International Society for Plant Pathology

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Royal Society honour for Sophien Kamoun

Professor Sophien Kamoun, a group leader at The Sainsbury Laboratory, UK, has been elected as a Fellow of the Royal Society.

In a distinguished career, Professor Kamoun, who is also Professor of Biology at the University of East Anglia, has made a major contribution to the understanding of plant diseases and plant immunity. He has pioneered genomics and molecular biology methods to reveal fundamental insights into the biology and evolution of plant pathogens. His inventive work in plant pathology has resulted in new approaches to mitigate some of the world's most serious crop diseases.

The Fellowship of the Royal Society is made up of the most eminent scientists, engineers and technologists working in the UK and Commonwealth. Past Fellows and Foreign Members have included Isaac Newton, Charles Darwin and Stephen Hawking. The Society's fundamental purpose, reflected in its founding Charters of the 1660s, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity.

Our congratulations to Sophien Kamoun!

(The Sainsbury Laboratory News, 9 May 2018)

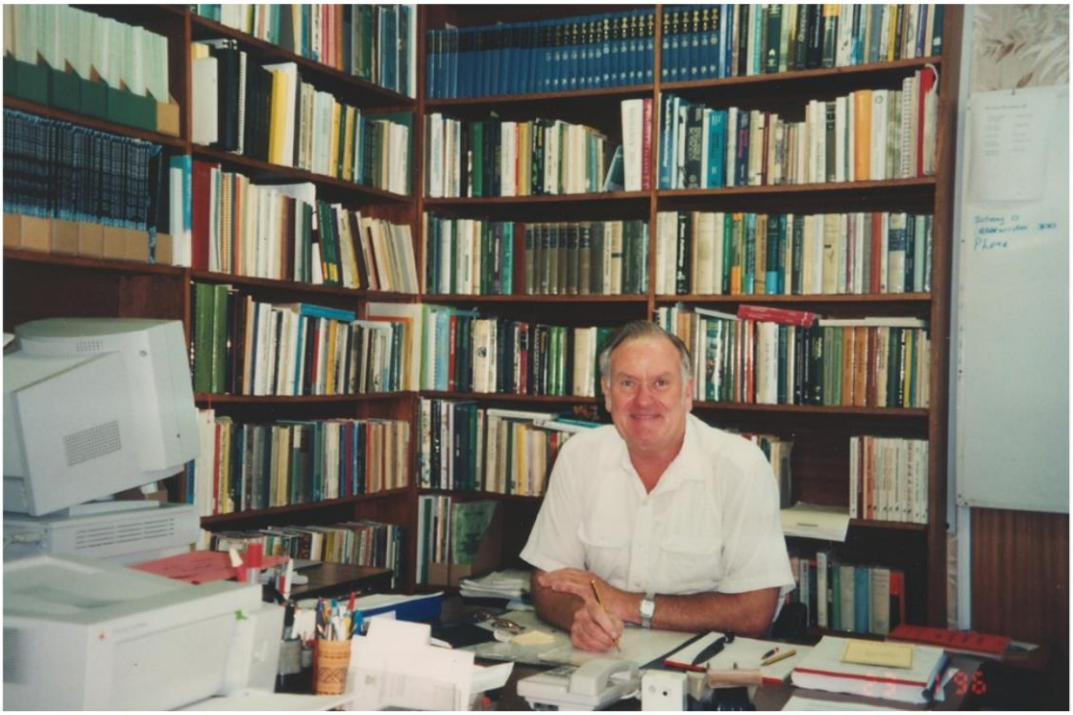
ICPP18 T-shirts now available for pre-order

Pre-order your ICPP Boston USA souvenir T-shirt by 7 June 2018 and it ready for pick up at the meeting. There are two designs to choose from and can be ordered through the APS website.

Vale Dr John Frederick Brown (4 March 1939- 4 April 2018), Foundation Member and Fellow of the Australasian Plant Pathology Society

It was with great sadness that I learnt of the passing of John Frederick Brown on 4 April 2018, after a short battle with cancer.

John was educated at Hurlstone Agricultural High School and the University of Sydney, graduating BScAgr (Hons) in 1961 and PhD in 1965. In 1964 he was appointed Lecturer in Botany at the University of New England (UNE) at Armidale. Initially he taught mycology and soil microbiology but soon introduced plant pathology into the curriculum. This was the beginning of more than 35 years of teaching and research into many aspects of plant pathology. His courses, teaching ability and rapport with students quickly attracted quality honours and postgraduate students and a significant research group was formed at UNE. He interacted with many agricultural and horticultural industry groups to identify disease problems that he and his students could research and hopefully solve. He had a great ability to attract research funds to support postgraduate research. John was promoted to Associate Professor in 1973, a position he held until he retired in 1996. He continued as a Research Fellow at UNE supervising PhD students until 2000 when he moved from Armidale. John supervised and co-supervised 14 PhD and 12 MSc students as well as numerous honours students.



John Frederick Brown at his desk at the University of New England in January 1996.

His research interests were broad and encompassed most major areas of plant pathology (aetiology, pathogenesis, epidemiology, disease assessment and management strategies). His research activities can be broadly divided into five categories; diseases of temperate field crops (particularly small grain cereals and sunflower), diseases of tropical cash and subsistence crops in Pacific Island nations, microbiology of leaf surfaces, mycorrhizal symbioses and biological control of weeds using plant pathogens.

John's interest in tropical agriculture commenced in 1969 when he was asked by the then Department of Foreign Affairs, to visit the Solomon Islands as an advisory plant pathologist. He spent 10 months in the Solomon Islands between 1970 and 1974. During the period 1977 to 1981, he was involved in running a 'short course in plant protection' and initiating and monitoring follow-up research in selected Universities in Indonesia.

The Australian Academy of Science sponsored five Plant Pathologists to visit 12 Chinese research institutions during a 26-day visit in June-July 1982. The group consisted of John, Chris Hayward, Bob McIntosh, Graham Stirling and James Wong with John as the group leader. The visit followed reports of two earlier visits to China in 1980, one led by Sir Otto Frankel and the other by Dr John Possingham, that recommended a visit by a team of plant pathologists might provide useful insights for Australian agriculture. The reasons for the recommendations related to the earlier teams' observations that crop disease levels were lower than expected and whether these might be attributed to the traditional farming techniques used in China. The group published its report 'Some impressions of plant pathology in China, 1982' in 1983 in the *Journal of the Australian Institute of Agricultural Science* 49, 71-80.

In 1986 and 1987, John was seconded from UNE for 17 months to the Bogor Agricultural Institute (IPB) in Indonesia to head a project designed to improve the University's (IPB) ability to train their own undergraduate and postgraduate students in agriculture and science. His most recent involvement in tropical plant pathology (1987-94) was in the South Pacific states of Tonga, Fiji, Samoa and Vanuatu where a dieback disease of kava was investigated and its cause established.

John developed special expertise in the area of epidemiology and crop loss assessment and was recognised both nationally and internationally for his contributions to this field. John has authored or co-authored about 190 publications including 10 books or book chapters, 177 scientific publications and several reports to international agencies. A highlight of his career was the publication of the 556-page textbook *Plant Pathogens and Plant Diseases* in 1997. The book contained contributions from John and 16 other Australian Plant Pathologists with specialist knowledge in various fields. It was edited by John and Helen Ogle, John's first PhD student. This textbook was specifically written to emphasise examples of diseases in the Australasian region and was launched at the 1997 APPS conference in Perth.

In addition to his research contributions to Australasian Plant Pathology, John contributed to our Society in many ways, particularly during the first 20 years of its existence. He acted as Chairman and Convenor of the Epidemiology and Crop Loss Assessment section for several biennial conferences as well as for the Fourth International Plant Pathology Congress held in Melbourne in 1983. John served as President of the Society from 1995 to 1997 and was designated a Fellow of the Australasian Plant Pathology Society in 1999. Several of his students have served on the executive committee of the APPS as well.

His past students work, or have worked, in Universities, Government Departments (both State and Federal), in private enterprise as well as holding overseas posts.

In his retirement John and his wife Leonie moved to the family property on the shores of Lake Conjola on the south coast of NSW, where he continued to maintain an interest in mycology and plant pathology and enjoyed catching up with past students and colleagues.

Those of us fortunate enough to know John will sadly miss his endearing sense of humour, warmth and honesty. John shared his life with his lovely wife Leonie, their children, Michael, Tony and Karen, grandchildren and great grandchildren. Our condolences go out to Leonie and all of John's family.

Dr Joe Kochman, one of John's students, Foundation Member and Fellow APPS, May 2018

Associations and causal relationships in the decline of *Eucalyptus marginata*

A paper by Elaine M Davison titled "Relative importance of site, weather and *Phytophthora cinnamomi* in the decline and death of *Eucalyptus marginata* – jarrah dieback investigations in the 1970s to 1990s" was published online on 28 April 2018 by *Australasian Plant Pathology*. The abstract is as follows:-

Jarrah dieback was the name given to the sudden death of *Eucalyptus marginata* in the southwest of Western Australia, a serious economic problem. Although deaths were attributed to *Phytophthora cinnamomi* in the 1960s, the supporting evidence was weak; these deficiencies were not realised until 1980. Renewed interest in jarrah pathology showed that the incidence and severity of root lesions caused by *P. cinnamomi* in live trees was low, but in recent deaths it could be isolated from the root collar and large roots of some, but not all trees. Jarrah deaths result from hydraulic failure, implying extensive sapwood damage. This is unlikely to result from *P. cinnamomi* infection, which preferentially invades phloem, but could result from waterlogging, which causes tyloses to form in xylem vessels so they no longer conduct water. Tylosed root sapwood has been reported from investigations into jarrah deaths. An interpretation of past deaths based on stress factors better fits where and when deaths occur. This is within 3 years of exceptionally heavy rainfall, an inciting factor. Predisposing conditions are sites with some form of poor drainage, such as water-gaining sites, or those with impeded sub-soil drainage. Recent logging further increases site wetness. *Phytophthora cinnamomi* should be seen as a contributing factor, which is normally compartmentalised by the host, but can spread extensively in dying trees.

Read paper.

State of the World's Fungi Symposium, Royal Botanic Gardens, UK, 13–14 September 2018

In conjunction with the publication of a cutting-edge annual report, scientists and policymakers will gather at Kew in the UK for the first international State of the World's Fungi Symposium.

Building on the success of our State of The World's Plants project, the State of the World's Fungi report provides a review of our current state of knowledge and the major issues affecting fungal diversity and abundance. Also featured in the report are fungal-plant interactions, conservation and uses of fungi, and the fungal tree of life.

The two-day symposium brings together plant and fungal scientists, ecologists, conservationists and industry and policy experts from around the world, to discuss issues raised in the report.
More details on the on meeting website.

(Alastair Lamb, Royal Botanic Gardens, Kew, UK)

Genomic models predict shorter time for banana breeding

Scientists have shown through genomic prediction models that it is possible to speed up banana breeding, giving hope to breeders and smallholders looking for improved varieties. Banana is an important staple crop for millions of people in Sub-Saharan Africa, especially those in East Africa.

In a study published in *The Plant Genome* in March 2018, researchers collected data on 15 key traits from 307 banana types that were grown in two fields in Uganda under low and high input field management conditions. The data covered two crop cycles from 2013 to 2016.

The researchers grouped the fruit plant's traits into five categories: plant stature, suckering behaviour, black leaf streak resistance, fruit bunch and fruit filling. They then mapped DNA differences and assessed the ability of six genomic prediction models to use cross-validation to identify the bananas with the best traits.

Read more.

(Baraka Rateng', SciDev.Net News, 4 March 2018)

Springer's "Change the World, One Article at a Time"

Springer's "Change the World" initiative is now entering its third year. The Editors-in-Chief have to nominate one article they believe offers something special to help tackle some of the world's greatest challenges. Articles range across disciplines but share one feature: they all have the potential to help humanity and to protect and preserve our planet.

All articles are freely accessible until 31 July 2018. Browse articles.

Indian Phytopathology and Journal of Plant Pathology now published by Springer

Indian Phytopathology (IP) and the *Journal of Plant Pathology* (JPP) are now both published by Springer.

IP is the journal of the Indian Phytopathological Society and deals with the disciplines of mycology, fungal pathology, bacteriology, virology, phytopathology and nematology. JPP is the international journal of the Italian Phytopathological Society (S.I.Pa.V), covering fundamental and applied aspects of plant pathology.

More information about IP and JPP are Springer's website.

Approachable science on genetically engineered crops (GMOs) recorded webinar

Paul Vincelli, Extension Professor at the Department of Plant Pathology, University of Kentucky, USA, recently gave an American Phytopathological Society (APS) webinar on "Approachable science on genetically engineered crops (GE)." This is now available online on the APS website.

The introduction to the webinar follows:
"Sometimes we scientists and science communicators find ourselves engaged in public controversy. GE crops certainly generate significant controversy in some settings. As scientists and science communicators, perhaps our most important task is to assure that the science underlying the controversy is adequately presented. This provides a foundation for people to make their own values-based choices, informed by the science for those that seek it. Towards this end, analogies that help teach basic scientific aspects of GE crops will be demonstrated. Specific practices that can ease emotional tensions will be demonstrated and discussed. In one or more cases, audience participation will be invited as part of the demonstration. In reducing tensions, more thoughtful, productive, and respectful exchanges are possible."

Crop immunisation can root out take-all fungus in wheat

Natural use of biology to control disease in crops is the Holy Grail of agriculture, and a team of young researchers at Rothamsted Research, UK, has now pinpointed a way of easing cereals' risks from the deadly take-all soilborne pathogen. Their complete findings are published in the *Journal of Experimental Biology*.

Take-all is a devastating root disease of cereal crops worldwide caused by the fungal pathogen, *Gaeumannomyces tritici*. Related species, notably *G. hyphopodioides*, are capable of immunising plant roots against the pathogen. Farmers struggle to control the disease because few chemical seed treatments are available and current biological strategies are hindered by the variety of soil types.

The team collected samples of the beneficial fungus from the fields of Rothamsted Farm and developed a laboratory test to explore their ability to colonise and protect the roots of barley, rye, wheat and the rye/wheat hybrid, triticale. In field trials, the team identified commercial cereal varieties that performed better than others.

"If the ability of wheat cultivars to support and be colonised by natural or introduced populations of beneficial Gaeumannomyces species could be harnessed and exploited, either through a seed dressing or via direct application into a crop's rooting zone, this could provide a potential biological management strategy for the control of take-all disease in wheat crops," notes McMillan, who leads the take-all research group at Rothamsted.

Understanding the complex interactions between the fungi and the cereal hosts will yield more information for developing strategies to control the disease.

(Rothamsted Research News, 22 May 2018)

Previously unknown rice blast resistance isolated

A never-before-described gene that gives rice resistance to a disease that has been costing about $66 billion a year in global damage has been isolated by a team of scientists led by Agricultural Research Service (ARS) plant pathologist Yulin Jia. Rice blast, caused by the fungus *Magnaporthe*

oryzae, results in annual yield losses large enough to have fed 60 billion people each year, according to the team's paper just published in the journal *Nature Communications*.

Amazingly, Ptr, the disease resistance gene Jia and his team found, has a structure that has not been seen in plants before. It has been previously deployed unknowingly in blast-resistant rice cultivars because it has been tightly linked to another disease resistance gene, Pi-ta, which has a genetic structure that is well-described in scientific literature.

Ptr has essentially been living in the shadow of Pi-ta. "Our research was able to separate the two genes and demonstrate that Ptr is independently responsible for its own broad-spectrum blast resistance without Pi-ta," says Jia. "This will provide a new strategy for developing blast-resistant rice cultivars." The full genomic sequence of the Ptr gene was put into GenBank for use by public researchers worldwide.

(Sharon Durham, Agricultural Research Service, Research News, 23 May 2018)

Battling Bubbles: How plants protect themselves from a killer fungus

In the battle between plants and pathogens, molecules called small RNAs are coveted weapons used by both invaders and defenders. Researchers at the University of California, Riverside (UCR) reported in a paper in the journal *Science* how plants package and deliver the small RNAs, or sRNAs, they use to fight back against plant pathogens. The study focused on *Botrytis cinerea*, a fungus that causes a grey mold disease in almost all fruits, vegetables, and many flowers.

Hailing Jin, a professor of microbiology and plant pathology in UCR's College of Natural and Agricultural Sciences, and her team found that during infection with *B. cinerea*, plant cells package sRNAs inside bubble-like sacs, called exosomes, which are sent out of the plant cells and accumulate near the site of infection. These 'battling bubbles' are taken up by the fungal cells efficiently, where the transferred host sRNAs inhibit the expression of fungal genes needed to cause the disease. The research was performed using *Arabidopsis thaliana*, a small flowering plant widely used as a model species because it is easy to grow and study.

(Sarah Nightingale, UC Riverside News, 17 May 2018)

African conference confirms growing strength of plant disease research network

Delegates from 10 African countries joined counterparts from the UK at the CONNECTED Virus Network Africa Launch Conference, which took place in Kampala, Uganda, from 7-9 May 2018. It was immediately followed by a two-day training workshop aimed at early career researchers looking to develop skills including research grant proposal writing.

Professor Neil Boonham from Newcastle University, UK and Co-Director of the CONNECTED project, says the outcomes of the conference confirm the value and potential of the project, and is urging more people to come forward to join the growing network. "The CONNECTED project is as yet just a few months old, but we are already seeing promising collaborations between highly-skilled and enthusiastic researchers to find solutions to plant disease in Sub-Saharan Africa.

“The project’s focus on encouraging early career researchers is already paying dividends, and it’s clear that one of the legacies of CONNECTED will be a cohort of scientists who have begun to form collaborations, injecting real energy to develop solutions to tackling devastating vector-borne plant disease in the years ahead.

The conference was hosted by Dr Titus Alicai, National Agricultural Research Organisation (NARO), Uganda and was officially opened by Yona Baguma, Deputy Director General of NARO. Delegates heard a number of research-focused presentations on issues including pest management, plant protection, and agricultural extension in Africa. There was a series of workshops during which delegates considered the project’s future priorities for the pump-prime research funding which forms an integral part of the opportunities offered by CONNECTED, as well as identifying training needs and opportunities for future inter-disciplinary work.

Day Two of the conference was hosted at The National Crops Resources Research Institute, and delegates enjoyed a tour of the laboratory facilities as well as some of the fields which are hosting much of the Institute’s work on crops including cassava, sweet potato and maize.

The CONNECTED network is funded by a £2 million grant from the UK government’s Global Challenges Research Fund, which supports research on global issues that affect developing countries. It is led by Professor Gary Foster from the University of Bristol’s School of Biological Sciences jointly with Professor Neil Boonham from Newcastle University.

Some of the delegates at the CONNECTED Virus Network Africa Launch Conference in Kampala, Uganda.

(Richard Wyatt, CONNECTED Communications Officer)

Drought will bring more crop disease in New Zealand

New Zealand's land-based primary industries need to get ready for more, and more serious, crop disease as climate change causes more and longer droughts, according to new research. In the journal *Australasian Plant Pathology*, the scientists say that climate change is expected to bring more droughts in many parts of New Zealand, and more droughts are "likely to increase the severity of a wide range of diseases affecting the plant-based productive sectors".

The probable negative effects of drought include "…a predisposition of hosts to infection through general weakening and/or suppressed disease resistance". More frequent and more severe droughts could also lead to "emergence of enhanced or new diseases of plants that can reduce primary production".

Lead author Dr Steve Wakelin, of the Bio-Protection Research Centre and Scion, said it was essential that more research was carried out so each industry could prepare for the effects of drought.

"Many industries, such as agriculture and horticulture, may have time to gradually change over the next 20 or 30 years, to avoid the worst effects of drought or even take advantage of any opportunities the changing climate may bring.

(Fresh Plaza, 7 May 2018)

Researchers move toward understanding the deadly citrus disease, huanglongbing

Researchers at the University of California, Riverside, USA, have made an important step in understanding the molecular mechanism of huanglongbing (HLB), a destructive disease that is a serious threat to the citrus industry worldwide. HLB, also known as citrus greening disease, has devastated groves in Asia, South America, and the southern USA, costing the Florida citrus industry billions of dollars since 2005. HLB is associated with a species of bacteria called *Candidatus* Liberibacter asiaticus (CLas), which is transmitted by a tiny insect called the Asian citrus psyllid (ACP). Infected trees show leaf mottling, deformed and discoloured fruits, and premature fruit drop. There is no cure for the disease and once a tree is infected it typically dies within three to five years.

An important step to developing HLB-resistant citrus varieties is to better understand how the bacterium infects trees and causes disease. In a paper published in *Nature Communications*, a team led by Ma reported a significant breakthrough in understanding the disease mechanism of HLB. They discovered that the bacterium secretes a protein—called Sec-delivered effector 1 (SDE1)—that helps infect plants. SDE1 works by attacking specific proteases—called papain-like cysteine proteases (PLCPs)—that could otherwise help the citrus trees resist infection.

Read more.

(Sarah Nightingale, UCR Today, 30 April 2018)

Acknowledgements

Thanks to Grahame Jackson, Greg Johnson, Joe Kochman and Peter Williamson for contributions.