

# Kew Scientist

October 2005 Issue 28

NEWS FROM THE LIVING COLLECTIONS, THE HERBARIUM AND THE LABORATORIES AT KEW & WAKEHURST PLACE

## Legumes of the World



*Dahlstedtia pinnata*

### Kew at the International Botanical Congress

*Legumes of the World* was presented at the XVII International Botanical Congress in Vienna (17-23 July 2005). Kew scientists had a major influence on the congress, organising ten of the sessions, presenting 33 papers, co-authoring a further 26, and presenting 14 posters and co-authoring another 29. Mark Chase gave one of the opening plenary lectures in which he reviewed 15 years of angiosperm classification from the perspective of DNA data. The African Plants Initiative also had an exhibition stand where a prototype web interface to digitised type specimens and illustrations of African plants was demonstrated.



Anna Saltmarsh (standing), Kew's African Plants Initiative (API) co-ordinator, demonstrating the prototype API web interface to delegates at the XVII International Botanical Congress in Vienna.

**I**n July 2005 *Legumes of the World*, edited by Gwilym Lewis, Brian Schrire, Barbara Mackinder and Mike Lock, was published by Kew. This first fully-illustrated encyclopaedia of the world's 727 legume genera is an authoritative compendium of legume information and it has already received much international acclaim. The text was contributed by the four editors together with 20 internationally renowned legume scientists and is lavishly illustrated throughout with over 1,100 photographs, paintings and line drawings, including 105 line drawings commissioned from the botanical artist Pat Halliday.

The book contains introductory chapters on the classification of the legume family and its biogeography. These are followed by accounts of all legume genera, arranged systematically by tribe and subfamily. The generic accounts give the main synonyms, number of species, geographical range, etymology, ecology, phylogenetic notes and economic uses. Each account also lists the main taxonomic and phylogenetic references, and these are given in full in a meticulously compiled bibliography. To aid the reader to navigate through the mine of information there is a section titled 'about the book', as well as a complete synopsis of legume genera and three separate indexes (to illustrations, vernacular names and scientific names).

The arrangement of the genera is based on a combination of morphologically derived taxonomies and new molecular analyses of the family. The result is a new systematic framework which spotlights as yet untapped economic potential in this important family by placing closely related genera near each other.

The book will appeal to the professional, student and amateur across a broad range of disciplines. It is reasonably priced at £55, a price tag only made possible by the donations of a number of generous sponsors.

**Contact: Dr Gwilym Lewis ([g.lewis@kew.org](mailto:g.lewis@kew.org))**

*Legumes of the World* (Eds G. Lewis, B. Schrire, B. Mackinder, M. Lock); Kew Publishing; ISBN 1 900 34780 6; £55.

Available from [www.kewbooks.com](http://www.kewbooks.com)

**Kew**

PLANTS PEOPLE  
POSSIBILITIES



Director's Message

## Partnerships for Africa

The wet tropics and drylands of sub-Saharan Africa have been a major focus of plant diversity research at Kew since the late nineteenth century. A traditional strength of these programmes has been circumscribing and identifying the basic units of plant diversity, but today Kew's work in sub-Saharan Africa also has a strong conservation focus: from identifying priority areas for conservation in Cameroon to assessing the conservation status of endemic species in Madagascar.

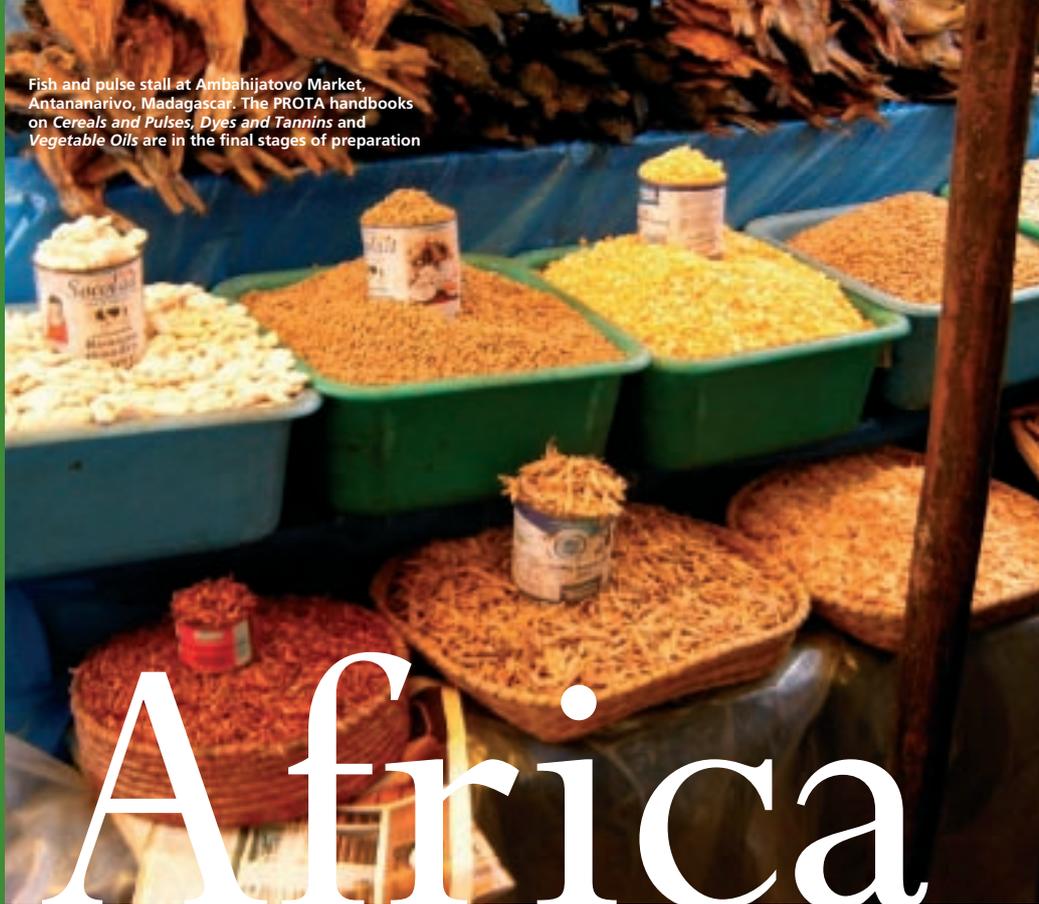
Nine of the 17 countries who are currently Millennium Seed Bank Project partners are in Africa. Partnerships include working with the Centre National de Semences Forestières in Burkina Faso on the sustainable management of indigenous trees, and assisting the South African National Biodiversity Institute to protect the unique plants of the Cape Floristic Province. All these projects include not only the collection and long-term preservation of seed, but also the sharing of resources, expertise and information to support broader plant conservation goals.

Several of Kew's long-standing projects in Africa are either nearing completion or are being approached in a new way. For example, *Flora Zambesiaca* is already available electronically on the Internet ([www.kew.org/efloras](http://www.kew.org/efloras)), *Flora of West Tropical Africa* is being prepared for electronic access and we hope that *Flora of Tropical East Africa*, which is now approaching completion, will follow shortly. There are also new projects with a clear focus on improved dissemination of information. The African Plants Initiative aims to transform the study of African plants by creating a digital on-line library of scholarly material, including images and text from many sources. Central to this resource will be a synonymised checklist for all African plant species south of the Sahara together with images of more than 300,000 herbarium specimens covering the more than 60,000 plant species. More than 50,000 type and other specimens from Kew are being digitised for this project.

The African Plants Initiative is a good example of a diverse and dynamic multilateral partnership in which partners work toward a common goal with mutual trust and respect. We hope that it will be a catalyst for future, still broader, partnerships that draw together the scattered resources on the plants of the world to make them more useful for scholarship, and for meeting the urgent challenge of managing the great variety of plant life in Africa in a sustainable way.

Prof. Sir Peter Crane FRS, Director

Fish and pulse stall at Ambahijatovo Market, Antananarivo, Madagascar. The PROTA handbooks on *Cereals and Pulses*, *Dyes and Tannins* and *Vegetable Oils* are in the final stages of preparation



# Africa

Kew's work with colleagues in Africa now has a strong focus on promoting conservation and sustainable use. New and existing African projects were presented by Monique Simmonds at the Parliamentary Links Day at Westminster on 21 June 2005, organised by the Royal Society of Chemistry. This had the theme of 'Science behind the G8 summit' and concentrated on the Government's twin priorities of climate change and Africa. The Prime Minister, Tony Blair, addressed the Links Day and later emphasised the importance of science in dealing with disease in Africa and the need to train future scientists.

## African Plants Initiative

In 2003 The Andrew W. Mellon Foundation initiated funding for the African Plants Initiative (API) aiming to improve access to information on African plants. The product will be a database of resources accessible via a subscription-based website distributed by Aluka, a not-for-profit organisation. Material is being gathered from a broad partnership currently involving 39 botanical institutions in 20 countries in Africa, Europe and North America.

Kew has taken a leading role in this initiative, digitising its extensive collection of African type specimens and offering training and support to partners. Staff throughout Kew have contributed to achieving ambitious targets over the past two years. As a result the Kew Herbarium Catalogue now contains information on over 53,000 African type specimens. High resolution digital images of the specimens have been captured and will be available via the Aluka database from summer 2006.

The project has also enabled the electronic capture of over 4,000 illustrations, photographs, economic botany artefacts and archival items, as well as H.M. Burkill's volumes on *The Useful Plants of West Tropical Africa*. Further material, including Kew's

African floras, will be added. A pilot of the API website was demonstrated at the 2005 International Botanical Congress, provoking considerable interest.

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Digitised type specimen of *Pelargonium salmoneum*.

## African Plant Resources

The international Plant Resources of Tropical Africa (PROTA) programme, co-ordinated from the Netherlands, is aimed at bringing together all available information on 7,000 species of tropical Africa's useful plants for dissemination on the web and by books. Olwen Grace is the PROTA officer at Kew and has helped gather some 1,500 references from all over the UK. The first volume in the PROTA handbook series, *Vegetables*, was published in 2004 and will be followed later this year by *Cereals and Pulses*, *Dyes and Tannins* and *Vegetable Oils*. Monique Simmonds attended the latest PROTA Trustees Meeting in Ghana in September 2005 to discuss the future plans for funding this project and the progress on the other 12 handbooks.

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## New Species

Over fifty species new to science have now been described from the botanical survey work undertaken in the Kupe-Bakossi area of Cameroon by botanists from the National Herbarium of Cameroon and Kew with the assistance of Earthwatch African fellows and volunteers. The area is so rich that in one recent collection of about 100 plants, made by an undergraduate student, there were 10 undescribed species. The area was not previously recognised for its significance for biodiversity and conservation, but now, with 2,440 species recorded, it is the top area for documented plant diversity in mainland Tropical Africa. Among the newly described plants is a species of *Cola* still to be named, a *Plectranthus* species (*P. cataractarum*) specific to waterfalls and *Justicia leucoxiphus*. The area has been formally protected by the Cameroon Government.

Contact: Dr Martin Cheek (m.cheek@kew.org)



B. Polhill

*Plectranthus cataractarum*, one of over 50 species new to science described from Kupe-Bakossi

## DNA Bank

Following successful funding from the Darwin Initiative, scientists at Kew and the South African National Biodiversity Institute in South Africa have established a DNA bank at Kirstenbosch. The DNA bank makes available ca. 4,000 DNA extracts of native South African plants, in addition to training dozens of students and researchers. During the last year it has been possible to bring together an international panel of evolutionary biologists and conservation planners to explore the existing or potential contribution of phylogenetic diversity measures in the conservation decision-making process. This has engendered widespread interest in the project and highlighted the pressing need to implement DNA banking strategies in biodiverse countries such as South Africa. *Science* 304, 1445 (2004).

Contact: Dr Vincent Savolainen (v.savolainen@kew.org)



P. Gaston

DNA samples of many species from the fynbos are now stored in the DNA bank at Kirstenbosch.

## Africulture

The Darwin Initiative has funded a project led by Garden Africa to promote the sustainable management of botanical resources used as medicine and food by traditional healers in the Makana District of South Africa. In October 2005, Monique Simmonds (Kew) and Georgina McAllister (Garden Africa) visited the 10 hectare Africulture site near Grahamstown that will be the focus for the project. They discussed with Umthathi, their South African collaborators, how best to ensure that the various local community groups participate in the selection of the species that will be cultivated on the site.

Contact: Prof. Monique Simmonds (m.simmonds@kew.org)

## Anti-malarial Plants

Alex Asase has been awarded his PhD from the University of Ghana for his research on the plants used to treat malaria by local people in the Wechiau Community Hippopotamus Sanctuary. He used three interviewing methods to identify the most frequently used species. Many of the 41 species from 17 families are known to be used to treat malaria, but the active ingredients in most of these plants are still unknown. Alex studied the chemistry of some of these plants while at Kew. *Journal of Ethnopharmacology* 99, 273 (2005).

## TRAINING SCIENTISTS IN AFRICA

### GSPC in Africa

With the 2010 targets for the Global Strategy for Plant Conservation (GSPC) moving ever closer, Kew and the CBD Secretariat organised an African Regional GSPC course in November 2004, hosted by colleagues at Makerere University, Kampala, Uganda. The course was attended by 18 delegates from 16 countries and balanced workshop sessions with practical field activities and case studies to explore how to mobilise efforts to achieve the 16 GSPC targets across Africa.

The CBD Secretariat has invited Parties to appoint national GSPC focal points, and course participants from Liberia, Central African Republic and Morocco have been appointed to these posts. Several others are effectively acting in these positions, and over the last year there has been some significant progress. The first step for many has been the production of a national report on the status of GSPC activities and identifying strategies for successful implementation.

Contact: Dr Colin Clubbe (c.clubbe@kew.org)

### TBA Course

During June and July 2005, Shahina Ghazanfar taught on a five-week course on current concepts and techniques in tropical ecology and conservation at the Makerere University Biological Field Station in the Kibale Forest National Park, Uganda. The course, organized by the Tropical Biology Association, gave participants an opportunity to put their university training into practice and develop their field interpretation skills.

Contact: Dr Shahina Ghazanfar (s.ghazanfar@kew.org)



C. Clubbe

Participants on the African Regional GSPC course.

## GLOBAL

### Biodiversity Hotspots

Kew, together with 14 partners (research institutes, universities and NGOs in London, Cambridge, Toulouse, Montpellier, Helsinki, Madrid, Lausanne, Göttingen, Johannesburg, French Guyana, La Reunion and Comoros), is leading the final stage of contract negotiation with the European Commission for an 'Early Stage Research Training Network', worth over £1.2m. This project will work towards increasing the knowledge and understanding of biodiversity hotspots, including the Mediterranean Basin and some European overseas territories. Given limited financial and human resources for nature conservation, it is appropriate to focus efforts on the richest and most threatened reservoirs of biodiversity. About 34 such biodiversity hotspots have been proposed recently, based on available data on plant and vertebrate species richness, endemism and threat status. Although there is a wide consensus on the choice and geographical delimitation of hotspots, the dynamics of biodiversity in these hotspots and the ecological impacts of predicted biodiversity loss are still only poorly understood. Applying field, molecular and bioinformatics approaches to flagship plants and animals, the 'hotspots' consortium will train nine PhD researchers in state-of-the-art methods for the study of evolution, ecology, and conservation.

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[www.kew.org/hotspots](http://www.kew.org/hotspots)

*Esterhazyia splendida* photographed during a botanical survey of Morraria de Santa Cruz in Brazil.



Flooded forest in the Amazon basin - a hotspot for biodiversity. Forests in French Guyana will be studied by the 'hotspots' consortium in a new major EU project.



# Conservation

Kew scientists are involved in new conservation projects across the world, many funded by the UK Government's Darwin Initiative programme. Projects focus on wet tropical forests, dryland regions, the UK and its overseas territories – as well as at Kew and Wakehurst Place.



A market growing scheme for plants used in traditional medicine.

## SOUTH AMERICA

### Mountain Habitats

In February 2005, botanists from Kew, working with scientists and students from the University of Mato Grosso do Sul, EMBRAPA (Brazil's agricultural research organisation) and the Royal Botanic Garden Edinburgh, undertook the first detailed botanical survey and vegetation mapping of the Morraria de Santa Cruz. This impressive ironstone mountain, rising from the edge of the internationally important Pantanal wetlands, supports a complex mixture of habitats including cliff vegetation, grassland, tree savanna (cerrado) and semi-deciduous forest. The iron ore mine on the mountain's summit, managed by a subsidiary of Rio Tinto, is due to expand substantially and the vegetation survey was designed to provide baseline information to guide this development. Results have been submitted and management recommendations are being finalised. These are aimed principally at reducing the environmental impact of expansion and facilitating the restoration of mined areas. This is one of a growing number of international projects in which Kew is collaborating with private sector organisations to help reduce negative impacts on biodiversity.

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## AFRICA

### Cryo-Conservation

A Darwin Initiative grant of £170k has been awarded to the Millennium Seed Bank Project to work with Pat Berjak and Norman Pammenter (University of Kwa-Zulu Natal, Durban) to establish a Cryo-Conservation Centre of Excellence for Sub-Saharan Africa (CCESSA). The centre will conserve socio-economically important recalcitrant seed species from the continent using ultra low-temperature storage techniques, and provide education and training. In sub-Saharan Africa there is pressure on plants used for traditional medicine ('muthi'), many of which produce recalcitrant seeds that cannot be stored by conventional means. The CCESSA will make such plants available through in vitro (micro)-propagation of ex situ cryo-preserved material as well as appropriate macro-propagation methods. This should reduce pressure on wild populations and benefit people in the host countries by contributing to the sustainable livelihoods of gatherers, traders and practicing herbalists.

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## CENTRAL AMERICA

### Orchids

A new Darwin Initiative grant of £150k will enable expertise in the biodiversity and conservation of meso-American orchids to be developed in Costa Rica. Led by Vincent Savolainen (Kew) and Jorge Warner (Director of the Lankester Botanic Garden in Costa Rica), the team will record orchid diversity and establish long-term monitoring sites in Coco Island, Monteverde and Tapanti National Park. It will also develop the necessary strategies, policies and material transfer agreements for conservation and sustainable use of orchids, undertake a pilot study on DNA barcoding for conservation and trade surveillance, and provide research training in orchid biology, linking with global efforts to build the orchid tree-of-life. The project will also help implement the CBD's Global Strategy for Plant Conservation and the orchid action plan of the World Conservation Union.

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## S.E. ASIA

### Commercial Forests

Much of the plant diversity of the lowland rainforests of Sabah (Malaysia) resides in the timber concessions of forestry companies. As a key ecosystem component in supporting and maintaining general biodiversity, it is important that plant diversity in managed forests is assessed and high conservation value forests are protected, ideally through the framework of Forest Stewardship Council (FSC) certification. However, there is a lack of capacity to implement this, both in habitat assessments and general plant identification skills. A new Darwin Initiative project aims to address these needs through a programme of training, research and institutional capacity building within the Sabah Forest Department, Yayasan Sabah and other major Malaysian forest management companies. The project will include: plant identification training, targeted collecting and the production of checklists and interactive keys; habitat assessment and vegetation mapping using ground surveys and satellite imagery; identification of 'High Conservation Value Forests'; and implementation of FSC certification principles relating to habitat and biodiversity conservation.

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Field station at Danum, which will be the base for a new Darwin Initiative project to assess biodiversity in managed forests.

## UK OVERSEAS TERRITORIES

### Biodiversity Assessments

Two new Darwin awards will enable Kew to widen its conservation project activities in UK Overseas Territories (UKOT). Both projects are highly collaborative with several UK and UKOT partners.

In Montserrat, a project with the RSPB, Durrell Wildlife Conservation Trust, Montserrat National Trust, and the Montserrat Department of Agriculture and Tourist Board, will mainly involve a biodiversity assessment of the Centre Hills. This region contains the last remaining forest relatively unaffected by volcanic activity and now under pressure as land is sought for agriculture and housing. The biodiversity assessment will provide information to produce a management plan for the Centre Hills where it is hoped to establish a National Park and develop sustainable activities for income generation.

Grand Cayman was devastated by Hurricane Ivan in September 2004 and the University of Exeter's Marine Turtle Research Group is

leading a project on the development of a Biodiversity Action Plan for Grand Cayman in collaboration with Kew and the Cayman Islands Department of the Environment. The project will look at the impact of the hurricane on biodiversity, and assess invasive species that are threatening native species and habitats.

Contact: Dr Colin Clubbe (c.clubbe@kew.org)



Officers from the Montserrat Department of Agriculture surveying some of the last remaining forest on Montserrat.

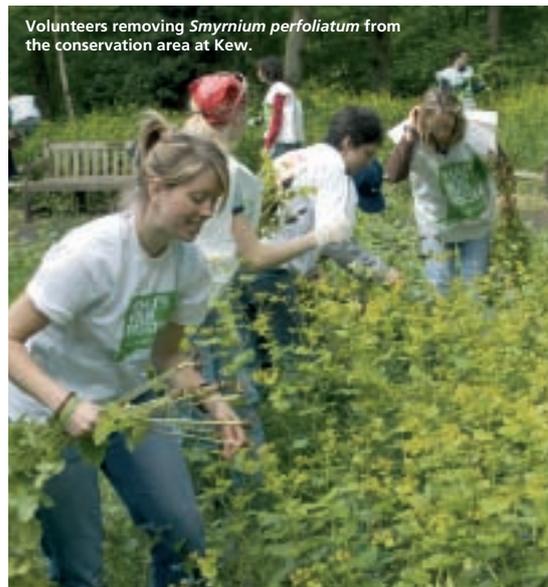
## AT KEW

### Alien Elimination

In May 2005 about 350 volunteers cleared 90% of the stands of *Smyrniun perfoliatum* that had become naturalised at the Kew site. The recent increase in this invasive alien is a management concern, in particular in the conservation area where it was competing with *Hyacinthoides non-scripta* (bluebell). Pulling the plants before seed set should bring it under control. The project was a joint venture with the British Trust for Conservation Volunteers as part of the Home Office's 'Year of the Volunteer' directive.

In the Francis Rose Reserve at the Wakehurst site, work has begun to eliminate *Rhododendron ponticum* from a 50 m strip of the sandstone outcrops. The plant has become a threat to the ferns, mosses and lichens in the reserve, and its clearance is mainly being funded by English Nature.

Contacts: Simon Cole (s.cole@kew.org), Iain Parkinson (i.parkinson@kew.org)



Volunteers removing *Smyrniun perfoliatum* from the conservation area at Kew.



*Bromus interruptus*, re-introduced at Aston Rowant National Nature Reserve, has produced abundant seed.

## UK

### Bromus Re-introduction

On 26 August 2004, 20,000 seeds of the British endemic grass *Bromus interruptus* (classed as 'Extinct in the Wild') were sown on a field margin at Aston Rowant National Nature Reserve, Oxfordshire. The site is on chalk downland in the southern Chilterns in an area where agricultural pesticides have not been used. The seed had been bulked up the previous year at Paignton Zoo, Devon, and cleaned and stored by the Millennium Seed Bank Project (MSBP). The seed germinated successfully and the resulting plants produced enough seed for some to be collected on 14 July 2005 and returned to the MSBP. The remainder of the seed was allowed to fall naturally and should germinate this autumn.

Contact: Stewart Henchie (s.henchie@kew.org)

## New Heads

Eimear Nic Lughadha was appointed as Head of Science Operations on 1 April 2005. Eimear will further the integration and development of Kew's science and conservation programmes and link them to the needs of external stakeholders, including Kew's sponsoring Department, Defra.

On 1 August 2005 Paul Smith was appointed as the new Head of the Seed Conservation Department and leader of the Millennium Seed Bank Project (MSBP). He succeeds the retiring Roger Smith under whose leadership the MSBP was founded. Paul's vision for beyond the MSBP's 2010 targets for seed conservation is to develop ways of using plants sustainably.

## More New Grants

With three-years funding from NERC's e-Science initiative, Kew, the Natural History Museum (NHM) and Imperial College London (ICL) will develop new ways of implementing taxonomic research and dissemination through the Internet. ICL is providing software expertise, while Kew and NHM will provide model revisions of plant (Araceae) and animal (hawkmoths - Sphingidae) taxa.

Contact: Dr Simon Mayo (s.mayo@kew.org)

Following the Barcode of Life conference (*Kew Scientist 27*), the Alfred P. Sloan and Gordon and Betty Moore Foundations have made an award to Kew for 'Establishing a standard DNA barcode for land plants'. Eleven institutes from Europe, South Africa and the Americas will collaborate on the 18-month project.

Contact: Robyn Cowan (r.cowan@kew.org)

In two Marie Curie Outgoing International Fellowships granted to Kew by the European Commission, Vincent Savolainen will work with Nina Rønsted (University of Minnesota) to study co-evolutionary processes in the fig-wasp model system, and Hervé Sauquet (Royal Botanic Gardens, Sydney) to study the evolutionary origin of biodiversity hotspots with a Mediterranean climate.

Contact: Dr Vincent Savolainen (v.savolainen@kew.org)

The Leverhulme Trust has awarded a £98k grant for the project 'Reactive oxygen species as markers of seed quality'. Ilse Kranner will undertake the research in collaboration with Farida Minibayeva (Russian Academy of Sciences, Kazan) and Richard Beckett (University of Kwa-Zulu Natal, Pietermaritzburg).

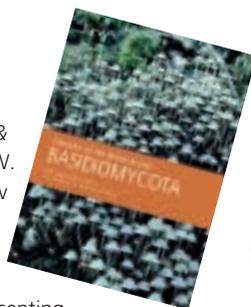
Contact: Dr Ilse Kranner (i.kranner@kew.org)

## New Editor

Dave Simpson has taken over as Chairman of the Editorial Board of *Kew Bulletin* following the retirement of Mike Lock. Ruth Linklater has been appointed as Managing Editor and the journal has a new format.

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# Basidiomycota Checklist



The recently published *Checklist of the British & Irish Basidiomycota* (N.W. Legon & A. Henrici; Kew Publishing; ISBN 1 84246 121 4; £29)

is the product of a landmark project, representing several years' painstaking research by Nick Legon (Project Officer), Alick Henrici, Peter Roberts and Brian Spooner at Kew, and RBG Edinburgh's Roy Watling. The checklist was funded by a consortium of the British and Irish conservation agencies plus the British Mycological Society and the Fungal Research Trust. At over 500 pages, the book is the first comprehensive checklist of the Basidiomycota of the British Isles and includes some 3,760 species of mushrooms, toadstools, bracket fungi, puffballs, earthstars, stinkhorns, club and coral fungi, tooth and jelly fungi, rusts and smuts. Brief habitat details, frequency, distribution and publication references are given for all species ever recorded in the British Isles. References are also cited for a further 12,500 synonyms and excluded taxa. Plans are in hand to make the database,

*Russula carpini* – one of several species new to Britain discovered as part of a project to update the list of fungi recorded from Kew Gardens. This ectomycorrhizal toadstool (a hornbeam associate) has been added to the new *Checklist of the British & Irish Basidiomycota*, based on two recent collections from Kew.

on which the checklist is based, available for consultation on the Internet.

Also published is the latest Collins New Naturalist volume on *Fungi* by Brian Spooner and Peter Roberts (Harper Collins; ISBN 0002201526; £40 Hbk). At 594 pages, it is the largest volume ever published in this prestigious series and the first to have colour printing throughout. The book takes a broad look at the extraordinary variety of fungal species and examines the often surprising roles fungi play in terrestrial and aquatic ecosystems and the impact of fungi on the human world, from forestry and agriculture to foods and pharmaceuticals.

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## Celebrations For Kew Botanists

Three scientific meetings were co-hosted this year by the Linnean Society of London and Kew to celebrate the careers of three Kew botanists on their retirement. On 6-8 April, over 100 experts from 22 different countries attended an international symposium on 'The Palms'. The meeting was held in honour of John Dransfield in recognition of his outstanding contribution to global knowledge of palms over the past 40 years. On 27 April a 'Palynology Day' marked the retirement of Madeline Harley after 32 years at Kew, with speakers on a range of subjects from fossil pollen to systematics. On 9 September 'A Celebration of Grasses' covered the grass family in all its diversity and from a variety of disciplines, such as taxonomy, horticulture, economic uses and art, to reflect the broad interests of Steve Renvoize during his 41 years' service at Kew.

## Papuan Plant Diversity Project

The UK Darwin Initiative-funded Papuan Plant Diversity Project, begun in June 2001, has successfully achieved its goals. The project built capacity in plant diversity research at the University of Papua, Indonesia, through the rehabilitation of the herbarium in Manokwari and training in taxonomic and curatorial techniques. Recent achievements include a herbarium techniques course run by Kew's SE Asia team and project co-ordinator Damien Hicks that was attended by 15 participants from Indonesia and Papua New Guinea. An *Interactive Key to Malesian Seed Plants* has also been published by a team from Kew and the University of Leiden. The strong links formed during the project are providing impetus for future collaborations and capacity building at the University of Papua.

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## Major Conifer Books

Three major books on conifers were published this summer – all by Aljos Farjon. The 'magnum opus' of these is *A Monograph of Cupressaceae and Sciadopitys* (A. Farjon; Kew Publishing; ISBN 1 84246 000 0; £125) published in July. This treats the third largest conifer family with the widest distribution. All species are illustrated by the author's detailed line drawings and are given IUCN ratings. The second edition of *A Bibliography of Conifers* (A. Farjon; Kew Publishing; ISBN 1 84246 1206; £75) almost doubles the scope of the 1990 edition and acts as a companion volume to the monograph. Lastly, the second edition of *Pines* (A. Farjon; Brill Academic Publishers; ISBN 9004139168; £75) replaces the author's first book from 1984 and gives a fully updated and illustrated treatment of this economically important conifer genus. Aljos's extraordinary achievement, the fruit of many years of dedicated work, was celebrated at the official launch of all three books on 20 September 2005 at Kew.

Contact: Aljos Farjon (a.farjon@kew.org).



## Other New Books

*Comparative Storage Biology of Tropical Tree Seeds* (Eds M. Sacandé, D. Jøker, M.E. Dulloo and K.A. Thomsen; IPGR, Rome; ISBN 92 9043 641 7; \$30) provides data collected over 6 years on the storage, handling and germination of seeds from 52 tropical socio-economically important forest tree species from Africa, Asia and South and Central America. This information should promote the planting of indigenous trees in the tropics, rather than fast growing exotics, and stimulate tropical tree seed research and conservation.

Contact: Dr Moctar Sacande (m.sacande@kew.org).



*Growing Orchids from Seed* (P. Seaton & M. Ramsay; Kew Publishing; ISBN 1 84246 091 9; £9.99)

explains how to germinate orchid seed without specialist laboratory facilities. Guidelines are given for buying and making equipment, pollinating flowers, harvesting and storing seed, germination and growing seedlings on to healthy plants.

Contact: Margaret Ramsay (m.ramsay@kew.org).

*Angiosperm Phylogeny and Evolution* (P.S. Soltis, P. Endress, M.W. Chase & D.E. Soltis; Sinauer Assoc. Inc.; ISBN 0878938176; £38.99) provides a summary of current concepts of angiosperm phylogeny resulting from dramatic changes in the understanding of the group. The book also highlights areas where further study is needed.

Contact: Prof. Mark Chase (m.chase@kew.org)



## Fritillaries

In a phylogenetic study of Liliaceae based on one nuclear and three plastid loci, Nina Rønsted and colleagues have, for the first time, obtained strong support (93% bootstrap) for the monophyly of *Fritillaria*, and confirmed a close relationship with *Lilium*. Within *Fritillaria*, two major clades were recovered. One, corresponding to subgenus *Liliorhiza*, consisted of all North American species sampled plus *F. camtschatcensis* (E Asia and N America) and *F. maximowiczii* (SE Russia). The other consisted of all the other Eurasian taxa, with the enigmatic *F. davidii* (W China) being the sister to the other species. The phylogenetic tree is now being used as the basis for a study of patterns and mechanisms of genome size evolution in Liliaceae, which include the largest known angiosperm genome sizes. *Mol. Phylogenet. Evol.* 35, 509 (2005).

Contact: Dr Mike Fay (m.fay@kew.org)

## On The Web

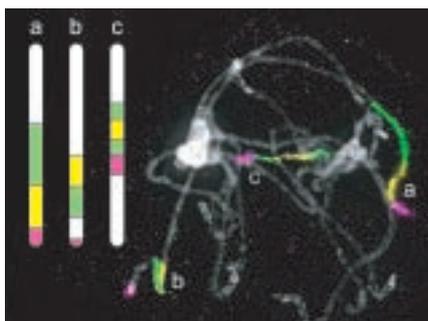
The *Kew Bibliographic Databases* (KBD), launched on 1 August 2005, is a combined search tool giving free access to the *Kew Record of Taxonomic Literature*, the *Plant Micromorphology Bibliographic Database* (PMBD), and the *Economic Botany Bibliographic Database*. Simple searches retrieve a limited number of references but registering permits more complex searches, selected record download and access to more records. [www.kew.org/kbd/](http://www.kew.org/kbd/)

*InsideWood* has been launched online. It is an interactive database combining descriptions of more than 5,700 hardwoods with representative micrographs. The project is led by North Carolina State University in collaboration with Kew, the National Herbarium of the Netherlands, and CSIRO Forestry and Forest Products, Australia. <http://insidewood.lib.ncsu.edu/search/>

An *Interactive Key to the Genera of Euphorbiaceae s.l.* (P. Hoffmann, D. Kirkup, A. Galster, G. Challen and A. Radcliffe-Smith) is now at [www.kew.org/herbarium/keys/euphorbs/index.html](http://www.kew.org/herbarium/keys/euphorbs/index.html). The key in DELTA includes 88 morphological characters and provides illustrations of character states where possible.

## Chromosome Evolution in Brassicaceae

Recent genetic discoveries show that some plants are hiding their wild past. It is now widely accepted that many (and perhaps all) diploid flowering plant species with low chromosome numbers are in fact ancient polyploids. Over millions of years multiple chromosome sets have been considerably reshuffled and the number of chromosomes radically reduced. Recently Martin Lysak (Kew), Marcus Koch (Heidelberg University), Ales Pecinka and Ingo Schubert (IPK, Gatersleben) explored the similarity between chromosomes (chromosome homeology) of *Arabidopsis thaliana* (thale cress) and more than twenty other species of Brassicaceae to look for evidence of their polyploid origin. They showed for the first time that nearly all analyzed species descended from a common hexaploid ancestor and that subsequent evolution had masked this by numerous chromosome rearrangements. These had reduced the chromosome number



Comparative chromosome painting in *Diploaxys erucoides* ( $2n=14$ ) revealed three homeologous copies (a-c) of an *Arabidopsis* chromosome segment. This result strongly suggests that this species descended from a hexaploid ancestor.

back to the 'diploid' level. In June, Martin Lysak was awarded a £50,000 research grant from the NERC to continue this research by studying karyotype evolution in further species of Brassicaceae using the chromosome painting technique. This research will shed more light on general trends of chromosome evolution in plants and further our understanding of the role of chromosomal changes in speciation. *Genome Research* 15, 516 (2005).

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A. McRobb/RSB Kew

Kew's Director guiding Lord Bach (left), EU Agriculture Ministers and guests amidst the Chihuly glass sculptures in the Temperate House.

## EU Ministers Visit Kew

In September 2005, Lord Selborne (Chairman, Kew Trustees) and Sir Peter Crane (Kew's Director) hosted two visits to Kew by Environment and Agriculture Ministers from EU member states. The Ministers were meeting in London to discuss the relationship between climate change and agriculture in the first combined meeting of the EU Agriculture and Environment Councils under the UK's EU Presidency. Elliot Morley MP (Minister of State, Climate Change and Environment, Defra) and Bill Stow (Director General, Environment, Defra) accompanied 26 EU Environment Ministers during their tour on 10 September while Lord Bach (Parliamentary Under-Secretary, Sustainable Farming and Food, Defra) and Sir Brian Bender (Permanent Secretary, Defra) accompanied 14 EU Agriculture Ministers and members of the Special Committee on Agriculture on 12 September. During their visits the Director gave presentations on the history of Kew and the contemporary role of the Gardens in understanding plant and fungal diversity and promoting their conservation and sustainable use.

Lord Bach, the Defra Minister with responsibility for Kew, had previously visited on 24 June 2005. During tours of the Herbarium and Jodrell Laboratory, he was updated on current progress in Kew's research programmes. Later, on 19 July 2005, Defra Minister, Jim Knight MP (Parliamentary Under-Secretary, Rural Affairs, Landscape and Biodiversity), launched the CITES public awareness campaign at Kew.

## Awards

Paula Rudall was awarded the 2005 Linnean Medal for Botany at the Linnean Society Anniversary meeting on 24 May 2005, in recognition of her research achievements in plant anatomy. The Linnean Medal was instituted in May 1888, and is the Society's highest award. At the same meeting, Alex Wortley was awarded the Irene Manton Prize for the best thesis in botany. Her DPhil thesis was jointly supervised by Paula Rudall and Robert Scotland (Oxford University). Also at the meeting, David Cutler (Kew Hon. Res. Fellow) was elected as the next President of the Linnean Society, with effect from May 2006.

The Kew stand at the Chelsea Flower Show (24-28 May 2005) entitled 'Message in a Bottle' won a Silver-Gilt Lindley Medal for its presentation on threatened plants in the Lifelong Learning Section. Kew's first retail stand, selling Kew books and other products, won a Certificate of Commendation for excellence in presentation.



A. McRobb/RSB Kew

Paula Rudall awarded the Linnean Medal.

On 10 March 2005, Hashendra Kathriarachchi successfully defended her PhD on the 'Phylogenetics of Phyllanthaceae with an emphasis on tribe Phyllanthaeae'. Her research showed that several segregate genera should be subsumed into *Phyllanthus*.

## New Classification of Palms

A new phylogenetic classification of the palm family (Arecaceae) will soon be published in *Kew Bulletin*. The new arrangement, authored by John Dransfield, Natalie Uhl, Conny Asmussen, Bill Baker, Madeline Harley and Carl Lewis, is designed to reflect the abundant phylogenetic discoveries made since the previous classification published in 1986.

Five subfamilies are accepted, rather than six, and numerous new tribes and subtribes are described. Although many groups remain stable, there are significant changes in some areas, especially in Arecoideae and Ceroxyloideae. The new classification will form the backbone of a new edition of *Genera Palmarum* (Uhl and Dransfield, 1987), the benchmark monograph of the family. The second edition will be a radical revision containing substantial new material on evolution, structural biology and palynology, as well as many new illustrations.

At the palm species level, a *World Checklist of Palms* by Rafaël Govaerts and John Dransfield has recently been published by Kew (ISBN 1 84246 084 6; £15). The checklist, which forms part of the World Checklist



A new species of *Borassus* from Burkina Faso. The species is being described by Ross Bayton, who recently defended his PhD thesis entitled 'Borassus and the Borassoid Palms: Systematics and Evolution' under the supervision of Barbara Pickersgill (University of Reading), John Dransfield and Bill Baker.

of Monocotyledons project ([www.kew.org/monocotChecklist/](http://www.kew.org/monocotChecklist/)), lists all 2,361 accepted species of palm as well as their synonyms and distributions. It is an essential reference for anyone with interests in the diversity and conservation of palms.

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