Foreword
In 2007 the Virology Group consisted of three permanent staff members viz, Professors Louis Nel and Gerhard Pietersen, Dr. Wanda Markotter and 16 postgraduate students. In one focus area, this group specialized in research on Rhabdoviruses of animals - like the zoonotic African lyssaviruses (rabies and rabies-related viruses) and of plants (nucleo- and cyto-rhabdoviruses). A second focus of this group involved the virus and virus-like diseases of citrus (eg. citrus tristeza, citrus greening) and of grapevine (eg. grapevine leafroll). Secondary research interests included smaller projects on Avian Influenza virus and West Nile virus. Our programmes involved different aspects of virology that included molecular epidemiology and surveillance - specifically on the African continent; development of new diagnostic assays; studies of virulence and pathogenesis; and vaccine development. Facilities of the group included a molecular laboratory, plant virology laboratory, greenhouse, tissue culture facilities, animal facilities through various collaborations and a recently developed Biosafety level 2 virology laboratory.

The year 2007 had been productive in terms of book and journal publications and in terms of national and international conference participation, liaison and collaboration. These contributions are listed further on – but a few other highlights of 2007 were:

- Five postgraduate degrees have been completed (Wanda Markotter, Katherine Stewart, Liz Botha, Gugu Zulu, Alette Kotze)
- Our involvement in the national rabies advisory group, first global world rabies day and spearheading the WHO/Gates foundation proposal towards a rabies elimination showcase for South Africa in which we have reached the final three.
- Our research has featured in different editions of local newspapers and in several newsletters of local organizations and interest groups.
Projects

Lyssaviruses

To date, seven different genotypes have been identified within the lyssavirus genus of the Rhabdovirus family of bullet shaped negative ssRNA viruses. Classical rabies viruses (including the rabies vaccine strains) are grouped in the lyssavirus genotype 1 (RABV, gt1), whereas the remaining six genotypes (2 to 7) are known as the rabies-related lyssaviruses. Lagos bat virus (LBV, gt2), Mokola virus (MOKV, gt3) and Duvenhage virus (DUVV, gt4) have only been encountered on the African continent. Duvenhage virus (gt 4) have been isolated from human fatalities and insectivorous bats, Mokola virus (gt 3) has been isolated irregularly, mostly from cats but the reservoir species is unknown and Lagos bat virus (gt 2) is continually isolated from fruit bats and from incidental terrestrial mammals. There is very little active surveillance for these rabies-related viruses in Africa and their true incidences are unknown. Two variants of rabies virus (gt 1) occur in southern Africa: viz. the canid and the mongoose variants and these variants have distinct epidemiology and pathogenicity characteristics. Our research focuses on aspects of lyssavirus pathogenesis, molecular epidemiology, diagnostics and vaccine development as indicated in more detail in the following sections.

A. Surveillance and molecular phylogeny of the canid variant of rabies virus (RABV)

In our investigations of the canid rabies virus variant (gt 1) of southern Africa, we have recently focused on the molecular epidemiology of the ongoing dog rabies epidemic in KwaZulu/Natal. For the first time we have obtained a picture of the viruses involved and their movement within and among the municipal areas of this province. Our research indicated that, contrary to traditional belief, there may have been multiple introductions of rabies virus into the province, with implication for the future control of rabies in this province and elsewhere in southern Africa. One of these introductions may have been from a virus cycle associated with jackal and dog cycles. Whereas the importance of dogs as rabies hosts throughout Africa is without question, the role of jackals as important hosts is controversial. With regard to the transmission of rabies, it is only in southern Africa that jackals are considered to be important hosts of the virus. Some studies have indicated that they are able to support rabies cycles independently of dogs, while others contradict this finding. It is clear that the mechanisms involved in sustaining rabies in African canids are not yet understood. As our contribution, we are expanding our molecular epidemiological data from of canid rabies in different directions:
• by inclusion of virus cycles towards the north, including Mpumalanga, Limpopo and North-West provinces

• by inclusion of viruses from neighbouring countries, Lesotho, Swaziland and Mozambique and

• by inclusion of virus cycles associated with the Eastern Cape Province (where the first documented outbreak of rabies in South Africa occurred in 1893).

• In other regions, the bat eared fox emerged as maintenance host for canid rabies. In this case, we were able to demonstrate the autonomy of these cycles and the independent evolution of the viruses involved

• by inclusion of viruses from the Free-State province

• by inclusion of viruses from wildlife species in KwaZulu Natal province.

B. Molecular phylogeny and the origin of the mongoose variant of rabies virus (gt 1) in Africa

Following our characterization of the southern African mongoose rabies virus, the origin of this apparently unique variant of rabies virus in southern Africa has become even more intriguing and there seems to be at least two possible explanations, which our future research will explore and seek to clarify - briefly: (1) A separate introduction from bats to small herpestid carnivores of southern Africa, sometime after the original establishment of cosmopolitan dog rabies and North American raccoon rabies (phylogenetically, the mongoose variant seems to be closer to the cosmopolitan variant than to the raccoon variant). Presumably, this would mean that a bat variant of rabies virus, with ancestral links to the European progenitor, would have to have been present in southern Africa a few centuries ago. If this is the case, the bat virus itself must have become extinct in southern Africa, since there is no evidence of rabies in bats in southern Africa, or anywhere on the African continent. Assuming that there are no extant true rabies viruses in African or other Old World bats, it has to be considered unlikely that a well established bat rabies virus would have become extinct in a stable reservoir(s) during the recent past.

(2) Introduction of terrestrial mongoose rabies into southern Africa at some time before the dissemination of the cosmopolitan variant. However, given the efficiency with which dog rabies has manifested in dogs and a huge variety of wildlife during the past 50 years, the mongoose virus is unlikely to ever have been a dog virus, given the specificity and adaptation of this virus for species of the Herpestidae and its tendency to cause dead-end infections in other hosts, including canids. If this is the case, it would constitute a very different scenario from rabies in mongooses in the Caribbean. These mongooses were imported into the Caribbean from India in the 1870’s and 1880’s and genetic analysis indicate that these mongooses acquired cosmopolitan dog rabies from endemically infected Caribbean dogs, resulting in a first major mongoose rabies outbreak in 1950.
Globally, the epizootiology of rabies in mongooses is poorly understood, outside of southern Africa and the secondary foci in the Caribbean.

C. Lyssavirus pathogenesis

All lyssaviruses may cause rabies, a fatal zoonotic disease of the central nervous system. It has been suggested that the Lyssavirus genus could be divided in two different phylogroups, phylogroup I and II. Phylogroup I was proposed to consist of RABV (gt 1), DUVV (gt 4), EBLV 1 (gt 5), EBLV 2 (gt 6) and ABLV (gt 7) and phylogroup II of MOKV (gt 3) and LBV (gt 2). Phylogroup II viruses were suggested to be less pathogenic and therefore considered less of a danger to public health due to the reduced pathogenicity in mice. There is virtually no information on the comparative pathogenicity of the African lyssaviruses. Better understanding of the pathogenesis of lyssaviruses will allow better understanding of the risks associated in these viruses being transmitted to humans and to other animals since current vaccines do not protect against gt 2 and 3 viruses. Humans cannot be experimentally infected and we need to plan and execute experimental procedures that will allow accurate comparison between lyssavirus genotypes pathogenesis. Important pathogenic properties to investigate are the correlation between dose of viral inoculum, route of inoculation and mortality when comparing different lyssavirus genotypes and biotypes in an animal model as well as the comparative analysis of the tissue tropism and viral load present in different organs after inoculation with different lyssaviruses. Differences observed in the pathogenicity can then be compared to DNA sequence and amino acid differences. Preliminary studies performed in our laboratory indicated that the pathogenicity of phylogroup II viruses has previously been underestimated. This proposed study will compare the pathogenicity of representatives of all African lyssaviruses genotypes and biotypes in a murine model and also compare the amino acid sequences of the full genomes of these viruses to identify possible regions that may be involved in pathogenesis and changes that may lead to a increased virulence. Gt 2, 3 and 4 and the Mongoose biotype of gt 1 are all uniquely African viruses. Presently rabies is an emerging disease in South Africa and on the African continent and more information about these viruses will enable us to make more informed decisions about future control and prevention of rabies.

D. Lyssavirus vaccine development

Oral vaccination of free-roaming and feral dogs will be a major step in the struggle to control rabies in Africa. Despite the effective use of oral vaccines to vaccinate wildlife in Europe and Northern America, current oral vaccines (designed for wildlife - attenuated or classic poxvirus recombinant) are not appropriate for application in sub-Saharan Africa. The main problems are relative instability of some vaccines, or the potential danger of others, given the very high incidence of immunodeficiency in the resident human populations, primarily through the AIDS pandemic in the
subcontinent. For various related reasons, the use of these classic pox recombinants has also been met with increasing resistance in the developed world. In this regard, a replication-deficient recombinant poxvirus expressing the relevant antigens may provide not only an effective vaccine but also a safer alternative to the currently available recombinant oral vaccines. Several such candidate vaccines (based on recombinant LSDV and MVA) have been constructed and evaluated in rodent and canine laboratory models. In addition, the generation of lyssavirus vaccines with an expanded range of effectiveness is a worthwhile objective. Combined or cross-reactive vaccines would be of obvious specific benefit to laboratory diagnosticians worldwide and to high-risk groups in those areas where rabies-related lyssaviruses are endemic. We have studied the cross-protective and cross-reactive responses elicited by DNA vaccines and recombinant vaccinia viruses expressing rabies, Mokola and/or West Caucasian bat virus glycoprotein genes either in single or in dual combinations. Our evidence suggest that a recombinant vaccine expressing rabies and Mokola virus glycoprotein is most likely to protect against the spectrum of lyssaviruses, but excluding West Caucasian bat virus (of which only a single bat isolate is known).

E. Rabies-related lyssavirus surveillance and molecular phylogeny in Africa

There is very limited surveillance for rabies-related lyssaviruses in South Africa and on the rest of the African continent. However, as our work and that of others discover more and more cases, the true incidence of these viruses is believed to be completely underestimated. Our project aims to improve the surveillance for these viruses by testing bats other animals implicated in rabies-related virus cycles for the presence of these viruses (viral RNA) or for exposure to these viruses (antibodies). There has also never been any comprehensive epidemiological study of Duvenhage, Lagos Bat or Mokola virus and these viruses remain among the most obscure in the Lyssavirus genus. However, these lyssaviruses have been encountered with increasing regularity on the continent and we have described recent isolations of Mokola, LBV and DUVV from South Africa. Most recently we regularly isolated LBV from bats, but also isolated LBV for the first time from terrestrial wildlife and implicated LBV in rabies vaccine failures of dogs. These findings re-emphasized our lack of understanding of the epidemiology of lyssaviruses throughout Africa and renewed the interest in the rabies-related viruses in particular. Internationally, these aspects are closely linked to similar questions of other lyssaviruses – including the newly discovered viruses from Asia as well as the better known genotypes like the European and Australian bat lyssaviruses. As one of our contributions towards a better understanding of the genetic diversity, geographic origin and pathogenesis of the phylogroup II viruses we have initiated a molecular epidemiological analyses of all African rabies-related viruses, both those
newly isolated here and those available from local and international archives.

**West Nile virus**
There has been a recent explosion in interest in this virus following its introduction and extraordinary spread throughout northern America. West Nile Virus is highly endemic in South Africa, but surveillance is very poor. The development of highly sensitive serological tests for WNV that can be safely produced on large scale will be of great value for diagnosis and surveillance of WNV activity in South Africa and elsewhere. Such tests may be used to answer important epidemiological questions regarding WNV associated morbidity in humans, ostrich chicks and horses and the association with neurological disease in South Africa. West Nile virus lineage II occurs in Africa and these tests must therefore be specifically developed for lineage II to be specific for use in Africa. Commercially available tests are all developed for lineage I West Nile virus strains.

**Avian Influenza virus**
Avian influenza is caused by a single stranded negative sense RNA virus and different subtypes of this virus occur. It is important to be able to identify Avian Influenza but also to be able to identify the subtype of the virus because this provides information about the pathogenicity of the virus. We have been involved in the development of a microarray assay to identify Avian Influenza and the subtype involved for a large amount of samples such as would be expected in an outbreak situation.

**Plant viruses**
The primary research of the plant virology program is directed at support of the South African Citrus Improvement Program (CIP) as well as the Wine Grape Certification scheme. Winetech, the wine industry research co-ordinating body, supports the grapevine research component financially. In both schemes virus control plays a central role, with citrus tristeza virus (CTV) being the most important virus in the citrus scheme, and Grapevine leafroll associated virus type 3 (GLRaV-3), the most important one for the wine grape scheme. Both of these viruses belong to the *Closteroviridae* family but CTV is in the Closterovirus genus and is aphid transmissible, while GLRaV-3 is in the genus Ampelovirus and is mealybug-transmissible. The differences in mode of transmission require that the respective certification schemes employ different strategies for control of these viruses. As CTV is easily and rapidly transmissible by highly mobile aphid vectors, citrus material from which viruses have been eliminated are protected against CTV infection in the field through the pre-inoculation of planting material with mild CTV strains. In contrast with this, wine grape material is subjected to virus elimination techniques and then propagated under conditions to minimize re-infection. This approach is possible as the re-infection takes place relatively slowly as mealybugs are generally sessile and it is possible to provide
essentially “virus-free” propagation grapevine material. Neither strategy is foolproof. In citrus the cross protection by mild CTV strains is not always durable and severe CTV symptoms may occur with time. In grapevines on the other hand, the certified planting material is often re-infected by GLRaV-3 when healthy planting material is established in the field.

Research projects at CRI@UP are directed at doing basic and applied studies to understand and control 1) the occasional lack of CTV cross protection durability, 2) GLRaV-3 re-infection of certified material, and 3) improving methods to detect graft-transmissible pathogens of citrus and grapevines for improved quarantine and pathogen elimination with the certification schemes.

Projects conducted during 2006 are divided into three main programs: 1) Studies on grapevine leafroll disease, 2) Graft-transmissible pathogens of citrus, and 3) rhabdoviruses of plants.

A. Grapevine leafroll disease.

Project 1: A Field trial is currently underway to determine the effect of fallow treatment on the transmission of leafroll disease from successive plantings of vines on the same site.

Project 2: Case studies in control of grapevine leafroll disease at Vergelegen Wine estate, Somerset West and KWV, Picardi are underway, with leafroll infected plant incidence and spatial distribution monitored annually.

Project 3: A study to determine the cause of anomalous results obtained with grapevine leafroll PCR’s on grapevine collected from Laborie, Paarl.

B. Graft transmissible diseases of Citrus

Project 1: Study the causes of incomplete citrus tristeza virus (CTV) mild strain protection afforded grapefruit trees by monitoring the dynamics between mild protecting strains and severe strains.

Project 2: Study the epidemiology of citrus greening disease: Search for alternate hosts of the pathogen, *Candidatus Liberibacter africanus*.

Project 3: Study the epidemiology of citrus greening disease: Study the molecular variability of Liberibacter africanus sources collected throughout the citrus production areas of South Africa, and monitor the spread of the disease at selected sites.

Project 4: Develop detection methods for the viroids of Citrus and determine or confirm their presence in South Africa.

C. Plant rhabdoviruses.

Project 1: Identify and characterise a rhabdovirus of soybean and one of *Cynodon dactylon*.

Collaborators

The above projects involve a close collaboration with several national and international institutions.

National

- Onderstepoort Veterinary Institute, South Africa (Dr
Claude Sabeta, Rabies Unit

- Allerton Veterinary Laboratory, Pietermaritzburg, South Africa (Mr. Kevin le Roux and Dr Keith Perret)
- National Institute for Communicable Diseases, South Africa (Drs Blumberg, Cohen, Paweska, Swanepoel and Weyer)
- EThekwini Heritage Department, Natural Science Museum, Durban, South Africa (Dr. Peter Taylor)
- Medical Virology, University of Pretoria, South Africa (Dr. Marietjie Venter)
- National Zoological Gardens of South Africa, Pretoria (Dr. Emily Lane)
- Transvaal museum, Pretoria, South Africa (Dr. Teresa Kearney)
- Gauteng and Northern Region Bat Interest Group
- KwaZulu Natal Bat Interest Group
- Department of Zoology, University of Pretoria (Dr. Kerstin Kruger)

**International**

- Centers for Disease Control and Prevention, Atlanta, USA, Rabies Unit (Drs. Charles Rupprecht and Ivan Kuzmin)
- Pasteur Institute, Paris, France (Dr. Noel Tordo)
- CRA Istituto Sperimentale per la Viticoltura, Conegliano, Italy (Dr. Elisa Angelini)
- QDPI, Australia (Dr. Andrew Geering)
- USDA, USA (Dr. Hong Ling)

**Students**

- Nicolette van Zyl (MSc: Comparative molecular epidemiologies of an African variant of rabies virus (mongoose biotype) and the only rabies-related virus of terrestrial animals (Mokola virus))
- Jessica Coertse (BSc (Hons): Molecular epidemiology of mongoose rabies in southern Africa using complete N, M and G gene sequences)
- Chuene Ernest Ngoepe (MSc: Spread of canid rabies into the Free State province of South Africa)
- Gugu Zulu (MSc: Molecular Epidemiology of Rabies: Focus on Black-backed Jackals and Domestic Dogs in Northern South Africa)
- Nantu Phalatsi (MSc: Development of new DNA combination vaccines for lyssaviruses)
- Shirley Muvhulawa (MSc: New recombinant cross-protective lyssavirus vaccines)
- Charmaine van Eeden (MSc: The determination and analyses of the full genome sequence of the rabies related Duvenhage virus)
- Molefi Mazibuko (BSc (Hons): Complete genome sequence of a South African Mokolavirus isolate)
- Liz Botha (MSc: Molecular characterization of South African lineage II West Nile virus isolates and
development of a diagnostic assay)

- Claudio Ferreira (BSc (Hons): The development of a PCR and blotting technique for use in a micro-array based diagnostic procedure for Avian Influenza in Africa)
- Renate Lamprecht (MSc: Characterization of two previously unknown plant rhabdoviruses from South Africa)
- Baby Phaladhira (MSc: “Candidatus Liberibacter africanus” (citrus greening) in indigenous plants of South Africa)
- Katherine Stewart (MSc: Development of an oligo-based microarray chip to differentiate a severe and mild strain of the Citrus tristeza virus (CTV).)
- Alette Kotze (MSc: Investigations in anomalous PCR reactions to grapevine leafroll-associated virus type 3 in South Africa)
- Zama Dlamini (MSc: Citrus Viroid detection in South Africa)
- Clinton Brits (BSc (Hons): Use of tissue immunoblot assays (TBIA) for the detection of two members of the closteroviridae)

Visits from international guests

Dr. Alex Wandeler (Canada)
During January 2007 Dr. Alex Wandeler of the Canadian Food Inspection Agency, Canada, visited our research group. Dr. Wandeler is an internationally recognized expert in lyssavirus research. During his visit he presented a training course covering rabies diagnostic methods and focusing on cell culture at the Onderstepoort Veterinary Institute (OVI).

Dr. Thomas Muller (Germany)
In July 2007 Dr Thomas Muller of the Friedrich Loeffler Institute in Wusterhausen paid us a week-long visit. Dr Muller is head of the WHO collaborating Centre and the OIE reference laboratory for rabies diagnostics and research in Germany. This was his first visit to South Africa and we were delighted to host him at the University of Pretoria. We have discussed plans for future collaborative opportunities structured around informal meetings and presentations, as well as the PhD thesis defense of Wanda Markotter.

Dr. Andrew Geering (Australia)
Dr. Andrew Geering, Plant Virologist, of the Queensland Department of Primary Industries in Brisbane, Australia visited our group in September. He presented a talk on viruses of bananas to the Virology group at UP and also described and had discussions on collaboration on the use of nanobeads for viral diagnosis.
International visits, workshops and conference participation

**Cambridge, UK (Nel)**
Wellcome Trust Centre (Hinxton). Meeting focused on Infectious animal and human diseases. Prof Nel was invited to overview the field of lyssaviruses and their control.

**Paris, France (Nel and Markotter)**
OIE headquarters. International meeting for rabies in Europe and Asia. Our contribution highlighted the discovery of more variation within the lyssavirus genus with the discovery of new bat lyssaviruses from Africa.

**Scotland, UK (Nel)**
University of St Andrews. International meeting on zoonotic diseases. Our contribution focused on rabies in Africa.

**Switzerland (Nel)**
Geneva. This consultative meeting of rabies experts was organized by the WHO. Prof Nel was invited to the consultative panel and to co-present the case for rabies elimination in South Africa.

**Kenya (Markotter)**
During June 2007 Dr. Markotter joined the team of the CDC Rabies Unit on a research visit to Kenya. This visit was part of a surveillance program to collect samples of bats to test for lyssaviruses and other bat associated viruses.

**Mexico (Nel)**
Guanajuato, International meeting on rabies in the Americas. Our contribution included several papers that highlighted aspects of the epidemiology of wildlife rabies and of the emerging nature of dog and human rabies in some areas of southern Africa.

**Arizona (Nel)**
Chinle, Navajo reservation. Here, the oral vaccination of dogs (against rabies) is being investigated – in an effort similar to our planned strategies in South Africa (viz. KwaZulu/Natal). After the RITA meeting, Prof Nel
has visited Dr Scot Henderson, chief veterinarian of the Navajo Reservation in Chinle.

**Kenya (Nel)**
Nairobi, consultative meeting on neglected zoonoses in Africa and strategic planning for future policy. Prof Nel was invited as representative for rabies in Africa and served on the committee that formulated management and advocacy issues of neglected zoonoses.

**Botswana (Nel and Markotter)**
Gaborone. We are planning our next rabies in Africa meeting in Gaborone, Botswana. During our visit we have met with policymakers and officials within the Botswana government structures and we have selected venues for the conference and for continued training in rabies diagnostics and surveillance.

**Turkey (Pietersen)**
Prof. Pietersen the 17th Conference of the International Organization of Citrus Virologists in Adana, Turkey, 22-26 October, 2007. The conference was held in the Seyhan Hotel, Adana, in the centre of the Mediterranean citrus-growing region of Turkey. The conference consisted of 55 oral presentations, 45 posters, and some 70 delegates from 17 countries attended it. A pre-conference tour from 18-21 October, 2007 was also provided in order to demonstrate a number of citrus diseases occurring in Turkey, of interest to delegates. Nearly half of the conference delegates participated in the pre-conference tours. A paper, “Survey for ‘Candidatus’ Liberibacter species on citrus in South Africa” was presented by Prof. Pietersen on behalf of himself and the late Marius Schwerdtfeger. A number of very interesting and relevant papers and posters were presented.
National conference participation
Molecular and Cell Biology Group (MCBG) Symposium
On the 17th of October the Virology group attended the MCBG symposium that was hosted by the University of Pretoria Medical School. The symposium is a gathering of people who focus their research on molecular and cell biology. There were many interesting talks ranging from HIV research to epidemiology of lyssaviruses. A total of 10 presentations were contributed by our group. This included presentations on West Nile virus, lyssaviruses, Avian Influenza virus, plant rhabdoviruses and viruses associated with citrus.

Field work and Other activities
Seroprevalence survey for Lagos bat virus antibodies in KwaZulu Natal
During July 2007, Prof. Nel, Dr. Markotter, Nicolette van Zyl and Charmaine van Eeden travelled to Kwa-Zulu Natal. The main purpose of this travel was to continue our surveillance for Lagos Bat virus, but we also utilised the opportunity to liaise with co-workers at the Allerton Veterinary Laboratory. Bats were captured at various locations where known roosts were situated, and wing membrane punches, blood samples and saliva swabs were collected. This surveillance effort was done in collaboration with the KZN Bat interest group as well as Dr Peter Taylor from the EThekwini Heritage Department, Natural Science Museum, Durban.

Surveillance for plantviruses and obligate graft-transmissible pathogens
Studies were conducted during 2007 to determine whether Candidatus Liberibacter africanus occurs in indigenous Rutaceous plants. A variant of this non-culturable bacteria identified as Ca. L. africanus spp. capensis was detected in Calodendrum capensis. Samples from these trees from various localities in South Africa have subsequently yielded this bacteria. Furthermore the natural spread of this bacteria in citrus orchards were monitored in Schoemanskloof, Nelspruit and Rustenburg areas. Various samples from throughout South Africa were submitted for diagnosis of this pathogen and a new area in which it occurs recorded.
Surveillance for lyssaviruses

During 2007, Madikwe, Taung and the Vredefort Dome in the North West Province were visited as part of an ongoing surveillance project for lyssaviruses in bats. Several samples were collected. These research trips were done in collaboration with the Transvaal museum, Gauteng and Northern Region Bat Interest Group and the Special Pathogen Unit of NICD.

Baby, Marius and Fanie van Vuuren and Prof. Pietersen collecting severe CTV

Dr. Markotter setting up a Harp trap to capture bats in a old mine tunnel at Taung

Dr. Markotter (UP), Dr. Weyer (NICD), Dr. Kearney (Transvaal Museum), Ernest (Transvaal Museum), Eric (Northern Cape Nature Conservation) and Julio (GNORBIG) busy processing bats at Taung.
Training courses presented
In collaboration with the FAO and IAEA, we have presented a PCR and molecular diagnostic course, for the 5th time. The aim of these courses is to provide delegates from developing countries with the tools and knowledge to carry out improved diagnostics and surveillance for infectious diseases that are of agricultural importance to their home countries. This activity also helps us to build networks and relationships with individuals and Institutes – particularly through Africa.

Delegates performing laboratory experiments during the PCR course presented in 2007

World Rabies day
On 8 September 2007 the first World Rabies Day was launched. The mission of World Rabies Day is to raise awareness about the impact of human and animal rabies, how easy it is to prevent it, and how to eliminate the main global sources. Even though the major impact of rabies occurs in regions of the world where many needs are present, rabies should no longer be neglected. The tools and technology for human rabies prevention and dog rabies elimination are available. Through the World Rabies Day initiative, partners will be Working Together to Make Rabies History. Dr. Markotter has been involved through the Rabies advisory group (RAG) in planning the activities of this day in South Africa. This day was a major success throughout South Africa where vaccination, education and awareness campaigns were held in every province. Dr. Markotter also presented a talk on this day in KwaZulu Natal to veterinary and health professionals to create awareness of rabies. KwaZulu Natal reports the highest number of rabies cases each year in South Africa.

Lab outings
Vredefort Dome, 7-8 March 2007
We visited Vredefort Dome, just 120 km from Johannesburg, for our annual group social event. Vredefort Dome is a representative part of a larger meteorite impact structure. Dating back 2 billion years, it is the oldest meteor crater found on Earth. With a radius of 190 km, it is also the largest and the most deeply eroded. The Vredefort Dome bears witness to the world’s greatest known single energy release event, which had devastating global effects including, according to some scientists, major evolutionary
changes. We arrived very early on the Wednesday morning, to start our Dome tour. The next day we chose a more adventurous exercise, river rafting down the Vaal river. After the river rafting experience, we had lunch and headed back to Pretoria, very tired.

**Weddings**

We have celebrated two weddings this year.

Liz Botha got married to Hein Botha on the 8 September 2007 from the NG Moeder Gemeente in Rustenburg. The bride was beautiful and the day was really eventful (mostly hairdressing and make-up). I can only congratulate her, firstly for the wonderful organization and secondly for getting married. Liz was a great student but even so a better friend and companion. She could easily negotiate her day through experiments, drinking coffee with friends and at the same time organize excursions for the lab or the department. With her help and leadership the lab was kept in tip-top shape, with nothing out of place and reagents stocked up, since she was also responsible for the ordering of the reagents. We will miss her for sure, but do wish her best.

**Personal**

**Where do our graduates go?**

Recently, Dr Jacqueline Weyer and Mr Peter Coetzee left us to take up positions at the National Institute for Communicable Diseases in Sandringham (Previously the National Institute for Virology) and Ms Nantu Phalatsi left us for Roche, SA. This year, two more of our students have left us for the NICD. They are Ms Elizabeth Botha and Ms Shirley Muvualawa.
On Saturday 27th October 2007, Katherine Stewart married Sean Scott at Oakfield Farm, Muldersdrift. It was a dream come true and a very special day, after many months of planning.

Passing away of Marius

Marius Schwerdtfeger

21/06/1982 – 21/07/2007

Marius was born and raised in Germany, and came to South Africa in 2005 to enrol in a Microbiology Honours degree at the University of Pretoria. His studies spanned from water research to plant virology. From the day he arrived he captured our hearts and filled us with laughter. He was really passionate about life and there was never a dull moment with Marius. He tragically died at the age of 25 in a car accident in South Africa. The friends Marius made at the University of Pretoria will miss him very much.

Peer reviewed publications of 2007


In Press:

