

Oxford Plant Systematics



With news from Oxford University Herbaria (OXF and FHO), Department of Plant Sciences, Oxford

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Agathis lanceolata (Waters 260 (FHO, NOU)), a tree 30 m high in rain forest on steep slopes on red, gravelly soil, on the north side of the Vallee des Kaoris, Monts des Koghis, Province Sud, Grande Terre, New Caledonia. *Agathis lanceolata* is a giant emergent tree of rain forests in New Caledonia, occurring usually in small, discrete populations in the south of the island but also in scattered pockets further north, always on ultramafic soils. The smooth, peeling red bark and the highly distinctive prismatic microsporophyll heads make it unmistakable in the field, but many populations have been logged in the past for their immensely valuable timber. The species is used in re-forestation projects in southern New Caledonia. See article by Tim Waters on pages 5-6.

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Editorial

At a time when the research and teaching of whole organism biology continues to decline in the UK university sector we are very pleased to be enhancing our research facilities for systematic botany. We have this year completed the second part of our herbarium refurbishment programme (see p. 7) which will be officially re-opened by Professor Peter Raven from Missouri in March.

Every so often taxonomy enters the mainstream of biological discussion. This year has seen renewed debate about the perceived decline and unfashionable status of taxonomy and the recently proposed solutions of web-based accounts and DNA barcode taxonomy. Our contribution to this debate can be found in an invited article entitled *The Big Machine and the much maligned taxonomist* published this year in *Systematics & Biodiversity*, 1: 139-143 (see ref. p. 4). Our central aim continues to be the integration of traditional taxonomic research in the light of modern conceptual and technological advances. Once again this year's newsletter highlights the diversity of our activities across a range of systematic research including monography (p. 9), field work (pp. 4, 5), field-guides (p. 6), and molecular systematics (pp. 2, 3, 4). That diversity of research activity reflects our view that while new technologies can certainly enhance current taxonomic activity, web-based and DNA taxonomy can never replace this broader agenda.

It seems odd that a supposedly unfashionable subject has delivered and is responsible for most of what we know about the phylogenetic history and biodiversity of life. Taxonomy at Oxford is as trendy as ever.

Robert Scotland

News items

Donovan Bailey, who joined the Department as a post-doc in November 2000 to work on a research project investigating hybridization in the legume genus *Leucaena* funded by the Leverhulme Trust, left in May 2003 to take up a lectureship in plant systematics at New Mexico State University in Las Cruces, USA. Donovan was replaced by **Dr. Ashley Robertson** for the final six months of this grant, which ended in October. Two papers arising from this research grant were published during the year (see 2003 publications pp. 3,4).

UK Legume Workshop

The Department hosted the annual one-day UK legume workshop in September. The aim of these meetings is to foster communication and collaboration among UK

legume researchers. The meeting, supported by the Genetics Society, was organized by **Colin Hughes** and **Ruth Eastwood** and was attended by 25 systematists, biochemists, geneticists and others from around the UK. As part of the workshop, Dr. Matt Lavin, Montana State University, gave a lecture entitled "Evolutionary age and rates estimations for the legume family and its major subclades".

Flora Graeca digitisation funded

The Oxford Digital Library Development Fund has agreed to fund the second stage of the *Flora Graeca* digitisation project. Following on from the now complete pilot project which included scans of some sixty sample drawings and corresponding printed plates from the *Flora Graeca*, together with ten each from the unpublished *Fauna Graeca* and *Mediterranean Scenes*, the new funding will allow completion of the entire set of drawings and printed volumes of the *Flora Graeca*. The work should be finished by July 2005, and all images will be accessible on the web via the Oxford Digital Library interface, due for commissioning later in 2004. A further funding application has been made to complete the *Fauna Graeca* and *Mediterranean Scenes*; and if approved these too will be available in the same time scale. The new digital library will make these magnificent works accessible to a world-wide audience for the first time. For further details see www.odl.ox.ac.uk contact roger.mills@plantlib.ox.ac.uk.

Student progress

Ruth Eastwood (D.Phil., second year). The systematics of Andean lupins and the origin of *Lupinus mutabilis* Sweet. Supervised by Dr Colin Hughes (Oxford) and Dr Julie Hawkins (Reading). BBSRC studentship.

I enjoy the diversity of my work which continues to be interesting and challenging. Species delimitation is still in progress and it is now estimated that there are ~70 lupin species found in the Andes. Morphological work this year has included observations of stipules, pods, seeds, leaves and flowers. Last summer in collaboration with Oxford Botanic Garden a sample of Andean lupins were grown. This allowed observation of early development and the opportunity to compare living plants with herbarium collections.

I am attempting to use molecular data to construct gene trees that can be used to identify close relatives of *L. mutabilis*. The first DNA sequence utilised was ITS. An analysis of over a hundred taxa was completed. However, the resulting gene tree had limited use due to lack of resolution and support. It does indicate the Rocky Mountain, Mexican and Andean lupins form a morphologically diverse clade and

confirms the independent nature of the domestication of lupins in the Old and New Worlds. Similar lack of resolution has been found following analyses of a limited sample of *cycloidea* sequences. The ITS and *cycloidea* results were presented at the 4th Biennial Systematics Association Conference. Thus, a major focus of my work during 2003 has been to look for more rapidly evolving DNA sequence regions that might provide greater resolution among closely related lupin species. Preliminary work was carried out with a selected set of low copy number genes. Attempts to design primers for *leafy* and *waxy* were frustrated by lack of legume data. Trials with *shoot meristemless* primers and with a technique using RAPDs to find fast evolving regions (Bailey *et al.*, 2003) were not continued as they did not amplify products consistently.

Work with the nuclear gene *glycerol-3-phosphate acyltransferase* (GPAT) began in September using degenerate angiosperm primers (Tank & Sang, 2001). Lupin specific primers have been designed but direct sequencing has been a problem probably due to copy number issues. During November and December 6 weeks were spent in Dr Donovan Bailey's lab at New Mexico State University in Las Cruces working in collaboration with Norma Oropeza from UMAM Mexico and learning cloning and AFLP techniques. These preliminary GPAT data look encouraging giving greater resolution than either ITS and *cycloidea* although taxon sampling remains limited at this stage.

Plans are being made for field work in Peru and Ecuador in June and July 2004. Collections made during this trip will hopefully fill collecting gaps for *Lupinus* and in particularly *L. mutabilis*. I am looking forward to visiting lupins in their native habitat and experiencing the rich floras which these countries have.

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Bailey, C.D., Hughes, C.E. & Harris, S.A. (in press). Using RAPDs to develop DNA sequence loci for species level phylogeny reconstruction: an example from *Leucaena* (Fabaceae). *Systematic Botany* **29**.

Tank, D.C. & Sang, T. (2001). Phylogenetic Utility of the Glycerol-3-Phosphate Acyltransferase Gene: Evolution and Implications in *Paenonia* (Paeniaceae). *Molecular Phylogenetics and Evolution* **19**: 421-429.

Timothy Waters (D.Phil., third year). Systematics of *Agathis* Salisb. Supervised by Stephen Harris (Oxford) and Aljos Farjon (RBG Kew). NERC studentship.

Agathis is a genus of tropical conifers found in lowland and montane forest, and occasionally in scrublands, throughout much of Malesia and in the southwest Pacific

islands. By virtue of its long history of taxonomic confusion, its paucity of discrete macromorphological characters, the availability of appropriate molecular markers developed for forestry research, and its intrinsic importance as a major timber-producing tree, it is an ideal genus within which to explore a number of issues relating to the principles, methods, and utility of different types of data in species delimitation, and about the nature of species themselves.

I am focusing particularly on species delimitation and the uses of molecular data in the southwest Pacific species – that is, the species of the New Hebrides chain (Vanuatu plus the Santa Cruz Islands), Fiji, New Caledonia, and New Zealand, where different authors have accepted between 5 and 12 species. *Agathis* often occurs in discrete and readily identifiable populations (Nasi 1982), which makes it suitable for the analysis of species-boundaries using such population-based methods as Davis & Nixon's population aggregation analysis (PAA: 1992) and Brower's cladistic haplotype analysis (CHA: 1999).

Two months of fieldwork in New Caledonia in spring 2003 provided both a far better understanding of the biology of *Agathis*, and especially the extent of spatial and developmental variation in leaf shape and size within the tree, which makes providing usable keys and diagnoses based on vegetative characters immensely difficult if not actually impossible. More than 250 trees from 18 discrete populations scattered up and down the central mountain chain were sampled for DNA, and over 80 herbarium specimens – including large collections of fallen mature pollen cones which have (with honourable exceptions) previously usually either not been collected, or not collected in numbers sufficient to draw well-founded inferences about the trees whence they came. Measuring and scoring various attributes of these pollen cones and their constituent microsporophylls has allowed analysis (using PAA) of the currently accepted species boundaries for *Agathis*, not all of which are supported by clear discontinuities or differences, suggesting a reduction in the number of species recognized in the region from the eight now recognized (Farjon 2001).

Molecular work to extract DNA from all the samples, and to characterize and sequence appropriate variable regions, is now in progress, which should give an alternative perspective on the diversity within and between populations. Preliminary data suggest the presence of many microsatellite length alleles held in common across species boundaries, but much remains to be extracted and sequenced. A full taxonomic account, with keys and illustrations of the diversity of both pollen

cone and leaf shape within species as well as between species, is also in preparation.

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Farjon, A. (2001). *World Checklist and Bibliography of Conifers*. 2nd ed. Royal Botanic Gardens, Kew.

Nasi, R. (1982). *Essai pour une meilleure connaissance et une meilleure compréhension des Araucariacées dans la végétation Calédonienne*. École Nationale des Ingénieurs des Travaux des Eaux et Forêts, Centre Technique Forestier Tropical, Nouméa.

Alex Wortley (D.Phil., fourth year). Systematics of *Thomandersia* Baill.: Resolving Difficult Phylogenies. Supervised by Robert Scotland (Oxford), Paula Rudall (Kew) and David Harris (Edinburgh). Burt-Davy Studentship.

Thomandersia (T. Anders. ex Benth.) Baill. is a distinctive, monophyletic genus, comprising six species of trees and treelets from the wet forests of west and central Africa. Traditionally placed in Acanthaceae, it is now of uncertain affinity within the large asterid order Lamiales. Although it shares a single primary homology (retinacula) with Acanthaceae, its position in this family is not upheld by other anatomical characters or molecular phylogenetic analysis.

A taxonomic revision of *Thomandersia* is underway, upholding previous monographic work, and augmented with an improved key and distribution data, through a comprehensive study of herbarium specimens from BR, FHO, K, MO, P and WAG, and material collected during fieldwork in Cameroon. The floral and wood anatomies of the genus have been examined through sectioning and scanning electron microscopy, to underpin taxonomic and phylogenetic investigations.

Lamiales phylogeny is characterised by well-supported families and isolated generic lineages (such as *Thomandersia*), separated by poorly-resolved and weakly supported short internal branches. Such tree models are typical throughout angiosperms and are problematic for the reconstruction of resolved, supported, accurate ordinal phylogenies. A matrix of two chloroplast gene sequence regions and morphological data has been compiled for a representative

sample of taxa spanning all major families of Lamiales. These data have been used to investigate the most productive methodology for resolving such challenging phylogenies, as well as to estimate the position of *Thomandersia* and relationships within Lamiales to the best of our present ability. At present, it appears *Thomandersia* may form the sister group to Bignoniaceae, Schlegeliaceae, or Verbenaceae.

The simultaneous analysis of morphological and multiple molecular sequence datasets has been shown to corroborate accurate relationships and reveal misleading signals in single gene partitions. Morphological data has been found to provide fewer useful characters than molecular sequences for computer-based phylogeny reconstruction, but to be reliable in this total evidence context, although in Lamiales it makes a negligible contribution to increased support and resolution. Simulation studies suggest that adding further genetic sequences, unless of an order of magnitude larger than currently available, would provide similarly little improvement in resolution of a robust, reliable phylogeny of Lamiales.

2003 publications

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Brennan, A.C., **Harris, S.A.** and Hiscock, S. J. (2003). The population genetics of sporophytic self-incompatibility in *Senecio squalidus* L. (Asteraceae): avoidance of mating constraints imposed by low S-allele number. *Philosophical Transactions of the Royal Society of London Series B Biological Sciences* **358**: 1047-1050.

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Expeditions and visits

Ruth Eastwood was awarded a student bursary from The Systematics Association to attend the 4th Biennial Meeting in August. Ruth presented her first conference talk entitled *Systematics of Andean Lupinus and the origin of L. mutabilis* (Sweet) *Fabaceae*. Ruth was invited to give this seminar at New Mexico State University during her visit there (see Student progress report on page 2).

William Hawthorne gave two conference talks at the 17th A.E.T.F.A.T. Congress in Addis Ababa, Ethiopia, in September 2003. These talks were entitled *New West African Field Guides* and *Litter bin plants and wet places in African Rain forest*. He also presented a joint poster at the International Conference on Tropical Savannas and Seasonally Dry Forests: Ecology, Environment and Development which took place between 15-20 September 2003 at the Royal Botanic Garden Edinburgh. The title of the poster by F. Bongers, L. Poorter, W.D. Hawthorne, F.N. Kouama & C. Jongking was *Biodiversity of West African Forests*.

Colin Hughes spent 6 weeks doing fieldwork in Peru and Bolivia in November and December. In Peru visits were made to the southern Departments of Arequipa, Moquegua, Puno, Cusco and Apurimac to collect material of *Lupinus* and other Leguminosae. In Bolivia Colin joined staff from the Darwin Initiative funded project investigating plant endemism in the central valleys of Bolivia. Field visits focusing on legumes were made to the Serrania Santiago in eastern Bolivia and the valley system of the Rio Bopi in the Dept of La Paz.

Colin Hughes, Alex Wortley, Ruth Eastwood and **Timothy Waters** attended the Fourth Biennial Systematics Association Conference from 18-22 August in Dublin. A number of papers were presented: **Colin Hughes** presented a joint paper entitled

Using RAPDs to develop DNA sequence loci for species level phylogeny reconstruction: an example from Leucaena.

Robert Scotland spent two weeks in June 2003 at the University of California at Davis. Robert is collaborating on a project with Mike Sanderson on the hollow curve of taxonomic diversity.

Alison Strugnell attended the XVIIth meeting of A.E.T.F.A.T. (the Association for the Taxonomic study of the Flora of Tropical Africa) held in Addis Ababa, Ethiopia from 21-26 September 2003. Alison presented a poster on the checklist of Mt. Mulanje and also went on the post-conference tour to the Bale Mountains to see afro-montane and afro-alpine vegetation.

Alex Wortley attended the XVIIth A.E.T.F.A.T. Congress in Addis Ababa, Ethiopia, in September. She presented a talk entitled *Systematics of Thomandersia: a rogue genus in Lamiales*, and took part in the pre- and post-congress tours to south-western Ethiopia and the Bale Mountains National Park (see article below). This trip was partly funded by the J. Burt Davy Research Scholarship. Alex was also awarded a bursary from the Systematics Association to attend the Fourth Biennial Meeting in Dublin, in August, where she presented a talk entitled *Morphology and Phylogeny: the matrix revisited*.

Experiences of Ethiopia: highlights of the 17th AETFAT Congress

In September 2003 I, along with others from the Plant Sciences department, were lucky enough to attend the 17th congress of the *Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale* in Addis Ababa and also to take part in pre- and post-congress tours around the country. While the conference was inspiring and great fun, and the plant, and animal life on the tours incomparably beautiful and intriguing, there are many people more qualified than me to comment on these. Instead I'll just wax lyrical on a few of things that made the trip memorable to me.

Ethiopia is Africa's oldest independent country, perhaps best known to many for its bloody civil war, periodic drought, and massive refugee problems. Contrary to these conceptions, the Ethiopia that I experienced was for the most part a lush, green, fertile landscape home to a charming, happy people, a surprisingly wet climate, and consequent quantities of mud. It is completely unique in Africa and in the

world, and impossible to describe; the best I can do is hint at some of the sensations I remember and (at risk of sounding like a tourist brochure) encourage everyone to visit for themselves.

Diversity

Ethiopia epitomises diversity at every scale: from landscape to species. We travelled across high mountains, lowland plains, volcanic lakes, *Acacia*-wooded valleys, desert, water-meadows ... everything, in fact, except for a coastline! On a single day in the Bale Mountains we passed through, among others, broadleaved *Combretum-Terminalia* woodland teeming with butterflies, *Schefflera* and *Pouteria*-dominated forest dripping with epiphytic ferns and lichens, dramatic *Hagenia* forest, a magical woodland of *Erica* and *Hypericum* with an understorey of great mossy mounds, a moonscape-like highland plateau dotted with grey *Helichrysum*, bright orange lichens and huge giant *Lobelia*, and grasslands alternating with swathes of red hot poker (*Kniphofia*) and old, gnarled juniper trees. And in a single meadow every step would uncover a new, beautiful, and usually endemic alpine species. Even the ubiquitous flip-flops in every hotel room were unique, never a matching pair, and generally of the most mismatched sizes and patterns imaginable.

One recurring, disturbing theme was the disparity between people. I won't patronise them to discuss this, but the gulf between rich and poor was particularly, painfully apparent. One universally shared characteristic, in capital and countryside alike, was the resourcefulness to make use of whatever materials were available. Houses, fences, stakes and cattle-pens could be constructed from any timber, bamboo, or tree-fern stems depending on the composition of the nearest forest. Furniture was fashioned from old

vehicle parts, musical instruments from paint cans, griddles from oil barrels, and toys from anything immediately to hand!

Sights, smells and sounds

Sights that stick in my memory include the view over a valley so wide you could see both ends of the rainbow suspended across it; the mist rising from every thatched hut at sunset as the stove was lit inside, heating and vaporising the day's rain absorbed in the roof; the colour and continual movement of Addis's *mercato*; the largest open-air market in Africa, and the timeless view of bands of proud horsemen riding across the plains.

Ethiopia provides an equally varied assault upon the nose: everywhere is permeated with the rich smell of coffee, which here is often spiced with cardamom, and the ever-present *berbera* spice mix (unique in each family, but all smelling equally unpalatable to me). Then there were mountains of ghee in the markets, piles of cabbages for sale by the roadside, and the scent of thyme and a thousand other herbs drifting up with every step through the alpine meadows of Bale.

Perhaps most memorable are the sounds, the car-horns and shouting traders of the capital, the constant shouts of "you-you!" at the sight of every white face, the excited shrieks of children catching a glimpse of their picture on a digital camera-screen, and equally excited shrieks of botanists discovering yet another species of *Commelina*! We were never far from a source of music, be it the chanting from a mosque or church which seemed to go on every hour of every day, the infectious traditional music and its associated impossible dancing in which every muscle of the dancer's body seems able to move independently, unceasingly, and at an improbably rapid pace, the ethereal piping of a young goatherd, drifting down as he

stood silhouetted against the sky on a mountain-top, and the enchanting song of a man leading his train of camels down to drink in the hottest part of the day.

As emotive as the sounds were the silences. I recall the cold, thin silence of the Bale Mountains' Sanetti plateau, where temperatures fall below freezing all night but the apparently barren land teems with hidden activity of the burrowing mole-rats, prowling endemic Simien fox and graceful mountain nyala. Then the rich, intense silence of the *Hypericum* woodland where mosses and lichens absorbed every sound, and the simply vast, empty silence of the Great Rift Valley, with clear expanses of mud and water in every direction ... until a dozen cars containing over fifty chattering botanists turned up!

Alex Wortley

Collecting in the Botanists' Promised Land

The genus *Agathis* (Araucariaceae), which I'm revising (in part) in the course of my doctorate, is at its most diverse in New Caledonia. Most people I meet are convinced that New Caledonia is one of Canada's colder Atlantic provinces, and ask whether it isn't dreadfully cold. In reality, it is an archipelago roughly the size of Israel, about 1200 km northeast of Brisbane in Australia, tucked just inside the Tropic of Capricorn, roughly halfway between New Guinea and New Zealand. About 70 – 80% of the flora is endemic, and as well as the usual stock of island peculiarities, the archipelago has some very special and unusual plants. As well as five flowering plant families all to itself, the islands are home to a staggering diversity of conifers – 43 species, according to the 1972 flora, all of which are endemic, accounting for 7% of the world's conifer flora on a truly tiny fraction of its land area. Depending on who you believe, somewhere between 25% and 40% of all *Agathis* species are New Caledonian endemics.

Eight weeks fieldwork in New Caledonia therefore beckoned. I sent off the best part of a forest's worth of paperwork to the highly efficient provincial offices in Nouméa and Koné, booked my flights, filled myself up with all the more unpleasant vaccines the University Occupational Health Service had on offer, and finally arrived at Tontouta, New Caledonia's international airport on the edge of the Bay of St Vincent, in January 2003.

There are so many ways in which fieldwork can go badly wrong, and I feared for the worst when mine didn't exactly get off to a



Bale Mountains National Park

flying start: I discovered on arrival that the gendarmerie were issuing me with a parking fine – the little car I had arranged had been put in the wrong place. A little under a week later, the country went on to full alert and I had to delay my fieldwork as Cyclone Beni danced menacingly between Vanuatu and the Loyalty Islands, but eventually nothing came of it and I set off for the southern plateau, where amongst other unlikely happenings I woke up one morning to find myself in the middle of a military exercise, with columns of tanks rolling past me.



Tim in rain forest in New Caledonia

Agathis makes a remarkably distinctive tree. They are usually enormous, and often a very odd shape, sometimes resembling an upside down pyramid. But this distinctiveness is a double-edged sword for a tree with such valuable timber, and many times, working from old herbarium records and talking to older people in the towns and to chiefs in the tribes, I realized that certain once-extensive stands had now been completely logged out.

Robert Nasi (1982) produced a map of all the known stands, based on aerial photographs, which was a godsend in the field, and increasingly drove my decisions about where to go for collections. It sent me on foot across the mountain chain from Tindo in the Hienghène valley to high in the valley of the Ouango, far from any roads or people, with a Belgian conservationist friend and a local flying-fox-hunter; through dense rain forest along pig trails to the summit of Mèèji Veevee with a gang of machete-swinging locals from the tribe of Ba who, it turned out, had never been up there either; to the Forêt de Saille, leaving my car in the care of a kindly old man of the St-Pierre tribe with a puzzling interest in the religious beliefs of British Prime Ministers; and perhaps most wonderfully, to the Aoupinié massif, where I offered a lift to a fierce-looking hunter who put an enormous freshly-killed pig in the back of the vehicle and started talking about how lovely the

courtship dance of the big blue papilionid butterflies is. In the grove of *Agathis montana* that graces the summit ridge of Mont Panié, New Caledonia's highest mountain, I realized the practical meaning of 8000 mm of rainfall per annum as my clothes, skin, camera and even my watch went mouldy within 12 hours: my guide, by contrast, was horrified by the notion that in the distant land I came from the temperature might, albeit only on occasion, drop below 10°C. I learnt the finer points of manipulating the heating system of a Peugeot 106 to dry herbarium specimens (prop the press up on a pair of shoes where a passenger's feet would be, open the windows and ramp the heating up), found myself spending the night in a tropical downpour surrounded by inquisitive wild pigs, and discovered the tedium of subsisting on tinned sardines and cous-cous for weeks on end.

Unnoticed by the world's news companies, understandably preoccupied with the imminence of war in Iraq, a cyclone was brewing in the Coral Sea. On 13 March, Cyclone Erica swung to the north-west of the New Caledonian mainland, and the next day raced the full 500 km down the west coast, carefully following the island's only main road from town to town and destroying roads, houses, boats and schools, sweeping away bridges and knocking out electricity, water supplies and telephone lines. Large areas of forest were battered or even knocked flat: in Nouméa, the capital, flamboyant-trees (*Delonix regia*) had been completely uprooted and municipal waste bins scattered around as if they were so many matchboxes. In the great national park in the centre of the southern plateau, the Parc Provincial de la Rivière Bleue, the bridge over the Rivière Bleue itself smashed to pieces and was swept away. By evening, the roads of the city were full of emergency teams clearing the northern and eastern approaches to the capital, electricity was restored for most of the capital (rural areas had to wait many weeks) and the High Commissioner of the Republic appeared on the television to promise financial support for those affected. The French government sent millions of CFP francs of emergency aid, and a planeload of troops arrived from France to help clear the roads.

But life goes on for botanists, and every cyclone has a silver lining. I made my way out of the capital and towards the headwaters of the river Ya, between the Col de Mouirange and the (distinctly French) Col de Deux Tétons, where the winds had brought down large quantities of *Agathis* and indeed just about anything else that had been a tree. Given that most of my previous collections had been recovered painfully slowly with a well-aimed throwbag, the easy pickings offered by cyclone-damaged trees were too good to miss. Tanguy Jaffré, head of the botanical research programme at the IRD research centre in Nouméa, helped me to get

a permit to enter the otherwise-closed Rivière Bleue park, and after wading waist-high across the river itself (by now slow, clear, and peaceful again) I gathered dozens of specimens of *Agathis lanceolata* from gallery rain forest along the river. Bernard Suprin, an Environment Service botanist who had earlier accompanied me on a trip to the Katrikoin tribal lands, drew me a map of where I could find a large population of *Agathis ovata* among the mountains at the head of the Koélagoguamba river, and with the mining track blocked by landslides I walked 38 km in a day, from sea-level to 900 m and back, through thick mist and pouring rain, to make a set of collections. The consequence of this surfeit of cheerful gung-ho bravado was that I couldn't even stand up properly for the next two days.

Was it productive? Very much so. Only in the field did I realize things about leaf development and variation that no amount of gazing at herbarium specimens could ever have told me. Only by seeing whole trees do aspects of the architecture and of the bark that photographs flatten become real and concrete in the mind, at once more difficult to differentiate from one another by description and more difficult ever to actually mistake for one another. Only by making the collections yourself, by visiting the trees, removing branches and gathering up pollen cones from the dank gloom of the forest floor, does it become possible to have a proper understanding of what the flattened and dried structures that fill herbaria actually *mean*, and how they fit together, grow, and work as living plants. I left having acquired dozens of new friends, 80-odd herbarium specimens, 250-odd DNA samples, hundreds of photographs, and above all else, a burning desire to return.

Tim Waters

Oxford Field Guide Workshop: Field Guide to the Oxford Parks in 3 weeks

The DFID/FRP field guide project R7367 held an end of project workshop in Oxford for three weeks over the summer of 2003. Over the last four years (see back issues of OPS), the project based in the Department of Plant Sciences has been investigating how to optimise field guide production, by making small field guides in Cameroon, Grenada and Ghana. Our main collaborators from these countries met up with each other for the first time to share the lessons learnt from the project.

We all, from DFID to Grenadian foresters, want to see more and effective field guides for tropical forests. Apart from anything

else, their existence provides various means by which poverty around diverse forests can be alleviated in a way that is linked to the conservation of biodiversity. To take one example, it is quite remarkable how few (typically <20%) of the rare or interesting plants in forests in our three collaborating countries – whether *Colas* in Cameroon, or large trees in Ghana – are known to people farming locally, let alone to ecotourists who may be prepared to pay for stimulating tours through those forests (see last issue of OPS).

One overriding lesson of the project has been that “modular photoguides” with minimum jargon can be made to work for broad audiences very quickly using digital cameras. Being ‘modular’ means they can be developed incrementally, so they can be used when not all species are included, and gradually improved. Photos can be assembled into useful guides with cheap and

required – apart from access to botanical knowledge of course – is handiness with a digital camera, and the eye to frame pictures aesthetically and meaningfully. Most of our participants were familiar with basic word processing and had used a camera before, but the maintenance of digital photo galleries; the subtleties of depth of focus and camera shake; the editing and enhancement of digital photos, and use of document templates, for instance, were new to all.

So, our six workshop participants (see photo below) were helped to develop these and other guide-related skills, demonstrated and guided by Alex Wortley and William Hawthorne from the Department of Plant Sciences, through the practical task of making a rapid photoguide to the trees of the Oxford University Parks. All participants had various other projects to complete and fourteen days each to do both. Our

generate pictures, so we are currently looking for funding ultimately to cover Africa with “Portfolio guides”, being what we call modular photo-guides, one species per page, which we would make available on the internet with other tools and photos for others to ‘mix and match’ into their own guide. The workshop’s photoguide to Oxford trees and other material will be downloadable from the end of this year on <http://herbaria.plants.ox.ac.uk/>.

William Hawthorne

Refurbishment of the Fielding-Druce Herbarium (OXF)

The Fielding-Druce Herbarium (OXF) has occupied its present location in the Department of Plant Sciences for the last 50 years. During this time, space restrictions have led to the introduction of strict collection policies. For example, material is no longer added to the Fielding Herbarium, other than the backlog of unincorporated material, although elite British material is still added to the Druce Herbarium. In the case of pteridophytes, bryophytes, lichens, fungi and algae there is no active collection of these groups. Therefore, future expansion of the Fielding-Druce Herbarium is likely to be limited, although space is needed to relieve pressure on over-packed cupboards. Furthermore, during the last 50 years, the conditions for collection conservation and facilities for collection-research have deteriorated. The collections are faced with the legacy of more than three hundred years of specimen treatment with a wide range of preservatives, most notably mercuric chloride.

Therefore, as the second phase of a three-phase programme to refurbish completely the housing and facilities in the Oxford University Herbaria, refurbishment of the Fielding-Druce Herbarium has been completed. The aim of which has been to maintain an atmosphere in keeping with the age of the collections (some specimens dating back to first years of the 17th Century), significantly improve the housing of the specimens and provide limited expansion space, reduce exposure of staff to mercuric chloride residues and increase the amount of useful research space. All of these requirements had to be met within the space currently occupied by the Fielding-Druce Herbarium.

One obvious solution to increasing the efficiency of space utilisation was to use compactor units, as was undertaken in the Daubeny Herbarium refurbishment. However, this was rejected for the Fielding-Druce Herbarium because of the structure of



Photo: left to right: Rita Lysinge, Limbe Botanic Gardens Cameroon; Dean Jules, Forestry Dept. Grenada; (behind) Elias Litonga, Limbe Botanic Gardens Cameroon; Alex Wortley (Oxford); Ntim Gyakari, Forest Herbarium, Kumasi; Patrick Ekpe, University of Ghana herbarium, Legon; William Hawthorne (Oxford); Musah Abu Juam, Northern Savanna Biodiversity Project, Ghana

widely available computer software and hardware, and even printed into a useful format using cheap printers and laminators.

So, what’s to stop botanists or related technical people in our countries getting on and making photoguides now? One bottleneck is lack of photographic and computing capital (the project has supplied printers, laminators and Nikon cameras to biodiversity institutions in our collaborating countries, but this problem is widespread). Another important bottleneck is skill, and more significantly the confidence, to operate these tools professionally. The main skill

expeditionary force of African and Caribbean field botanists, stalking the park during the remarkable August heat wave, caused some bemusement amongst the sunbathers and tennis players, and in spite of a struggle against the annoying aspects of biodiversity, not least being youths removing the tags from the already photographed trees, a presentable guide was completed to about 100 of the trees, including a number of rarities.

A final bottleneck for field guide producers is institutional commitment to staff time and transport, especially for fieldwork to



OXF before refurbishment (February 2003, photograph: S.K. Marner).

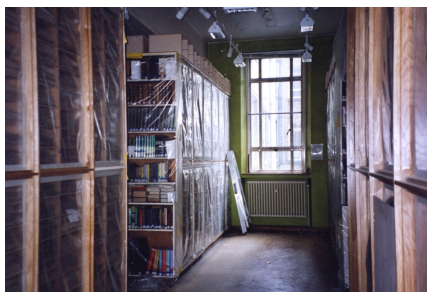


Work in progress at the far end of OXF (July 2003, photograph: S.K. Marner).



Newly refurbished OXF (February 2004, photograph: J. Baker).

the building and the number of fixed units that would need to be included to reduce damage to historic material in the collection. The latter concern meant that there would have been no increase in the available research space. We, therefore, opted to use the existing cupboards, supplement them with new ones and redesign the existing space for research. In addition to the space issue, the use of the existing cupboards had two other advantages. There was no need to dispose of large amounts of potentially mercury-contaminated wood. The majority of the specimens could remain in place during the refurbishment; only about 80,000 specimens were removed (mainly the historical material). The fronts of all the existing cupboards were removed and replaced with new ones and redesigned the existing space for research. In addition to the space issue, the use of the existing cupboards had two other advantages. There was no need to dispose of large amounts of potentially mercury-contaminated wood. The majority of the specimens could remain in place during the refurbishment; only about 80,000 specimens were removed (mainly the historical material). The fronts of all the existing cupboards were removed and replaced with new frames, to which new doors were then hung and Neoprene seals applied; the idea being that the seals would minimise leakage of mercury vapour from the finished cupboards. During this operation, all the shelves were sealed with plastic sheeting (see photograph below) to minimise exposure to mercury vapour. Six new units were constructed to fill space between the existing cupboards.



OXF shelving sealed with plastic sheeting (July 2003, photograph: S.K. Marner).

All of the new units are constructed with European oak frames and birch ply interiors. The existing units now have European oak fronts and the original cedar interiors. The doors, in order to ensure structural stability, comprise an oak border with a MDF core and an oak veneer; in total, some 860 doors were replaced. All of the bays in the herbarium have matched veneer and a single sheet of veneer has been used from floor to ceiling through each set of cupboard doors; features which add to the overall appearance of the herbarium.



Fielding-Druce Herbarium (OXF) showing new style cupboard doors (February 2004, photograph: J. Baker).



Far end of OXF before refurbishment (February 2003, photograph: J. Baker).



Research space at far end of OXF (February 2004, photograph: J. Baker).

Oxford University Herbaria now have excellent facilities for the housing of the collections, plus space for researchers to work on these collections. However, the next step is to improve access to the

collections through the creation of an on-line database to all of the specimens in the collections using BRAHMS. The databasing effort is being directed initially at databasing and digitising all of the type specimens (estimated at about 25,000). However, it is also envisaged that this system will provide a means to deliver 'loan' material as images, especially of the collections in the historic herbaria (pre-1796). This is an exciting development and it will combine maximising access to the collections, with new ways of using information technology and discharging our responsibilities for the stewardship of these unique, internationally important collections.

The refurbishment programme has been funded by a generous grant from HEFCE via the Science Research Investment Fund (SRIF), for which the Department of Plant Sciences is very grateful. I would also like to take this opportunity to thank the University Surveyors, the architect, the contractors and Serena Marner for all of their hard work in seeing phase II of the refurbishment programme to completion.

Stephen A. Harris

Hunting for *Strobilanthes*

Oxford University's Department of Plant Sciences is conducting an on-going study of the systematics of *Strobilanthes* (Acanthaceae), which has resulted in a series of over ten publications in the last few years (see references below). As part of this study we have needed to see as many different species as possible. *Strobilanthes* is a large, entirely Asian genus of over 400 species found in the hill districts of south and south-east Asia. It is probably at its most diverse in the remote, mountainous and politically unsettled areas of north-east India and Upper Burma.

Plant hunting normally refers to travelling to remote places to find attractive plants suitable for cultivation in temperate countries. Like voyages of discovery and journeys of exploration, the great days of plant hunting are almost certainly in the past. Many of the great plant hunters of the past in Asia, including Hooker, Farrer, Forrest and Kingdon Ward, concentrated on the eastern Himalayas, upper Burma and south-west China where *Strobilanthes* is most diverse. All of them brought back new species of *Strobilanthes* as dried specimens. Kingdon Ward, described in recent books as "the last of the great plant hunters" (Lyte 1983), found more new species of *Strobilanthes* in the 20th Century than any other botanist from any country with a total of over 20. Species described from his collections range from *Strobilanthes oresbia*

from Upper Burma described by William Smith as long ago as 1918 to *Strobilanthes asymmetrica* from eastern India described by Jon Bennett and me last year (Wood, Bennett & Scotland 2003). There are still other new species found by him awaiting description.

This paper, however, is concerned with a different kind of plant hunting. This is the search for type specimens, which is so important for any kind of systematic monographic study. In this search Oxford has a headstart with *Strobilanthes* since a significant proportion of *Strobilanthes* types are found in the three principal British herbaria at Kew, the Natural History Museum in London and at Edinburgh Botanic Gardens. The other two main sources are Leiden for specimens from Indonesia and Paris for specimens from China and former Indo-China. It is a relatively easy task to ask for the loan of types from these herbaria but there is one important proviso – does the herbarium know that it has the type specimen? In another paper (Wood 1994), I have indicated how important types of *Strobilanthes* from Sri Lanka lay unrecognized at Edinburgh by all botanists working on the genus. In the same way we have come across unrecognized types of *Strobilanthes spathulata* and *S. andamanensis* at Kew while the type of arguably the commonest *Strobilanthes* in China (*S. dimorphotricha*) was found pasted on the corner of a sheet of a different species at the Natural History Museum. This specimen must have had an adventurous history, having escaped the burning of most of Hance's specimens in an anti-foreign riot in Amoy in the late 19th Century. However we have so far failed to find the type of the mysterious *Strobilanthes lactucifolia* described from China by Hector Léveillé and which should be in either Paris, Edinburgh or both. It has probably been filed under another genus or even family, as Léveillé was notoriously inaccurate in his identifications.

However these five herbaria do not account for all the type specimens we needed to see. Specimens were traced to places as diverse as New York, St Petersburg, Vienna and Singapore. Some of these loaned specimens and others sent digital images. A digital image of *Hemigraphis szechuanica* sent by St Petersburg enabled us to confirm that this mysterious species was, in fact, *Strobilanthes tetrasperma* described earlier from Hong Kong. Surprisingly we found that most types from Berlin had survived the bombing raid and subsequent fire in 1943 because of a fortuitous loan to Holland at that time. Thus we were able to identify *Gutzlaffia birmanica* with the earlier *Strobilanthes rosea* and to confirm the identity of *S. renschiae* and place it in relation to other species. But what had

happened to the type collection of *Strobilanthes limprichtii* described from a specimen from western China? It could not be located at Berlin or at Wrocław where it might have been expected. Perhaps it was destroyed in the Berlin fire. Even when we successfully located certain types, the specimens were not always very useful. The type of *Strobilanthes apoensis* described by Elmer from the Philippines consists only of a stunted inflorescence with one fruiting capsule, while that of *S. saltiensis* described by Spencer Moore from Vietnam has no flowers or leaves. Assessing specimens of this kind is little more than inspired guesswork.

Not all types come easily to Oxford so I have recently journeyed to China and India to search for types in their collections. The visits to both places were planned over several years and twice postponed but in the end took place in January this year with outstanding success. In China I was able to see all the types I expected and in India all but one. In addition I was able to see a range of specimens which included several hitherto undescribed species.

The four Chinese herbaria that I visited in Guangzhou, Kunming, Nanning and Gwulin were all impressive for their friendliness and their flexibility in meeting my rather antisocial visiting hours. Which British institution would open on Sunday for an unimportant foreign visitor? Two Chinese institutes (Guilin and Guangzhou) did just that. I was very impressed with the quality of the infrastructure of the herbaria whether in the Guangxi Institute of Traditional Medical & Pharmaceutical Sciences in Nanning where specimens were housed in neat, traditional wooden cabinets or in Kunming's state of the art herbarium with modern compactors and well-lit workspaces. Finding the types I was looking for immediately clarified some problems and corrected some of my false assumptions. *Strobilanthes alatiramosa*, described from China in 1997, is in fact *Strobilanthes pateriformis* described from Vietnam a century earlier, *Pteracanthus grandissimus* is *Strobilanthes oresbia* and the species that in China is known as *Sympagis petiolaris* is, in fact, my *Strobilanthes kingdonii* from Tibet. However I had to change some of my conclusions too. The species I described in 1994 from Tibet as *Strobilanthes campaniformis* is the same as *Disflugossa medogensis* described by a Chinese author ten years earlier and my *Strobilanthes unilateralis* from Burma is antedated by *Pteracanthus gongshanensis* from China. However examination of the wider range of specimens of this species complex in Kunming casts doubt on the validity of this species and is a spur to further investigation. New data leads to the revision of earlier assumptions.

Calcutta (or more correctly now, Kolkata) is home to India's Central National

Herbarium. This contains collections by British and Indian botanists going back to the early 19th Century. Calcutta was the capital of Britain's Asian empire throughout the 19th Century and accumulated specimens not only from India but from much of Asia. Collections by long-forgotten travellers, forestry officers and a clutch of British army officers from General Collett to Colonel Jenkins, Captain Mackenzie and Lieutenant Toppin are all well represented. Many of these specimens are not duplicated in British herbaria and represent interesting and rare plant species some never collected subsequently. What is less well known is that much of the basic identification and description of new species in what was British India was not carried out at Kew but in Calcutta. Thus many specimens described by Thomas Anderson, George King, Sulpiz Kurz and others are in Calcutta. It was these specimens that I particularly wanted to see. I was able to find that the long-forgotten *Strobilanthes mastersii* described by Anderson in 1867 was, in fact the same as *S. scoriarum* described from China much later and that *Strobilanthes karenium* described by Kurz from the Karen country in Burma was the same as *Strobilanthes lilacina* from Thailand. Both species are thus shown to have a wider distribution that had hitherto been supposed.

Calcutta herbarium also helped me update my rather sketchy knowledge of a number of species. Outside India there are only three known specimens of *Strobilanthes rhombifolia* (Wood 1994b: 255). From the additional specimens at Calcutta I now have a much clearer idea of the distinctive characteristics of this species as well as of its distribution. Finding recent collections of *Strobilanthes denticulata* and *S. monadelphica* showed that species that I had thought might be extinct (Wood, Bennett & Scotland 2003: 141; Wood & Scotland 2003a: 107) are happily revealed by more recent collections to be still surviving even from the much degraded Khasi Hills of Meghalaya State. Two species hitherto known only from a single collection (*Strobilanthes polythrix* and *S. pterygorhacchis*) are now shown to be present in different states of eastern India.

In my visits to China and India I have received generous help from numerous people and organisations but I need to single out four for special mention. In the first place I would like to express my thanks to the Stanley Smith Horticultural Trust for the financial support that made my visits possible. In Oxford I would like to thank Robert Scotland for his encouragement over many years. At Kew I would like to thank the Indian botanical liaison officer, Lakshmi Narasimhan, for arranging all necessary contacts with the Botanical Survey of India. Finally I would like to express my especial thanks to Deng Yunfei for organising my visits to Chinese herbaria and for his

company throughout my time in China. I very much hope that my visit to China and India will result in co-operation between him and other contacts in China and India and with Oxford to further our understanding of *Strobilanthes*.

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J.R.I. Wood

Systematics Discussion Group 2003

The systematics discussion group meets weekly during term time to scrutinise papers that are relevant to our interests. Last term's discussions focussed on two main themes-how to get good phylogenies, and how best to investigate character evolution. The papers discussed, and what we thought of them are listed below.

Those that examined how best to generate phylogenies were:

Pennington, R.T. (1996). Molecular and morphological data provide phylogenetic resolution at different hierarchical levels in *Andira*. *Systematic Biology* **45**: 496-515.

The paper presents an interesting exploration of issues about combining character sets. Chloroplast restriction site data and discrete morphological characters are combined to give resolution. The limited number of characters used dated the paper due to the advent of molecular sequence data. ☺.

Mathews, S. & Donoghue, M.J. (1999). The root of angiosperm phylogeny inferred from duplicate phytochrome genes. *Science* **286**: 947-950.

This paper resolves basal angiosperm relationships and shows that in instances where outgroup rooting is inappropriate, a good alternative may be duplicate gene rooting. ☺☺.

Lynch, M. & Conery, J.S. (2000). The evolutionary fate and consequences of duplicate genes. *Science* **290**: 1151- 1155.

The authors investigate duplicate gene behaviour in sequenced genomes. This necessitated a mathematical approach, which made it slightly inaccessible. ☹.

Rokas, A., Williams, B.L., King, N. & Carroll, S.B. (2003). Genome-scale approaches to resolving incongruence in molecular phylogenies. *Nature* **425**: 798-804.

This paper addresses incongruence between data sets, and how to deal with it. Amalgamation of data sets from 106 genes in 8 species overrode incongruence between individual sets and gave a single fully resolved and supported tree. ☺. In species without fully sequenced genomes, sets from 20 genes should suffice!

Those that explored character evolution were:

Soltis, DE, Senter, AE, Zanis, MJ, Kim, S, Thompson, JD, Soltis, PS, Ronse de Crane, LP, Endress, PK, & Farris, JS. (2003).

Gunnerales are sister to other core eudicots: implications for the evolution of pentamery. *American Journal of Botany* **90**: 461-470.

The authors concatenate 3 data sets to resolve relationships amongst core eudicots, and then map floral characters onto their tree. We thought that the tree had little support at the nodes relevant to the evolution of pentamery, and that the distance between taxa was too large for meaningful exploration of character evolution. Phylogeny ☺, character evolution ☹.

Doebley, J., Stec, A. & Hubbard, L. (1997). The evolution of apical dominance in maize. *Nature* **386**: 485-488.

A paper that accounts for the architectural differences between maize and its wild progenitor, *Teosinte*. We liked the explicit ancestor descendant relationship that gave direction to the morphological change, and the evidence for a particular gene generating novelty. A salutary message was that characters that appear unlinked morphologically may in fact be linked genetically. ☺☺.

Sucena, E., Delon, I., Jones, I., Payre, F. & Stern, D.L. (2003). Regulatory evolution of shavenbaby/ovo underlies multiple cases of morphological parallelism. *Nature* **424**: 935-938.

Differences in expression of a particular gene in flies accounts for morphological differences in embryonic hairiness. These are examined in a loose phylogenetic context. We would have welcomed some consideration of interspecific gene homology issues. Evo ☺, devo ☹.

Wray, GA. & Abouheif, E. (1998). When is homology not homology? *Current Opinion in Genetics and Development* **8**: 675-680.

An exploration of different genetic and morphological levels at which the concept of homology is useful for comparative studies. We have to be explicit about the hierarchical level to which we are referring when we say things are homologous. ☹.

All of the papers stimulated good discussion. Our overall conclusions for the term were that to study character evolution we need well resolved and supported phylogenies, to look at closely related taxa, and to use genetics.

The systematics discussion group was: Ruth Eastwood, Stephen Harris, Jill Harrison, Colin Hughes, Elizabeth Moylan, Caroline Pannell, John Pannell, Robert Scotland, Tim Waters, and Alex Wortley.

Jill Harrison and Elizabeth Moylan

Herbaria

Fielding-Druce (OXF)

We are now very pleased to re-open the Fielding-Druce Herbarium to visitors and enquiries etc. after being closed for the last year during our refurbishment programme (see article on page 7). We are sorry for any inconvenience caused during the closed period. Some of you have been very patient in waiting for answers to specimen queries or in waiting for loans which will now all be dealt with very shortly. We welcome those of you who would like to visit (by arrangement please) and hope you will enjoy our smart new and modernized facilities. The whole environment of the herbarium is now much brighter and hopefully more welcoming (no more the orange and lime green paint adorning the walls, now a much more subdued cream complimenting the oak veneer of the cupboard doors!). All herbarium cupboards housing the collections are now totally accessible and there are wider benches for laying out and sorting specimens and to sit and work at. Computer internet points are available for visitors to use as well as an updated binocular microscope.

Now that all the collections are back in place, work in the herbarium will progress on labelling the 860+ cupboards so that specimens can be found with ease. The task of databasing the OXF collections using BRAHMS will begin with type material, which will be available on-line in the near future. Lists of collectors who have contributed to OXF, plus their dates and geographical areas of collection, are now available to search on our website at <http://herbaria.plants.ox.ac.uk>. It is possible to search by collector name or geographical area. Having a server designated to the

herbarium has now opened up many possibilities for future access to the collections on-line not previously possible (see page 9). Watch this space!

Serena Marner

Daubeny (FHO)

It is now, unbelievably, nearly two years since the FHO collection was returned to the refurbished herbarium and the new arrangement of the facilities continues to prove its worth with use. Because the area that FHO occupies is not huge, the alphabetical arrangement of the families has not been an impediment to any user of the collection and, for some, has made life easier. After a period of use and the incorporation of outstanding material, some readjustment to the placement of the boxes of specimens on the compactor shelves has become necessary due to congestion in some parts of the collection. For example, the monocot. families and dicot. families at the beginning of the alphabet took up more space than had originally been allocated to them, exacerbated by Compositae being updated to Asteraceae. The collection is much more accessible now than it was before refurbishment and there is also the space to spread out specimens for study. During the refurbishment of OXF, extra people and equipment had to be accommodated in FHO, but now that refurbishment is complete, FHO is back to normal functioning.

Other facilities in FHO have also been upgraded. Computer and internet points are available around the herbarium along the work benches and a high-grade, binocular microscope, with digital camera, has replaced the previous microscope. A server for the herbaria's computers and a digital camera facility for photographing specimens are available for use in both FHO and OXF.

Over the next year, we will start to database the FHO Type specimens using BRAHMS (www.brahms.co.uk). As well as cataloguing, we aim to be able to make the collection more easily available through electronic loans of digital images and information posted on our website <http://herbaria.plants.ox.ac.uk>. Loans (both in and out) and accessions have already started to be processed using BRAHMS and this facility will be improved by allowing more information to be available electronically. For instance, we hope that borrowers will eventually be able to request material for loan and provide determinations electronically.

Curation of the FHO collection has been the major activity in FHO throughout the last twelve months, as material has been incorporated or updating was required. The Chapman collections and my own much smaller collection, from Mt. Mulanje,

Malawi and the rest of the Chapman Nigerian collections have now been incorporated, as have the remainder of Dr. Frank White's Zambian and South African collections. Specimens of *Faurea* (Proteaceae) from east and south tropical Africa are now back in the collection following the completion by Serena Marner of the accounts of this genus for F.T.E.A. and *Flora Zambesiaca*. Colin Hughes' ongoing current collections of *Leucaena* and other legumes from central and south America continue to be incorporated as they are collected. Also, FHO continues to be the base for William Hawthorne's Tree Guide Book project in Ghana and Grenada. His collections and Colin's recent *Lupinus* collections are currently being mounted for eventual incorporation into FHO.

Our main aim for the next twelve months is to clear as much of the backlog of unincorporated material as possible so that all will be available for study in the collection. As well as being 'good house-keeping' practice, we will then feel we are truly moving on to new enterprises.

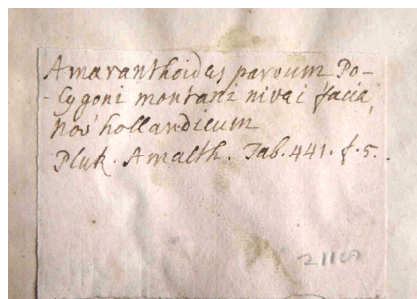
Alison Strugnell

Another Dampier specimen re-discovered in OXF



When William Dampier (1651-1715) returned to Britain in 1701 after his second navigation of the world with a collection of plant specimens from the west coast of New Holland and elsewhere, he was Court-Martialled. This was because of the loss of his ship the *Roebuck* which sank off the

coast of Ascension Island and for his ruthless treatment of two of his crew who disobeyed orders. Dampier had however managed to rescue and preserve a number of pressed plants he collected in 1699 and remarkably safeguarded them for 2 years through his perilous journey back to Britain. These specimens were later given to William Sherard who bequeathed his collections to the University of Oxford. (See *Oxford Plant Systematics* 7: 5-8 (1999) for a fuller account).



William Dampier's specimen of *Pilosus villosiflorus* below left and above, its label on the herbarium sheet in William Sherard's handwriting.



Figure from Plukenet *Amaltheum Botanicum* (1705): Plate 441, Fig. 5. Reproduced from Sherard 567, Plant Sciences Library.

Although Dampier's Australian plant specimens have been well studied and documented since 1939 when T.G.B. Osborn and C.A. Gardner wrote a paper about them in the *Proceedings of the Linnean Society of London* (151,2: 44-50), it remained a bit of a puzzle that one of Dampier's plants that had been named and illustrated by Leonard Plukenet in 1705 was absent from the collection. Alex S. George, who published a book, entitled *William Dampier in New Holland. Australia's First*

Natural Historian in 1999, felt that the specimen could exist in the herbarium somewhere. Therefore early in 2003, before packing the Sherardian Herbarium away in boxes in preparation for the refurbishment of the herbarium, I had a look through the folders of miscellaneous Amaranthaceae. The whole Sherardian collection had been sorted into families and genera by George Claridge Druce in the 1880's and 90's while he was Honorary Curator of the Fielding Herbarium. A large proportion of the specimens though are still not determined with modern binomial names but are just identifiable by their pre-Linnean polynomials. Such was the case of the 'missing' Dampier plant. Much to my delight before long I came across a specimen labelled as *Amaranthoides parvum Polygoni montani nivei facie nov' hollandicum*. The plant on the sheet matched well with the illustration from Plukenet's *Amaltheum Botanicum* depicted on Plate 441, Fig. 5 (see figure) and the polynomial, written in William Sherard's hand, also matched that published in 1705. When Alex George visited OXF a couple of months later he confirmed that the specimen was *Pilosus villosiflorus* F. Mueller (see image on the left).

This specimen of *P. villosiflorus* was most probably collected on Dirk Hartog Island in Shark Bay, Western Australia, one of Dampier's known collecting sites. In fact we saw this plant on the island 300 years later in 1999 and I was fortunate in seeing the plant again growing on the shores of Shark Bay near Denham on a visit there in September 2003. It is a small annual with soft woolly white flowers and grows in sandy soil. Although Dampier was the first European to collect this plant and bring a specimen back to Britain, the species was not given a modern Latin name until 1862 when Ferdinand von Mueller described it, more than 160 years after it had first been collected.

We can now say that there are 25 extant Australian specimens collected by Dampier (including a seaweed). We are still hoping that we might discover one or two more in the Sherardian Herbarium in the future! Perhaps a specimen of *Acanthocarpus* will be found, for instance, as this was also figured in Plukenet's *Amaltheum Botanicum* but a specimen is not known to exist at present. Both *A. robustus* and *A. preissii* occur on Dirk Hartog Island. Although Alex George and I collected a specimen of *A. robustus* from the Island in 1999, George now thinks that Dampier's figured plant is more likely to be *A. preissii* which was plentiful behind Dampier's landing site.

Serena Marner

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