

MEMORANDUM

31 May 2007

TO: Paul Risser, Hans Sues, and the Biology Chairs, NMNH

CC: Cristián Samper, Ira Rubinoff, Scott Miller, Sue Fruchter, and Wendy Wiswall

FROM: V. Funk, Director, Biological Diversity of the Guiana Shield Program (BDG)

RE: 2006 BDG Annual Report

The annual report for 2006 is attached. The report is based on our activities for the calendar year 2006; however, the budget figures are for FY06.

The lead article in the most recent issue of the Department of Botany *Plant Press* is about the BDG program. It is attached in lieu of an extended introduction to the program. (See **APPENDIX A**: Funk, V.A. 2007. The Guiana Shield: 20 years and counting. *The Plant Press* 10 (2): 1, 12-15).

As always, thanks go to the OD at NMNH for the continued funding (and of course to Congress for the Global Change money many years ago). Also, the Program could not run without the help of Carol Kelloff the Assistant Director of BDG, and our very capable part-time contractors, Marilyn Hansel, Sara Alexander, and John Dodge and our friends and colleagues in Guyana and across the Guiana Shield.

An electronic version of this report, without the budget information, will be sent to our many collaborators.



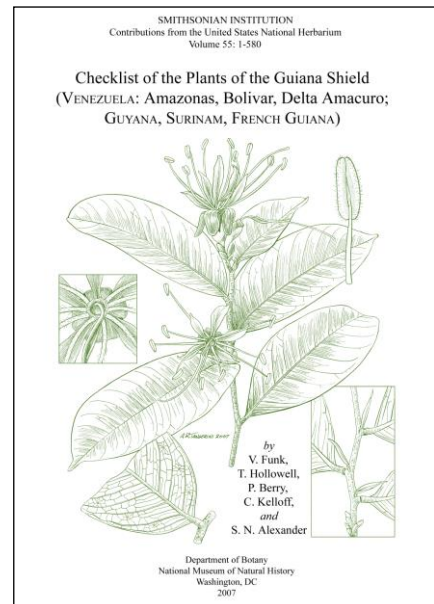
ANNUAL REPORT 2006
 Biological Diversity of the Guiana Shield (BDG)
Activities 1 January to 31 December, 2006
<http://mnh.si.edu/biodiversity/bdg>

The goal of the Biological Diversity of the Guiana Shield Program (BDG) is to document, understand, and conserve the biological diversity of the Guiana Shield area. In line with that goal BDG continues to work with specimens from the Guiana Shield area of northeastern South America. We collect, sort, identify, mount, inventory, barcode, and file all plant specimens collected by the Program and we assist scientists from other departments in NMNH (Zoology, Entomology, Anthropology) in their collecting and processing efforts. We interface with other bureaus at SI (STRI, NZP, NMNH, NASM, CRC), and we collaborate with over 300 scientists around the world. We publish scientific papers and books as well as items for more general use and we train and educate staff and students from the Shield area.

HIGHLIGHTS

The Database: Barcoding of the plant specimens in the US National Herbarium continues with 29,708 records added to the database in 2006. Currently, the total number of records is 155,095 (50,052 BDG collections, 95,868 historical specimens, 9,175 misc. collections) all databased and barcoded by BDG. The Program has finished databasing and barcoding all known plant specimens collected in the Guiana Shield and housed in the US National Herbarium (historical specimens) and we are focusing on cleaning and geo-referencing those data. To date the Program has 125,387 records of plant collections cleaned and geo-referenced from the Guiana Shield. Unfortunately, many of the data analysis projects we had planned are stalled because of a lack of a data manager.

The *Checklist of the Plants of the Guiana Shield* is in press and scheduled to be published during the summer of 2007. This checklist covers all vascular plants known to occur in the Guiana Shield region of northeastern South America. It includes 256 vascular plant families; 2,070 genera, and 13,357 distinct species. There are 6,788 species listed from Amazonas (Ven), 6,668 from Bolívar (Ven), 1,651 from Delta Amacuro (Ven), 7,117 from Guyana, 4,995 from Surinam, and 5,433 from French Guiana. Less than 297 (2.2%) are estimated to be introduced and naturalized. In the three Guianas there are 9,179 species and 10,038 are in the Venezuelan Guayana. With 5,970 species found in both areas the overlap is 45%. Within the checklist area 3,209 species are found only in the Guianas and 4,068 are found only in the Venezuelan Guayana. The families with the largest number of species are the Leguminosae (beans) and Orchidaceae (orchids) each of which has over 1,000 species. This plant checklist is a companion to the recently published *Checklist of the Terrestrial Vertebrates of the Guiana Shield* (Hollowell and Reynolds, eds. December 2005). Together they represent a new



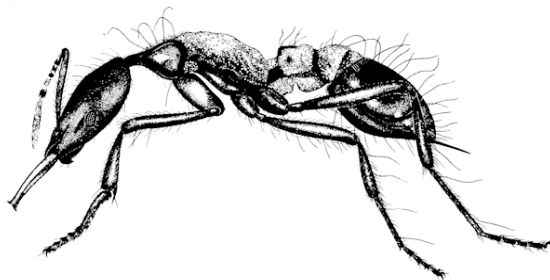
research and conservation resource which highlights three critical facets of taxonomic work: research, collections, and expeditions.

During 2006, despite a lower budget, BDG was able to once again have a 6 month resident collector for plants in Guyana. Dr. Karen Redden is a postdoctoral fellow for Dr. Pat Herendeen at George Washington University. Dr. Herendeen was very interested in obtaining collections from the Guiana Shield area so we agreed that he would pay Dr. Redden's salary from his NSF grant and BDG would pay the field expenses. Karen has made about six expeditions in Venezuela and Guyana and is headed to Guyana and French Guiana in 2007. She has made about 500 collections this year, most with silica collected leaves for DNA work, and has five months of trips planned for 2007. We are using the BDG data base to determine potential collecting sites so we can test the 'survey gap analysis' method.

The Centre for the Study of Biological Diversity, University of Guyana, Georgetown, Guyana has been making great strides in establishing a viable biodiversity program. For instance, they have begun a monthly lecture series: Carol Kelloff (SI-Botany) and Karen Redden (GWU) have presented talks during this year. The Centre is also collaborating on a Wetland Project with UNDP and this project has provided a receptionist for the Centre. Calvin Bernard, Lecturer (UG) is now the Manager of the Centre and has an office in the building. Students from the Faculty of Natural Science are working with the Scientific Officers to maintain and curate the collections.

The BDG Program has hired a graduate student, Sara Alexander, as a part-time contractor to fill in as the data manager. Because Sara is p/t she has to concentrate on the practical aspects of the data managers position and spends most of her time producing labels and notebooks, geo-referencing the herbarium entries and assisting with information needed so that we can continue to maintain the *Smithsonian Plant Collections, Guyana* series. We are still unable to process requests for data and geo-referencing the herbarium entries has been slow. Sections of the website were updated to correct for errors and to update contact information but because our data manager left in November 2005 we have had no major web site updates since that time.

SPECIMEN WORK AND DATABASES.



Strumigenys

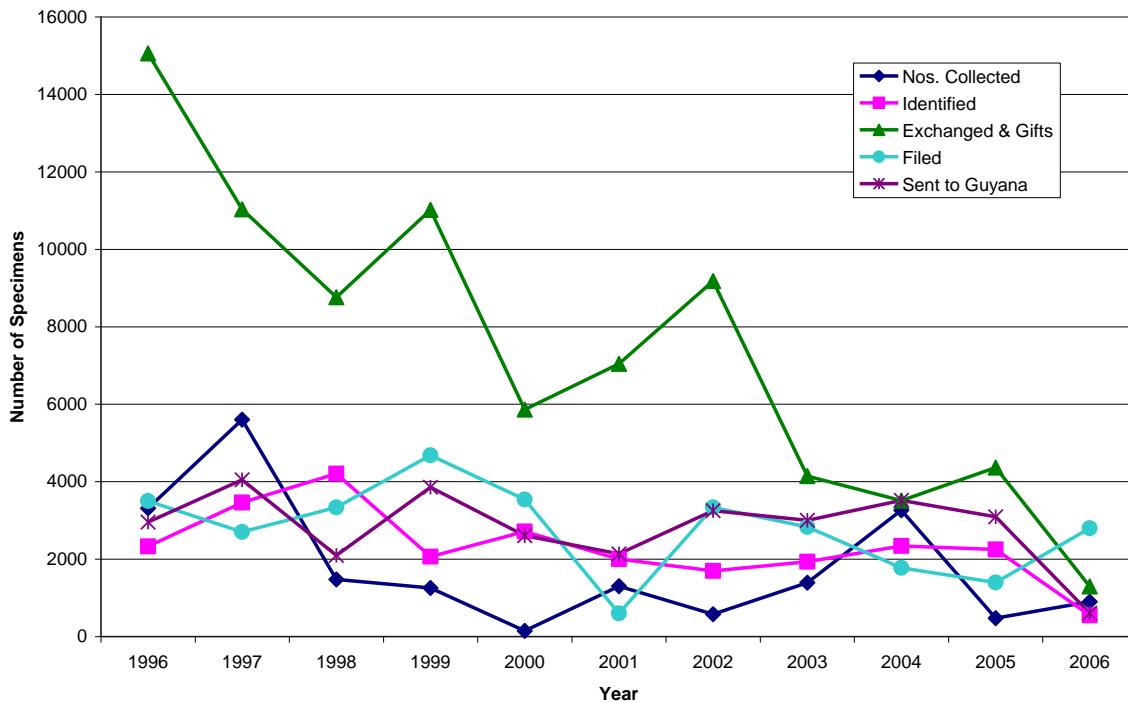
Animals – Insects - Ants:

As of this report all of the specimens of Ants previously collected by the Schultz team (ca. 75,000) were identified, barcoded, databased, and sorted to family.

Animals – Zoology – Birds:

The total for all bird expeditions to date: bird specimens collected ca.4,302 specimens and 5,923 tissue samples have been identified, databased, sorted to family and filed or stored.

Summary of Plants Collected and Processed by BDG
prepared by CLK 31 December 2006

**Plants** (during 2006):Specimens determined: **546**Specimens sent as gifts/loans for determination: **274**Duplicates sent out as exchange: **1019**Returned to the host country: **823**New collections: **900** single numbers, excluding duplicate sheets (new collections)Duplicate Labels prepared: ca. **3,500**Sheets barcoded and inserted into the US National Herbarium: **2,800** (newly mounted)Sheets that have been inventoried and barcoded: **9,528** (historical collections from US)Total plant specimens collected for 2006: approximately **777** (**2,603** sheets).

All plant specimens from the three Guianas, housed in US National Herbarium have been inventoried and all but about 300 have been barcoded. BDG has **completed** the barcoding and databasing of the US plant specimens from the Venezuelan Guayana area.

EXPEDITIONS IN 2006**Plants:**

Acevedo (SI. Botany) plant number series: (14577 – 14578): Montagne de Kaw, Camp Caiman, French Guiana with F. Crozier, J.S. Decanet, C. Delnatte, and C. Girod, 30 Jan 2006, 2 collection, 3 sheets.

Redden (Post-doc, GWU) plant number series: (3799-4298): Kaieteur National Park, Potaro River, Eagle Mts. and Madhia, Guyana with C. Perry, K. Wurdack, K. Glennon, E. Liverpool, P. Benjamin, C. Hinchliff, 28 August – 20 Sept 2006: 500 collections and 1500 sheets.

Wurdack (SI-Botany) number series: (4127-4402) Kaieteur National Park, Potaro River, Eagle Mt., Mahdia, Guyana with C. Perry, K. Redden, K. Glennon, E. Liverpool, P. Benjamin, C. Hinchliff, 27 Aug - 17 September 2006: 275 collections and 1100 sheets.

Animals – Insects – Ants

Ted Schultz (SI, Entomology) Acarai Mts. and Karanambu, with Jeff Sosa-Calvo and Christopher Marshall, Sept – Nov 2006, approx. 30,000 leaf and wood ants.

Animals – Insects – Beetles

Christopher Marshall (Rutgers University) Acarai Mts. and Karanambu, with Ted Schultz and Jeff Sosa-Calvo, Sept – Nov 2006, approx. 200 dung beetles.

Animals – Arthropods – Spiders

Jonathan Coddington (SI, Entomology) Les Nouragues Field Station, French Guiana, with M. Kuntner, I. Agnarsson, D. DeRoche, and J. Miller, October – Nov 2006, approx. 3000 spiders.

Animals – Vertebrates – Birds:

Christopher Milensky and Brian Schmidt (SI, Birds) Rewa River, Guyana, July – Sept 2006, approx. 281 birds. Many tissues were preserved for DNA studies.



SPECIMENS RETURNED TO GUYANA

823 **plant** specimens (BDG)

89 **bird** specimens

253 **ant** specimens

POST-DOCTORAL FELLOWSHIP

The BDG and the Department of Entomology co-sponsored Dr. John LaPolla as a post-doctoral fellow to work on the ant collections from the Guiana Shield and to organize and participate in collecting expeditions to the GS and to analyze the results. Dr. LaPolla is now an Assistant Professor at Towson State University in Maryland and is a Research Collaborator at NMNH. He will be doing field work in Guyana in August 2007.

THE CENTRE FOR THE STUDY OF BIOLOGICAL DIVERSITY, GUYANA (CSBD)

- 1) UG has begun hosting a monthly seminar series in the CSBD new lecture hall where invited speakers, visiting scientists and staff can present talks to students and guests.
- 2) UG now using CSBD and its collections educate the public about conservation and biodiversity issues through tours for elementary and secondary school children and public exhibits.
- 3) Students from the Faculty of Natural Science are working in the collections (replacing old jars, topping off alcohol in the preserved collections, plant mounting, and sorting and filing plants) as part of their lab credit.
- 4) UG continues to maintain the collection databases, adding label data as specimens are returned and incorporated into CSBD collections.

- 5) Kelloff continued to work in the Guyana National Herbarium at the Centre with accessioning and filing herbarium specimens in Guyana.
- 6) Kelloff began working in the Jenman Herbarium sorting out the backlog of specimens left by the Dutch and other collectors over the past 20 years. These specimens will be incorporated in to the Guyana National Herbarium, CSBD, at the Centre. Although most of the collections were poorly stored they seem to have survived in good shape. There were some specimens without labels and the appropriate institutions were contacted. Specimens that were already mounted or had labels were taken to the Centre and frozen to control pests.
- 7) Kelloff hand-carried ant collections back to Guyana. At the Centre she filled each vial with alcohol and put the vials in a larger jar to prevent evaporation. The specimens were then added to the Zoological wet collection.
- 8) Kelloff assisted Ravina, data transcriber in the Jenman Herbarium with question about the collections.
- 9) The CSBD herbarium now has over 45,000 identified, mounted and filed specimens. The Jenman Herbarium has ca. 16,000 specimens.
- 10) Funding is still being sought for the CSBD library as the new hall still does not have shelving to hold the books and journals.



- 11) The collections at CSBD are used by other agencies to identify plant and animal species. A recent example was a grass growing in the rice field that resembled young rice plants. It was identified as *Echinochloa crusgalli* var. *oryzicola*, a “superweed” that has a potential to spread rapidly in the fields, reducing rice production.

OTHER ACTIVITIES

- 1) CSBD journal: Volume 3 of the *Contribution to the Study of Biological Diversity* is in prep. This volume will be titled “Plant Community Structure, Fire Disturbance, and Recovery in Mangrove Swamps of the Waini Peninsula, Guyana.” the editors of this issue are P. DaSilva, V. Funk and C. Kelloff and the author is T.T. Hollowell.
- 2) The program continues to process the material from China and Philippines that were donated by Nebraska to the US. We expect to finish in early 2007.
- 3) The *Checklist of the Plants of the Guiana Shield* publication came back from the reviewer with many comments. These were addressed and the document was sent to the editor for formatting. The *Checklist* should be published in 2007.
- 4) Aymard (VEN) and Kelloff (SI) finished and submitted the Dilleniaceae manuscript to the Flora of the Guianas (FoG) editors for review (35 species). Kelloff has begun working on the Grammitidaceae treatment (38 species) with G. Cremers and M. Boudrie (CAY) for the FoG publication.
- 5) The BDG program has been gathering clothes and toys for the orphanage in Imbaimadai, Guyana; several large boxes were sent to Guyana and will be delivered the next time either Funk or Kelloff go down. Meanwhile they are being stored at the house.

- 6) Funk presented a paper at a Conference in Barcelona, Spain where Kelloff assisted with the organization and implementation of the meeting. Kelloff then traveled to Kew to work in the herbarium.
- 7) Kelloff and Funk attended the Botany Conference in Chico, California where they gave several papers.
- 8) The 5000 specimens from the ECOSUR herbarium arrived and were sorted and filed at MSC in pod 2.
- 9) Another shipping container of supplies was gathered and secured to pallets for the CSBD in Guyana. This included herbarium cases, gray shelving units, herbarium mounting supplies, books and journals for the library and other supplies. It was decided delay the shipment to Guyana until the New Year as the University would be closed for several weeks in December.
- 10) Acevedo attended the Flora of the Guianas Advisory Board Meeting in Berlin as the BDG representative and he also worked in the herbarium.

The Program's databases now contain 155,095 plant records and 10,439 fish records (3507 records are from the Guiana Shield area). Databases of birds, mammals, herpetofauna and Lepidoptera, although often supported by BDG, are maintained by the respective units here at NMNH.

PUBLICATIONS 2006

Cole, C. J. and P. J. R. Kok. 2006. A new species of gekkonid lizard (Sphaerodactylinae: *Gonatodes*) from Guyana, South America. *American Museum Novitates* 3524: 1-13.

Donnelly, M. A., R. D. MacCulloch, C. A. Ugarte and D. Kizirian. 2006. A new riparian Gymnophthalmid (*Squamata*) from Guyana. *Copeia* 3: 396-403.

Kok, P., R. MacCulloch, G. Bourne and A. Lathrop. 2006. A new species of *Colostethus* (Anura: Dendrobatidae) from French Guiana, with a redescription of *Colostethus beebei*. *Phyllomedusa* 5(1): 43-66.

MacCulloch, R. D., A. Lathrop and S. Z. Khan. 2006. Exceptional Diversity of *Stefania* (Anura: Hemiphractinae) II: Six Species from Mount Wokomung, Guyana. *Phyllomedusa* 5(1): 31-41.

Mathis, W. N. and T. Zlatwornicki. 2006. A review of the New World species of the shore-fly genus *Leptopsilopa* Cresson (Diptera: Ephydriidae). *Annales Zoologici (Warszawa)* 56(1): 85-138.

Strong, M. T. 2006. Taxonomy and distribution of *Rhynchospora* (Cyperaceae) in the Guianas, South America. *Contributions of the United States National Herbarium* 53:1-225.

In Press:

Carvalho, V. T., R. D. MacCulloch, L. Bonora and R. C. Vogt. (in press). A New Species of *Stefania* (Anura: Cryptobatrachidae) from northern Amazonas, Brazil submitted to *Journal of Herpetology*

Fulgenzi TD, TW Henkel, RE Halling. (in press). *Tylopilus orsonianus* sp. nov. and *Tylopilus eximius* from Guyana. *Mycologia*.

Funk, V.A., T. Hollowell, P. Berry, C. Kelloff, and S. Alexander. 2007. Checklist of the Plants of the Guiana Shield (Venezuela: Amazonas, Bolivar, Delta Amacuro; Guyana, Surinam, French Guiana). *Contributions from the US National Herbarium* 55:1-886.

Henkel, T.W., M.C. Aime, H. Mehl, and S.L. Miller. (in press). *Cantharellus pleurotoides*, a new and unusual basidiomycete from Guyana. *Mycological Research*

Kok, P.J.R., M.N.C. Kokubum, R.D. MacCulloch and A. Lathrop. (in press). A redescription of *Leptodactylus lutzi* (Heyer, 1975) with description of its advertisement call and notes on its courtship behavior. Submitted to *Phyllomedusa*.

MacCulloch, R. D. and A. Lathrop. (in press) Herpetofauna of Mount Ayanganna, Guyana: Results of the Royal Ontario Museum Ayanganna Expedition 2000. Submitted to the Royal Ontario Museum Science Publication Series.

MacCulloch, R.D., A. Lathrop, L.R. Minter and S.Z. Khan. (in press) *Otophryne* (Microhylidae) from the highlands of Guyana: redescrptions, tadpoles and new distributions. submitted to *Papeis Avulsos de Zoologia*.

Robbins, M. B., M. J. Braun, C. M. Milensky, B. K. Schmidt, W.Prince, N. H. Rice, D. W. Finch, & B. J. O'Shea. (in press). Avifauna of the upper Essequibo River and Acary Mountains, Southern Guyana, with comparisons to other Guianan Shield sites.

Woolley L. P., Henkel T. W., Sillet SC. 2006. Reiteration in the Monodominant Tropical Tree *Dicymbe corymbosa* (Caesalpiniaceae) and its Potential Adaptive Significance. In revision in *Biotropica* as of Aug 18, 2006.



BUDGET – The Program received federal funding in 2006 (note: budget is for FY06, the descriptive portion of this report is for the calendar year 2006).

Funds from sources outside our federal allocation were used to promote field work and specimen processing. In FY06 these funds came from a variety of sources including The National Geographic Society, the National Science Foundation, Conservation Organizations, other institutions, and other parts of the Smithsonian; **the total outside funds for FY 06 was \$60,000.**



APPENDIX A: Funk, V.A. 2007. The Guiana Shield: 20 years and counting. *The Plant Press* 10 (2): 1, 12-15.

This article can also be viewed at <http://www.nmnh.si.edu/botany/plantpress/vol.10no2.pdf>