Virology Laboratory

Department of Microbiology and Plant Pathology staff
Dr. Louis Nel (Professor)
Dr. Gerhard Pietersen (Extra-ordinary Professor)
Wanda Markotter (Junior lecturer)

Collaborators and co-workers (include the following individuals/institutions)
Dr. Anthony Fooks (Veterinary Laboratory Agency, Weybridge, UK)
Dr. Kerstin Kruger (Department of Zoology and Entomology, University of Pretoria)
Dr. Hennie Le Roux (Citrus Research International)
Dr. Barry Manicom (ARC-ITSC, Nelspruit)
Dr. Janusz Pawska (Special Pathogens Unit, NICD, South Africa)
Dr. Jenny Randles (Allerton Veterinary Laboratory, Pietermaritzburg, South Africa)
Dr. Charles Rupprecht (Rabies unit, Centers for Disease Control and Prevention, Atlanta, USA)
Dr. Claude Sabeta (Rabies unit, Onderstepoort Veterinary Institute, South Africa)
Dr. Bob Swanepoel (Special Pathogens Unit, NICD, South Africa)
Dr. Peter Taylor (EThekwini Heritage Department, Natural Science Museum, Durban, South Africa)
Dr. Noel Tordo (Pasteur Institute, France)
Dr. Fanie van Vuuren (Citrus Research International)
Dr. Marietjie Venter (Department of Medical Microbiology, University of Pretoria)
Dr. Alex Wandeler (Canadian Food Inspection Agency, Ontario, Canada)

Postdoctoral fellows
Dr. Jacqueline Weyer

Doctoral students
Wanda Markotter

Master students
Liz Botha
Peter Coetzee
Zama Dlamini
Orienka Koch
Alette Kotze
Jacolene B Meyer
Shirley Muvhulawa
Ernest Ngoepe
Baby Phaladira
Nantu Phalatsi
Katherine Stewart
Nicolette van Zyl
Gugu Zulu

BSc Honours students
Johan Fouche
Renate Lambrecht
Charmaine Wilsenach
Research activities and interests: 2006

A: Evolution of Rhabdoviruses and epidemiology of lyssaviruses

The origin and evolution of viruses are of as much interest in the discipline of virology as is the evolution of life forms to paleontology, and is also important in understanding future evolution of new virus strains. The genetic evolution of the lyssaviruses within the Rhabdoviridae family has become one of our main interests. Elucidating the epidemiology and evolutionary history of two indigenous viral lineages, viz. Mokola virus and the mongoose rabies virus, are core objectives of this research interest. Within the Mononegavirales, the Rhabdoviridae is a family of which the members cumulatively infect more than 200 species, which include a broad variety of plants, insects, fish, birds and mammals. Among the lyssaviruses (one several genera) it is of particular interest that Mokola virus has been found in insectivorous shrews and the virus is known to be able to replicate in insects and insect cells – it is also the only lyssavirus for which a reservoir species is not known and, bizarrely, it has never been isolated from bats. All the other lyssaviruses can either be transmitted by insectivorous bats or are exclusive to insectivorous bats. This last category also includes the putative Asian genotypes i.e. Aravan, West Caucasian bat virus, Khujand and Irkut viruses. Three other rhabdoviruses were once considered as putative lyssaviruses, and have been encountered in insects only, viz. Rochambeau, Obodhiang and Kotonkan. It is therefore tempting to speculate that bat lyssaviruses emerged from an insect rhabdovirus and that one of these emerged as the now global classical dog rabies virus. Dog rabies emerged only in recent decades over much of the world, including Africa and continues to radiate in new host species.

(1) Recently, an excellent plant virology programme has joined our laboratory. Jointly, ours is one of few virology laboratories in which animal and plant viruses are studied in parallel. On this opportune interface, it is our intention to carry out a more comprehensive molecular evolution study of the rhabdoviruses of animals, insects and plants. A number of new and unindentified nucleo- and cyto-rhabdoviruses from South Africa will be studied, together with insect rhabdoviruses of African origin and animal viruses such as Mokola and rabies viruses. These studies will involve the generation of molecular epidemiological clocks and other bioinformatical information, but also investigate physical and biological properties of viruses such as the relative ability to grow on various types of animal and insect cells.

(2) There has never been any comprehensive epidemiological study of Lagos Bat virus or Mokola virus and these viruses remain among the most obscure in the Lyssavirus genus. However, these lyssaviruses have been encountered everywhere on the continent, where it was competently looked for and we have described various recent isolations of Mokola and LBV 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 pathogenicity or 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 the LBV isolates and all the Mokola virus isolates, both those newly isolated here and those available from local and international archives. It has already become evident that errors have been made in the classification of various isolates and we hope to contribute to a better understanding of the epidemiology of the African lyssaviruses. Apart from the quest for vaccines that will protect against the non-rabies lyssaviruses, the most fundamental questions regarding Lagos Bat virus and Mokola virus and their similarities or differences with rabies virus remains: (1) the identification of the reservoir of Mokola virus and whether or not this virus can infect bats (as all the other lyssaviruses do); (2) whether or not Lagos Bat virus could be regarded as a potential threat to human health (as all the other lyssaviruses are). In searching for answers, we have initiated a comprehensive analyses and comparison of pathogenicity of these viruses in appropriate animal models.
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.

As an established rabies epidemiology facility in southern Africa, we continue to be involved with research activities related to the radiation of rabies into and through the animals of our region. In our investigations of the canid rabies virus 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 Kwazulu/Natal in 3 directions: (1) by inclusion of virus cycles towards the north, including Mpumalanga and Northern Province (2) by inclusion of viruses from neighbouring countries, Lesotho, Swaziland and Mozambique and (3) by inclusion of virus cycles associated with the Eastern Cape Province (where the first documented outbreak of rabies in South Africa occurred in 1893). (4) 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.

**B: Lyssavirus vaccines**

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 nonrabies 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).

C: 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.

D: Plant viruses
Other than the proposed research on rhabdoviruses of plants, insects and animals – we are involved with a number of different plant virus programmes. These are (1) establishing a citrus virus diagnostic capability (2) studies on the epidemiology of grapevine leafroll disease, and (3) BSV incidence and transmission in South Africa. Pro-active strategies to prevent the introduction of plant viruses to new plantings and new areas are amongst the most efficient control methods for plant virus-induced diseases as it is very difficult and expensive to control them once they are already present. Foremost amongst these strategies are phytosanitary regulations and certification schemes, both of which ensure that healthy status of propagation material. To ensure that these strategies continued in the local citrus industry after the retirement of Dr. Fanie van Vuuren, formerly plant virologist at the ARC-Institute for Tropical and Subtropical Crops (ARC-ITSC), the South African Citrus Growers Association (CGA) via Citrus Research International (CRI) established a Plant Virology program in 2004 in collaboration with the Microbiology and Plant Pathology Department of the University of Pretoria (UP). This is housed at UP as part of the larger virology laboratory and is known as CRI@UP.

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 \textit{Closteroviridae} family but CTV is in the \textit{Closterovirus} genus and is aphid transmissible, while GLRaV-3 is in the genus \textit{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, grape wine 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. With these objectives in mind four MSc. students are involved in studying aspects of the above: 1) Katherine Stewart has been establishing techniques to differentiate CTV strains in order to study the dynamics of CTV strains within the mild strain cross protecting populations under different environmental conditions, 2) Orienka Koch is identifying pathogens spreading within certified material of the wine grape certification scheme, 3) Aletta Kotze is studying GLRaV-3 variability in order to develop molecular markers with which to monitor the spread of the virus in vineyards, and 4) Baby Phahladira is developing a protocol for the detection of “Candidatus” Liberibacter africanus, the causal organism of African greening of citrus, and studying the potential of other hosts involved. Gerhard Pietersen is study leader to all of the above and is also busy establishing a comprehensive diagnostic capability to the graft-transmissible pathogens of citrus, and is studying the epidemiology of GLRaV-3 in the wine grape certification scheme.

In support of the banana industry, Jacolene Meyer has done studies to determine whether banana streak virus (BSV), when present as an endogenous virus in B-genome bananas, can be transmitted by mealybug vectors once activated to become an episomal virus. These findings are very important in quantifying risks associated with the tissue culture propagation and dissemination of banana plantlets.

**Visits from international guests**

We were fortunate to have been able to welcome a number of international collaborators and guests to our shores during 2006.

**Dr. Alex Wandeler (Canada)**

During January 2006 Dr. Alex Wandeler of the Canadian Food Inspection Agency, Canada, visited our research group. Dr. Wandeler is an internationally recognized expert in lyssavirus research and heads up the WHO collaborating centre and the OIE reference centre at the CFIA in Ottawa, Ontario. During his visit he also presented a training course covering rabies diagnostic methods at the Onderstepoort Veterinary Institute (OVI). A number of students from our laboratory also participated in this course.

Lyssavirus diagnostic course:
Back row: Dr. Shumba (OVI), Wanda Markotter (UP), Nicolette van Zyl (UP), Dr. Wandeler, Peter Coetzee (UP), Dr. Sabeta (OVI). Front row: Ernest Ngoepe (OVI/UP), Jacqueline Weyer (UP), Gugulethu Zulu (OVI/UP), Deborah (OVI), Nantu Phalatsi (UP)
Dr. Charles Rupprecht (CDC, USA)
Dr. Charles Rupprecht, Head of the CDC rabies unit and Director of the World Health Reference Centre for rabies research, visited our research group during June 2006. During his visit we went on a surveillance field trip towards Duvenhage virus surveillance, in collaboration with the National Institute for Communicable Diseases (NICD). This puzzling and obscure lyssavirus was responsible for a human fatality earlier in the year and we visited the general area associated with the virus, in the North West province of South Africa. At the NICD Dr Rupprecht presented a talk on global issues of rabies. Subsequently, we have traveled to Kwazulu Natal (KZN), where we visited our collaborators at the Directorate of Veterinary Services, Allerton, Pietermaritzburg. We have studied the molecular epidemiology of the dog rabies epidemic in KZN during the recent past and hope to contribute to improved control efforts that may include the use of new generation oral vaccines. Later, we met with the KZN bat interest group in Durban, another important collaborator of our group. Here, our focus was on our interest in the lyssaviruses of bats, considering that all of our Lagos bat virus isolates originated from within KZN.

Danielle Davignon (USA)
Danielle Davignon, a final year veterinary student from Wisconsin, USA, spent a month as part of a Hubert fellowship with our research group. During this time she was involved in field surveillance of bats for lyssaviruses, laboratory diagnosis of rabies in bats and spent time with the SPCA in Durban assisting in vaccination campaigns for rabies in rural areas.
Dr. Noël Tordo (Pasteur Institute, France)
This was a long planned informal visit from Dr Noël Tordo and his two daughters, Jade and Maiva. Apart from discussions with members of the virology group, the Tordo’s have visited KwaZulu Natal as well as the Lowveld with us. The three of them also explored various museums independently. It was great to have these true Parisians with us.

Prof. J. Bové (INRA, France)
Prof. Bové, arguably the world authority on Citrus greening disease joined staff of CRI@UP and CRI in late November, early December on a collection trip to obtain greening infected citrus trees throughout South Africa. These samples will be analysed for the presence of known Liberibacter species as well as a determination of the variability of *Liberibacter africanus* locally.
Dr. P. Yamamoto (Fundecitrus, Brazil)
Dr. Yamamoto, an entomologist working on the psyllid vector of greening at Fundecitrus in Brazil (Diaphorina citri), also took part during the greening collection trip. He was most interested in observing differences between African greening transmitted by the psyllid Trioza erytrea and the two greening causal organisms transmitted by Diaphorina citri in Brazil.

Dr. S. Lopes (Fundecitrus, Brazil)
Dr. Lopez, a plant virologist working on numerous aspects of greening control and transmission at Fundecitrus in Brazil also took part in the greening collection trip in November/December. Doing very similar work to that envisaged at CRI@UP, a lot of excellent dialogue was held with Dr. Lopes and ties strengthened to ensure future collaboration.

International research visits
During 2006 Wanda Markotter (PhD studies) and Nantu Phalatsi (MSc studies) visited the Centers for Disease Control and Prevention, Rabies Unit on separate research visits to complete part of their post graduate studies. Wanda performed research investigating the epidemiology and pathogenesis of Lagos bat lyssavirus. This lyssavirus causes rabies encephalitis in fruit eating bats in Africa and current rabies vaccines do not provide protection. Nantu analyzed the efficiency of DNA vaccines for lyssaviruses in animal models at this facility.

The CDC rabies research group
International conferences: Organizing and participation

The 9th Annual Conference on Vaccine Research.
Baltimore, United States of America, 8-10 May 2006.
Jacqueline Weyer presented a poster entitled “Cross-reactive and cross-protective immune responses to recombinant vaccinia viruses expressing full-length lyssavirus glycoprotein genes”

The 8th Meeting of the Southern and Eastern African Rabies Group (SEARG).
Heja Game Lodge, Windhoek, Namibia, 22-26 January 2006
Our group organized this meeting and, apart from Conference Chair and related functions, a number of the formal paper presentations were from our laboratory:
- Jacqueline Weyer: Rabies vaccination: Future trends
- Nantu Phalatsi: DNA vaccines for rabies: an Overview
- Wanda Markotter: Molecular epidemiology and characterization of Lagos bat virus isolates from South Africa
- Wanda Markotter: Classical rabies diagnostics and new developments
- Louis Nel: Non-rabies lyssaviruses from Africa: the status quo
- Peter Coetzee: Molecular phylogeny of canine rabies in KwaZulu Natal

Students of our research group attending the conference: Wanda Markotter, Jacqueline Weyer, Nantu Phalatsi, Ernest Ngoepe, Peter Coetzee, Liz Botha and Nicolette van Zyl.

Conference delegates at the SEARG meeting: Wanda Markotter (UP), Dr. Alex Wandeler (Canada), Prof. Louis Nel (UP), Dr. Peter Taylor (Durban Science museum), Dr. Claude Sabeta (OVI) and Dr. Tony Fooks (UK).
Salamanca is a historic Spanish university town. The architecture is breathtaking and the meeting itself was excellent. Apart from being well-organized and including quality social events and classical shows, the level of the scientific contributions at these meetings are very high indeed. Our presentation (Nel et al) was entitled: New aspects of the epidemiology and control of rabies and rabies related viruses in South Africa. Other well-known lyssavirologists at this meeting included Dr’s Schnell (USA), Tordo (France), Johnson (UK) and Nadin-Davis (Canada).

15th Meeting of the International Council for the Study of Virus and Virus-like diseases of the Grapevine
3-7 April 2006, Stellenbosch, South Africa
Prof. Pietersen was on the Organising Committee of this very successful conference, which some 140 delegates from 24 countries attended. Our MSc students Aletta Kotze and Orienka Koch both attended the conference.

The following was presented at this conference by Prof. Pietersen:
- Use of remote sensing to monitor the spread of grapevine leafroll disease in South Africa.
- Rapid identification of three mealybug species by multiplex PCR (This paper was presented by Dr. Pietersen’s collaborator, Dr. K. Krugër (Department of Zoology, UP).
- Spatio-temporal distribution dynamics of grapevine leafroll disease in Western Cape vineyards.
- Vergelegen, South Africa; a case study of an integrated control strategy to prevent the spread of grapevine leafroll disease.
Neither Prof.s Pietersen, Nel nor Jacolene Meyer could attend the conference personally because of prior commitments but requested that Dr. John Robinson presented the invited paper for them.

Presentation by Dr. John Robinson for Prof. Pietersen, Nel and Me. Meyer
“Transmission studies of activated-episomal banana streak badnavirus from FHIA-21 (AAAB) by four mealybug species”

Huanglongbing-greening International Workshop
16-20 July, Ribeirao Preto, Brazil.

This workshop, to discuss all aspects of huanglongbing/Greening was attended by experts from throughout the world. Renewed interest in this disease has been generated due to its introduction Brazil and now to the United States of America as well. It was attended by Prof. Pietersen who was supported financially by CRI.

Monitoring for citrus greening disease in Brazil.

17th International Rabies in the Americas meeting
15-20 October 2006, Brasilia, Brazil.

Prof Nel presented two papers at this meeting viz (1) Recent epidemiology of southern African lyssaviruses and (2) Rabies and its control in KwaZulu-Natal, South Africa.

Brasilia is the capital of Brazil and a most interesting city – founded less than 50 years ago. It was originally planned for 200 000 people (mostly government employees) but the population has quickly ballooned to more than 2mill. The annual RITA meeting is the most important lyssavirus-specific meeting on the calendar and this, the 2006 meeting, was the largest to date. The 2007 meeting is planned for Mexico.
3rd International Enology and Viticulture Conference  
14-17 November, 2006, Somerset West, South Africa.  
Prof. Pietersen attended this conference and presented a paper, “An integrated control strategy to prevent the spread of grapevine leafroll disease on Vergelegen wine estate – a model for the South African wine industry.

National conference participation.

44th Congress of the South African Society for Plant Pathology  
Prof. Pietersen was invited to present the Van der Planck Memorial lecture at this conference, where he discussed the past ten years research conducted by his group on the epidemiology and control of grapevine leaf roll disease in South Africa in a talk titled: “Tackling the grapevine leafroll disease problem in South Africa”

Three MSc students of the virology group attended the conference namely Jacolene Meyer, Katherine Stewart and Zama Dlamini.

Further papers presented:
- Jacolene Meyer: Evaluation of the efficiency of four mealybug species to transmit activated-episomal Banana streak badnavirus.
- Katherine Stewart: Dynamics and molecular characterisation of citrus tristeza virus (CTV) strains within South African GFMS12 cross-protecting population.

4th Citrus Research Symposium  
This conference on all aspects of Citriculture, was attended by Prof. Pietersen, and two MSc. Students, Me. Katherine Stewart and Me. Baby Phahladira

The following was presented:
- Prof. Gerhard Pietersen: Progress towards establishment of a comprehensive diagnostic capacity at CRI against citrus graft-transmissible pathogens
- Katherine Stewart: Development and implementation of PCR and microarray-based methods to differentiate citrus tristeza virus (CTV) strains.

Field work and other activities.

Gauteng and Northern Regions Bat Interest Group (July 2006)  
At a meeting in the Discovery centre of the University of Pretoria, Prof. Nel presented a talk to the Gauteng and Northern Regions Bat Interest Group. The theme that we focused on was: ‘Bats and emerging viruses: Who is at risk?’ This provided an overview of the scientific knowledge on viruses in bats and the implications for zoonoses and emerging zoonoses. Our meeting also provided an opportunity to inform regular bat handlers about the risks involved and how to minimize these as well to rediscover common interests and to re-enforce future collaborations.

Vaalwater – Bela-Bela  
The purpose of this field trip on 14-15 July was surveillance for Duvenhage virus, one of the uniquely African lyssaviruses. We tried to identify locations where it would be possible to capture bat species implicated in the epidemiology of the disease. These surveillance efforts are done in collaboration with the Special Pathogens Unit at the NICD in Johannesburg. Dr. Rupprecht and Danielle Davingnon from the USA also accompanied us.
**Thabapashwa, Potgietersrus**
Jacqueline Weyer and Wanda Markotter attended a group outing of the Gauteng and Northern Regions Bat Interest Group (GNOR BIG) from 20-22 October to the Thabaphaswa area just outside of Potgietersrus (now Mokopane), Limpopo Province. The weekend was spent trying to catch bats in mist nests as well with a “harp trap”, and then subsequently identifying the bats. Wing web biopsies were also collected to aid in the identification of some specimens through molecular methods.

**Paarl, Western Cape**
A field trip was conducted in February, 2006 to monitor mealybugs in a Vineyard in Paarl, Western Cape in which a long-term trail is being conducted to compare the efficacy of fallow periods as opposed to systemic insecticide/herbicide treatment has on transmission of grapevine leafroll disease between successive vineyards planted on the same site.

**Vergelegen, Western Cape**
During April-May, 30 vineyards were monitored in the western Cape for leafroll spread as part of an ongoing study into the spatio-temporal spread of grapevine leafroll disease. Studies were also conducted in this period on Vergelegen, where strategies to achieve leafroll eradication are being applied. The first wines from these virus-free vineyards are of an excellent quality, and Vergelegen winemaker, Andre’ van Rensburg was awarded the “Platter Wine of the Year” award for a wine from one of these vineyards.

**Komati River Gorge, Machadodorp**
Jacqueline Weyer and Wanda Markotter attended a group outing of the Gauteng and Northern Regions Bat Interest Group (GNOR BIG) from 10-12 November to the Komati River Gorge nearby Machadodorp, Mpumalanga. The weekend was spent trying to catch bats in mist nests as well with a “harp trap”, and then subsequently identifying the bats. Wing web biopsies were also collected to aid in the identification of some specimens through molecular methods.
Awards and recognition

Jacqueline Weyer received her PhD titled “Immune responses to recombinant poxviruses expressing full-length lyssavirus glycoprotein genes” in May 2006. She was an International Travel Grant Award recipient to the 9th Annual Conference on Vaccine Research. The conference was sponsored by the National Foundation of Infectious Diseases and was hosted in Baltimore, United States of America on the 8-10 May 2006.

Jacqueline Weyer also received an L’Oréal-UNESCO PhD fellowship award for academic excellence during the 2006 L’Oréal-Unesco Women in Science Awards ceremonies.

Nantu Phalatsi received a Travel Grant from the International students office of the University of Pretoria to visit the CDC in Atlanta USA

Katherine Stewart and Orienka Koch received prestigious PhD bursaries from the NRF.

Katherine Stewart was awarded the Best Speaker Award at the 4th Citrus Research Symposium, in Port Elizabeth, 20-23 August, 2006

Baby Phaladira received a DST Transformation and Capacity Building Award. This award aims to increase the number of African scientists through mentorship of the particular research field and to implement and develop leadership and management skills to the awardees.

Employment

Jacolene Meyer, was seconded to CRI, Nelspruit by du Roi Laboratories to set up diagnostic tests and to provide this as a service on tissue culture banana plantlets. Part of here time is also utilized by CRI in doing research on greening disease of citrus.

Nantu Phalatsi was employed as an Applied Science Training Consultant at Roche (1 November 2006)

Peter Coetzee was employed as a Medical Scientist, Polio Division, National Institute for Communicable Diseases (October 2006)

Jacqueline Weyer has been offered the position of Senior Medical Scientist, Special Pathogens Unit, National Institute for Communicable Diseases (January 2007).
**Students graduating 2006**

Peter Coetzee (MSc Cum Laude: Prof Nel)
Jacolene B Meyer (MSc Cum Laude: Proffs Nel, Pietersen)
Orienka Koch (MSc: Proffs Pietersen, Nel)
Jacqueline Weyer (PhD: Prof Nel)

**Lab outings**

**Namibia**

During January 2006 members of the laboratory went on a road trip from Pretoria, *via* Botswana to Windhoek, Namibia, and *via* the Fish River Canyon back to Pretoria. The trip proved to be very memorable, and also marked the first “Out of SA” trip for some of our students. As part of the trip we stayed over in the following places: Kang (Botswana); Windhoek (Nam); Swakopmund (Nam); Sesriem, Sossusvlei (Nam) and Ais-Ais, Fish River Canyon (Nam).

Left: Prof Nel, Nicolette van Zyl, Jackie Weyer, Nantu Phalatsi and Liz Botha at Sossusvlei;
Top: Students trying to cross a “flashflood” river

![Prof Nel in a pensive mood](image-url)
**Nylosvlei weekend**
During the weekend of the 24-26th November 2006 we visited Nylosvlei Nature Reserve, Limpopo Province as our group year-end function. Nylosvlei is recognized as the habitat for an immense variety of waterfowl and other birdlife and is one of our few UNESCO world heritage sites. We were fortunate to have Michael Poll of the South African Astronomy Association with us. He presented a talk on astronomy, and guided us in around the night skies by eye and by telescope.

![Members of our group giving closer inspection to a tree](image1)

![Prof Nel, Prof Pietersen and Renate Lambrecht](image2)

**Tswaiing Crater experience**
Forty kilometers north of Pretoria nearby Soshanguwe, lies a ring of hills a kilometer in diameter and 100 meters high. These hills are the walls of an impact crater left by an asteroid which hit there some 200 000 years ago. Towards the end of 2005, the members of the laboratory visited this Tswaiing Crater site. The trip included a guided walk to the crater site and allowed us to, during the 2006 visit of some of our international guests, provide our own guided tours of this unique and magnificent site.

![The Virology research group of 2005 visiting the crater](image3)


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RECENT EPIDEMIOLOGY OF SOUTHERN AFRICAN LYSSAVIRUSES
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