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Plant Protection Research Institute

Newsletter of the Plant Protection Research Institute (PPRI), an institute in the Natural Resources and Engineering Division of the Agricultural Research Council (ARC)

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The Scale Insect Barcoding Initiative

DNA barcoding is an exciting new tool for identifying biological specimens. This novel method of determining the names of organisms promises huge benefits for the study and management of the vast diversity of species that inhabit our planet. An organism's DNA barcode comprises the sequence of the DNA base-pairs in a selected small portion of its entire genetic code. Currently, a large library of reference barcode sequences for thousands of species is being generated through barcoding projects worldwide. This open access data resource will enable non-specialists to rapidly identify biological specimens, by comparing their DNA barcodes with the reference barcodes to find the matching species.

The obvious advantages of applying this new molecular method to the identification of insect pests has led to the recent launch of the Scale Insect Barcoding Initiative (SIBI) project at the National Collection of Insects at PPRI. This three-year venture is being funded by the National Department of Agriculture, at the request of the Department's Plant Health quarantine services. The Consortium for the "Barcode of Life", based at the Smithsonian Institution in Washington D.C., also provided important support in developing the SIBI project.

Scale insects are important pests of crops. They live sedentary lives on plants, and are easily transported between countries on imported and exported agricultural products, such as fruit. Thus they are of major concern to quarantine agencies, and scale insects that are intercepted in international agricultural trade have to be quickly and accurately identified.

This is currently done by studying their morphology which is a difficult and time-consuming process requiring a high degree of expertise. Immature or damaged specimens present problems as these are usually impossible to identify. A more effective method of identification is needed, and DNA barcoding offers the solution to the difficulties involved in determining the names of scale insect specimens.

The SIBI project aims to determine DNA barcodes for over a hundred of the most important pest species of scale insects in South Africa. These DNA sequences will be used by the DoA for the rapid identification of scales which are intercepted by quarantine inspectors on shipments of agricultural products.

A team of four people at the National Collection of Insects is busy carrying out the SIBI project. Ian Millar, who works on scale insect taxonomy, is co-ordinating the project and is involved in the collection and identification of the species that are being barcoded. Ledile Mankga has been employed on contract to carry out the field work required to collect scale samples, and to curate the reference specimens. Ledile is a zoologist who studied at the University of Limpopo. The molecular laboratory procedures required to generate the DNA barcodes are being undertaken by another contract worker, Theresa Sethusa, who qualified in microbiology at the University of Pretoria. Theresa is working together with the fourth team member, Riana Jacobs, a molecular mycologist here at the Biosystematics Division, who supervises the laboratory aspects of the project.

The SIBI team (l to r): Ian Millar, Ledile Mankga, Riana Jacobs, Theresa Sethusa

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Insect Quarantine under new management

Leoni Pretorius, manager of the Insect Quarantine at ARC-PPRI for the last 16 years, retired at the end of October 2008 (see p.15). Almie van den Berg, senior researcher at ARC-PPRI took over Leoni's duties in November 2008.
The insect quarantine service is rendered under a mandate from the Directorate of South African Agricultural Food, Quarantine and Inspection Services (SAAFQIS) of the Department of Agriculture, in terms of the Agricultural Pests Act (Act 36 of 1983). All insects, mites and nematodes that are imported, whether for the biological control of insect pests, for scientific study or other beneficial purposes, have to pass through quarantine before being released back to the importing agency. All imports are reared for al least one generation in quarantine to ensure that the culture is pure and of the right identity, and that it conforms to the host specificity requirements set by SAAFQIS.

The main purpose of insect quarantine is to prevent unwanted organisms from entering a country. Field collected material may include hyper parasitoids, phytophagous insects, pathogens or weeds whose importation must be prevented at all cost.

The quarantine facility is a fully equipped, self contained, insect tight, highly functional laboratory and permits the handling of imported material in a manner that prevents the escape of potentially harmful organisms.

The Insect Quarantine facility is situated at the PPRI Rietondale campus in Pretoria and is the only Insect Quarantine facility in South Africa. It is available to any person or institution in possession of a valid import permit issued by SAAFQIS.

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Almie van den Berg in the Insect Quarantine Facilities

Appointments on committees

Congratulations to the following PPRI researchers that were appointed to positions on national and international committees.

- The Minister for Agriculture and Land Affairs, Lulama Xingwana, recently appointed **Dr E Sandmann** of the Pesticide Programme as Technical Advisor for the Registrar of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 236 of 1947). The appointment period is for 2 years, and will involve inputs on specific areas of expertise. This is a good example of the good working relationship between ARC- PPRI and the Department of Agriculture, and specifically the Registrar of Act 36 of 1947, Mr Jonathan Mudzunga.
- **Dr Connal Eardley** of the Biosystematics Programme was appointed to the Vice-Chair position of the International Commission on Plant Bee Relations (ICPBR). For more information see p. 7.
- **Dr Eddie Ueckermann** of the Biosystematics Programme was appointed **on the Programme Subcommittee of the** next International Congress of Acarology (2010).
- **Dr Ansie Dippenaar-Schoeman** of the Biosystematics Programme was appointed as General Secretary of the Royal Society of South Africa.

Obituary –Johann Möhr

It was with great sadness that we learned of the passing of Dr. Johann Möhr shortly before Christmas last year.

Johann was born on 13 October 1943. He completed his B.Sc. Agric degree at the University of Stellenbosch in 1965 and in 1968 he joined the Department of Agriculture in Middelburg, Western Cape. In 1972 he obtained his M.Sc. Agric from the University of Natal and in 1982 his Ph.D. from Rhodes University.

Dr Johann Möhr

In 1982 he moved to Pretoria, as Assistant Director of Entomology and Zoology, working with Dr. Keetch. He then moved to Rietondale where he worked with Dr. Staphorst as Assistant Director of Plant Pathology. Under Mike Walters he moved to Roodeplaat as Manager of Business Development. He later moved back to Rietondale as Manager of Insect Ecology. From 2003 to 2005 he was Acting Director of PPRI. He retired early in May 2006.

Johann's English was immaculate and he helped many people in the Institute to edit their thesis, scientific publications and letters. He also knew better than anybody the content and meaning of all Government acts and policies related to Agriculture and the environment and when the Institute had to submit reports on various policies to the ARC it was always Johann who was the go-to person.

Johann was a real gentleman from whom you never heard a bad word on anybody. He was trusted and respected by all as a fair manager. He will be missed by everybody who knew him. On behalf of all his colleagues at PPRI and the ARC we would like to convey our deepest sympathy to his family.

Biosystematics

A survey of nematodes in the Bakwena Cave, Irene

Bakwena Cave in Irene can be accessed by a sink hole and is part of a karst system. But what exactly *is* karst?: **Karst** is a landscape formed from the dissolution of soluble rocks including limestone, dolomite and gypsum. It is characterized by sinkholes, caves and complex underground water flow networks. Rain water travels through this network until it reaches the water table. The karsified rock formations act as aquifers where water is stored and later extracted from boreholes for consumption.

One of the world's oldest and most extensive dolomite sequences occur in South Africa and extends from the North West Province through Gauteng and Mpumalanga to the Limpopo Province. The South African karst system contains thousands of caves, sinkholes, underground lakes, rivers and karstic aquifers. The groundwater, sinkholes and caves house a wide diversity of organisms, forming part of a complex and unique karst ecosystem.

The conservation of karst systems is therefore important for the survival of many sensitive and endemic species which form part of these unique ecosystems. Conservation starts with the thorough understanding of the functioning and interaction of the components of an ecosystem. Such an understanding must begin with a survey of the components of the particular ecosystem type.

A research group, headed by Dr. Francois Durand (Dept. Zoology, University of Johannesburg) consists of experts in different fields and has been formed to undertake a systematic study of the organisms in Bakwena Cave. The seasonal fluctuations of the species composition, the activities of the cave-dwelling organisms and the ecology of their interaction in the cave as well as the relationship with the outside environment will be studied. The aim of this project is to contribute to the effective conservation of cave and groundwater ecosystems.

Many cave-dwelling organisms are dependent on nutrients that may enter the cave system in different ways. The bulk of these nutrients consists of allochthonous plant matter and bat guano. The food web in a cave consists of a complex interrelationship between bacteria, protists, fungi and animals, such as nematodes, whose existence depend almost entirely on these introduced nutrients. Cave-dwelling organisms are therefore indirectly, but totally, dependent on the plants and insects outside the cave for their survival and if these disappear so would the cave-dwelling organisms.

Like almost all caves, Bakwena Cave is characterised by high humidity, low oxygen and high carbon dioxide levels, relatively constant temperature regardless of the season or time of day, as well as the absence of many temporal environmental cues such as sunlight. The cave is home to an exceptionally high diversity of species due to the fact that it is utilised by thousands of bats which produce a significant amount of guano. The cave serves as a roost colony of up to 2 000 *Miniopterus schreibersii* (Schreiber's long-fingered bats) during summer in addition to some *Rhinolophus* and *Clivosus* bats. Decomposers such as fungi and bacteria feed on the bat guano inside the cave. Insects, mites and nematodes feed in turn on the fungi and bacteria. Spiders, carnivorous insects and millipedes feed in turn on the insects and mites. Groundwater is exposed in a fissure inside the cave, which is about 35 m below the soil surface. Bakwena Cave is also the type site for the stygobitic amphipod *Sternophysinx* which occurs in the groundwater. Stygobitic amphipods feed on the organic film covering the surface of the water. The organic film consists of bacteria and decaying organic material derived from the allochthonous plant material and bat guano.

The Nematode Unit of the ARC-PPRI has already two surveys of the nematodes within the cave, one in May and one in October 2008. We sampled the floor of the cave (soil but no guano), the guano heaps, the groundwater and the soil at the mouth and in the outer vicinity of the sink hole. In the first of these surveys we found a mono culture of a bacterium-feeding nematodes, *Panagrolaimus* sp., inhabiting the guano heaps; a community of nematodes dominated by a bacterium-feeding nematode, *Diploscapter* sp. (see photographs) in the groundwater and a few predatious nematodes (*Mylonchulus* sp.) in the sand on the cave floor. *Mylonchulus* spp. feed on other nematodes, Protozoa, Rotifera, Tardigrada and small Oligochaeta. Only one plant parasitic nematode was found inside the cave in the ground water (± 35 m below ground level!). In the May-survey, the nematode populations in the soil at the mouth of the cave and among the roots of plants at a short distance from the sinkhole, consisted of 84 % saprophagous, 12% fungivorous and 4 % plant parasitic nematodes. In October the cave was much drier and the *Miniopterus schreibersii* – bats had already migrated to pup elsewhere. During this visit we found a few fungus feeding nematodes in the soil on the cave floor and in the ground water. However, as veld fires devastated the plant growth in October, no nematode samples could be taken outside the cave.

At least three follow-up surveys to the cave are planned from December 2008 to May 2009. After these surveys we should have an idea of the contribution of nematodes to the ecosystem within the Bakwena Cave. As nematodes are also very sensitive to chemicals in their environment, they are good ecological indicators of pollution. By examining the different nematode feeding groups within the ground water of the cave, we may be able to monitor the pollution levels of the groundwater during the different seasons.

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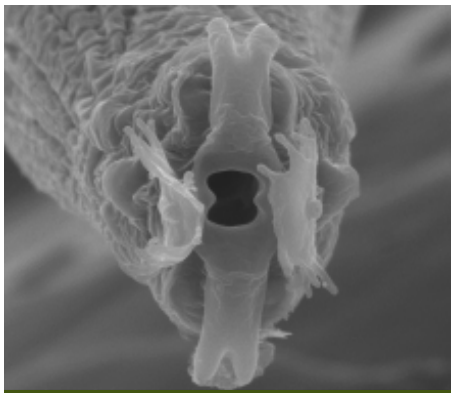
Diploscapter sp lateral view of head



Diploscapter sp lateral appendages and the stomatal opening

Biosystematics (continued)

Revision of Important Predatory Mite family from Africa completed

Early in the 1970's, the Neotropical mite pest species *Mononychellus tanajoa* (Bondar) (Acari: Tetranychidae) also known as the cassava green mite, was first reported in East Africa. It quickly spread to most of the cassava growing countries in Africa. As an immediate response the search was on for an effective predatory species to help with the control of this mite.
The family Phytoseiidae contains mite predators that have been extensively used for the biological control of mite and insect pests on a number of crops worldwide, and the International Institute of Tropical Agriculture (IITA) initiated a biological control program to combat *M. tanajoa* using phytoseiid mites in the early 1980's. Surveys were conducted by IITA personnel in cassava habitats in several sub-Saharan cassava-growing countries from 1986 to 2002 to sample and identify the phytoseiid species composition of the mite fauna. A few effective bio-control agents were eventually successfully established. However the biggest problem remained - the identification of these species.

In 2000 it was decided to revise the Phytoseiidae of Sub-Saharan Africa and Dr. Ueckermann, a phytoseiid specialist at ARC-PPRI, was approached to co-author these revisions with his Brazilian, African and American colleagues, Drs. Gilbert De Moraes, Rachid Hanna, Ignace Zannou and John Yaninek, respectively, The revision of the family resulted in nine taxonomic papers, reporting on 27 genera and 277 species of which 68 were described for the first time and 170 were re-described.

The first paper was published in 2001 and the ninth and last paper (the largest, 122pp) was published at the end of 2008 and dealt with 65 species of the tribe Typhlodrominii of which 15 were new.

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A phytoseiid mite in action

Visitor from ICIPE, Kenya to the Mite section

Mrs. Faith Toriotich of ICIPE, Nairobi, Kenya visited the Mite Section from 13-17 October 2008 to discuss her Ph.D. study on the spider mite family Tetranychidae in Kenya with her co-study leader Dr. Eddie Ueckermann. The first paper resulting from this study was reviewed and the description of new species discussed.

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Dr Eddie Ueckermann (back) with Faith Toriotich (left) and Tshidi Mokutoane of PPRI who provided the technical assistance

Biosystematics (continued)

Micro-scale heterogeneity of spiders

If a country's conservation goal is to retain as much of the region's biodiversity as possible, then the delineation of spatial heterogeneity in communities or assemblages at the local scale is an important step towards achieving this. Information on the extent to which local biotas vary between and within habitat types is thus a prerequisite for a better understanding of the underlying processes explaining local community patterns. Priority conservation areas identified at broad global or regional scales are often heterogeneous and cannot be translated into effective local conservation strategies without reference to local landscape and species distribution patterns. This is because local heterogeneity can be present across scales and may significantly complicate the development of effective regional conservation strategies. Coarse-scale studies that focus on species distributions and richness neglect heterogeneity that may be present at finer scales.

Studies of arthropod assemblage structure at fine scales (1x 1 km) are rare, but these studies are important because they encompass the spatial levels at which real world applications are viable. Spiders are a ubiquitous component of invertebrate assemblages and are important generalist predators in ecosystems, with the potential to complement existing large-scale area selection activities currently based on vertebrates. Spiders are known to be sensitive towards fine-scale changes in environmental factors, are relatively easy to identify based on external genitalia and have the potential to act as indicators of habitat quality and conservation value.

A team from the University of Venda and University of Pretoria as well as Dr Ansie Dippenaar-Schoeman, spider specialist at ARC-PPRI, investigated the fine-scale variation in spider assemblages comparing five representative vegetation types in the Western Soutpansberg, Limpopo Province, South Africa.

The team assessed these different vegetation types in terms of their spider family and species composition as well as levels of endemicity, relating these differences to vegetation structure. A total of 297 spider species (49 families) in an area less than 450 ha was sampled. Analysis of the results suggested that endemic taxa are associated with tall forest and woodland vegetation types to a lesser extent. The woodland had the highest species diversity. Based on vegetation structure variables that explained significant variation in spider assemblages, human influence through bush encroachment could result in a unidirectional change of spider assemblages to that of the short forest and mosaic woodland vegetation types. This will have severe implications for biodiversity maintenance and heterogeneity. For reference to published paper p. 15.

Contact: Ansie Dippenaar-Schoeman at DippenaarA@arc.agric.za

Lajuma Mountain Resort in the Soutpansberg

Spiders part of global climate change project of SAEON

The Soutpansberg mountain range, Limpopo Province, a major centre of plant endemisim, has the highest plant generic and family level diversity among the 18 recognized Centres of Plant Endemism (CPEs) for southern Africa. Lajuma Mountain Retreat is a nature reserve nestled on the southern slopes of the Soutpansberg that stretches up to the highest peak of the mountains. The reserve, which falls within the proposed Vhembe Biosphere Reserve, contains a high diversity of plants and animals, with strong altitudinal and climatic gradients containing a mosaic of ecosystems from mesic savanna and wetlands on the slopes, to sourveld grassland and mistbelt forest on the summits. Lajuma is now be one of the South African Earth Observation Network (SAEON) Ndlovu Nodes. SAEON delivers long-term reliable data for scientific research and informs decision-making for a knowledge society and improved quality of life.

The monitoring of a long-term altitudinal transect across the Soutpansberg will be undertaken on an annual basis and started in November 2008. This largely involved pitfall trapping for arachnids, with a view to tracking individual species and community responses to global climate change.

The University of Venda will be the lead organization and Dr Ansie Dippenaar-Schoeman and her team will provide specialist scientific support with the sorting and identification of material.

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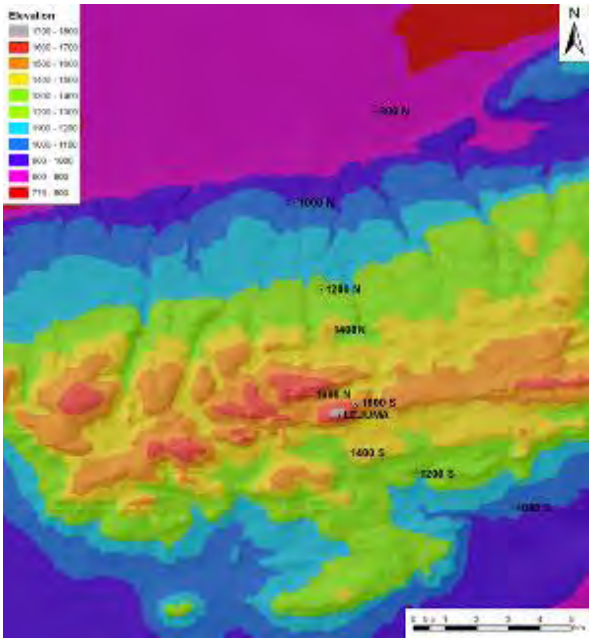

Transects over the Soutpansberg to be sampled

For more information visit:
http://www.soutpansberg.com/workshop/synthesis/spiders.htm

Biosystematics (continued)

South African National Survey of Arachnida makes important contribution to NCA

It is now the third year of SANSA II, a national Arachnida atlassing project funded by SANBI and the ARC. SANSA addresses aspects such as:

- *surveys and digitizing of data*
- *creating new partnerships on a local, national and trans-national level*
- *on-line biodiversity informatica such as computerized identification tools (AFRAD)*
- *awareness through road shows, radio talks, talks and lecture series*
- *environmental education through the spider Educare - programme*
- *product development e.g. books, CD's, posters etc.*
- *capacity building through training of students*
- *marketing through a website and an electronic newsletter letter*
- *support for public participation e.g. virtual museum.*

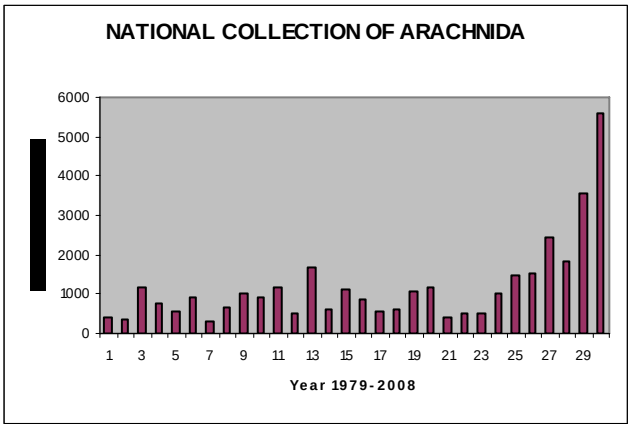

Figure showing the pattern of annual entries into the NCA

Curation of the NCA

Surveys and databasing

The National Collection of Arachnida (NCA) is one of the National Assets of the ARC. With funding available through SANSA, teams are presently surveying parts of the country not previously sampled. During 2008, four teams sampled a total of 20 grids in the Free State, Limpopo and Northern Cape Provinces, following a specific sampling protocol. This type of sampling will continue for another two years. All the material sampled will be sorted and identified by the Spider Team at ARC-PPRI.
In addition to the SANSA surveys, new spider material is streaming in from other projects presently running in the country. More than 10 student projects from various Universities in South Africa include spiders as part of their projects and all that data will feed into SANSA and the NCA.
Other large Arachnid sampling programmes such as the Maloti-Drakensberg Transfrontier Park project of the University of KwaZulu-Natal (> 5000 specimens), the transient Cedarberg project of CIS of the University of Stellenbosch (> 7000 bottles with specimens) and Environmental Risk Assessments (ERA) surveys also became available to SANSA.

Sampling arachnids has also generated a lot of interest from managers of nature reserves and the public. The following Nature Reserves are presently being surveyed by the SANSA team or reserve teams: Eastern Cape (5); Free State (5); Gauteng (4); Mpumalanga (4); Limpopo (8); KwaZulu-Natal (11); Northern Cape (4) and Western Cape (15).

The number of specimens entered into the NCA has increased dramatically. Over the last 30 years on average about 1 000 records were entered into the NCA database per year. This number has increased dramatically with 2008 having a record of 5 600 entries representing 15 000 specimens.

All this material has been curated and digitized as part of a project funded by the South African Biodiversity Information Facility (SABIF). More than 5 000 bottles are ready to be entered into the database while > 7 000 bottles still need to identified.

New species and distribution records
With this huge influx of new spider material, numerous new species and even genera have been identified. Since the start of SANSA II:

- 10 new genera were described.
- more than 80 new species have been described.
- and more than 30 species were collected for the first time from South Africa.

Some other results

- 962 entries of 160 photographers have been entered into the SANSA virtual museum representing about 2000 photographs.
- 300 images and information on 72 families, 100 genera and 250 species entered into the on-line AFRAD database.
- 7 electronic newsletters.
- 10 students have completed or are busy with post-graduate studies.

Information on SANSA available at:
www.arc.agric.za see quick link SANSA

Contact: Dr Ansie Dippenaar-Schoeman at DippenaarA@arc.agric. za

Biosystematics (continued)

New Executive Committee for ICPBR

Prof Peter Kevan

The International Commission on Plant Bee Relations (ICPBR) recently received a new Chair, Professor Peter Kevan, from Guelph University, Canada. Peter invited Dr Connal Eardley of ARC-PPRI to be the Vice-Chair, a position he gratefully accepted. Peter was born in Kenya and moved to Canada when he was a young boy. However, Peter maintained his contact with Africa through training African bee and pollination biologists at Guelph University.

Bees are the most important pollinators of agricultural crops, being responsible for about one in three mouthfuls of food we eat each day. Bees are also essential in maintaining most natural ecosystems, which contribute to agriculture through providing grazing, preventing soil erosion, maintaining water tables and creating refuges for natural enemies of agricultural pests. For these reasons, and because bees are an important part of our natural biodiversity, numerous bee and pollination projects have been initiated in many African countries during the past decade. Connal's position in ICPBR should help grow this field of research in Africa.

ICPBR was instigated in 1950, during the International Botanical Congress in Stockholm, and was founded at the International Beekeeping Congress in the UK the following year. At that time, it was known as the International Commission for Bee Botany. The newly founded Commission soon became a scientific member of The International Union of Biological Sciences and remains so to this day.

The Commission was set up with three objectives.

- to promote and coordinate research into the relationships between plants and bees.
- to organize meetings related to plant-bee relationships and to publish and disperse their proceedings,
- to collaborate closely with other national and international institutions interested in the relationships between plants and bees.

The work of the Commission is organized through its Working Groups. As Peter only recently received his position, we'll have to wait and see how the Commission develops through the coming years. A website will be developed, although information relevant to Africa will be posted on the African Pollinator Initiative's (API) web page in the ARC web site.

www.arc.agric.za see quick link African Pollinator Initiative

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International collaboration on bee research in South Africa

The winter rainfall regions of South Africa are home to a number of endemic bee genera. These bees are not only important pollinators that maintain the natural flora of the region, but their taxonomy is important for understanding the evolution of bees as a whole.

One group, namely *Fidelia*, was studied for many years by Dr Vin Whitehead of the Iziko South African Museum in Cape Town. Whitehead and Eardley (2003) published a taxonomic revision of the group. Such revisions are essential for further studies, like molecular research to better understand bees in relation to the breakup of Gondwanaland. Although this appears very abstract to agriculture in South Africa, such knowledge helps us to understand the role of bees in the ecosystem and enables the implementation of improved conservation measures for the protection of the natural vegetation in the area.

The molecular biologists Professor Bryan Danforth, from Cornell University in the USA, his student Jessica Litman and Dr Terry Griswold, from USDA, joined Connal Eardley on a field trip to the Western and Northern Cape provinces to collect fresh material of *Fidelia* and anthidine bees for another project that has just began. Namaqualand is also the centre of biodiversity for the anthidine bees.

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Relaxing in Cape Town after their collecting trip (from L to R) - Jessica Litman, Bryan Danforth, Terry Griswold & Connal Eardley

Heinz Center Research Associate visits National Collection of Insects

After three weeks of fieldwork in the Kruger National Park (KNP), Dr Jonathan Mawdsley spent two highly productive days in December 2008 with local beetle taxonomists Beth Grobbelaar and Riaan Stals in PPRI's National Collection of Insects (SANC).

Jonathan is a Research Associate at the Heinz Center, Washington, D.C., USA. This independent institution strives to improve the scientific and economic basis for environmental policy and develop innovative solutions to environmental problems. In collaboration with the KNP's Invertebrate Research Manager, Mr Hendrik Sithole, Jonathan is conducting research in the KNP that deals with tiger beetles (Cicindelinae) and flower-visiting beetles of the taxa Cleridae (chequered beetles), Melyridae (soft-winged flower beetles) and Cetoniinae (fruit chafers). Significant progress has already been made in compiling a checklist of the tiger beetles of the Kruger National Park.

Biosystematics (continued)

Heinz Center Research Associate visits National Collection of Insects (cont.)

In South Africa, the tiger beetle subfamily contains some spectacular species, perceived to be rare and hence listed as protected species in national legislation. The SANC contributed invaluable information associated with beetle specimens previously collected in the KNP. A premier example is that of southern Africa's bulkiest beetle, the Southern Goliath Beetle, which is in actual fact an oversized kind of fruit chafer. This generally uncommon species had previously been unrecorded from the KNP—but in the SANC we have one such specimen collected there! Jonathan also sifted through our collection of chequered beetles, their taxonomy being an additional interest of his. Amongst our specimens he discovered new species and returned to the USA with a loan of valuable SANC specimens to further his research. In future he will return them named and newly described for Science. Other contributions he made whilst working in our collection included sorting several drawers of unidentified Cleridae to genus level, and identifying various beetle groups within his fields of expertise.

The tiger beetle *Chaetodera regalis*, here on the bank of the Sabie River in KNP, can be an indicator of river system quality. Photo: Alice Mawdsley.

Three happy coleopterists, Beth, Jonathan and Riaan
Photo: Mrs Alice Mawdsley

Reference specimens collected by Jonathan in South Africa are to be deposited in the SANC and the Transvaal Museum (TMSA, Pretoria), as well as in the collection of the United States National Museum of Natural History, Smithsonian Institution.

Jonathan is enthusiastic about future collaborative research with beetle specialists from both the SANC and the TMSA. He plans to return to South Africa next summer, if not sooner!

Contact: Beth Grobbelaar at GrobbelaarB@arc.agric.za or Riaan Stals at StalsR@arc.agric.za

News snippets from Biosystematics

- **Ian Millar** attended the Regional Meeting on DNA Barcoding in Central and Western Africa, held in Abuja, Nigeria, from 24-25 October 2008.
- **Riaan Stals** was an invited presenter at a workshop dealing with the Identification of Aquatic Coleoptera in Southern Africa held at Rhodes University and Albany Museum in Grahamstown from 19–20 November 2008.
- Television interviews: *Agriculture Today* (SABC2) broadcast on 09 October 2008 and again 09 January 2009:
  * **Riaan Stals**: Introduction to the Biosystematics Division of ARC-PPRI
  * **Ansie Dippenaar-Schoeman**: Spiders, the Farmers' best friends.
- **Ansie Dippenaar-Schoeman** was the keynote speaker at the Gauteng Research Seminars held at Heidelberg in November 2008. She informed them of the SANSA project.
- The new Biosystematics building at Roodeplaat is progressing well and the big move is planned for mid-2009.
- The new poster "The magnificent 8 spiders of Africa" sponsored by Oppenheimer & Son is a great hit and more than 150 have already been distributed. The feedback (even from the SPCA) has been very positive.
- Graduate students of the University of the Free State visited the National Collection of Arachnida and Insects in Pretoria on 1 October 2008.
- Although **Dr Esther van den Berg** retired at the end of 2006 she still visits the Nematode Unit three days a week to continue with her research and to help with the identification of nematodes. In this period she was able to publish three scientific papers.

Biosystematics (continued)

PPRI taxonomist co-presents workshop on the identification of water beetles

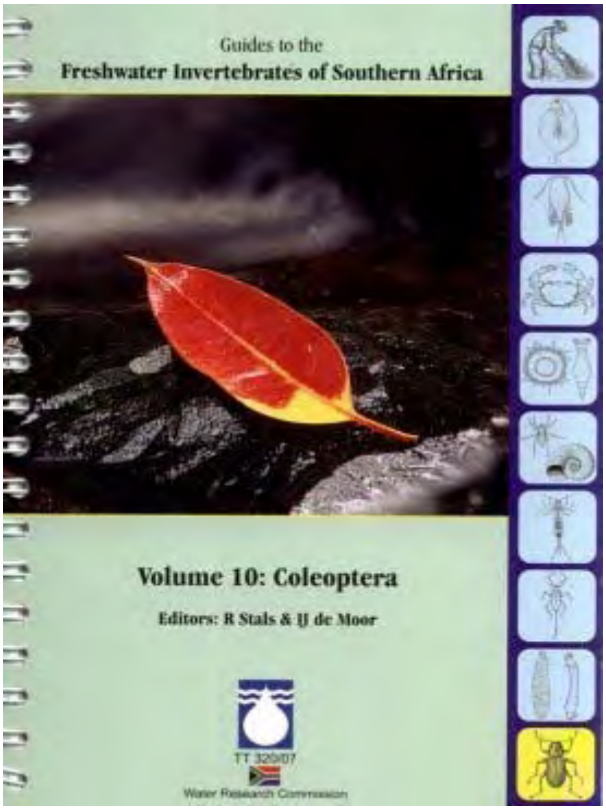
Two happy events in the world of southern African water beetle research motivated Dr Ferdy de Moor of the Albany Museum, Grahamstown, to organise a workshop on the identification of the water beetles found in our region. Those events were the publication, in March 2008, of the Coleoptera (beetle) volume in the series '*Guides to the Freshwater Invertebrates of Southern Africa*', issued by the Water Research Commission; and, in November 2008, a month-long research visit to the Albany Museum by Professor Olof Biström, the current world expert on the predacious diving beetles (family Dytiscidae) of the Afrotropical Region, which includes southern Africa. Riaan Stals, beetle taxonomist at PPRI's National Collection of Insects, was the main author and scientific editor of what locally has become known as "*The Water Beetle Book*". Thirteen scientists from six countries contributed to this book, and Olof Biström, Director of the Zoological Museum at the University of Helsinki, Finland, appropriately wrote the chapter on the Dytiscidae.

Uninitiated people may not realise that a "water beetle" is not merely a "water beetle", but that several thousand species, belonging to at least 24 different and diverse beetle families, make up the southern African water beetle fauna. Despite the arrival of "*The Water Beetle Book*", it is still rather difficult to identify these important and interesting creatures without expert advice.

Prof. Olof Biström, visiting world expert from Finland.

Hence, when Ferdy de Moor managed to obtain financial support from the Water Research Commission, it became possible for him to organise a workshop on the identification of these animals. The workshop was held in November 2008 at Rhodes University, Grahamstown, during the time of the eminent Finnish scientist's visit. Riaan Stals was invited to act as fully funded presenter at the workshop, and his "*Water Beetle Book*" was the ideal manual for this endeavour. He lectured on the bulk of the water beetle fauna, while Olof Biström presented the Dytiscidae and related water beetle families. Martin Villet (Rhodes University) gave an introduction to the poorly known suborder Myxophaga, that contains exceptionally small kinds of beetle. Besides putting everything in perspective, Ferdy de Moor really was *The Guy* when it came to the larvae of water beetles. Water beetle larvae are—at the best of times—nightmarish to identify even to experienced biologists.

Interest in the workshop surpassed all expectations, and the organiser had to limit the number of attendees. The eventual group of participants comprised a healthy mix of biologists from (among others) various universities, government departments and NGOs, ranging from MSc students to postdoctoral researchers, and including several actual practitioners in the field of fresh water resource management.

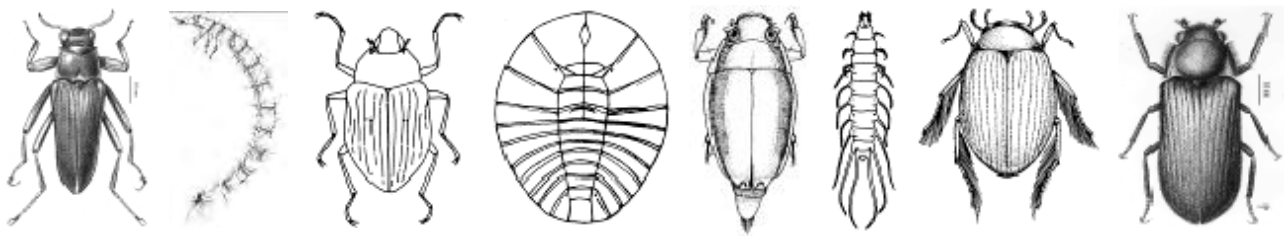


The cover of the recently published "*Water Beetle Book*". It is Volume 10 in the series '*Guides to the Freshwater Invertebrates of Southern Africa*', published by the Water Research Commission. Riaan Stals of PPRI's National Collection of Insects was main author and scientific editor of this Volume.

All four presenters were involved in the hands-on practical sessions of the workshop, for which most of the available time was set aside. Upon prior invitation, the workshop participants brought along problematic specimens of water beetles they were at the time dealing with in their respective research programmes. Great fun was had by all in sharing the same frustration of not being able to discriminate some obscure taxonomic characters, and in sharing the joy of clinching correct identifications of apparently problematic specimens.

The workshop was a great success. And yes, there is a need for more such highly specialised training opportunities in South Africa.

Contact: Riaan Stals at StalsR@arc.agric.za



A menagerie of water beetles and water beetle larvae. This is a small selection of the original illustrations commissioned for "*The Water Beetle Book*". Illustrators included ARC-PPRI's Elsa van Niekerk and Beth Grobbelaar.

Pesticide Science

ECORAT (Development of Ecologically-based Rodent Management for Southern Africa)

The annual ECORAT project meeting was hosted by the Pest Management Centre, Sokoine University of Agriculture in Morogoro, Tanzania from 17 to 21 November 2008. The aim of the project is to develop ecologically-based rodent management in rural communities, for the southern African region. Sixteen ECORAT researchers from the UK, Tanzania, Swaziland, Namibia and South Africa, ECORAT advisors from Belgium, Australia and the Philippines, as well as community representatives and local media attended the meeting. The SADC/ICART Secretariat Chairman, Dr Clesensio Tizikara and technical adviser Dr Monica Murata attended part of the meeting and accompanied researchers on a field visit to one of the four communities involved in the ECORAT project.

Apart from planning and coordinating the 2009 research activities, each partner country presented an overview of their activities and their latest research results. At the meeting it became clear that one of the positive outcomes of the project is the establishment of strong scientific linkages between partner countries. Mr Malebana of ARC-PPRI presented an overview of project activities managed by PPRI in the SADC ICART project ECORAT.

During the field visit to communities involved in ECORAT, the active participation and endorsement of the project by the local village authorities and community members were encouraging and will strengthen the sustainability of ecologically-based rodent control management.

An interesting break from the meeting was a visit to the Apopo Centre, where African Giant rats (*Cricetomys* spp.) are trained on explosive scent samples and deployed to search for landmines in Mozambique, and to detect tuberculosis quickly in human saliva samples.

More information on the ECORAT project can be found on: www.nri.org/ecorat

Contact: Frikkie Kirsten at KirstenF@arc.agric.za

Media presence was prominent at the annual ECORAT workshop in Tanzania

Mr Malebana of ARC-PPRI presenting his talk

Training of African Giant rats to search for landmines

A visit to the village of Berega in Tanzania where ECORAT project fieldwork is conducted

Weeds Research

First releases of biocontrol agents against problem cactus

Opuntia fulgida, an extremely spiny cactus commonly known as chain-fruit cholla or jumping cholla, was probably imported into South Africa as an ornamental, but has now become a serious invasive weed in parts of the Northern Cape and the Limpopo Provinces. The worst infestations occur near Douglas and Kimberley (Northern Cape), and on both sides of the Zimbabwean border at Beit Bridge near Musina (Limpopo Province). The cactus was previously erroneously regarded as *Opuntia rosea*, and is still referred to as rosea cactus in South Africa.

A cochineal insect, *Dactylopius tomentosus*, was recently released for the first time against chainfruit cholla in South Africa as a biocontrol agent. Although the cochineal belongs to the same species that has been in use against imbricate cactus (*Opuntia imbricata*) in South Africa since 1970, it represents a different biotype of *D. tomentosus*, with a slightly different host preference. The starter colony was collected from a closely related cactus in Mexico, *Opuntia cholla*, and research by a PhD student, Catherine Mathenge, had indicated that this "cholla biotype" was the most suitable biotype to control chain-fruit cholla. The original culture was cleared of predators and contaminants under quarantine conditions at Rietondale, Pretoria, and mass-reared to obtain sufficient numbers for release. Leoni Pretorius and Almie van den Berg from the Insect Ecology Division are thanked for taking care of this aspect of the project.

The first two releases of the cochineal biotype in South Africa were made in the Northern Cape with the assistance of Debbie Sharp and Mimi Langa from the *Working for Water* (WfW) Programme during October 2008. The first release in Limpopo was undertaken on 18 November 2008 on a chain-fruit cholla infestation in the dry bed of the Limpopo River near Beit Bridge. Cochineal-infested cactus cladodes (stem segments) harbouring thousands of cochineal insects were supplied by Hildegard Klein and Anthony King (ARC-PPRI) to the WfW Biocontrol Implementation Officer for Limpopo Province, Fickson Lemao, who attached each cladode to a healthy cactus plant. It is hoped that the immature insects will colonise the invasive cactus plants and gradually cause them to die, but not before some infested cladodes have been distributed to other cactus plants to infest them in turn.

The mature cochineal females remain attached to the same spot on a cactus plant for their entire lifetime, but the youngest immatures can still crawl around and are often blown to neighbouring cactus plants by wind. Infested cladodes are very easily detached when animals or humans brush against them, which is another way of dispersal for the cochineal insects.
We gratefully acknowledge funding from WfW for this research project. We also appreciate the assistance of Lucas Maremba (Area Manager) and Aloane Mushaphe (Project Manager) for WfW in Musina, who made the arrangements for the release, secured a release site, collected uninfested cactus cladodes for our mass-rearing programme, and who will ensure the integrity of the release site.

Contact: Ms Hildegard Klein at KleinH@arc.agric.za

Opuntia fulgida invading mopani veld on a little island in the dry bed of the Limpopo River

Cochineal insects (*Dactylopius tomentosus*, biotype "cholla"), covered by white cottony wax, on cladodes of chain-fruit cholla

Fickson Lemao (WfW) releasing cochineal insects against chain-fruit cholla near Beit Bridge

Weeds Research (continued)

Early indications of establishment of biocontrol agent on cat's claw

Recent recoveries of the sap-sucking bug, *Carvalhotingis visenda*, from new releases made late last year suggest that the biological control agent may be becoming established in the field. Surveys of two release locations, at the Groenkloof Nature Reserve in Pretoria and in the Groot Marico area of the North West province, found low levels of adult feeding on cat's claw leaves, as well as the presence of numerous egg batches.

Originally introduced as an ornamental, cat's claw creeper (*Macfadyena unguis-cati*) has become a significant threat to our native biodiversity. The vigorously growing dense infestations of the weed compete for light with mature trees, suppress understory vegetation and limit the germination of indigenous seeds. The plant's sprawling growth habit, as well as the presence of an extensive underground network of root tubers, make the weed notoriously difficult to control, either chemically or manually. A biological control programme was initiated in 1996 which resulted in the release of the golden spotted tortoise beetle, *Charidotis auroguttata*. However, due to its limited impact on weed infestations, additional natural enemies were sought and in late 2007, two tingids (sap-sucking bugs), *C. visenda* and *C. hollandi*, and the leaf mining beetle *Hylaeogena jureceki*, were approved for release in South Africa. Establishment of the insects was, however, not achieved from initial releases undertaken at the time.

The sap-sucking tingid, *C. visenda*, is an especially promising agent due to its high reproductive capacity and extensive feeding. Laboratory studies done in Australia show that even a single generation of insects can significantly reduce leaf chlorophyll content, resulting in a reduction in plant height and leaf biomass. If high population densities of *C. visenda* can be achieved in the field in South Africa, these effects are expected to severely limit plant vigour and negate some of the detrimental effects brought on by very dense infestations of cat's claw.

Future work will centre around establishing the agents in different combinations at as many infestations around the country as possible. Monitoring of the different combinations of introduced agents will be done in order to evaluate the effects of different factors, such as climate, on their efficacy, as well as to assess the interactions between the insects themselves.

Contact: Anthony King at KingA@arc.agric.za

Cat's claw creeper competes with mature trees for light.

Carvalhotingis visenda adults (winged) and nymphs feed gregariously

The sap sucking tingid *Carvalhotingis hollandi*

The leaf mining beetle *Hylaeogena jureceki*

Weeds Research (continued)

Optimism prevails in South Africa for biological control of two emerging weeds, red and Mexican sunflowers

The red sunflower, *Tithonia rotundifolia*, and Mexican sunflower, *Tithonia diversifolia*, are native to Mexico, and are currently naturalized throughout the humid and sub-humid tropics in Central and South America, South East Asia and tropical and sub-tropical Africa, including South Africa. Both species are declared weeds (Category 1) in South Africa, with *T. rotundifolia* being particularly invasive in the inland provinces, including Gauteng and the North West Province, while *T. diversifolia* is invasive in the lowveld of Mpumalanga, Limpopo and along the coastal regions of KwaZulu-Natal. They are aggressive colonisers, particularly on human-disturbed sun-exposed ecosystems with high water table, including plantations, abandoned sites, and along railways and roads. They are very capable of displacing native vegetation in areas where they occur.

Mexican sunflower, *Tithonia diversifolia* and red sunflower, *T. rotundifolia*

In 2007, the *Working for Water* (WfW) programme provided funding, spanning a three-year cycle, to enable PPRI to conduct research aimed at releasing suitable biological control agents (insects and pathogens) against these invasive sunflower species in South Africa. During field surveys conducted in Mexico in 2007 and 2008, nine potential biocontrol agents (insects) were found on both species of *Tithonia,* and these were subsequently introduced into South Africa. Reported below are five of the nine candidate agents that were successfully reared in PPRI quarantine at Rietondale Research Centre.

Two leaf feeding chrysomelid beetles, *Zygogramma signatipennis* and *Z. piceicollis*, are potential biocontrol agents for the red sunflower. The two species have very similar life histories and feeding habits. *Zygogramma signatipennis*, initially imported in 2007 by Dr S. Neser, is the larger of the two, and is shiny black in colour with silver green markings on the wings. In 2008, *Z. piceicollis* was imported by Dr D. Simelane. This has a dark red head and thorax with light grey markings on the wings. Females mostly deposit their eggs singly on the lower leaf surface, but occasionally on flower heads and stem surfaces. Both adults and larvae of the two beetle species feed on the leaves, often skeletonising the leaves completely, leaving only the leaf veins. Fully grown larvae drop down and burrow into the ground to pupate. Development from egg to adult takes about 5 to 6 weeks. Although tests are still in progress, preliminary investigations indicate that both species of *Zygogramma* strongly prefer *T. rotundifolia* for feeding and oviposition to other closely-related plant species. (cont. next page)

Top left: *Z. signatipennis* adults

Top right: *Z. piceicollis* adults

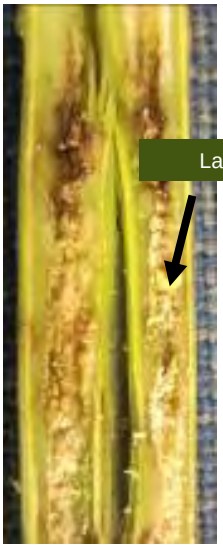
Below: Feeding damage by either *Z. signatipennis* or *Z. piceicollis* adults and larvae

Weeds Research (continued)

Optimism prevails in South Africa for biological control of two emerging weeds, red and Mexican sunflowers (cont.)

Adult weevil

Oviposition holes



Larva

Unidentified stem-feeding weevil adult, its larva and oviposition holes in the stem

An as yet unidentified stem-boring weevil was collected from red sunflower in Mexico and introduced into quarantine in South Africa in October 2008. The adults, which are dark grey to black in colour, nibble along the margin of the leaf and lay their eggs in the stems, approximately 4cm above the ground. The larvae tunnel along the stem, causing a hollow space that is likely to increase the vulnerability of plants to wind damage. Larvae eventually pupate at the base of the stem, from where the adults emerge through an exit hole. A reliable rearing technique is being developed, in preparation for future host specificity studies on this weevil.

A shoot tip-feeding moth was collected from the Mexican sunflower, *T. diversifolia*, and introduced into quarantine in South Africa in October 2008. Although adults presumably feed on nectar, a honey solution was provided during rearing in the laboratory. Adults lay their eggs on leaf tips and at the base of the petioles of young leaves. Larvae burrow into the stem tissue and feed internally, gradually causing permanent wilting of the entire branch. Larvae produced by over three pairs of adults can kill the entire plant under laboratory conditions. After preparing exit holes for the adults to emerge, larvae pupate in the stem. Preliminary investigation has indicated that the cultivated sunflower, *Helianthus annuus*, is also attacked by the moth, although the target weed, *T. diversifolia*, remains the most preferred host. Intensive host-specificity tests on this moth are still in progress in quarantine.

A defoliating butterfly, tentatively identified as *Chlosyne hippodrome*, was also collected from the Mexican sunflower and introduced into South Africa in October 2007.
(cont. next page).

Early damage

Late damage

Damage by the shoot-tip feeding moth

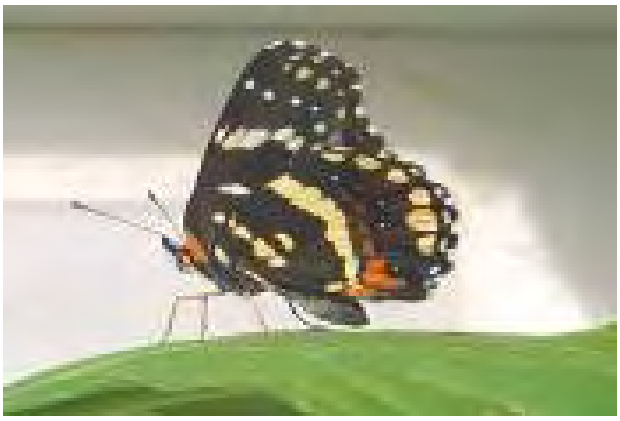
Weeds Research (continued)

Red and Mexican sunflowers (cont.)

The adults deposit their eggs in batches under the leaf surface. The eggs hatch in about 5 days. The larvae feed on leaves and spin a whitish pupa on any plant surface. A few tests conducted previously indicated that the larvae of the butterfly were able to develop successfully on the target weed only. However, host-specificity tests are still in progress.

Based on the quantity and quality of potential biocontrol agents found on the two invasive sunflowers in their native range, prospects of selecting and releasing suitable biocontrol agents against these alien invaders in South Africa are good.

Contact: ***Khethani Mawela (MawelaK@arc.agric.za)*** and ***Dr David Simelane (SimelaneD@arc.agric.za)***



The defoliating butterfly, ?*Chlosyne hippodrome*: Adult (top), larva (middle) and feeding damage

New appointments

Makosandile Christopher Xhegwana (Chris) joined the Weed Pathology Unit in Stellenbosch in July 2008. He is responsible for maintaining all the plants used for research by the Unit, as well as helping with laboratory and field work. Despite no formal training in looking after plants he has quickly developed green fingers and the plants are healthy under his diligent care. All in the Unit wish him the best in his career with PPRI.

Chris Xhegwana

News snippets from Weeds Research

- Annelize Lubbe, who kindly took on the responsibility for the financial management of contracts for the Weeds Research Division since December 2007, was transferred to Stellenbosch at the end of December 2008. In addition to resuming her former post in the Insect Ecology Division, she will also help out the Weeds Division with their contracts until a replacement for her has been found in Pretoria. Our heartfelt thanks go to Annelize for the professional way in which she managed this extremely difficult post.
- During December 2008 the Division received a visit from its former Division Manager, Mr Arne Witt from CABI, who is currently in charge of Invasive Species Management in East Africa. His presentation *Weeds and Wildlife—a Journey through Africa* was attended by more than 30 scientists from ARC-PPRI and several Universities.

Technology transfer

Refereed publications

BASSET Y., MISSA O., ALONSO A., MILLAR S.E., CURLETTI G., DE MEYER M., EARDLEY C.D., LEWIS O.T., MANSELL M.W., NOVOTNY V. & WANER T., 2008. Changes in arthropod assemblages along a wide gradient of disturbances in Gabon. *Conservation Biology* 22: 1552-1563.

CROUS P.W., WOOD A.R., OKADA G. & GROENEWALD J.Z., 2008. Foliicolous microfungi occurring on *Encephalartos*. *Persoonia* 21: 135-146.

FOORD S.H., MAFADZA M.M., DIPPENAAR-SCHOEMAN A.S. & VAN RENSBURG B.J., 2008. Micro-scale heterogeneity of spiders (Arachnida: Araneae) in the Soutpansberg, South Africa: a comparative survey and inventory in representive habitats. *African Zoology* 43: 156-174

GOSZCZYNSKI D.E., DU PREEZ J. & BURGER J.T., 2008. Molecular divergence of Grapevine virus A (GVA) variants associated with Shiraz disease in South Africa. *Virus Research* 138: 105-110.

MARAIS M., GAIDASHOVA S.V. & TIEDT L.R., 2008. Species of the genus *Helicotylenchus* Steiner, 1945 from an indigenous forest in Rwanda, with description of *Helicotylenchus wilmae* sp.n. (Nemata: Hoplolaimidae). *Journal of Nematode Morphology and Systematics* 11: 109-118.

MOSKOVITZ Y., GOSZCZYNSKI D.E., BIR L., FINGSTEIN A., CZOSNEK H. & MAWASSI M., 2008 Sequencing and assembly of a full-length infectious clone of grapevine virus B and its infectivity on herbaceous plants. *Archives of Virology* 153: 323-328.

SABOORI A., UECKERMANN E.A. & VAN HARTEN A., 2008. A new genus of Neothrombiidae (Acari: Trombidioidea) from Yemen.. *Zootaxa* 1925: 23-30.

UECKERMANN E.A., ZANNOU I.D., DE MORAES G.J., OLIVEIRA A.R., HANNA R. & YANINEK J.S., 2008. Phytoseiid mites of the Tribe Typhlodromini (Acari: Phytoseiidae) from sub-Saharan Africa. *Zootaxa* 1901: 1-122.

Newsletters

DIPPENAAR-SCHOEMAN A.S., 2008. Spiders in Mud-Dauber wasp's nests. *SANSA Newsletter* 7: 13-14.

DIPPENAAR-SCHOEMAN A.S. & HADDAD C.R., 2008. (Eds). SANSA Newsletter no. 7. July-September. pp.20.

Radio

DIPPENAAR-SCHOEMAN A.S., 2008. Presented six radio talks on spiders on Radio Laeveld during the report period.

DIPPENAAR-SCHOEMAN A.S., 2008. The violin spiders. Station: RSG

Suid-Afrikaanse Akademie vir Wetenskap en Kuns, Jaarkongres, Pretoria

DIPPENAAR-SCHOEMAN A.S., 2008. Die Suid-Afrikaanse Nasionale Opname van Arachnida: die pad vorentoe.

HELBERG L.A. & DIPPENAAR-SCHOEMAN A.S., 2008. [Plakkaat] Die Afrika Arachnida Databasis (AFRAD): 'n web gebaseerde bioinligtings databasis.

MARAIS M., SWART A., LAMPRECHT S.C., FARINA M.P.W., THIBAUD G.R., HABIG J.H. & BLOEM J.F., 2008. Die invloed van grondbewerking op nematodes.

MARAIS P., VAN DEN BERG, A.M. & DIPPENAAR-SCHOEMAN, A.S., 2008. Watter effek het geneties gemanipuleerde mielies op spinnekop-populasies in die Delmas distrik van Mpumalanga, Suid-Afrika?

SWART A., MARAIS M., VAN DEN BERG E. & BUCKLEY N.H. 2008. 'n Opname van plantparasitiese aalwurms in die tuine van bestaansboere in Limpopo.

Other meetings

DIPPENAAR-SCHOEMAN A.S., 2008. National atlassing programmes the way to go for invertebrates in South Africa. Gauteng Nature Conservation Research Symposium 2008.

DIPPENAAR-DIPPENAAR-SCHOEMAN A.S., 2008. South African National Survey of Arachnida: present status of the spiders of the Gauteng Province, South Africa (Arachnida: Araneae). [Key note address]. Gauteng Nature Conservation Research Symposium 2008.

MALEBANA P.S., 2008. Rodent Impact Management. Ecorat second annual meeting. Sokoine university of Agriculture Tanzania.

MILLAR, I.M. 2008. The Scale Insect Barcode Initiative. Presentation given at the Regional Meeting on DNA Barcoding in Central and Western Africa, held in Abuja, Nigeria, from 24-25 October 2008.

STALS R. 2008. Workshop on the Identification of Aquatic Coleoptera in Southern Africa: invited presenter. Rhodes University and Albany Museum, Grahamstown, 19–20 November 2008

WOOD A.R., 2008. Biological control of alien invasive weeds. seminar presented at Centro de Investigaciones en Ecosistemas, La Universidad Nacional Autonoma de Mexico (UNAM), Morelia, Mexico.

Lectures and Talks

ANDERSON C.J., 2008. Die wonderwêreld van spinnekoppe. Three talks presented to schools in Pretoria during the report period.

DIPPENAAR-SCHOEMAN A.S., 2008. Why spiders are unique invertebrates. Invited speaker at a meeting of the Northern Branch of the Royal Society of South Africa. 7 October, Pretoria.

GROBBELAAR, E. 2008. *Natural Jewels*. Invited speaker, public lecture on insects at the Annual Seminar Day of the Fine Art Embroidery Guild, Pretoria, 28 October 2008.

Retirements & Resignations

Ida Pretorius

Ida Pretorius, affectionately know as Tannie Ida, officially retired on 30 September 2008. Ida started her working career with the Department of Agriculture in Bethlehem back in 1980. After about 9 years working in Bethlehem she was transferred to Pretoria and started her career at ARC-PPRI in the Registration Department at the Agriculture Buildings on Hamilton street.

Ida was transferred to Rietondale Research Station as a switchboard operator before being transferred back to Agriculture Buildings in 1991 as a Procurement Officer. In 1995 Ida moved to Roodeplaat as the PPRI Procurement Officer as part of the large administration team. Since then the procurement and administration team has drastically shrunk in size and Ida took on more and more duties and responsibilities. For a long time she ran the whole procurement office by herself and spent many hour training people.

Ida worked with a number of generations of PPRI staff, from the days of Dr Bing Wiese, to the more recent generation of Dr Rami Kfir. For all PPRI managers, researchers, technicians and administration staff, Ida Pretorius has always been **the** key person at Finances who knows the rules and regulations and kept things running smoothly. Despite all the turmoil with the staff changes and reorganization at the ARC, Ida was always one of the constant and stable persons around. Her detailed knowledge of the history of each of the projects, the suppliers, contractors and characters was something that the researchers came to rely and depend on and it was much appreciated.

A big thank you to Ida for her service to PPRI. We wish Ida and her family the best for the future.

NS. We are fortunate to have Ida still around on a contract basis while a new appointment is made.

Leoni Pretorius

After 40 years of being associated with ARC-PPRI, Leoni Pretorius took early retirement at the end of October 2008.

Leoni joined PPRI in 1968, starting in the Termite Section at the Agriculture Buildings on Hamilton Street. Leoni was part of a PPRI team, including Dr. Bing Wiese, Nic Basson, Henk van Ark, Eric Whiteside and Ansie Dippenaar, studying the impact of area spraying of Dieldrin for harvester termite control on the fauna. When these trials finished Leoni was transferred to Biological Control of specifically cotton pests, working with Nic Basson, Sarel Broodryk and Carina Cilliers. During this time Leoni developed her entomological skills, specifically her great ability to develop new rearing techniques for insects. This skill formed the most important part of her career and became well known in the research community.

From 1976 to 1990 Leoni left PPRI to raise her family, but returned to PPRI in 1991 where she joined the Insect Quarantine Unit. Her expert skill at rearing insects was put to good use and the Insect Quarantine developed under her management into a facility of National Importance.

In 1994 the Insect Quarantine moved to Rietondale and here she became involved in a range of other projects as well: the bioassay of botanical pesticide products with Almie van den Berg and Dr. Eric Sandmann, she had great success with the mass rearing of cactoblastus and cochineal for release against invasive cacti with Dr. Helmuth Zimmermann, she ran the Insectary for a while, studying the biology of the *Trigogramma* parasitoid with Kirsten Kruger, Rami Kfir, Annelize Lubbe and Deidre Charleston. Most recently she worked with Dr. Stefan Neser on the Hoodia project.

Leoni always had a great dedication to and enthusiasm for her job. Her willingness to do new things made her a very valuable member of staff in the Institute. We wish her and her family well for the future.

Heinrich Klingenberg

At the end of September 2008 Heinrich Klingenberg, Financial Manager for PPRI, left the Institute to start a new job as a tax consultant in Perth, Australia. Heinrich joined PPRI in December 2004 on contract as a financial consultant with the House of Accountants company. By the end of 2005 when his contract was up Heinrich decided to join PPRI on a permanent basis. Heinrich has been an excellent Financial Manager for PPRI during these difficult past few years. He was able to understand the 'weird and wonderful' goings-on in the projects, and even more importantly, he had the flexilbility, patience and initiative to understand that project work often does not go to plan and that results may take longer than expected. This understanding of the research field allowed many researchers to flourish which in turn brought in extra money for PPRI in the long run. All his colleagues at PPRI wish him all the best in his new endeavours 'Down Under'.

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