The Biology Curator

Title: Book Review: The Liverwort Flora of the British Isles by J. A. Paton (1999)

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Cytogenetics, Anatomy, Molecular Systematics and Biological Interactions.

Cytogenetics are largely occupied with surveying chromosome numbers, shape, size and DNA content across the plant kingdom to provide a better understanding of how different species are related and thus a more realistic classification of the plant kingdom. The behaviour of hybrid species chromosomes is also studied to aid prediction in future natural and cultivated hybrids.

The Anatomy Section complements the main herbarium botanists through maintaining and adding to Kew's anatomical microscope slide collection, currently totalling 95,000. These are stored vertically in metal fireproof cabinets. The Section also receives a large number of enquiries from identifying tree roots to food contaminants to charcoal from archaeological digs. The Section is also responsible for publishing the *Anatomy of Dicotyledons* and the *Anatomy of Monocotyledons* book series.

Molecular Systematics studies variations in DNA, RNA and proteins. The Section has a major input into the understanding of the taxonomy and classification of Angiosperms while the determination of genetic diversity within endangered plants species plays a major role in planning their conservation. The DNA Bank contains some 10,000 samples of plant genomic DNA (and still growing). These are stored a –80 degrees Celsius. As and when required this material can be extracted and amplified for further research.

Biological Interactions is primarily concerned with the identification of biologically active compounds in plants. Useful compounds, once identified can then be sought for in related species to find the best source. Such chemicals can be used for pharmaceutical drugs e.g. taxol from the Pacific Yew, and pest control e.g. *Calceolus* spp being investigated as a whitefly deterrent. It was noted that while fresh material generally contains a wider selection of active compounds, many of the more stable chemicals can still be extracted from herbarium specimens and thus can help to refine costly field searches.

With the time now approaching 3.00 p.m. we retired in search of shade, seating and food and a chance to reflect on the large number of Kew staff who enthusiastically welcomed and showed us around their respective territories. Thanks to all.

Book reviews

The Liverwort Flora of the British Isles, by J.A. Paton (1999). Harley Books, Colchester. 626pp, + glossary and scale. Price: £52.50. ISBN 0-946589-60-7.

This lavish production is a joy to scholars as much as to artists and bibliophiles. The British liverwort and hornwort flora is not only described in detail hitherto unmatched in this country, but every species is copiously illustrated by a full plate of immaculate line drawings.

There can be no doubt about the authoritative nature of this book. It includes accounts of life history and anatomical characters of taxonomic importance, as well as the wider ecological and biogeographical features of liverworts, and touches, too, on considerations of conservation.

In presenting this encyclopaedic volume to bryologists, the author expresses the hope that it will help all of them, whether amateurs or professionals, beginners or the more experienced, to identify liverworts accurately. Those of them who rely on the dichotomous keys, however, will unfortunately encounter difficulty. This is often a consequence of the complexity of critical groups and of language, but not always.

Successful discrimination between entire-level species of two very common genera, *Nardia* and *Mylia*, for instance, depends on two attributes of the underleaves. Whether they are free or jointed to the lateral leaves is variable in the former, invalidating the use of this character as an infallible means of discrimination. Dependence must therefore be placed on the underleaves being said to be "small but usually conspicuous" in *Nardia*, but "absent, or usually minute and inconspicuous" in *Mylia* (p. 43, couplet 72). Dimensions quoted for their length in *N. scalaris* are "to 400 (600) :m" (p. 291) compared with illustrations showing those of *M. taylorii* (p. 261) and *M. anomala* (p.263) to be in the order of 475 :m and 570 :m, respectively. The beginner would therefore not find his way to one or other of these species by means of the key. Nor would he be able to name *Lejeunea patens* and *L. lamacerina* correctly, for these two species are distinguished by the differing angle each presents at the junction of the postical margin of the lobe with the keel of the leaf. Couplet 5 on p.490, however, describes instead the angle between the postical margin of the leaf (*i.e.* the margin of the lobule) and the keel. In nearly every case, this would lead to each species being mistaken for the other. These are the sorts of problems that only a thorough testing of keys by keen bryologists will bring to light.

Experienced bryologists will welcome this book, for it lays before them the views of one of today's most respected hepaticologists. They might dislike the innovative use of average cell dimensions, which, without ranges and/or standard deviations, are often unhelpful. Couplet 22 on p.265, for instance, fails to assist the reader in attempting to discriminate between non-fertile *Jungermannia hyalina* and *J. paroica* for precisely this reason. Nevertheless, although there are bryologists who might wish to debate points of taxonomic judgement, there will, I think, be universal gratitude to the author for the opportunity she has given them to assess their own opinions in a much wider context than formerly. It is a book that ought to be accessible in public libraries and in as many private ones as possible, for it contains an enormous wealth of information that will benefit aspiring and established bryologists alike. Mrs Paton has made a splendid contribution to bryology.

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Collections research

Unique herbarium collections

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Herbarium specimens and their labels provide a huge amount of information, which is an invaluable research and voucher resource for botanists. Most collections consist of a mixture of specimens collected by individuals for their own herbaria, and duplicates collected for exchange with other botanists. Whilst researching records for a number of rare plants, I have found it necessary to visit or borrow material from a variety of herbaria to build up a reasonable picture of the species history and distribution in each site. This has also allowed me to quantify how many collections are unique to individual herbaria.

The numbers of exsiccatae represented in one, two, three, four or five or more herbaria are shown in Table 1 (an exsiccate is here defined as any unique combination of collector, date and locality).

This shows that on average, 83% of the specimens only occur in one collection and are not represented elsewhere.

Much of the duplicate material was distributed through the Botanical Exchange Club of the British Isles, and now resides in the larger herbaria. Many local herbaria have local collections which are not represented anywhere else. It is clear that all herbaria contain a high proportion if unique information.

Table 1. Numbers of exsiccate (herbarium species) represented in one, two, three, four or five or more herbaria for ten rare species investigated in detail. With the exception of *Pilularia* (data courtesy A.C. Jermy and A. Lockton), all data compiled by TCGR.

Species	Number of herbaria investigated	Number of different herbaria exsiccitae					
		1	2	3	4	5+	Total specimens
Ajuga pyramidalis	10	58 (85%)	6	2	1	1	68
Apsaragus prostratus	12	156 (84%)	16	7	2	4	185
Filago lutescens	20	142 (74%)	29	6	5	11	193
Filago pyramidata	20	165 (82%)	19	4	7	6	201
Fumaria purpurea	18	200 (84%)	22	6	5	6	239
Hieracium cambricum	5	20 (64%)	7	3	-	1	31
Hieracium linguans	7	15 (83%)	1	1	-	1	18
Pilularia globulifera	69	516 (87%)	57	6	5	8	592
Salvia pratensis	9	148 (98%)	2	1	-	-	151
Schoenoplectus triqueter	12	101 (83%)	12	6	-	2	121