PARATAXONOMY AND FIELD
CONSERVATION:**

Mr. Romeo DeFritas, Guyana Marine Turtle Conservation
Society
Mr. Audley James, Guyana Marine Turtle Conservation
Society
Mr. Regis James, Guyana
Mr. Claudius Perry, Guyana
Mr. Romeo Williams, Guyana

NATIONAL MUSEUM OF AMERICAN HISTORY:

Mr. David Shayt, Division of Cultural History
Mr. David Todd, Division of the History of Technology

28 March 2005
- END -