

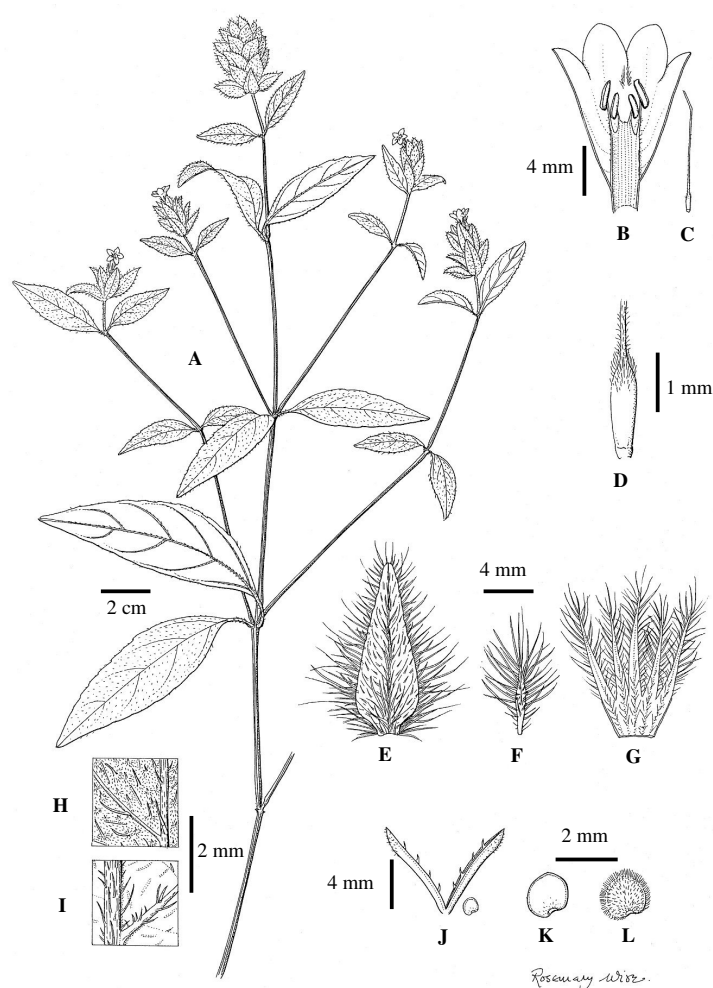
# Oxford Plant Systematics



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

OPS 9

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A. Habit. B. Flower section. C. Gynoecium. D. Ovary pubescence. E. Bract. F. Bracteole. G. Calyx. H. Upper leaf surface. I. Lower leaf surface. J. Capsule. K. Dry seed. L. Seed after wetting.

*Hemigraphis hirsutissima* Merr. is endemic to the island of Luzon in the Philippines. It is easily recognised by its violet flowers subtended by hairy bracteoles and bracts. It was recollected from Benguet Province, Luzon by Elizabeth Moylan, Ernesto Reynoso & Raymond Fuentes in February 1999 and is one of eighteen species of *Hemigraphis* found in the Philippines (see page 4).

## Contents

|                                                               |    |
|---------------------------------------------------------------|----|
| <b>Editorial</b>                                              |    |
| <i>Robert Scotland</i> .....                                  | 2  |
| <b>News items</b> .....                                       | 3  |
| <b>Student progress</b> .....                                 | 3  |
| <i>Timothy Waters</i>                                         |    |
| <i>Alex Wortley</i>                                           |    |
| <b>Abstracts of systematic theses submitted in 2001</b> ..... | 4  |
| <i>Jonathan Bennett</i>                                       |    |
| <i>Elizabeth Moylan</i>                                       |    |
| <i>Julian Starr</i>                                           |    |
| <b>2001 publications</b> .....                                | 5  |
| <b>Expeditions and visits</b> .....                           | 5  |
| <b>Refurbishment of Oxford University Herbaria</b>            |    |
| <i>Stephen A. Harris</i> .....                                | 6  |
| <b>Sibthorp Medal awarded</b>                                 |    |
| <i>Roger Mills</i> .....                                      | 8  |
| <b>Oxford, Greek Revival and John Sibthorp</b>                |    |
| <i>H. Walter Lack</i> .....                                   | 8  |
| <b>Three days plant collecting in Eastern Bolivia</b>         |    |
| <i>John Wood</i> .....                                        | 10 |
| <b>Evergreen forest flora of Malawi</b>                       |    |
| <b>Book Review</b>                                            |    |
| <i>Stuart Cable</i> .....                                     | 12 |
| <b>Herbaria</b>                                               |    |
| Visitors .....                                                | 13 |
| Fielding-Druce (OXF) .....                                    | 13 |
| Daubeney (FHO) .....                                          | 14 |
| <b>Tropical forest plant field guide project</b>              |    |
| <i>William Hawthorne</i> .....                                | 14 |
| <b>BRAHMS</b>                                                 |    |
| <i>Denis Filer</i> .....                                      | 15 |

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## Editorial

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At a time when taxonomy and herbarium based activities have all but disappeared in the university sector in the UK, it has been very exciting witnessing the refurbishment of our Daubeny Herbarium this past summer. This phase of refurbishment represents an ongoing financial and structural commitment to whole organism systematics within the Department of Plant Sciences but also provides an exciting opportunity, within a university environment, to continue taxonomic research in an age in which the biological sciences are being revolutionized by molecular biology. The issue of systematic and taxonomic research is currently the focus of renewed discussion in the UK and has been given a particular focus recently.

In November 2001, I and two of my research students (Alex Wortley & Jonathan Bennett) began to write an opinion article for *Edinburgh Journal of Botany* highlighting the demise of alpha taxonomy at the expense of phylogeny reconstruction (see below). In December 2001 the House of Lords Select Committee on Science & Technology decided to revisit (previous report in 1992) the issue of systematics in the UK by taking evidence over a three-month period with a focus on two questions:

1. How has the organisation of and funding for systematic biology in the United Kingdom changed since 1992?
2. What, if any, are the changes required in this area to enable the United Kingdom to meet its policy aims on biodiversity?

One of the topics I and my students were addressing in our paper concerning the relationship between alpha-taxonomy and phylogeny reconstruction is particularly pertinent to the issues being addressed by the House of Lords. In much biological research over the last decade phylogenetic trees have become common place, as it is increasingly viewed as important to research all aspects of biology within the context of phylogeny. Thus in recent times the research and building of particularly molecular phylogenetic trees has been extensive and systematics as a subject has enjoyed a period of relative growth, resonance and interest. Unfortunately, this growth in tree building systematics has not been matched in that part of systematics (taxonomy) that is attempting to complete the inventory of species which, at least in the UK, appears to be in serious decline.

### Introduction

The current plight of systematics in the UK especially with regard to inventory taxon-

omy raise fundamental issues about the nature of science. Much scientific research is driven by new technological innovations, cutting edge-breakthroughs and a Popperian hypothesis-testing approach. The global research project to complete the species level inventory, at some level of detail, is neither a hypothesis nor does it demand cutting edge breakthroughs or new technological advances. Therefore, in the UK, and in contrast to funding bodies in the United States, inventory taxonomy is still mistakenly perceived as old fashioned, and peripheral to the main science agenda rather than as one of the most fundamental, central, achievable and necessary global scientific goals of the coming century (Wilson 2000).

### The scope of systematics

Similar to the term biodiversity the term systematics is pseudocognate, meaning that we all have a fair idea of what it is but defining it is not easy. Discussion of the two associated terms systematics and taxonomy either view them as synonyms and broadly defined (Stace, 1989) or view systematics as a broader concept that includes taxonomy. Stace (1989) defines systematics as '*The study & description of the variation of organisms, the investigation of the causes and consequences of this variation and the manipulation of the data obtained to produce a system of classification*'. Broad definitions of systematics represent an accumulated breadth of studies from cytology and genetics (biosystematics), phylogeny reconstruction, anatomy, floristics, monography, biogeography, and taxonomy. When taxonomy is defined in the narrower sense, it generally includes the discovery, description, naming and classification of species or groups of species. Taxonomy in the narrow sense can be associated with a number of different terms such as alpha, classical, fundamental, orthodox, practical, traditional etc (Turrill; 1935, 1938).

Attempts to define the scope of systematics need to take into account the way in which the systematics research agenda has changed as both new sources of data (chemotaxonomy, palynology, DNA sequencing) have been introduced but also new methods of analysis (e.g. cladistics). However, not only are new data and methods of analysis affecting the scope of systematics, but the questions being addressed have also changed as evidenced by the massive interest in phylogeny reconstruction over the last decade or so. Therefore any attempt to pin down the breadth of systematics is constrained in time. Perhaps a more pertinent question is the scope of systematics today and in the immediate future. In other words, what are the research priorities for the systematics community at this time.

The late Colin Patterson of the Natural History Museum (London) gave oral evidence to the House of Lords Select Committee in 1992 and stated that the two most important questions for a systematist faced with a specimen of an organism are what is it and where does it fit on the evolutionary tree or classification? Similarly, the *Systematics Agenda 2000* initiative state that the research priorities over the next 25 years are to answer the following questions:

- What are the Earth's species?
- Where do they occur?
- What properties do they have?
- How are they related?

Therefore so-called 'alpha taxonomy' is associated with a global research agenda with a focus on completing and documenting the Earth's species whereas the so called 'omega taxonomy' has come to have a particular focus on phylogeny reconstruction and an understanding of the tree of life. Although the four questions posed above are interrelated they also are separate in terms of career interests and who does what research. Therefore people with particular research skills and focus on inventory issues (the first three questions) are often distinct from those with a focus on building and understanding the tree of life (the fourth question). These two research areas are complementary but distinct not only in that they are pursued generally by different people, but also, that they demand a different set of skills. Thus, the often stated view that research associated with completing the inventory, 'alpha taxonomy', is somehow a mere, albeit important, building block for the more intellectually challenging and worthwhile task of understanding evolution and phylogeny is an outdated and wrong-headed conceptual framework to consider the scope of modern systematics. Rather, the 'framework' and four questions of the priorities for systematics outlined in the *Systematics Agenda 2000* initiative, places both inventory taxonomy and phylogeny reconstruction as the two most important tasks facing modern systematics. Furthermore, Wilson (2000) discussed these two priorities and stated that '*Phylogenetic reconstruction, currently the dominating focus of systematics obviously is worth doing, but more scientifically important and far more urgent for human welfare is the description and mapping of the world biota*' (see Landrum, 2001 for discussion).

Therefore, in the UK we need to make a decision about whether we wish to play a significant role in two global research programs: completing the inventory of species and building the tree of life. This is why I have been excited by the refurbishment of the Daubeny Herbarium this summer. The refurbishment represents a

significant commitment to stem the decline of taxonomy in the UK university sector and maintain an active whole organism - based plant systematics capacity for research and training across both tree building and species inventory. The news and articles in this issue of OPS give a flavor of that broader agenda.

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## Robert Scotland

*Typesetting and layout of this issue of OPS by Serena Marner.*

## News Items

**Jonathan Bennett** will take up a post-doctoral research post in the New Year at the University of Missouri - Columbia, Missouri, USA to investigate the molecular evolution of phytochrome genes.

**Elizabeth Moylan** has taken up a three-year post-doc position in Jane Langdale's laboratory at Oxford Plant Sciences (down the corridor) working on photosynthetic cell-type differentiation.

**Julian Starr** has received a two-year National Sciences and Engineering Research Council (NSERC) Postdoctoral Fellowship to examine hybridisation and phylogeny in the genus *Rosa* L. Julian will be working under the supervision of Dr. Anne Bruneau at the institut de recherche en biologie végétale (IRBV) at the Université de Montréal in Canada.

**Stuart Cable** joined the Department in January 2001 to work with William Hawthorne on the tropical forest plant field guide project.

From June to December 2001 **John Wood** joined Robert Scotland and his students contributing to the ongoing monographic research of *Strobilanthes*. Further collaborative research is in the pipeline for 2002 onwards.

Congratulations to **Alex Wortley** for winning the 'best student paper' at the 2001 Systematics Association biennial conference in London. Alex, in the first year of her D.Phil., was awarded £300 worth of books from Taylor & Francis. Her talk was entitled 'Systematics of *Thomandersia* Baill.: a rogue genus in Lamiales'.

At the end of July we said a sad farewell to **Cynthia Styles**, the herbarium secretary, who retired after long service in the Department. Cynthia had worked for many years for the late Frank White.

## Student Progress

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

*Agathis* (Araucariaceae) is a genus of between 10 and 20 species of tropical conifer, distributed throughout Malesia, the Philippines and Melanesia, and also present in parts of Australia & New Zealand. Species delimitation in the genus has traditionally been extremely problematic, owing to the difficulty of collecting cones and the highly and continuously variable leaf dimensions. Previous studies with *rbcl* have recovered very little phylogenetic structure, although the phylogenetic relationships of *Agathis* within the Araucariaceae and of the Araucariaceae to other conifers are reasonably clear. Micromorphological and anatomical work have historically been used to delineate broad, informal groupings within the genus; critical investigations of these characters, alongside molecular systematic analyses of new sequence data, will help to provide clearer species delimitation and the phylogenetic framework for a taxonomic revision of the genus. Fieldwork will hopefully be carried out in Borneo and in the archipelagoes of the SW Pacific, to provide herbarium and DNA material for these studies.

**Alex Wortley** (D. Phil., second year). Systematics of *Thomandersia* Baill. Supervised by Robert Scotland (Oxford), Paula Rudall (Kew) and David Harris (Edinburgh). Burt-Davy studentship.

*Thomandersia* comprises shrubs and small trees forming a significant part of the vegetation of tropical West Africa. Six species were described by Heine (1966), and their delimitation has been upheld in a preliminary study of herbarium specimens from BR, FHO, K, MO and P. The systematic position of *Thomandersia* has never been certain: its morphology is aberrant for any family in which it could be classified. Traditionally placed in Acanthaceae (e.g. Bentham and Hooker 1876) on the basis of fruit characters, it has also been associated with Pedaliaceae (Bremekamp 1942) or put into a monogeneric Thomandersiaceae (Sreedhavan 1976, 1977). Anatomical sectioning of the retinacula (hook-like outgrowths of the funicle) of *Thomandersia* and other taxa in Acanthaceae, has demonstrated that these structures are not homologous, refuting the morphological basis for including *Thomandersia* in Acanthaceae (e.g. by Bentham and Hooker 1876; Lindau 1895). In addition, preliminary phylogenetic analyses of chloroplast *rbcl* and *ndhF* sequences for *Thomandersia hensii* and 133 other taxa, spanning all major families of Lamiales, have placed *Thomandersia* outside Acanthaceae.

*Thomandersia* appears from these investigations to form a relatively restricted clade, the position of which, within Lamiales, remains unclear. It may be associated with the Mesoamerican liana *Schlegelia* Miq., one of a number of similarly isolated "rogue" taxa in Lamiales (e.g. *Paulownia*; Armstrong 1985 and *Sanango*; Smith et al. 1997). Sequencing of *rbcl* and *ndhF* for *Schlegelia* and related genera (following a visit to MO to obtain recent herbarium material) is underway, in association with the Royal Botanic Garden Edinburgh, to clarify the phylogenetic position of *Thomandersia*. Sequences of a greater number of genes may be needed to improve resolution and support for its position in Lamiales. A collecting expedition may be undertaken to obtain material of *Thomandersia* and/or its potential sister taxa, for further sequencing and anatomical studies.

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## Abstracts of systematic theses submitted in 2001

The following three D. Phil. theses were submitted and successfully defended in 2001:

**Jonathan R. Bennett**  
**Linacre College**  
**Systematics of the Strobilantheae**  
**(Acanthaceae) of south-east Asia**

### Abstract

Three aspects of the systematics of the Strobilantheae are addressed: a taxonomic account of the Javanese species with four or fewer seeds in the capsule, excluding the yellow-flowered species usually referred to *Sericocalyx*, a survey of the pollen morphology of species from south-east Asia and an investigation of the molecular systematics of the group using both chloroplast *trnL* – *trnF* and nuclear ITS markers.

Twenty five species are recognised from Java and a key to their identification is provided, and several species illustrated. Two new species are described. Morphological variation found within and between species is described. A critical evaluation of the suitability of competing species concepts for species delimitation in tropical taxa which show a high level of infraspecific morphological variation is made. The advantages and disadvantages of applying a pattern-based phylogenetic species concept which recognises groups of individuals sharing a unique combination of morphological characters are discussed.

The variation in pollen morphology among species of the Strobilantheae from south-east Asia is documented. It is shown that the range of variation is greater than previous taxonomists had appreciated, and comparisons are made with the range of morphologies found in species from southern India and Sri Lanka. The variation in pollen morphology is essentially quantitative and continuous, with even apparently distinct morphologies bridged by intermediate forms. The difficulties of breaking up continuous variation in to discrete character states for a phylogenetic analysis are discussed. Furthermore, the assumptions of character state transformations made during a phylogenetic analysis are difficult to uphold for morphological data in general. It is maintained that the most appropriate context in which to interpret pollen morphology is in light of a molecular phylogeny.

A molecular phylogeny of the Strobilantheae is presented using DNA sequence data from ITS and *trnL* – *trnF* markers. Evidence from *trnL* – *trnF* sequences confirms the monophyly of the group, but some analyses of ITS sequence data place *Dyschoriste decumbens* within the Strobilantheae. However, there is strong evidence that several genera within the group are non-monophyletic. In light of these findings, and the earlier findings of Carine (1999) and Carine & Scotland (2000b), it is suggested that all species of the Strobilantheae be referred to *Strobilanthes*, with all allied genera reduced to synonymy. A broadly defined *Strobilanthes* is not only monophyletic, but is also diagnosable by morphological characters.

**Elizabeth Clare Moylan**  
**St Cross College**  
**Systematics of *Hemigraphis* Nees**  
**(Acanthaceae)**

### Abstract

Four aspects of the systematics of *Hemigraphis* Nees (subtribe Strobilantheae – Acanthaceae) are investigated in this thesis. First, a taxonomic account of species of *Hemigraphis* from the Philippines is provided. Secondly, the micromorphological variation of *Hemigraphis* and other members of the Strobilantheae is assessed. Thirdly, the phylogenetic relationships of *Hemigraphis* and other Strobilantheae are investigated. Finally, the classification of the Strobilantheae is reviewed.

Applying an explicit pattern-based species concept, 18 species of *Hemigraphis* are recognised from the Philippines. A key to all species is provided, together with descriptions, synonymy, illustrations and distribution maps. Six species are widespread throughout the Philippines and in south-east Asia, three species, including

one newly described species, are archipelagic endemics and nine species are restricted island endemics.

A survey of micromorphological characters of the inflorescence and flower structure in *Hemigraphis* and other Strobilantheae permits re-assessment of the filament curtain – a complex structure formed from the fusion of staminal filaments within the corolla tube. Characters of biological significance with regard to the function of the filament curtain are identified and discrete characters of use in phylogeny reconstruction are discussed. The importance of inflorescence and flower characters in the context of recent developmental studies in Lamiales is highlighted.

Phylogenetic analyses are performed using sequence data from the *trnL-F* and ITS regions and morphological data. Parsimony and maximum likelihood analyses of *trnL-F* indicate that the Strobilantheae are a monophyletic group. Parsimony analysis of ITS recovers a non-monophyletic subtribe; however, maximum likelihood analysis of ITS corroborates results from *trnL-F* and suggests that systematic error is impacting on ITS parsimony analysis. A combined ITS and *trnL-F* analysis results in a strengthening of signal and also recovers a monophyletic subtribe. Limitations in using morphological data alone for phylogeny reconstruction are apparent in terms of a paucity of characters with discrete variation that can be repeatedly and objectively scored. However, including morphological data with molecular data in simultaneous analysis provides increased resolution and support for phylogenetic relationships at lower hierarchical levels. Phylogenetic analyses indicate that *Hemigraphis*, *Sericocalyx* and *Strobilanthes* are non-monophyletic.

The distribution of morphological characters throughout the Strobilantheae is highly homoplastic and the prospects for a new generic classification of the Strobilantheae aiming to recognise and diagnose only monophyletic groups are extremely limited. An expanded genus *Strobilanthes s.l.* is therefore recognised at the level of the well-supported and monophyletic Strobilantheae. All species previously referred to *Hemigraphis* in the Philippines are placed in synonymy.

**Julian Richard Starr**  
**Linacre College**  
**Systematics of *Uncinia* Pers.**  
**(Cyperaceae)**

### Abstract

Inquiries into the phylogeny of Cyperaceae tribe *Cariceae* (c. 2,150 spp.) have been stifled by tradition, and by the uncertain homology of the tribe's highly reduced floral and vegetative structures. At the heart

of this problem lies the poor circumscription of the enormous (c. 2,000 spp.), and highly variable genus *Carex* from its smaller satellite genera (*Cymophyllus*, *Kobresia*, *Schoenoxiphium*, *Uncinia*, *Vesicarex*). To gain a better understanding of character evolution and generic limits within the *Cariceae*, a phylogenetic study focusing on the ingroup and outgroup relationships of the genus *Uncinia* (c. 65 spp.) was undertaken.

Phylogenetic analyses of ITS and <sup>5</sup>ETS sequences suggest that *Uncinia* is monophyletic within a paraphyletic grade of *Kobresia*, *Cymophyllus* and reduced members of *Carex* subg. *Carex*, *Vignea* and *Primocarex*. Analyses do not support the historical transition series involving *Uncinia* s.s., *U. kingii* and *Carex microglochis* that has been pivotal to numerous tribal evolutionary scenarios. Trees suggest there is a fundamental split between the dioecious and androgynous unispicate species of the *Cariceae*. Dioecious species are related to multispicate species of either *Carex* subg. *Carex* or *Vignea*, whereas the androgynous species of *Uncinia*, *Kobresia*, *Cymophyllus* and *Carex* constitute a separate clade that includes multispicate species of *Schoenoxiphium* and *Kobresia*. *Carex* classifications that recognise only two subgenera, *Carex* and *Vignea*, are probably a better expression of relationships within the genus as presently circumscribed. Despite the strong conviction of many authors that *Schoenoxiphium* and *Kobresia* are morphologically indistinct, phylogenetic analyses strongly suggest that these genera should not be merged. The monotypic genera *Cymophyllus* and *Vesicarex* do not warrant generic status.

A combined ITS, <sup>5</sup>ETS and <sup>3</sup>ETS analysis suggests that *Uncinia* s.s. is divided into two major groups: (1) a predominately Australasian clade consisting of sect. *Uncinia* species, and (2) a predominately South American clade comprising the species of sect. *Platyandrae* and sect. *Uncinia* series *Macrolepidae*. This topology and outgroup relationships suggest that sectional characters are homoplastic, and that those used to define sect. *Uncinia* are plesiomorphic. Except for the *Australes*, series are either poly- or paraphyletic. Similar trends in the phylogenetic analyses of *Uncinia* and the *Cariceae* suggest 'cryptic' clades may be common, and that parallelisms and reversals in even the most important morphological characters used for classification are widespread. This raises the prospect that a phylogenetic classification may be incompatible with the pragmatic need to create groups that can be easily diagnosed by traditional means. High levels of homoplasy and a general lack of discrete morphological characters indicate that the discovery of clades, and our confidence in their reality, will largely depend on molecular characters.

In common with the results of many *Carex* studies, groups defined by silica bodies in *Uncinia* often conflict with traditional classification, large groups such as sections could not be defined, and distantly related taxa may share similar silica bodies. However, when silica body characters are examined within the context of smaller, monophyletic groups, there appears to be considerable congruence between groups based on silica body characters and clades discovered in phylogenetic analyses. Nonetheless, a lack of discrete character states and a poor understanding of the homology of structures indicate that silica body characters are inappropriate for cladistic analysis, and are best used for circumscribing species in the *Cariceae*.

## 2001 publications

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White, F., Dowsett-Lemaire, F. & Chapman, J.D. (2001). *Evergreen forest flora of Malawi*. 697 pp. Royal Botanic Gardens, Kew. [For review see page 12.]

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## Expeditions and visits

Alison Strugnell attended the XVI<sup>th</sup> meeting of A.E.T.F.A.T. (the Association for the Taxonomic Study of the Flora of Tropical Africa) from August 28<sup>th</sup> – September 2<sup>nd</sup> 2000. This meeting marked the 50<sup>th</sup> anniversary of the establishment of A.E.T.F.A.T., one of whose founding members was Dr. Frank White of Oxford University.

Colin Hughes was awarded the 2001 Rupert Barneby Award by the New York Botanical Garden enabling him to spend a month in New York (NY) and Washington (US) during February to work on Andean *Lupinus*. As part of that visit research seminars were presented at NYBG and the Bailey Hortorium at Cornell University. These were the first in a series of field collecting and herbarium visits undertaken during the year associated with monographic work on *Lupinus*. A month was spent in Peru with botanists from the MOL herbarium of the Universidad Agraria La Molina in Lima working on delimitation and collection of the Andean species of *Lupinus*. Most of the time was spent in northern Departments of Cajamarca, Amazonas, and Ancash between 2,000 and 5,000m elevation where there is high diversity of lupin species. In addition short visits were made to Florida and Iberia to collect material of *Lupinus* more generally. Colin Hughes also attended the IV<sup>th</sup> International Legume Conference in Canberra, Australia in July 2001. Two papers were presented.

Donovan Bailey and Colin Hughes spent November 2001 in Mexico working on a new research project funded by the Leverhulme Trust to investigate hybridization and polyploid origins in the Mimosoid legume genus *Leucaena* in relation to its indigenous domestication as a minor food plant in south-central Mexico. A week was spent working in the National Herbarium (MEXU) at the Universidad Nacional Autónoma de México, UNAM, a research seminar on *Leucaena* was presented to staff of the UNAM Instituto de Biología, and three and half weeks were spent in the field working with Helga Ochoterena (MEXU). Fieldwork concentrated on assembly of new collections of

a number of *Leucaena* polyploid species and hybrids in the south-central Mexican states of Puebla, Oaxaca, Guerrero, Morelos and Veracruz.

**Rosemary Wise** was invited to join the team from The Royal Botanic Gardens, Kew and visited Irian Jaya for the fourth time during November 2000, to paint lowland plant species. In September 2001 Rosemary attended the 5<sup>th</sup> International Flora Malesiana Symposium in Sydney and ran a workshop on techniques of Botanical Illustration.

**Serena Marner** attended the Investigator 200 Symposium in Albany, Western Australia, organized by the Australian Systematic Botany Society with the Department of Conservation and Land Management CALM, in December 2001. Serena was invited to the Chelsea Physic Garden by the Florilegium Society in August 2001 to talk about pressing, mounting and storing herbarium specimens for their new herbarium.

**Timothy Waters** led an Oxford University Expedition to New Caledonia in December 2000 – January 2001, working on the population biology and conservation of the narrow endemic *Araucaria nemorosa* de Laub. with the Service de l'Environnement in Province Sud. Only described in the 1960s, this distinctive emergent conifer of coastal forest is restricted to a tiny area at the southern tip of Grande Terre. A preliminary report, making some conservation recommendations and suggesting a change in the basis of its IUCN "Critically Endangered" status, was circulated in the spring. The full report, including the ecological, biogeographic and dendro-chronological datasets, botanical and entomological collection data, ornithological observations, colour plates and detailed demographic analyses will be published shortly; more information is available on the expedition website at: <http://users.ox.ac.uk/~scat1055/expedition/>

## Refurbishment of Oxford University Herbaria

The Botany Department Herbarium (OXF) was established in 1621 and the Forest Herbarium (FHO), now known as the Daubeney Herbarium, was established in 1924. In 1992 these collections were brought together as Oxford University

Herbaria. The collection in Oxford is the fourth oldest herbarium in the world and the oldest in the United Kingdom. Oxford University Herbaria comprise some 800,000 specimens collected from all over the world but is particularly strong in Africa, Europe, South and Central America and South East Asia. Approximately 3% of the collection is type material.

Oxford University Herbaria has occupied its current site in the Department of Plant Sciences for nearly 50 years. However, the space problems had become severe, cupboards were overfull and boxes of specimens covered almost all available surfaces or were secreted away in other parts of the Department of Plant Sciences. Thus, there were three significant problems; storage conditions for the collections were not ideal, space to work on the collections was very limited and no space was available for the collections to expand. However, after six years of persistent work on the parts of Professor Christopher Leaver and Dr Stephen Harris, funding for refurbishment of Oxford University Herbaria has been secured from Gatsby Charitable Foundation and Science Research Infrastructure Fund (SRIF). To these organisations, we are most grateful.

Additional physical space is not available for the Herbaria within the Department of Plant Sciences and hence it has been necessary to maximise the use of the existing space. Refurbishment of the collections will take place in two phases. Refurbishment of FHO has already begun and the refurbishment of OXF will occur over Summer 2002. The principles that have guided the refurbishment of FHO are care and access to the collections, space for researchers to work and space to expand the collections. Whilst, for OXF, collection care and access plus research space are the most important issues, as there is relatively little expansion of the collection.

Specimens in FHO will be stored on rolling stack in Kew-style green boxes, thus generating space for additional specimens and creating research space for our own staff and students and visitors. The vision of FHO at the end of refurbishment is simple, but the implementation is another matter. The biggest problem that was faced was the amount of material to be moved, approximately 250,000 herbarium specimens and associated spirit and carpological collections. Over about a month, nearly 37 tonnes of material was decanted from the herbarium. Herbarium specimens were placed into numbered green boxes and their contents databased to family and genus. Nearly 3,500 green boxes were filled and each box moved approximately 300 m into temporary storage in the Department of Plant Sciences. Stark numbers of specimens moved out of FHO to temporary storage give only a feel for the task; only those who have moved this amount of material in such

a short period will have any idea of the effort involved! Whilst FHO was closed to outside users we tried to maintain the function of the collection for our own staff and students, which created additional logistical problems.

For the last five years, curatorial work in FHO was undertaken in the belief that funds for refurbishment would be secured. This work resolved many curatorial problems, e.g. matching herbarium specimens with fruit and spirit collections, although emptying FHO uncovered other problems that had lurked in the bottoms of cupboards and drawers for at least 30 years. Once empty, gutting FHO was done rapidly; the cedar wood cabinets yielding easily to sledge hammer and crowbar, before the remnants were discarded through a window into a skip. Fifty years of dust were disturbed, specimens that had slipped behind cupboards were found and 1950s empty cigarette packets were uncovered. However, it was the size of the room that FHO occupied that most surprised people, given there was such little available space when the cupboards were in place.

The floor has been strengthened and, once the rolling stack is installed, the specimens will be returned to FHO. It will take time to get things back into order but once this is done, for the first time in nearly 40 years the whole of FHO will be in one place and a single sequence, rather than scattered around the Department of Plant Sciences.

The refurbishment of FHO threw up logistical problems associated with the temporary storage of material and tracking boxes. The lessons learnt include that collections should be closed completely during refurbishment, many people are needed to shift material but few people are needed to pack material. However, perhaps most importantly is that the planned process should be maintained despite external pressure. These lessons will be used when OXF is refurbished. The refurbishment has allowed us to rethink the arrangement of the specimens, resolve curatorial problems in the collections, which may have remained unresolved without the stimulus of emptying FHO, and make decisions about the fate of unincorporated material.

I would like to express publicly my thanks to Alison Strugnell, Ruth Eastwood and Ian Gourlay for their Herculean efforts in emptying FHO of its contents in just over a month. Many thanks also to all those people in the Department of Plant Sciences who helped in unloading the lorry loads of green boxes when they arrived.

*Stephen A. Harris*



*FHO just before demolition (July 2001, photograph: B.E. Juniper).*



*FHO after demolition (July 2001, photograph: S.A. Harris)*



*FHO cupboards being discarded (July 2001, photograph: B.E. Juniper).*



*Refurbishment work in progress in FHO (January 2002, photograph: J. Baker)*



## Sibthorp Medal Awarded

The Department of Plant Sciences has awarded the first Sibthorp Medal to Professor. Dr. H. Walter Lack of the Free University, Berlin for work on the greatest treasure of Oxford's Plant Sciences Library and other associated collections in the herbarium: John Sibthorp's *Flora Graeca*. A major exhibition at the Bodleian Library marked the publication of Lack's book *The Flora Graeca Story* (OUP) in 1999, and a project to make digital scans of the *Flora*'s 966 magnificent coloured drawings by Ferdinand Bauer available world-wide on the web is expected to begin in 2002.



Sibthorp, the first to discover the lilac and the horse chestnut growing in the wild, endowed Oxford's chair of Plant Sciences currently held by Professor Chris Leaver, who presented the medal at a ceremony in the Department on 5 November 2001. Designed by Danuta Solowiej-Wedderburn, a Polish specialist in the sand-casting of bronze at the Royal Academy of Art, it shows in deep relief details from Bauer's drawing of *Iris germanica* which featured on the cover of the exhibition catalogue and also on the accompanying poster. The reverse of the medal shows the 'Danby Gate' at the entrance to the Botanic Garden, which is also the logo for the Department.

Professor Lack was also presented with a hand-illustrated certificate to mark the occasion. The design, based around autumn fruits, was the work of Rosemary Wise, botanical artist in the Department. Following his award, Prof. Lack lectured to great acclaim from a packed hall on 'Oxford, Greek Revival and John Sibthorp'; the text of his address is printed below.

Professor Lack has recently received three other awards for his outstanding books. In 1999 he received the OPTIMA medal for *The Flora Graeca Story* and in 2000 the DGG (German Horticultural Society) Book Prize for *Ein Garten Eden (Garden Eden. Masterpieces of botanical illustration)* and the prestigious Engler Medal for *Ein Garten für die Ewigkeit (A Garden for Eternity: The Codex Liechtenstein)*. We are delighted to be able to add the Sibthorp Medal to this impressive list.

To acquire the Sibthorp Medal you will have to make an outstanding contribution to plant sciences, but if you would like a copy of the original *Iris* drawing it is available as a newly-produced greetings card from the Plant Sciences Library and the Wildlife Trusts; notepads and notebooks are also on sale, as are copies of the 1999 exhibition catalogue and poster. These may be obtained from:

Plant Sciences Library  
Oxford University Library Services  
South Parks Road  
OXFORD OX1 3RB, UK  
Tel. +44 1865 275082  
e-mail: [enquiries@plantlib.ox.ac.uk](mailto:enquiries@plantlib.ox.ac.uk).

**Roger Mills**  
Plant Sciences Library



*Professor Lack receiving the Sibthorp Medal from Professor Chris Leaver.*

## Oxford, Greek Revival and John Sibthorp

*Words of thanks after the receipt of the first Sibthorp Medal from the University of Oxford, 5 November 2001*

Let me first say that I feel delighted and highly honoured by having been chosen as the recipient of the first Sibthorp Medal. My sincere thanks go to Professor Leaver, the present Sibthorpien Professor of Plant Science, whose chair was endowed in 1796 by John Sibthorp, Professor Whatley, the former Sherardian Professor of Botany, and to Professor Dickinson, the present Sherardian Professor, who have among their predecessors the same John Sibthorp.

Irrespective of the intentions, the foundation of a Sibthorp Medal is most appropriate: firstly because John Sibthorp was one of the key figures in English botany, secondly because he laid the foundations of the most splendid flora ever published, the *Flora Graeca*, and thirdly because he brought back from his two expeditions into the Levant a multitude of extremely valuable botanical collections, which are still kept in this very building.

For me personally there are also three reasons for being particularly happy: firstly because this day marks the successful completion of a project which has led three years ago to the publication of my book *The Flora Graeca Story*, the most complex text I have produced; secondly because this medal expresses the sentiment that all this is appreciated as a contribution to understanding botany at Oxford; and thirdly because this day enables me also to acknowledge encouragement and help received from others, in particular from Professor William T. Stearn, London, Professor David Mabberley, Sydney, from the indefatigable Mrs. Anne Marie Townsend, Special Collections Librarian at this institute, always kind, always helpful, and from the most competent and knowledgeable Miss Sandra Raphael, who as copy editor for Oxford University Press read the entire text of *The Flora Graeca Story*. However, it would be utterly inappropriate to forget the most liberal working conditions I enjoyed in this institute - on the first day I was given the keys, a practice unheard of in places like Kew or the British Museum. So thank you all for this.

Let me now say a few words about today's hero - John Sibthorp, or to be more precise about Oxford, Greek Revival and John Sibthorp.

Feeling quite incompetent to offer you a new definition of Oxford, I shall simply say, that this is a place where very many outstanding things were either written,

thought of or done for the first time. A single example from the recent past may suffice as an example: in 1983 a surgeon at the Radcliffe Infirmary had the courage to transplant the heart of a traffic victim into the body of patient suffering from terminal heart failure and at the same time treat the transplant patient with cyclosporine. The success was limited, because the patient survived only for a few days. However, upon post mortem it was shown that the transplanted organ had no signs of rejection, whereas the kidneys had failed. In short, the cyclosporine dose had been too high. This opened an entire new field in cardiology: heart transplantation, now a standard technique used world-wide. As a matter of fact, my life - and also writing *The Flora Graeca Story* - entirely depended on this very operation plus cyclosporine, first used in Oxford eighteen years ago.

However, this is just one example for a break-through at Oxford. If you have brilliant people in all branches of learning performing in a brilliant way for more than seven hundred years, you simply cannot avoid arriving among the top universities of the world, and this is where Oxford was and is right now.

The eighteenth century was full of many excellent new ideas; one of them is called in retrospect Greek Revival: the sum total of research into the Greek World, its culture, history, language and life. At that time Greece was not the country we now know from our summer holidays. It formed one of the western provinces of the Ottoman Empire, a region very dangerous and difficult to travel in due to malaria, pirates, and civil unrest, and then as unknown as the heart of Africa.

Although strictly speaking not a purely Oxford idea, Greek Revival had an important proponent at Oxford - Richard Chandler, a demy of Magdalen College. He was one of the very few who had actually travelled in the Levant. Across the High Street a boy grew up - John Sibthorp. His father Humphrey was a rich landowner and, as a sideline, the second Sherardian Professor of Botany. His mother was Elizabeth Gibbs, heiress to a rich London merchant. Although there is no proof, it seems reasonable to assume that John knew of his next door neighbour Chandelor and the latter's travelogues, the *Travels in Asia Minor* and his *Travels in Greece*.

Not surprisingly, John Sibthorp studied medicine like his father, first at Oxford, later at Edinburgh. After the early death of his mother, her huge estates descended upon John and a year later his father managed to have him elected a Radcliffe Fellow. For the next ten years he now received the colossal sum of £300 per annum, with the single stipulation that he must travel abroad for five years for his improvement. This John did, staying mainly in Montpellier and Paris, and only returned to Oxford to receive his

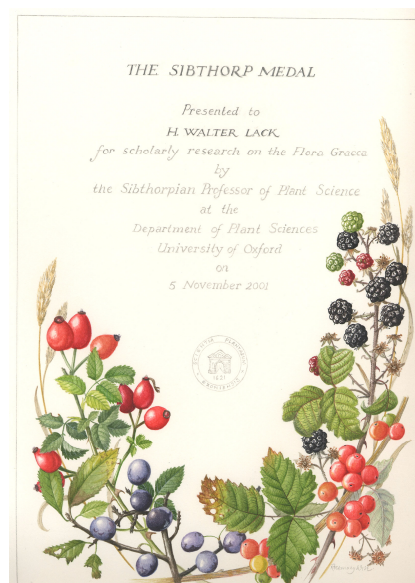
M.D. and get himself elected successor to his father. Thus, at the age of 25, John became the third Sherardian Professor of Botany. Although by the standards of today the whole affair reeks of jobbery and nepotism, it turned out to be a change for the better: in fact the resignation of the 72-year-old Humphrey Sibthorp, inactive for many years, led to the appointment of the keen and much more energetic John.

However, John showed no intention of devoting himself to the routine duties of a professor and instead continued to travel on the Continent. There is a hint that he developed the idea of exploring the Levant while in Göttingen, but the decision was taken in Vienna, where he had seen in the Imperial Library two outstanding medicinal codices of the early Byzantine period. These were illuminated manuscripts of the writings of Dioscorides, dating from the early 6th century and mid-7th century. Hard to believe but true, in the eighteenth century these texts were still regarded as sacrosanct to physicians as the texts of the Bible are sacrosanct to Christians.

Sibthorp had a brilliant new idea: he decided to test the writings of Dioscorides by travelling to the Levant and looking out for the plants described in his texts and illustrated in the manuscripts in the Imperial Library. All this must have happened in the winter 1785/86 in Vienna. Both the stately home where Sibthorp lived, the spectacular Palais Pallavicini, and the reading room, the world famous Prunksaal, where a few days ago my exhibition 'A Garden Eden' ended, have remained virtually unchanged. Sibthorp also had the good fortune of receiving a series of copper-engravings from his homologue in Vienna, showing the plants in the two codices, annotated with their early Byzantine plant names. In short, his approach was totally new, radical and was to shake the very basis of established belief and knowledge of medicinal plants.

Vienna was also important for Sibthorp in another respect. In Ferdinand Bauer, only a single year younger than himself, he found an outstanding illustrator, who was prepared to join him in his adventures and depict with utmost precision and accuracy several hundreds of plants and animals of the Levant. The first expedition has been told in detail in *The Flora Graeca Story* and need not be repeated here. For eight months Sibthorp and Bauer were accompanied by another gentleman of leisure, John Hawkins, mainly interested in topography, geology, mining and antiquities.

What matters in an expedition of this kind is the material brought home: Sibthorp and Bauer had collected herbarium specimens, living material, which subsequently was raised in the Oxford Physic Garden as a 'plantation sacred to Greece'; animal specimens, both dried and in spirits; notes, and very many drawings, documenting



Certificate to mark presentation of the Sibthorp Medal, 5 November 2001

plants, animals and landscapes. Most of these have survived at Oxford. The importance of these collections cannot be overestimated, they are of relevance for modern science and form the hard core of any institution. Irrespective of so-called priorities, research policies etc., the collections have to be maintained and preserved. As in my home institution, these comprise the living collections in the botanical garden, the dead collections in the herbarium, the manuscript material in the archive, and the printed material in the library. It is good to know that all these materials are well kept here and I trust that this will remain so. You are certainly aware of the fact that across the channel in the Netherlands all herbarium specimens are now listed as national cultural heritage, like their Rembrandts.

But, back to Sibthorp. In December 1786 he was again in Oxford and started to determine his specimens, while Bauer prepared finished watercolours on the basis of his pencil sketches. A skeleton of a precursor to a projected *Flora Graeca* was written by Sibthorp, but was not completed. We do not know why. Thus the only one working hard on the project for six years was Bauer, meticulously preparing 966 watercolours of plants and 293 watercolours of animals. He was both very badly paid and very badly treated by John Sibthorp, almost like a slave. As a result, when Sibthorp set out on a second expedition to the Levant, Bauer could not be persuaded to join in again.

This second tour was a disaster right from the beginning. Sibthorp was seriously ill when arriving in Ostend and had to travel by carriage in sixty days to Istanbul, a record at that time. Due to malaria and diarrhoea he arrived in a critical condition, but on his way he was lucky to make another

spectacular observation: he found the lilac blossoming in the wild, a shrub widely cultivated in England and Central Europe, but then of totally unknown origin. His specimen from Eminska Planina in modern Bulgaria is in your herbarium.

It took months for Sibthorp to recover and when he set out from Istanbul, again with John Hawkins, autumn had started and only some seeds could be collected. The story of the second expedition has also been told in *The Flora Graeca Story* and need not be repeated here. It ended in Sibthorp returning to Oxford in very bad shape, without his collection, which arrived only several months later, when his life was already approaching its end.

After having had a single, but very brilliant new idea, selected an extremely able collaborator and developed a lasting friendship with Hawkins, John Sibthorp, always chaotic, difficult and inconsiderate, prepared a surprisingly well considered will. It is a long legal document, the essential points being that one of his estates should go to the University of Oxford, under the condition that the proceeds should first be used for the publication of a *Prodromus Florae Graecae* and the *Flora Graeca* and then for the endowment of a chair in botany, the modern Sibthorpian chair. By fixing a clear sequence of steps to be undertaken, by describing in detail the format, size etc. of the two works, and by selecting his friend Hawkins as one of his executors, Sibthorp ensured that the University would do what he intended.

A few weeks later John Sibthorp died at Bath, aged 38. His epitaph is famous, being one of the very early cases of a conscious severe Greek revival relief, showing Sibthorp stepping out of a boat and approaching a building, clearly the Danby Gate to the Physic Garden at Oxford. Sibthorp carries flowers - those of the plantation sacred to Greece, of the herbarium, and, in a wider sense, the greatly increased knowledge of the flora of the Levant, which he had collected but which others would publish later - James Smith, Robert Brown, John Lindley - the cream of English botany. The list of Sibthorp's trophies is a long one, and I have seen with my own eyes several of his discoveries in English gardens.

At Oxford Sibthorp is remembered today in a different way, in the Sibthorpian Professorship founded by his will and as a consequence in a prayer of commemoration. Regarding this the *Decrees and Regulations* state: 'The Preacher, in a prayer before the sermon of the first Sunday after the beginning of term and on the morning of the Sunday preceding Encaenia, shall make a grateful commemoration of the benefactors of the University, that is to say of . . . Joannis Sibthorp, M.D.' In a way Sibthorp had achieved what he intended from the beginning - to become famous, his name

being among the immortals of Oxford, listed just after King Henry VIII, Queen Elizabeth I, Thomas Bodley, Gilbert Sheldon, Elias Ashmole, John Radcliffe, and William Sherard.

If we look more critically and with modern eyes on Sibthorp's life and work, we realise that he had not achieved very much, but by making his one brilliant, challenging idea a reality he had opened up gates for others - in botany, in pharmaceutical sciences.

Hermann Hesse, a German writer, the Nobel laureate of 1946 and a passionate gardener, wrote shortly before he died a poem entitled 'Steps', quite philosophical in approach, comparing life to a series of steps. And there is a verse saying that even the last steps may lead us to new views and insights 'because there is magic in every beginning' [denn jedem Anfang wohnt ein Zauber inne]. The magic of the beginning - this is very much Sibthorp. Imagine him as the first European traveller on Mount Parnassos, imagine him studying the Omega 75 Dioscorides in the library of the Megista Lavra on Mount Athos, imagine him smelling for the first time the fragrance of the lilac on a sunny day in May in the Eminska Planina. But the magic of the beginning - thinking, writing, doing something for the first time - is also very much Oxford.

#### H. Walter Lack

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Professor Lack with Rosemary Wise,  
designer of the certificate.

## Three days plant collecting in Eastern Bolivia

It is approximately 750 kilometres from the city of Santa Cruz, which lies just beyond the most easterly point of the Andes, and the border between Bolivia and Brazil. There are only a few dirt roads across this vast area connecting the small, scattered settlements, but there is a daily train, which travels through the night to cover the distance in about 20 hours.

Roberto and I left Santa Cruz at half past three in the afternoon. Our destination was the small town of Chochis which lies on the pre-cambrian shield, an ancient rocky plateau extending from central Brazil into eastern Bolivia, worn away over millions of years into low flat-topped serranias and undulating plain. The plains are still mostly covered in dry forest but the higher ground consists of open, seasonally burnt, scrubby grassland, interspersed with boggy hollows and rock outcrops and commonly referred to as "cerrado". To the north of Chochis village lies the most massive of the remaining mountains of the Bolivian pre-cambrian shield, known also as Chochis. This rises up with spectacular cliffs on all sides to around 1200m. It is still unclimbed and as far I know I am the only botanist ever to visit the area. Eastern Bolivia is for the most part unexplored botanically.

The train deposited us at Chochis at 2.30 in the morning. There is no electricity and no hotel but fortunately the message we had sent to the family who had helped us before had got through and they were waiting for us at the station. All of this was actually very convenient because we were, in fact, entering a politically controversial situation, in which I am anxious to keep a low profile and be closely associated with local people. The situation is not unique to Bolivia and has arisen in the following manner. A group of environmental organizations, some local and some U.S.-based, including a well-known U.S. Botanical Garden, have founded an NGO called the "Fundacion para la conservacion del Bosque Chiquitano". This has attracted considerable financial support, principally from oil companies and has at least 20 million dollars committed to it. However the F.C.B.C. appears to have been set up without any consultation with the local communities, who are understandably jealous of the very considerable sums of money it has attracted and are deeply suspicious that their interests are being in some way sold out to the oil companies, who have already built one pipeline through the area. Civic authorities throughout a considerable area of Eastern Bolivia, not without some prodding from

other NGOs, have joined together to exclude any activities connected with the F.C.B.C. I have to admit that I myself see dark motives in such lavish generosity on the part of the oil companies.

Chochis has played a leading role in excluding the FCBC and there is every risk that any visiting naturalist might be damned by association and asked to leave. Field work increasingly requires political skills as the years pass! Fortunately I carry papers from La Paz indicating I have no connection with the FCBC and, in any case, no one notices our pre-dawn arrival in the dark nor our early departure to the field. The family were ready and waiting to leave soon by seven the next day so after a hurried but substantial breakfast of steak and cassava we set off into the hills.

I travel relatively light when collecting, going out into the field for only a couple of days before returning to a base, where I can sort out my specimens and get the drying process seriously underway. I take one or two presses and enough newspaper for collections but I can't cope with collecting more than about 25 numbers a day, especially as I try to make four specimens of each number. I try to put specimens into the press immediately I collect them as they wilt very fast in tropical conditions. I bring secateurs and a machete but rely on long sticks or climbing to get specimens from trees. A light burden means we can cover considerable distances in a day.

Our route took us through secondary scrub and into dry forest composed of various species of *Bignoniaceae* and *Annonaceae*, the presence of the former easily noted by the abundance of corollas on the forest floor. As always I look out for *Acanthaceae* and in this area there was an abundance of an undescribed *Justicia*, which I propose naming *Justicia mesetorum* after the flat-tipped mesetas around which it grows. It is somewhat problematic as it only occurs at Chochis and on the Serrania de Huanchaca, some 500 kilometres to the north. The populations are quite uniform on each Serrania but differ somewhat from each other, the Chochis plant being smaller in all its flower parts. They should possibly be distinguished at subspecific level, but it is quite possible that there are intermediate populations on other serranias between these two. The area between is almost totally unexplored botanically and there is consequently a strong element of intelligent guessing in taxonomic decisions.

An extremely hot and very steep climb took us to the top of a pass over the mountain range, but not before we were drenched by a short thunderstorm that spattered us with hail. The other side was totally different with extensive rolling plains terminating in cliffs. Although dry at the time of our visit this area is undoubtedly interesting and as we made our way to the only stream in the area, I kept coming across

plants I had not seen before and the best area of all was near where we spent the night.

We slept out in the open near a group of old poles, which marked the unsuccessful attempts of a long-forgotten family to establish a farm – our guides told us that attacks of vampire bats on their cattle had forced them out, but sheer loneliness seems a more likely explanation to me. My fears during the night, however, centred on the persistent flashing of lightening in various directions but we survived the night without another drenching and in the morning I was able to look around with some care.

Everywhere in the rough grassland were the fading white corollas of a species of *Macrosiphonia* in the *Apocynaceae* – one of several night flowering, moth-pollinated species with long corolla tubes and conspicuous white, spreading lobes. I searched these carefully looking for a similar-flowered *Acanthaceae*, *Ruellia nobilis*, collected only twice in Bolivia but drew a complete blank. However there were three blue-flowered *Ruellias*, whose corollas open at dawn and fall around midday. Although clearly day-flowering and not moth-pollinated I have no idea what insect performs this function – there were plenty of possible contenders for this role at the site!

All three species are very similar and easily confused. The smallest but most distinct is the inappropriately named *Ruellia bulbifera*. It is not bulbous but like the other species and many other cerrado plants has a thickened woody base, which allows it to survive droughts and periodic fires. However its low habit, pale flowers and glabrous leaves make it easy to identify. It is essentially circum-chaco in distribution in contrast to the relatively rare, large-flowered, densely hairy *Ruellia brachysiphon*, which is restricted to the pre-cambrian shield in Bolivia and Brazil. These two would be easy to distinguish were it not for the presence of a third species, *Ruellia geminiflora*, which is widespread throughout tropical South America. It is to some extent intermediate between the two other



*Ruellia ciliatiflora* Hook. A blue, day-flowering *Ruellia*.

species being smaller-flowered and less hairy than *Ruellia brachysiphon*. In the field all three are readily distinguished but the characters that separate them are “soft”, essentially corolla dimensions and degrees of hairiness, and this complex together with some other Brazilian species would make an interesting topic for molecular studies as conventional systematics is unlikely to make further progress in unraveling the complexities of this group. *Ruellia geminiflora* is in fact extremely variable with a long synonymy but part of the variation is environmental. It is one of the first plants to flower in the cerrados after burning and in this situation is commonly less than 20cm in height, but in situations where no burning takes place it develops into an untidy, branched plant about a metre high, which looks very different. Until my own observations in Bolivia this was recognized as a different species, *Ruellia elliptica* but I am sure it is only a habitat form being fully sympatric, in Bolivia at least, with the more common, low form.

The area also had some interesting legumes and orchids but I was most interested in *Asclepias candida*, only a single sterile example of which David Goyder and I had found in February in the then only known locality in Bolivia. It was not common here either but an hour's search turned up five scattered individuals in the grassland. It is clearly not a very sociable plant.

We made the previous day's journey in reverse and as so often happens found a completely different set of plants on the return. I can never resist collecting *Melastomataceae*, partly because there are so many different kinds in South America and partly because they are so attractive – I feel they go some way to compensate for the absence of *Rhododendrons*, which are such a colourful feature of the mountain forests of east, and south east Asia. I found five species along our track as well as three species of *Aristolochia* with their dark, somewhat foetid, insect-attracting flowers and best of all as we walked back into Chochis village in the early evening I was delighted to find *Ruellia nobilis* opening its pure white flowers in the gathering gloom. My failure to find it earlier was clearly explained by its presence in the dry *Acacia* bushland on the plain below the mountain. It had got the habitat wrong!

We spent our third day climbing round a huge rock pillar overlooking Chochis, known as El Torre. We turned up another *Aristolochia* on the way to the pillar and a further colony of *Ruellia nobilis* at its base. I spent some hours clambering around the rocks with considerable success. The most interesting discovery was an undescribed species of *Blepharadon* in the *Asclepiadaceae*. David Goyder and I had found the same plant on some cliffs further east at Santiago earlier in the year. It was rare there

and fiercely guarded by hornets. Here it was abundant but protected only by its inaccessibility. However using a long forked stick to twist round the stems I was able to get good specimens. I used the same technique to collect flowers from several trees unknown to me and perched on cliff ledges.

The view here over the plains to the south is spectacular and it is not surprising that a small sanctuary has been built below the pillar. It commemorates the miraculous escape of a train from a collapsing bridge in a freak storm that buried much of the village of El Porton some eight kilometers from Chochis. It is a peaceful place today and a good place to relax and sort specimens before we descended to board the night train back. We had collected about 75 numbers, including two undescribed new species and twenty or so species I have never seen before, any of which could be new to science. Our established links with the family in Chochis had apparently quelled any suspicions of connections with the F.C.B.C. As so often in the field I left feeling a sense of wonder at the diversity of plants and a sense of exhilaration at being in a remote place, where the flora is still essentially unknown.

*John Wood*

## Evergreen forest flora of Malawi

By F. White, F. Dowsett-Lemaire & J.D. Chapman (2001) and for which we have permission to reproduce the **foreword** here:

The gestation period of this important new work on the evergreen flora of the forests of Malawi has been undeniably long owing to many unforeseen circumstances. Frank White and Jim Chapman first met in northern Malawi in 1952 when the former was working in the Commonwealth Forestry Institute, Oxford, towards his Forest Flora of Northern Rhodesia (published in 1962), and the latter was a Forest Officer in Malawi (then Nyasaland). In their ensuing correspondence they planned to collaborate in an account of the forests of Malawi, which eventually resolved itself into two publications. The first, a largely phytosociological and phytogeographical account, was published as *The Evergreen Forests of Malawi* in 1970. The second, a principally taxonomic account, was expected to follow soon after, first draft treatments having already been prepared by 1966. However, these were temporarily put aside owing to many other commitments which Frank White had at the time. After spending seven years in the field in Nigeria, Jim Chapman

returned to Malawi in 1980 and, with the collaboration of the Malawi Forestry Department, invited Frank to join him in the field there in 1981. It was during this visit that Frank first met Françoise Dowsett-Lemaire who was engaged with her husband, Robert Dowsett, in a survey of the avifauna and flora of the Nyika Plateau forests. This tour by Frank White was the catalyst that spurred a revival of the project.

Between 1984 and 1986 Françoise Dowsett-Lemaire made many visits to Oxford and worked closely with Frank White on the text of the present volume. At the same time the outstanding Oxford botanical artist Rosemary Wise was brought into the project to prepare the many excellent line drawings which now form such a prominent part of the present book and which are in themselves a significant contribution to African botany. Jim Chapman continued to provide information and collections and to comment to Frank White on the draft text of the Species Conspectus of the present work up to 1994. However, as the project was nearing completion, Frank White became progressively more ill, and the role of Françoise Dowsett-Lemaire became increasingly vital to the completion of the project. When Frank White died in 1994 there was still much left to be done, and Françoise put in a great deal of hard work to complete the book, which she did in 1996 despite her ongoing commitments to her other work in Africa. She herself has written the introductory chapters, collaborating with Jim Chapman on the conservation chapter, and has thoroughly reviewed every page of this text. The introductory chapters give a good summary of the history of the project, and it is evident that this work could not have been completed without the work of Françoise Dowsett-Lemaire.

The taxonomy is basically that of Frank White with minor modifications where strong new evidence exists to indicate changes were needed, but Françoise Dowsett-Lemaire has made every effort to preserve his taxonomic opinions. These were based on his extensive knowledge of the African flora, his field trips to Malawi in 1981, 1984 and 1987, and much exchange of ideas with Jim Chapman over a period of more than 40 years, and with Françoise Dowsett-Lemaire whose field experience was also invaluable. The demise of the senior author inevitably made the task harder for those who were left to complete it. As a life-long associate of Frank White, I must express considerable thanks to Françoise Dowsett-Lemaire for bringing the work to publication and to Jim Chapman for his enthusiastic commitment over so many years and his consistent input right up to going to press. Two of the herbarium staff at the Royal Botanic Gardens, Kew, with long experience of the African flora and Malawi in particular, Dick Brummitt and Gerald

Pope, have dedicated much time and effort to editorial matters. I would personally like to thank them for the major contribution they have made to someone else's work.

Like several other of Frank White's major contributions to African botany, because of his perfectionism, this work has taken a long time to emerge. It is, however, a fitting final tribute to one of the leading experts of the twentieth century on the African flora. That his colleagues would put so much effort into realising his dream for this work demonstrates the esteem with which Frank White was regarded amongst specialists in the African flora.

*G. T. Prance*

## Book Review

**Frank White, Françoise Dowsett-Lemaire and Jim Chapman.**

*Evergreen forest flora of Malawi.*

Pp. x + 697, 31 photographs, 213 line drawings (mostly by Rosemary Wise), 65 distribution maps. UK: Royal Botanic Gardens Kew, 2001. Price £59, ISBN 900347970, softback.

Sir Ghilleen Prance describes this book in his forward as '...a fitting tribute to one of the leading experts of the twentieth century on the African flora'. Frank White is best remembered for his work on the chorology of the African flora and the taxonomy of the African Chrysobalanaceae, Ebenaceae and Myrtaceae. However, the posthumously published 'Evergreen forest flora of Malawi' is a major contribution to African botany and will be the standard reference to the forest flora of Malawi and central Africa for many years. It is of great credit to the co-authors, Françoise Dowsett-Lemaire and Jim Chapman, and to the many botanists at Oxford, Kew, Meise and in Malawi who contributed time and expertise, that this book was brought to fruition five years after Frank White's death and nearly 50 years after his first visit to Malawi.

The first part of the book is an introduction to the environment, chorology of the forest flora and vegetation of Malawi written by Françoise Dowsett-Lemaire. The evergreen forests of Malawi covered only c.320 km<sup>2</sup> in the early 1980's, but have faced increasing pressure for land and firewood and the future looks uncertain. The final section is an assessment of the conservation status and importance of the forests by Françoise Dowsett-Lemaire and Jim Chapman, which is an interesting and sobering historical catalogue of destruction and ineffectual management. No solutions are offered, but the areas involved are not large and hopefully this book will precipitate action by administrators in Malawi and international conservation organisations.

The second part of the book is the species conspectus that covers all trees, shrubs and lianas that are evergreen or briefly deciduous, including introduced plants that are commonly used or naturalised. The definition of woody is applied loosely to include sub-woody climbers, as is the minimum height for inclusion of 2 m, so that genera consisting of small shrubs that may vary in height over their range are not arbitrarily or partly excluded. Also included are some small montane trees and shrubs, such as species of *Protea* and *Xerophyta*, which are generally found at a higher altitude than the forest. In total the conspectus includes 712 species from 107 families. Nearly 400 species are illustrated by high-quality line drawings, mostly by Rosemary Wise, showing leaves, inflorescences, dissected flowers and fruit. Many species are illustrated for the first time, which greatly enhances the value of the book for anyone working on the African flora.

The taxonomy is faithful to the ideas of Frank White, but also reflects the experience of Jim Chapman and Françoise Dowsett-Lemaire. Families, genera, species and synonyms are ordered alphabetically, and the names of authors follow the standard of Brummitt & Powell (1992). Roger Polhill contributed the accounts for Loranthaceae and Viscaceae, and Serena Marner contributed the account for *Faurea*. There is no key to families, but within the family accounts there are dichotomous keys to genera and species. The family accounts include a concise description, notes on global distribution and totals of genera and species. Some family accounts are supplemented with notes on pollination ecology, taxonomy and important cultivated and non-forest species. Each genus starts with species totals and global distribution, but occasionally notes on taxonomy and thumbnail descriptions are also given. Species accounts include main literature references and recent synonyms (this serves to point the user to more detailed taxonomic treatments and to indicate accepted names for use in Malawi), a brief note of habit and habitat, specimen citations, global distribution and chorological classification. The specimen citations are divided into the three regions within Malawi (Northern, Southern and Central) mostly one for each, given along with regional distribution and altitudinal range where appropriate.

This book should be an essential reference for all botanists, conservationists and natural resource managers interested in the flora of the evergreen forests of Malawi. Unfortunately, the excessively high price will ensure that many students, botanists and workers in Malawi will not benefit from this important work.

**Stuart Cable**

## Herbaria

### Visitors

We were pleased to welcome 147 visitors to the herbaria during the academic year from 1 October 2000 to the end of September 2001. Several group visits were made. Guided tours of the herbaria were given to a group of students participating in the Kew International Diploma Course in Herbarium Techniques 2001, also to a group of M.Sc. students from Birmingham University and another group of M.Sc. Students from the Department of Zoology, Oxford University.

On 26 January 2001 a special exhibition focusing on some of the University's greatest treasures in plant sciences was arranged by the Department, together with St. Catherine's and Magdalen Colleges, to which some 35 distinguished guests attended. The theme of the displays was based on four hundred years of botanical exploration and species introduction, by continent. The display in the Daubeny Herbarium ranged from herbarium specimens from the historic collections alongside related drawings, manuscripts and books from the Special Collections in the Library, to herbarium specimens with related publications from the present day collections to highlight recent and current work in the Department. Our visitors were also able to view the early 17<sup>th</sup> century watercolours contained in the '*Tradescant Orchard*' kindly lent by the Bodleian Library for the day, plus the recently published paintings of '*The Banksias*' in a three-volume set kindly donated to Plant Sciences by Sir Martin Wood. Again on 14 June, a number of distinguished visitors, including a return visit by the Marchioness of Salisbury, came to the Fielding-Druce Herbarium to view the Flora Graeca and other items from the historic collections.



*Protea cynaroides* from the Sherardian Herbarium (on left) collected c.1693 plus coloured drawing of *Protea cynaroides* from MS Sherard 188 dated 1693, Plant Sciences Library

## Fielding-Druce (OXF)

### The historic herbaria of OXF

Many enquiries were received in connection with the historic herbaria. The Flora Graeca and related Sibthorpien collections were the focus of several visits by groups mentioned above or by individuals. A number of visitors again came to view the Australian Dampier specimens collected in 1699. This collection was the reason for a visit by a group from the Western Australian Maritime Museum, headed by the Curator of Maritime Archaeology Dr. Mike McCarthy. The group, a team of divers, visited while on route to Ascension Island to search for the wreck of William Dampier's ship, the *Roebuck*, which sunk off the coast of the island in 1701, with the specimens OXF now has on board. The team were successful in their mission and uncovered the ship's bell, which is now being conserved, and various other artefacts. As a result Dampier and his collections received some newspaper coverage. For further details see *Daily Telegraph* 20.3.01, *Western Daily Press* 24.3.01 page 11, *The West Australian* 19.3.01 pages 1 & 12, plus *The West Australian 'Weekend'* 26.5.01 pages 1-2. In August we were delighted to welcome to the herbarium a descendant of William Dampier's brother to see his ancestors' collections.

### Accessions

94 sheets of miscellaneous British plants collected by Mr R.C. Palmer during 1995-97, including many species from Berkshire, Oxfordshire, Shetland, East Sussex and Dorset, were added to the Druce Herbarium. An additional 82 sheets collected by Dr H.J.M. Bowen were also incorporated, adding many new species/aliens to the British collection.

Specimens collected by Rosemary Wise during the Linnean Society Expedition to Lapland in 1988 were added to the Fielding Herbarium, having previously been mounted for OXF. 36 specimens collected by Dr H.J.M. Bowen in Switzerland in August 1965 were also incorporated.

### Curation

An undergraduate, Ruth Eastwood, was employed in the herbarium for 4 weeks during the Long Vacation. Part of her time was spent on a conservation project involving much needed re-folding of the Dillenian Collections.

The substantial collections of *Rosa* and *Rubus* material in the Druce Herbarium were re-organized according to D.H. Kent's List of Vascular Plants of the British Isles in line with the rest of the British Collections (with the exception of *Taraxacum* and *Hieracium* which remain to be tackled). The specimens were also placed in acid-free folders.

### Loans

Material sent out on loan from the Fielding and Druce collections during the last academic year included specimens from the following genera and families: *Stenosiphonium*, *Strobilanthes*, Acanthaceae; *Anastatica*, *Malcolmia*, *Sisymbrium*, Cruciferae; *Juniperus*, Cupressaceae; *Eriophorum*, *Scirpus*, Cyperaceae; *Geranium*, Geraniaceae; *Agropyron*, *Bromus*, and *Bromopsis*, Gramineae; *Galeopsis*, Labiatae; *Lupinus*, *Swartzia*, Leguminosae; *Altensteinia*, *Dactylorhiza*, *Prescottia* and *Stenoptera*, Orchidaceae; *Clavija* and *Jacquinia*, Theophrastaceae; *Antrophyum*, *Monogramma*, *Vittaria*, Vittariaceae. OXF material comprising 26 loans, or parts of loans, were returned during the year and 13% of the returned specimens were types.

Serena Marnier

## Daubeney (FHO)

The refurbishment of FHO has dominated this year, much of the time being spent sorting out specimens before the herbarium was packed into boxes for temporary storage in June and July. However, other activities did not completely cease, at least in the first half of the year.

### Accessions

A small amount of material was accessed to FHO during the year and mainly comprised Chris Fagg's Tanzanian *Acacia* collection; Augustine Chikuni's *Brachystegia* collections; *Lupinus* for Colin Hughes and *Aglaia* for Caroline Pannell.

### Loans

Activity on this front increased this year with a large quantity of loan material moving through the herbarium. Loans for commencing research were received for Colin Hughes (*Lupinus*, Leguminosae); John Wood (*Strobilanthes*, Acanthaceae) and Alex Wortley (*Thomandersia*, Acanthaceae) as well as for Ruth Eastwood (undergraduate research project on *Senecio squalidus*, Compositae) and Stephan Gale (Forestry M.Sc project on *Lysiloma*, Leguminosae).

Over 1000 specimens were returned to other herbaria at the end of research projects, mainly *Aglaia* and other Meliaceae; *Strobilanthes* and *Stenosiphonium* (Acanthaceae); Euphorbiaceae, Sterculiaceae and Irvingiaceae from West Africa.

### Curation

Curation of the collection was confined to the earlier part of the year. *Acacia* was completed and other smaller genera in the Leguminosae as well as other families were worked on as the need arose, mainly after returned loans or the activities of William Hawthorne and his team on the Tropical Forest Field Guide project.

The spirit collection had to be reduced further in order to fit it into the storage organised in the basement of the department. This was achieved by retaining smaller, but representative, amounts of each collection and did not, therefore, necessitate the disposal of any collections. Due to safety requirements, this collection will be kept separate from the main herbarium collection after refurbishment.

Some Leguminosae and Meliaceae fruits were added to the carpological collection as unincorporated material came to light during clearing of the herbarium. This collection had to be boxed up for the refurbishment period as the cupboards it occupies will be modified and moved in the new layout of the herbarium.

### Other activities

Visitors were fewer this year because FHO was closed from May 1<sup>st</sup> 2001. The areas of interest of those that came included the African ferns, Ugandan forest trees, the Sudan flora, some Leguminosae and Meliaceae genera.

The work on the checklist of the flora of Mt. Mulanje, Malawi was somewhat curtailed during the year due to refurbishment work taking priority. Alison Strugnell has now submitted the paper on the endemics of Mt. Mulanje to 'Systematics and Geography of Plants', and the checklist of the spermatophyte flora is ready to be extracted from the database.

Alison Strugnell

## Tropical forest plant field guide project

In 2001 the FRP field guides project outlined in the last newsletter (OPS 8) has visited Grenada again, where we are collaborating with the ministry of Forestry and National Parks. Rosemary Wise has now painted from living material more than 100 species of trees and shrub and later has drawn the same species from dried specimens. William Hawthorne and Stuart Cable have added to collections from the island made earlier, so that we and Grenadians now have a comprehensive collection of woody plants from all vegetation types on the island, linked to digital photolibrary-material that has so far taken only 4.5 person-months to compile. This material, the specimens, paintings, drawings and actual leaves, will be made into various field guides covering four areas of forest on the island. These will be tested in early 2002 on tourists and Grenadians and scored for accuracy, user-appeal, cost and time to produce and other attributes.

In Ghana in October-November 2001 William Hawthorne will be testing, with the Ghana Forest Service and the Protected Areas Development Project, a bark-and-bole photoguide to more than 100 of the most important, largest tree species, arranged with various formats and indexes, and to be tested on several groups with an interest in their tree identification skills. Other 'guidelets' being tested in Ghana are various formats of guide to important NTFPs (Non Timber Forest Products e.g. rattans, *Garcinia* chew sticks, *Dracaena* species) and leaf guides to Sapotaceae and Bignoniaceae trees. Meanwhile, Stuart in collaboration with Limbe Botanic Garden staff, in Cameroon, will be testing guidelets to species of *Cola* from Mt. Cameroon in several formats. Formats of guidelet to this 'difficult' genus include detailed photographs of dried and living plants, line drawings, Xrays of venation, photocopies of herbarium specimens and actual dried leaves, all to be tested on various user groups.

All the information from these activities will be analysed in early 2002 to help provide guidance for the sorts of field guide appropriate in different circumstances. Being a DFID project, we are particularly interested in guides appropriate in various ways for promoting sustainable rural livelihoods and poverty-alleviation. Meanwhile, we hope the 'guidelets' themselves will be developed based on our results to produce useful products in these countries.

William Hawthorne

# BRAHMS



BRAHMS is database software for botanical research and collection management. For downloads and documentation, go to [www.brahms.co.uk](http://www.brahms.co.uk)

## Key developments – 2001

During 2001, the continued development of BRAHMS has been one component of the extensive modernisation of the Oxford herbaria. In addition to the extension of curation services, there has been a substantial development of research support tools including the addition of modules to manage DNA samples and sequences. Within this Department, the Hughes work on *Lupinus* is steering BRAHMS into new areas of practical support for monography while the preparation of the checklist of Mount Mulanje by Strugnell has pushed forward developments with text storage and formatting. Andrew Liddell has re-developed the BRAHMS web site and Jonathan Bennett is coordinating the preparation of the BRAHMS 5 manual.

New software developments are posted on the web site in the Software Development section. They include the addition of the Map Library, Image Library and DNA sequence modules; upgraded transactions

module for loans and exchanges; optional-use data forms added to key data screens including the main collection file; increased flexibility with linked data files allowing users to attach linked data files with any fields to a core BRAHMS database; custom lookups that generate lookup dictionaries for non-standard fields; extensive enhancements to RDE and RDE importing; password encryption; extended calculate and data analysis options throughout; and a new auto-upgrade feature that means you can download the new version from the web and rapidly auto-upgrade your databases.

## Active projects – 2001

The BRAHMS Project started in 1985. Since then, the software has worked its way through five principal revisions. It is now assisting herbaria in Europe (Baltic states, Germany, Netherlands, Portugal and the UK); Africa (Benin, Cameroon, Gabon, Ghana, Kenya); Asia (Bangladesh, Indonesia, Malaya, Sabah, Sarawak, Singapore) and the Americas (Brazil, Honduras, Panama, Puerto Rico, USA). The first external project was started at the Paul C. Standley herbarium (EAP), Honduras in 1989. The largest database to date is in the

Netherlands where the Leiden, Utrecht and Wageningen databases have been growing since about 1995.

Regional data networks are being established in Brazil and the Netherlands and, with assistance from the Asia IT&C European Community Initiative, the web based project 'South East Asian Collection Information Network (SEABCIN)' will assist with data exchange between herbaria in Europe and South East Asia.

## Feature – managing loans

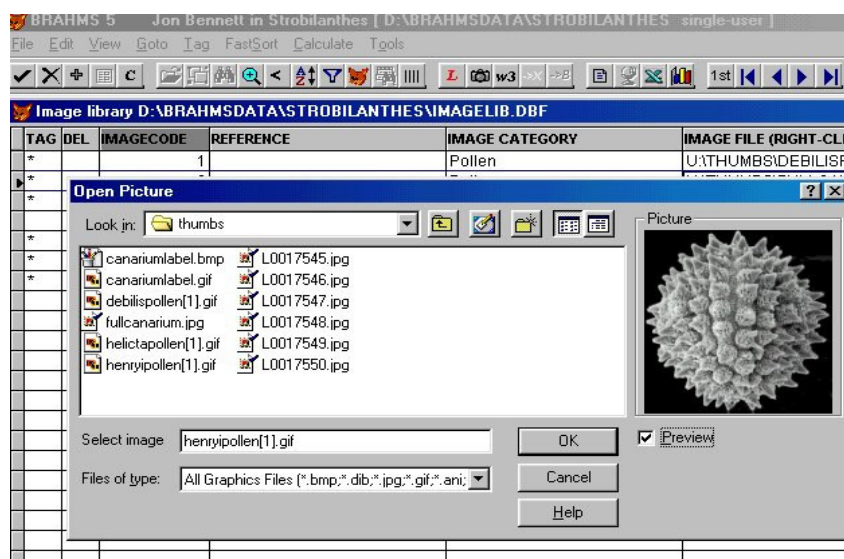
The **BRAHMS Transaction Module** monitors incoming and outgoing loans, gifts and exchanges and any other category of transaction entered into your Transaction Category dictionary. It maintains permanent records describing the movement of specimens and associated materials such as extra sheets, photographs and wood samples to and from your herbarium.

### Transaction categories

Transaction Categories are classified into **IN** and **OUT** groups or combinations of these. A default list of categories is provided with the BRAHMS set-up – but these may be edited. The most commonly used of these is the **OUT-IN** category '**Loan requested from you - then returned**' – the typical loan. As well as the incoming and outgoing loans, you can store transactions that are gifts, exchanges, purchases and staff collections. The grouping of transactions into categories means that you can prepare period reports for and otherwise analyze transactions by group.

### Transaction records

Each transaction entry is given a unique Transaction ID and is coded by category. In addition, the transaction record stores where the transaction was sent to or received from, a contact name, various dates and optional memo fields including a summary of the transaction content. Counts of specimens (in and out) can be manually added. The manual count fields are useful when it is not possible or realistic to physically link the specimens. These fields can be used to balance exchanges or simply check that loan returns are complete.



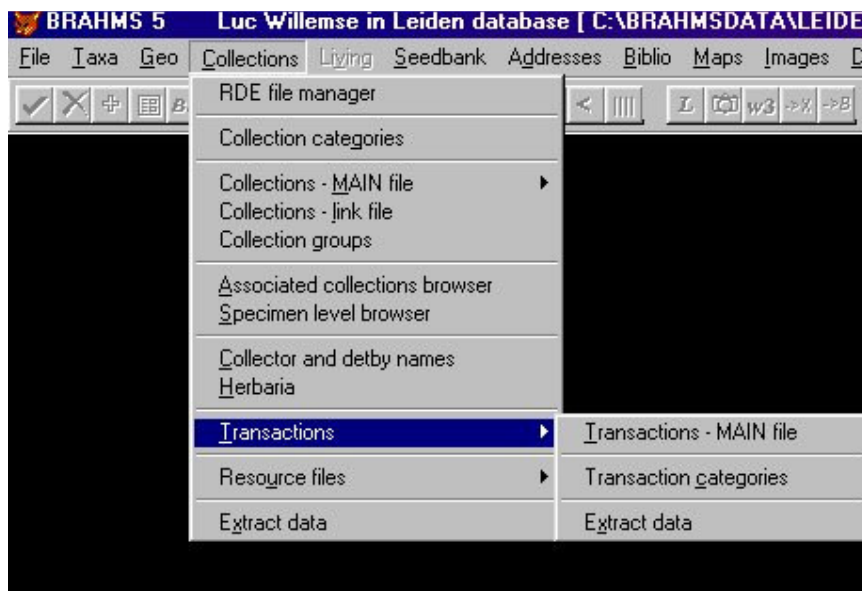
*The **Image Library** is one of the additions made to BRAHMS in 2001. Slides, illustrations and other pictures including saved pictures of maps and other scanned items can be catalogued. Once added, the images can be linked to individual taxa, collections or a locality.*

### Linking specimens

The value of the transaction module increases when specimens, stored in BRAHMS, are explicitly linked to the transaction records. As well as enabling you to keep track of exactly which items are included in a transaction, you can print specimen lists, monitor loan returns, make retrospective enquiries (e.g. exactly which specimens were sent in loans to the USA in 1990). The system includes a range of tools to efficiently link and unlink specimens to and from transactions. Herbaria using barcodes can make good use of these with the transaction module. Barcodes provide extra precision with the handling of collection materials; save time selecting collections for dispatch and recording returns; and they can be included on specimen lists providing an unambiguous collection reference.

### Designing reports

After a loan or any other type of transaction has been processed, you can print a list of specimens included in the transaction. Using the BRAHMS Visual Reporter, you can design and print a wide range of lists. These may be formatted to include any of those fields in the main transaction record (e.g. the ID number and the address) and the linked specimen file. If necessary, you can set filters on lists to include only some of the specimens. For example, you may want to print a list of material that has not yet been returned to send attached with a reminder letter. Sample reports are provided with BRAHMS in the \Brahms5\Reports\Transactions folder.



Selecting Collections, Transactions – MAIN file opens a screen similar to that shown below.

### The immediate and longer term benefits

As well as providing longer term benefits that come from tackling the movement of collections, the transaction module has immediate practical uses – printing lists, forms and address labels; pinpointing the whereabouts of particular collections; balancing specimen numbers in herbarium exchange schemes; listing loans overdue; and preparing transaction period activity reports. The module also provides a logical platform to record in-coming determinations – as specimens return from loans, revised

and the need to record which specimens are being dispatched on loan is an incentive to databasing collections, providing a realistic way to making a start with this often massive and daunting task, at the same time doing something of immediate practical benefit. To make full use of the transactions module, you do not need to have a fully databased herbarium – you can start today.

Frequently, the need to record which specimens are being dispatched on loan is an incentive to databasing collections, providing a realistic way to making a start with this often massive and daunting task, at the same time doing something of immediate practical benefit. To make full use of the transactions module, you do not need to have a fully databased herbarium – you can start today.

Denis Filer

| BRAHMS 5 Administration in Leiden [ C:\LEIDEN\B5 single-user ] |     |             |            |           |        |            |          |         |                                 |                        |
|----------------------------------------------------------------|-----|-------------|------------|-----------|--------|------------|----------|---------|---------------------------------|------------------------|
| Herbarium transactions C:\LEIDEN\B5\INOUT.DBF                  |     |             |            |           |        |            |          |         |                                 |                        |
| TAG                                                            | DEL | TRANSACTION | PROCESSED  | SPECIMENS | EXTRAS | SENT       | RETURNED | ADDRESS | ATTENTION OF                    | NOTE                   |
| *                                                              |     | L10757      | 15/12/2000 | 162       | 2      | 08/01/2001 | 95       | SOLLM   | de heer Ph. Sollman             | 164 specimen(s) of M   |
| *                                                              |     | L10758      | 04/01/2001 | 3         | 0      | 08/01/2001 | 0        | FI      | Prof. G. Sartoni                | 3 specimen(s) of Algae |
|                                                                |     | L10759      | 04/01/2001 | 14        | 0      | 08/01/2001 | 0        | LISI    | Prof. Dr. Mario Lousa           | 14 specimen(s) of Styl |
|                                                                |     | L10760      | 04/01/2001 | 28        | 0      | 08/01/2001 | 28       | SPARRIU | Dhr. L. Sparrius                | 28 specimen(s) of Lich |
| *                                                              |     | L10761      | 04/01/2001 | 2         | 0      | 08/01/2001 | 0        | C       | Dr. M. Sorensen / S.R. Knuds    | 2 specimen(s) of Arrac |
|                                                                |     | L10762      | 11/01/2001 | 14        | 2      | 26/01/2001 | 0        | HKU     | Dr. R. Saunders                 | 16 specimen(s) of Pse  |
|                                                                |     | L10763      | 11/01/2001 | 826       | 101    | 26/01/2001 | 0        | NAGOYA  | Sachiko Nishida, PhD.           | 927 specimen(s) of La  |
|                                                                |     | L10764      | 24/01/2001 | 10        | 2      | 26/01/2001 |          | DAV     | Dr. J. Doyle / Ms. T. Sher Kahr | 12 specimen(s) of Ann  |
|                                                                |     | L10765      | 24/01/2001 | 1         | 1      | 26/01/2001 | 0        | CATAN   | Prof. G. Furnari                | 2 specimen(s) of Lept  |
|                                                                |     | L10766      | 24/01/2001 | 7         | 0      | 26/01/2000 | 7        | HKBUE   | Dr. M.L. So                     | 7 specimen(s) of Herb  |
| *                                                              |     | L10767      | 24/01/2001 | 11        | 0      | 26/01/2001 | 0        | AH      | Dr. F. Javier Rejos             | 11 specimen(s) of Inoc |
| *                                                              |     | L10768      | 24/01/2001 | 3         | 0      | 26/01/2001 | 0        | CANB    | Dr. R. de Kok                   | 3 specimen(s) of Verbu |
|                                                                |     | L10769      | 24/01/2001 | 1         | 0      | 26/01/2001 | 1        | MA      | Dr. Pablo Perez D. niels        | 1 specimen(s) of Ram   |

The above screen shows part of the National Herbarium of the Netherlands – Leiden transaction file. If the actual specimens have been linked, these can be accessed using the Open button or double clicking in the Transaction column. The field SPECIMENS in this record refers to the number of specimens attached to the transaction. The field EXTRAS refers to the number of associated collections attached to the transaction (extra sheets, wood samples, etc.).