IMA EXECUTIVE COMMITTEE MEETING 2016

The IMA Executive Committee met on 16 April 2016 at the CBS-KNAW Fungal Biodiversity Centre in Utrecht. Those present included Keith Seifert (President), Jennifer Luangsa-ard (Vice-President), Sharon Cantrell (Vice-President; *via* Skype), Karen Hansen (Treasurer; *via* Skype), Pedro Crous (Secretary-General), David Hawksworth (Hon President); EC members Dominik Begerow, Chiharu Nakashima, Mike Wingfield, Wieland Meyer, Paul Dyer; RMMO members: Wilhelm de Beer (representing Africa), John Dearnaley (Australasia; *via* Skype), Sharon Cantrell (Latin America; *via* Skype); SMMO representatives: Marc Stadler (German Society of Mycology), Chiharu Nakashima (The Mycological Society of Japan); and IMC Programme Committee Chair: Chris Schardl (*via* Skype).

Finances

IMA Treasurer Karen Hansen presented a summary of the revenue, expenditures, and balance sheet of the IMA. There were no unexpected financial developments since last meeting. Most MMOs paid their dues as expected.

Manual of Operations

The President has worked on a draft manual of procedures, compiling previously circulated and approved procedures for Awards and Conference bids into one document. Much remains to be done. The next Officers and EC may be missing much of the 'corporate memory' of the last 12 years and a Manual of Operations will be important for future ECs. The President proposed an addition to paragraph 3.3 of the statutes to allow the EC to elect replacements if a previously elected EC member is unable or unwilling to complete their term. The wording was adapted from the existing paragraph on in-term replacement of Officers.

> "When necessary in the period between two General Assemblies, the Executive Committee may elect new members to fill vacancies on the Executive Committee."

VOTE: The proposed addition to the statutes was unanimously accepted by the Executive Committee, and will be added to the Statutes placed before the General Assembly in 2018.

MycoBank

An improved MycoBank interface was launched in November 2015. There were previously 1850 unique users/day, but with the speed improvements and the new data centre migration, there are now regularly 2400–2500 unique users/ day. Registration of types (MBT numbers) was successfully introduced during 2015, and so far 4166 MBT records exist, of which 449 are neotypes or epitypes.

For the past year, the day-to-day curation has been done by Nathalie van de Wiele; the IMA is very grateful for her efforts. Nomenclatural support was provided by Shaun Pennycook. Konstanze Bensch (working with Dagmar Triebel in Munich) will be employed as the new curator from 1 June 2016.

The ICTF has been approached regarding the possibility of mobilizing its subcommissions and working groups as taxon curators. This will need to be carefully coordinated. Training of remote MycoBank curators was undertaken in February 2016 with Conrad Schoch, Barbara Robbertse, Scott Redhead, Tom May, Maria Paz Martin Esteban, all trained to use Citrix remote access accounts with full access to curation tools.

Synchronization of data with IndexFungorum happens periodically, but it is envisioned that a new script will allow regular synchronization in the future.

Tom May and Wilhelm de Beer suggested that the MycoBank Advisory Board should be expanded to include representatives of the IMA, ICTF, Nomenclature Committee for Fungi, a technical person from MycoBank (Vincent Robert), and the CBS director (or delegate). Twice annual virtual meetings were recommended.

IMA Banner

Dominik Begerow, Pedro Crous, and, Manon Verweij had developed a banner and brochure to represent the IMA and the EC, and shared PDFs at the meeting. Banners and handouts are needed for IMA displays at meetings, including IMCs. "Living" documents either on Google Docs or the IMA website would be an option to keep these up to date; EC members could download the latest version of the brochure or banner and print them before they go to a conference, or arrange for printing on location.

After discussion, the IMA Mission Statement was revised to read: "*The mission of the IMA is to promote international scientific research and education in fungal biology, and the exploitation of fungi for the benefit of humankind and the environment.*"

IMC11 planning progress

The President reviewed efforts to recruit the IMC Scientific Programme Committee. Chris Schardl had now accepted the invitation to Chair the Committee. The President gave a brief PowerPoint presentation to show the brand new venue, which he visited in May 2015. Vice-President Sharon Cantrell noted that the contracts with the venue were signed.

ACTION: The Executive Committee request a volunteer from the EC or ICTF to determine what groups will require meetings during IMC, including the ICTF, nomenclatural subcommissions and working groups, other societies such as International Association for Lichenology (IAL), and journal editorial boards. This could be done by email.

Scientific programme committee (SPC): The composition of all committees is now listed on the IMC11 website at http://msafungi.org/IMC11/committees/. Tom Volk, MSA President in 2018, has been appointed Chair of the Steering Committee, which is intended to oversee the work of the SPC and the Local Organizing Committee.

Chris Schardl reported that the memberships of the SPC and its subcommittees are almost complete, with due attention paid to international representation, gender balance and inclusion of Latin American representatives.

At the time of the meeting, a list of potential keynote speakers was established and plenary speakers were still being discussed. After the meeting, Paola Bonfante (University of Turin), a pioneer in the study of arbuscular mycorrhizal fungi, accepted an invitation be the Keynote Speaker for IMC11.

Programme themes and symposia: Themes of the congress are listed at http://msafungi.org/IMC11/cong-theme-topics/

The draft program is expected about a year from now. The IMA EC and officers will assist as needed, but the selection and approval of all speakers is the responsibility of the SPC. The next step is the call for symposia before July 2016. Some symposia will be shared across two or more themes.

The present agenda (http://msafungi.org/IMC11/program-at-a-glance/) includes 1.5 hour slots for 'Special Interest Groups' on three evenings, each preceded by a 2 hour poster session. Some symposium suggestions may be turned into workshops that could fit in that space. The venue is unavailable on the weekend before the IMC, but there will be a possibility for workshops on campus the weekend before.

The IMC11 venue in Puerto Rico.

There are six young mycologist awards (YMA)to be made at the Congress. After discussion, the EC agreed to adopt Mike Wingfield's suggestion that the programme include speaking slots for YMA winners to give a short talk (10-15 min) before the plenary speakers each day. The YMA prize would be modified so that IMA pays the awardee's registration fee at the subsequent IMC *in lieu* of a cash prize, plus the opportunity to present the talk.

It was noted that the International Society of Human and Animal Mycology (ISHAM) Congress is to be one week before IMC11, and the International Congress of Plant Pathology (ICPP) is one week after. It was important to be careful to minimize overlap, especially with higher profile speakers. The President suggested that the SPC for the IMC might attempt to have symposia that link with ISHAM and ICPP as a means of enhancing a spirit of co-operation with these organizations.

ACTION: Chris Schardl and the President to communicate with the SPC chairs of ISHAM and ICPP to attempt to link/share one symposium with each congress.

Registration fees: There will be no waivers of registration fees for any delegates at IMC11 except Plenary and Keynote speakers. Symposium organizers are expected to raise funds if they want to pay registration fees for speakers.

IMA Fungus

IMA Fungus continues to function well, and despite minor delays caused by holidays at Ingenta, has appeared regularly on schedule. We have been trying to get an impact factor for *IMA Fungus* for several years. Prior to the meeting, we contacted ISI through their online query system and received assurances that they are evaluating the online version of the journal. The EC hopes for a favourable outcome as soon as possible.

Website and social media

Keeping the public face of the webpage, particularly uploading news in a timely manner, is a challenge. News of job opportunities and upcoming events would be welcome additions to IMA communications. EC members were encouraged to be proactive in sending information to webmaster Begerow.

Awards

The President presented a nomination of EC member Chiharu Nakashima as the acting Vice-President in charge of Awards, which was accepted unanimously.

Nagoya protocol

David Hawksworth had represented the IMA at the IUBS General Assembly in Berlin in December 2015. The Assembly adopted a Resolution concerning the Nagoya Protocol. The EC expressed concern about the potential detrimental effects of the Nagoya Protocol on international collaboration in mycology and that the IMA is the instrument to speak for the international mycological community. For countries that have not yet implemented Nagoya, business proceeds as

usual; for others, Marc Stadler noted that he has template contracts available for several countries. We need to lobby for change with the bodies responsible for administering the CBD and Nagoya.

ACTION: Marc Stadler, David Hawksworth and Mike Wingfield will lead a discussion on maintaining access to cultures and specimens published in the biodiversity literature. This will lead to a 'Declaration' article from the IMA promoting changes to Nagoya consistent with our mission as an international organization promoting mycological research. The Secretariat of the CBD is headquartered in Montreal, and the President will try to engage them in discussions after the IMA-EC has formulated its position.

International Society for Fungal Conservation

Minter updated the EC on this society, established in 2010, during the 2015 General Meeting. The focus of the ISFC is political, and it is actively lobbying conservation bodies, especially the International Union for the Conservation of Nature (IUCN), which now recognize that fungi are important to protect. Links between the IMA and ISFC, perhaps by an EC member being given this responsibility.

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CBS SYMPOSIUM – FUNGI AND GLOBAL CHALLENGES

For 2016 the theme of the CBS symposium was "*Fungi and Global Challenges*" (14–15 April 2016) in Amsterdam, which again formed part of the CBS Symposium week, initiated by the "*Taxonomy, Species and Hybrids in Yeasts*" symposium held at CBS on 13 April, which was attended by more than 50 participants. In a separate meeting, the *Fusarium* community (20 participants) held a meeting to plan the inauguration and running of the *International Centre for Fusarium Research* (ICFR; www.Fusarium.org). Following a light lunch in the Utrecht Botanical Garden, participants departed for the Academy headquarters in Amsterdam, where a special evening public symposium was organised in collaboration with the Royal Academy of Arts and Sciences. The symposium had two keynote speakers, namely David Denning (Education and Research Centre of the University Hospital of South Manchester, UK) – *Hope on the Horizon for Reducing Death and Misery from Fungal Diseases,* and Sarah Gurr (University of Exeter, UK) – *Global Food Security: Food, Famine and Fungi.* The meeting was a roaring success, with around 170 participants, many being non-mycologists, with a general interest in fungi, and the implications thereof on human health and food security. Both talks were captured on video, and can be viewed online (http://www.cbs.knaw.nl/news/6990).

On Thursday morning the main symposium kicked off with the first session on Fungi, Global and Climate Change (Mike Wingfield, Sarah Gurr and Geoff Gadd) presenting data ranging from fungi in fibre and food security, to fungi and metal and mineral transformation. After a short lunch break the second session focussed on Fungi and Human Health (David Denning, Marc Stadler, Paul Verwey, and Wieland Meyer), with topics ranging from disease diagnostics to fungicide resistance, antibiotics and DNA barcoding. The third session focussed on Taxonomic Challenges in *Fusarium* (Kerry O'Donnell, Keith Seifert, Takayuki Aoki, Balazs Brankovics, Nani Martawi, Cees Waalwijk, Martijn Rep and Ulf Thrane), which set the stage for the launch of the International Centre for *Fusarium* Research (see Report on pp. (11)–(12)).

Friday started with the announcement of the two CBS awards, namely the Johanna Westerdijk and Josef von Arx Awards made respectively to Meredith Blackwell and Keith Seifert (see pp. (23)–(24)). The first scientific symposium focused on *Fungi and Food Production* (David Miller, Gert Kema, Francine Govers, and André Levesque) discussing fungal populations, clones, global plant destroyers and quarantine implications of free trade. After a short coffee and tea break, the first of two sessions on *New Developments in Fungal Ecology and Taxonomy* kicked off (Joey Tanney, David McMullin, Amanda Chen, Fahimeh Jami, Emma Steenkamp, Margarita Hernandez Restrepo, and Kathrin Wittstein), covering topic from fungal endophytes, to the polyphasic approach to their identification, and novel antimicrobial compounds. The second session on this topic (Xuewei Wang, Alejandra Giraldo Lopez, Lorenzo Lombard, and Yanping Jiang) focused on specific fungal groups, including *Chaetomiaceae*, *Plectosphaeriaceae*, *Stachybotryaceae*, and *Onygenales*. A final session was dedicated to *Fungi, Novel and Emerging Applications* (Anton Sonneberg, Patricia Wiltshire, Jack Pronk, and Corné Pieterse), covering mushroom cultivation, forensic mycology, the fuel and chemical production, and fungi in the root microbiome. On Saturday many again travelled to the CBS in Utrecht for the annual meeting of the IMA Executive Committee (see pp. (5)–(7)). Planning is already well advanced for the *CBS Symposium Week* in 2017 (28 August – 1 September 2017), with a special two day symposium "*Leading Women in Fungal Biology*" planned for 30–31 August, in celebration of the appointment of Johanna Westerdijk as professor at Utrecht University in 1917, becoming the first female professor in The Netherlands. The meeting will also coincide with the inauguration of the new CBS building for Novel Fungal Product Discovery and Industrial Mycology. For details and updates please consult the CBS website, www.cbs.knaw.nl.

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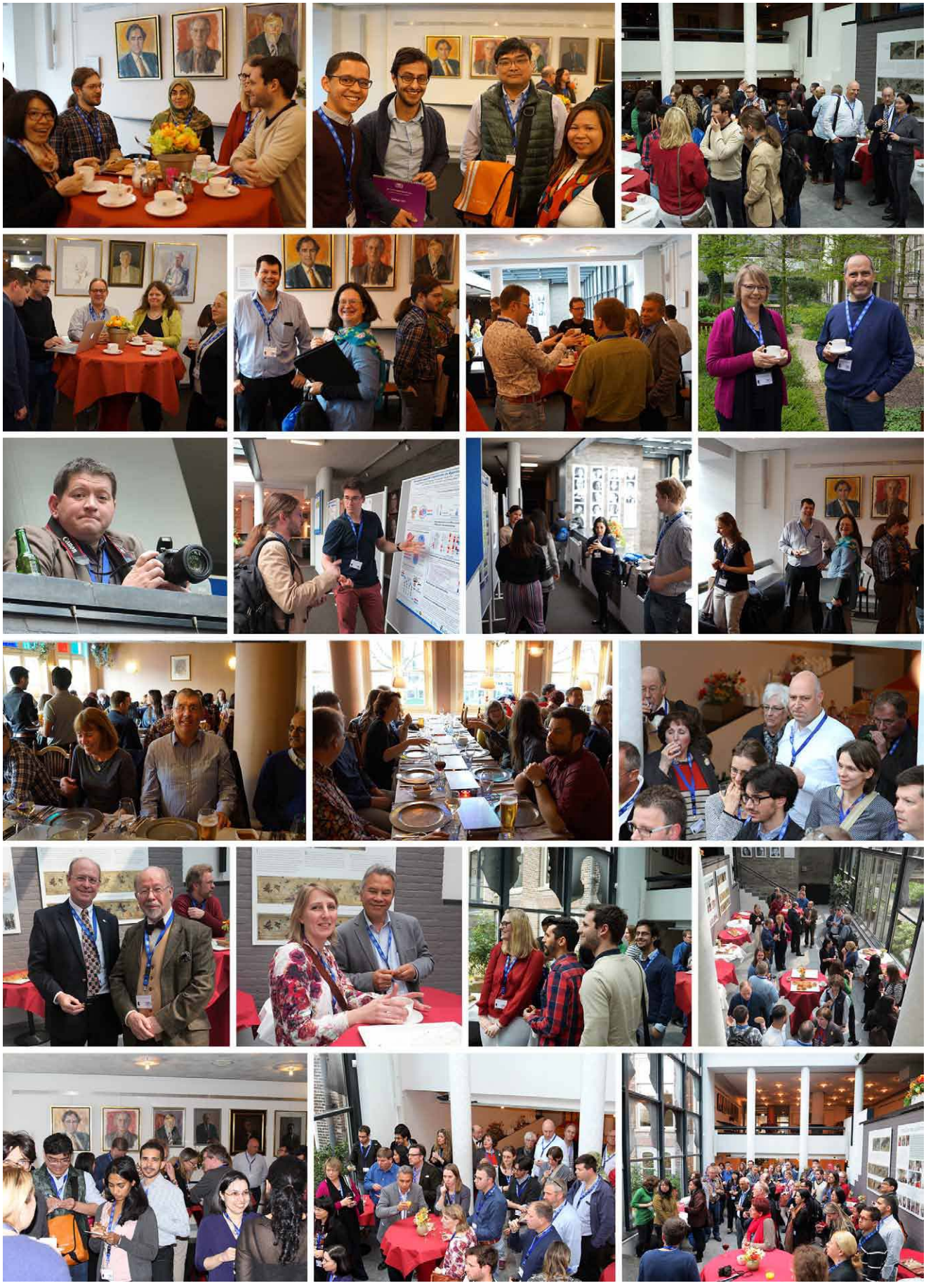
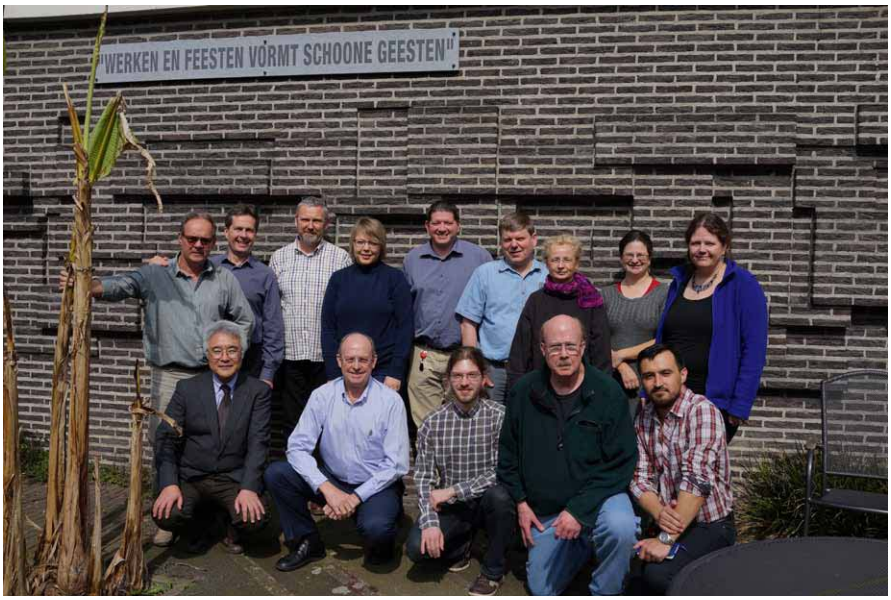
Speakers at the CBS-KNAW Symposium "Fungi and Global Challenges" held in Amsterdam on 14–15 April 2016. The meeting was hosted at the "Trippenhuis" by the Royal Netherlands Academy of Arts and Sciences ("KNAW").

Speakers and scenes from the CBS-KNAW Symposium "Fungi and Global Challenges".



Scenes from the CBS-KNAW Symposium “Fungi and Global Challenges". At the meeting the CBS "Josef Adolf von Arx Award" and the "Johanna Westerdijk Award" were awarded to Keith A. Seifert and Meredith M. Blackwell respectively. Pictures of this can be found in the "Awards and Personalia" section, pp. (23)–(24).

LAUNCH OF THE INTERNATIONAL CENTRE FOR *FUSARIUM* RESEARCH (ICFR)



Attendees of the inaugural ICFR meeting held at the CBS-KNAW Fungal Biodiversity Centre.

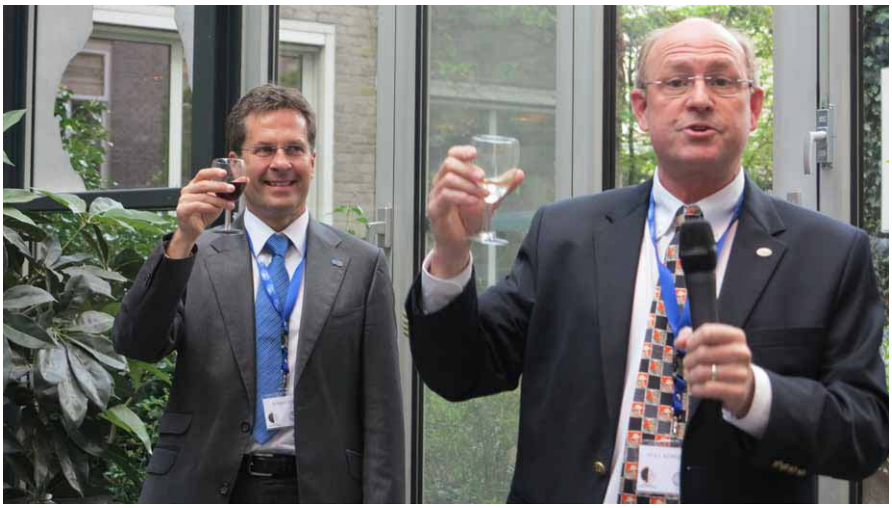
The fungal genus *Fusarium* includes some of the world's most important plant and human pathogens as well as fungi that produce life-threatening mycotoxins. While there are many individual researchers and laboratories that study these fungi, there is an urgent need to promote global collaboration between these groups in order to find solutions to the many plant and human health problems that are caused by *Fusarium* species. The **International Centre for *Fusarium* Research** (ICFR) will provide a catalyst to encourage and promote such collaboration, providing a single stable platform linking *Fusarium* researchers and laboratories globally. A key aim will be to promote innovative *Fusarium* research and to seek solutions to problems caused by these fungi.

Historically, *Fusarium* taxonomy has focused on the asexual morph (anamorph), as the sexual morph (teleomorph) is mostly unknown for most species. In contrast, it is the asexual morph that is most frequently encountered in nature by biologists and plant disease practitioners. The implementation of the *International Code of Nomenclature for algae, fungi, and plants* (ICN; Melbourne Code), which ended the naming of separate morphs of the same species in July 2011, has revolutionized the taxonomic treatment of fungi, including *Fusarium*. This has resulted in a recent segregation of *Fusarium*, including the resurrection of generic names linked to sexual morphs. This important step has been met with mixed emotions by the international *Fusarium* working community. *Fusarium* taxonomic studies in the past decade have seen the use of various characterization protocols (morphology and DNA sequence based), making comparative studies difficult or even impossible, with key *Fusarium* strains lodged in collections not accessible to the international *Fusarium* working community. Against this background, it became clear that an international initiative was required to promote international collaboration amongst the *Fusarium* working community. The ICFR will seek to achieve this goal, linking *Fusarium* scientists in a positive manner, promoting the sharing of new knowledge as well as through the establishment of standardised research protocols in the fields of molecular taxonomy, pathology and morphology.

On 13 April 2016, the inaugural meeting of the ICFR was hosted by the CBS-KNAW Fungal Biodiversity Centre in Utrecht, The Netherlands. The meeting was attended by several prominent *Fusarium* researchers, which included Takayuki Aoki (National Agriculture and Food Research Organization, Japan), Christiane Baschien (DSMZ, Germany), Pedro W. Crous (CBS-KNAW Fungal Diversity Centre, The Netherlands), Marcelo Sandoval Denis (University of the Free State, South Africa), Anne van Diepeningen (CBS-KNAW Fungal Biodiversity Centre, The Netherlands), David M. Geiser (Penn State University, USA), Marieka Gryzenhout (University of the Free State, South Africa), Gert Kema (Plant Research International, The Netherlands), Lorenzo Lombard (CBS-KNAW Fungal Biodiversity Centre, The Netherlands) Kerry O'Donnell (USDA, USA), Keith A. Seifert (Agriculture and Agri-Food Canada, Canada), Emma Steenkamp (Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa), Ulf Thrane (DTU Systems Biology, Denmark), Cees Waalwijk (Plant Research International, The Netherlands), and Mike J. Wingfield (Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa). The aim of the meeting was to establish a formal infrastructure for the ICFR and included discussions on the aim/vision and governance of this virtual *Fusarium* research centre.

As the ICFR will be a virtual centre that brings together key international *Fusarium* research programmes, the main vision of the ICFR is to provide a stable platform for *Fusarium* research on an international level. To achieve this vision, several aims were identified at the inaugural meeting of the ICFR:

- Promote a global awareness of *Fusarium* amongst the global public, key stakeholders and funding agencies.
- Advance *Fusarium* research through the establishment of standardised research protocols (morphology, phylogeny, taxonomy, biology, epidemiology and metabolic studies).



Launch of the International Centre for *Fusarium* Research by Mike J. Wingfield on 14 April 2016 at the Trippenhuis, Royal Netherlands Academy of Arts and Sciences, Amsterdam, The Netherlands.

- Identify and maintain a list of researchers and institutes worldwide, involved in *Fusarium* research and share details of their research interests/ activities.
- Provide a platform to locate partners able to engage in international research programmes and projects.
- Seek funding for important *Fusarium* research programmes at an international scale.
- Stimulate research collaboration on *Fusarium*.
- Encourage the *Fusarium* researchers to lodge key *Fusarium* strains in accessible collections or Biological Resource Centres, making them as widely available as possible.
- Establish a comprehensive database of all publications regarding *Fusarium* and make this as widely available as possible.

The ICFR includes members from various research institutes globally, and will be governed by a Board of Directors, a revolving Chair and a Secretary-General. The Board of Directors consists of several prominent international *Fusarium* researchers, which will meet at least once a year, functioning as a scientific advisory committee to the Chair and Secretary-General. Members of the Board of Directors identified so far are:

P.W. Crous – CBS-KNAW Fungal Biodiversity Centre, The Netherlands. (Present ICFR Chair)
L. Lombard – CBS-KNAW Fungal Biodiversity Centre, The Netherlands. (Secretary-General)
M.J. Wingfield – Forestry and Agricultural Biotechnology Institute (FABI), University of South Africa South Africa.
K. O'Donnell – United States Department of Agriculture, USA.
D.M. Geiser – Penn State University, USA.
J.F. Leslie–Kansas State University, USA.
B. Summerell – Royal Botanic Gardens and Domain Trust, Australia.
T. Aoki – National Institute of Agrobiological Sciences, Japan.
K.A. Seifert – Agriculture and Agri-Food Canada, Canada.
C. Waalwijk – Plant Research International, The Netherlands.
U. Thrane – DTU Systems Biology, Denmark
A. Moretti – Institute of Science of Food Production, Italy

The Chair of the ICFR will in future be selected annually by the Board of Directors. This selection will be based on the hosting country/institute of prominent mycological meetings/congresses where a (satellite) meeting of the ICFR Board of Directors will be held. The main function of the Chair of ICFR will entail usariumg and leading meetings of the Board of Directors and to promote *Fusarium* research at various mycological meetings and/or congresses.

The Secretary-General will act as liaison between the international *Fusarium* research community, the Chair and the Board of Directors. Additional to providing support to the Chair, he will be responsible for the maintenance of the ICFR website (www.fusarium.org) and regular publication of news items related to *Fusarium* research.

The official ICFR website (www.fusarium.org) will aim to be an important research platform for the international *Fusarium* community. This website will provide a list of researchers and institutes involved with *Fusarium* research to allow future *Fusarium* researcher to identify possible partners for research collaborations. Additionally, the website will also provide several important resources related to *Fusarium* (literature library and research protocols), including news and events.

The Centre was formally launched by Mike J. Wingfield (FABI, University of Pretoria, South Africa) on 14 April 2016 during the CBS Symposium "Fungi and Global Challenges" held at the Trippenhuis, Royal Netherlands Academy of Arts and Sciences, Amsterdam, The Netherlands.

The ICFR will bring together key research institutes working on the genus *Fusarium* and fusarium-like sister genera. As a virtual research centre with its members spread over many research centres and universities worldwide, communication and collaboration on a global scale will be actively and enthusiastically promoted.

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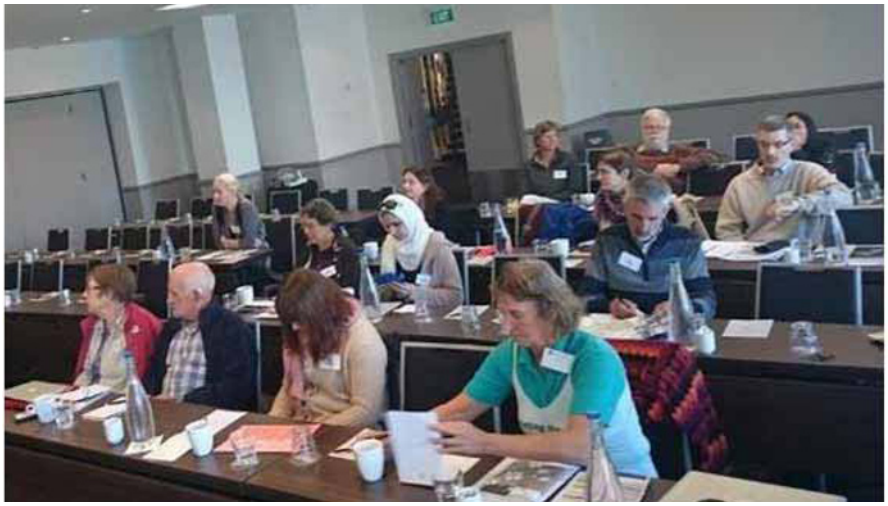
REPORT ON THE 2016 COMBINED AUSTRALASIAN MYCOLOGICAL SOCIETY (AMS) AND FUNGAL NETWORK OF NEW ZEALAND (FUNNZ) SCIENTIFIC CONFERENCE

This year's Australasian Mycological Society (AMS) conference was a combined meeting with the Fungal Network of New Zealand (FUNNZ) in beautiful Queenstown, New Zealand from 3–9 May. The meeting began with a workshop on "Red-listing of Fungi in Oceania", chaired by Tom May (Royal Botanic Gardens, Victoria), Peter Buchanan (NZ Landcare Research) and Sapphire McMullan Fisher (Royal Botanic Gardens, Victoria). In this workshop, attendees learnt of procedures used for the composition of the IUCN fungal Red list (which currently records 33 species globally and two Australasian taxa). Of interest was the IUCN's definition of separate fungal individuals in a defined area i.e. basidiomes separated by at least 10 m. Tom stressed that Red fungal lists, although useful in the evaluation of the risk of extinction of fungal species and in prioritising management decisions for such taxa, were only the start of the process in protecting significant fungal species. Attendees were encouraged to make submissions of candidate species for Red-listing in their region and globally.



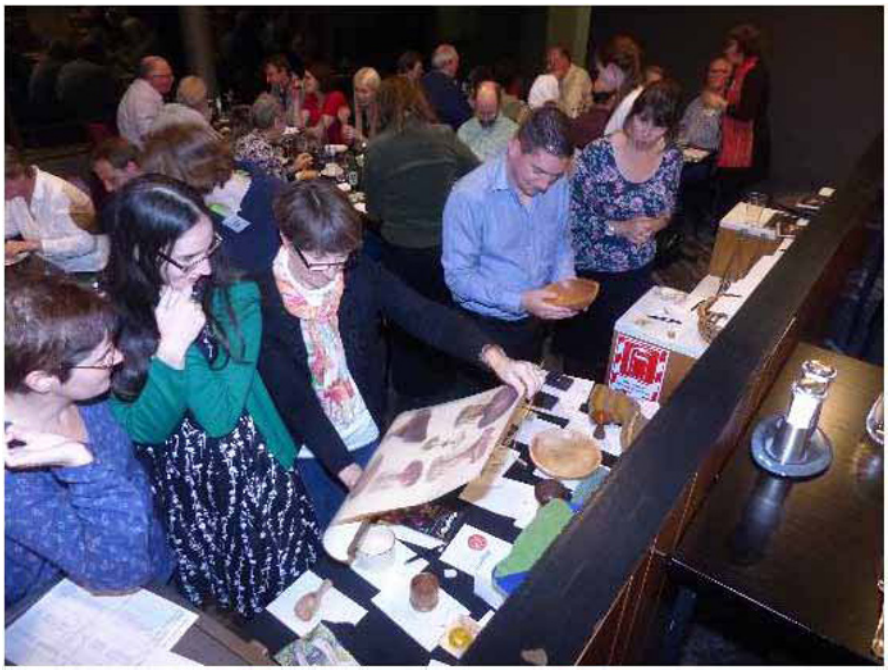
Delegates at the pre-conference workshop on Red-listing of Fungi in Oceania. Photo: Susan Nuske.

A second workshop "Australasian Mycology Education" was chaired by Sapphire McMullan Fisher and John Dearnaley (University of Southern Queensland) and focussed on the dearth of mycological teaching, particularly in the tertiary sector, in Australasia. A SWOT analysis was conducted within the group to examine the potential for the AMS to improve mycology education in the region. Several actions resulted from these discussions. The first is to completely survey the universities in Australia and New Zealand to establish what campuses still offered mycology courses or courses with at least some mycological component. This list will be placed on the society website so that students seeking mycological studies can target these institutions. A second major decision was to transfer the information currently in a University of Sydney teaching resource on the biology of fungi to the AMS website. Lastly it was discussed, that in the longer term, the AMS would explore the possibility of running a tertiary level online course or MOOC in mycology.

On day two, the first plenary session was given by Brian Monk (University of Otago) entitled "Can we discover better antifungals?" In his address, Brian outlined the impacts of fungal pathogens on society i.e. deaths of 1.4 million per year and major effects on food production. New antifungals are needed as existing drugs have limited efficacy and because of the evolution of resistance in many pathogens. In his endeavours to find novel drugs, Brian has focussed on the structure and function of fungal integral membrane proteins, especially drug pumps, ion transporters and cytochrome P450 proteins. He has used a variety of investigative approaches including molecular biology, advanced microscopy, combinatorial chemistry and X-ray crystallography. His research has recently characterised a number of key antifungal drug targets including an ABC transporter CaCdr1p (specifically inhibited by the D-octapeptide, RC21v3) and lanosterol 14α-demethylases from *Saccharomyces cerevisiae* and the fungal pathogens *Candida albicans* and *C. glabrata* (acted on by the azole drugs). Such structure-directed approaches to drug discovery are novel and exciting and suggest that the potential, disastrous end to the era of antibiotics may at least be delayed for some time.

A conference session in "Medical Mycology" followed on neatly from the first plenary address. Laszlo Irinyi (University of Sydney) discussed the development of a new DNA barcode that can be used to enable fast and accurate identification of mycotic agents. The translation elongation factor 1α region (tef1α) showed less variability at species level and had higher resolution at interspecies level than ITS DNA for a number of fungal pathogenic species. Kenya Fernandez (University of Sydney) next outlined associations between capsule production, cell size and clinical outcomes in *Cryptococcus* species. In *C. neoformans* strains, higher pathogenicity was associated with larger polysaccharide capsules while in *C. gattii* isolates, larger cell size was significantly associated with patient death. Wendy McKinney (Auckland City Hospital) discussed lessons learned in a recent outbreak of invasive Aspergillosis in a Children's Hospital. Measures to reduce further cases included removal of contaminated carpets, rectifying ventilation approaches, the use of patient

masks and enhanced cleaning of the unit. Samra Qaraghuli (Flinders University) described investigations of the antibacterial properties of Australian macrofungi. Of 170 species screened, a significant proportion produced antibacterial compounds, including those that inhibited biofilms and blocked bacterial efflux pumps. Ningxin Zhang (Massey University) finished the session with an explanation of a new Next Generation Sequencing (NGS)-based Multilocus Sequence Typing (MLST) approach for detecting multiple *Candida albicans* genotypes in clinical specimens. The approach is less costly than MLST, can be used on multiple colonies from a patient and therefore represents a significant technological advance.



Delegates enjoying the conference dinner and perusing silent auction items at the Queenstown Skyline Stratosfare restaurant. Photo: Peter Buchanan.

The session after lunch was entitled "Molecular Mycology". First up, Zachary Ardern (University of Auckland) discussed his research into genes involved in environmental adaptation in *S. cerevisiae*. In his experiments, sexual and asexual reproducing strains of the microbe were grown under either low carbon and raised temperature or low nitrogen and raised sodium chloride concentration. After 300 generations, Illumina Hi-Seq showed multiple genetic changes including SNPs with different frequencies and effects and duplication of different hexose transporter genes in the low carbon treatment. David Orlovich (University of Otago) next discussed comparative genomic and transcriptomic studies of the truffle-like fungus *Cortinarius beeverorum* and its close mushroom relative *C. dulciolens*. Both species had approximately 10,000 genes although the number was slightly higher in *C. dulciolens*. Interestingly, *C. beeverorum* had 100 unique highly expressed genes, whereas *C. dulciolens* had about 80 unique highly expressed genes. Sophie Lev (University of Sydney) outlined recent studies of phosphate-induced cell signalling in *Cryptococcus neoformans*. IP7 appears to be necessary for the activation of phosphate mobilising enzymes and phosphate transporters in *C. neoformans*, crucial to adaptation within the environment of a mammalian host and in disseminated cryptococcosis. Dee Carter (University of Sydney) next explained research into enhancing the effects of existing antifungal targets using synergistic agents. While synergy was found between amphotericin B and the chelating protein lactoferrin, antagonistic reactions were seen between azoles and some chelators in *C. neoformans* var. *grubii*. The final speaker in the session was Aidan Kane (University of Sydney) who detailed his research into approaches to prevent azole resistance in fungal pathogens. Some synergies have been observed with the combined use of upstream inhibitors in *Candida*, *Aspergillus* and *Cryptococcus.*

The final session of day two of the conference was entitled "Plant and Insect Pathogens". Marie-Laure Desprez-Loustau (INRA) discussed how three invasive *Erysiphe* species were differentially distributed on *Quercus* hosts throughout Europe. *E. quercicola* was largely found in southern regions and only on *Quercus* seedlings while *E. hypophylla* was found in Northern and Central Europe and typically on lower leaf surfaces. *E. alphitoides,* cause of major plant epidemics in the early 20th century, was the most widely distributed pathogen and was found on trees of all ages and on all leaf surfaces. Judy Gardner (NZ Forest Protection) next described two *Phytophthora* pathogens affecting *Pinus* plantations in New Zealand. *P. kernoviae* appears to be native to New Zealand while *P. pluvialis* is likely to have been introduced. These species form sporangia on the needle surface and released zoospores are attracted to stomata through which they penetrate into internal tissues. Nick Cummings (Lincoln University) outlined New Zealand collections of the arthropod pathogen *Cordyceps* and its anamorphs. More collections of this group are needed, as well, molecular work needs to be conducted on many existing herbarium specimens to clarify identifications. Maj Padamsee (Landcare Research) described how the majority of the 125 native New Zealand rust fungi are autoecious (have one host). Molecular examination has however recently confirmed that species in the genera *Mikronegeria* and *Aecidium* have alternate hosts. The final speaker in the session, Merje Toome (NZ Ministry for Primary Industries) outlined some of the challenges her department faced in making informed biosecurity decisions on potential invasive fungal and fungal-like pathogens. Molecular identification of all potential pathogens and staying up-to-date with taxonomy is essential to determine whether species are new or already present in New Zealand.

The day finished with a most enjoyable conference dinner at the spectacular Skyline Stratosfare restaurant high on the mountain above Queenstown. The evening's proceedings were greatly enlivened by a silent auction of mycological paraphernalia run by Teresa Lebel (Royal Botanic Gardens Victoria) and Sapphire McMullan-Fisher. Over A$1000 was raised with the money to be split between two student awards, the

Ross Beever Memorial Mycological Award and the Jack Warcup Memorial Prize.

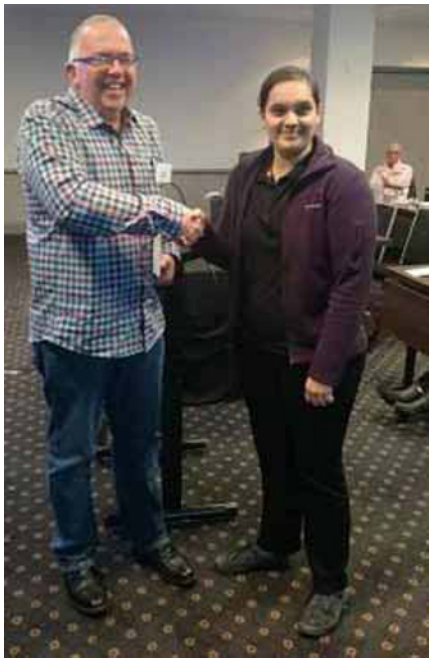
Day three of the conference began with a plenary address by Ian Dickie (Lincoln University) entitled "Multi-kingdom interactions in invasion: plants, fungi and animals". He began by talking about how the introduction of exotic tree species such as *Pinus*, *Pseudostuga*, *Alnus* and *Salix* into New Zealand has been accompanied by the invasion of exotic ectomycorrhizal fungal taxa. These fungi, including species of *Amanita*, *Rhizopogon* and *Suillus*, curiously have developed a novel ecology with exotic animal species such as red deer and brushtail possums that consume fungal fruit bodies and disseminate spores. *Pinus*-fungal invasions into New Zealand grasslands and shrublands has impaired soil ecology by decreasing the numbers of native mites and nematodes and increased soil bacteria via raising soil P and N levels. This in turn has enhanced the intrusion of exotic grasses and ultimately resulted in an overall loss of native plants and fungi from native ecosystems. What is to be done with this "homogecenic" disaster? Planting native seedlings around pines herbicide-drilled may be one approach. Exploring the role that native New Zealand bird species such as Kiwis and Wekas play in fungal spore dispersal (and reintroducing such species back into restored ecosystems) may have merit. More studies on the ecology of fungi in both disturbed and intact New Zealand ecosystems are also clearly necessary.

A session on "Fungal Ecology" followed morning tea. The first speaker, Renee Johansen (University of Auckland) explained her research on the root fungal communities of the cosmopolitan dune grass *Ammophila arenaria* (marram grass). NGS of fungal DNA in plant roots from multiple locations in New Zealand and Australia showed a wide diversity of predominately ascomycetes which varied between sites and country. This suggests that local environmental conditions are key to defining the fungal community of *A. arenaria*. Sarah Knight (University of Auckland) described her genetic study of 10,000 isolates of *Saccharomyces cerevisiae* from natural and agricultural regions across New Zealand. Surprisingly little genetic differentiation was observed within each region, even between neighbouring native forests and vineyards. At locations separated by distances greater than 100km, varying degrees of genetic differentiation were observed and this may relate to movement of fruit in the wine industry. Michael Rostas (Lincoln University) outlined his research on the metabolic and transcriptional changes that occur in insect herbivore-challenged plants previously colonised by the endophytic fungi *Trichoderma atroviride*, *Beauveria bassiana* and *Epichloe uncinatum*. Interestingly these endophytes did not trigger classic plant defence pathways involving jasmonic acid and salicylic acid and herbivore resistance may be mediated by an increase in volatile compounds such as monoterpenes. Julie Deslippe (Victoria University of Wellington) described investigations of the mycelial network of the shrub, *Betula nana* which is expanding its range into the Arctic tundra due to global warming. Stable isotope labelling experiments and DNA sequencing suggested that a single species of *Cortinarius* links and transfers C between multiple *B. nana* shrubs giving the plant an advantage over competitors and enhancing its invasive ability. Samuel Tourtellot (Lincoln University) described his research into the mycorrhizal partners of introduced *Eucalyptus* species in New Zealand. Experiments showed the ectomycorrhizal community of *Eucalyptus* grown in New Zealand soil was relatively depauperate. Additionally, invasive *Eucalyptus* species were more responsive to arbuscular mycorrhizal fungi (AMF) than ectomycorrhizal species. Sarah Sapsford (Murdoch University) finished the session with an overview of her PhD research into the impacts of canker disease on the mycorrhizal ecology of *Corymbia calophylla* (Marri). NGS was used to compare the fungal community of both adult trees across a gradient of disturbance and in seedlings grown in soil from along the gradient. Mycorrhizal fungal taxa and functional types were shown to change across the gradient in roots of both adult trees and seedlings.

The second session of the day focussed on "Fungal Conservation". Tom May spoke on threat-status listing of fungi in Australia and future directions for fungal conservation. He highlighted that currently only a single species of an Australian-occurring fungus, *Claustula fisheri* is listed on the IUCN Red List of threatened species, none are listed nationally and 45 species are listed under state and territory legislation in Australia. More nominations are clearly needed although it should be emphasized that listing does little to mitigate extinction and action plans are needed particularly in protecting habitat and perhaps in creating Millenium Seed *and* Fungi Banks. Peter Buchanan discussed the risk that imported mycorrhizal inoculum might have on native species of fungi in New Zealand. These products, which appear to evade biosecurity questions with relative ease, contain species of *Pisolithus* and *Scleroderma* which are foreign to the country. Veronique Gourmelon (Institut Agronomique neo-Caledonien) described investigations of the fungal and bacterial communities of four different plant formations in New Caledonia. NGS showed that each formation had a specific microbial community structure with high plant cover correlating with higher fungal diversity. This information will inform conservation and restoration actions for these biodiversity hotspots. Patrick Leonard (Queensland Mycological Society) next outlined the history of the IUCN Red lists and explained the reason that fungi have been relatively neglected from these is largely due to the lack of scientific data. He suggested a number of strategies that might be adopted to protect fungal biodiversity in light of this: (1) Wait for the science to catch up (which is also likely to result in species extinctions); (2) Protect habitat; and (3) List species and "be damned". The latter would likely provide the best chance of lowering the extinction rate of threatened fungal taxa. Alex Coles (Victoria University of Wellington) discussed investigations of the AMF communities of *Phormium tenax* across a hydrologic gradient of a New Zealand wetland restoration site. Hypotheses tested were that AMF diversity and biomass is higher in older restoration stages during summer and lower in flooded early restoration stages in winter. The final speaker in the session Sapphire McMullan-Fisher outlined research into the impacts of controlled burning on soil fungal populations in Australian urban grasslands. NGS of soil fungal DNA from multiple sites showed that fire frequency and not time since fire had the greatest impact on fungal community composition. In particular, the diversity of AMF was reduced in sites which had frequent controlled fires and this may have been related to an associated shift in plant community composition.

The final session of the conference, "Systematics", began with a talk by Roy

Halling (New York Botanical Garden) on the genus *Austroboletus*. This group of *Boletaeae* are distinct with pinkish ornamented spores and a stipe with cavities or a network pattern and are mostly found in countries of the western Pacific. Australia has approximately 16 species while New Zealand has just two. More specimens from neighbouring countries such as New Caledonia, PNG and Indonesia are keenly sought. Barbara Thiers (New York Botanical Garden) next explained the Macrofungi Collections Consortium (MaCC) a group of 40 US institutions that collectively have digitized and shared collection information from about 1.5 million herbarium samples of fungi as well as approximately 25,000 images of live specimens. A parallel Microfungi Collection Consortium (MiCC) is contributing similar information regarding micofungi. These initiatives are funded by the National Science Foundation and will be available to international researchers by 2018. Pam Catcheside (State Herbarium of South Australia) delighted the conference with her descriptions of six under-collected small black discomycetes (*Pezizales*) from South Australia. Macro and microscopic features, Australian distribution and molecular data were provided for species in the genera *Sphaerosoma*, *Marcelleina*, *Plectania*, *Plicaria* and *Boudiera*. Hyun Lee outlined his study of *Lactarius* (*Russulales*) diversity in South Korea. ITS sequencing of 574 fruiting bodies and NGS of 94 soil samples revealed 100 species of *Lactarius* - 48 more than previously reported for the country. Javier Fernandez-Lopez (Real Jardin Botanico, Madrid) described his investigations of *Schizopora radula* (*Hymenochaetales*). 50 specimens of this white wood rot fungus were examined from around the world and these separated into 4 different taxa based on morphological characterisation, nuclear DNA sequence analysis (ITS, LSU, RPB2, EF1α) and ecological niche modelling. Zai-Wei Ge (Chinese Academy of Sciences) explained his assessment of *Leucocoprineae* (*Agaricales*) diversity in China using both morphological and molecular approaches. His research showed that there were 46 species present within the genera *Chlorophyllum*, *Clarkeinda*, *Leucoagaricus*, *Leucocoprinus* and *Macrolepiota*. Many of these species had been previously misidentified and their phylogeny misinterpreted. To close the session, Teresa Lebel (Royal Botanic Gardens Victoria) discussed her revision of the Australasian "roll rims"; the genera *Austropaxillus* and *Gymnopaxillus* (*Boletales*). Investigations using a 3-gene data set and morphological approaches validated seven described species, highlighted five undescribed species and suggested that all should be renamed "*Gymnopaxillus*"



Kenya Fernandez being congratulated for the "best student talk" by David Orlovich. Photo: Susan Nuske.

Collecting table at Glenorchy after the foray. Photo: Susan Nuske.

At the end of the meeting, David Orlovich and Peter Buchanan presented the Jack Warcup Memorial Prizes for best student presentations. Best student talk went to Kenya Fernandez for her seminar titled "Associations between capsule production, cell size and clinical outcome in *C. neoformans* and *C. gattii* clinical isolates". Best student poster was awarded to Hyun Lee for his presentation entitled "Phylogenetic diversity of *Polyporus* sensu lato (*Polyporales*) in Korea". Many of the delegates then moved onto three days of fungal collecting at the magnificent forests of Glenorchy (co-ordinated by FUNNZ).

It has been a number of years since the last AMS meeting in New Zealand (the previous get-together was in Waikanae in the North Island in 2009) and the success of this conference provides impetus for more regular AMS meetings in the "Land of the Long White Cloud".

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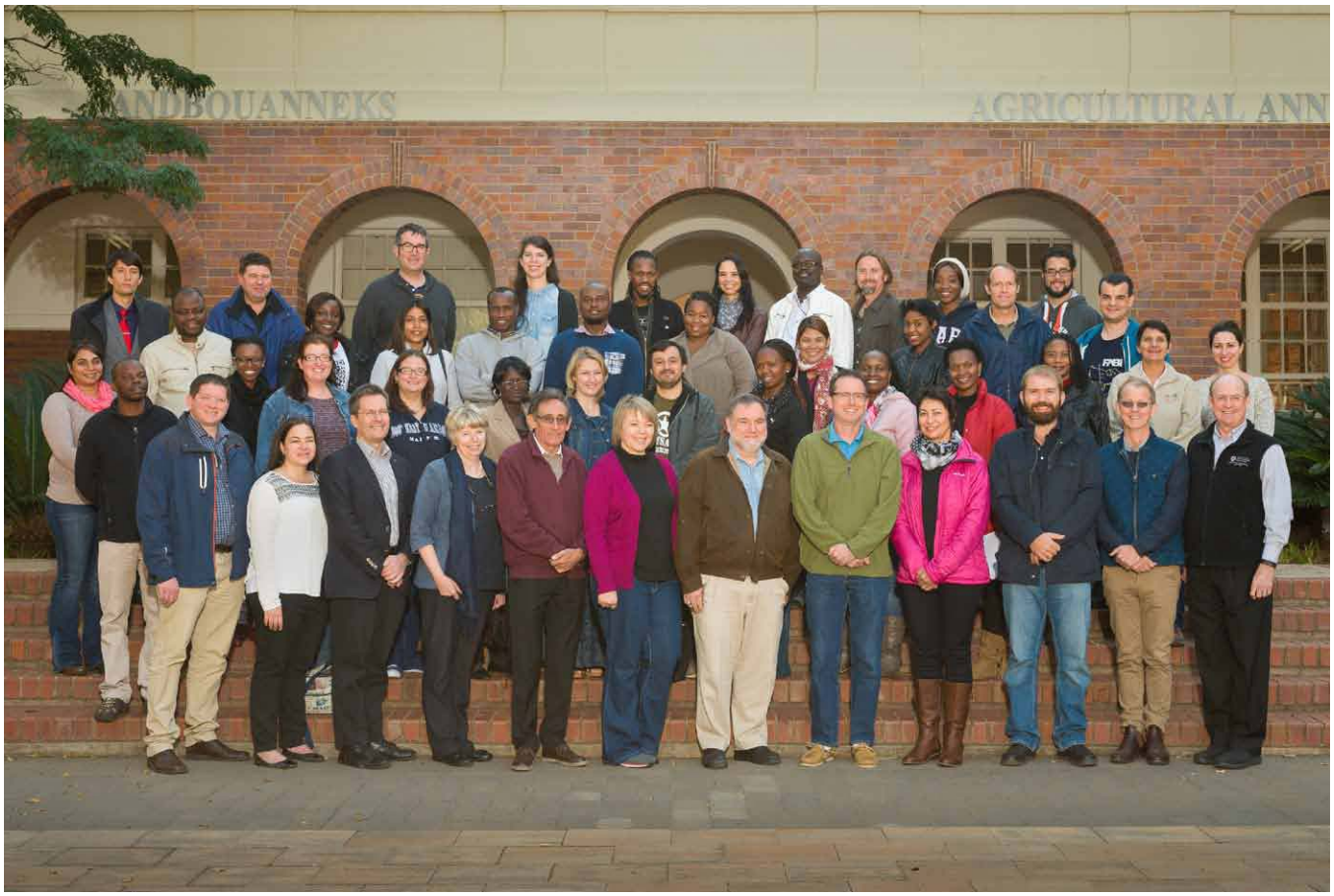
THE 2016 INTERNATIONAL *FUSARIUM* LABORATORY WORKSHOP



Attendees of the 17th International *Fusarium* Laboratory Workshop.

The Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa (www.fabinet.up.ac.za), an institute globally recognized for research in mycology and plant pathology, had the pleasure of hosting the 17th International *Fusarium* Laboratory Workshop from 30 May to 3 June 2016. This annual workshop, hosted by FABI for the second time, was led by a number of the world's leading authorities on this fungal genus (listed below). As has been true for past workshops, the event was comprised of lectures on a wide range of topics including laboratory strain identification, molecular identification, mycotoxins, VCG analysis, mating type identification as well as species concepts, phylogenetics, population genetics and genomics. The "hands on" laboratory sessions provided participants with experience in methods to culture, isolate and store strains of *Fusarium* and how to PCR, sequence and BLAST barcoding genes for molecular identification. The 30 participants from 11 different countries were also given the unique opportunity to observe and compare the various morphological characters of more than 80 *Fusarium* species.

The first International *Fusarium* Laboratory Workshops were initiated by John Leslie (Kansas State University) and Brett Summerell (Royal Botanic Gardens, Sydney). They are held bi-annually at the home base at Kansas State University, USA and alternately at universities elsewhere in the world. "Holding these workshops in different countries of the world is very important as it makes them broadly accessible to mycologists and plant pathologists interested in *Fusarium*" said Mike Wingfield, Director of FABI, during the welcoming ceremony. Whilst this year's workshop was more Southern Hemisphere focused in terms of delegates, it allowed researchers from the northern and southern hemispheres to interact and foster new collaborative efforts and thus to further research on this important genus of fungi.

The 2016 workshop provided the opportunity for *Fusarium* specialists to explore opportunities to expand the reach and influence of the International Centre for *Fusarium* Research (ICFR), recently launched at the CBS Spring Symposium in April (*see* pp. (11)–(12)). And then, after an intense four days of lectures and laboratory training sessions, the delegates and instructors enjoyed a drumming session under the tutelage of the African Drum Café's expert team. Everyone had a good laugh while trying to maintain a rhythm before sitting down to enjoy a hearty braai (barbeque) under a crisp, clear African Autumn sky. In all, the workshop was a great success providing skills to a community of *Fusarium* researches while at the same

time developing new friendships and collaborations.

The 2016 International *Fusarium* Laboratory instructors were: John Leslie (Kansas State University), David Geiser (Pennsylvania State University), Brett Summerell (Royal Botanic Gardens, Sydney), Emma Steenkamp (FABI, University of Pretoria), Mike Wingfield (FABI, University of Pretoria), Brenda Wingfield (FABI, University of Pretoria), Gerda Fourie (FABI, University of Pretoria), Lieschen de Vos (FABI, University of Pretoria), Sandra Lamprecht (Agricultural Research Commission, PPRI), Gordon Shephard (Institute of Biomedical and Microbial Biotechnology, Cape Peninsula University of Technology), Lorenzo Lombard (CBS, The Netherlands), and Pedro Crous (CBS, The Netherlands).

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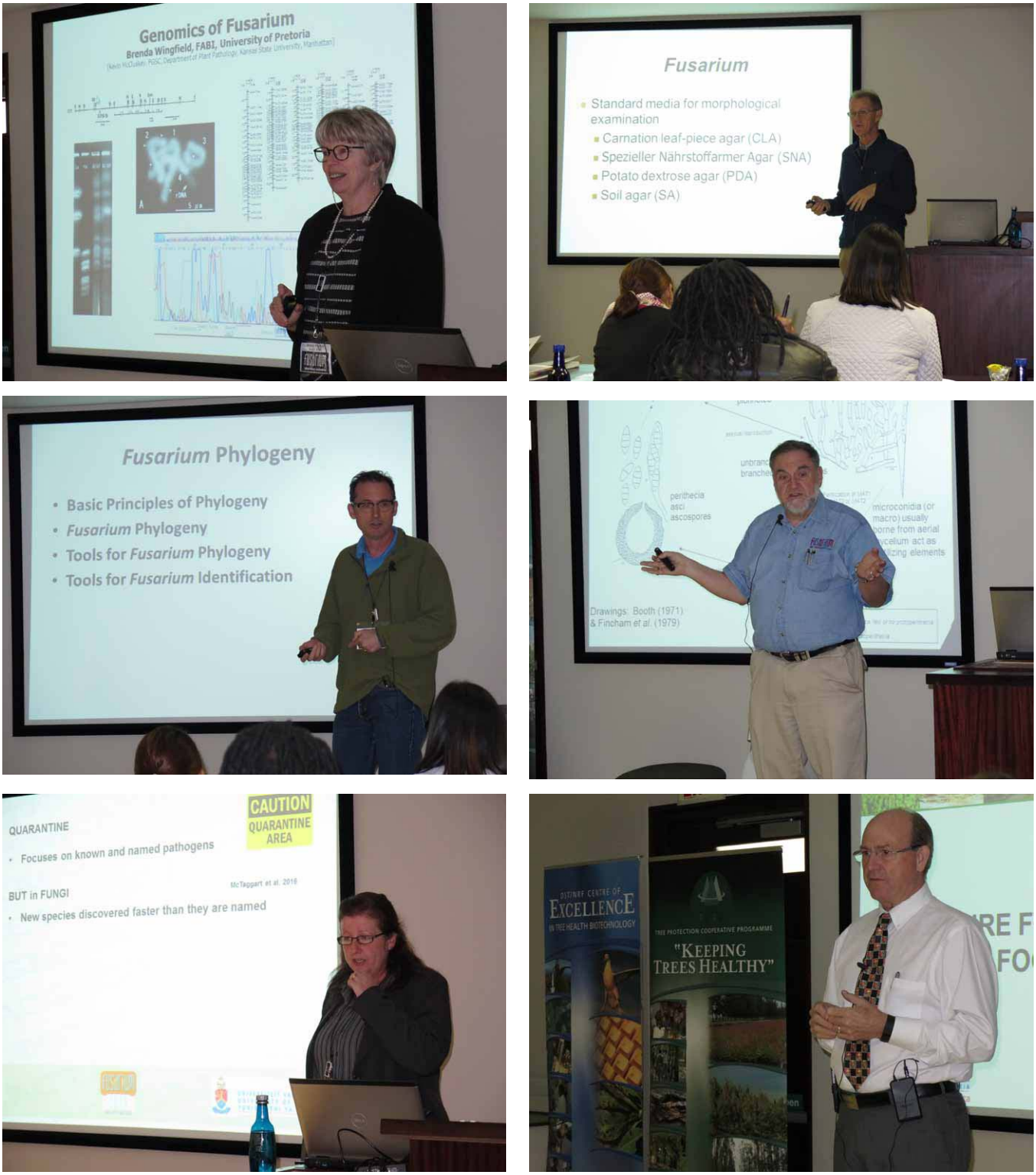


Scenes from the 2016 International *Fusarium* Laboratory Workshop held in Pretoria.

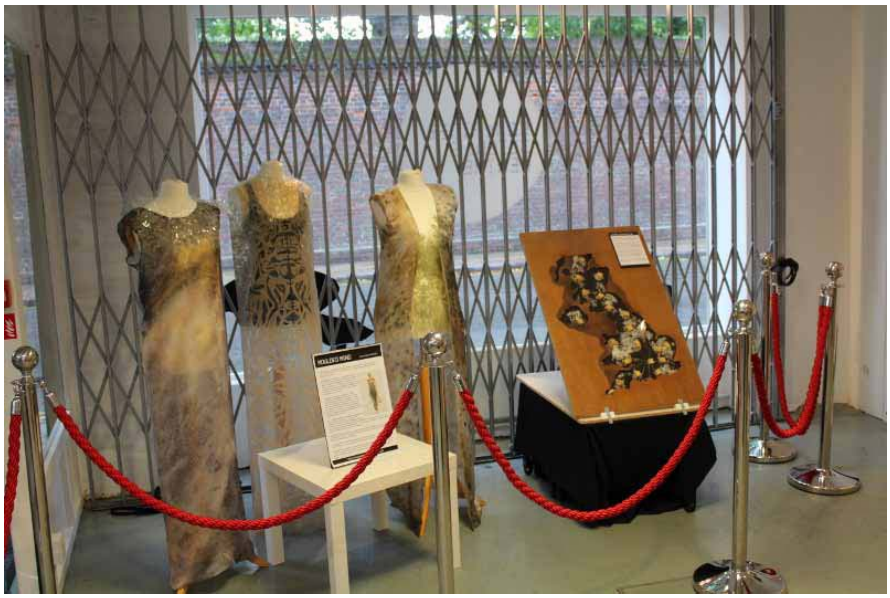
Scenes from the 2016 International *Fusarium* Laboratory Workshop held in Pretoria.

UK FUNGUS DAY: THE OUTREACH ARM OF THE BRITISH MYCOLOGICAL SOCIETY RAISING AWARENESS OF FUNGI AND FUNGAL SCIENCE

UK Fungus Day is the outreach arm of the British Mycological Society whose aim is to raise awareness of fungi and fungal science in the public arena. UK Fungus Day encourages outreach events throughout the year and culminates in an intense weekend of activities across the UK in October, bringing together academics, research scientists, teachers, educators and enthusiasts to share their passion for 'all things fungal'.

In the UK, the word 'fungus' is often associated with decaying food in fridges or fruit bowls, rotten wood timbers in homes, diseases of crop and horticultural plants; not to mention the fear of poisonous mushrooms. Fungi certainly can cause devastation; being responsible for some of the most important emerging infectious diseases such as bat white nose syndrome, ash dieback and amphibian decline; fungi are key targets in the quest to safeguard our food security and are increasingly reported as the hidden killers of the immunocompromised patient. However, few people realise that without fungi there would be no fertile soil, no plant life, no herbivores, no carnivores and no humans. Every plant in our gardens, every crop plant in our fields and every tree in our woodlands and forests has a fungus associated with it. Furthermore, fungi are the main garbage disposal agents of the natural world, breaking down dead plants and animals and releasing accessible nutrients which are utilised by other organisms for growth. Fungi are central to technologies that generate some of our foods, clothing and medicines; provide enzymes for biotechnology and for the production of biofuel. UK Fungus Day seeks to raise awareness of all of these areas. This is a challenge because fungal science encompasses so many disparate specialist disciplines; from genomics and pathology to conservation and taxonomy. Public interest in fungi is equally wide ranging; from natural history and gardening to gastronomy. Fungi have been the inspiration for creative arts such as poetry writing, photography and textiles; they are enjoyed by 'food lovers' worldwide, and have provided the creative spark for writers and musicians. Their importance to the ecosystem is recognised by conservationists and to industry by economists and entrepreneurs. Given this diversity of interest groups and their tendency not to cross-fertilize, a new approach to achieve wider engagement was adopted.

Amanita hats, masks, and mushroom badges, Cambridge University Botanic Garden. Photo: Ali Ashby.



Fungal fashion and mycelium map. Photo: Ali Ashby.

UK Fungus Day (UKFD) provides an identifiable platform that facilitates discourse between individuals who have a common interest in fungi and fungal science, albeit often from different disciplines; encouraging them to participate

Café Scientifique, Aberdeen. Photo: Alex Brand.

Roy Watling giving a fungal talk and walk, Royal Botanic Garden Edinburgh. Photo: A. Murfitt.

Fungal dyes, Royal Botanic Gardens Kew. Photo: N. Ianova

in the 'UKFD' weekend and other outreach events throughout the year, to enhance public knowledge of the fungal kingdom. Through this platform, the BMS seeks to create a 'communication' network; linking experts working in fungal research at universities, institutes and within the UK business sector; with schools, colleges, museums, enthusiasts, forayers and the wider audience. The platform facilitates the translation of cutting edge research data into accessible knowledge that can be used by teachers and educators in schools and colleges, putting fungal science firmly within the grasp of the national curriculum, whilst providing the impetus for academics to fulfil their public engagement objectives. The platform aims to encourage interdisciplinary involvement, with science and the arts working in synergy.

In October each year, UKFD outreach activities culminate in a nationwide celebration of the fungal kingdom which is supported through events such as: fungus talks by academics and enthusiasts; fungus walks with experts in mycology and conservation; and family outreach days involving scientists from industry and academia together with enthusiasts and educators. Fungus inspired exhibitions and performances are made by artists and musicians; and displays of fungus finds are displayed, identified and categorized by mycologists; at numerous venues across the UK. This year, our UKFD weekend will run over the weekend of 8–9 October 2016 and will offer a unique platform to unite all aspects of fungal science under one umbrella, from reporting on the latest scientific breakthroughs in fungal research to inspiring the general public with fascinating fungus facts. Feedback is collated from outreach events throughout the year and from the UKFD celebratory weekend and 'the best ideas for promoting fungi and fungal science' are shared with the UKFD community. New resource ideas resulting from such feedback are developed further by the BMS's Education & Outreach committee and made available in subsequent years to all UKF event organisers.

Since its inauguration in 2013, UK Fungus Day activities have 'mushroomed' and the UKF' networks continue to grow. Over 80 events took place across the UK during our celebratory weekend in October 2015. UKFD is supported by some of the UK's most prestigious institutions; by the British Mycological Society's recording group network; by schools and colleges,

Explaining flying sporophores and the life-cycle of *Phyllactinia guttata*. Photo: A. Richards.

universities and conservation groups, artists, chefs, and musicians. This year the BMS are hoping to achieve a record number of events nationwide on 8–9th October as we 'kick start' the Royal Society of Biology's 'Biology week' programme for the fourth year in succession.

The challenge and this approach is not one that should be limited to the UK, and the opportunity to build upon the success of the UKFD model on a global scale is well within reach; 'World Fungus Day' is achievable, with support from the international mycological community.

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