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BOOK REVIEWS ❖ REVUE DE LIVRES

Lime-trees and Basswoods – A Biological Monograph of the Genus *Tilia*

Donald Pigott, 2012. ISBN 978-0-521-84054-5 Cambridge University Press, New York, NY. US 132.95 + shipping. Contact: public-ity@cambridge.org

Lime-trees and Basswoods is a focused and scholarly taxonomic treatment of the genus *Tilia*. It is also fully accessible to any reader with a working knowledge of taxonomic classification or with an interest in acquiring such knowledge. The most satisfying element of Pigott's work (leaving aside the effective presentation of an unexpectedly complex genus) is the synopsis Pigott offers of the multidisciplinary skill modern science demands of taxonomists. *Lime-trees and Basswoods* is as much an insight into the craft of the taxonomist as it is a rational and well-ordered revision of a genus. Pigott, past Director of the Cambridge University Botanic Garden and a former Professor of biology and Head of Department at the University of Lancaster, UK, is well-qualified to present the revision and an overview of the discipline. His careful account of the extensive fieldwork and herbarium research on which his revision of *Tilia* rests provides particular insight into the

modern taxonomist's working day.

Pigott's monograph makes no concession to ornamentation. Aside from a striking floral image on the front cover, it contains no colour plates or photographs of any sort. *Lime-trees and Basswoods* is clearly not intended to double as a coffee-table book. Pigott's work is supported by a range of informative and precise illustrations, primarily with strong botanical line drawings that communicate important morphological characters on which classification of *Tilia* species depends. (Minute fascicular and stellate hairs borne on *Tilia* leaves are particularly useful). Botanical illustrations are supplemented by illustrations of macro- and microscopic wood structure, graphs of statistical probability of identification occurrence, species distribution maps, ecological and statistical analysis, and diagrams depicting development and ontogeny. Text describing the association of *Tilia* species with human activity through the ages includes reproductions

of Bronze Age etchings and 16th century wood cuts.

What makes *Lime-trees and Basswoods* an exceptional work is the effort the author has made to describe in

detail every aspect of the multi-disciplinary approach taken in developing his revision of *Tilia*. What emerges is an examination rooted in classical morphological investigation to which are added layers of reference to cellular anatomy, physiological ecology, floral ecology, geological history, reproductive ecology, techniques of propagation and taxonomic history. Each area contributes significantly to Pigott's revision of the genus.

And a complex genus it is. Regarding the species of *Tilia*, Pigott notes in his preface that the species names and the trees to which they refer "began with confusion and have continued in much the same way to the present day". Much of this confusion is attributed by Pigott to the attitudes of those who studied the genus in the past and to general disagreement regarding the degree of detail that justifies taxonomic recognition of species and sub-species. Conceptual debate is often the case in taxonomy, which often transforms what seems a dry vocation into a town hall pursuit. Regarding certainty around the genus *Tilia*, reference to the Integrated Taxonomic Information System Database (<http://www.itis.gov/>) offers up a very different classification. Time and debate will likely be required for Pigott's treatment to advance from concept to widely accepted model.

In *Lime-trees and Basswoods*, Pigott proposes a revised taxonomy of *Tilia* that reduces the more than 100 species that have been described at one time or another into a more manageable 23 species and 14 subspecies. The author is cautious in his presentation and emphasizes, particularly with reference to the North American taxa, that his treatment is provisional. He notes the requirement for further information on variation between populations and an application of reliable and discriminating morphological characters to the re-examination of existing herbarium material.

The complexity inherent in managing so broad an assemblage of hybrid, varietal and subspecies designations is increased with the challenge of evaluating herbarium specimens where location names and descriptive terms are subject to change over time, and where text that often requires translation and interpretation of Chinese, Japanese and

other languages. The forensic skill set the dedicated taxonomist employs begins with linguistics before moving anywhere near genetic codes and DNA.

Though complex taxonomically, the genus *Tilia* is described as morphologically unique. It is the observed morphological uniformity of *Tilia* species that makes their identification so difficult, and which leads to the taxonomic confusion for which the genus is renowned. Pigott makes specific reference to a familiar feature that is a "unifying character" of the genus—the conspicuous bract to which the floral structure of any *Tilia* species is partly fused. While the "*Tilia* bract" is probably the most familiar feature of the genus, Pigott points out one other prominent character that is easily overlooked in casual observation—an "extra" vein that occurs where the basal pair of veins meet at the petiole of a *Tilia* leaf. This distinctive "third vein" is considered to be an evolutionary vestigial of an earlier palmate venation pattern and is related to the basal asymmetry typical of *Tilia* leaves. Pigott notes that though prominent, the third vein is frequently overlooked in botanical illustrations.

Pigott's revision organizes the taxa of *Tilia* into three geographical groupings: European and western Asian, Eastern Asian, and North American. Pigott notes that the very earliest botanical descriptions of North American taxa recognized four species. By the 1940s subsequent studies had expanded that list to more than 70 species. Classification efforts in the 1960s condensed the list of North American species back down to the four originally described. Pigott's treatment reduces the list further by recognizing only two species occupying a complex distribution in eastern North America comprised of hybrids, subspecies and varieties. All complexity, however, occurs to the south of the area occupied by glaciers at the peak of the last glacial maximum. North of latitude 40° (the Canadian portion of the range) only typical *Tilia americana* (American basswood) is obvious. The richer distribution of species, varieties and hybrids occurs to the south of the Great Lakes, along the eastern seaboard, and south into Mexico.

Pigott's revision of *Tilia* includes detailed dichotomous keys that allow

identification and comparison of the taxa as he interprets them. Unlike some taxonomic works, where the information in keys is virtually indecipherable, Pigott's keys provide clear and comprehensible direction to the characters on which his keys are based. In general, Pigott's descriptive content throughout the monograph, while technical, is similarly clear and easily understood.

In addition to taxonomic description, *Lime-trees and Basswoods* provides information on the practical uses of basswoods and lime-trees throughout history as well as references to the special social status of *Tilia* trees—including as meeting places for town councils and locations for sentencing of "social miscreants". The role of *Tilia* species in eastern and western mythology and folk lore is explored. Additionally, Pigott provides a description of the many means of propagation and regeneration associated with the genus.

Lime-trees and Basswoods is first and foremost a taxonomic work. It is carefully documented, technically rigorous and detailed. *Lime-trees and Basswoods* is also a creative and inspiring publication. For the reader whose focus may not begin or end at plant classification, but whose interest includes conceptual approaches to science, Pigott's book makes a fascinating study. By including and explaining the statistical methodology and technical skills required in modern taxonomy, he allows outside observers to grasp, and appreciate, the contribution taxonomy makes to understanding of modern biodiversity and phylogenetics.

At a time when national newspapers as well as scientific journals are apt to report taxonomists as a vanishing breed (or at least, as members of a discipline in existential crisis) Pigott's remarkable book reminds the reader that to understand the evolutionary links that link even the familiar plant species around us requires imagination as well as field experience and technical acumen. Pigott's revision of *Tilia* communicates, successfully, that visionary science will always demand creativity of its practitioners. In doing so, Pigott confirms that, regardless of contemporary perspectives, much work remains to be done in taxonomy.

Ken Farr