MEMORANDUM

1 May 2006

TO: Cristián Samper, Hans Sues, Biology Chairs, and the External Review Committee members

CC: Dave Evans, Scott Miller, Sue Fruchter, Wendy Wiswall

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

RE: 2005, BDG Annual Report

Attached you will find the 2005 Annual Report for the BDG. The first page lists some of the highlights of the calendar year.

By far the most important **international activity** was the expansion into the new addition of the Centre for the Study of Biological Diversity, at the University of Guyana (paid for by a USAID grant). The herbarium was moved into the new addition and is now fully functional and the zoology collections have been re-organized and are waiting additional shelving to finish their expansion; we have obtained the shelving (at no cost) but must wait until FY07 to ship it to Guyana. There are two remaining problems that need to be solved, the library needs to be moved into the new space but needs shelving and a computer, and the small hut next to the Centre needs to be renovated into a drying room for plants. Just a few days ago we submitted a grant proposal to USAID to purchase the library shelving and we are still looking for funds for the drying room. We plan to have all this work completed by the end of FY2007. Also of note is the first recent scientific publication coming out of Guyana and featuring Guyanese authors.

Certainly for BDG the publication of the **Vertebrate Checklist** marked the culmination of a project that was conceived years ago and it was gratifying to see it come to fruition. Also, several other large projects are nearing completion, such as the Plant Checklist, and we have made great strides in **processing specimens**, i.e., over 1500 Butterflies and Moths, nearly 800 Melastomes, and approximately 75,000 ants were identified and databased, and are available for study. Currently we have over 125,000 plant records in our databases. In 2006 we plant to publish the Plant Checklist, two collector books, another volume of the Contributions to Biodiversity, the new Kaieteur Falls checklist with images, and 6-10 journal articles.

We have been thinking a lot about the future of the Program. Most of you know that the Program was reviewed by an external committee (Appendices A & B). The report was very positive and was well received by the ADRC. There were several important recommendations: including finishing the database, putting the data online, etc. They also recommended that we begin to think about ending the Guyana Program and they suggested a competition so that the funds could be used to work in another area of the world or to focus on another group in the same area. In line with the recommendation to phase out BDG we have begun to prepare for a four year plan. FY06 and FY07 we are to receive full funding but in FY08 and FY09 we will not sponsor any fieldwork and we will not receive the funds normally used for field work. The final two years of the Program we will use our funds to work toward the goal of cleaning up as much

backlog as possible and getting out all of the large checklists and finishing the database. Unfortunately we cannot proceed on some of publications we had planned nor can we increase the information available on the web site because we lost our database manager. By 2009 we hope to have the data online so that others can make use of it.

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 Tom Hollowell our Data Manager (left in November 2005).

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

Kaslyn Holder, one of the two Scientific Officers recently hired by the University of Guyana; Kaslyn is now in charge of the herbarium. She is posed with a bromeliad in front of Kaieteur Falls in central Guyana.

ANNUAL REPORT 2005
Biological Diversity of the Guiana Shield (BDG)
Activities 1 January to 31 December, 2005
(http://mnh.si.edu/biodiversity/bdg)

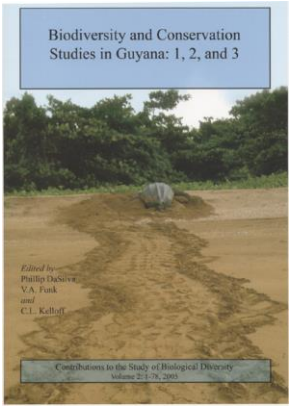
The goal of the Biological Diversity of the Guiana Shield Program (BDG) is to document, understand, and conserve the biological diversity of the shield area. In line with that goal BDG continues to collect and process specimens from the Guiana Shield area of northeastern South America. We collect, sort, identify, mount, inventory, barcode, and file all plant specimens collected by the Program. We assist scientists from other departments in NMNH (Zoology, Entomology, Anthropology) in their collecting efforts. We interface with other bureaus at SI (STRI, NZP, NMNH, NASM, CRC), and we collaborate with over 100 scientists around the world. In addition, we publish scientific papers and books as well as items for more general use.

HIGHLIGHTS

The Review: An external review of the BDG program was conducted by the Office of the Associate Director for Research and Collections and was very complimentary (Appendices A & B).

The Database: Barcoding of the plant specimens in the US National Herbarium continues with 11,818 records added to the database in 2005. Currently, the total number of records is 125,387, which consists of 49,527 BDG collections, 71,136 historical specimens, and 4,724 misc. collections all databased and barcoded by BDG. The Program is on track to finish this project by the end of 2006. We will then focus on cleaning and geo-referencing the data. By mid-2007 we should have about 135,000 geo-referenced, cleaned records of plant collections from the Guiana Shield. Unfortunately we will not be able to do many of the data analysis projects we had planned (see below).

Vertebrate Publication: The *Checklist of the Terrestrial Vertebrates of the Guiana Shield* (Hollowell & Reynolds, eds., December 2005) was published. It contains all known, non-fish vertebrates from the Shield and so has chapters on birds, mammals, herps, and reptiles. The Director of NMNH, Cristián Samper, wrote the forward and the chapter authors are from Canada, Venezuela, Brazil, and the USA (copy attached).



CSBD journal: Volume 2 of the *Contribution to the Study of Biological Diversity* was published in December of 2005. This volume was titled "Biodiversity and Conservation Studies in Guyana: 1, 2, and 3." (Pp. 1-78); the editors of this issue were P. DaSilva, V. Funk and C. Kelloff and the authors were several recent graduates of UG.

Entomology collections: Contractors identified 1530 specimens of micro-Lepidoptera collected in Guyana.

Plant Publication: The Checklist of the Plants of the Guiana Shield is nearing completion. This joint project between BDG and the Missouri Botanical Garden should be finished in 2006.

The Centre for the Study of Biological Diversity, University of Guyana, Georgetown, Guyana has moved all of its collections into the new extension or rearranged them in the old facility. Two new scientific officers have been hired by the University.

Departure of Database Manager: Tom Hollowell, the database manager for BDG for the last 9 years completed his PhD. He had been working via term-appointment and BDG was unable to secure a permanent job for him. He left to work for NMNH Office of Information Technology. His departure was a big loss for BDG and we are now unable to process requests for information and the website is moribund. Our schedule for geo-referencing the herbarium entries and making the data available to the public has been curtailed and may fail all together. The website has not been updated since October 2005.

The Program's databases now contain 125,387 plant records and 10,439 fish records. Databases of birds, mammals, herpetofauna and Lepidoptera, although often supported by BDG, are maintained by the respective units here at NMNH.

SPECIMEN WORK AND DATABASES.

Animals – Insects - Lepidoptera:
1800 specimens of Lepidoptera specimens were identified, barcoded, databased, and sorted to family for a total of 8235.

Animals – Insects - Ants:
All of the specimens of Ants previously collected by the Schultz team (ca. 75,000) were identified, barcoded, databased, and sorted to family.

Plants:
Specimens determined: **2,247**
Specimens sent as gifts/loans for determination: **504**
Duplicates sent out as exchange: **3,860**
Returned to the host country: **3,092**
New collections: **472** single (new collections)
Duplicate Labels prepared: ca. **4,100**
Sheets barcoded and inserted into the US National Herbarium: **1,397** (new mounted)
Sheets that have been inventoried and barcoded: **5,630** (historical collections from US)
Total plant specimens collected for 2005: approximately **472** (**2,832** 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 continues to barcode and database US plant specimens form the Venezuelan Guayana area. To date about 78 %, of the families have been processed. If funding remains consistent and we are able to hire a contractor with the appropriate skills we expect to complete this project is December 2006.

EXPEDITIONS

Plants:

Redden plant number series: (3320-3797) Rio Bario, Bolivar, Venezuela with A. Licata, W. Diaz, R. Williams (Guyanese), O. Leon, O. Santaella, and A. Garcia, 8 February – 4 March 2005; 472 numbers, 2,832 sheets.

Animals – Arthropods – Spiders

Jonathon Coddington and collaborators conducted field research in French Guiana.

Animals – Insects – Ants

Ted Schultz and John LaPolla, (SI, Entomology) Kaw Mountain (Amazon Nature Lodge) and Nouragues Field Station, French Guiana with Ted Schultz (NMNH), July 16 to August 9 collected approx. 6000 ant specimens. Some collections were preserved for DNA studies.

Jeffery Sossa (SI, Entomology), Surinam with Ryan Badal (student at the University of Suriname); Trond Larsen (Princeton University, dung beetles), Dr. James Watling (University of Florida, herpetologist); Sergio Solari and Miguel Pinto (University of Texas), Keneth Jon, Keneth Wong Ton (CI – Suriname) September 28 – October 20; approx. 5000 ants from leaf litter.

Animals – Insects – Dung Beetles

Dana Price (Rutgers U.- dung beetles) Kaw Mountains (Amazon Nature Lodge) and Nouragues Field Station, French Guiana, with Ted Schultz and John LaPolla, July – August, approx. 300 beetles. Some collections were preserved for DNA studies.

Animals – Vertebrates – Birds:

Mike Braun (SI, LAB) and members of the South Rupununi Conservation Society, South Rupununi, Guyana, November, collected 107 bird specimens (skins and skeletons); approximately 100 tissue samples for DNA studies were taken for most collections. The specimens remain in Guyana awaiting NMNH's new CITES permit.

SPECIMENS RETURNED TO GUYANA

3,092 **plant** specimens (BDG)
678 specimens of Noctuidae and Lycaenidae (**moths and butterflies**) for a total of 996
115 **bird** specimens
48 specimens of **ants,** including 3 holotypes
2 **mealybug** specimens, both holotypes

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 and to organize and participate in collecting expeditions to the GS.

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

1) Kelloff worked with CSBD staff on accessioning and filing herbarium specimens in Guyana. The bird skins in the zoology hall were rearranged zoology hall and the room was painted. Kelloff spent time working with students in the collections, answering questions on biodiversity, taxonomy, and general basic biology.

2) Kelloff responded to emails with information and advice when the Jenman Herbarium (also at UG) was flooded. The Jenman collection is now being databased and there is some discussion about incorporating this historical collection into the CSBD herbarium.

3) The mounting of plant specimens for the CSBD Herbarium continues and UG has now incorporated plant mounting as part of their biology lab curriculum. Students are given instructions and supervised by the Scientific Officer. The CSBD herbarium now has over *43,000 identified, mounted, and filed specimens.*

4) The University has hired a new scientific officer, Kaslyn Holder, to curate the Guyana National Herbarium.

5) Kelloff and Funk began drafting a proposal (to be submitted to USAID) for library shelving and equipment for the Centre at UG. Discussions with UG staff are moving slowly.

In order beginning top left, clockwise: new alcohol collection in the process of being arranged, old library, new library, inside of an herbarium case, and new herbarium.

OTHER ACTIVITIES

1) An external review of the BDG program was conducted by the Office of the Associate Director for Research and Collections and was very complimentary (Appendices A & B). This report is influencing activity in BDG (see cover memo)
2) Published: Hollowell, T. & R. Reynolds (editors). December 2005. Checklist of the Terrestrial Vertebrates of the Guiana Shield. *Bulletin of the Biological Society of Washington* 13: 1-95. It contains all known, non-fish vertebrates from the Shield and has chapters on birds, mammals, herps, and reptiles and has authors from Canada, Venezuela, Brazil, and the USA (copy attached).
3) Published: DaSilva, P., V. Funk & C. Kelloff (editors). December 2005. Biodiversity and Conservation Studies in Guyana: 1, 2, and 3. *Contribution to the Study of Biological Diversity* 2: 1-78. This volume was published by the Centre for the Study of Biological Diversity in Guyana and is an excellent example of supporting the host country by advancing it scientific capabilities (copy attached).
4) Tom Hollowell, the database manager for BDG for the last 9 years, completed his PhD. He has been working via term-appointment and BDG was unable to secure a permanent job for him. He left to work for NMNH Office of Information Technology. His departure was a big loss for BDG and we are now unable to process requests for information and the website is moribund. We are attempting to train some recent graduates (B.S.) but we lost the money we had put into Tom's position and are too short on funds to hire another full time person. In the short term this means that we are continuing to enter data but we are not updating the website and we are not cleaning or geo-referencing the data and we are not analyzing the data. It also means that we are not filling data requests from non-SI people. Tom has been helping us a couple of hours a week but now his supervisor has left NMNH and he has extra duties in IT so the situation is continues to worsen. The future seems bleak for the data analysis portion of BDG.
5) Taxonomists F. Almeda (CAS), D. Penneys (FLAS) and F. Michaelagel (NY) visited US to work on unidentified *Melastomataceae* (plant) specimens for the BDG Program and other botany staff; they identified 760 previously unidentified collections.
6) G. Mathieu (GENT) visited US to work on unidentified *Peperomia (Piperaceae)* for the BDG Program and other botany staff.
7) Funk and Kelloff attended the International Biogeography Society biannual meeting held in West Virginia and organized a NMNH "behind the scenes" tour for attendees.
8) M. Braun presented a talk about the Red Siskin (bird) work and conservation efforts in the Rupununi to staff of the U.S. Embassy – Guyana; it was open to the public.
9) Cardboard herbarium boxes were purchased and shipped to Mexico. The ECOSUR Herbarium intends to send NMNH a complete set of Dr. Brent Berlin's ethnobotanic collections. The BDG program is using its experience with collections to assist this small Mexican herbarium.
10) A shipment of herbarium supplies was sent to Guyana.
11) Torke (MO) visited US to work on *Swartzia* (Fabaceae) for the BDG Program.
12) P. Berry (WIS) visited to work on Euphorbiaceae.
13) M. Sewell identified general collections in the BDG backlog.
14) The first *BDG Newsletter* was published covering the history of the program and short updates on all of the people we could think of that have been associated with BDG over the last 20 years (copy attached).

15) BDG prepared documentation on the activities of the Program since its inception for the External Review Committee. (Copy of final report attached)

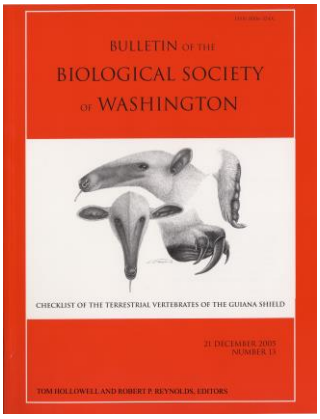
PUBLICATIONS 2005

Ávila Pires, T.C.S. 2005. Reptiles, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, editors. *Bulletin of the Biological Society of Washington* 13: 25-40.

Celsa Señaris, J. and R. MacCulloch. 2005. Amphibians, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, editors. *Bulletin of the Biological Society of Washington* 13: 9-24.

Clarke H.D. and V.A. Funk. 2005. Using checklists and collections data to investigate plant diversity. II: An analysis of five florulas from northeastern South America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 154: 29-37.

Funk, V.A. and P.E. Berry. 2005. Chapter 10.4: The Guiana Shield. Pp 76-79 (references 89-92) in G.A. Krupnick and W.J. Kress (eds). *Plant Conservation: A Natural History Approach*. University of Chicago Press.



Funk, V.A. and C.L. Kelloff. 2005. Preface, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, editors. *Bulletin of the Biological Society of Washington* 13: ix.

Funk, V.A., K.S. Richardson, and S. Ferrier. 2005. Survey-gap analysis in expeditionary research: Where do we go from here? *Botanical Journal of the Linnean Society* 85: 549-567. [erroneously cited as number 86 in printed article]

Henkel, T.W. 2005. Parakari, an indigenous fermented cassava beverage utilizing amylolytic *Rhizopus* in Guyana. *Mycologia* 97(1): 1-11.

Henkel, T.W., J. Mayor, and L. Woolley. 2005. Mast fruiting and seedling survival of the ectomycorrhizal, monodominant *Dicymbe corymbosa* (Caesalpiniaceae) in Guyana. *New Phytologist* 167(1): 543-556.

Henkel T.W., R. Meszaros, M.C. Aime and A. Kennedy. 2005. New *Clavulina* species from the Pakaraima Mountains of Guyana. *Mycological Progress*.

Hernández, J.R., M.C. Aime, and T.W. Henkel. 2005. The rust fungi (Uredinales) of Guyana. *Sydowia* 57(2): 189-222.

Hollowell, T. and R.P. Reynolds, editors. 2005. Checklist of the terrestrial vertebrates of the Guiana Shield. *Bulletin of the Biological Society of Washington* 13: 1-98.

Kok, P.J., G.R. Bourne, D. Arjoon, N.M. Wulff and G.L. Lenglet. 2005. *Colostethus beebei*. Charismatic Jewel of the Lost World: The Golden Rocket Frog. *Reptilia* 38: 47-53.

Lim, B.K., M.D. Engstrom and J. Ochoa G. 2005. Mammals, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, eds. *Bulletin of the Biological Society of Washington* 13: 77-92.

MacCulloch, R.D. 2005. A tale of Two Tepuis. *Rotunda* 38(2): 32-41.

MacCulloch, R.D. and A. Lathrop. 2005. Hylid Frogs from Mount Ayanganna, Guyana: New species, redescriptions, and distributional records. *Phyllomedusa* 4(1): 17-37.

Milensky, C. W. Hinds, A. Aleixo and M. de Fátima C. Lima. 2005. Birds, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, eds. *Bulletin of the Biological Society of Washington* 13: 43-74.

Noonan, B.P. & P. Gaucher. 2005. Phylogeography and demography of Guianan Harlequin Toads (*Atelopus*): Diversification within a refuge. Molecular Ecology 14: 3017-3031.

Robbins, M.B., M .J. Braun, C.J. Huddleston, D.W. Finch, and C.M. Milensky. 2005. First Guyana records, natural history and systematics of the White-naped Seedeater *Dolospingus fringilloides*. *Ibis* 147(2): 334-341.

Samper, C. 2005. Forward, in Checklist of the Terrestrial Vertebrates of the Guiana Shield, Hollowell, T. and R.P. Reynolds, eds. *Bulletin of the Biological Society of Washington* 13: vii.

Strong, M.T. 2005. Two new species of *Rhynchospora* section *Tenues* (Cyperaceae) from the Guianas, South America. *Novon* 15(3): 479-483.

In Press:

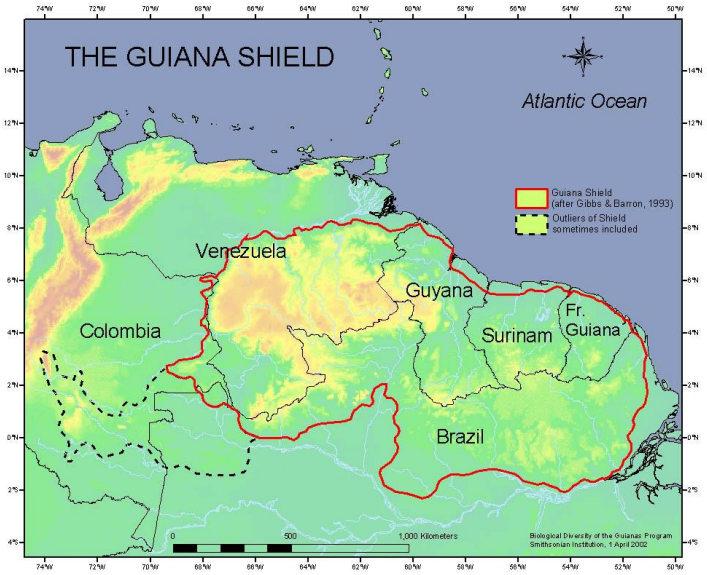
Braun. M.J., M.L. Isler, P.R. Isler, J.M. Bates and M.B. Robbins. In press. Avian speciation in the Pantepui: The case of the Roraiman Antbird (*Percnostola* [*Schistocichla*] "*leucostigma*" saturata). *Condor*.

MacCulloch, R.D. and A. Lathrop. In Press. Hereptofauna of Mount Roraima, Guiana Shield region, northeastern South America.

Mathis, W. In press. A review of the New World species of the shore-fly genus *Leptopsilopa* Cresson (Diptera: Ephydridae).

Mayor, J.R., Henkel, T.W. In press. The influence of ectomycorrhizas on leaf litter decomposition within a monodominant *Dicymbe corymbosa* (Caesalpiniaceae) forest in Guyana. *New Phytologist* (accepted 10-01-05).

Rice, N. and C. Milensky. In Press. *Myrmornis* nest in Guyana. *Wilson Bulletin.*



The Guiana Shield area of South America

Appendix A: Cover Letter to the Review Committee:

Dear Recipient:

We have enclosed a series of items we think you might find useful. First there is a general history of the program then a series of recent publications that we hope shows the diversity of our interests. Second, there are a few reports that you may find interesting. You can check our website for a full listing. Two publications will be out by the time you arrive, *The Checklist of the Terrestrial Vertebrates of the Guiana Shield* and the first BDG Newsletter that will discuss people that have been part of BDG. These will be given to you upon your arrival. Finally, there are **two lists of what is planned for the next few years**. Cheers, Vicki

INCLUDED IN PACKET

Braun, M.J, D.W. Finch, M.B. Robbins, and B.K. Schmidt. 2000. *A Field Checklist of the Birds of Guyana*. Biological Diversity of the Guianas Program, Smithsonian Institution, Washington DC.

Clarke, H.D., V. Funk and T. Hollowell. 2001. Using checklists and collections data to investigate plant diversity. I: A comparative checklist of the plant diversity of the Iwokrama Forest, Guyana. *Sida Botanical Miscellany* 21, 86pp.

Clarke H.D. and V.A. Funk. 2005. Using checklists and collections data to investigate plant diversity. II: An analysis of five florulas from northeastern South America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 154: 29-37

Funk, V.A., K.S. Richardson, and S. Ferrier. In Press. Survey-gap analysis in expeditionary research: Where do we go from here? *Botanical Journal of the Linnaean Society*. (page proofs read in June 2005)

Funk, V.A. and K. Richardson. 2002. Systematic data in biodiversity studies: Use it or lose it. *Systematic Biology* 51(2): 303-316.

Funk, V.A., A. Sakai, and K. Richardson. 2002. Biodiversity: the interface between systematics and conservation. *Systematic Biology* 51(2): 235-237.

Funk, V.A & P.E Berry (in press) The Guiana Shield. In: Krupnick, G.A. & W.J. Kress. *Plant Conservation: A Natural History Approach*. University of Chicago Press.

Hollowell, T., P. Berry, V. Funk, C. Kelloff. 2001. *Preliminary Checklist of the Plants of the Guiana Shield* (Venezuela: Amazonas, Bolívar, Delta Amacuro; Guyana; Surinam; French Guiana). Volume 1: Acanthaceae - Lythraceae. Biological Diversity of the Guianas Program, Smithsonian Institution, Washington DC. 134 pp.

Hollowell, T., L.J. Gillespie, V.A. Funk and C.L. Kelloff. 2003. Smithsonian Plant Collections, Guyana: 1989 - 1991, Lynn J. Gillespie. *Contributions from the United States National Herbarium* 44: 104 pages.

Kelloff, C.L. 2003. The use of biodiversity data in developing Kaieteur National Park, Guyana for ecotourism and conservation. *Contributions to the Study of Biological Diversity* 1: 1-44. University of Guyana

Kelloff, C.L. and V.A. Funk. 2004. Phytogeography of the Kaieteur Falls,Potaro Plateau, Guyana: floral distributions and affinities. *Journal of Biogeography* 31: 501–513

LaPolla, J.S. 2004. *Acropyga* (Hymenoptera: Formicidae) of the World. *Contributions of the American Entomological Institute* 33(3): 1-130. (not included, will be in meeting room)

Robbins, M.B., M.J. Braun and D.W. Finch. 2003. Discovery of a population of the endangered Red Siskin (*Carduelis cucullata*) in Guyana. *The Auk* 120(2): 291-298.

Guyana Symposium 2001 – Program
Guyana Symposium 2001 – Final report

Plant Pathway – shows how the plant specimens move around and shows the central importance of the database.

BDG End of Year Report 2004

A few pages from the website

Mission Critical Statement for Tom Hollowell.

PUBLICATIONS TO BE FINISHED SOON
Hollowell, T. and R. Reynolds (eds.). 2005. Checklist of the Terrestrial Vertebrates of the Guiana Shield. 2005. *Bulletin of the Biological Society of Washington*.

Funk, V. A., Kelloff, C. L. and T. Hollowell. 2005. Newsletter of the Smithsonian's Biological Diverstiy of the Guiana Sheild Program. Published by BDG. (ca. 28 published pages)

ONGOING RESEARCH and COLLECTING – It has taken a number of years to develop a coherent plan for research and collecting in BDG. Currently we are seeking to examine biological diversity across the Guiana Shield. Some areas are well collected for some groups but there are areas or groups for which we have no data at all. We are attempting to coordinate the efforts of many individuals to help answer questions about biodiversity and conservation.

Ants
Organized by Ted Schultz and John LaPolla from the Department of Entomology, the ant project has been in operation for several years (there is a link on the BDG website). Schultz has a systematized way of collecting so that results are comparable across sites. The overall goals of the Ant Project are to produce a comprehensive survey of the ant fauna of Guyana, including the description of new taxa; to compare leaf-litter ant diversity patterns across Guyana and other regions of South America; to compile databases on preferred microhabitats, which will be useful to understanding parameters influencing endemism and species richness; to deliver other terrestrial invertebrates to specialists for study; and to support entomological studies in Guyana and enhance invertebrate collections within the country. LaPolla's postdoctoral fellowship is supported by the BDG (half year's salary) and has been renewed for 2006. This will insure survey work and taxonomic studies of Guyanan ants continues. This project should be completed in 3 years.

Birds
The Venezuelan parts of the Shield are pretty well known as far as bird diversity is concerned. The Guyana area is much better now because of the efforts of several groups most frequently from NMNH and the Natural History Museum, University of Kansas. The biggest holes are now Surinam and French Guiana. This year the NMNH team plans on collecting in French Guiana and if it goes well there could be a follow up expedition next year.

Butterflies and Moths
When the Program was still focused on Guyana rather than the whole Shield we had a resident collector for butterflies and moths in Guyana for six months. This collector made a wonderful collection and it is just about completely identified and data based. Some discussions are taking place on whether or not we want to gather data from other museums or whether or not we want to send a resident collector to French Guiana and\or Surinam as well as a few new places in Guyana. This would be a 2 year project.

Insects (other)
Before the Program expanded to examine the larger bio-geographical questions of the Shield several entomologists traveled to Guyana to collect insects including: Mathis (flies), Flint (Dragonflies and Damselflies), Spangler (water beetles), and Collins (termites). The specimens from some of these trips were processed and produced a number of taxonomy papers (see list on web site) but the work on other groups was never finished. We learned a lot from these early trips about how to organize non-botanical trips and how to help make sure the specimens are processed and data based and that publications are finished. We now do a better job of planning expeditions.

Plants
The Plant Project is moving into a testing phase. We have used existing data and newly developed programs to predict where we need to collect to actually increase our collection of previously unknown taxa. These predictions are in a paper that is in press in the *Biological Journal of the Linnean Society* and we would like to have a resident collector in botany to spend a year or two in the field visiting these sites. We could then re-examine the data and see if our predictions were correct. Also, we are in the process of using mostly volunteer interns to database US National Herbarium specimens that are from the Shield. The data basing of the specimens from the three Guianas was finished last year because of funds from Scott Miller. The Venezuelan part is underway and should be finished in late 2006.

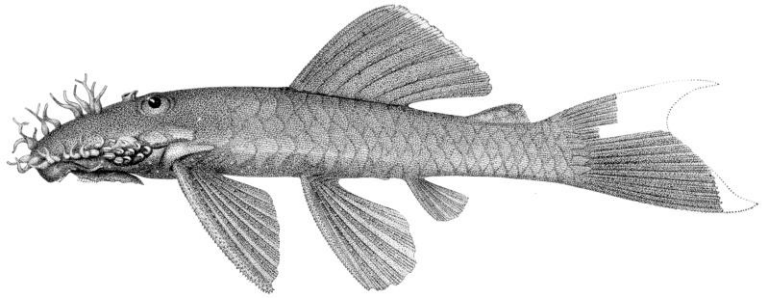
Snails
Bob Hershler has colleagues in Florida who are interested in starting a collecting project in the Guiana Shield. The specimens would be shared among Guyana, Florida, and NMNH. This October they are scheduled to go to Mt. Ayanganna in Guyana but it is on hold. We would very much like to have data from another group of invertebrates but we hesitate to start anything until we know the future of the Program.

Spiders
Spiders have been collected in southern Guyana and a trip to French Guiana is planned for later this year. There are some data from Venezuela but much collecting remains to be done in order to gain an understanding across the Shield. This project is lead by Jonathon Coddington (NMNH, Department of Entomology) who has a systematized way of collecting so that results are comparable across sites.

PUBLICATIONS PLANNED for the NEXT FEW YEARS

Taxonomy
Tom Hollowell, Carol Kelloff and I are slowly working our way through the collectors that have worked for BDG. When we hit 80% identification on the plants for each collector we produce a volume that has descriptions of all their trips and lists of all the plants they have collected in numerical order and by taxon. The first three volumes have been published under the Smithsonian Plant Collectors, Guyana series. We have five to go. The first volumes took some time to compile as trip reports were not required in the early days of the Program. Now we are ready to prepare the next publications on the more recent collectors - Bruce Hoffman, Terry Henkel, David Clarke, Karen Redden and a miscellaneous volume (all the smaller trips) – all of which have reports that will serve as the bases for the manuscript so the new volumes should be published faster. Most of these collections have reached 80% on identification (except the most recent collector, Redden). These publications are extremely useful as they provide a summary of the collecting trips, the list of the species collected, and can give a sense of the diversity in a certain area. They are very popular with our colleagues.

Checklist of the Fishes of the Guiana Shield is on the drawing board. We have the raw material from the book by Reis et al. [Reis, R.E., S.O. Kullander, and C.J. Ferraris, Jr. (eds.). 2003. Checklist of the Freshwater Fishes of South and Central America. Edipucrs, Porto Alegre, Brazil.]. Unfortunately the authors do not have the database of the taxa and Tom is trying to find time to convert the Word text of the book into an Access database so the data can be sorted. In the next few months we will need a person knowledgeable about neo-tropical fishes to do the work. We hope to have this project finished within the next year or so. It would be published in the *Bulletin of the Biological Society of Washington* as a companion volume to the terrestrial vertebrate checklist that will come out this year.



Catfish collected in Guyana in early 1900s

Completion of the *Checklist of the Plants of the Guiana Shield* authored by Tom Hollowell, P. Berry, V. Funk, and C. Kelloff. This is a project that combines the Checklist of the Plants of the Guianas and the Flora of the Venezuelan Guayana thereby producing a checklist of the plants of a natural area. The first half (A-L) was published in 2001 and we have been updating it on line as new volumes of the Venezuelan flora come out. Currently the online version is updated from A through Plu. The production of this joint checklist is slow because the information from the Venezuelan Guayana flora is not in a database and each volume has to be "parsed out" and a database constructed. Also, the nomenclature must be reconciled. However, this project should be completed and published in the *Contributions from the United States National Herbarium* by late 2006.

C. L. Kelloff and V. A. Funk. Annotated Checklist of the Plants of Kaieteur National Park. *Contributions from the United States National Herbarium*. This work completes the project the BDG Program began at Kaieteur National Park, Guyana in the mid-90's. This preliminary version of this checklist has been helpful in Guyana's tourism and with the establishment of the national park.

Aymard, G. and C. L. Kelloff. Dilleneaceae in *Flora of the Guianas*. This work is part of the International project to document the plants of the three Guianas.

Hollowell, T. The Waini Peninsula, Guyana Flora

Hollowell, T. (expected in 2006). The Mangrove Palm *Nypa fruticans* Wurmb.: a Widespread Exotic Species in Northwestern Guyana

Ted Schultz and John LaPolla are in the middle of a several year study of terrestrial ant diversity accross the Guiana Shield. LaPolla spent three months in Guyana collecting (Schultz was there for part of the time). After LaPolla finished his thesis he came to Washington as a postdoc. Several ant taxonomy papers have been published and no doubt several more papers with new genera and species will result from the planned field trips to French Guiana, Suriname and Guyana. Some publications that are now underway include:
LaPolla, J. Two new *Pheidole* for Guyana. *Transactions of the American Entomological Society* (Submitted June 2005).
LaPolla, J. Monophyly of the ant genus *Acropyga* (Hymenoptera: Formicidae). *Insect Systematics and Evolution* (Submitted June 2005).

Theoretical
The survey gap paper is due out (see publication list) in the *Biological Journal of the Linnean Society.*

In 2006 Carol Kelloff is expected to publish her analysis of her plot study data collected from tree plots at Kaieteur. These data will expand our knowledge of the tree diversity along a raparian forest at Kaieteur National Park, Guyana.

Karen Richardson (Canada) and V. Funk, sometimes with Simon Ferrier (Australia) have three papers underway. An evaluation of the use of surrogate taxa, an examination of species turn over rates, and the impact of new information on the old studies of where to put national parks. For these we use plant, bird, and insect data. Some or all of these, along with others, should come out about one or two a year for the next few years. All of these depend on using the latest data.

Ted Schultz and John LaPolla plan on publishing one or more papers on ant diversity across the Shield. One that has been submitted is: LaPolla, J, Suman, T., Sosa-Calvo, J. and Schultz T.R. Leaf litter ant diversity of Guyana. *Biodiversity and Conservation* (Submitted March 2005).

Hollowell, T. Structure of Fire Disturbed and Undisturbed *Avicennia* Forest, Waini Peninsula, Guyana

Hollowell, T. Dispersal and Establishment of Mangrove Propagules Following Fires

Conservation & Biodiversity

DaSilva, P., V. Funk, & C. L. Kelloff (eds). A compilation of papers on biodiversity and conservation in Guyana. *Contributions to the Study of Biological Diversity* 2. University of Guyana. This series, started through the Centre for the Study of Biological Diversity UG, provides a venue for young Guyanese researcher to publish their works. This is a reviewed publication.

Karen Richardson (Canada) and V. Funk, are planning a study on the impact of new information on the old studies of where to put national parks. This should show the importance of new data in conservation and biodiversity studies.

Hollowell, T. (planned for 2006). Plants of the Waini Peninsula in Regional and Global Context

Hollowell, T. Impacts of El Niño-related Fires in the Mangrove Swamps of Guyana

Appendix B: Report from Review Committee.

Biological Diversity of the Guiana Shield
External Review Committee
(Submitted 11 October 2005)

The aim of the Biological Diversity of the Guianas (BDG) Program is to inventory the biodiversity of the Guiana Shield. The program began in 1983, as a result of an earmark of federal funds. Initially focused on plant diversity, for more than a decade BDG has also encompassed other groups, primarily in response to interest by collaborators.

On July 6 -7, 2005, Mark Engstrom, Lucinda McDade, and Elizabeth Losos served on a committee to review the BDG Program within the National Museum of Natural History (NMNH). The agenda is listed in Appendix 1 and the list of materials provided in Appendix 2. A complete list of publications and other information is available on the BDG website (www.mnh.si.edu/biodiversity/bdg). The committee was tasked with addressing the following questions:

1. What are the principal scientific and educational accomplishments of BDG scientists, postdoctoral fellows, and visiting scientists? How do they rank relative to those of other, similar programs in tropical biology?

2. Are the current personnel, organizational structure, and management of the BDG program suitable for the stated mission and mandate?

3. What comparative advantages does the BDG program enjoy in terms of location, resources, and staff expertise compared to other, similar initiatives?

4. What is the impact of the BDG program on individual research programs of biologists at NMNH, other SI bureaus, other museums, and educational institutions?

5. Are the activities and research priorities of the BDG program consistent with and important to tropical biology in general and to the mission of NMNH and the Smithsonian Institution in particular?

Over 1.5 days, the committee interviewed numerous individuals associated with the program in various ways, from program staff to museum staff with only peripheral involvement.

As a result of these interviews and discussions, the committee unanimously reached the following conclusions and recommendations:

I. **Value to NMNH and the Smithsonian**: The review committee is convinced that the mission, goals, and objectives of the BDG program are well aligned with those of NMNH and the Smithsonian Institution at large. Many of the program's features represent values that the museum has identified as the core of what the museum does, including excellence in scholarship and collections, relevance to the preservation of biological diversity, and dedication to the institution. For example, BDG is one of the few programs in the Smithsonian that successfully draws in multiple researchers from a diversity of research disciplines. While most of these researchers are from the National History Museum, there are a few from other SI museums including the National Museum of American History. BDG is very attractive to NMNH and SI researchers in general because the program provides logistical support, international diplomacy, scientific collaboration, and even financial support to collect in a biologically diverse location. Consequently, BDG is a highly appropriate program for a collections-oriented natural history museum like NMNH. As such, the project makes excellent use of the NMNH's strengths.

II. **Assessment of Program**
In more than two decades since its inception, BDG has made substantial progress in a number of areas from establishing an infrastructure for research support in Guyana to inventorying the biodiversity (notably plants) of the Guiana Shield, primarily in Guyana. Some of the most significant achievements include the following which we have categorized somewhat artificially as "Within the Smithsonian Institution" and "Beyond the SI":

Within the Smithsonian Institution

Collections processing: The project can claim the remarkable achievement of rapid and complete processing of collections made during ca. 80 project expeditions over 18 years, including over 150,000 new collections to the museum. This is no small feat when working with poorly known tropical floras and faunas, including invertebrates. The ability to process new collections rapidly could only be built at a large collections-oriented museum like the NMNH, again pointing to the 'fit' of the project to its institution. By 'curating its own' and doing so efficiently and conscientiously, the project has resulted in NMNH now housing the best modern collections in the world of specimens from the Guianas. Moreover, at whatever time in the future the program ends, the BDG will not leave the Museum with a legacy of massive unaccessioned collections as is all too often the case with large-scale projects of this nature.

Informatics: After interacting with numerous project participants and other staff at NMNH, it became clear to the review committee that BDG's record in capturing, managing, and disseminating data from its collections represent an impressive achievement, well beyond what has thus far been achieved overall at the museum. This is of course owed in part to the smaller scale of the task at hand. However, it is also due to an early decision of the project's leadership to emphasize data acquisition and management. BDG provides funds to researchers not only for collecting, sorting, mounting, and identifying specimens, but – nearly uniquely – the program also provides funds to enter data into NMNH's system. It is important that this aspect of the project be maintained as it is central to the project's productivity.

Multi-researcher cooperation: Multi-researcher, multidisciplinary studies are trendy but notoriously hard to carry out successfully. The BDG project has notably achieved the active involvement of researchers in multiple departments, although within the Smithsonian this has been to largely limited to the NMNH. The program has facilitated work in Guiana by numerous researchers from other institutions as well.

Achievements in fund-raising: A federal appropriation was responsible for launching BDG and continues to provide consistent – though diminishing – core funds. These funds have been used to attract and leverage additional funds from other public and private sectors, most significantly World Bank funding.

Impact of program outside of the SI

Guiana: The review committee did not visit Guyana, so all conclusions were drawn from reading and from discussions with staff and colleagues at the museum. Although it is to some degree beyond the scope of a 1.5 day review to evaluate the impact of the project in the host country, we understand that the program has high visibility in Guyana. There have clearly been many achievements in terms of *infrastructure*. At the outset of the project, it is probably safe to say that there was very little in-country administrative or infrastructural support for research and collections; now there is a physical administrative center and considerable logistic support is available to researchers both in-country and internationally. The project has a strong track record in *human resources* by providing in-country training, employment, and international training to local Guyanese. Despite this heavy investment in local capacity, the program has not been able to retain many of its local students as they advanced in their careers. It is our understanding that the socioeconomic situation in the country makes retention lamentably difficult and it to some degree an inevitable consequence of working in this country. The project has also had and continues to have impacts on *conservation decision making* in Guyana in that the biodiversity information produced by the project has been used in guiding decisions about conservation efforts at the level of the national government and international donor community.

Across the Guiana Shield: Despite its name, the project has had less of a presence and thus less productivity in the other parts of the Shield. In fact, the BRG is at a cross-roads in terms of whether it will attempt to replicate a similar collecting program into French Guiana and Suriname, in order to complement and complete the collections made in Guyana. This would of course require considerable additional funding and an extended time-line for the project. We recommend that this decision be carefully considered from scientific, political, and financial perspectives.

Scientific community: The scientific success of the program can be measured through several different means. First, the quality and number of publications generated by the program has been very strong. Second, the project has

attracted scientists outside of the Smithsonian to contribute to the program; in many cases these scientists brought their own additional resources to contribute to field work. It was the feeling of the review committee that the broader scientific community outside of NMNH, especially researchers who seek to work in the Guyana, share substantial respect for the program, both intellectually and administratively.

Dissemination: Most fundamentally, the BDG has a good record of productivity in terms of basic biodiversity science. There have also been a number of publications of a synthetic nature: patterns of species diversity countrywide, the relationship between collections and inventory knowledge, GAP analysis, etc. Many of these latter publications provide important knowledge of pragmatic and policy use to the host country. The project has also done a good job of establishing web products that will be increasingly important worldwide. As the program wraps up this phase of its work, the review committee urges the scientific staff to focus on further dissemination of findings through technical and lay-public publications, to production of synthetic works, and to works that preserve the lessons-learned with the goal of facilitating similar future projects.

III. Challenges:

1. Administrative: The project is located in an administrative framework in the museum that is awkward and not conducive to the success of cross-cutting endeavors. The success of the program in involving researchers from a number of departments and achieving buy-in across departments is laudatory. Yet the departmental structure of NMNH lends itself to competition rather than to cooperation among departments. BDG will never be the highest priority project for any one single department because its resources and energies are spread among so many different groups. If the museum is to achieve success in this sort of endeavor, there must be consistent support for it at all levels of the leadership of the museum and it must have a clear mandate.

    Recommendation: if the NMNH is to effectively mount programs like this (and see the first point above), there must be an administrative structure that ensures that such programs will be able to compete for the resources that they need in order to achieve their goals. Toward this goal, we suggest that the program leader should report directly to ADRC. Moreover, the program will continue to attract researchers from across the museum and SI if there is an incentive structure that encourages this cross-departmental approach.

2. Leadership: For better or worse, success of the program is dependent upon the current leadership team which will not be automatically replicable / reconstituted for the next such undertaking

    Recommendation: It is vital that lessons learned and experience gained be recorded in a way to facilitate hand-off to the next leadership team, as well as replication of the project. Moreover, if a new leader is selected, it would be ideal to have a transition period for the new program leader can work with the current one.

3. Geography: The BDG project has done a good job with a number of taxonomic groups via its own work and projects that it has logistically facilitated in Guyana. Via collaborations with other institutions, it has contributed to advancing our knowledge of the biotas of the Guianan region more broadly, although it is the committee's impression that considerable work remains to be done. One future direction for the project would be for it to expand its geographic coverage to the entire Guianan region; this would certainly mean another five or so years of very active programming. On the other hand, the committee is struck that the potential for more comprehensive regional accomplishments by BDG must be considered in the context of international efforts at NMNH in general. The committee was not tasked with evaluating the larger notion of multidisciplinary international efforts NMNH, but the legacy of such projects, including this one, was continually raised by those we interviewed.

    Recommendation: The committee recommends that NMNH consider its commitment to large-scale (i.e., more than one PI / more than one department) international projects in the context of its long-term goals. Using the same federal funds currently appropriated for BDG, NMNH might implement a museum-wide competition for such projects. Among criteria for evaluating the proposals could be the value of adding collections either in areas of pre-existing strengths or to cover gaps in coverage, as well as involvement of NMNH scientists across multiple departments. Thus at any one time, at least one major, international, multi-investigator project would be in progress. Proposals to continue on-going efforts would be submitted as competitive proposals. At the same time, we presume that projects that have a very extended time-line would be strongly encouraged to recruit other funding sources.

IV. Future of the Program: we recommend that the present incarnation of the project set a time-line of 3-4 years for completion. To achieve this:

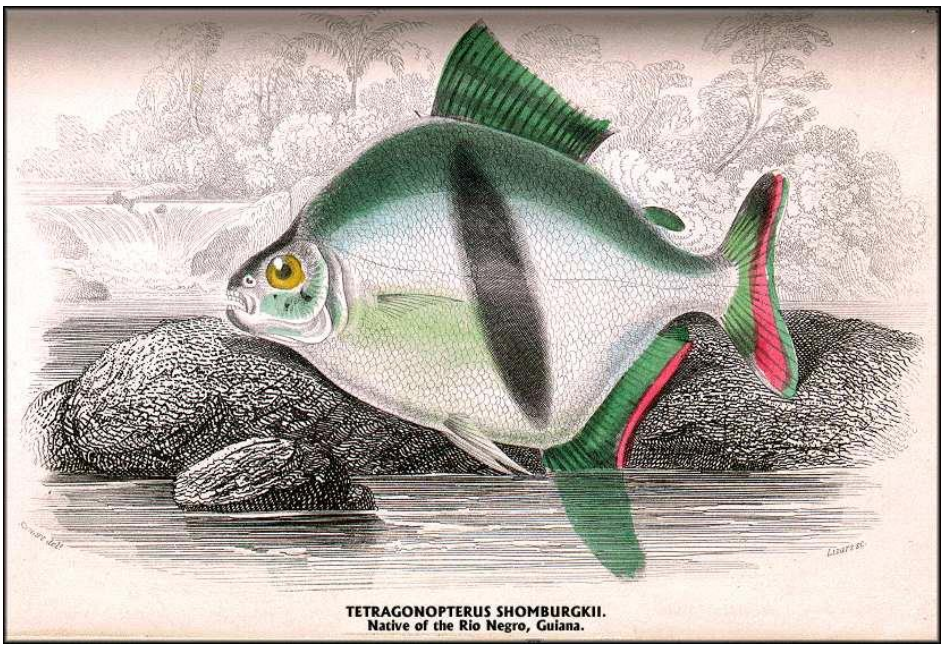
Personnel: The committee feels that the BDG is now at the critical point of turning more than two decades of collecting and training into an explosion of publications and work products. For the museum to take full advantage of this long term investment, it is critical that several key positions be maintained over the next few years to maximize the output of the project. Of particular importance, we strongly urge that a solution be found to maintain the informatics position associated with the project. The larger informatics staff at the museum is not at a stage where they can accept the responsibilities associated with the BDG and continue to make progress in informatics museum-wide. The position should be located in Botany but should not be construed as compromising botany's place in the queue for new positions. After wind-down of the project, the position could transition to botany where there will no doubt be need for additional informatics and web expertise.

Beyond this immediate need, the program should be challenged to devise an explicit set of goals to be achieved as it reaches fruition and winds down. We recommend that it contemplate the following topics / issues / areas:

Geographic extension: We urge program staff to engage in a clear-eyed planning exercise about whether it is feasible to achieve regional coverage for some taxonomic groups. To the review committee, it seems desirable and potentially feasible to expand to the Guianas more broadly, probably by new collecting, processing of specimens and data in hand at NMNH and elsewhere, and by data synthesis. We do not expect that accomplishments in the other Guianan countries will be as in-depth as those in Guyana but careful targeting of efforts should permit considerable progress.

Synthetic Science: As importantly, project staff should propose a set of specific goals that will enable the BDG to achieve the over-arching, synthetic goals in biodiversity science that have come to characterize the project (e.g., the identification of GAPS work that builds on the data brought together and analyzed). We believe that they have the knowledge, experience and data to think beyond the project at hand to contemplate 'methods' paper that would have a major impact on the field.

Legacy: equally importantly, as the project looks toward wind-down of its own physical activities in Guyana, it is vital to develop plans to make sure that the infrastructure on the ground for research and for collections remains intact and can continue to fulfill these functions long after NMNH moves on to other projects.



New Species of fish collected by R. Schomburgk in Guiana Shield area, 1835-1844