VOLUME 2: Issue 1 March 2010

sabi South African Biosystematics Initiative

Student newsletter

Inside this issue

Tales of species discovery

2010 International Year of Biodiversity

Dear readers,

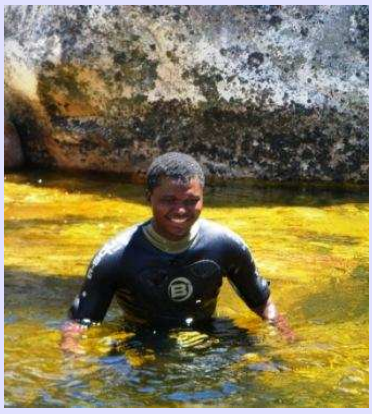
Once again we turn our focus to this the SABI student newsletter and this first issue of the year. What a pleasing experience it is to see young minds getting enthused and continuing to share their research with the biosystematics community. What makes this issue exciting is that it has a variety of contributions which focus on different study groups including fish, fungi, insects, reptiles and amphibians. These deal with adventurous trips for species discovery which include visits to some research institutions overseas, our own CFR and a *"lost"* forest. Who will not want to visit the world's largest collection or new area for their group of interest?

It is however critical that we all consider how our work can influence the conservation of this diversity due to the threatened status of most of these species. This even more so as we barely know what the diversity of most groups is out there.

So, let's all get out there and continue to support our quarterly newsletter with great inspiration and success research stories!!

Many thanks to all the contributors in this issue.

Sincerely, Tshifhiwa (*SABI Student representative*) ■



Albert experiencing the healing power of nature

> *"What processes have led to the co-occurrence of fishes in this region?"*

Did you know?
— Invasive fish and plants are widespread in the rivers and riparian zones of the CFR

Threatened unique fish fauna of the Breede river and CFR need your help

✍ **Albert Chakona** *(PhD student: Rhodes University)*

For purposes of biodiversity conservation and management, knowledge of species distribution and genetic diversity is a fundamental pre-requisite. The Breede River Research Team surveyed the Breede and other river systems for ecological data and tissue samples for genetic analysis from November 2008 to December 2009. This team was comprised of researchers from the South African Institute for Aquatic Biodiversity (SAIAB), Department of Ichthyology and Fisheries Science (DIFS, Rhodes University), CapeNature and as 'far afield' as the Anthropology Department (Rhodes University). The team, working with my guidance was particularly interested in conducting fine scale geographic sampling of freshwater-restricted indigenous fishes associated with two palaeoriver-systems (i.e. the Breede-Duiwenhoks-Heuningnes palaeoriver system and the Gouritz-Goukou palaeoriver system) that are currently isolated from one another by marine and terrestrial barriers. The aim of the sampling was to determine the relationships between the fishes and shed more light on the processes that could have led to the common occurrence of these fishes in these river systems.

Over 350 sites were sampled across the study area, albeit with some difficulty. Sampling involved a crew of two people per sampling occasion. With sampling equipment in hand and lots of enthusiasm, the team would set off every morning to hike up the 'kloofs' and map the distribution ranges of species belonging to four genera; *Sandelia, Galaxias, Pseudobarbus* and *Barbus*. Finding our way to the top of fish distributions was our biggest challenge because it involved lots of bundu-bashing through the 'scratchy' fynbos and bolder-hopping along the river bed, not to mention the several slippery-rock accidents! After slashing across several stretches of fynbos, crewmember James Merron admitted that *"this is fynbos, not funbos!"*

continued on next pape ☛☛

Top: *One of the new discovered rare Galaxias species from the Breede system*
Bottom: *The Tradou River Redfin a critically endangered fresh water species*

The Tradou River Gorge, home to the critically endangered Tradou River Redfin

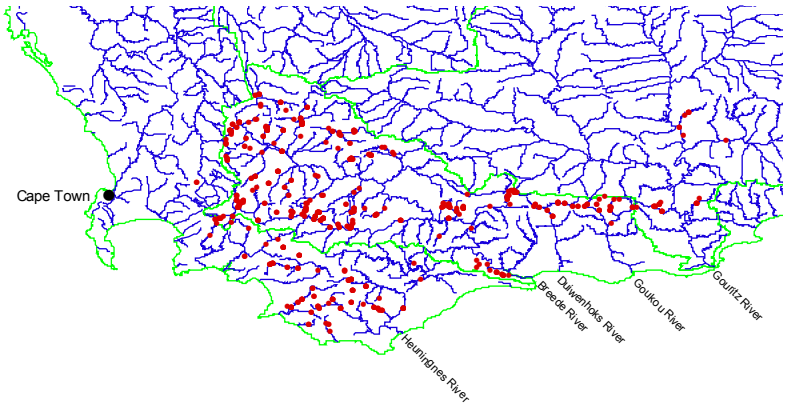
Threatened unique fish fauna of the Breede river and CFR need your help!

Being a native of the northern and savannah regions of southern Africa, working in such a remarkable area with a dazzling diversity of plant life, stunning sceneries, spectacular gorges, clear flowing mountain streams and beautiful waterfalls in the Cape Fold Mountains was a unique opportunity. I felt I was getting the royal treatment having to encounter and experience such exceptional beauty that many only get to see in glossy magazines! Ernst Swartz emphatically stated (with great humour) that the Cape Floristic Region (CFR) is a precious reservoir of biological diversity, being renowned for harbouring several faunal and botanical gems. However, the future of this biodiveristy is heavily dependant on reliable data to inform appropriate conservation planning and management. It was reassuring to meet the many private landowners and nature reserves that supported and provided access for sampling. Through them, large amounts of data were collected from the Gouritz, Goukou, Duiwenhoks up to the Breede as well as several coastal rivers including the Heuningnes, Uilkraals, Haelkral and Ratel (See map). This study is the first to discover and document the occurrence of an amphibious air-breathing galaxiid in the CFR, a phenomenon rare in temperate fishes. This is common among tropical freshwater fishes especially in temporary habitats and stagnant swamps where deoxygenation and droughts favour the evolution of diverse adaptations for aerial respiration.

> *"A unique opportunity to explore a region with a dazzling diversity of life"*

Clarias galore. The little galaxias or redfin species cannot withstand this alien invasive predator

Preliminary genetic analyses led to the discovery of four unique lineages of *Galaxias* in addition to the 10 lineages already discovered by Swartz & McDowall (unpublished data). All these discovered lineages may be described as new species, suggesting that the fish diversity of the CFR may parallel its botanical diversity. However, many of these discovered lineages are at an elevated risk of extinction due to small known population sizes and narrow distribution ranges. Most populations are highly fragmented, occurring in habitats surrounded mostly by converted land. Any change in land use or intensification of farming practice could lead to the disappearance of many of these unique lineages. Habitat degradation through bull dozing, complete water abstraction and sedimentation also threaten the future survival of the fishes. Furthermore, the extensive flooding in November 2008 resulted in a range expansion of several alien piscivorous predators particularly *Clarias gariepinus* and *Micropterus* species, causing local extinctions in invaded river reaches.



Map of the surveyed areas in the CFR showing all the localities sampled

> *"There's an elevated risk of extinction for small populations with narrow distribution ranges"*

The current threats and rate of biodiversity loss can only be successfully halted with collaboration among land owners and researchers and aggressive promotion of public awareness on the benefits of maintaining healthy functional ecosystems. This study has successfully initiated public participation and awareness among land owners, and we aim to provide guidelines on how wine farmers can contribute to conservation through best farming practices. The response has been overwhelming and the farming community has been very supportive and enthusiastic about preventing further loss of biodiversity, *"the heritage for future generations,"* as one farmer stated. We have enjoyed talking to many of the land owners about the interesting findings from this study and we look forward to working with them in future years. The data from these surveys will be analysed for more detailed reports on the best strategies to manage the exceptional ichthyofaunal diversity of the CFR. We hope that this information will be published in future issues of the SABI Newsletter as well as local and international journals.

I gratefully acknowledge the institutions that have supported our crew including the National Research Foundation (NRF), International Foundation for Science (IFS), the Rufford Small Grants for Nature Conservation and World Wildlife Foundation (WWF) for affording me this great opportunity to carry out this study. I am very thankful to Mr and Mrs Swartz in Stellenbosch for offering us free accommodation during field trips, and for allowing us to convert their house into a *"field laboratory"* for our experiments. The lovely meals they prepared for us were so tasty that we just wish we could visit more often. To the research team I say *baie dankie*! ■

Albert's PhD study on the "Comparative phylogeography of freshwater restricted fishes in the Breede and associated systems" is through SAIAB and the Dept. of Ichthyology and Fisheries Science at Rhodes University , Grahamstown.
Good luck bundu basher!!!

Here, there and pretty much everywhere (in two weeks) – a race through Europe!

✍ **Ben Price** *(SABI Postdoctoral fellow: Albany Museum)*

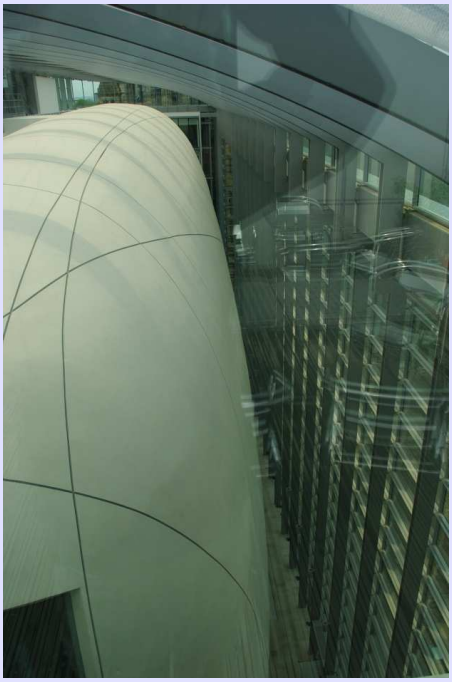
Taxonomy is the foundation of all the biological sciences. In order to study an organism and effectively communicate your findings to the broader scientific community you need to know exactly what you are looking at! To make sure you are calling your specimen the right name, which turns out to be quite important, you need to compare it to the name bearer or "type" specimen. Types are usually designated by the person who first describes the species, which means in many cases they are very old and kept in museums very far away, which leads us to the reason for this rush through Europe. My supervisor, Prof Martin Villet, and I work on African cicadas, those really loud insects, you know, the ones that drown out Christmas parties and once you notice them will drive you mad! As it turns out, most of the type specimens are in Europe, which gave us an excuse to rack up some air miles and sample a little of Europe for ourselves. We picked a time of the year when our South African cicadas were still underground (winter) for the trip, which just happened to coincide with the northern hemisphere summer!

All in all we visited five museums in four countries (The Natural History Museum, London; The Museum Nationale d'Histoire Naturelle, Paris; The Musee Royale d'Afrique Centrale, Terveuren; The Royal Institute of Natural Sciences, Brussels; and The Natural History Museum of Humboldt University, Berlin). These museums house some of the largest insect collections in the world and given that we had two weeks in total (about 3 days in each city) we rushed through the cabinets as fast as possible. At each museum we photographed the type specimen of all African species and databased the locality information; this resulted in 954 images of specimens, helping to clarify the identity of 328 species and confirm the validity of numerous species, yet to be described, that we have recently discovered! The photos and locality information will now be added to various online initiatives such as the Encyclopaedia of Life (http://www.eol.org/), and the Global Biodiversity Information Facility (http://www.gbif.org/) which will make them accessible to all.

What little time there was for sightseeing, essentially when the museums weren't open, was used very efficiently and we managed to tick off most of the top ten sights in every city, although at times this involved quite a bit of running! Luckily Europeans like their liquid refreshments, and we were able to quench our thirst on hot summer days with beverages that are often hard to come by here in SA!! After two weeks of hectic travel the 36 hour return trip was a welcome rest!! *Buzzzzzz!* ■

Ben's PhD study was on the "Historical biogeography of the tribe Platypleurini Schmidt, 1918 (Hemiptera: Cicadidae) with a focus on southern Africa" in the Dept. of Zoology and Entomology, Rhodes University, Grahamstown. He is currently a recipient of a SABI post doctoral award and will be working with the Albany Museum in Grahamstown.

All photographs were taken by Ben Price except for the Cicada (Clipart obtained from Florida Center for Instructional Technology resource site)



The new insect collection facility @ the Natural History Museum, London (meant to look like an insect cocoon)

"The assembled database of localities and images of cicadas, will help to clarify species identities and confirm the validity of numerous species yet to be described"

Big Ben – often confused with the clock in the background!

"I work on African cicadas - those really loud insects!"

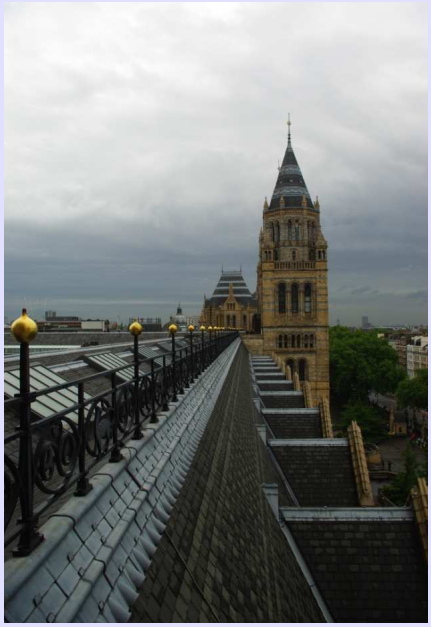
Did you know?

— That the name Cicada is a direct derivation of the Latin *cicada*, meaning "*buzzer*!"

— Only male cicadas buzz being among the loudest in the insect world.

— The loudest cicadas can achieve 109 decibels, equal to that of a chain saw!

hmm… *like big Ben's chime* !



A view from the roof of the Natural History Museum, London – yes, that is an English summer in the background!

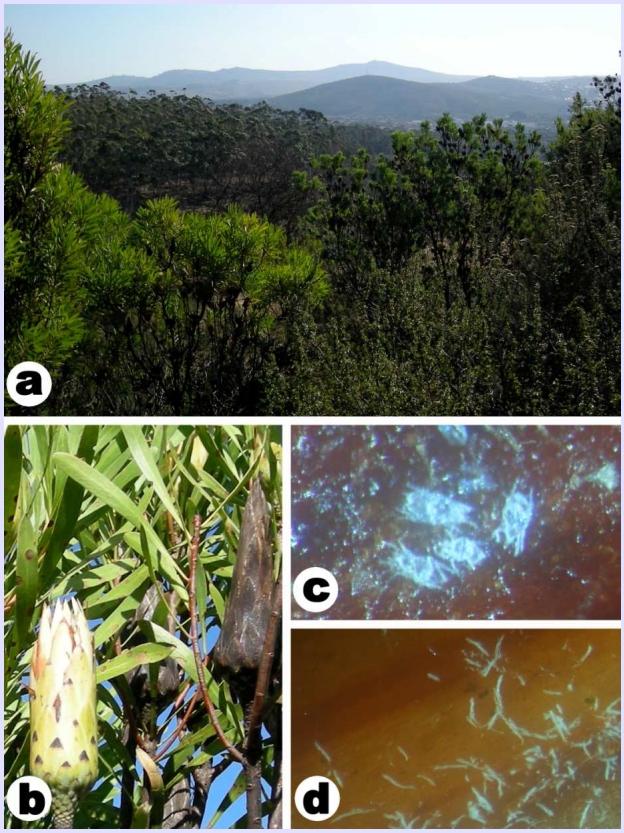
Cobus with his microscope

Exploring Penicillium diversity in the Cape Floristic Region

✍ **Cobus Visagie** *(PhD student: Stellenbosch University)*

My work as a postgraduate student at the University of Stellenbosch is focused on the fungal genus *Penicillium*, specifically species occurring in the Fynbos biome under the supervision of Prof. Karin Jacobs, with Dr. Francois Roets as co-supervisor. Apart from their ecological function, species of *Penicillium* are of great economic importance for biotechnology, pharmacology and as post harvest pathogens. The ±230 members of this fungal genus are notoriously difficult to identify using traditional morphological techniques and, therefore, *Penicillium* taxonomists often help shape future trends with regards to species concepts (definitions) and incorporation of new tools and technologies for identification purposes. In South Africa *Penicillium* are one of the dominant fungal genera in soils and have been observed to be diverse and unique, much like the plant kingdom. Unfortunately, very little information is available on the genus as past taxonomists have greatly neglected our species.

I am therefore currently exploring the diversity of *Penicillium* spp. from Fynbos, specifically focusing on species associated with mites from *Protea repens* or sugar bush infructescences, and the surrounding soil and air in the Cape Floristic Region. We believe that mites serve as transport vectors from *Protea* infructescences, since wind or water dispersal is not possible from these enclosed floral structures. We also expect that a large number of the species that will be isolated will be new to science, based on earlier results from my MSc. study, where 11 out of the 24 characterised species were new and are in the process of being described. The main aim of this current project is therefore, to characterise species using both traditional morphology, as well as genetic analyses using a multigene phylogeny. All of the identified species will be incorporated into an interactive electronic Identification key for use by the South African as well as international fungal community.



(a) Stellenbosch Mountain; (b) P. repens infructescences; (c) samples isolated from mites; and (d) Penicillium growing & sporulating on the inside of the bracts of the Protea

> *"Penicillium species are notoriously difficult to identify using traditional taxonomy"*

Did you know?
— *Penicillium* is from Latin "penicillus" meaning paintbrush due to its conidial structures that look like brushes.

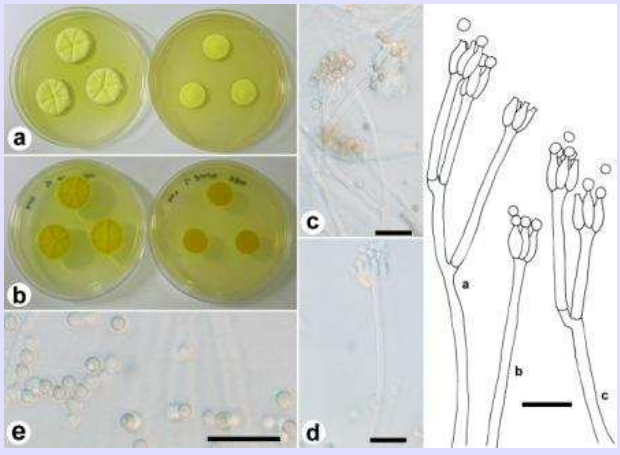
Our current study, indicates that *Penicillium* species diversity from Fynbos is immense. Nearly 80 species have been isolated from mites, *Protea repens* infructescences, soil samples and air from our three sampling sites in Struisbaai, Stellenbosch Mountain and the Riverlands Nature Reserve near Malmesbury.

> *"Species diversity from the Fynbos is immense with ±80 species isolated!"*

Cobus's PhD study on the fungal genus Penicillium has a focus on species in the Fynbos biome of the CFR. He is registered with the Dept. of Microbiology at the University of Stellenbosch.

Photographs were provided by Cobus Visagie.

All the best of luck in this huge task Cobus!

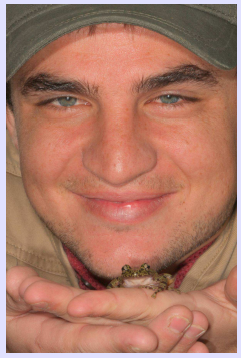


P. toxicarium, one of the dominant species isolated from Protea repens

These species are in the process of being characterised, initially based on morphological techniques before performing multigene phylogenetic analyses using the selected ITS, β-tubulin and Calmodulin gene regions. Considering the ±80 South African species which will be characterised and compared with other closely related *Penicillium* spp., South Africa has a real opportunity to make a great taxonomic contribution to the international understanding of the genus. These studies should also help shape changes in future trends in taxonomic procedures not only for *Penicillium*, but for fungi as a group■

New species from a forgotten Mozambique forest

Werner Conradie *(PhD student: Port Elizabeth Museum)*



Werner and the ghost frog

Mount Mabu in central Mozambique is a long lost forest, that was recently rediscovered quite by accident by researchers using GoogleEarth. They stumbled upon this unique area through a project that is trying to identify low to mid altitude rainforests for conservation. Although locals used this dense forest as a place of refuge during the lengthy civil war that tore through the country, this area remained hidden to science. During one of the first surveys, numerous new species were discovered, with a great potential for many more. This valuable biodiversity contribution included butterflies, snakes, river crabs and plants species, amongst others. Mt Mabu is also identified by BirdLife as an important birding area. Indeed, this *lost* forest has much to offer science and is a very exiting discovery.

A research team was therefore assembled to explore the area with Bill Branch and I, representing Port Elizabeth Museum. It was a wonderful opportunity and privilege to be the very first herpetologists on these surveys. We embarked on this short privately funded expedition to record the reptile and amphibian diversity of Mt Mabu in early June 2009. Although we were specifically looking for the new chameleon species photographed by a botanist on a previous expedition, our hope was to discover other new reptile or amphibian species. We soon realised that this was not at all easy.

The granite top of Mount Mabu in Mozambique (about 1700m)

Firstly, we flew to Lilongwe in Malawi, and took a connecting flight to Blantyre, where we were picked up by our local contact from the Mt Mulanje Conservation Trust (MMCT), Dr. Julian Bayliss. We spent the night at the foot of Mt Mulanje Massif in a Country Lodge (a place I personally visited a few months later, but that is another story). Alas this luxury was not to last as we packed our vehicle and headed for the Mozambique border the next day. We were almost there when we reached the Lugela river, about a 15 minutes drive to Mt Mabu. However, we could not quickly get near to our destination as the bridge over the river was in a poor state and un-crossable. After some negotiations, a few locals agreed to make a new path for us through some reeds, but for a price, of course. About 45 minutes later, we were able to cross and go on.

> *"Nadzikambia is a Malawian name for chameleons in Chichewa"*

Did you know?
— That the chameleons tongue extends faster than human eyes can follow.

The first night on the mountain, was spent in an old abandoned tea plantation, now a deteriorating and empty house of one of the residents. We then embarked on a grueling 6-hour hike the next day to our forest base camp, our final destination. Though it was a tough hike, it was worth it as I was lucky to collect the first specimen of the new chameleon that night. Although the individual was a juvenile, this was still an amazing find. After studying the unique creature, we set out with renewed energy and found an adult female later that night. We were then lucky to also find another female, plus a male two nights later. Nothing could stop us now. We also found numerous pygmy chameleons of *Rhampholeon*. DNA tissue of all specimens was collected and sent for analyses to Krystal Tolley (SANBI Kirstenbosch Research Centre in Cape Town). Results indicated that both species of chameleon are in fact new species.

The new pygmy chameleon species of Rhampholeon

The new species of Nadzibambia

> *"The unexplored lush green lost forest is a very exciting science discovery."*

Interesting to note is that the new species is now part of *Nadzikambia*, a genus that was previously monotypic and only known from Mt Mulanje, Malawi (300km away). This therefore just emphasises the great biodiversity treasure this unexplored lush green mountain forest represents. Other important findings include a unique species of butterfly found by the other team members, which is also only previously known from another rainforest located more north of Mt Mabu. Amongst our own selection of species, was also a new species of a leaf-litter frog belonging to the genus *Arthroleptis*. The species description is in preparation and will be published shortly. This survey experience was an enriching one, and we hope to return soon to continue the exploration and hopefully discover more species for a better documentation of all the biodiversity that Mount Mabu has to offer to the scientific community■

Werner is a PhD candidate in herpetology, affiliated with SANBI & SAIAB. He is employed as a curator of herpetology at Bayworld (Port Elizabeth Museum). All photographs were provided by Werner

Good luck Werner, we clearly need more of you out there exploring!!!

VISIT THE FORUM

www.sabistudents.org.za

Or contact Thabo ✉
news@sabistudents.org.za
for comments on newsletter.

Upcoming events!!

* ***National science festival —*** *(SCIFEST Africa) in Grahamstown from the 24th –30th of March with the theme "Science in motion."*

* ***SABI student alumni —*** *The student forum will soon be setting up a distribution list of alumni. Send your details to get involved now and suggest activities to info@sabisttudents.org.za*

Next issue...

*Submit articles & notices before **15th June 2010** for inclusion to news@sabistudents.org.za*

THIS ISSUE:

Editor/ organiser: Monica Mwale (SAIAB) and Tshifhiwa Mandiwana-Neudani. (Student rep.)

SABI forum in PE

The theme of the 2010 SABI forum meeting held in PE on the 26th of February was on the "*Importance of Systematics in Biodiversity Science for Human Well Being*." This meeting was well received with over 100 attendants from the SABI research community from museums, universities, government depts. and research institutions.

The key note addresses focused on the value of biosystematics with highlights in agriculture (Prof Mervyn Mansell: Univ. of Pretoria/USDA -APHIS), forensic science (Prof Martin Villet: Rhodes Univ.), ecosystem services (Dr Mandy Cadman - Biodiversity Specialist consultant) and controlling Malaria vector mosquitoes (Dr Basil Brooke - National Health Laboratory Service) ■

Post Docs positions awarded to Museums for 2010

Three Post Doctoral fellowships were awarded to South African PhD graduates to continue their research in biosystematics with support and participation by researchers based at South African museums and researchers based at universities. These fellowships will commence in 2010 for a year and can be extended for a second year if the post-doc makes good progress .

The current post docs will be based at the Albany Museum in Grahamstown and the South African National Museum – Iziko in Cape Town. A call for 2011 fellowships will be circulated later in the year and all potential PhD graduates are encouraged to apply! ■

The ARC biosystematics facility!

A new custom-designed building for research and the collections of the Agricultural Research Council (ARC) Plant Protection Research Institute Biosystematics Division, was constructed on the premises of the Institute's headquarters at Roodeplaat near Pretoria. This facility will house the national collections of insects, arachnids, nematodes and fungi. ARC Staff were transferred to the new premises at the end of last year.

This facility is a success and step in the right direction for collections and South African biosystematics research ■

Comments to the newsletter

"I'd just like to congratulate you on an interesting and informative newsletter. Communication is key to keeping people informed and interested" Ian Engelbrecht, Invertebrate Scientist, Gauteng Nature Conservation.

"It's about time we had something this exciting amongst the systematic students in South Africa. I would like to thank all the students for sharing their experiences and exciting work" Ben Price, SABI Post-Doc.

To continue giving you a good SABI student newsletter, we would like to continue to hear your thoughts. Please feel free to write to us about any comments and suggestions for improvement you may have. Together we can do so much more!■

Let us celebrate together!

2010 is a significant year in South Africa's history not only being the international year of biodiversity but in terms of hosting the first ever FIFA world cup on African soil! Therefore we would like the SABI student forum to celebrate these events. Please send us or post us your pictures and information on what you will be doing this year during the football world cup and your participation in biodiversity events for a photo gallery and feature on the website. All other interesting activities are very welcome.

Regards, Editorial team.

science & technology Department: Science and Technology REPUBLIC OF SOUTH AFRICA
NRF National Research Foundation | RISA Research and Innovation Support and Advancement
The SABI student forum is funded by the Department of Science and Technology and the National Research Foundation. It is managed through the South African Institute for Aquatic Biodiversity.
NRF National Research Foundation | SAIAB South African Institute for Aquatic Biodiversity