TREE PROTECTION NEWS

Newsletter of the Tree Pathology Co-operative Programme
University of Pretoria

No 4

NOVEMBER 2002

CONTENTS

From the Director's desk

The end of another TPCP year is rushing towards us. As I write this short commentary, team members are working furiously to start up inoculation and other trials that are so important in Spring and early summer. Students are adding finishing touches to theses and reports. There are certainly some that are wishing that they were further ahead of schedule than they are.

So much has happened since the publication of the last issue of Tree Protection News (TPN) that it is hard for me to present a fair summary. As I write, I am looking to my "pin board" above my desk and I see at least one photo of a baby born to a TPCP member during the last few months. Then a student receiving an award for a "best poster", a picture of a TPCP/ FABI group that participated in a recent ABSA relay and one from a recent field trip. The truth is that the group is large and involves so many activities that a summary is not a realistic goal. But the contents of this issue of TPN should give you a fair view of important events, new diseases and the passion and excitement that the group commits to reducing the impact of plantation disease and insect problems.

On the disease and insect front, certainly the two most important issues have been growing problems with the pitch canker pathogen in pine nurseries AND the unexpected spread of the Sirex wood wasp to new areas, far north of expectation. Dealing with both of these problems has placed considerable pressure on forestry companies, not to mention the TPCP team. Much progress is being made, but realistically we have a long way to go before we can rest easy. This perhaps illustrates how complicated disease and insect problems can be, and how very important it is to have the capacity to deal with such incursions. Certainly the pitch canker and Sirex problems have highlighted for me, the fact that there will be new problems in the future, and how difficult it is to deal with biological invasions.

Just the other day, I was talking with an engineer friend of mine, and telling him about our difficulties with Sirex. He made the interesting remark that "surely we could throw some chemical at it". I was struck by the fact that engineering problems can generally be resolved with some discrete action, even though this might be hugely expensive. The truth is that with biological systems, there is seldom a solution per se,

and success lies with reduction in the magnitude of the problem. This is of course, the reason why we talk of DISEASE MANAGEMENT and generally not of DISEASE CONTROL.

During coming months, the TPCP will be working actively to implement a series of actions to deal with the Sirex wood wasp problem. There are various options available. Not surprisingly these are also very costly. But we will surely begin with some definite actions and we will monitor and report on progress actively.

Another significant challenge during the coming months will be to revisit the idea of modifying the TPCP structure. The need to do this is linked to a desire to provide services and support to smaller forestry groups. In addition, the privatisation of SAFCOL and the loss of a significant funding partner is a significant problem, that needs attention. Discussions surrounding this matter began early in 2002 and these have yet to be concluded.

By the time you read this newsletter, you will either have had your Christmas vacation, or the Holiday Season will be just ahead. I take this opportunity to thank all the staff of the TPCP member companies, at every level of the organistions, for your friendship and support. We sincerely appreciate having this opportunity to work with you and AT THE SAME TIME thoroughly enjoy the challenge of KEEPING TREES HEALTY

Mike Wingfield

Graduations

We wish to congratulate the following people who recently received degrees on topics related to plantation health.

Irene Barnes – M. Sc.: Taxonomy. phylogeny and population biology of *Ceratocystis* species. with particular reference to *Ceratocystis fimbriata*. Irene started her Ph.D on Dothistroma needle blight of *Pinus* spp.

Gavin Hunter – M. Sc.: *Mycosphaerella* species causing leaf Blotch on *Eucalyptus* species in South Africa. Gavin is continuing his studies on *Mycosphaerella* spp. and is currently busy with his Ph.D. on this genus.

Wilhelm de Beer – M.Sc.: Ophiostoma species from hardwood sources in South Africa. Wilhelm is currently busy with his Ph.D on blue-stain of *Pinus* timber.

Where will the wood come from? Plantation forests and the role of biotechnology

By

Trevor M. Fenning and Jonathan Gershenzon
Trends in Biotechnology (2002) 20:7:291-296

Wood is almost as important to humanity as food, and the natural forests from which most of it is harvested from are of enormous environmental value. However, these slow-growing forests are unable to meet current demand, resulting in the loss and degradation of forest. Plantation forests have the potential to supply the bulk of humanity's wood needs on a long-term basis, and so reduce to acceptable limits the harvest pressures on natural forests. However, if they are to be successful, plantation forests must have a far higher yield of timber than their natural counterparts, on much shorter rotation times. To achieve this in reasonable time, biotechnology must be applied to the tree-improvement process, for which large increases in public and private capital investment are needed. However, additional obstacles exist in the form of opposition to plantations, some forest ecocertification schemes, and concerns about aspects of forest biotechnology, especially genetic engineering. It is the intention of this article to explain, in detail, why plantation forests are needed to sustainably meet the world's demand for wood, why they are not being developed fast enough, and why the application of biotechnology to tree improvement is essential to speeding up this process.

Dates for Annual Meeting of the TPCP – 2003 Meeting

The next annual meeting of the TPCP will be held on Tuesday 11th & Wednesday 12 March 2003. Many exciting and information-packed presentations by both the TPCP team and special visitors are planned. This is a great opportunity for TPCP members to acquire new knowledge pertaining to pests and diseases and to interact with students, foresters and forest managers from other companies. If you wish to attend the meeting, please contact your TPCP board representative or if this is not appropriate contact us directly at: mike.wingfield@fabi.up.ac.za or 012 420 3939/8. Board representatives for TPCP members are as follows:

Mr. Peter Keyworth – CTC/NCT/TWK
Mr. Thabiso Madau - DWAF
Ms. Lorraine McNamara - GFP
Mr. Botha Maree – Hans Merensky/Singisi
Dr. Bernard Janse – Mondi
Dr. Andrew Morris – Sappi
Prof. Colin Dyer – ICFR
Mr. Waldo Hinze - Safcol

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SCIENTISTS BECOME CHAINSAW OPERATORS

During the week of 26-30 August four of the TPCP team members underwent training in the operation and maintenance of a chainsaw. The course was presented by a retired forester/nursery manager, Mr. Hennie Taljaart, who now works for Enviro Chainsaws in Centurion. The course was very practical, with a strong emphasis on safety. All four TPCP members passed their final evaluation with the minimum of problems and no accidents occurred in the week.

Left to right: Hardus Hatting, Brett Hurley, Mr Hennie Taljaart, Ronald Heath and Jolanda Roux

Welcome to the TPCP/FABI

Maria-Noel Cortinas from Uruguay will be working on *Coniothyrium zuluense*, the cause of Coniothyrium canker of *Eucalyptus* spp.

Lawrie Wright has joined us for his Post-doctoral work and will be studying the population biology of *Cylindrocladium* spp. He recently completed his Ph.D at the University of Pretoria, on the biochemical analysis of black tea.

Lancelot Maphosa from Zimbabwe is busy with his M. Sc in Genetics and works on the Molecular and Biochemical Characterization of Zimbabwean *Armillaria* spp.

Welcome back:

Karin Jacobs who obtained her Ph.D in FABI has returned after completing a two-year post-doc in Canada. She is working on the taxonomic characterisation of *Ophiostoma* and *Ceratocystis* spp.

VISITORS TO THE TPCP/FABI

Every year the TPCP seizes opportunities to bring foreign pathologists/scientists to South Africa. These visits are important for the exchange of knowledge and they provide a great opportunity for the TPCP to share experiences with our foreign colleagues. At the time of writing we have had the pleasure of hosting three visitors from different continents, one each from Uganda, Australia and the United States of America for the year. They are as follows:

Prof. John Kaboggoza is the Dean of the Faculty of Forestry and Nature Conservation at the University of Makerere in Kampala, Uganda. John attended the Woodfor meeting at Howick, after which he visited with the TPCP team in the field and in Pretoria. He is also the mentor of one of the TPCP's masters students, Grace Nakabonge, who is the first forestry pathology student to join the group, from Uganda. Together, John and Grace have the responsibility for training

Above: *Grace Nakabonge (TPCP), Prof John Kaboggoza and Alemu Gezahgne (TPCP) looking at Coniothyrium and Botryosphaeria damage to E. grandis trees.*

Top left to right: *Jeff Stone, Mike Wingfield and Bernard Janse (Mondi) discussing diseases.*

Uganda's foresters and ensuring the health of their rapidly developing forestry industry. Geoff Pegg is a forest pathologist with the Queensland Forestry Research Institute, in Australia and manages their pathology programme. He visited Africa on a "great safari", but could not resist mixing the "Big Five" with the "small Five" and spent a few days visiting plantations with the TPCP team. Dr. Jeff Stone presented an excellent talk on the impact of needle diseases on pine trees at our annual TPCP meetings in March. He is from Oregon State University and has had many years of co-operation with Mike Wingfield. Jeff is currently a research associate professor and focuses on fungal pathogens of conifers and also endophytes.

Right: *Lorenzo Lombard (TPCP) with Geoff Pegg in front of a tree with symptoms of Cryphonectria canker.*

Forestry colleagues in various parts of South Africa assisted us in entertaining these visitors and in showing them various aspects of our research. In this way, they were able to learn about our industry and to see some of our beautiful country. We are grateful to those from the industry who provided accommodation and contributed valuable time to share experiences with these visitors. This in turn helps us when we require the assistance of colleagues from other parts of the world. In the fields of pathology and entomology, exchange of knowledge is imperative and we continuously solicit information on the spread of pests and pathogens. Having close contact with foreign colleagues is clearly essential.

During the latter part of 2002, we expect various visitors to the TPCP programme. These will include Dr. Pia Barklund from the World Agroforestry Centre (ICRAF) in Nairobi and Dr John Leslie of Kansas State University. We will share more regarding these visitors in a later newsletter.

An army of imported pests is devouring the nation's trees

By Jessica Ruvinsky

Source: Science & Technology 9/9/02

A long, slow autumn: 'Each time they take a bite, it's kind of like breaking a small matchstick." Cyrus Smith, a nuclear engineer at Oak Ridge National Laboratory, is good at discriminating sounds. His last acoustic detectors monitored the noise of the Navy's ultra silent Seawolf nuclear submarine. His latest listens to tree trunks for the sounds of a six-legged invader: the Asian long horned beetle, a tree pest that has already destroyed more than 7,000 hardwoods in New York and Chicago. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service began testing the devices in Central Park last week, hoping that high tech will help keep the beetles from spreading. If not, they could wipe out $600 billion worth of urban trees over the next 30 years.

The beetles first hitched a ride to U.S. ports in 1996 on wooden packing material from China. Unfortunately, they are far from the first threat to arrive from abroad. At least 420 exotic pests and diseases are already preying on U.S. trees. Hemlock woolly adelgid, an insect native to Japan, has been munching its way west across the Appalachians for decades, leaving countless gray ghosts behind it. White pine blister rust, a fungus first observed near the Baltic Sea, devastated the king pine, the basis of the inland Northwest timber industry, by the late 1960s. It now infects almost every whitebark pine tree in Glacier National Park. Each year, European gypsy moth caterpillars strip leaves off millions of acres of trees and cost the U.S. Forest Service $11 million to control.

The risk of new invasions is rising year by year, with growing international trade. Total imports to the United States are up 71 percent since 1994. And whether it's marble from Italy or barbells from China, it often comes packed in wood with all the insects and diseases that infect that wood. APHIS manages to inspect only 2 percent of the more than 14 million shipping containers that now arrive annually at U.S. ports, and yet it catches dangerous exotic insects on wood packing material more than 400 times a year. Inspectors are "finding more and more all the time. They just can't keep up with it," says Kathleen Shields, an entomologist at the Forest Service's Northeastern Research Station.

A new continent is a land of opportunity for a bug, which is one reason exotics are so dangerous. Immigrant pests don't have to contend with their natural enemies, and the trees they encounter haven't evolved to defend themselves against the new invader. Exotics have taken out entire species, as the chestnut blight did in the first half of the 20th century and as Dutch elm disease has nearly done. And forests today, weakened by years of drought, climate change, air pollution, and acid rain, may be more vulnerable to invasive pests than ever before.

It's not that trees will disappear altogether. When one species is lost, another usually fills in the gaps. But the change can devastate both economies and ecosystems. After white pine blister rust decimated loggers' beloved king pine, firs and hemlock took its place. But these new forests produce less wood and are more prone to fire. Now that the disease is killing off the white bark pine that grows in almost every high-elevation national park in the West, not only trees but whole ecosystems are in danger. White bark pine grows where other conifers can't. It holds the soil, regulates snowmelt, and makes nuts that animals need. As white bark pine disappears, so do the grizzly bears. "The trees that are replacing white bark pine just don't make the kind of foods that can support a bear," says Katherine Kendall, a U.S. Geological Survey ecologist who works in Glacier National Park.

What next? Experts are left wondering what the next major invasion will be. Since virtually any wood can serve as packing material, virtually any pest can travel in it and get distributed to warehouses nationwide. Imports of nursery plants, 700 million of them a year, are another highway for tree diseases.

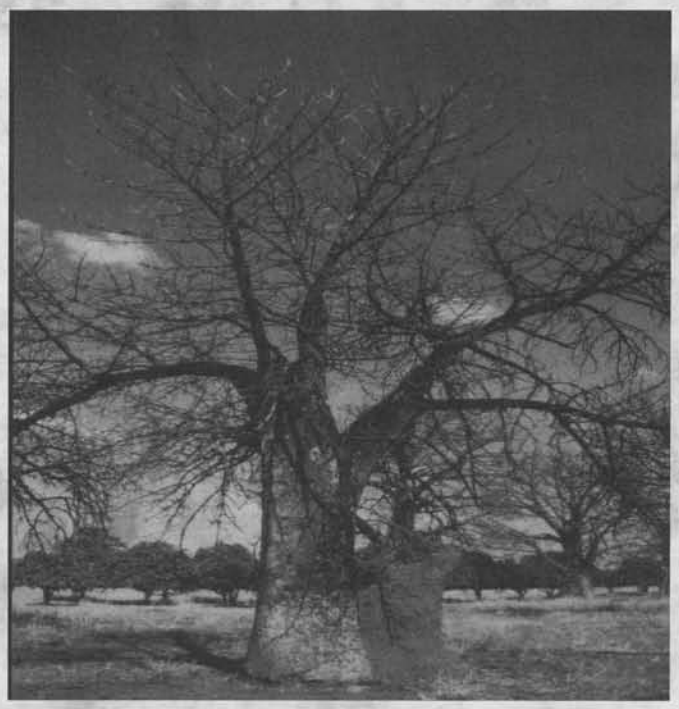
Officials fumigate, incinerate, or return to sender any bug they find that's a known threat. They've managed to head off the disaster from Siberia that is the Asian gypsy moth, an even more indiscriminate eater and much better flier than the unnoticed. Sudden oak death may be one: This fungus has killed tens of thousands of trees in California and Oregon since its 1995 discovery, and no one even knows where it came from.

Once an invasive species gets in, it's hard to stop. Thirty years of effort and 427,000 gallons of herbicide failed to control white pine blister rust in Yellowstone National Park. The best and cheapest way to combat invasive species would be to keep them out in the first place. But because a bug-scare is a good way to disguise a trade barrier,

international trade agreements require a high level of proof for a country to exclude goods known to harbor pests. Faith Campbell, director of the invasive species program at American Lands Alliance and author of a report released this week called "Fading Forests II: Trading Away North America's Natural Heritage," says there are simple things that could be done. For example, packing material doesn't have to be wood. And even wood, properly and verifiably treated, could be safe. APHIS plans new regulations, but Campbell fears it will be years before they are implemented.

In the meantime, four new pests that slipped past inspectors have been discovered this year. One of them, the emerald ash borer, has already infested well over 100,000 street and yard trees in Michigan. Some townships will soon face the cost of removing tens of thousands of dead trees. Ash was widely planted to replace the elms killed by Dutch elm disease. It may soon suffer its predecessor's fate.

http://www.usnews.com/usnews/issue/020909/misc/9forests.htm



Are Africa's BAOBABS Dying?

The baobab, *Adansonia digitata*, is probably one of the best-known trees in Africa. This is due to its unique shape, its huge size and the tremendous ages these trees reach. In South Africa, this tree has also reached notoriety for the "baobab bar" near Magoebaskloof and the "toilet tree" in the Caprivi. The baobab was even considered as a possible alternative source of pulp for paper in the earlier parts of the previous century.

In 1991 an article appeared in the New Scientist stating that Southern Africa's Baobab trees (*Adansonia digitata*) are "falling ill". This short report states that "symptoms of an unknown pathogen attacking Africa's best loved tree have been found". Before this report, however, the Zimbabweans have been investigating a mysterious disease of baobabs in that country for a number of years. Some stated that a sooty mould fungus is the cause of disease, resulting in the disease being called "sooty bark disease". More recent studies came to the conclusion that the deaths in Zimbabwe are linked to environmental conditions including climate change (drought) and farming practices in that country. For many people, none of the above explanations, and others including elephant damage etc., is, however, satisfactory. Many consider the cause of baobab mortality to still be unresolved and others suggest that what is being observed is just the natural decline of the trees.

Descriptions of the disease in Zimbabwe and the report in the New Scientist describe the disease as being characterised by the blackening of trees. In both cases a dark fungus was isolated from affected branches and stems. The fungus from Zimbabwe was identified as a sooty mould fungus, but no information was published on the South African fungus. However, as stated in later articles, and known from scientific literature, sooty mould fungi are not known as primary pathogens, capable of killing trees. This supports reports from Zimbabwe that states that trees that were identified as being diseased in the 1960's are still alive today.

Recently, FABI was approached to become involved in investigations into the deaths of baobabs in South Africa. We have visited two sites from where disease of baobabs has been reported, one near Messina and the other near Tom Burke. Disease symptoms in these two areas were, however, very different. At Tom Burke, symptoms were typical to those described by the Zimbabweans, resembling "sooty bark disease". At Messina, no sooty bark disease was found at the time of the survey, but trees showed extensive exudation of fluids, die-back of branches and death of entire trees. Unless the lack of sooty bark symptoms was as a result of time of survey, we are dealing with two different diseases.

Based on very small sample sizes, we are not yet in a position to pin the cause of tree death on a fungal pathogen/s. FABI is currently in the process of searching for the required funds to undertake a detailed study of baobab mortality in Southern Africa. We hope that this would be forthcoming soon and that we will be able to provide a clearer answer to the question of whether there is a serious and devastating pathogen killing "Africa's favourite" trees, the baobabs.

TRACKING *SIREX*

***Sirex noctilio*, the woodwasp** threatening the pine industry of South Africa, continues its easterly spread towards KwaZulu Natal and Mpumalanga. First recorded in Cape Town in 1994, *Sirex* was discovered further east at Knysna by July 2001 and as far as Bloukrans (approximately 60km east of Knysna) by July 2002. *Sirex* was also incidentally discovered in Umtata in March 2002. However, *Sirex* has not been found in any of the plantations between Bloukrans and Umtata, suggesting that the occurrence of *Sirex* in Umtata may have resulted from a separate introduction and not from the natural migration of the wasp. This matter requires further investigation. The TPCP continues to monitor the spread of *Sirex noctilio* and evaluate the status and efficacy of it biological control agents.

If you notice any symptoms of *Sirex noctilio* in your area, please alert the TPCP immediately.

NEWS UPDATE ON SIREX:
The woodwasp has now been discovered in Ugie and Weza

Left:
Sirex noctilio, the woodwasp threatening the pine industry of South Africa

Building Biotechnology with BRICs

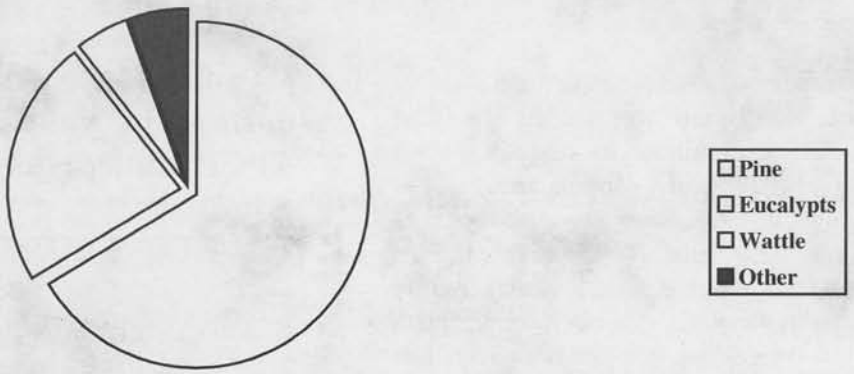
During May 2001 an expert panel was constituted by the Department of Arts, Culture, Science and Technology (DASCT), and tasked with the job of drafting a National Biotechnology Strategy. The scientific community and anyone else interested was asked to make comments on this strategy towards the end of 2001. The strategy was put to parliament and accepted in the early part of 2002. In May of 2002, DASCT announced a call for proposals for Biotechnology Regional Innovation Centres (BRICs). In addition to this there was also an announcement of a National Bioinformatics Centre. These announcements reflect a significant increase in funding for Biotechnology by the South African government and are with out question a very exciting development for Biotechnology in general and also Forest Biotechnology.

A number of the members of the TPCP have spent much time during June 2002 to put in applications for projects in the BRICs. Prof. Brenda Wingfield in addition to being on the initial panel of Experts for the Strategy Document is also the manager for the Plant Biotechnology Programme that was submitted along with three other programmes as part of the Gauteng BRIC application. The Gauteng BRIC is called BioPAD and is one of at least three regional applications for the BRICs.

DASCT has indicated that one of the BRICs will be awarded in October 2002 and a further two will start in April 2003. We at the TPCP expect that this injection of funds into biotechnology in the region will help build sorely needed capacity. While we do not know at this stage if the TPCP will be directly involved in BioPAD the expected R 45 million which will be allocated to each BRIC will encourage students to pursue careers in Biotechnology which will positively impact on TPCP activities.

Diagnostic Clinic 2002 – the first six months

A total of 166 samples have been received and analysed by the Diagnostic Clinic team over the past six months. The majority of these samples were from pine (Fig. 1) and particularly from nurseries and newly established sites. The cause of these problems is mainly due to outbreaks of *Fusarium circinatum*, the causal agent of pitch canker.



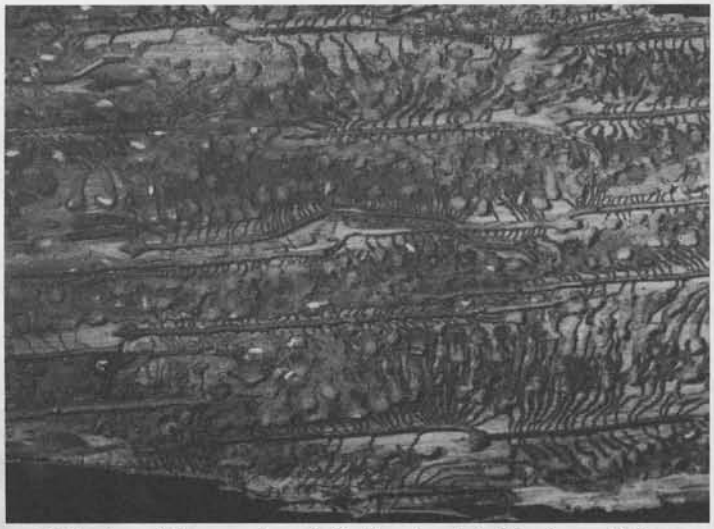
THE FABI-CHINA CONNECTION

Since 1998, the TPCP has hosted a Chinese student, Zhou XuDong who has become well known to members. Zhou is doing his Ph.D. on bark beetle-associated fungi occurring on pines in South Africa. For his M.Sc. at Yunnan University, Zhou studied the fungi associated with the bark beetle *Tomicus piniperda* attacking *Pinus yunnanensis* in Southwestern China. For many years, conifer-infesting bark beetles have been studied in China, but this was the first study in that country to focus on the fungi associated with bark beetles. Many of these fungi cause bluestain, and some are severe pathogens, killing adult trees. For various reasons, populations of native conifer species in China are shrinking. Bark beetles and their fungi are thus becoming an increasingly important threat to these forests, and more research is needed to effectively protect them.

Collecting bark beetles and fungi in a sawmill near Yanji, in Jilin Province, Northern China

Early in the year 2000, the South African government signed a Science and Technology Agreement with the People's Republic of China, in terms of which funding would be made available for collaborative research projects. A research proposal was compiled and submitted for a project with FABI as the South African, Yunnan University and the Southwest Forestry University, as the Chinese counterparts. The proposal was approved and funded. In terms of the project, a survey would be conducted on the fungi associated with conifer-infesting bark beetles in the two most important forestry provinces in China: Yunnan in the Southwest and Jilin in the North. Part of the justification for this partnership was the need for more information on the topic and the fact that the TPCP has a long and outstanding history of research on bark-beetle associated fungi.

The two-year project has included three field trips where fungi were collected from bark beetles and their galleries. The first collection trip, towards the end of 2001, was conducted by Zhou, assisted by some of the Chinese collaborators, and they focused primarily on *Pinus yunnanensis* in Yunnan. A second, more extensive trip was conducted during June-July this year by Zhou, together with Wilhelm de Beer. This time, Jilin province in the north was visited for 10 days and bark beetle associated fungi from as many as 10 different species of spruce, larch and pine, were collected. From Jilin, they turned South and visited Yunnan. This time, beetles were collected from other sites and more tree species than during the first visit. The last trip as part of the current project, will take place in November this year and will include



Galleries of *Ips cembrae* infesting larch in Northern China

presentations at the Asian Mycological Congress and meetings with Chinese counterparts. The large collection of fungi obtained thus far, are currently being identified and studied by a team of six people in FABI.

Apart from bark beetles, our team has encountered many potential forestry foes in China that are familiar to us. These include *Armillaria*, *Dothistroma* needle blight, wasps similar to *Sirex*, etc. Although the Chinese forestry industry has largely exploited native forests in the past, they are currently planting large areas to Eucalyptus and wattle. Since these trees are new to the environment, new diseases, as well as those known to us, might appear on these hardwoods. Because we are fighting a common enemy, and with their forestry practices becoming more like those in South Africa, there will be many possibilities for collaboration between FABI and our Chinese colleagues in future.

Catching planes and trains after adult whitegrubs through European Museums

An important aspect of whitegrub taxonomy is to validate species names for the whitegrub adults, as the scientific name is attached to the adult beetle. In insect taxonomy, the genus and species name is attached to the adult, which in our case are tree defoliators or leaf chafer beetles.

The taxonomic term "type" refers to the original specimen (Holotype) and other specimens (Paratypes) used by the original author of the species description. To illustrate this, I use the well-known large wattle chafer (common name), which was described in 1855 by Burmeister as *Hypopholis sommeri* Burmeister, 1855 (scientific name, author and date). Thus, this common forestry pest was first described to science 147 years ago, which is pretty "Wow". However, the challenge faced by all taxonomists is to be 100% certain that what we are calling "X" today is actually "X" and not "Y". As sometimes through time, the name which was originally associated with one species (a real biological entity), becomes associated with another species. For scientific work to be consistent, repeatable and for the literature to relate to the same animal these seemingly trivial taxonomic matters can make the difference between an important pest being confused with a non-pest species, with subsequent complications for appropriate control measures.

Thus, between 11 July and 7 August 2002 James Harrison funded by a Mellon Foundation grant awarded jointly to James and Prof. Clarke Scholtz of TUKS visited four European countries and seven key insect collections. This was done to locate Leaf Chafer types to ensure that we get our whitegrub taxonomy right from day one, to prevent confusion in the future. To cover the whole trip, would keep you too long, thus I summarize and say that these were the collections visited: "The Natural History Museum, London", "Muséum National d'Histoire Naturelle, Paris", "Museum für Naturkunde der Humboldt-Universität, Berlin", "Deutsches Entomologisches Institut, Eberswalde", "Martin-Luther-Universität, Wissenschaftsbereich Zoologie, Halle", "Institut Royal des Sciences Naturelles de Belgique, Brussels", "Musee Royal de l'Afrique Centrale, Tervuren". This trip was a sheer privilege, as I was able to look at 100 year old specimens, mounted on silver pins with handwritten ink labels. Adrenalin pumped through my veins as I rediscovered the types of Dr. Blanchard (1819-1900), and Dr Fairmaire (1820-1906) in the "pick-a-box" Paris collection. However, I now have the types of species like *Hypopholis sommeri* and *Asthenopholis subfasciata*, just to mention two of many whitegrub adults studied. So next time you receive an identification to species level for control purposes, share the history and careful research that goes into providing the latest, but also *the original* and thus correct name for your disease clinic sample.

James Harrison (Transvaal Museum Coleopterist, and "Department of Zoology and Entomology" and "Forestry and Agricultural Biotechnology Institute" Ph.D. student).

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THE RESEARCH TEAM OF THE TREE PATHOLOGY CO-OPERATIVE PROGRAMME

The research team of the Tree Pathology Co-operative Programme is varied. It includes full time staff of the University of Pretoria (Prof MJ Wingfield, Director and Mondi Professor, Prof BD Wingfield, Prof TA Coutinho, Dr J Roux, and Mr P Govender), Rosemary Visser, Helen Doman, Valentine Nkosi, Martie van Zyl, Sonja de Beer, Elizabeth Attinger, Eva Muller and Brett Hurley, colleagues and students attached to other organizations 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 obviously provide advice and support where this is required.

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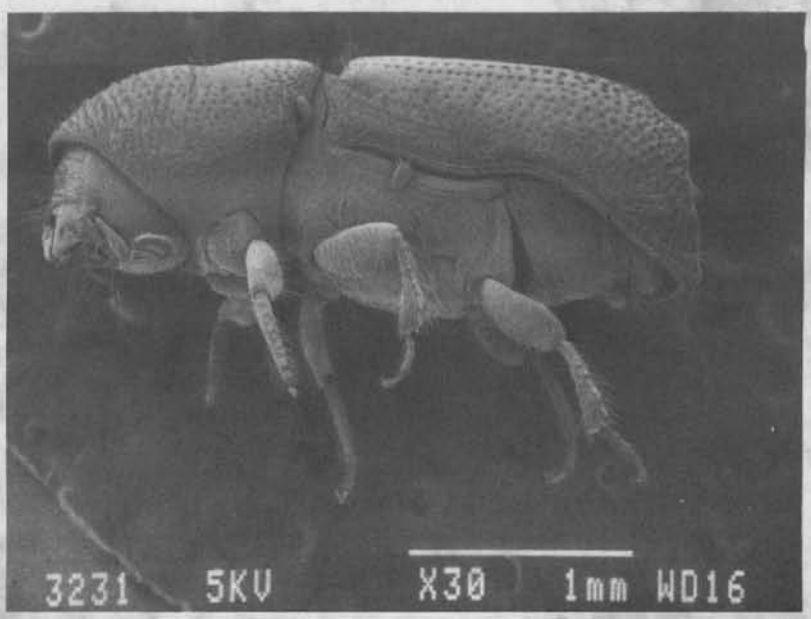
Dispersal strategies of sapstain fungi

In the previous issue of the TPCP newsletter, we discussed what sapstain (bluestain) is, and the effect of sapstain fungi on wood. But since they are the first fungi to colonize a tree after it has been cut, how do they get onto the wood? There are three different strategies these fungi have through which they infect wood.

The first strategy is that the spores of these fungi attach to the bodies of wood-dwelling **insects**, especially bark beetles. The fungi have developed special structures (called perithecia or synnemata) on



The pine bark beetle – Orthotomicus erosus, infesting pine trees in South Africa

which the spores are carried in a sticky droplet. Although the fungal hyphae grow within the wood cells, the spore carrying structures are formed on the surface of the wood or within bark beetle galleries. As the beetles move through these galleries, the spores attach to their bodies. When they then move across the wood surface, or fly from log to log or tree to tree, the spores are distributed. Spores cannot penetrate bark. One of the advantages of attaching to bark beetles is, therefore, that the beetles bore through the bark and deposit the spores on the surface of the sapwood, where they germinate and start penetrating the sapwood, causing discoloration. Sometimes a specific bark beetle species is associated with a specific fungal species. More often, however, several fungal species can be found on a single bark beetle species. The same fungi can then also be associated with other bark beetles. Although bark beetles are the most important vectors of sapstain fungi, many other species of arthropods, e.g. mites and flies, also disperse these fungi.

The spore-bearing structure (synnema) of Ophiostoma querci, distributed by pine bark beetles in South Africa

The second strategy of spore dispersal is by means of rain **water** running down the stems of trees, or from log to log on a log pile, or even rain splash. The third strategy is by moving **air**. Many sapstain fungi produce a second type of spores, which are not produced in a slimy droplet. These spores are light and can be distributed in air currents. In both the cases of air and water dispersal, the spores enter the wood through wounds in the bark.

For many years it was believed that all sapstain fungi infect the wood only when the tree is heavily stressed, or after it has been felled. Evidence obtained in more recent studies, however, suggests that some sapstain fungi exist as endophytes in healthy, living trees for an extended period of time before harvesting. Endophytic fungi usually exist in very small quantities, invisible to the naked eye, within the living wood. When the tree is felled and the wood starts drying, the fungus becomes active and starts colonizing the wood from within. Studies are still underway at FABI to determine exactly at what stage and how these fungi enter living trees.

Read more about the reasons why bark beetles are carrying sapstain fungi with them, in the next issue of Tree Protection News.

INTERNATIONAL MYCOLOGICAL CONGRESS (IMC7)

http://www.uio.no/conferences/imc7

Ahoy, all mycologists gathered round and off to Norway they were bound!

It was the Viking country and capital city Oslo that was the chosen location for hosting the 7th International Mycological Conference (IMC7), during the period 11-17 August 2002. Settled between hills covered with woods, this picturesque city, rich with unique Norwegian culture, was the temporary home to many fungus-mad people (who were also, no doubt, hoping to glimpse a troll or two).

Preparations for this congress started well over a year ago with the usual mayhem of registrations, abstract submissions and poster/presentation preparations. Seven FABI members applied for bursaries and amazingly, all were awarded significant grants by the IMC7 organising committee. These grants were greatly appreciated and sponsored the payment of registration and accommodation fees, making it possible to attend the congress in this expensive part of the world (large pizza = R116 and 500ml Coke = R25). So, it was an excited group of Fabians, including Mike and Brenda Wingfield, Jolanda Roux, Karin Jacobs, Martin Coetzee, Bernard Slippers, Marieka Gryzenhout, Mauricio Marin and Irene Barnes who left for Norway to represent FABI and to a great extent, forestry in South Africa.

The congress was attended by a diverse group of over 1 500 mycologists representing 84 different countries. The scientific themes were equally diverse and included sessions on biodiversity and conservation; systematics, phylogeny and evolution; pathogens and nuisances; food and medicine; population dynamics and ecology; and cell biology and physiology. To fit all these themes into one week, meant that time was scarce and the meeting was jam-packed with many concurrent sessions. On some afternoons, as many as 12 sessions were running at the same time. It was often tough to decide between the topics to support and many of us were hopping around, in-between lectures, trying to attend presentations in different sessions. Even with so many delegates and presentations, the congress ran smoothly and was well organised.

FABI's research was well represented with 11 posters exhibited and four very interesting and first-class invited oral presentations given by Mike, Bernard, Karin and Martin. Our heartiest congratulations go to our own Ronald Heath, whose poster, together with Marieka Gryzenhout, won the best student poster award in one of the five categories judged. This award consisted of a certificate, a bottle of great red wine and, most importantly, money (in Krone!) A great achievement for South African students and FABIANS at this top international level.

Below
Front: Bernard Slippers, Brenda Wingfielda and Karin Jacobs;
Back: Mauricio Marin, Martin Coetzee, Marieka Gryzenhout. Jolanda Roux and Irene Barnes.

All work and no play was certainly not the case at this congress. Although the days were busy, we did manage to do some sightseeing in the evenings (aided very kindly by the sun only setting around 10 pm) and to attend the social events organised by our Norwegian hosts. Organised events included an Opening Ceremony in the Oslo concert hall, which, according to Mike, was *"...Really well done - with the well known Scandinavian dry humour. To me the highlight was a feature on Elias Fries - one of the fathers of mycology and certainly THE father of mycology in this part of the world - first papers written when he was 12 years old!! His story was told and then a person ...(a re-enactment of the character of Fries) arrived dressed as Fries - and he continued to give his comments and views on what he sees happening with mycology today - a view from the past so to speak. Very telling and very entertaining too..."*. We also enjoyed a Mayor's welcome in the spectacular city hall and a lovely congress dinner with typical (normally unaffordable) Norwegian food and entertainment including comedy, music and singing. There was also a "Wines of the World" evening and most of us also attended the panoramic tour of Oslo including stops at the Viking ships and museums, the Gustav Vigeland sculpture park the famous Holmenkollen ski jump.

All in all, this was an interesting and worthwhile congress where we were able to make new contacts, establish international collaborations, share and exchange ideas on current research and in areas where we lack expertise. In this fast moving and wide field, this was an excellent opportunity to keep up with new developments. What a privilege it was to attend! And if any of you are wondering, we did not see any trolls - except in the shops.

Fungus Gnats as Potential Vectors of *Fusarium circinatum*

Fusarium circinatum, results in severe losses of pine seedlings in South African nurseries. Diseases associated with this fungal pathogen include seed decay, damping-off, root rot and stem cankers. Insects are suspected of vectoring *F. circinatum* in nurseries, but currently no such vectors have been identified. Of the various insects that could possibly vector *F. circinatum*, fungus gnats appear to be the most likely candidate.

Fungus gnats are small, slender flies (Diptera: Sciaridae and Mycetophilidae). Information on the taxonomy and biology of fungus gnats is scanty in South Africa because of the lack of specialists working on this group and their superficial homogeneity. The adults are about 2 – 4 mm in length, have elongated legs and beaded antennae. The larvae are about 0.5 mm in length, translucent to white in colour, with black heads.

Besides a broad range of natural habitats, fungus gnats have been recorded in nurseries of various crops, including forestry. In these nurseries, the fungus gnat larvae feed on decaying and healthy plant roots and fungi. Feeding on the plant roots can cause a reduction in plant vigor, while the combination of feeding on plant roots and fungi makes fungus gnats suitable vectors of *F. circinatum* and other pathogens that require a wound to enter the plant. Research has shown that the larvae do not digest the majority of fungal spores, so that viable spores may be found in the faeces and corpses of larvae, thus assisting the spread of the fungus. Spores may also remain on the mouthparts of the larvae and can be transmitted directly to the plant when the larvae feed on the roots. Adult fungus gnats do not feed on plant material or fungi, but viable spores remain in the adult gut from the larval phase and these may be transmitted to healthy plants in the adult faeces and corpses. Fungal spores can also attach to the numerous hairs on the body of flies and hitch a ride from plant to plant (phoresis).

In South Africa, the association between fungus gnats and *F. circinatum* in pine nurseries has not been investigated. This is now being investigated as part of a postgraduate research project, with two major research questions: What species of fungus gnats are present in South African pine nurseries and is there any association between fungus gnats and the spread of *F. circinatum*?

To answer these questions, four of the major pine growing nurseries in South Africa are being monitored. The presence of fungus gnats and their dynamics have already been established. These results show that fungus gnats of the family Sciaridae are present in the nurseries. Interestingly, only one species of Sciaridae has been found, which is the same in all the nurseries examined. This species is a common commercial nursery pest in Europe and this is the first time its identification has been confirmed in South African forestry nurseries. Various control methods against fungus gnats have been developed in Europe and the United States and some of these have proved to be very effective. However, the control of fungus gnats in South African forestry nurseries would only be necessary if we determined that they play a role in the spread of *F. circinatum* or other pathogens. This aspect of the research is currently underway.

Spoof 2002

Society for the Presentation of Outrageous Findings (SPOOF)

By Koala, Smokey and Babbalas.

We work our fingers to the bone,
All through the day and the night
To produce data that we will
Share with our friends forthright.

So hoist a beer and give a cheer
And join in this good fun.
At S.P.O.O.F we honour all research
That is published, for it is done!

"SPOOF is dedicated to the proposition that no research is too trivial, mundane, useless, misguided, asinine or insane to deserve a forum for intellectual discourse" George Hudler (PhD) 1998, Epsilon Chapter.

This is a command by the Divine Thor and Odin, Gods of War and Thunder, to read this review on the gathering of the Druids at the FABI village on the 7th of the 6th moon of the year 2002.

The annual gathering of the Druids took place once again at the FABI village on a beautiful starry evening. Several self invited Druids presented interesting and totally useless information. Our Spanish-speaking Viking chieftain presided over the gathering with a big axe, a big moustache and an even bigger belly. Taking his duties seriously he dealt with all interruptions strictly and with his axe.

Unfortunately no funding for travel expenses were made available since the exchange rate on slaves to row the ships have severally deteriorated in the last century. All attempts to alter this situation thus far have been futile. Luckily no requests were received for this annual gathering.

The gathering was held to introduce all Druids and their apprentices to the wonderful world of bogus science. The beautiful evening was started with a look at how to start research from scratch, was followed by an interesting look at distance science by a friendly group of Gaulish travelling Druids making their own type of magic potion. A look into the development of interesting plant defence mechanisms and evolution, which was followed by the interval. The interval provided the gathering – goers with some true Celtic magic potions and fruit juice. After pulling some of the Druids out of the vats of magic potion the gathering was continued with a memorial seminar dedicated to Ethel M. Doidge. This presentation showed findings on plantation diseases, pests and their management. The importance of the South African paper plant was evaluated and the well-known Prof. Dr. Death closed the evening's gathering in a J. E. Vanderplank Defence Seminar, which he failed completely. A special gift was presented to him of whom comments had to be edited since this is a family friendly environment. Let's just say it was a very gifted Tokolosi.

The evening was closed with a Celtic feast. A true Celtic atmosphere was created with bonfires, ships, axes and shields and not to forget the wishing well. The Druids, apprentices and guest were treated to a wonderful ensemble of food, drink and true Celtic music. This carried on through the night.

Foresters at a field day

Field days

The most important tools that we have to manage tree diseases are linked to having knowledge regarding the distribution, host range, infection biology, diversity and spread of the causal agents. The TPCP team in Pretoria mostly deals with the more fundamental research questions, while disease monitoring is a team effort in which the TPCP and foresters and contractors play equally important roles. For this reason, it is important that all foresters should have an awareness of plantation diseases and pests. This knowledge should ideally be acquired during the training of foresters, and the TPCP team attempts to provide updated knowledge through training sessions and field days.

One of the most important functions of the TPCP is the transfer of new information on pests and diseases to foresters, contractors, farmers and researchers. It was based on this focus that, Dr. Jolanda Roux was appointed as Forestry Extension Pathologist in 1996. More recently, Brett Hurley has been appointed on a part time basis to fulfil the same function, and particularly to assist Prem Govender with forest entomology extension. This small team is thus responsible for conducting regular surveys, maintenance of trials and technology transfer. An important medium to achieve this goal is through field days.

TPCP member companies request the TPCP team to present field days. During the first half of 2002, members of the TPCP team presented talks at several field days. Although more contractors were present at these meetings than in previous years, there is still a noticeable need to bring this group who work most closely with trees in plantations, to training sessions. It is our hope that in future this situation can be improved.

Please do not hesitate to contact Jolanda, Prem or Brett if you wish to organise a disease/pest field day. These are generally developed individually and can have a variety of formats to address specific needs. There is a limitation to the number of field days that can be presented each year. Ideally these should be organised at the start of the year so that appropriate time slots can be found and responsible budgeting can take place.

The TPCP has prepared a wide array of colour pamphlets to assist foresters in identifying diseases of plantation trees. Please do not hesitate to contact the group if you require copies. This information, and a great deal more is also posted on our web site (http://www.up.ac.za/academic/fabi) for those who have easy access to an internet connection.

Koala Bears, *Eucalyptus* and Yugoslavia

The Government of Australia gave South Africa two male koala bears as a gift when we become a democratic country. The bears, Franklin and Dunphy, are housed in the Australian section of the National Zoological Gardens in Pretoria. The Koala programme, as it is called, was set up to establish shared conservation efforts between the two countries as well as to raise community awareness of the unique wildlife of both nations.

Koala bears eat *Eucalyptus* leaves, especially the growing tips. Thus suitable food had to be available to feed them. To

comply with the strict conditions imposed by the Australians, suitable *Eucalyptus* trees were planted. Today, a plantation of 36 different species exists in Pretoria. The trees were donated by Mondi and the TPCP is keeping them healthy.

Early this year, Ms. Draginja Pavlic joined the Programme. She is from Yugoslavia and together with other team members monitors the *Eucalyptus* trees for the presence of pests and diseases. Her research project also focuses on an important pathogen of *Eucalyptus*, namely *Botryosphaeria*. She is currently examining the endophytic *Botryosphaeria* spp. in the 36 *Eucalyptus* species to determine which species are present and their possible origin.

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ABSA RELAY CHALLENGE

The ABSA relay challenge is the world's biggest company relay of its kind and this year, for the first time, FABI entered. The race covered a total of 52 km starting from downtown Johannesburg to Esselen Park. Each team consisted of 8 members who ran stretches of anything from 1.5km to 11km. The race began this year on a very early, chilly morning on the 4th August. It was a very chaotic (loads of traffic), fun-filled day with lots of supporting, cheering and camaraderie. Both teams did very well finishing within the time limit (FABI Team 1 = time 4:46:02; position 442; FABI Team 2 = time 4:36:46; position 348) and for this, all received bronze medals. Fabians have now extended their talents into areas of fitness and the word "Fit-Fabians" has been added to their list of descriptions.

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ABSTRACTS FROM RECENT CONGRESSES

First report of *Coniothyrium* stem canker on *E. camaldulensis* in Ethiopia

During a survey of *Eucalyptus* diseases in Ethiopia, a serious stem canker disease was discovered on *E. camaldulensis* trees at several localities in the South and South Western parts of the country. The disease is characterised by the presence of discrete necrotic lesions, stem cankers, cracking of the stems, production of kino pockets in the wood, as well as malformation of stems. These symptoms are similar to those caused by *Coniothyrium zuluense* in South Africa. The aim of this study was to positively identify the causal agent of the disease in Ethiopia. This was achieved by sequencing the ITS region of the rRNA operon for a representative set of isolates. Sequences for the Ethiopian isolates were compared with those from authenticated isolates collected in South Africa, Thailand and Mexico. Based on these data, the Ethiopian isolates were shown to group more closely with those from South Africa, than with those from other areas. This study represents the first report of *C. zuluense* and its associated

disease in Ethiopia. Currently the disease is causing considerable losses in yield and quality of timber and it also impacts negatively on the lives of subsistence farmers. We are currently studying additional isolates of the fungus and utilising sequences of different genes to study the phylogenetic relationships between *C. zuluense*, from a wide range of countries.

Identifying species in the genus *Botryosphaeria*

Botryosphaeria species are common endophytes and opportunistic pathogens of woody hosts, world-wide. Approximately 150 *Botryosphaeria* species have been described, but their taxonomy is often confused due to limited morphological variation and the wide host range of some species. Recent studies have successfully combined rDNA sequence and morphological data to define and describe species. These characters, however, need to be evaluated for their use in defining species boundaries between closely related species and species complexes. In this study, we combined sequence and PCR-RFLP data from the ITS rDNA, β-tubulin and elongation factor-1-α, with traditional morphological and ecological criteria, to delimit various *Botryosphaeria* spp. The ITS region was sufficiently variable to distinguish all species groups. However, some closely related species such as *B. ribis* and *B. parva* could not be separated. Combined data sets of the three sequenced regions, however, clearly separated the different species. Morphological characters were found to be variable in nature. But under controlled laboratory conditions, conidial and cultural morphology could be used to recognise most species. Ecological data were also useful in defining taxa, as many species are restricted to a particular host or environment. The combination of morphology, habitat data and DNA sequences produced a reliable basis for the characterisation of *Botryosphaeria* spp., both at the phylogenetic and diagnostic levels.

Molecular and morphological comparisons of *Fusarium* species accommodated in the *Fusarium subglutinans sensu lato* complex

A total of 13 species formed part of the *Fusarium subglutinans sensu lato* species complex at the time of this study. These species are pathogens of many hosts including pine, mango and pineapple but are morphologically similar. They are all characterised by typical *F. subglutinans* morphology including false heads, absence of chlamydospores and microconidia produced in polyphialides. The aim of the study was to distinguish between these species based on morphology and DNA sequences. Phylogenetic relationships were determined based on sequences from the histone, elongation 1a, and b-tubulin genes. Furthermore, sequences of the EF-1a gene were subjected to restriction analysis using four different restriction enzymes. Based on their recognition sites, unique EF-1a restriction patterns were generated for the species. The morphological characteristics that were informative included the origin of conidiophores on the aerial mycelium, conidiophore branching, the number of conidiogenous openings on the polyphialides, macroconidial septation and the presence or absence of sterile coiled hyphae. All 13 of the species in the *Fusarium subglutinans sensu lato* could thus be distinguished based on morphological and molecular characteristics.

IMPORTANT : PLEASE READ THIS

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

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