

Kew Scientist

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

GENERA PALMARUM



Pritchardia viscosa, one of the world's most endangered palms, growing on the Hawaiian island of Kauai.

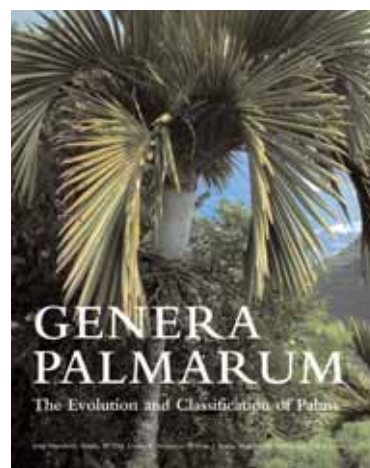
J. Dransfield

All suprageneric groups from subtribe to subfamily are treated in detail and keys are provided to groups at all ranks.

Nine introductory chapters contain authoritative reviews of palm morphology, pollen, cytology, chemistry, fossils, phylogeny and evolution, biogeography, natural history, conservation and the classification of palms. An updated version of the classification published recently by the authors of *Genera Palmarum* (*Kew Bull.* 60, 559; 2005) is used throughout the book and reflects the latest phylogenetic evidence. The book concludes with geographical listings, an illustrated glossary, an extensive bibliography and indices.

Launched at the monocot conference in Copenhagen on 12 August, at the Bailey Hortorium on 29 August and at Kew on 22 September, *Genera Palmarum* will appeal to the specialist and amateur user alike. The authors hope that the new edition, like the first, will become a standard text that inspires palm researchers and enthusiasts in the coming years.

Contact: Dr Bill Baker (w.baker@kew.org)



Genera Palmarum: The Evolution and Classification of Palms (J. Dransfield, N.W. Uhl, C.B. Asmussen, W.J. Baker, M.M. Harley & C.E. Lewis); Kew Publishing; ISBN 978 1 84246 182 2; £79 (available from www.kewbooks.com).

In August 2008, *Genera Palmarum: The Evolution and Classification of Palms*, by John Dransfield, Natalie Uhl, Conny Asmussen-Lange, William Baker, Madeline Harley and Carl Lewis, was published by Kew, in association with the International Palm Society and the L.H. Bailey Hortorium, Cornell University. It succeeds the first edition by Natalie Uhl and John Dransfield, published in 1987, which became the standard reference for palms and inspired much new research. The new *Genera Palmarum* is a radically different publication, entirely rewritten and extended to 732 pages, and contains a wealth of new data cast within a phylogenetic framework. It represents the culmination of long-standing collaborations among the three Kew authors

and colleagues from Cornell University, University of Copenhagen and Fairchild Tropical Botanic Garden.

The core of the book comprises definitive treatments of all 183 accepted palm genera, many described since the first edition, including the giant *Tahina* from Madagascar that was discovered as the new manuscript was being completed. For every genus, a detailed description with nomenclature and etymology is provided, along with notes on distribution, ecology, anatomy, phylogenetic relationships, common names and uses. Each account is illustrated with photographs (more than 500 in total), pollen micrographs, distribution maps, and analytical drawings by Marion Ruff Sheehan and Lucy T. Smith.

Kew
PLANTS PEOPLE
POSSIBILITIES

DIRECTOR'S MESSAGE

Restoration Ecology for Kew



The international workshop on restoration ecology held at Kew in June 2008 resolved unequivocally that botanic gardens are well-placed to advance this discipline. The

challenges of restoration ecology would build on traditional botanic garden strengths in systematics, seed science and banking, genetics and horticulture.

A careful analysis of where the greatest global needs exist for scientific input in the repair and restoration of wild vegetation is needed, and strategic partnerships in such regions will be essential. It is proposed, consequently, that in 2009 a small team of Kew staff will visit selected restoration sites around the world to hone understanding of key issues meriting further investigation.

I am delighted to report that following the successful conclusion of the restoration ecology workshop, Kew's received a generous multi-year pledge from The Man Group plc Charitable Trust to help us establish a restoration ecology programme. We are grateful to The Man Group plc Charitable Trust for their visionary investment in Kew and this programme. It will enable a much more rapid move by Kew into this relatively new field than would otherwise be possible. The new Head of Restoration Ecology will provide the necessary leadership and scientific direction to ensure a focused and significant programme is developed.

The workshop also resolved to prepare a multi-authored paper on the future role of botanic gardens in restoration ecology as a direct output of subjects discussed and debated over the three days. This will be co-ordinated and prepared for publication by Kate Hardwick, assisted by a small editorial team volunteered from the floor at the workshop.

There is a real appetite from within Kew and outside for advancing the science of restoration ecology as a matter of urgency. This is evident from both the outcomes of the workshop and the Man Group plc Charitable Trust support. I look forward to completing the international search for a Head of Restoration Ecology at Kew and seeing the discipline being taken up much more vigorously across the range of Kew's science and horticulture departments.

Prof. Stephen D. Hopper FLS, Director

Climate Change and Systematics

Irish Minister of State for the Environment Michael Kitt opened the international conference sponsored by the Systematics Association on 'Climate Change and Systematics', held in Trinity College, Dublin (1–3 Sept. 2008). Invited talks included Steve Hopper's account of the conservation implications of climate change, richly illustrated with examples from the research programmes of Kew and King's Park, and Richard Bateman's provocative polemic on the importance of linking taxonomy with other long-term research disciplines to successfully monitor and ameliorate climate change. The conference received wide coverage in the Irish media, suggesting that the edited volume resulting from this topical meeting will reach a large readership.

Contact: Prof. Richard Bateman (r.bateman@kew.org)



Climate change and horticulture: *Protea subvestita* flowering in the Southern Hemisphere Garden at Wakehurst Place in August 2008, the first time a species *Protea* has flowered at Wakehurst without any form of winter protection.

C. Clement

SYSTEMATICS

Monocot Conference and Grant

Kew scientists made a major contribution to 'Monocots IV and Grasses V', an international conference on the comparative biology of the monocots held in Copenhagen, Denmark (11–15 August 2008). In addition to co-authoring 32 papers, including the closing lecture presented by Mark Chase on 'Phylogenetics and evolution of monocots: a review and prognosis', Kew staff also co-organised eight symposia: 'Monocot Genomes and Genomics' (Mike Fay and Ilia Leitch), 'Monocot Mycoheterotrophs: Systematics and Evolution' (Paula Rudall), 'E-taxonomy' (Bill Baker and Simon Mayo), 'Recent Advances in Araceae Research' (Simon Mayo), 'Evolution, Systematics and Diversity of Asparagales' (Paul Wilkin), 'Palm Evolution and Ecology' (Bill Baker), 'The Palm Flower: a Tribute to Natalie Uhl' (Bill Baker) and 'Systematics and Evolution of Poales' (Dave Simpson and Paula Rudall).

During the conference, discussions were held to co-ordinate two recently funded projects with complementary goals: the US NSF-funded 'Assembling the Monocot Tree of Life' and the UK Leverhulme-funded 'Global Patterns of Monocot Diversity'. In the latter three-year project, the Leverhulme Trust has provided c. £250K of funds for Imperial College London and Kew to develop a synthetic approach for explaining the evolution of biodiversity within the monocots. This will examine how traits, environment and geography interact to determine global patterns of dispersal and diversification. These initiatives will maintain the monocots as one of the most comprehensively studied major plant groups and Kew's leading role in that research.

Contact: Dr Paula Rudall (p.rudall@kew.org)



Epipogium aphyllum, a mycoheterotrophic orchid.

P. Gibson

Genic View Reviewed

The genic view of the process of speciation is based on the notion that species isolation may often be achieved by changes in a modest number of genes, rather than by large-scale chromosomal differences or changes in ploidy. Although great strides have been made to characterise 'speciation genes' in some groups of animals, little is known about the nature of such genic species barriers in plants. A recent review of the topic by Christian Lexer (Kew) and Alex Widmer (ETH Zurich) identified priorities for future research. *Phil. Trans. R. Soc. B* (in press), doi:10.1098/rstb.2008.0078.

Contact: Dr Christian Lexer (c.lexer@kew.org)



Ornithogalum thyrsoides.

J. Manning

This summer saw Kew scientists discussing new questions in systematics research, eight PhD students defending their theses and the publication of the House of Lords report into systematics.

Systematic PhDs

Systematics projects have been prominent among the research topics of PhD students, co-supervised by Kew staff, who have defended their PhD theses recently. Successful students include:

Maria Vorontsova, 'The Evolution of tribe Poranthereae (Phyllanthaceae or Euphorbiaceae *sensu lato*)' (April 2008).

Charan Leeratiwong, 'Systematics of *Premna* (Lamiaceae) in Thailand and Indo-China' (April 2008).

Martyn Powell, 'Evolutionary ecology of Neotropical orchids, with emphasis on Oncidiinae' (May 2008). Martyn's thesis records the first documented case of Batesian floral mimicry between a tropical, deceit-pollinated, orchid (*Trichocentrum ascendens*) and a rewarding model species (*Byrsonima crassifolia*, Malpighiaceae).

María Angélica Bello Gutiérrez, 'Systematics and floral evolution of the order Fabales' (August 2008). Her thesis demonstrates that the highly characteristic petaloid lateral sepals in 'pea-flowered' Polygalaceae evolved independently of superficially similar structures in legumes.

Thelma Barbará Santos, 'Molecular population genetics of *Alcantarea* spp. adapted to inselbergs in the Atlantic rainforest of Brazil' (July 2008).

Mario Martínez Azorín, 'Sistemática del género *Ornithogalum* L. (Hyacinthaceae) en el Mediterráneo occidental: implicaciones taxonómicas, filogenéticas y biogeográficas' (June 2008)

Ornithogalum Split Again

In a study published in 2004, the several genera forming subfamily Ornithogaloideae (Hyacinthaceae), a widely distributed group found in Africa and Eurasia, were subsumed into the single large genus *Ornithogalum*. This wider circumscription of *Ornithogalum* was the result of low topological resolution, non-monophyly of most segregate genera and lack of morphological features supporting the various lineages. The proposed solution was not unanimously supported among botanists. The analysis of additional molecular evidence compiled by researchers from the South African National Biodiversity Institute, the Missouri Botanical Garden and Kew, with a particular focus on the sub-Saharan species, draws attention to an alternative classification for the 250–300 species of this group. Three of the genera previously included in *Ornithogalum* are reinstated (*Albuca*, *Dipcadi* and *Pseudogaltonia*), the delimitation of genus *Ornithogalum* is redefined, and infrageneric subdivisions are proposed for genera *Albuca* and *Ornithogalum*. This new classification is more stable taxonomically, more amenable to users and reflects adequately the diversity of this attractive group of plants. *Taxon* (in press).

Contact: Dr Félix Forest (f.forest@kew.org)



Actephila albidula (Phyllanthaceae). PhD student Maria Vorontsova found that petals have evolved several times in Phyllanthaceae tribe Poranthereae.

G. Bramley

Piyaporn Saensook, 'Comparative studies of the biology and conservation of *Cornukaempferia*' (May 2008).

Eleanor Jones, 'Molecular and morphological systematics of Juncaceae' (June 2008).

Evo-Devo Excites

The second biennial conference of the European Society for Evolutionary-Developmental Biology (30 July to 1 Aug 2008; Ghent, Belgium) produced an interdisciplinary mix of cutting-edge talks in an exciting new discipline. Paula Rudall co-organised symposia on 'Evolution of Plant Form' and 'Origin and Diversification of Seeds and Flowers', and Richard Bateman co-organised an intentionally controversial symposium on 'Saltational Modes of Evolution' in which the views found considerable support among the broad-minded evo-devo community.

Contact: Dr Paula Rudall (p.rudall@kew.org)

House of Lords Report on Systematics

The House of Lords Science and Technology Committee issued its follow-up report on Systematics and Taxonomy on 13 August. The first inquiry took place in 1992 and the second in 2002. The most recent report was based on large numbers of interviews and presentations to the Committee in early 2008. Overall, the Lords Committee believed that the response of Government to the last set of recommendations was mixed. It noted some successes (restoration of BBSRC academic analogue status to RBG Kew and RBG Edinburgh), but they were highly disappointed that their other recommendations were not taken forward; these include principally their statement that the Higher Education Funding Council for England (HEFCE) should have explored ways in which to support systematic biology and that Defra did not set up a body to coordinate funding for systematics.

The Committee questioned if systematic biology in the UK is now able to produce the taxonomic data required to support the concept of ecosystem services and to understand and predict the impact of climate change on biodiversity. Among the 25 specific recommendations were the following:

- 1) NERC should undertake a study to determine the current number and trends in numbers of taxonomists in the UK;
- 2) NERC and BBSRC should jointly fund development of a roadmap for the delivery of internet-based taxonomy;
- 3) NERC should make clear how it is going to approach funding of taxonomy;
- 4) in order not to cause further erosion to the already highly threatened mycological community in the UK, Government should take steps to secure the future of the CABI mycological collections, which are being sent to RBG Kew in January 2009;
- 5) DIUS should take on the role of lead department responsible for the health of systematic biology in the UK.

Other recommendations were addressed to the systematics community, asking it to work harder to promote systematics to the public and to use the electronic tools becoming available to increase its efficiency and the availability of systematic knowledge to a much wider audience.

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

Kew Record

Reluctantly, it has been decided that the cost of keeping the *Kew Record of Taxonomic Literature* up-to-date outweighs its value in relation to newly published literature that is becoming increasingly accessible in electronic format. The *Kew Record* of references from 1971–2007 will continue to be available at <http://kdb.kew.org/kdb/searchpage.do>.

NEW PROTECTED AREAS

Imbak Valley, Sabah

Sabah is one of the most botanically diverse areas in South-East Asia, and this diversity has been under threat from various factors.

Specifically, pristine lowland Dipterocarpaceae rainforest is becoming exceptionally rare, and in Sabah it is now almost completely restricted to a few protected areas. The Imbak valley, situated in the Kinabatangan district, is one of the last remaining pristine

lowland Dipterocarpaceae rainforests, with populations of the endangered orang-utan and the Borneo pygmy elephant. This year, the area has been declared a conservation area (class I) by the Sabah state government, on a par with the better known Danum Valley and Maliau Basin. In 2004

Kew's SE Asia team with colleagues from the Sandakan Herbarium were invited to be part of the assessment team to look at the conservation importance of the Imbak valley. The forest was found to be undisturbed with a surprisingly high number of new and/or rare species. One of the main finds was a fruiting specimen of the monotypic *Lampas elmeri* (Loranthaceae), a Sabah endemic, which was previously only known from the type specimen at Kew.

Contact: Rogier deKok (r.dekok@kew.org)



T. Uteridge

Lampas elmeri.



T. Uteridge

The newly protected Imbak River.

SCIENCE-BASED

RBG Kew's scientific role in helping to record and study plant biodiversity can have tangible outcomes in conservation, such as the creation of new protected areas.

Bakossi National Park, Cameroon



The new Bakossi National Park.

M. Cheek

Early in 2008 the news broke that the Prime Minister of Cameroon, Ephraim Inoni, and his Minister of Forests, Elvis Ngolengolle, had signed decree 2007/1459, officially creating the 29,320 Ha Bakossi National Park.

Unusually among national parks created in tropical Africa, plant diversity was cited as the justification for its creation. The new national park will protect part of the area covered by the *Plants of Kupe, Mwanenguba and the Bakossi Mountains, Cameroon*, which was published by RBG Kew in 2004 (see *Kew Scientist* 27, April 2005, Checklist Reveals Top New Centre of Diversity). It was based on the

plant inventory work conducted between 1995–2003 with IRAD-National Herbarium of Cameroon and supported by Earthwatch and the Darwin Initiative. Further support for setting up the national park came from the film 'The Mists of Mwanenguba', released in November 2007 and shown on TV in Cameroon. This is centred around Kew botanists in the field, with supporting parts for Kew's partners RECODEV (a small environmental NGO fighting to protect the Bakossi forests from logging) and Greenpeace.

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

Conservation Priorities in Madagascar

Henk Beentje and John Dransfield contributed palm data for a major analysis of the distributions of organisms in Madagascar, in a multi-author paper led by Claire Kremen (University of California at Berkeley) published in *Science*. The paper demonstrates how to find and protect the best remaining hotspots for thousands of rare species that live only in Madagascar, considered one of the most significant biodiversity hotspots in the world.

The rich data source for both animals and plants allowed the researchers to map out the habitats of 2,300 species for each square kilometer of the island. Some surprising areas emerged as conservation priorities, including coastal forests and central mountain ranges, since they had large concentrations of endemic species. Such regions, the researchers noted, have historically been neglected in favour of large tracts of forest. The analysis maximises the proportion of every species so that they achieve maximum conservation within the target of 15 million acres set by the Malagasy government. *Science* 320, 222 (2008).

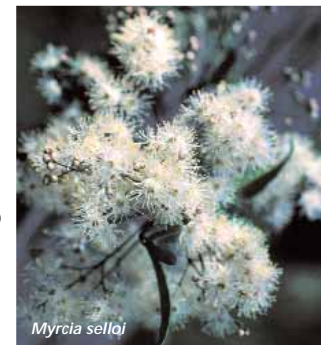
Contact: Dr John Dransfield (d.dransfield@kew.org)

Predicting Biodiversity in the Mata Atlantica

Kew's herbarium collections are serving as the basis for biodiversity assessments in the Atlantic coastal forests of Brazil. *Myrcia sensu lato* (c. 750 species) is the fourth largest genus of Myrtaceae and has been demonstrated to indicate effectively tree species diversity in these threatened forests. Distributions of endemic and threatened

species of *Myrcia s.l.* have been compiled from herbarium specimen data and subjected to three geographic information system (GIS) techniques to indicate areas of maximum plant diversity and conservation importance within the biome.

Predictive species-distribution modelling (Maxent), complementarity analysis (DIVA-GIS) and observed herbarium collection occurrences indicated two separate, major areas of endemism: the Serra do Mar mountain range from Paraná to Rio de Janeiro, and the coastal forests of northern Espírito Santo and southern Bahia. Within these, 12 priority areas (of



Myrcia sellowii

E. Lucas

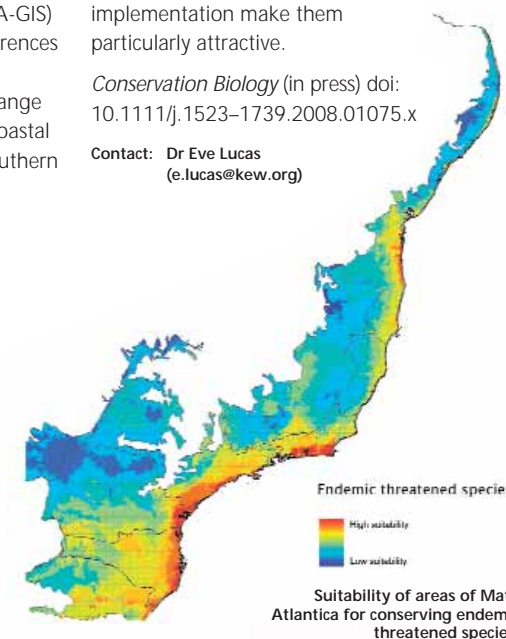
approximately 35 km²) of maximum species richness and threat have been highlighted as priorities for conservation: areas with the highest endemic species richness and lowest levels of protection were found in Bahia and Espírito Santo.

This study forms the basis for a wider project seeking

to apply similar protocols to other high-performing indicator families and, with assistance from local NGOs and government, to promote prioritised areas for legal protection. Techniques used here can be applied to other taxa and global hotspots: their accuracy and relative ease of implementation make them particularly attractive.

Conservation Biology (in press) doi: 10.1111/j.1523-1739.2008.01075.x

Contact: Dr Eve Lucas (e.lucas@kew.org)



Endemic threatened species

High suitability
Low suitability

Suitability of areas of Mata Atlantica for conserving endemic threatened species.

Inselberg Bromeliads

Studies of organisms on 'terrestrial islands' can improve the understanding of two unresolved issues in evolutionary genetics: the likely long-term effects of habitat fragmentation and the genetic underpinnings of continental species radiations in island-like terrestrial habitats. These issues have been addressed in a study of nuclear microsatellites of four *Alcantarea* species (Bromeliaceae) adapted to ancient, isolated rock outcrops (inselbergs) in the Brazilian Atlantic rainforest. The ability of *Alcantarea* species to colonize isolated inselbergs probably stems from their flexible mating systems and an ability to tolerate inbreeding. The results also indicated a high potential for divergence in the presence of gene flow in inselberg bromeliads and they provide base-line data about the long-term effects of fragmentation in plants. *Heredity* (in press), doi:10.1038/hdy.2008.65.

Contact: Dr Thelma Barbará (t.barbara@kew.org)



Inselberg bromeliads

Barcoding Hotspots

DNA barcoding aims to identify species using sequences from a small fragment of the genome, so contributing to ecological and conservation studies in which traditional taxonomic identification is not practical. A team led by Vincent Savolainen (Kew/Imperial College London), Michelle van der Bank (Univ. Johannesburg) and Jorge Warner (Univ. Costa Rica) compared eight potential barcodes for over 1,600 samples. Going beyond previous plant studies, they assessed to what extent a 'DNA barcoding gap' is present between intra- and inter-specific variations using multiple accessions per species. They identified a portion of the plastid gene *matK* as a universal DNA barcode for angiosperms and further demonstrated the applicability of DNA barcoding for biodiversity inventories. In addition, DNA barcoding of 1,000 species of Mesoamerican orchids with *matK* alone revealed cryptic species and proved useful in identifying species listed in CITES appendices. *Proc. Natl. Acad. Sci. USA* 105, 2923 (2008).

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

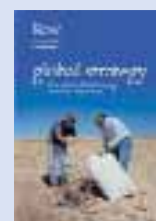
GSPC News

Target 1: Progress and Prospects

Target 1 of the Global Strategy for Plant Conservation (GSPC) is 'a widely accessible working list of all known plant species, as a step towards a complete world Flora.' In a paper assessing progress to date, a group of Kew scientists found that bryophytes, ferns and gymnosperms have widely accessible working lists either complete or almost so and on-line working lists are available for around 50% of flowering plants. In all, Target 1 is 53% complete. It is estimated that there are c. 352,000 species of flowering plants and that the current gap in on-line coverage is c. 177,000 species. Kew's World Checklist of Selected Plant Families is the largest component of existing coverage with 104,000 accepted species. These checklists have involved over 138 collaborators from over 20 countries. The majority of families for which there is no working list available are either cosmopolitan or pantropical. However, progress to date suggests that neither broad distribution nor large numbers of species in a family are insurmountable problems in compiling working lists. The major barrier to completion of Target 1 remains the availability of taxonomists to contribute to the target. Completion of Target 1 by 2010 is possible if botanical institutions recognise its importance and collaborate, lever funding and prioritise activities appropriately. Kew is working with partners to complete the Target. *Taxon* 57, 602 (2008)

Contact: Dr Alan Paton (a.paton@kew.org)

GSPC Brochure Launched at COP9



The Convention on Biological Diversity held its ninth meeting of the Conference of the Parties (COP 9) in Bonn, Germany, from 19–30 May 2008. Delegates from 191 countries attended, as well as observers from scientific organizations, the industry and business sector and local and indigenous groups. COP9 also coincided with International Biodiversity Day. Two Kew staff members attended COP9, with one member joining the UK delegation to advise on all plant-related issues and access and benefit sharing. A new brochure outlining RBG Kew's contributions to the Global Strategy for Plant Conservation was distributed at the meeting. For hard copies of the brochure, contact Natasha Ali at n.ali@kew.org.

Kew's Conventions and Policy Section has produced an up-to-date bibliography of publications on access and benefit sharing. This is available in MS Word format at www.kew.org/conservation/access-benefit.pdf. For an endnote copy, contact China Williams at c.williams@kew.org.

ECONOMIC BOTANY



Hanging the Cook Island barkcloth in Paris.

Barkcloth Exhibited in Paris

A remarkable barkcloth from Kew's Economic Botany Collection travelled to the Musée du Quai Branly in Paris in June 2008. The 3.5 x 1.7 m barkcloth, collected in the Cook Islands in 1850, is made from the inner bark of *Broussonetia papyrifera* (paper mulberry tree) and features three eight-legged creatures. Conservators at the Sainsbury Centre, University of East Anglia, devised a system to hang the barkcloth without damage, using numerous small magnets to attach it to a metal backing. Returning to Kew's collection from a touring exhibition on indigo is a magnificent model of an indigo factory. The 1.5 m long model was made in Krishnagar for the Colonial and Indian Exhibition of 1886 and features 100 clay models of workers and animals. It was seen by 80,000 visitors to the exhibition in Manchester, Plymouth and Brighton, and is now newly displayed in the Plants+People exhibition at Kew, along with 500 other items from the 80,000 in the collection.

Contact: Dr Mark Nesbitt (m.nesbitt@kew.org)

Therapeutic Aloes

A recent study on the succulent-leaved genus *Aloe* (Xanthorrhoeaceae) has indicated that the value of this genus extends far beyond the well-known species *Aloe vera*. Aloes are invariably mentioned in historical and



Aloe hedge in South Africa

Citrus Greening

Huanglongbing (citrus greening) is a fatal disease of citrus threatening the citrus industry worldwide. To identify research priorities to combat the disease, the Citrus Growers of Florida invited the (US) National Academy of Sciences to join with other agencies to bring together a 'meeting of experts'. David Mabberley was nominated to join the meeting in Florida (21–24 April 2008). His previous work with scientists at University of Western Sydney suggests that citrus is new to the disease, which appears to have arisen in Africa (where it is asymptomatic in certain Rutaceae). From infected groves in eastern Africa it was then introduced by humans to Asia and now to the Americas. Controlling the disease in the short-term will be challenging, but David emphasised that long-term work was also required to broaden the genetic base of the crop, which meant identifying wild stands of what we now know to be the parental species (the cultivated apomicts are of hybrid origin), preparing conservation assessments and working with the countries concerned to conserve these species *in situ*.

Contact: Prof. David Mabberley (d.mabberley@kew.org)

contemporary accounts of plant use in their natural range throughout Africa, the Arabian Peninsula and western Indian Ocean islands. A survey of over 350 references published during the last 170 years revealed that uses have been recorded for many of the 548 taxa presently recognised in the genus. A snapshot of southern Africa showed that more than half the species of *Aloe* in the region have been documented for their therapeutic value, including *Aloe ferox*, which supports a thriving natural products industry. The study, part of ongoing research by scientists at Kew, the University of Pretoria and South African National Biodiversity Institute, highlights the cultural value of *Aloe* and sustainable harvesting as factors for consideration in the conservation of the genus. *J. Ethnopharm.* 119, 604 (2008).

Contact: Olwen Grace (o.grace@kew.org)

New Yam

Despite having tubers that can attain 1.5 m in length and 5.5 kg in weight, distinctive vegetative and floral morphology and being an especially sought-after food plant, the yam species known as bako in the Sakalava language has only just been described. It was discovered by Mamy Tiana Rajaonah, Vololoniaina Jeannoda and Paul Wilkin during work on the Yams of Madagascar project, a collaborative research programme of the Département de Biologie et Ecologie Végétales, Université d'Antananarivo and Kew. *Dioscorea bako* is endemic to deciduous forests near Morondava in western Madagascar. Its exploitation as a favoured starch source, coupled with its restricted distribution, place it under significant threat of extinction. Research is underway on the conservation of bako, ensuring that future use is sustainable, but the work needs more resources. *Dioscorea bako* is symbolic of the importance of wild yams and their biodiversity to the Malagasy people and highlights the need for a country-wide yam conservation programme. *Kew Bull.* 63, 113 (2008).

Contact: Dr Paul Wilkin (p.wilkin@kew.org)



An inhabitant of Beroboka carrying bako tubers.

Narcissus Selection

Acetylcholine deficiency in the brain is a feature of Alzheimer's disease, and an important approach to manage the condition is inhibition of the enzyme acetylcholinesterase (AChE). Scientists at Kew and University of Copenhagen have studied whether the distribution of alkaloids, such as galanthamine, with AChE activity in *Narcissus* is better predicted by a molecular phylogenetic approach than morphologically-based classifications. They found that their distribution is evolutionarily constrained, and simultaneous evaluation of all available information on alkaloids and AChE inhibitory activity in a phylogenetic framework provided an improved strategy for the selection of species for further studies. *Biochem. Syst. Ecol.* 36, 305 (2008).

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



Xstrata Treetop Walkway

EDUCATION



To coincide with the 200th anniversary (2009) of Charles Darwin's birth, the Wellcome Trust has commissioned and funded The Great Plant Hunt, a major educational project that will be launching in primary schools across the UK from spring 2009. They are providing grant finding of just over £2 million. This project is part of the Darwin 200 celebration and will get primary school children out and about and excited by nature. In March 2009, RBG Kew will be sending primary schools a Treasure Chest full of free resources that are mapped to the primary science curriculum. They will be invited to take part in a series of activities including a unique experiment that will help Kew's scientists at the Millennium Seed Bank.

Steven Sinkins, Wellcome Trust Senior Research Fellow at Oxford University, commenting on The Great Plant Hunt said: 'Charles Darwin, perhaps the most influential scientist of all time, made meticulous observations of nature and maintained an open mind in interpreting what he found. His methods were low-tech, but his science has revolutionised our understanding of the world and our place in it. Children in schools across the country can readily follow his inspiring example.'

Further Information: www.greatplanthunt.org

Three Major Flora Parts Appear: End in Sight

The *Flora of Tropical East Africa* (FTEA) is a large regional Flora produced at Kew in cooperation with East African institutes and dealing with some 12,500 plant species. FTEA was started in 1952 and is now nearing completion – it is hoped to publish the final parts in 2010. In August 2008 three major parts appeared: Acanthaceae part 1 (by Kaj Vollesen), dealing with 240 species; Scrophulariaceae (by Shahina Ghazanfar, Nigel Hepper and Dave Philcox) treating 187 species; and Aspleniaceae (by Henk Beentje) with 64 species. Descriptions, identification keys,

Treetop Walkway Opens

Kew took conservation education to new heights with the opening of the Rhizotron and Xstrata Treetop Walkway on 24 May 2008. The 18 m high and 200 m long permanent walkway, designed by Marks Barfield (the architects of the London Eye), is a thrilling site to provide information on the rich biodiversity of the forest canopy. Beneath the walkway, the Rhizotron, supported by the Hanson Environment Fund, uses animatronics and animations to show the development of roots and mycorrhiza.

Further information: www.kew.org/trees

Other School Initiatives

John Dickie, Robin Probert, Vanessa Bertenshaw, Sarah Gattiker and Nicola Keogh are now accredited Schools Science and Engineering Ambassadors. The ambassadors inspire and inform both students and teachers, not only about studying science, technology, engineering and maths, but also the importance of these subjects in everyday life and as a potential career.

Félix Forest and Robyn Cowan gave an introduction to DNA work and barcoding to A-level students at the International Students Symposium held at The Natural History Museum, London, on 3 July 2008.

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Dr Félix Forest (f.forest@kew.org)

illustrations and conservation assessments make this, according to a review in *Taxon*, a world class Flora.

Publication of the Flora is now 85% complete; 5% (Lamiaceae, Malvaceae, Hymenophyllaceae) are being edited, and the final 10% (Commelinaceae, Solanaceae, Cyperaceae, Apocynaceae part 2, Acanthaceae part 2) are being worked on by nine authors. At long last, the end is in sight, and this will be the largest African regional Flora ever completed!

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EDUCATIONAL BOOKS

The Plant-Book

Mabberley's Plant-Book (by D.J. Mabberley; Cambridge Univ. Press) is accepted as an essential reference for anyone studying, growing or writing about plants. This dictionary has over 20,000 entries providing information on every family and genus of seed-bearing plant (including gymnosperms) plus ferns and clubmosses. The recently published third edition updates each entry, taking into consideration the most recent literature, notably the great advances from molecular analyses, and adds over 1,650 new entries (including ecologically and economically important genera of mosses).

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Conifers Explained

A Natural History of Conifers (by A. Farjon; Timber Press) is a new book aimed at a general readership. With no more than 630 species worldwide, conifers nevertheless inhabit all terrestrial ecosystems except salt marshes (where they did occur in the Jurassic). The smallest are 15 cm tall, the largest 117 m, and some live to an age of 5,000 years. No other plants equal this range of diversity with so few species. In the book, Aljos Farjon covers the diversity of conifers, their deep geological past, intriguing ecological strategies for survival that evolved during 300 million years, and a biogeography that took the conifers to all continents. Sections on 'Conifers and People' and 'Conservation' highlight the complex relationships people have with conifers. Richly illustrated with photographs, this book is a good introduction to conifers around the world.

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

Educational Imagery

In *Fruit: Edible, Inedible, Incredible* (by W. Stuppy & R. Kessler; Papadakis Publisher) Kew seed morphologist Wolfgang Stuppy and visual artist Rob Kessler have used scanning electron microscopy (SEM) to create astonishing images of a variety of fruits and the seeds they contain. The book shows surface and cross-sectional SEM images that have been coloured to highlight the intricate structure and function of fruits. Accompanying text describes the formation, development and demise of fruits to a general readership and how understanding their vital role is key to the preservation of the biodiversity of our planet.

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Bulbostylis neglecta

C. Clubbe

Re-discovery of *Bulbostylis neglecta*

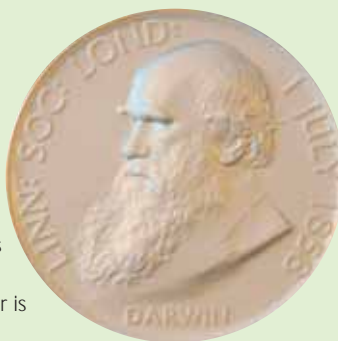
The remote southern Atlantic Ocean island of St Helena has revealed another of its secrets. During inventory work for a new checklist, the endemic neglected tuft sedge, *Bulbostylis neglecta*, was rediscovered having not been seen since it was first collected by local botanist W.J. Burchell in 1806. It had been listed as one of eight endemic plant species thought to have gone extinct on St Helena. The type specimen in Kew's herbarium was scanned and formed part of the preliminary work for the project to conserve St Helena's unique flora. Conservation measures are urgently needed for *B. neglecta* as its habitat is seriously threatened by the invasive grass *Pennisetum setaceum*, thought to be a relatively recent arrival from Africa. The small population is being monitored by local botanists, and seeds will be collected for the long-term storage in the Millennium Seed Bank.

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AWARDS

Darwin-Wallace Medal

The Darwin-Wallace Medal was awarded by the Linnean Society in 1908, 1958 and again in 2008 for 'major advances in evolutionary biology'. It was awarded to commemorate the 50th, 100th and 150th anniversaries of the reading of the joint paper by Charles Darwin and Alfred Russel Wallace, which was published by the Linnean Society. Among the 12 recipients this year is Prof. Mark W. Chase, Keeper of the Jodrell Laboratory.



Bicentenary Medal

At the 220th Anniversary Meeting of the Linnean Society on 23 May 2008, the Society's Bicentenary Medal was presented to Dr Bill Baker, Kew's Head of Palm Research. First awarded in 1978 to commemorate the 200th anniversary of the death of Linnaeus, the Bicentenary Medal is given annually in recognition of work done by a biologist under the age of 40 years. The 2008 medal recognises Bill Baker's



Bill Baker

A. McRobb

achievements in palm research, the breadth of his international collaborations and his broader contributions to capacity building and the systematics community.

Irene Manton Prize

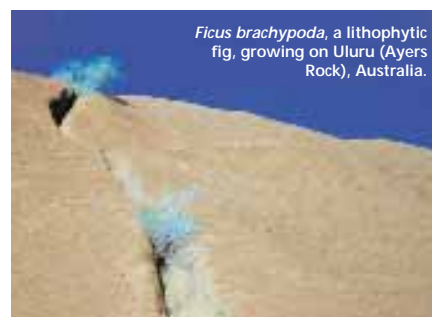
At the same Linnean Society Meeting, Dr James Clarkson was awarded the Society's Irene Manton Prize for the best doctoral thesis in botany examined during the academic year September 2006 to August 2007.

Nancy Burbidge Medal

Prof. Stephen Hopper (Director) is the recipient of the 2008 Nancy Burbidge Medal, awarded by the Australian Systematic Botany Society for substantial contribution to Australian systematic botany.

Visiting Professorship

The Mathematical, Physical and Life Sciences Board of the University of Oxford has conferred the title of Visiting Professor in Plant Sciences upon Prof. David Mabberley, Keeper of the Herbarium, Library, Art and Archives, for three years from 1 May 2008.



Ficus brachypoda, a lithophytic fig, growing on Uluru (Ayers Rock), Australia.

J. Cook

Fig Phylogeny

Ficus constitutes one of the largest genera of flowering plants with c. 750 species. While the extraordinary mutualism between figs and their pollinating wasps has received much attention, the phylogeny of both partners is only beginning to be reconstructed. As part of a Marie Curie Fellowship awarded to Nina Rønsted (Kew) and Vincent Savolainen (Kew/Imperial), and in collaboration with James Cook (Univ. Reading) and George Weiblen (Univ. Minnesota), a large-scale analysis of figs has been undertaken using DNA data. Of the six subgenera traditionally recognised based on morphology and distribution, only subgenus *Sycidium* is supported as monophyletic. Section *Malvanthera* was recovered as monophyletic if *Ficus elastica* (rubber fig) is excluded. The results do not conform to any previously proposed taxonomic subdivision of this section, and characters used for previous classification are homoplasious. Geographic distribution, however, is highly informative. *Mol. Phyl. Evol.* 48, 12 (2008); *Symbiosis* 45, 45 (2008).

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