tree pathology news

NEWSLETTER OF THE TREE PATHOLOGY COOPERATIVE PROGRAMME - UFS

NO. 22

NOVEMBER 2000

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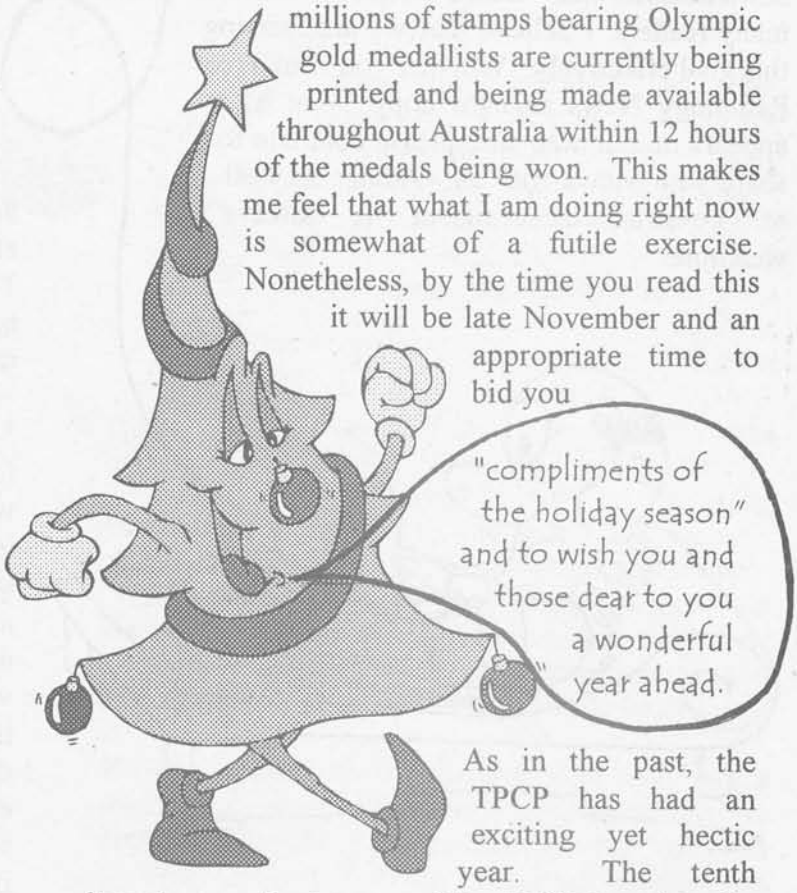
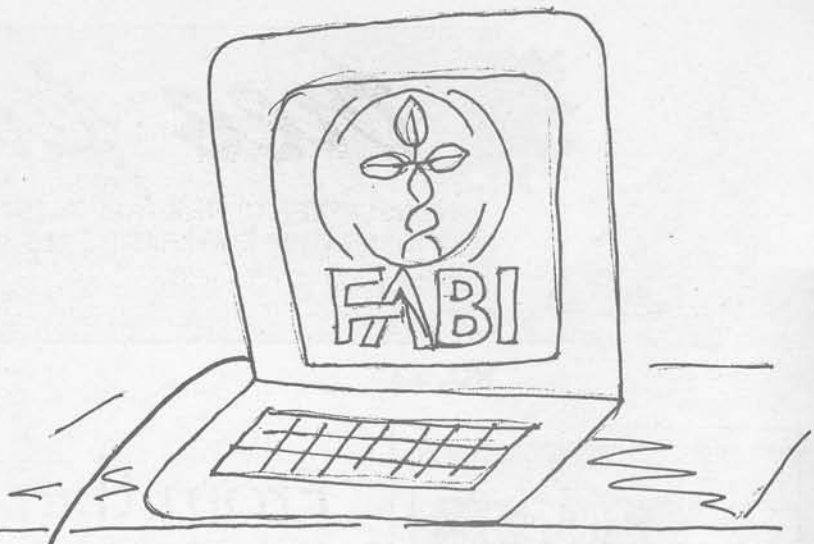
From the desk of the Director

It is only mid September and I once again find myself writing a foreword for the end of year issue of Tree Pathology News. What seems amazing is that I am de facto presenting a closing statement for the year – and must also use this opportunity to wish all our forestry colleagues good wishes for the holiday season and coming year. Yet it seems much to early in the year to be doing so. The reality of course is that there is a great lapse in time between writing notes for the newsletter, and its ultimate appearance. What lies ahead is the compilation of the contributions, layout and style work, printing, inclusion in ICFR news and ultimately dispatch to readers. Thus I marvel at the fact that umpteen millions of stamps bearing Olympic gold medallists are currently being printed and being made available throughout Australia within 12 hours of the medals being won. This makes me feel that what I am doing right now is somewhat of a futile exercise. Nonetheless, by the time you read this it will be late November and an appropriate time to bid you

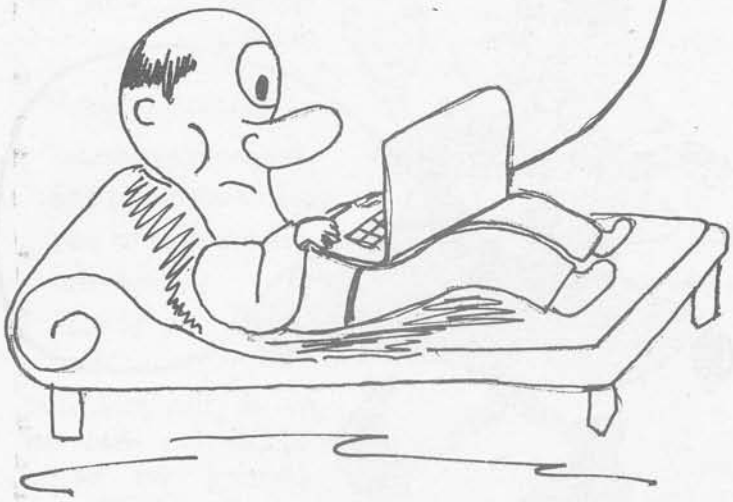


As in the past, the TPCP has had an exciting yet hectic year. The tenth formal year of existence of the TPCP has virtually come and gone. We started the year with a major contribution to the BIOY2K meetings in Grahamstown – the largest national biological sciences meeting to have ever been held in South Africa and things have not stopped since then. An

exciting and hugely successful annual TPCP meeting held in March, a wonderful group of new graduate students, and equally impressive crop of graduates, a superb publication record – and field monitoring and plantation programme that rivals the best in the world. All in all, it is my firm belief that our challenge to make the millennium year our best ever has been squarely met on all fronts.



As in the past, this issue of Tree Pathology News seeks to report briefly on the broad range of activities of members of the team. This document has never sought to be a report on scientific investigation. Results of those studies are adequately reported elsewhere. As a team, we strongly contend that quality research can only be tested by international peer review. The TPCP has many conduits through which scientific product is popularised and shared with our constituency – you the forestry community of South Africa. What Tree Pathology News seeks to do is to share with you an overall view of the activities of the Programme. Most importantly, we aim to communicate the excitement and spirit of the programme in a newsletter format. Based on feedback from many readers, I believe that we are meeting this goal effectively. Whether you read Tree Pathology News as hard copy - or as it appears on our web site, please continue to share your views with us. Advice as well as constructive criticism is always welcome.



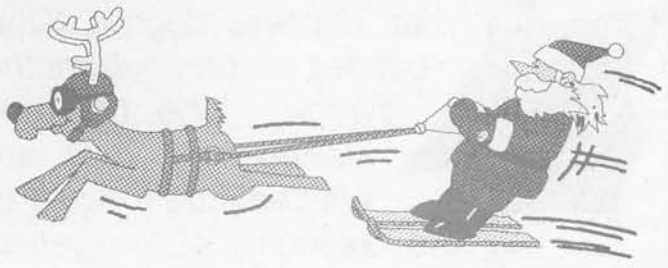
The international profile of the TPCP – and consequently the Forestry Community of South Africa continues to grow unabated. The group is repeatedly approached for advice and for participation in a wide range of international activities. These are far to numerous to even mention briefly. Students and staff are having increasing opportunity to travel internationally, and this is also usually funded from resources not directly linked to the TPCP. The international contacts and activities of the TPCP are not only an outstanding advertisement for S.A. Forestry, but they are also essential to the core business of the Programme. Effective tree health management depends squarely on a thorough knowledge of the distribution and movement of pests and pathogens of forest trees, worldwide. Successful management of new disease and pest outbreaks in the past have been effective due to knowledge and informed decisions. There can be no question that we will rely on this base of knowledge and experience increasingly in the future.

Some of you might have deduced from the foregoing commentary that this is being written while I am in Australia. Indeed, I am on the first leg of what has become a rather fragmented sabbatical leave. My last sabbatical was in 1994 and after that experience, I swore that the next – usually considered for approval every five years- would be uninterrupted and perhaps a little longer than six months. The fact that this sabbatical is three months in duration and made up of two terms is not ideal. Yet having the opportunity to work closely with colleagues elsewhere in the world and to have a little more time than usual for lab and field research is hugely enriching. Elsewhere in this newsletter, you will have read Brenda Wingfield's view of being in Australia.

From my standpoint, being amongst native Eucalypts and *Acacia mearnsii* (a most common inhabitant of Canberra and surrounding areas) is fascinating. It is certainly an eye-opening experience to see the many pests and pathogens of these trees that have not found their way to South Africa - or other areas of the world where eucalypts and wattles are being planted as exotics. One certainly does not wish to focus on the negative- I am not keen on the 'prophet of doom" approach to our discipline; yet I remain amazed at the huge number of threats that plantation forestry faces. Some say we are firmly "sitting on a powder keg". My view remains that with careful planning and an informed group of foresters and researchers, it should be possible to face new and serious introductions. We have done so for 100 years and I would like to think that this would be the case in the future.

I have promised the editorial team that compiles Tree Pathology News that I will not "over stay my welcome" in writing these introductory notes. They will no doubt tell me that I have already done what I promised not to do. So let me hasten to end and to once again thank you all for your support both in meeting rooms and in the plantations. The growth and success of the TPCP is due to a team effort. One that includes a huge number of foresters and forest managers, spread throughout South Africa. The ENTIRE TPCP joins me in thanking you and in wishing you and your families a wonderful year ahead. It is a great pleasure to work with you in our sole mission of .....

"KEEPING TREES HEALTHY".



TPCP NEWSFLASHES

Travel grants and congresses

A number of TPCP members were fortunate enough to receive travel grants to attend congresses in other parts of the world in the last 6 months. They included:

Emma Steenkamp (Ph.D. student) received a grant from the Mycological Society of America (MSA) to attend their conference in Burlington, Vermont. At the meeting she presented a paper on the molecular taxonomy of *Fusarium subglutinans*.

Bongani Maseko (Ph.D. student) received a grant from the South African National committee for IUFRO funded by the NRF to attend the XXI meeting of the International Union of Forestry Research Organisations (IUFRO) in Kuala Lumpur in Malaysia.

Christelle Klopper (Ph.D student) attended the XXth International Conference on Polyphenols by the Group Polyphenols and the Phytochemical Society of Europe in Germany in September after receiving a travel grant from them. ***Dr. Thierry Regnier***, a researcher in FABI, accompanied her. They presented posters on the "Screening of *Acacia mearnsii* for phytoalexin production after inoculation with *Ceratocystis albofundus*" and "Inhibition of *in vitro* rooting of *Eucalyptus grandis* in South Africa".

Jolanda Roux (Manager: TPCP Field Services) was awarded a grant from the IUFRO Scientist Assistants Programme to attend the XXI meeting of the International Union of Forestry Research Organisations (IUFRO) in Kuala Lumpur in Malaysia. She presented an invited paper on Ceratocystis wilt of *Eucalyptus* and *Acacia* and their threat to international plantation forestry.

Marieka Venter (Ph.D student) and ***Dr. Teresa Coutinho*** attended the annual congress of the American Society of Phytopathology that was held in New Orleans. They presented posters on bacterial blight of *Eucalyptus* and the *Eucalyptus* canker pathogen *Endothia gyrosa*. They also displayed posters on *Sphaeropsis sapinea* on pine by Juanita de Wet, the cypress canker causing species of *Seiridium* by Irene Barnes and the diseases of plantation forestry trees in Uganda by Jolanda Roux.

Graduations

The following people graduated in the past 6 months.

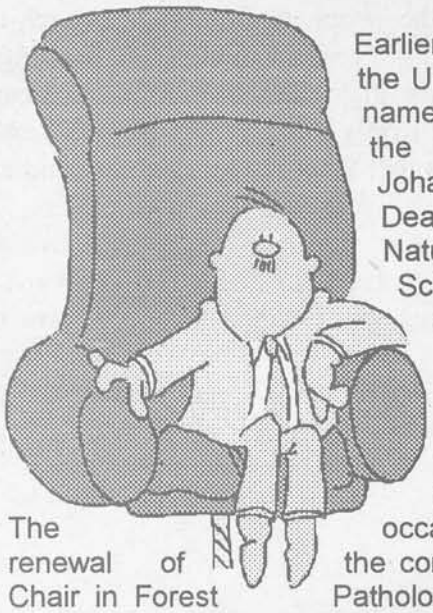
Lorenzo Lombard received his B.Sc degree in September. He is currently busy with his Honours on diseases of cuttings in nurseries.

Marieka Venter received her Masters degree (Cum Laude) on *Endothia gyrosa*. She has now started her Ph.D and will continue to work on the taxonomy of the genera *Endothia* and *Cryphonectria*.

More integration at FABI

The Department of Plant Pathology at the University of Pretoria was formally included into the Forestry and Agricultural Biotechnology Institute (FABI). This makes the number of Departments linked to FABI a total of seven. FABI aims at establishing stronger links between researchers, staff and students of all departments linked to plant sciences at the University of Pretoria. These links allows for greater synergy and progress in plant related research.

Mondi renews chair in Forest Pathology



Earlier this year staff from the University of Pretoria, namely the Principal of the University, Prof. Johan van Zyl and the Dean of the Faculty of Natural and Agricultural Sciences, Prof. Robin Crewe, had the opportunity to visit clonal plantations in the Kwambonambi area of Zululand. The occasion marked the renewal of the contract for the Mondi Chair in Forest Pathology, currently held by Prof. Mike Wingfield of FABI. Mr. Andrew Thomson of Mondi and other Mondi staff accompanied Mike and the other University visitors to the field and attended a meeting at Mondi's guesthouse and training centre at Kwambonambi.

Left to right: Colin Smith, Bongani Maseko, Mike Wingfield, Jolanda Roux and Colin Dyer arriving in Kuala Lumpur

FUNGI "DOWN UNDER"

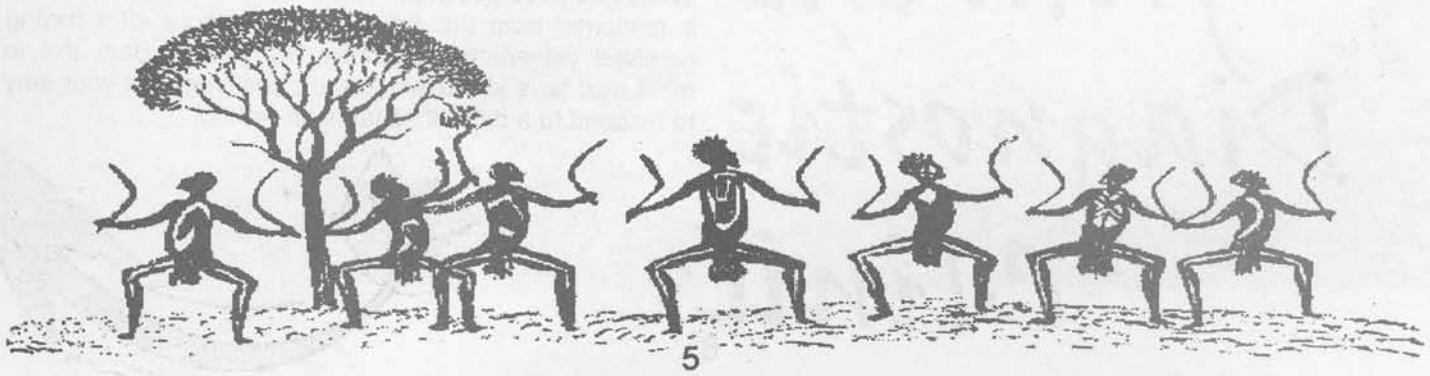
Brenda and Mike Wingfield left on their "Sabbatical 2000" in July. This was to be a rather disjoint sabbatical for Mike, but Brenda planned to stay "put" for the entire period. The Wingfields have chosen to spend their sabbatical in Canberra which is Australia's' capital city and also headquarters to CSIRO, the Australian equivalent to the CSIR in South Africa.

Mike travelled to Australia with the family and helped with the settling in Canberra before continuing on to a congress in Hong Kong. This also gave Mike a couple of days to make contact with the Forest and Forest Products section of CSIRO in Canberra. The Wingfields new residence in the suburb of Lyneham in Canberra is compact but well furnished and close to the Black Mountain CSIRO research station and the head quarters of the Plant Industry Section of CSIRO. This is the research section, which Brenda joined for her sabbatical.

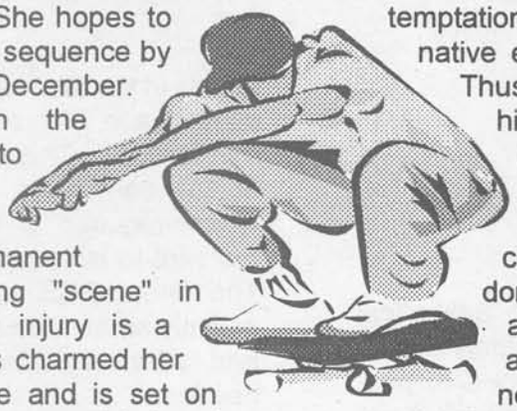
Once Mike had left for his meeting in Hong Kong the rest of the Wingfield family settled down to their six month stay in Australia. The children, Anthony and Beverley, started school and discovered education the Australian way. Brenda in the meanwhile started her **work at CSIRO** on the rust fungi. This group of fungi has been neglected (until now) from the standpoint of the molecular revolution, which has overtaken the taxonomy of fungi and all of biology. One of the reasons for this is that these fungi are obligate parasites. Thus they can not be cultured on Petri dishes in the laboratory but can only grow on living plant tissue. This has made working with rusts very difficult. This was especially true in the case of the early DNA based molecular techniques, which required a fairly large amount of fungal material to isolate sufficient DNA for experiments. The latest PCR based methods with which to multiply small amounts of DNA have changed this and today only small amounts of fungal material is needed.

Brenda's research in Australia, has not only been made possible by the latest PCR based techniques. This project would have been impossible without the careful planning of her host in Australia, Dr. Jeremy Burdon who heads the Plant Biodiversity section of the Plant Industry section at CSIRO. Dr. Burdon has collected rust fungi from all over the world during the last two years that this project has been in "incubation". While some of the fungi have been collected by Dr. Burdon himself many others have been collected by experts in their field (of rust fungi) in many different parts of the world and imported into Australia for this study.

The study is too large to be completed in a mere six month period but Brenda hopes that she will be able to produce a basic rust phylogeny on which many other research projects will be based in the next few years. One very important fungus, which has been included in this study, is of course **Eucalyptus rust**. This rust is interesting in that it belongs to a group of fungi which are usually extremely host specific, yet in the case of the Eucalyptus rust it has jumped onto *Eucalyptus* from another host. Understanding the phylogeny of this devastating pathogen is extremely important to Eucalyptus plantations world-wide and thus also to the South African Forestry Industry.



During her first three months in Canberra Brenda has **isolated DNA** from a large number of rust fungi and has literally "sequenced" up a storm of rust DNA sequences. Brenda is enjoying the relative calm of being away from her administrative responsibilities but has literally buried herself in DNA sequence at this point. She hopes to have made some sense of this sequence by the end of her sabbatical in December. The Wingfield offspring in the meanwhile have adapted to living in Australia.



Anthony has become a permanent fixture in the skate boarding "scene" in Canberra (thus far the only injury is a sprained ankle). Beverley has charmed her teachers and peer group alike and is set on staying in Australia forever. However, this is only because she had a bad flight across from South Africa and currently has no intention of ever getting on an overseas flight again.

Mike joined his family in Canberra for a second time at the beginning of September. However, the temptation to look at fungi on *Eucalyptus* in their native environment proved to be irresistible. Thus during his month stay in Canberra his second week was spent on a week field trip taking advantage of his time in Australia. Mike was recently introduced to some of his CSIRO colleagues as the person who has done more research and knows more about *Eucalyptus* diseases than anyone else in the world. If this was not true before his sabbatical it will certainly be true at the end of his sabbatical.

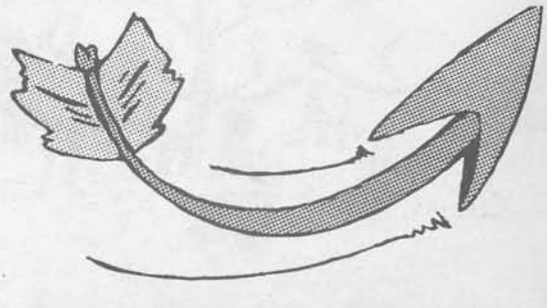
What is Canada's Millenium Tree?

It's a white spruce, the product of 40 years of research carried out by the Canadian Forest Service. Hardy, handsome and useful, the white spruce flourishes everywhere in Canada. The Millenium Tree can live for 200 years or more, growing 25 m high and up to 1 m in diameter.

News from the Diagnostic Clinic

From time to time, some very difficult samples or requests come to the TPCP clinic from both the forestry industry and the public. You will probably have heard of samples without return addresses - which are hugely difficult to handle. But we have VERY OCCASIONALLY had others that are so far removed from disease or insect problems that it becomes quite difficult to "engineer" a polite response. We thought that the story below - although pertaining to a fossil diagnosis illustrated the situation quite well.....

The story behind the letter below is of a person named Scott Williams in Newport, Rhode Island. He digs things out of his backyard and sends them to the Smithsonian Institute, labelling them with scientific names. He insists that they are actual archaeological finds. This chap really exists and does this in his spare time! The letter below is a response from the Smithsonian Institute after having received yet another of these "samples". Bear this in mind next time you think you are challenged in your duty to respond to a difficult situation in writing.....



Smithsonian Institute
207 Pennsylvania Avenue
Washington, DC 20078

Dear Mr. Williams:

Thank you for your latest submission to the Institute, labelled "93211-D, Layer seven, next to the clothesline post...Hominid skull."

We have given this specimen a careful and detailed examination and regret to inform you that we disagree with your theory that it represents conclusive proof of the presence of Early Man in Charleston County two million years ago. Rather, it appears that what you have found is the head of a Barbie doll, of the variety that one of our staff, who has small children, believes to be "Malibu Barbie."

It is evident that you have given a great deal of thought to the analysis of this specimen and you may be quite certain that those of us who are familiar with your prior work in the field were loathe to come to contradiction with your findings. However, we do feel that there are a number of physical attributes of the specimen which might have tipped you off to its modern origin:

1. The material is moulded plastic. Ancient hominid remains are typically fossilised bone.
2. The cranial capacity of the specimen is approximately 9 cubic centimetres, well below the threshold of even the earliest identified proto-hominids.

3. The dentition pattern evident on the skull is more consistent with the common domesticated dog than it is with the ravenous man-eating Pliocene clams you speculateroamed the wetlands during that time.

This latter finding is certainly one of the most intriguing hypotheses you have submitted inyour history with this institution, but the evidence seems to weigh rather heavily against it.Without going into too much detail, let us say that:

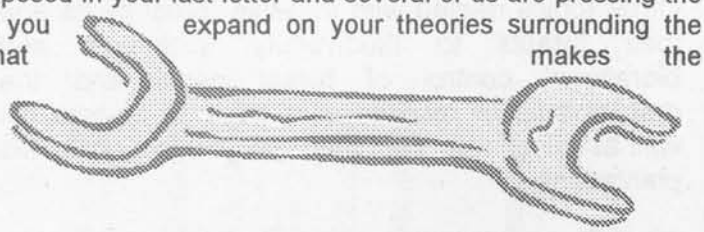
1. The specimen looks like the head of a Barbie doll that a dog has chewed on.
2. Clams don't have teeth.

It is with feelings tinged with melancholy that we must deny your request to have the specimen carbon-dated. This is partially due to the heavy load our Lab must bear in its normal operation, and partly due to carbon-dating's notorious inaccuracy in fossils of recent geologic record. To the best of our knowledge, no Barbie dolls were produced prior to 1956 AD and carbon-dating is likely to produce wildly inaccurate results.

Sadly, we must also deny your request that we approach the National Science Foundation Phylogeny Department with the concept of assigning your specimen the scientific name Australopithecus spiff-arino. Speaking personally, I, for one, fought tenaciously for the acceptance of your proposed taxonomy, but was ultimately voted down because the species name you selected was hyphenated and didn't really sound like it might be Latin.

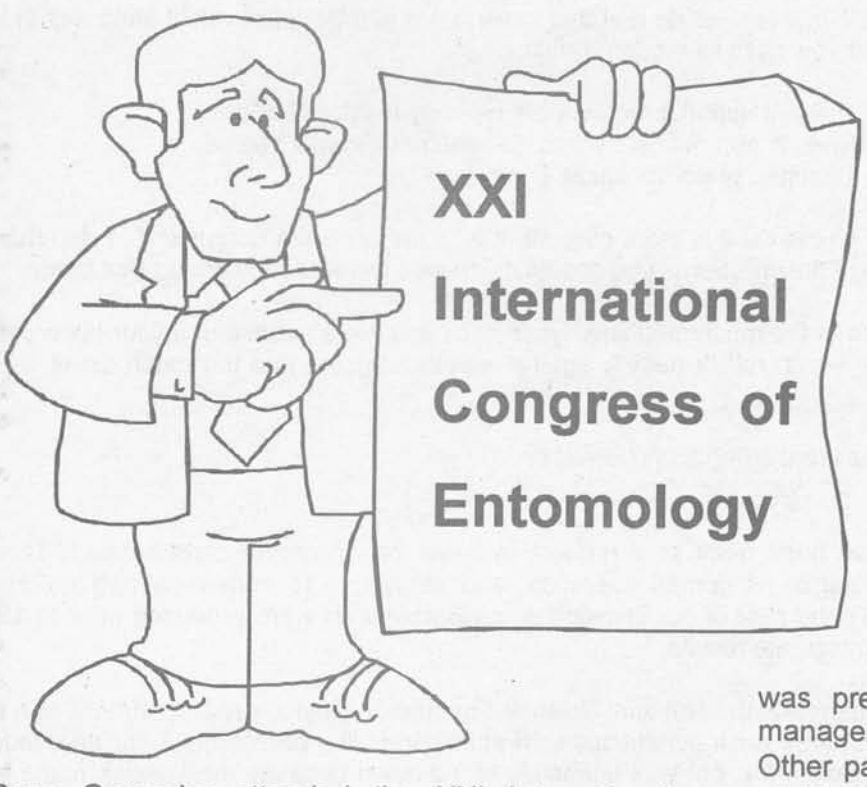
However, we gladly accept your generous donation of this fascinating specimen to the museum. While it is undoubtedly not a Hominid fossil, it is, nonetheless, yet another riveting example of the great body of work you seem to accumulate so effortlessly. You should know that our Director has reserved a special shelf in his own office for the display of the specimens you have previously submitted to the Institution and the entire staff speculates daily on what you will happen upon next in your digs at the site you have discovered in your Newport back yard.

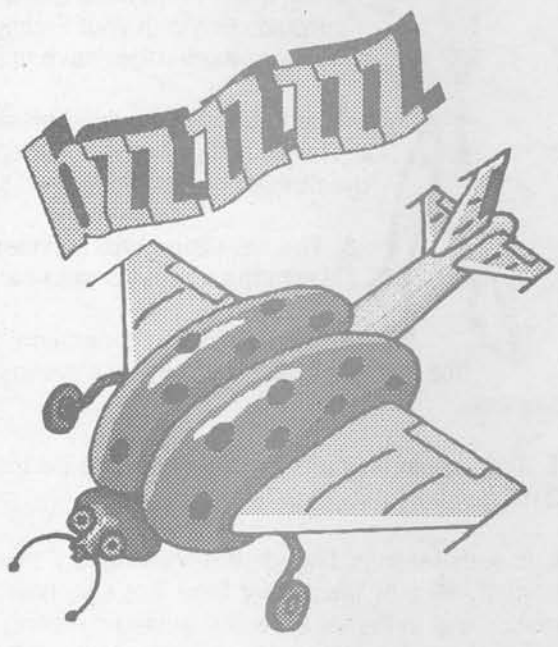
We eagerly anticipate your trip to our nation's capital that you proposed in your last letter and several of us are pressing the Director to pay for it. We are particularly interested in hearing you expand on your theories surrounding the trans-positating fillifitation of ferrous ions in a structural matrix that makes the excellent juvenile Tyrannosaurus Rex femur you recently discovered take on the deceptive appearance of a rusty 9-mm Sears Craftsman automotive crescent wrench.



Yours in Science,
Harvey Rowe
Chief Curator-Antiquities

We have hands that create tools and a mind that pushes the limits of their use. We leave our imprint everywhere we go, from cave paintings to footprints on the moon. Nature has been very forgiving. We have survived natural catastrophes and our own excesses. There has always been somewhere else to go. But now we are engaged in an environmental experiment on a global scale. And the Earth speaks to us with our greatest challenge:understand human impact, live in balance.

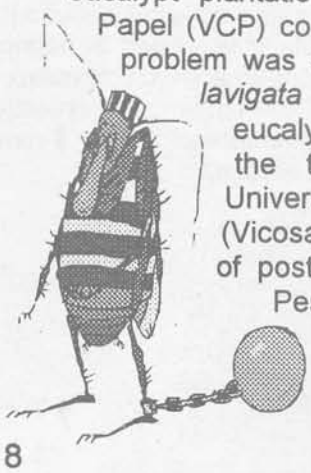




Prem Govender attended the XXI International Congress of Entomology at Foz do Iguassu in Brazil from the 20th to 26th August 2000. There were 24 parallel sessions at the congress; one of which was Forest Entomology. The Forest Entomology sessions included a wide range of topics from forest management and insect diversity to integrated pest management in tropical forestry. Other topics dealed with invasive forest pests and their threats to biodiversity, biological and biorational control of forest pests and the mechanisms of resistance in trees to insects, as well as specifically pest management in *Eucalyptus* plantations.

All of these symposia consisted of presentations by invited persons. A paper titled "Associations of insects and pathogens resulting in disease and damage to plantation grown *Eucalyptus* in the tropics and southern hemisphere" authored by M. Wingfield, J. Roux, P. Govender & B. D. Wingfield was presented by Prem Govender in the Pest management in *Eucalyptus* plantations symposium. Other papers from the TPCP group included those of "Understanding the introduction and spread of *Sirex noctilio* in the southern hemisphere", "Ophiostomatoid fungi associated with three bark beetles in South Africa" and a "A national perspective of forest tree pests in South Africa"

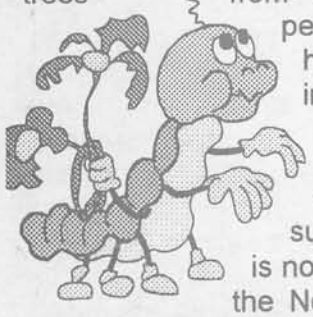
A post congress tour included visits to several eucalypt plantations of the Votorantim Celulose Papel (VCP) company. The only significant pest problem was attack by leaf cutting ants (*Atta lavigata* and *Acromyrmex*) and the eucalypt rust pathogen. The final leg of the tour included a visit to the Universidade Federal de Vicosa (Vicosa) where Prem presented a series of postgraduate lectures on Integrated Pest Management of agricultural pests and a seminar on "Eucalypt leaf beetle management in South Africa".



Understanding the introduction and spread of *Sirex noctilio* in the southern hemisphere

B. Slippers, G. Hunter, T.A. Coutinho, B.D. Wingfield & M.J. Wingfield

Exotic pine species have been established with great success in plantations in the t ropics and subtropics of the Southern Hemisphere. Part of this success can be attributed to the separation of these trees from their native pathogens and pests. These pests are, however, steadily being introduced and the introductions often lead to severe and damaging outbreaks. An example of one such a pest is *Sirex noctilio*. It is not considered a primary pest in the Northern Hemisphere, but has caused substantial losses to softwood plantations in Southern Hemisphere countries, where it has been introduced. Understanding the epidemiology and population dynamics of this insect is important in preventing further spread and in controlling the pest where it has already become established. In this study we report on the use of phenotypic and DNA-based studies of *Amylostereum areolatum*, the obligate fungal symbiont of *S. noctilio*, to determine the diversity and relationship of isolates from different countries in the Southern Hemisphere. Results show that the genetic diversity of isolates of *A. areolatum* from Southern Hemisphere wasps is small and uniform. This indicates that *Sirex* has spread between continents of the Southern Hemisphere after initial introduction at the beginning of the 20th century. Fungal isolates from South Africa and Brazil are the most closely related of all isolates, indicating a common origin of *Sirex* in these two countries. These techniques and data now enable us to monitor and characterise *S. noctilio* populations and to plan future biological control strategies.



Ophiostomatoid fungi associated with three bark beetles in South Africa

X.D. Zhou, Z.W. de Beer, M.J. Wingfield & B.D. Wingfield

Ophiostomatoid fungi, for example, *Ophiostoma*, *Ceratocystis* and *Ceratocystiopsis*, are economically important because they cause blue stain in lumber and logs, thus reducing the value of export wood. These fungi are often associated with bark beetles (Coleoptera: Scolytidae). Three species of exotic bark beetles, *Hylastes angustatus*, *Hylurgus ligniperda* and *Orthotomicus erosus* occur on mature *Pinus spp.* in South Africa. *Hylastes angustatus* also damages pine seedlings during its maturation feeding stage. Despite extensive research on these three bark beetle species in South Africa, little is known about the fungi associated with them. The aim of this study was to determine the extent to which these three bark beetles contribute to the blue stain problem, and to identify their fungal associates. During the past year, fungal isolations were made from about 2000 beetles and 1000 beetle galleries from trapping logs, infested stumps and root collars of *Pinus patula* and *P. elliottii* trees in the eastern parts of South Africa, and about 600 fungal isolates were collected. Forty additional isolates were collected in the Western Cape Province of South Africa. All these isolates were identified based on morphology, rDNA sequencing and mating studies. At least 12 different ophiostomatoid species have been found to be associated with these three bark beetles. The dominant fungal associates were *Leptographium serpens*, *L. lundbergii*, *Ophiostoma ips*, and *Graphium* sp. *Ophiostoma galeiformis* and *L. procerum* are reported here for the first time from South Africa.

Associations of insects and pathogens resulting in disease and damage to plantation grown *Eucalyptus* in the tropics and southern hemisphere.

M.J. Wingfield, J. Roux, P. Govender & B,D, Wingfield

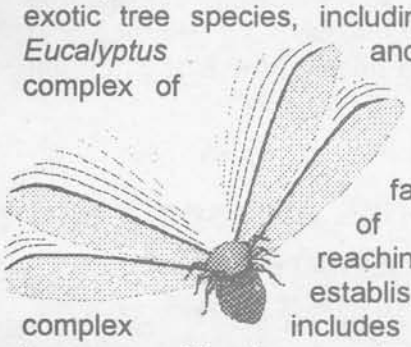
The tremendous growth and success of plantation-grown *Eucalyptus* in the tropics and southern hemisphere, can partially be attributed to the fact that these trees have been separated from the pests and diseases that affect them where they are native. Diseases and insect pests are, however, gradually causing increasing damage to these trees. Interesting interactions between pests and pathogens have also emerged as threats to *Eucalyptus* in

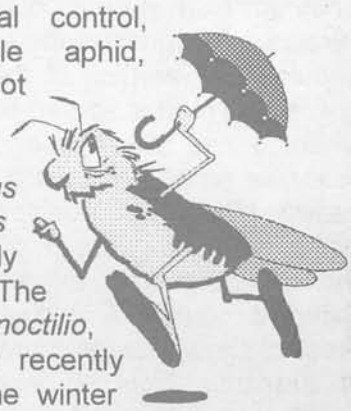
plantations. Various opportunistic pathogens such as species of *Botryosphaeria* and *Cryptosporiopsis eucalypti* cause serious disease on trees damaged by *Helopeltis* spp (Hemiptera: Miridae). *Ceratocystis fimbriata* that causes the recently discovered Ceratocystis wilt disease of *Eucalyptus* in Africa and South America is also likely to have insect vectors. The relationship between insects and fungal pathogens of *Eucalyptus* has largely been ignored in the past. Our belief is that an enhanced knowledge of these insects and the fungi with which they interact will form an integral component of efforts to reduce the damage associated with them.

A national perspective of forest tree pests in South Africa

M.J. Wingfield, J. Roux, O. Govender & B.D. Wingfield

The S. African forestry industry relies on a total of about 1,49 million hectares of intensively managed plantations. These are composed of exotic tree species, including those of *Pinus*, *Eucalyptus* and *Acacia mearnsii*. A complex of indigenous soil pests contributes to about a 23 % failure of all species of seedlings from reaching full establishment. This pest complex includes termites, tipulid larvae, millipedes, cutworms, whitegrubs, nematodes, wireworms, grasshoppers and crickets. Four exotic pests affect established *Eucalyptus* in South Africa. The eucalypt snout beetle, *Gonipterus scutellatus*, a defoliator, is under effective biological control but requires augmentation in the high altitude areas. The eucalypt tortoise beetle, *Trachymela tincticollis*, another defoliator, is also under effective biological control by an egg parasite. Two longhorn beetles, *Phoracantha semipunctata* and *P. recurva* damage the wood of stressed and recently felled trees. Parasitoids that attack the various life stages are being evaluated. All the wattle pests are endemic to South Africa. *Chaliopsis junodi* is the most economically important of the lepidopteran defoliators; while the wattle mirid, *Lygidolon laevigatum*, is the second most serious pest. Three indigenous lepidopteran pests, (*Imbrasia cytherea, Pachypasa capensis and Euproctis terminalis*) defoliate species of pines. All other pests are exotic. The economic impact of the pine weevil, *Pissodes nemorensis* and the pine woolly aphid, *Pineus boerneri*, and possible biocontrol options are being considered. The black pine aphid, *Cinara cronatii*, is under effective biological control, while the pine needle aphid, *Eulachnus rileyi*, does not appear to cause economic damage. The bark beetles, *Orthotomicus erosus* and *Hylastes angustatus* occasionally cause sporadic damage. The pine wood wasp, *Sirex noctilio*, has entered the country recently and has spread within the winter rainfall region. Various biocontrol efforts on the different life stages of *S. noctilio* represent an area of active research. There is now a gradual appearance of new and damaging pests that can reduce the productivity of plantations in S. Africa. This trend will continue with the increasing movement of people and products around the world.





Cassi.Myburg@OXFORD.United_Kingdom

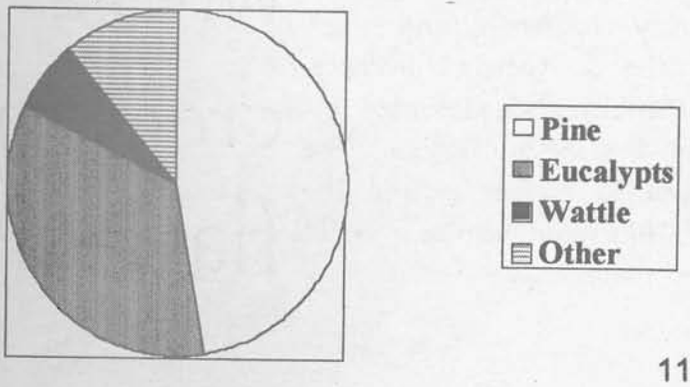
At the end of 1999 Cassi Myburg, a Ph.D student in FABI received an e-mail from her supervisor, Prof. Brenda Wingfield (Director of the FMBC) asking her whether she would like to go to the UK. A question for which the obvious answer was YES. Cassi subsequently applied for, and received, funding from the COMMONWEALTH SCHOLARSHIP AND FELLOWSHIP PLAN, offered by the Commonwealth Scholarship Commission in the United Kingdom.

Cassi, who is currently busy with her Ph.D on the molecular taxonomy of *Cryphonectria cubensis* will be joining the Oxford Forestry Institute (OFI) for one year. She already has strong contact with this group since she was fortunate to previously spend three-months in the group on a scholarship. Cassi will be part of the research group of Dr. Malcolm Campbell, head of the Fibre Biotechnology Lab. The main focus of Dr. Campbell's research is the molecular biotechnology of trees. For her project Cassi will be investigating the biological processes occurring after the infection of a fungal pathogen with a hypovirus. She is hoping to accomplish this with the use of microarrays, also known as "DNA chips". This technology is powerful as it allows the measuring of the expression of more than one gene at the same time.

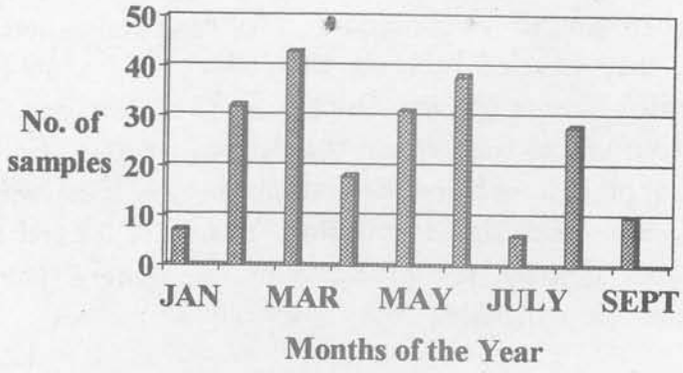
Preliminary report on the Diagnostic Clinic for 2000

A total of 213 samples have been received by the TPCP Diagnostic Clinic for the period January to September 2000. The majority of these samples were from pine (53%) followed by eucalypts (39%) (Fig. 1). A number of "other" samples were also received during the course of the year. This included soil or seed samples or were from trees other than those grown for forestry. Between six (July) and 43 (March) samples were received per month (Fig. 2). The disease most commonly identified on pine was root and collar rot caused by the pitch canker fungus. On *Eucalyptus*, bacterial blight was the most common.

NUMBER OF SAMPLES RECEIVED FROM DIFFERENT HOSTS



NUMBER OF SAMPLES RECEIVED - JAN TO SEPT 2000

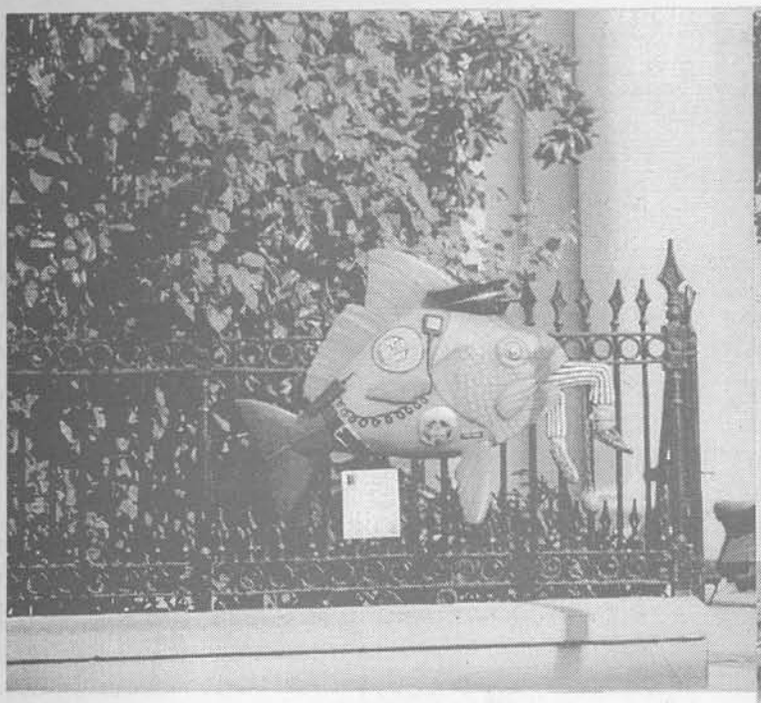


An APS congress with a creolan flavour

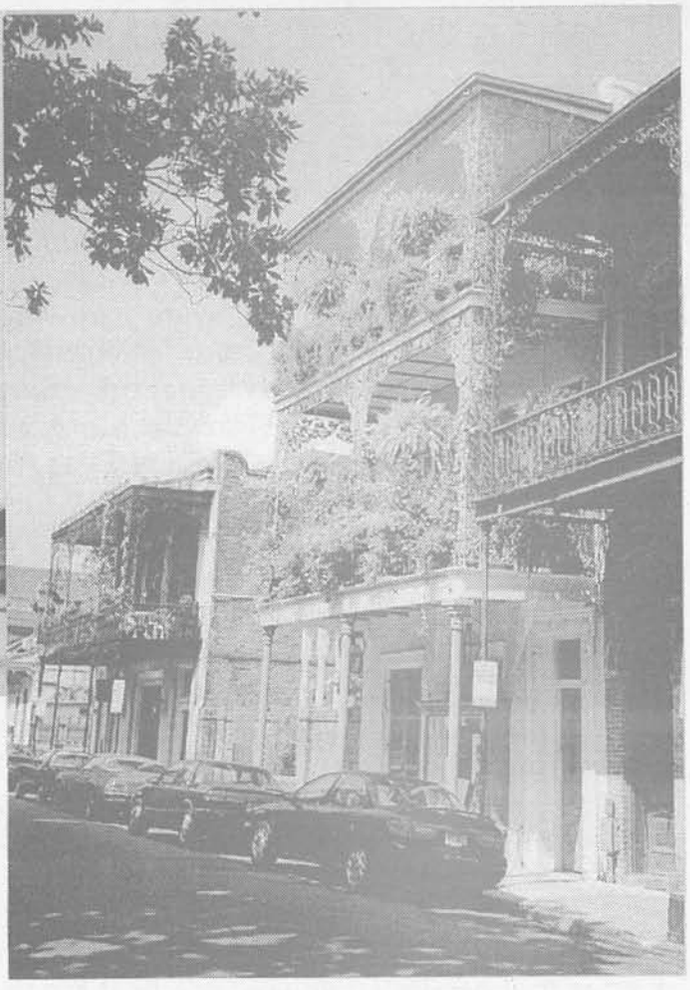
New Orleans - a city with a unique blend of cultures, spices, music and history. This legacy was left by its early French, and later Spanish inhabitants, whose cultures blended to that of its creolan, French-speaking descendants. Being so close to the Caribbean Sea, names like Pirate's alley and the Voodoo Lounge soon followed. In the French Quarter, or Viex Carrê, with its antique architecture, brookilaced verandas and narrow alleys, one can almost imagine oneself in a nineteenth century evening dress, catching the carriage to a splendid creolan dinner. A mere century later, the sounds of Dixieland jazz filled the air - as it is doing to this day. Cutting through the Crescent City, as New Orleans is also known, the mighty but silent Mississippi River flows, giving this city its trading reputation. As the whistle of the Natchéz steamer cuts through the sullen night air, New Orleans stands out as one of the few places in the world that offers a unique atmosphere and unique experiences.

This was the backdrop setting of the 2000 annual meeting of the American Phytopathological Society attended by Teresa Coutinho and Marieka Venter. It kicked off with a two-day field trip that took participants over the surrounding swamps and Lake Pontchartrain to Alexandria. From there, they traveled back via Lafayette and Baton Rouge to New Orleans. The field tour visited trials where the native longleaf pines were being re-established, and where controlled burning was used to destroy the undergrowth. Another stop included the Southern Forest Heritage Museum, where the sawmill used at the beginning of the previous century is actually still working! The organisers also showed attendees how a nursery of white and longleaf pine operated - no trays and everything on a very large scale. From there they went to the Louisiana State University where the pathologists saw their first disease of the field trip, namely fusiform rust of pine. They were also shown how the swamp cypreses were dying because of salt water entering the swamps as a result of human interference. To summarize, in Louisiana pine reigns and eucalypts and wattle are unheard of - and water and air-conditioned buses is vital to survive in the unbearable humidity and heat!

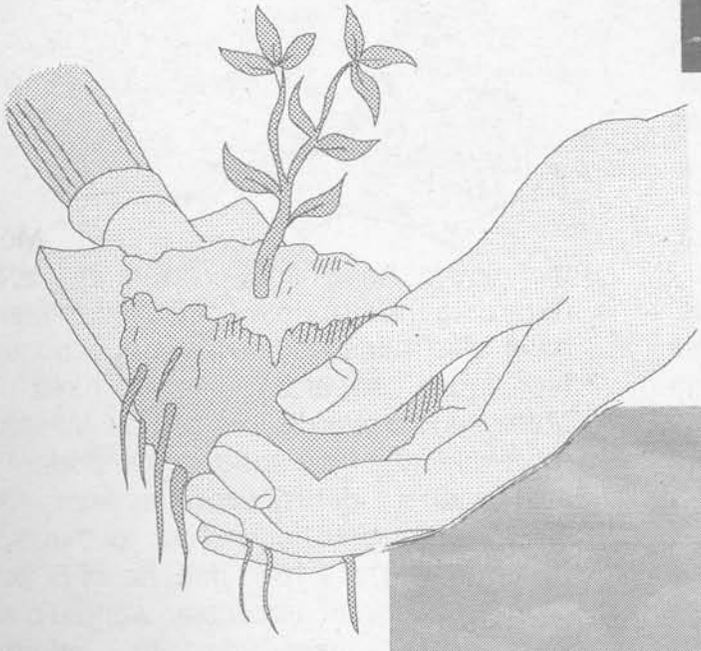
Approximately two thousand people attended the 2000 congress from mostly the United States, but also from many other countries. This was Marieka's first trip abroad and one of the highlights for her was meeting many of the authors of the papers used in the writing up of her Masters and for her publications. There were also many forestry-related talks, and although many of the problems were new to her, she says she learnt many new things. The congress served as a wonderful base for meeting new people and strengthening existing ties. Marieka also participated in the cultural diversity program during which they visited the Southern University. Teresa and Marieka also presented six posters from the FABI team. The congress served to further expand the TPCP's and FABI's reputation as a world leader in forest pathology.



These fishes were all over the place, each looking different. Don't mess with this one, though!



New Orleans – the ultimate tourist destination.



In the USA they mow their pine seedlings..

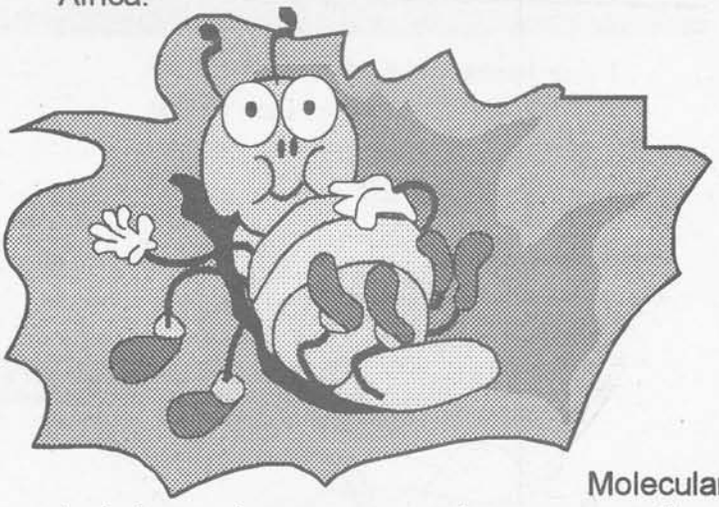
BACK TO THE FUTURE

In October 1863 two Italian researchers, Cesati and De Notaris, observed fungal fruiting structures on dead twigs of *Fraxinus* (ash) trees that were growing near the little town of Pusiano in Northern Italy. After careful examination they realised that this fungus were the same as that described by the Swede, Elias Fries, in 1823 as *Sphaeria dothidea*. They, however, renamed it as *Botryosphaeria dothidea*. As this is the first described species of this genus, it is called the type species. All new species that are more similar to *B. dothidea* than any other group of fungi, are described in the genus *Botryosphaeria* (e.g. *Botryosphaeria obtusa*, etc.). In this way, more than 200 species have been added to the genus *Botryosphaeria* since 1863. All of them 'anchored' to the type species, *B. dothidea*.

Botryosphaeria dothidea is a cosmopolitan fungus that occurs on a very wide host range. On many of these hosts, including many commercial crops (e.g. pome and stone and subtropical fruit trees, nut trees and forestry trees such as eucalypts, pine and wattle) this fungus is a serious pathogen that mainly cause stem cankers and die-back. Control strategies include chemical spraying, pruning and other reactive responses to developing symptoms. The most important control strategy, however, is selection for resistance in plantingstock. For this purpose identification of the causal agent of the disease is of paramount importance.

Confusion at this level could be compared to not knowing whether the HIV virus that we have in South Africa is the same as the one that drugs are being developed against in the USA.

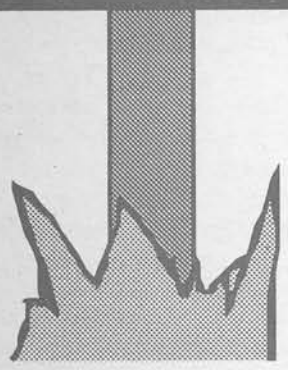
Morphological identification of *B. dothidea* and other *Botryosphaeria* spp. are very difficult. Molecular techniques have, however, proven to be highly effective in delineating the different species. These techniques have shown that many 'unique' *Botryosphaeria* species from different hosts are in fact the same. On the other hand diseases previously only ascribed to one species, now seems to be caused by more than one. A good example is the resent description of another species, *B. eucalyptorum*, from *Eucalyptus* in South Africa.



Molecular techniques have answered many questions regarding the taxonomy of *Botryosphaeria*, but have also raised some new questions. Such techniques separate live cultures of *B. dothidea* into two distinct groups. Which group represents the type species is important as the international identification system for this group of fungi is 'anchored' to this species. Unfortunately, the 1863 material of *B. dothidea* is not suitable for molecular work. To resolve the issue, according to international nomenclatural rules, the fungus has to be redescribed from the location and host of the original collection.

Through the years of experience gained by members of the TPCP on *Botryosphaeria* species, we are now in a position to address this problem. In October of this year, Bernard Slippers, who is currently doing his PhD on *Botryosphaeria* spp., will visit dr. Orlando Petrini to recollect this fungus from *Fraxinus* in southern Switzerland and northern Italy. A trip into the past to lay a firm taxonomic foundation for control strategies in the future.

Posters presented at the annual meeting of the American Phytopathological Society



Pathogenicity of *Endothia gyrosa* on *Eucalyptus* in South Africa.

M. VENTER, T. A. Coutinho, and M. J. Wingfield.

The fungus *Endothia gyrosa* is associated with superficial cankers on stems of *Eucalyptus* spp. in South Africa. In Australia, however, more severe cankers causing tree death, have been reported. This study was undertaken to assess the pathogenicity of *E. gyrosa* on *Eucalyptus* clones because *Eucalyptus* spp. make up a substantial portion of the forestry resource in South Africa. The pathogenicity of fifteen isolates of *E. gyrosa* was compared in an inoculation trial using the susceptible *E. grandis* clone, ZG14. An isolate that was highly pathogenic was subsequently selected to screen 42 clones of *E. grandis* to determine whether levels of tolerance to *E. gyrosa* exist. Isolates of *E. gyrosa* differed in pathogenicity on ZG14, and varying levels of genotype × environment interaction were evident. Varying levels of tolerance to *E. gyrosa* were also detected in the 42 different *E. grandis* clones tested. This suggests that a breeding programme for resistance in *Eucalyptus* to *E. gyrosa* should be possible.

Bacterial blight and die-back of *Eucalyptus* species, clones and hybrids in South Africa

T.A. Coutinho[1], M.C. Oosthuizen[2] and M.J. Wingfield[1]

Early in 1998, a serious bacterial disease appeared in KwaZulu/Natal on leaves and shoots of a *Eucalyptus grandis x E. nitens* (GN) hybrid in a nursery. The disease subsequently spread to other nurseries and plantations in Mpumalanga province. Typical symptoms of the disease include die-back of young shoots and leaf blight. The blight is confined to young leaves and they appear scorched. The objective of this study was to isolate and identify the causal agent of the disease. A bacterium was consistently isolated from infected material and pathogenicity tests undertaken. The bacterium was identified by sequencing the 16S rRNA gene and comparing the sequences obtained to those in GENBANK. The bacterium is Gram negative, rod-shaped varying in size from 0.5-0.75 µm in width and 1.0-2.0 µm in length. Colonies of this bacterium have a typical yellow pigment, are domed, shiny and mucoid. Sequence similarity o the bacterium was 100% homologous *to Pantoea ananatis* pv. *ananatis* followed by *P. ananatis* pv. *uredovora* (99.9%) based on a 700 bp fragment. *P. ananatis* pv. *ananatis* is the causal agent of brown rot of pineapple and has been reported to infect sugarcane. This bacterium has also been shown to form a synergistic relationship with an undescribed *Pantoea* sp. and *Coniothyrium zuluense*, the causal agent of Coniothyrium canker of eucalypts. Due to the serious nature of this disease, attempts are currently being made to develop an inoculation technique which can be used to screen Eucalyptus species, hybrids and clones for tolerance.

Characterisation of *Seiridium* isolates associated with cypress canker based on molecular sequence data.

I. Barnes, J. Roux, M.P.A. Coetzee, B.D. Wingfield, T.A. COUTINHO, M.J. Wingfield.

Cypress canker is a debilitating disease leading to the death of millions of *Cupressus* spp. The taxonomic status of the cypress canker pathogens has been the subject of considerable debate. The causal agent of this disease has been viewed as either two or three species (*Seiridium cardinale*, *S. cupressi* and *S. unicorne*) or a single morphologically variable species. In this study, sequence data from the beta-tubulin and histone gene were used to distinguish between these *Seiridium* species. Results showed that isolates reside in two major clades. One clade includes *S. unicorne* from Portugal and South Africa. The second clade includes two sub-clades containing *S. cardinale* separate from *S. cupressi* isolates. We believe this second clade represents the cypress canker pathogens while *S. unicorne* resides in a clade of less pathogenic isolates with a wide host range. This study supports previous morphological data suggesting that three distinct species of *Seiridium* are associated with cypress canker.

Characterization of a third morphotype of *Sphaeropsis sapinea.*

J. de Wet, M.J. Wingfield, T.A. Coutinho, B.D. Wingfield

Post-hail associated die-back of pine trees induced by *Sphaeropsis sapinea*, is an mportant disease in commercial pine lantations. Two morphotypes, A and B, have been described for his fungus based on differences in cultural characteristics, conidial morphology and virulence. The aim of this study was to characterize a set of *S. sapinea* isolates from South Africa, Indonesia and Mexico using RAPDs, ITS sequences and orphological characteristics. Three groups of *S. sapinea* emerged from the RAPD analysis of which two represented the previously described A and B morphotypes. ITS sequences of the *S. sapinea* isolates only resolved the A and B RAPD groups. In culture and based on the texture of conidial walls, isolates belonging to the third RAPD group were indistinguishable from typical A morphotype isolates. Conidia of isolates in the third RAPD group were, however, significantly longer than those of the A and B morphotype isolates. Isolates from the third RAPD group also produced lesions with significantly larger surface areas on Granny Smith apples and *P. patula* seedlings, in comparison to A and B morphotype isolates. Isolates from the third RAPD group also produced lesions with significantly larger surface areas on Granny Smith apples and *P. patula* seedlings, in comparison to A and B morphotype isolates. RAPD analysis had enabled us to identify a third sub-group of *S. sapinea* that is genetically and morphologically different to the described A and B morphotypes and thus, represents a third morphotype, we now refer to as the C morphotype.

Endothia gyrosa from *Eucalyptus* represents a new fungal taxon.

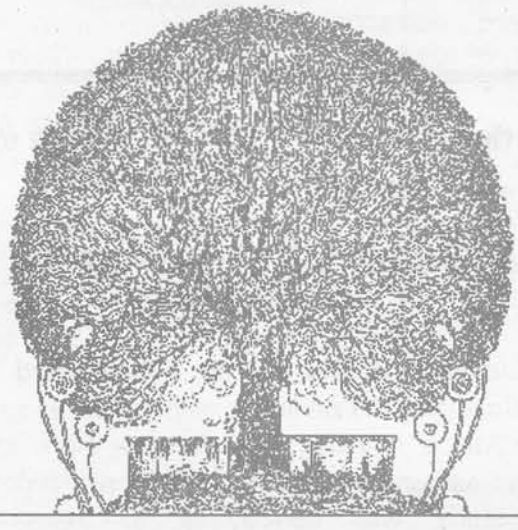
M. VENTER, M. J. Wingfield, T. A. Coutinho, and B. D. Wingfield

Endothia gyrosa is a canker pathogen of several tree genera in the USA and is best known for its association with pin oak blight. In recent years, *E. gyrosa* has been found on *Eucalyptus* spp. in Australia and South Africa. The aim of this study was to compare *E. gyrosa* isolates from South Africa and Australia, with those from North America. Collections from the two areas of the world were compared based on DNA sequence data, RFLPs and morphology. The restriction digests, sequence-based phylogenetic tree and cultural studies showed that Australian and South African isolates of *E. gyrosa* are different from those originating in North America. Moreover, Australian and South African isolates grouped together with *C. parasitica* in a clade different to that including *E. gyrosa*. The South African and Australian specimens also had stromata similar to that of *C. parasitica*, but ascospores were similar to those of *E. gyrosa*. The fungus from *Eucalyptus* in Australia and South Africa is thus different to *E. gyrosa* from North America, and should reside in a new species of *Cryphonectria*.

Diseases of plantation forest trees in Uganda

J. Roux, T.A. Coutinho, D. Mujuni Byabashaija and M.J. Wingfield

A survey of the diseases affecting plantation *Eucalyptus* and *Pinus* species in Southern Uganda was conducted in May 1999. The only disease symptoms found on *Pinus* spp. during this survey was stem cankers and associated blue stain caused by *Sphaeropsis sapinea*. A number of serious stem diseases were found on *Eucalyptus grandis*. The most common and wide spread of these was a stem canker disease apparently caused by *Lasiodiplodia theobromae*. Other diseases of this tree included Ceratocystis wilt, caused by *Ceratocystis fimbriata*, bacterial wilt caused by *Ralstonia solanacearum* and leaf spot caused by a species of *Mycosphaerella*. Many *Eucalyptus* trees also had large stem cankers, infected with a *Valsa* sp., developing from machete wounds. This survey provides a preliminary list of the most important pathogens and should be useful in the development of future breeding programmes for Uganda.



The research team of the Tree Pathology Co-operative Programme

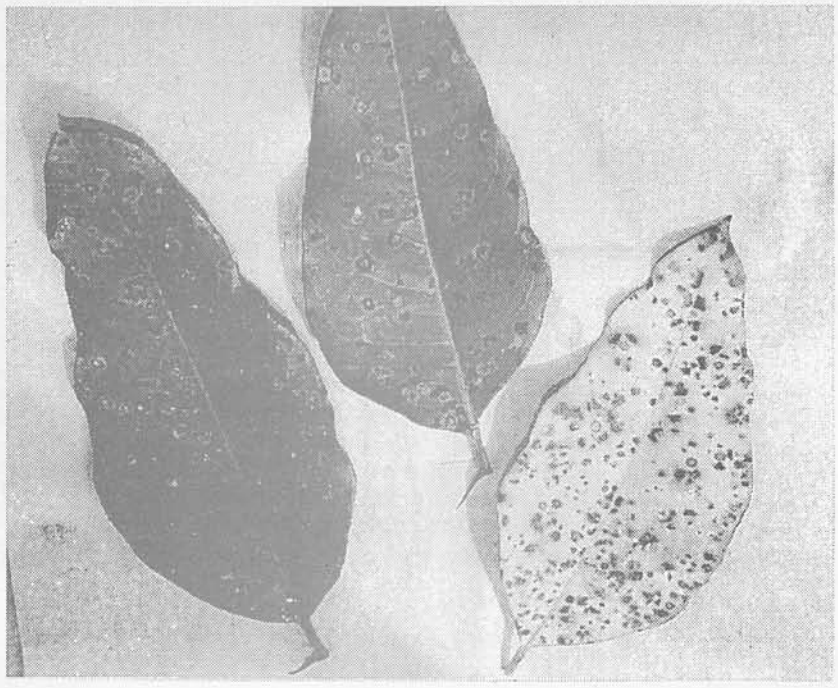
The research team of the Tree Pathology Cooperative Programme is varied. It includes full time staff of the University of Pretoria (Prof M.J. Wingfield, Director and Mondi Professor, Prof. B. Wingfield, Dr. T.A.Coutinho, and Dr. J. Roux), Rosemary Visser, Shazia Shaik, Helen Doman, Marveline Molema and Sonja de Beer, colleagues and students attached to other organisations such as the ICFR, technical assistants funded by the University or through membership fees and post graduate students who are mainly funded by the NRF. Staff from various Departments in the University provide advice and support where this is required.

EXTENSION AND FIELD DAYS

It has been a busy year for staff and students of the TPCP. From January to September a total of 26 field trips were undertaken by the group and more than 300 person days spent in plantations and nurseries. This year, field trips included those for both diseases and pests. A number of presentations were also given by students and staff at field days and other forestry meetings.

The disease of biggest concern this year was without doubt Bacterial blight caused by a species of *Pantoea*. Typical symptoms of bacterial blight include the formation of leaf spots (Fig. 1a) and death of young growth tips (Fig. 1b). In severe cases, side branches also develop cankers, which girdle branches and result in their breakage. Severely affected trees have a scorched appearance from all the dead growth tips. This tip and branch die-back results in the stunting of trees and create a bushy appearance. Other early symptoms of infection include darkening and death of leaf petioles, resulting in the abscission of leaves. Highly susceptible trees show a combination of leaf spots (blight) and die-back. More tolerant trees only show leaf spot symptoms. The spots initially appear as water-soaked lesions. These spots are often concentrated along the central veins of leaves, leading to the malformation and curling of the leaves. On some trees, spots appear randomly along the surface of the leaves, or along the leaf margins.

Bacterial blight of *Eucalyptus* first appeared in KwaZulu-Natal on *E. grandis* X *E. nitens* (GN) hybrids in 1998. Subsequently the disease has been reported from many other nurseries as well as the field in both KwaZulu-Natal and in Mpumalanga. To date the bacterial blight pathogen has been found on *E. grandis*, *E. saligna*, *E. nitens*, *E. smithii*, *E. camaldulensis*, *E. grandis* X *E. camaldulensis* (GC), *E. grandis* X *E. urophylla* (UG) and GN hybrids.



The TPCP assisted, and presented talks, at a number of field days organsised by the forestry Industry. NCT especially has been very active and the TPCP had both students and staff presenting at their field days. These field days are very important venues for introducing farmers and foresters to diseases. This in turn expands the survey and monitoring capabilities of the industry. The TPCP was this year again actively involved in a disease scoring day organised by the Mensuration and Modelling Research Consortium (MMRC), this time held at SAFCOL's Nyalazi plantation. These field days serve to calibrate the scoring techniques used

Top: Fig 1a Formation of leaf spots

Left: Fig 1b Death of young growth tips

by mensuration teams in the evaluation of diseases. It was clear that distinguishing between Botryosphaeria cracks and Coniothyrium cracks is still a major problem and this will be addressed in future.

This year Ronald Heath, our own resident forester busy with his B.tech, presented a lecture on FABI, the TPCP and plantation diseases in South Africa to students at Saasveld. He received a great response with many questions at the time of the talk and also lots of correspondence since then. Jolanda Roux (TPCP manager of Field Services) presented talks to the Specialist *Eucalyptus* tree breeding course of the CSIR and also presented lectures to the 3rd year forestry students at the University of Natal at Pietermaritzburg. These lectures to students should definitely continue in future, since this is where the most impression is made with regards to diseases. The more people in forestry that know about diseases the more likely we are to have success in controlling them. Next time we should talk to the chainsaw operators and bark strippers as well!!

Right: *TPCP students (Eduard Venter, Xudang Zhao, Helen Doman and Karin Jacobs with Bernard Slippers in front) taking a photo break during the inoculation of SAFCOL pine cuttings at Tweefontein,. This formed part of large inoculation trials of P. radiata and P. patula cuttings to test them for their susceptibility to Fusarium (FSP. Pitch canker) and S.sapinea.*

Disease diagnosis and monitoring forms a large component of the Field Services of the TPCP. It also serves as an excellent opportunity for students to get to know the diseases and forestry in South Africa first hand. Ronald Heath, Jolanda Roux and Gavin Hunter after a root digging exercise in Tzaneen.

IMPORTANT NOTICE : PLEASE READ THIS

In order for us to coordinate our services to you lease help us by using the following contact address:

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