

**ANNUAL REPORT 2008**  
 Biological Diversity of the Guiana Shield (BDG)  
 Activities 1 January to 31 December, 2008; Budget for FY2008  
<http://botany.si.edu/bdg/index.html>

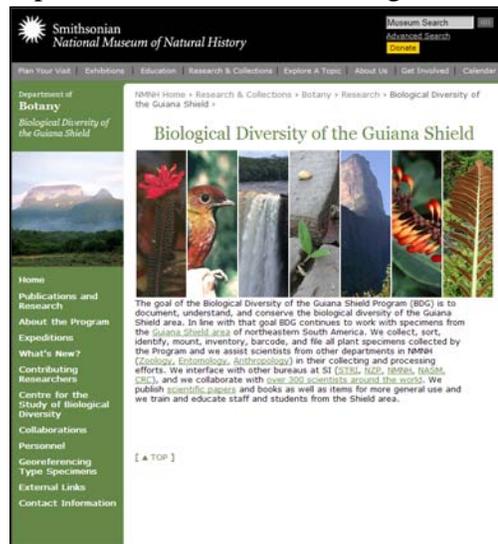
The goal of the Biological Diversity of the Guiana Shield Program (BDG) is to document, understand, and conserve the biological diversity of the Guiana Shield area. In line with that goal BDG continues to work with specimens from the Guiana Shield area of northeastern South America. We collect, sort, 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. All publications are available online along with many other items of interest.

### HIGHLIGHTS

The Checklist projects continue to move forward. The *Fishes of the Guiana Shield* (Vari et al. 2009) was sent off for review in 2008 and is now in press. This checklist of fishes known from the freshwater systems of the Guiana Shield includes 1173 species. In fact, **the drainage systems of the Guiana Shield are home to approximately 23% of the freshwater fish species from the vast expanse between southern South America and the southern border of Mexico** (Reis et al. 2003). The checklist also accounts for over 4% of the 28,400 fish species recently estimated to be present in all marine and freshwater systems worldwide (Nelson, 2006).

The Fish checklist is expected to be published in September of 2009 and is designed to be a companion to the *Checklist of the Terrestrial Vertebrates of the Guiana Shield* (Hollowell & Reynolds 2005) and the *Checklist of the Plants of the Guiana Shield* (Funk et al. 2007). There is also A *Field Checklist of the Birds of Guyana 2<sup>nd</sup> Edition* that was published in 2007 (Braun et al.) and planned for the future is A *Checklist of the Butterflies of the Guiana Shield*. In addition, interest has been expressed in a checklist of the ants.

The Website update has been completed, thanks partially to a grant from the NH-ITO. It has been changed to the new 'Smithsonian template' and has moved to a new location, <http://botany.si.edu/bdg/index.html>. This new format is designed to make data and information from the BDG Program available to the public, scientific community, government agencies, conservation groups, and others interested in the biodiversity of the Guiana Shield.



The Database projects: The public access effort is divided into four phases. **Phase 1:** *Georeferencing Plants of the Guiana Shield: US Types*, has been completed. This site, <http://botany.si.edu/bdg/georeferencing.cfm>, currently includes the plant Type collections from the Guiana Shield (Guyana, Suriname, French Guiana, and the Venezuelan states of Amazonas, Bolivar and Delta Amacuro) that are housed at the US National Herbarium (ca. 3400 specimens). The types were already imaged through the Botany Department but BDG spent a lot of time and money getting the localities checked and adding coordinates so they could be mapped using Google Earth. A paper was submitted to *Biotropica* on how this was done and why it is important to ecology and conservation biology. A copy of this manuscript is attached in Appendix A; it has been “accepted pending revision.”

**Phase 2** is to make available the data from the BDG funded expeditions. **Phase 3** is to make the images from these expeditions available. These two phases are moving along together, although at different speeds, because we require assistance from the collectors to make sure the



photographs are labeled accurately. Phase 2 is nearly finished; all but two major collectors are available online.

This phase should be finished by the end of September 2009. Phase 3 is a little less under our control and although we have many expeditions photos available on line we are still waiting on two collectors to help with their images. This phase is scheduled to be completed by the end of September but some parts may never be finished. Interactive maps using *Google Maps API* trace collecting expeditions made by BDG Program resident collectors, complete with stories from the field, photo galleries, and full lists of plants collected. Currently, full expedition information is available for three collectors: John J. Pipoly, Lynn J. Gillespie and Tim

McDowell. Trip reports for H. David Clarke and Karen M. Redden are expected to be available in the summer of 2009 with T.W. Henkel and B. Hoffman in early 2010. Eduardo Garcia Milagros, part-time contractor, along with Sara Alexander, BDG data manager, continue to work toward completing this project by early 2010. See the website for further information: <http://botany.si.edu/bdg/expeditions.html>.

**Phase 4** is to develop a program that will allow visitors to the website to search by species and display all collections of a particular taxon. Currently visitors to the site can view each expedition with taxon lists and locations, but it would be more useful to have the ability to search across all expeditions for a taxon. We hope to have this completed by January of 2010.

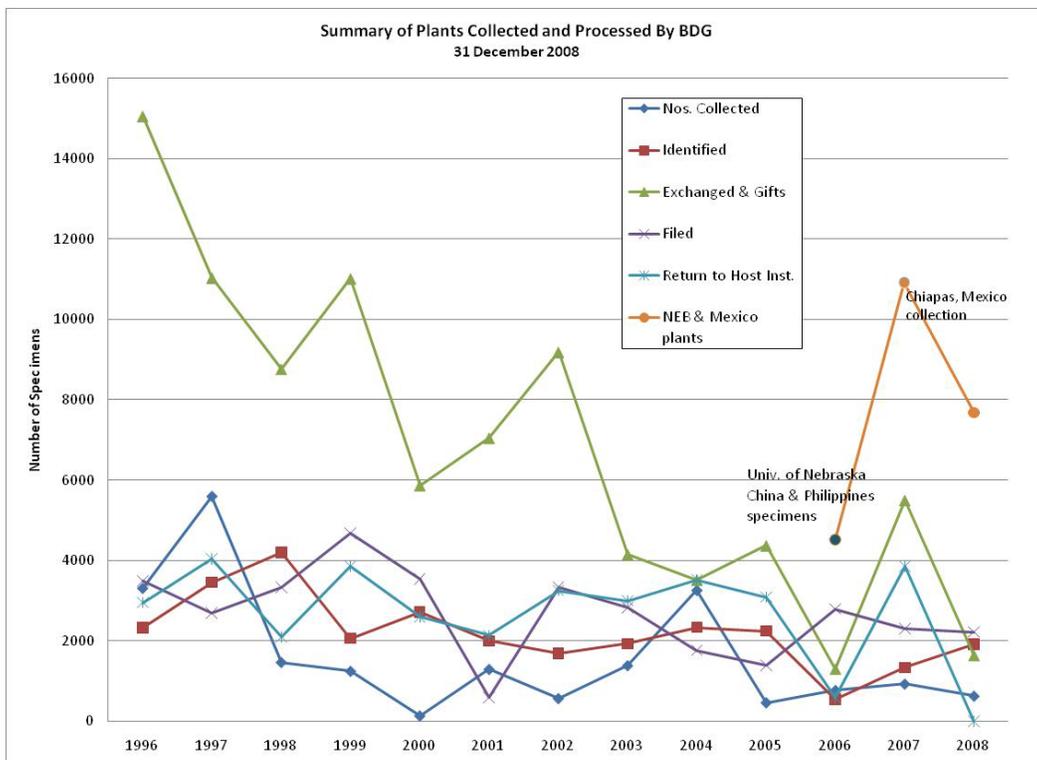
There is an unscheduled **Phase 5** that we hope to implement in the future. We have databased nearly 100,000 specimens in the US National Herbarium (referred to as historical specimens) that we would also like to make available on line. However, the time and funds required to check all the locations and identifications, to georeference them, and to scan the specimens is not available.

During 2008, despite an ever lowering budget, BDG was able to once again have a two month resident collector for plants in Guyana. Dr. Karen M. Redden finished her postdoctoral fellowship with Dr. Pat Herendeen, George Washington University, and began an SI postdoctoral fellowship with Dr. Vicki Funk in November 2008 (Phylogeny and biogeography of six Caesalpinioideae legume genera concentrated on the Guiana Shield). Dr. Redden along with

Dr. Ken Wurdack, Curator-Botany, received funding from Herendeen's NSF grant, the BDG Program, and the Dept. of Botany to collect plants in the Conservation International Concession, an area where very little collecting has been done. They collected nearly 1000 numbers in sets of 3-6. This expedition and several others that we have planned will fill in the missing data in our gap analysis model. Dr. Redden and Dr. Wurdack are planning another trip to the upper Mazaruni and Kako Rivers near the border with Venezuela in 2009, and one close to the New River Triangle in 2010.

**Our quest for outside funds continues:** During FY 2008 we raised \$5000 from NH-ITO to update the website, \$15,000 from Collections Care proposal to mount Berlin specimens, \$10,000 from NSF funds from Herendeen to help support an expedition, for a **total of \$30,000**.

### SPECIMEN WORK AND DATABASES.



In 2006 the BDG sorting center began processing donated collections for various institutions. The University of Nebraska sent 10,000 mounted sheets of material collected in China and the Philippines (we kept 6,000 and sent the rest to herbaria in the countries where they were collected). In addition, we are now processing the priceless ethnobotanical collections of Dr. Brent Berlin (Chiapas, Mexico).

#### Plants (during 2008)

Specimens determined: **1,921**

Specimens sent as gifts/loans for determination: **119**

Duplicates sent out as exchange: **1,535**

Returned to the host country: **GNH** has a backlog of mounting and asked that we hold plant specimens until further notice – current holdings: **1091 collections**

New collections: **636** single numbers, excluding duplicate sheets (new collections **2,534** sheets)

Duplicate Labels prepared: ca. **2,534**

Sheets barcoded and inserted into the US National Herbarium: **1,160** (newly mounted)

Sheets that have been inventoried and barcoded: **1,069** (historical collections from US)

### EXPEDITIONS IN 2008

#### Plants: Guyana

**Karen Redden** (Post-doc, GWU), (6011-6377): CI Concession, Himara Creek, Essequibo River, Guyana. With K. Wurdack; A.



Claudius Perry, field guide

Rodriguez; C. Perry; P. Ragnauth; N. John; H. James; H. Simon; E. Joseph. Date: 14 September 2008 to 11 October 2008. 368 collections and 1408 sheets.



**Ken Wurdack**, (4536-4803): CI Concession, Himara Creek, Jaguar Creek, Essequibo River, Guyana; with K. Redden; A. Rodriguez; C. Perry; H. James; H. Simon; P. Ragnauth; E. Joseph. Date: 14 September 2008 to 11 October 2008. 268 collections and 1126 sheets.

#### Specimens returned to the Guianas:

Ca. **250 Fungi** specimens – Henkel expedition, including **2 holotypes**

The University of Guyana has a backlog of specimens and has requested that BDG hold shipment until they are ready. Currently there are **1091 plant specimens** ready to be shipped to Guyana.

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

(see Appendix B: Faculty of Natural Sciences Annual Report 2007 2008 excerpt covering CSBD Pg 53 – 65)

- 1) The student volunteer program has increased from a few students last year to almost 70 this year. The program allows a hands-on approach to collections and has increased the number of students undertaking research on biodiversity-related issues.
- 2) Mrs. Kaslyn Holder-Collins, Scientific Officer – Herbarium, participated in a training course for herbarium techniques in Trinidad and Tobago.
- 3) The CSBD continues its seminar series. One presentation was by Prof. Jose Fragoso on ecosystems and biodiversity use by indigenous peoples.
- 4) Eleven small grants were given out to students in the Faculty of Natural Sciences to support their research on biodiversity issues.
- 5) Two biodiversity research projects were conducted under the auspices of the Centre: *A Fish Survey of the Upper-Mazaruni River* and *The Fishes of Guyana*.
- 6) The Rupununi Wetland project has started its second phase at the Centre. This project is designed to develop and implement management of natural resources and ecotourism in the North Rupununi area.

- 7) The Butterfly Biodiversity project is a collaboration between the Centre, Iwokrama, and the Warwick University, UK to understand the diversity of the host plant – butterfly community at the Iwokrama Rainforest Reserve in central Guyana.
- 8) The Centre also supports several faculty members and students as “research attachments.” This year the Centre had two: Mr. Phillip DaSilva, on sabbatical from UG, looked at freshwater invertebrates from the Essequibo. Ms. G. Maharaj, M.Sc. student, was attached under the Butterfly Biodiversity project.
- 9) Volume 3 of the *Contributions of the Centre for the Study of Biological Diversity* is expected to be published in the spring of 2009. It is a study of plant community structure, fire disturbance and recovery in the mangrove swamps of the Waini Peninsula.
- 10) The Centre continues to serve the community through its visitors programs (see attached report for list of visitors, collaborators and research organizations).
- 11) The Centre continues to receive donations of books and herbarium and collection supplies from the Smithsonian and various literature from University of Hawaii, Royal Botanical Gardens – Kew, and the Open University, UK.
- 12) The herbarium has 4 cases of plants (ca. 3000 sheets) to be mounted with another ~1000 held by the Smithsonian for the Centre.
- 13) The zoology halls are currently being organized and databased.

#### OTHER ACTIVITIES

- 1) Kelloff and Dodge continue to receive and process the mounted/unmounted ethnobotanical collections (B. Berlin) from the University of Georgia. Number of plants received (excluding duplicates): **9,897**. These specimens have been mounted and are filed by family waiting until all have arrived.
- 2) Alexander databased **2778** mounted collections from the University of Georgia that were missing from the database we were sent (B. Berlin collections).
- 3) Funk and Kelloff attended the Botany 2008 meeting in Vancouver, Canada and presented talks.
- 4) Kelloff and Funk are preparing the second addition to the *Plants of Kaieteur National Park, Guyana*, which should be completed by summer 2010.
- 5) BDG sponsored Calvin Bernard, Manager, CSBD to attend the *Sustainable Management of Natural Resources* course by SI/MAB.
- 6) BDG continues to support specimen preparation with a grant given to Entomology to identify and image of the ants of the Guiana Shield. Over 200 ant species have been photographed including three standard specimen views (head, lateral and dorsal habitus). The 2006 expedition of leaf-litter ants have been sorted to morphospecies with a subset of the samples pinned. A paper resulted from this work and has been submitted for publication. Five new species are described and more publications are expected.

#### THE FUTURE

BDG has published three volumes (Pipoly, Gillespie, McDowell) in the *Smithsonian Plant Collections, Guyana* series and five more should be finished within the next two years (FY2010-2011). These include the expeditions of Clarke, Hoffman, Henkel, Redden, and a volume of miscellaneous BDG expeditions to the Guianas in the past 25 years. Each volume will be

completed after the interactive maps of these expeditions are uploaded to the website using Google Maps. These published trip reports will be made available in pdf format on the web page.

*Future Funding - proposals:*

Redden, Funk & Herendeen submitted an NSF-REVSYS Proposal: *Biogeography, phylogenetics and taxonomic revision of the neotropical genus Macrolobium (Leguminosae, Caesalpinioideae)* for \$416,718 in July of 2009. If funded, this would pay Redden's salary and help support field work for four years.

A Smithsonian Women's Committee proposal was submitted for \$24,000 to pay for the shelving in the library at the Centre in Guyana.

A grant for \$1,000,000 for five years to establish a large plot in Guyana (in collaboration with the Brazilians) was submitted to BS&I in 2008. It was not funded. However, there were some very good comments in the reviews and we are rewriting it for the January 2010 deadline for \$750,000 and four years.

### PUBLICATIONS 2008

Feuillet C. 2008. Folia taxonomica 4. Conspectus of *Myriopus* (Heliotropiaceae, Boraginales) in the Guiana Shield. *J. Bot. Res. Inst. Texas* 2(1): 263-265.

Feuillet, C. 2008. Folia Taxonomica 6. Two new species of *Besleria* (Gesneriaceae) from the Venezuelan Guayana. *J. Bot. Res. Inst. Texas* 2 (1):269-273.

Feuillet, C. 2008. Folia Taxonomica 7. Two new species and a new section in *Episcia* (Gesneriaceae) from the Venezuelan Guayana. *J. Bot. Res. Inst. Texas* 2 (1):275-280.

Feuillet, C. 2008. Folia Taxonomica 8. *Passiflora tecta*, a new species in subgenus *Passiflora* from the Guianas. *J. Bot. Res. Inst. Texas* 2 (1): 281-283.

Fulgenzi TD, Mayor JR, Henkel TW, Halling RE. 2008. New species of *Boletellus* from Guyana. *Mycologia* 100(3): 490-495.

Kelloff, C.L. 2008. Structure and diversity of a riparian forest at Kaieteur National Park, Guyana. *J. Bot. Res. Inst. Texas* 2(1):521-545.

Largent, D.L., M.C. Aime, T.W. Henkel, T.J. Baroni. 2008. The Entolomataceae of the Pakaraima Mountains of Guyana II: *Inocephalus dragonosporus* comb. nov. *Mycotaxon* 105: 185-189.

MacCulloch, R.D., A. Lathrop and S.Z. Khan. 2008. A new species of *Adelophryne* (Anura: Leptodactylidae) from Guyana, with remarks on *A. gutturosa*. *Zootaxa* 1884: 36-50.

MacCulloch, R.D., A. Lathrop, L.R. Minter and S.Z. Khan. 2008. *Otophryne* (Anura: Microhylidae) from the highlands of Guyana: redescrptions, vocalisations, tadpoles and new distributions. *Papeis Avulsos de Zoologia* 48(22): 247-261.

Mayor J.R., T.D. Fulgenzi, T.W. Henkel, and R.E. Halling. 2008. *Boletellus piakaius* sp. nov. and a new distribution record for *Boletellus ananas* var. *ananas* from Guyana. *Mycotaxon* 105: 387-398.

Redden, K. 2008. A new species of *Paloue* (Caesalpinioideae: Leguminosae: Detarieae) from Guyana South America. *Brittonia* 60:257-260.

Woolley L.P., Henkel T.W., Sillet S.C. 2008. Reiteration in the Monodominant Tropical Tree *Dicymbe corymbosa* (Caesalpiniaceae) and its Potential Adaptive Significance. *Biotropica* 40(1): 32-43.

#### Articles published in late 2007:

Fulgenzi TD, TW Henkel, RE Halling. 2007. *Tylopilus orsonianus* sp. nov. and *Tylopilus eximius* from Guyana. *Mycologia* 99 (4): 622-627.

Henkel, T.W., M.C. Aime, H. Mehl, and S.L. Miller. 2006. *Cantharellus pleurotoides*, a new and unusual basidiomycete from Guyana. *Mycological Research* 110:1409-1412.

**BUDGET** – The Program received federal funding in 2008 (note: budget is for FY08, the descriptive portion of this report is for the calendar year 2008).

Funds from sources outside our federal allocation were used to promote field work and specimen processing. In FY08 these funds came from a variety of sources including the National Science Foundation, George Washington University, other institutions; **the total outside funds for FY 08 was \$30,000.**

<b>Outside funding raised by BDG</b>	
NH-ITO website improvement grant	5,000.00
Collection care proposal	15,000.00
NSF Grant - Herendeen	10,000.00
TOTAL	<b>30,000.00</b>

[Appendices not included in short version of Annual Report]