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To our wives, Robin and Margaret

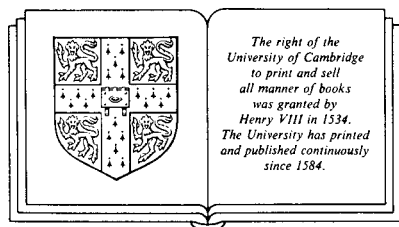
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MICHAEL HICKEY & CLIVE KING

100 FAMILIES OF FLOWERING PLANTS

With a Foreword by S. M. Walters, formerly Director of the
University Botanic Garden, Cambridge

SECOND EDITION



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Contents

<i>Foreword to the second edition by S. M. Walters</i>	page ix	<i>Signs and abbreviations</i>	<i>Floral formula</i>	xiv
<i>Preface</i>	xi	<i>Systematic grouping of plants</i>		xv
<i>Note to the second edition</i>	xiii	<i>Authorities</i>		xv
<i>Acknowledgements</i>	xiii	<i>Introduction</i>		1

FAMILIES IN SYSTEMATIC ORDER

DICOTYLEDONS

Magnoliales		Theales	
1. <i>Magnoliaceae</i>	16	18. <i>Theaceae</i>	96
Lurales		19. <i>Guttiferae (Clusiaceae)</i>	100
2. <i>Lauraceae</i>	20	Malvales	
Piperales		20. <i>Tiliaceae</i>	104
3. <i>Piperaceae</i>	24	21. <i>Malvaceae</i>	108
Aristolochiales		Urticales	
4. <i>Aristolochiaceae</i>	28	22. <i>Moraceae</i>	112
Ranunculales		23. <i>Urticaceae</i>	116
5. <i>Ranunculaceae</i>	32	Violales	
6. <i>Berberidaceae</i>	42	24. <i>Violaceae</i>	124
Papaverales		25. <i>Passifloraceae</i>	130
7. <i>Papaveraceae</i>	46	26. <i>Cistaceae</i>	134
Hamamelidales		27. <i>Begoniaceae</i>	138
8. <i>Hamamelidaceae</i>	50	28. <i>Cucurbitaceae</i>	142
Fagales		Salicales	
9. <i>Fagaceae</i>	54	29. <i>Salicaceae</i>	146
10. <i>Betulaceae</i>	60	Capparales	
11. <i>Corylaceae</i>	64	30. <i>Cruciferae (Brassicaceae)</i>	150
Caryophyllales		31. <i>Resedaceae</i>	156
12. <i>Cactaceae</i>	70	Ericales	
13. <i>Caryophyllaceae</i>	74	32. <i>Ericaceae</i>	160
14. <i>Portulacaceae</i>	80	Primulales	
15. <i>Chenopodiaceae</i>	84	33. <i>Primulaceae</i>	168
Polygonales		Rosales	
16. <i>Polygonaceae</i>	88	34. <i>Crassulaceae</i>	174
Plumbaginales		35. <i>Saxifragaceae</i>	182
17. <i>Plumbaginaceae</i>	92	36. <i>Rosaceae</i>	190
		Fabales	
		37. <i>Leguminosae (Fabaceae)</i>	208

Contents

Myrtales			
38. <i>Lythraceae</i>	222	Lamiales	
39. <i>Thymelaeaceae</i>	228	71. <i>Verbenaceae</i>	384
40. <i>Myrtaceae</i>	232	72. <i>Labiatae (Lamiaceae)</i>	390
41. <i>Onagraceae</i>	237	Plantaginales	
Cornales		73. <i>Plantaginaceae</i>	396
42. <i>Cornaceae</i>	246	Scrophulariales	
Proteales		74. <i>Scrophulariaceae</i>	400
43. <i>Elaeagnaceae</i>	250	75. <i>Gesneriaceae</i>	414
Santalales		76. <i>Bignoniaceae</i>	422
44. <i>Loranthaceae</i>	254	77. <i>Acanthaceae</i>	428
Celastrales		Campanulales	
45. <i>Celastraceae</i>	258	78. <i>Campanulaceae</i>	434
Euphorbiales		Rubiales	
46. <i>Buxaceae</i>	262	79. <i>Rubiaceae</i>	440
47. <i>Euphorbiaceae</i>	266	Dipsacales	
Rhamnales		80. <i>Caprifoliaceae</i>	444
48. <i>Rhamnaceae</i>	274	81. <i>Valerianaceae</i>	452
49. <i>Vitaceae</i>	278	82. <i>Dipsacaceae</i>	456
Sapindales		Asterales	
50. <i>Hippocastanaceae</i>	282	83. <i>Compositae (Asteraceae)</i>	461
51. <i>Aceraceae</i>	286	MONOCOTYLEDONS	
52. <i>Anacardiaceae</i>	290	Alismatales	
53. <i>Rutaceae</i>	294	84. <i>Alismataceae</i>	472
Juglandales		Commelinales	
54. <i>Juglandaceae</i>	300	85. <i>Commelinaceae</i>	476
Geraniales		Poales	
55. <i>Linaceae</i>	304	86. <i>Gramineae (Poaceae)</i>	481
56. <i>Geraniaceae</i>	308	Juncales	
57. <i>Oxalidaceae</i>	314	87. <i>Juncaceae</i>	494
58. <i>Balsaminaceae</i>	318	Cyperales	
Polygalales		88. <i>Cyperaceae</i>	498
59. <i>Polygalaceae</i>	324	Typhales	
Umbellales		89. <i>Typhaceae</i>	502
60. <i>Araliaceae</i>	328	Bromeliales	
61. <i>Umbelliferae (Apiaceae)</i>	332	90. <i>Bromeliaceae</i>	506
Gentianales		Zingiberales	
62. <i>Loganiaceae</i>	338	91. <i>Musaceae</i>	512
63. <i>Gentianaceae</i>	342	92. <i>Zingiberaceae</i>	516
64. <i>Apocynaceae</i>	346	93. <i>Cannaceae</i>	522
65. <i>Asclepiadaceae</i>	352	94. <i>Marantaceae</i>	528
66. <i>Oleaceae</i>	356	Arecales	
Polemoniales		95. <i>Palmae (Arecaceae)</i>	534
67. <i>Solanaceae</i>	364	Arales	
68. <i>Convolvulaceae</i>	370	96. <i>Araceae</i>	540
69. <i>Polemoniaceae</i>	374	Liliales	
70. <i>Boraginaceae</i>	378	97. <i>Liliaceae</i>	546

Contents

<i>98. Amaryllidaceae</i>	554	Orchidales	
<i>99. Iridaceae</i>	558	<i>100. Orchidaceae</i>	566

Comparative Tables

<i>1. Ranunculaceae – Saxifragaceae – Rosaceae</i>	573	Glossary	591
<i>2. Fagaceae – Betulaceae – Corylaceae</i>	574	Leaf shapes (simple leaves)	603
<i>3. Boraginaceae – Labiatae – Scrophulariaceae</i>	575	Leaf shapes (compound leaves)	605
<i>4. Gramineae – Juncaceae – Cyperaceae</i>	576	Petioles and points of attachment	606
<i>5. Zingiberaceae – Cannaceae – Marantaceae</i>	577	Leaf margins	607
<i>6. Liliaceae – Amaryllidaceae – Iridaceae</i>	578	Cymose inflorescences	608
Table of Family Characters	579	Racemose inflorescences	609
Less Common Family Characters	586	References	610
Approximate Flowering Times	588	Index to families and genera	611

Foreword to the second edition

It is very gratifying indeed to be invited by the authors to write a short comment on the second edition of their book. During the five years since the 'Hundred Families' was first published, much valuable comment has been made by many of the users of the book, and the authors have taken great care to consider all criticisms and act where they felt the criticisms were justified. The new edition is therefore considerably improved in the light of experience, which is an ideal way to achieve improvement in a book designed explicitly to

fill a practical need.

Since I retired in 1983, I have kept up some interests in lecturing and instruction to students of botany and horticulture of all ages, and have certainly found an increasing demand for carefully presented authoritative material to help keen people who would like to go deeper into the enjoyment of their hobby or profession. The 'Hundred Families' seems to be exactly this kind of book, and I wish it continued success.

S. M. Walters
*Formerly Director,
University Botanic Garden,
Cambridge*

October 1986

Preface

It is generally agreed that there are about 240,000 species of flowering plants in the world at the present time, and that depending on the authority concerned, these may be grouped into 300–400 families. To understand fully the relationships between these families and to appreciate the diversity of their floral structure would require research into a wider range of plants than time and available facilities normally permit. However, a basic knowledge can be obtained by the study of a selected group of families, and therefore we decided to restrict the number dealt with in this book to one hundred. We thought that this number would be sufficiently large to enable students at schools and universities to gain a reasonable general knowledge of this aspect of botany.

In selecting the hundred families we have tried to ensure (1) that the range of families should be sufficiently wide to illustrate adequately the similarities and differences existing in floral structure and (2) that the typical representative(s) of a family should, as far as possible, be readily available, either as members of the native flora or as introduced plants commonly found in cultivation.

In limiting ourselves to a maximum of one hundred families we have had to omit many which are both large and important, especially some which are prominent in tropical or subtropical regions.

In general, the descriptions of the families have been based on information given in Willis's *Dictionary of the Flowering Plants and Ferns*. But in cases where long-established families were divided up we decided to depart

from this course, the broader view of the family being considered more valuable to the students for whom this book is designed. The families are arranged in the same order as those in *The Identification of Flowering Plant Families* by Davis & Cullen. This order reflects current thinking as expressed by G. L. Stebbins in *Flowering Plants – Evolution above the Species Level* (1974). Thus, families that appear near to each other in the present volume may be considered more closely related than those further apart. However, mention is made where one family has a particular relationship to a more distant family.

The text for each family is in two parts. The first part treats the family as a whole and gives its world distribution, general characteristics, principal economic and ornamental plants, and a classification that mentions some of the larger or more important genera together with their distribution and the number of species they contain. The second part is devoted to the detailed description of a plant chosen as a typical representative of the family – in a number of cases two or more plants have been used to show the variation in floral structure existing within the family. This part gives the distribution of the plant, its vegetative characteristics, floral formula, details of the flower and inflorescence, and pollination mechanism; it also suggests alternatives if the plant described proves to be unobtainable. It should be noted that the information on pollination is not the result of personal observation by the authors but that this has been obtained from the most recent literature available.

All the drawings of plants or parts of

Preface

plants, an essential feature of this book, have been made from living material. It should be emphasised that students will be able to observe most of the detailed structure illustrated with a $\times 10$ hand lens, and only rarely will a low-powered microscope be required. The drawings are accompanied by extended captions which in most cases include measurements of the floral parts. Since many of the drawings are larger than life-size in order to show more clearly the parts concerned, it was felt desirable to provide these measurements so that students, when examining a flower or fruit, should have a clear mental picture of the actual size of the part in question. It must be emphasised that the measurements were taken from the specimens used for the drawings, and that care was taken to ensure that these were typical in form. However, variation within a species or

developmental factors may mean that a student will sometimes find that a certain part does not agree exactly with the description or dimensions given. The abbreviations L.S. and T.S. (for longitudinal and transverse sections, respectively) have been found convenient to indicate what is seen when a part has been cut lengthwise or across at any point. Their use has therefore not been restricted to describing thin slices of material such as those normally used in microscopic work.

It is hoped that this book will be useful, not only to students, but also to professional botanists and interested amateurs of natural history and horticulture.

We would be grateful if users of the book would notify us of any errors or omissions that may come to their notice.

M.H.
C.J.K.

Note to the second edition

Those who are familiar with the first edition will be aware that there has been a change of format to a larger page-size, and also a different lay-out of the text. In addition, a considerable number of illustrations have been re-drawn and many more added, including drawings of whole plants. In several cases a second representative has been used to enlarge the coverage of certain families. It has been decided (1) to omit Ulmaceae, since the elm population in Britain has been greatly reduced by Dutch Elm disease and (2) to revert to the traditional treatment of Saxifragaceae, resulting in the inclusion of Grossulariaceae and several other small families of woody plants. To complete the number of families, Balsaminaceae and Elaeagnaceae have been chosen, the former because of the interesting flower-structure of its largest and most commonly grown genus, *Impatiens*, and the latter since it demonstrates the previously unrepresented order Proteales. Alterations to the text include extensive revision of the Introduction, an increase in the number of Comparative Tables, and the addition of a Table of Family Characters.

Acknowledgements

We would like to express our appreciation and gratitude to Dr S. M. Walters for all the helpful advice and encouragement he has given during the writing and illustrating of both editions of this book. We would also like to thank the Director, Dr C. D. Pigott, the Taxonomist, Dr P. F. Yeo, and other members of the staff of the University Botanic Garden, Cambridge, for their assistance in various ways, including the provision of much of the plant material used for the illustrations. Other valuable help has been received from Dr Margaret Bradshaw, P. Butler, J. K. Barry, J. & H. Blackwood, R. & C. Draper, R. C. Edwards, R. G. Ellis (National Museum of Wales), R. Gregory, W. G. Hennessy, T. V. & J. Ireland, M. Newland, E. W. Pymont, S. W. Smith, A. Tandy, D. Tullis, and the staff of Westonbirt Arboretum. Finally, we wish to thank Martin Walters, Biology Editor, and other members of the Cambridge University Press for their expert help throughout the production of this work.

M.H.
C.J.K.

Signs and abbreviations

♂	male
♀	female
♂♀	bisexual
∞	indefinite number
±	more or less
×	hybrid
()	united
A	androecium
C	corolla
Ḡ	gynoecium (ovary inferior)
G̅	gynoecium (ovary superior)
K	calyx
P	perianth
L.S.	longitudinal section
T.S.	transverse section
c.	(circa) about, approximately
cm	centimetre(s)
m	metre(s)
mm	millimetre(s)
2-merous	dimerous
3-merous	trimerous
4-merous	tetramerous
5-merous	pentamerous
6-merous	hexamerous
8-merous	octamerous
adj.	adjective
plur.	plural

A measurement given without qualification refers to length. Two measurements connected by × indicate length followed by width. Further measurements in brackets indicate exceptional cases outside the normal range.

In the Classification section for each family, the number in brackets after a genus indicates the number of species known throughout the world.

Floral formula

Some of the above signs and abbreviations occur in the Floral Formula, which is a convenient form of 'shorthand' for representing the structure of a flower. The letters K, C, A, and G are used to indicate the whorls of floral parts, beginning with the outermost whorl and working inwards towards the centre of the flower. Where there is no separation into calyx and corolla the letter P is used in place of K and C.

Each letter is followed by one or more figures showing the number of parts comprising each whorl, e.g., A5 indicates an androecium consisting of 5 stamens, and A5+ 5 shows that there are 2 whorls of stamens with 5 in each whorl. Where the number of parts is large and imprecise the sign '∞' is used. If the number of parts in a whorl is variable, a dash joining 2 figures indicates the range of variation, e.g., A12–20 (in *Reseda lutea*) means that from 12 to 20 stamens may be found in a flower of this species.

The parts forming a whorl are sometimes connate, e.g., G(3) denotes a gynoecium of 3 united carpels. (A bracket may be placed above the letters concerned to indicate that 2 whorls are joined together, e.g. C̄(5) A5, but this practice has not been adopted here.)

The position of the ovary is shown by a line above or below the letter G, representing an inferior or superior ovary respectively (see Fig. 10). In rare instances where unisexual flowers lack a perianth, e.g., female flowers in *Betula pendula*, it is not possible to show the relationship of the ovary to the other floral parts and the line is therefore omitted.

Systematic grouping of plants

The basic unit of classification in the plant kingdom is the species, species being grouped into a genus, genera into a family, families into an order, and so on. Even at the lower levels of classification there may be differences of opinion as to the precise rank that should be given to a plant or group of plants, and at higher levels the grouping of the plants and the ranks assigned to the groups may vary considerably according to the authority concerned.

In the list of Families in Systematic Order on pages v–vii, the flowering plants are divided first of all into dicotyledons and monocotyledons, a widely accepted dichotomy. These are subsequently divided into orders, the names of which end in ‘-ales’, and then into families. All family names end in ‘-aceae’, with the exception of certain long-established families where we have kept the traditional names. But the more recently created alternative names for these eight families, ending in ‘-aceae’, have also been given.

In the Classification section of the family texts it will be found that there is quite often, particularly in the case of the larger families, a further division into subfamilies, with names ending in ‘-oideae’, and/or tribes, ending in ‘-eae’. The endings of the taxonomic ranks mentioned are those prescribed by the International Code of Botanical Nomenclature.

Authorities

It will be noticed that, at the beginning of each family text, the name of the family is followed by a personal name, often in an abbreviated form, e.g. Lauraceae Juss. (= Jussieu). Similarly, at the beginning of the species text, the name of the species is also followed by a personal name, e.g. *Laurus nobilis* L. (= Linnaeus).

This is the method used, in accordance with the International Code of Botanical Nomenclature, to refer to the name of a taxon in a more precise way by indicating the person (or ‘author’) who first validly published that name.

The name of a species will sometimes have a ‘double citation’, e.g. *Knautia arvensis* (L.) Coult. In this case, the plant was first called *Scabiosa arvensis* (by Linnaeus), and later transferred to the genus *Knautia* by Coulter. Another use of double citation is when a plant first described as a species is now considered to be of lower rank, e.g. a subspecies or variety. The reverse process, an upgrading in rank, also results in a double citation.

Fig. 1. GEOLOGICAL TIME-SCALE

