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How to use the Card Sorting Key for the Identification of Families of Dicotyledons

BY

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Foreword to the First Edition

MANY field workers (for example, foresters, ecologists and regional surveyors) who lack a specialised training in systematic botany find identification of plant species difficult. This is particularly true of those who work under conditions which make reference to herbarium taxonomists either inconvenient or impossible. The usual printed key is sometimes useless because the available plant material is incomplete. Often, obviously unusual characters of an unknown plant cannot be used because the normal key does not mention them.

In an attempt to provide the answer to this problem the Bureau has produced a punched card system as an aid to plant identification within the class Dicotyledoneae. The introduction of this key has been influenced by the favourable reception given to the card sorting key for the identification of species of eucalypts which was produced in 1954.

This system can be used with incomplete material, and the order of sorting can be varied so that the most conspicuous or most selective features can be used at an early stage. Thus the need for making decisions on features which are not well developed can be eliminated, a point which may be of major importance for those who are not experts in systematic botany.

A card sorting system also has the advantage that the cards for additional families can be added to a set, or cards can be removed when operating in a restricted area, without involving any basic change in the key. Disadvantages of such a system, compared with a dichotomous key, are that it is relatively expensive to produce and it is comparatively bulky. Partly because of this last fact, the scope of any one sorting system is limited by the number of cards which can be handled conveniently. Therefore whilst the system now presented is of general application, separation has only been attempted to a family level.

The complete set of 264 cards cover the families of dicotyledons based on the classification of Hutchinson in " The Families of Flowering Plants " (1926). The adoption of this classification is justified by

the fact that Hutchinson is a reasonably well known and widely used reference book, it is written in English and it appears suitable for use by the non-specialist. In addition, the number of families in the classification—264—represents about an average number based on present day concepts, and the family limits (although not necessarily the higher groupings) are generally acceptable to contemporary taxonomists.

G. J. RODGER
Director-General

1955

Foreword to the Second Edition

THE continuing demand, since the original production in 1955, for the card sorting key for the families of dicotyledons has necessitated a second edition. Prior to proceeding with the production of the cards for the new edition, enquiries were addressed to people and organisations which had had experience with the first edition, seeking their views on any changes which they felt desirable. The principal change suggested was that the size of the card should be reduced considerably. This has been done and instead of the original 11¾ x 8½ inches, the new card is only 8 x 5 inches. This reduction of more than one-half in size has necessitated several other major changes, the more important of which are the introduction of double rows of holes in order to accommodate the same 141 botanical features used in the first edition, and the omission of any space on the front of the card for the addition of distinctive family characteristics. The large space on the back for outline keys to the genera and notes on local genera and species has been reduced considerably in size and left without any specific title. Also features 157-202 and unallocated numbers 203-219, which were included within the face of the card and could not be mechanically sorted, have been omitted. A minor change, necessitated by the introduction of double rows of holes and consequent reduced space for printing, has been the abbreviating of some of the longer titles printed against the hole numbers. An addition, which the designers have found desirable has been the introduction of letters of the alphabet in serial numbers 1-20, whereby it is possible to sort for a family name by using the first vowel and the first consonant appearing in the name. When dealing with a group of 264 cards this device will aid the quick location of the card for a specific family. Finally, where experience with the cards has shown original omissions, the necessary additions to the coding have been made. It will, of course, be appreciated that the completeness of coding can only be as full as the botanical descriptions available for families, augmented by such genetic descriptions as could be examined by the authors.

The original card system has been used at a number of herbaria throughout the world for assistance in determining the probable

families of "unknown" specimens, and by some universities for teaching and practical family identification.

The first edition was described by N. Hall and R. D. Johnston in "Field Identification of Dicotyledons: A Punched Card System for the Identification of Families", Aust. Jour. Bot. 3 (1) pp. 82-88, 1955. For the preparation of the second edition the original workers have had the assistance of Mrs. J. M. Marryatt.

M. R. JACOBS
Director-General

April, 1964.

How to use the Card Sorting Key for the Identification of Families of Dicotyledons

By N. Hall* and R. D. Johnston*

GENERAL

THIS key is designed to assist in identifying the families to which plant specimens belong. It may not always enable unequivocal determination to be made, but it will, at least, reduce the number of families to which a specimen could be referred. The extent to which the 264 cards (representing the families of dicotyledons according to Hutchinson) can be mechanically sorted depends upon two factors. The first of these is the completeness of the plant specimen available and the second is the degree of distinctiveness of the family concerned.

The selection of characters to be used on the edge of the card was based on certain guiding principles:

1. All aerial parts of the plant should be represented, in order that when only incomplete material is available it will be possible to use those characters which are present.
2. All characters should be of importance at the family level. A character which only occurs in one or two families is of little value; likewise a character which occurs in nearly all families.
3. As many characters as possible should be macroscopic. However, this would not debar the use of certain microscopic characters, such as the type of ovule, for use in the identification of difficult specimens.

Characters have been coded according to their appearance and detailed anatomical study should not be necessary. For instance, in the case of apetalous families which have a petaloid calyx, the coding of the calyx/perianth is repeated for the corolla, so that users of the cards will not need to distinguish between the two conditions. If the user can make the distinction the characters used will be more selective and mechanical sorting faster. Another example is the number of loculi in the ovary. The ovary may be 2-celled, but by development of false septa it may appear 4-celled. In such a case the family would be coded for both conditions.

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N.B.—In the sets of cards supplied the coding is incomplete for type of ovules and seed details on a few cards. This is because the information is lacking in published family descriptions. Where the embryo or seed is described as minute, the lack of details as to type of embryo and cotelydons will not affect the operation of the card system by the field botanist. There are also one or two little known families, such as Gomortegaceae, where accessible information on seed characteristics is lacking.

TERMS USED

The terms used, with few exceptions (such as hypanthium), have been based on Hutchinson (1), but considerable reference has been made to the illustrated glossary by Lawrence (2). The simplest terms consistent with clarity of meaning have been used in referring to botanical characters. For example, free and united carpels have been used rather than apocarpous and syncarpous ovary, and free and united (petals) rather than polypetalous and gamopetalous corolla. There are a few cases where it has been necessary to give an arbitrary definition of the way in which certain terms have been used in the preparation of the family coding, notably with reference to what constitutes an unbranched or free style compared with a branched or partly united style, and the distinction between the latter and a lobed or branched stigma. A list of the terms used, together with definitions, is given in Appendix A, whilst for convenience Plates I and II illustrate those features which appear to be more simply shown in that way than by definitions.

Hutchinson's classification of the families by orders is provided in Appendix B, whilst an alphabetical cross reference to the number in the classification is given in Appendix C.

DESIGN OF THE CARD

The size of the card is 8 x 5 niches, with 172 sorting holes in double rows on the edge. Letters of the alphabet have been used for 20 holes and botanical features for 141 holes, leaving 11 unallocated for the possible needs of specialist users. Thus for any particular set of cards, additional characters may be added to enable sorting to be effected for features which are of special significance to the user, but which have not appeared to have sufficient use for general application. Some users may desire to allocate these to geographical distribution or ecological groupings.

The following is a summary of the characters which have been used:

Letters of the alphabet	20	Ser. Nos.	1-20
Habit	10		21-30
Leaves	15		31-45
Inflorescence	12		46-57

Flower summary	6	58-63
Calyx/perianth	14	64-77
Corolla	13	78-90
Androecium	16	91-106
Gynoecium	11	107-117
Ovary	10	118-127
Ovules	12	128-139
Fruit	11	140-150
Seed	11	151-161
Unallocated	11	162-172

SORTING PROCEDURE

(a) The presence of any character is shown by the clipping of the appropriate number on the card for the family concerned, i.e. all coding is on a positive basis.

(b) Before commencing to sort it is necessary to appreciate what is covered by each character. It is helpful to a beginner to examine a specimen and note down the code numbers of the characters which are present.

(c) Sorting should always be positive, e.g. do not discard the cards clipped for simple leaves because the specimen concerned has compound leaves. The family described may be clipped for both.

(d) It is important to use the most definite characters first, leaving those which are less definite until later. Certain characters have a more selective value than others and these should be used as early as possible in the procedure. An indication of the selective value of the character is given if one looks across the edges of the stacked cards and notes the relative number of clippings for various characters, e.g. in the case of leaves, " oil dotted " is selective whilst " simple " is not, or in the inflorescence " cauliflorous " and " solitary " are selective whilst " cymes " is not.

(e) To sort a group of cards the following procedure should be observed:

(1) See that all cards are orientated correctly. This can be readily checked by observing whether the top right hand corners of all cards are cut off. If any corners are sticking out it means that these cards are not orientated.

(2) Use a suitable sorting rod, i.e. a steel knitting needle small enough to go through the holes but sufficiently rigid not to bend when holding up to a hundred cards. (Larger numbers than a hundred should be sorted in sections.)

(3) Insert the needle into the hole for a character which is present. Lift the cards slightly and shake gently. The cards which drop out are the ones required and are then sorted for the next

feature. Those which remain on the needle are discarded. When dealing with a large number of cards be careful to check that all clipped cards drop.

(f) When a character in the inner row of holes is used for sorting, some cards will fall right out, but those which have the relevant outer hole unclipped will fall only through the distance between the rows (¼ inch). It is then necessary to insert a second needle through a corner hole in the outer row and remove the first needle, to allow the clipped cards to fall completely.

(g) It is not always advisable to try to sort to a single card unless sufficient selective characters are available. When the cards remaining are reduced to two or three it may be desirable to consider the auxiliary characters on the face of the card and refer to the family descriptions.

(h) When using the *first* vowel and the *first* consonant of a family name in sorting for a specific card, it is not possible to select whether the vowel or the consonant comes first in the name. Hence, when sorting for "e" and "b" the following cards would fall out—Ebenaceae, Begoniaceae, Berberidaceae and Betulaceae.

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Appendix A

DEFINITIONS OF TERMS USED

HABIT

21 **Trees:** Woody plants more than about 10 feet in height, usually having a major axis; the greater portion of the branches and foliage usually in the upper half of the plants.

22 **Shrubs:** Woody plants less than about 10 feet in height, usually without a major axis and with the greater portion of the branches and foliage not confined to the upper half of the plants.

23 **Herbs:** Plants lacking woody tissues.

24 **Climbers:** Plants which are not self supporting, but raise themselves by climbing over some other object, which is frequently another plant. Climbers may be woody or herbaceous, and usually have developed special organs for holding themselves in position.

25 **Succulents:** Plants composed largely of soft, thickened, juicy or fleshy tissues. Succulence may be restricted to the leaves.

26 **Aquatics:** Plants growing partly or wholly in water. (Excluding intertidal plants.)

27 **Parasites, etc.:** Parasites, saprophytes, insectivores. Plants dependent on other organisms (living or dead) to supply part, or, sometimes, all of their nutritive requirements. Usually lacking or deficient in chlorophyll, and attached to the host, or with specially developed organs.

28 **Intertidal plants:** Plants normally growing between high and low water marks. The principal representatives of this group are "mangroves".

29 **Thorns, spines, etc.:** Any sharply pointed organs arising from modification of plant parts, or as emergences. Not including microscopic units such as barbs on pollen.

30 **Latex:** Milky sap.

LEAVES

31 **Alternate:** Leaves arranged singly at different heights on the plant stem or branch.

32 **Opposite:** Leaves arranged two at each node, one on each side of the stem or branch.

33 **Whorled:** Three or more leaves at each node, arranged radially about the stem.

34 **Basal:** Leaves borne, usually as a flat rosette, at the base of the stem.

35 **Absent, reduced:** Leaves absent, reduced to scales or phyllodes. Normal leaf blades not present. Where photosynthesis takes place, this occurs in modified stems or petioles.

36 **Deciduous:** Leaves falling at the end of one season of growth, either in autumn or the beginning of the dry season.

37 **Entire:** The leaf margin straight or convexly curving; not indented in any way.

38 **Not entire:** The leaf margin toothed, lobed or dissected.

39 **Simple:** The leaf blade a single continuous unit; not divided into separate leaflets.

40 **Compound:** The leaf divided into two or more separate leaflets so that the blade is no longer continuous. Compound leaves which have been reduced to a single leaflet are coded as simple leaves.

41 **Stipulate:** Leaves bearing appendages on or at the base of the petiole. Stipules are usually leafy or scale-like, but may be spiny. In one family (Rubiaceae) the stipules of a pair of leaves are united and appear as scale-like organs at the stem node.

42 **Stipules on the petioles:** The stipules are usually borne at the base of the petiole, but in certain families they are developed at a considerable distance from the base.

43 **Exstipulate:** No stipules apparent on mature leaves. Includes cases where the stipules are present on very young leaves only.

44 **Oil dotted:** Leaves showing pellucid dots in the lamina.

45 **Stellate hairs:** Hairs with radiating branches.

INFLORESCENCE

46 **Solitary:** A single flower in the axis of each leaf, or on the terminal flower stalk.

47 **Fascicles:** Inflorescences formed of flowers borne in clusters, with stalks arising from approximately the same point and without a common stalk (peduncle).

48 **Spikes:** Inflorescences comprising stalkless flowers borne along a single stem, without a terminal flower.

49 **Racemes:** Inflorescences comprising stalked flowers borne along a single stem, without a terminal flower.

50 **Corymbs:** Short, broad inflorescences, with flower stalks arising at various levels from a central stalk, but the flowers at about the same level; the outer flowers opening first, and without a terminal flower.

51 **Umbels:** Inflorescences in which the flower stalks arise from a common point at the apex of a peduncle.

52 **Capitula (Heads):** Inflorescences composed of a number of closely aggregated, stalkless flowers.

53 **Panicles:** Inflorescences composed of stalked flowers borne on a branching axis, the lower flowers opening first and with no terminal flower.

54 **Cymes:** Inflorescences in which the terminal flower opens first and the successive flower or flowers arise from below the previous one.

55 **Catkins:** Inflorescences in which flowers are borne singly or in small groups along a central axis, and subtended by scaly bracts. The inflorescences are usually unisexual and the male ones fall soon after the pollen is shed.

56 **Cauliflorous:** Flowers produced on the older stems from which the leaves have fallen.

57 **Bracts, etc.:** Bracts, bracteoles. Reduced leaves, associated with the inflorescence or individual flowers.
Excludes epicalyx. An apparent second calyx, supposedly formed by the fusion of bracts.

FLOWER

58 **Unisexual:** Flowers in which either stamens or pistil(s) alone are functional.

59 **Bisexual:** Flowers in which functional stamens and pistil(s) are both present.

60 **Regular:** Here applied to flowers which are *radially* symmetrical.

61 **Irregular:** Here applied to flowers which are *not radially* symmetrical.

62 **Spirally arranged:** When any of the floral parts, i.e. sepals, petals, stamens or pistils are arranged spirally on the receptacle.

63 **Hypanthium:** The cup-like receptacle derived usually from the fusion of the bases of calyx, corolla and androecium. This character is coded when the hypanthium is partly or wholly free from the ovary, but not when it is completely adnate.

CALYX

64 **(Calyx) absent:** When the calyx is petaloid, i.e. apparently absent, both features 64 and 65 are coded.

65 **Petaloid:** For flowers in which all perianth segments are brightly coloured, this character is clipped; when the sepals are petaloid, but petals are absent, the family is coded additionally for the characters which would apply if the sepals were regarded as petals.

66 **Free:** The sepals or tepals not joined together.

67 **Basally connate:** The sepals or tepals united for a short distance at the base (less than about ¼ of their length).

68 **United:** Sepals or tepals joined together for more than ¼ of their length; not including hypanthium, *q.v.*

69 **Persistent calyx:** Used to indicate that the sepals are present on the mature fruit.

70 **Valvate/open:** Valvate. Sepals or tepals in the bud touching but not overlapping.
Open. Sepals or tepals in the bud quite separate; not in contact with one another.

71 **Imbricate:** Sepals or tepals overlapping with one or more wholly outside or inside and some half out and half in.

72 **Contorted:** Contorted. Sepals or tepals in the bud overlapping on one side only.
Includes crumpled. Petals folded or crumpled in the bud.

73-77 **Numbers of parts:** The numbers of units or segments in the calyx or perianth.

COROLLA

78, 80-90: The definitions of 64, 66-77 applied to the corolla.

79 **Sepaloid petals:** The converse of " petaloid sepals ", *q.v.*

91 **Free stamens:** Individual stamens not attached to one another nor to the petals; not including hypanthium.

92 **Connate:** Stamens partly or wholly united by filaments or anthers.

93 **Adnate:** Stamens attached to the petals or ovary.

94 **Alt. with petals:** Alternate with petals (opposite the sepals). The stamens the same number as petals and attached alternately wih them. Where petals are absent, the character applies to stamens which are the same number as the sepals and opposite them.

95 **Opp. petals:** Opposite petals (alternate with sepals). Stamens the same number as the petals and attached at the base (or on) the petals. Where petals are absent the character applies to stamens which are the same number as sepals and attached between them.

96 **Filaments dimorphic:** The filaments of the stamens of two (or more) different lengths, so that the anthers are borne at different levels.

97 **Staminodes:** Sterile stamens; these may be petaloid or reduced to short filaments.

98-102 **Number:** The number of fertile stamens present in the male or hermaphrodite flowers.

103 **Same as petals:** Where the number of stamens is the same as that of the petals.

104 **Twice petals:** Where the number of stamens is twice the number of petals.

105 **Sessile:** Anthers with no apparent filaments.

106 **One-celled:** Anthers with a single cell in each at maturity.

GYNOECIUM

107 **Unbranched/free:** Covers (1) A simple style on a monocarpellary ovary.
(2) A single style, not branched below the stigmas in a polycarpellary ovary. The stigmatic surface is continuous in this case.
(3) Completely separate styles, on free or united carpels.

108 **Branched/partly united:** Styles partly united, but separate either at the base or apex. In the latter case the stigmatic surfaces are discrete.

109-112 **Number of styles:** The number of separate styles in the pistil.

113 **Sessile stigma:** The stigma borne on the ovary with no apparent style.

114 **Lobed/branched:** A continuous stigmatic surface which is only partly divided into lobes or branches.

115 **Capitate/discoid:** Capitate. Of larger diameter than the style, and globular in shape.
Discoid. Of larger diameter than the style and shaped like a disc.

116 **Free carpels:** More than one carpel present in each flower and quite separate.

117 **United or one:** A single ovary in each flower, whether formed from one or several carpels.

OVARY

118 **Inferior:** Where the ovary appears to be completely immersed in the tissue below the point of attachment of the sepals.

119 **Half inferior:** Where the ovary appears to be partly immersed in the tissue below the point of attachment of the sepals, i.e. calyx appears to arise from the side of the ovary.

120 **Superior:** Ovary attached at the base, otherwise free from calyx or perianth.

121 **Stalked:** Pistil borne on a stalk within or above the calyx or perianth.

122-127 **Number of loculi or carpels:** In polycarpellary ovaries, the number of cells in the ovary. This usually corresponds to the number of carpels, but when false septa further divide the ovary, then the final number of divisions is counted. Where the carpels are free, the number of carpels is counted.

128 **Apical:** See Plate.

129 **Basal/free central:** See Plate.

130 **Axile:** See Plate.

131 **Parietal/marginal:** See Plate.

OVULES

132-135 **Number:**

136 **Atropous, Orthotropus:** Ovule erect, with micropyle directed away from the placenta.

137 **Anatropous:** Ovule reversed so that the micropyle is close to the placenta.

138 **Campylotropous:** Ovule curved by uneven growth, so that its axis is approx. perpendicular to the funicle. Ovule lies parallel to placenta.

139 **Amphitropous:** Ovule parallel to placenta by the curving of the funicle.

FRUIT

140 **Simple:** A fruit formed from a single pistil.

141 **Compound:** A fruit formed from 2 or more pistils from one or more flowers, united in a single unit.

142 **Dry:** Fruit formed of non-fleshy, non-woody tissues.

143 **Woody:** Fruit formed partly or wholly of hard, woody tissues.

144 **Fleshy:** Fruit formed partly or wholly of soft succulent tissue.

145 **Dehiscent:** Fruit opening to shed seed at maturity.

146 **Indehiscent:** Fruit *not* opening to shed seed at maturity.

147 **Schizocarp:** Fruit separating into indehiscent, one-seeded units.

148 **One stone/seed:** Each fruit containing a single seed. Fleshy fruits with a single hard endocarp forming a stone are included here.

149 **Two or more seeds:** Each fruit containing more than one seed.

150 **Winged:** Fruit with a thin dry or membraneous expansion of the outer surface (wing).

SEED

151 **Winged:** Seed with a thin dry or membraneous expansion of the outer surface (wing).

152 **Hairy:** Seed with hairs attached to any part of the surface.

153 **Arillate:** Seed with an outer covering, frequently soft and pulpy, growing out from the funicle.

154 **Endosperm present:** Seed with starchy or other nutritive material accompanying the embryo.

155 **Endosperm ruminate:** The endosperm marked by wavy irregularities.

156 **Endosperm absent:** Seed without starchy or other nutritive material accompanying the embryo.

157 **Curved:** Embryo curved. The long axis of the embryo curved, but not forming a circle.

158 **Coiled:** Embryo coiled. The long axis of the embryo curved so that the two ends meet or overlap.

159 **Straight:** Embryo straight. The long axis of the embryo not curved.

160 **Curved, folded, etc.:** The cotyledons curved, folded or rolled about the long axis of the embryo.

161 **Not curved, folded, etc.:** The inner (adaxial) surface of the cotyledons, at least, not curved, etc., about the long axis. This includes plano-convex cotyledons, and also may apply to the cotyledons of curved embryos.

Appendix B

LIST OF FAMILIES OF DICOTYLEDONS BASED ON THE CLASSIFICATION OF J. HUTCHINSON, 1926

1 MAGNOLIALES
- 1 Magnoliaceae (A)
- 2 Winteraceae
- 3 Schisandraceae
- 4 Himantandraceae
- 5 Lactoridaceae
- 6 Trochodendraceae
- 7 Cercidiphyllaceae

2 ANNONALES
- 8 Annonaceae (A)
- 9 Eupomatiaceae (A)

3 LAURALES
- 10 Monimiaceae (A)
- 11 Lauraceae (A)
- 12 Gomortegaceae
- 13 Hernandiaceae (A)
- 14 Myristicaceae (A)

4 RANALES
- 15 Ranunculaceae (A)
- 16 Cabombaceae (A)
- 17 Ceratophyllaceae (A)
- 18 Nymphaeaceae (A)

5 BERBERIDALES
- 19 Berberidaceae
- 20 Circaeasteraceae
- 21 Lardizabalaceae
- 22 Sargentodoxaceae
- 23 Menispermaceae (A)

6 ARISTOLOCHIALES
- 24 Aristolochiaceae (A)
- 25 Rafflesiaceae (Cytinaceae)
- 26 Hydnoraceae
- 27 Nepenthaceae (A)

7 PIPERALES
- 28 Piperaceae (A)
- 29 Saururaceae
- 30 Chloranthaceae
- 31 Lacistemataceae

8 RHOEADALES
- 32 Papaveraceae (A)
- 33 Fumariaceae (A)

9 LOASALES
- 34 Turneraceae
- 35 Loasaceae

10 CAPPARIDALES
- 36 Capparaceae (A)
- 37 Moringaceae
- 38 Tovariaceae

11 CRUCIALES
- 39 Cruciferae (A)

12 VIOLALES
- 40 Violaceae (A)
- 41 Resedaceae (A)

13 POLYGALALES
- 42 Polygalaceae (A)
- 43 Trigoniaceae
- 44 Vochysiaceae

14 SAXIFRAGALES
- 45 Crassulaceae (A)
- 46 Cephalotaceae (A)
- 47 Saxifragaceae (sensu stricto) (A)

15 SARRACENIALES
- 48 Droseraceae (A)
- 49 Sarraceniaceae

16 PODOSTEMONALES
- 50 Podostemaceae (A)
- 51 Hydrostachyaceae

17 CARYOPHYLLALES
- 52 Elatinaceae (A)
- 53 Caryophyllaceae (A)
- 54 Molluginaceae (A)
- 55 Aizoaceae (Ficoidaceae) (A)
- 56 Portulacaceae (A)

18 POLYGONALES
- 57 Polygonaceae (A)
- 58 Illecebraceae (A)

19 CHENOPODIALES
- 59 Phytolaccaceae (A)
- 60 Cynocrambaceae
- 61 Chenopodiaceae (A)
- 62 Bataceae
- 63 Amaranthaceae (A)
- 64 Basellaceae

20 GERANIALES
- 65 Linaceae (A)
- 66 Zygophyllaceae (A)

- 67 Geraniaceae (A)
- 68 Limnanthaceae
- 69 Oxalidaceae (A)
- 70 Tropaeolaceae
- 71 Balsaminaceae

21 LYTHRALES
- 72 Lythraceae (A)
- 73 Crypteroniaceae
- 74 Sonneratiaceae (A)
- 75 Punicaceae (A)
- 76 Oliniaceae
- 77 Onagraceae (A)
- 78 Haloragaceae (A)
- 79 Callitrichiaceae (A)

22 THYMELAEALES
- 80 Geissolomataceae
- 81 Thymelaeaceae (A)
- 82 Penaeaceae
- 83 Nyctaginaceae (A)

23 PROTEALES
- 84 Proteaceae (A)

24 DILLENIALES
- 85 Dilleniaceae (A)
- 86 Crossosomataceae

25 CORIARIALES
- 87 Coriariaceae

26 PITTOSPORALES
- 88 Pittosporaceae (A)
- 89 Byblidaceae (A)
- 90 Tremandraceae (A)

27 BIXALES
- 91 Bixaceae (A)
- 92 Cochlospermaceae (A)
- 93 Flacourtiaceae (A)
- 94 Samydaceae (A)
- 95 Canellaceae
- 96 Cistaceae

28 TAMARICALES
- 97 Frankeniaceae (A)
- 98 Tamaricaceae
- 99 Fouquieriaceae

29 PASSIFLORALES
- 100 Malesherbiaceae
- 101 Passifloraceae (A)
- 102 Achariaceae

30 CUCURBITALES
- 103 Cucurbitaceae (A)
- 104 Begoniaceae
- 105 Datiscaceae
- 106 Caricaceae (A)

31 CACTALES
- 107 Cactaceae (A)

32 THEALES
- 108 Theaceae (Ternstroemiaceae) (A)
- 109 Medusagynaceae
- 110 Marcgraviaceae
- 111 Caryocaraceae
- 112 Actinidiaceae
- 113 Saurauiaceae (A)
- 114 Ochnaceae (A)
- 115 Ancistrocladaceae
- 116 Dipterocarpaceae
- 117 Chlaenaceae

33 MYRTALES
- 118 Myrtaceae (A)
- 119 Lecythidaceae (A)
- 120 Melastomataceae (A)
- 121 Combretaceae (A)
- 122 Rhizophoraceae (A)

34 GUTTIFERALES
- 123 Hypericaceae (A)
- 124 Eucryphiaceae (A)
- 125 Quiinaceae
- 126 Guttiferae (A)

35 TILIALES
- 127 Scytopetalaceae
- 128 Tiliaceae (A)
- 129 Gonystylaceae
- 130 Sterculiaceae (A)
- 131 Bombacaceae (A)

36 MALVALES
- 132 Malvaceae (A)

37 MALPIGHIALES
- 133 Malpighiaceae (A)
- 134 Humiriaceae
- 135 Erythroxylaceae (A)

38 EUPHORBIALES
- 136 Euphorbiaceae (A)

39 CUNONIALES
- 137 Cunoniaceae (A)
- 138 Brunelliaceae
- 139 Escalloniaceae (A)
- 140 Greyiaceae
- 141 Grossulariaceae
- 142 Hydrangeaceae

40 ROSALES
- 143 Rosaceae (A)
- 144 Dichapetalaceae (Chailletiaceae)
- 145 Calycanthaceae

41 LEGUMINOSAE
- 146 Caesalpiniaceae (A)
- 147 Mimosaceae (A)
- 148 Papilionaceae (A)

42 HAMAMELIDALES
149 Bruniaceae
150 Stachyuraceae
151 Hamamelidaceae
152 Eucommiaceae
153 Myrothamnaceae
154 Buxaceae
155 Platanaceae

43 SALICALES
156 Salicaceae (A)

44 GARRYALES
157 Garryaceae

45 LEITNERIALES
158 Leitneriaceae

46 MYRICALES
159 Myricaceae

47 BALANOPSIDALES
160 Balanopaceae (A)

48 FAGALES
161 Betulaceae
162 Corylaceae
163 Fagaceae (A)

49 CASUARINALES
164 Casuarinaceae (A)

50 URTICALES
165 Ulmaceae (A)
166 Barbeyaceae
167 Moraceae (A)
168 Scyphostegiaceae
169 Urticaceae (A)
170 Cannabaceae

51 CELASTRALES
171 Aquifoliaceae (A)
172 Empetraceae
173 Celastraceae (A)
174 Corynocarpaceae
175 Cyrillaceae
176 Cneoraceae
177 Pandaceae
178 Hippocrateaceae (A)
179 Icacinaceae (A)
180 Salvadoraceae
181 Stackhousiaceae (A)

52 OLACALES
182 Olacaceae (A)
183 Opiliaceae

53 SANTALALES
184 Octoknemaceae
185 Loranthaceae (A)
186 Santalaceae (A)
187 Grubbiaceae
188 Misodendraceae
189 Balanophoraceae (A)

54 RHAMNALES
190 Rhamnaceae (A)
191 Elaeagnaceae (A)
192 Heteropyxidaceae
193 Vitaceae (Ampelidaceae) (A)

55 RUTALES
194 Rutaceae (A)
195 Simaroubaceae (A)
196 Burseraceae (A)

56 MELIALES
197 Meliaceae (A)

57 SAPINDALES
198 Sapindaceae (A)
199 Akaniaceae (A)
200 Aceraceae
201 Sabiaceae
202 Melianthaceae
203 Didiereaceae
204 Staphyleaceae
205 Anacardiaceae (A)
206 Connaraceae (A)

58 JUGLANDALES
207 Juglandaceae
208 Julianiaceae

59 UMBELLIFLORAE
209 Cornaceae (A)
210 Alangiaceae (A)
211 Nyssaceae
212 Araliaceae (A)
213 Umbelliferae (A)

60 ERICALES
214 Clethraceae
215 Ericaceae (A)
216 Vacciniaceae (A)
217 Epacridaceae (A)
218 Monotropaceae
219 Diapensiaceae
220 Lennoaceae

61 EBENALES
221 Ebenaceae (A)
222 Sapotaceae (A)

62 MYRSINALES
223 Myrsinaceae (A)

63 STYRACALES
224 Styracaceae (A)
225 Symplocaceae (A)
226 Diclidantheraceae
227 Lissocarpaceae

64 LOGANIALES
228 Loganiaceae (A)
229 Oleaceae (A)

65 APOCYNALES
230 Apocynaceae (A)
231 Asclepiadaceae (A)

66 RUBIALES
232 Rubiaceae (A)
233 Caprifoliaceae (A)

67 ASTERALES
234 Adoxaceae
235 Valerianaceae (A)
236 Dipsacaceae (A)
237 Calyceraceae (A)
238 Compositae (A)

68 GENTIANALES
239 Gentianaceae (A)

69 PRIMULALES
240 Primulaceae (A)
241 Plumbaginaceae (A)

70 PLANTAGINALES
242 Plantaginaceae (A)

71 CAMPANALES
243 Campanulaceae (A)
244 Lobeliaceae (A)
245 Goodeniaceae (A)
246 Stylidiaceae (A)

72 POLEMONIALES
247 Polemoniaceae (A)
248 Hydrophyllaceae (A)

73 BORAGINALES
249 Boraginaceae (A)

74 SOLANALES
250 Solanaceae (A)
251 Convolvulaceae (A)

75 PERSONALES
252 Scrophulariaceae (A)
253 Orobanchaceae (A)
254 Lentibulariaceae (A)
255 Columelliaceae
256 Gesneriaceae (A)
257 Bignoniaceae (A)
258 Pedaliaceae (A)
259 Acanthaceae (A)

76 LAMIALES
260 Globulariaceae
261 Myoporaceae (A)
262 Selaginaceae (A)
263 Verbenaceae (A)
264 Labiatae (A)

(A) Indigenous to or naturalized in Australia.

Appendix C

ALPHABETICAL LIST OF FAMILIES

With reference numbers according to the classification of J. Hutchinson, 1926

259	Acanthaceae
200	Aceraceae
102	Achariaceae
112	Actinidiaceae
234	Adoxaceae
55	Aizoaceae
199	Akaniaceae
210	Alangiaceae
63	Amaranthaceae
193	(Ampelidaceae) Vitaceae
205	Anacardiaceae
115	Ancistrocladaceae
8	Annonaceae
230	Apocynaceae
171	Aquifoliaceae
212	Araliaceae
24	Aristolochiaceae
231	Asclepiadaceae
160	Balanopaceae
189	Balanophoraceae
71	Balsaminaceae
166	Barbeyaceae
64	Basellaceae
62	Bataceae
104	Begoniaceae
19	Berberidaceae
161	Betulaceae
257	Bignoniaceae
91	Bixaceae
131	Bombacaceae
249	Boraginaceae
138	Brunelliaceae
149	Bruniaceae
196	Burseraceae
154	Buxaceae
89	Byblidaceae
16	Cabombaceae
107	Cactaceae
146	Caesalpiniaceae
79	Callitrichaceae
145	Calycanthaceae
237	Calyceraceae
243	Campanulaceae
95	Canellaceae
170	Cannabaceae
36	Capparaceae
233	Caprifoliaceae
106	Caricaceae
111	Caryocaraceae
53	Caryophyllaceae
164	Casuarinaceae
173	Celastraceae
46	Cephalotaceae
17	Ceratophyllaceae
7	Cercidiphyllaceae
144	(Chailletiaceae) Dichapetalaceae
61	Chenopodiaceae
117	Chlaenaceae
30	Chloranthaceae
20	Circaeasteraceae
96	Cistaceae
214	Clethraceae
176	Cneoraceae
92	Cochlospermaceae
255	Columelliaceae
121	Combretacea
238	Compositae
206	Connaraceae
251	Convolvulaceae
87	Coriariaceae
209	Cornaceae
162	Corylaceae
174	Corynocarpaceae
45	Crassulaceae
86	Crossosomataceae
39	Cruciferae
73	Crypteroniaceae
103	Cucurbitaceae
137	Cunoniaceae
60	Cynocrambaceae
175	Cyrillaceae
25	(Cytinaceae) Rafflesiaceae
105	Datiscaceae
219	Diapensiaceae
144	Dichapetalaceae
226	Diclidantheraceae
203	Didiereaceae
85	Dilleniaceae
236	Dipsacaceae
116	Dipterocarpaceae
48	Droseraceae
221	Ebenaceae

191	Elaeagnaceae
52	Elatinaceae
172	Empetraceae
217	Epacridaceae
215	Ericaceae
135	Erythroxylaceae
139	Escalloniaceae
152	Eucommiaceae
124	Eucryphiaceae
136	Euphorbiaceae
9	Eupomatiaceae
163	Fagaceae
55	(Ficoidaceae) Aizoaceae
93	Flacourtiaceae
99	Fouquieriaceae
97	Frankeniaceae
33	Fumariaceae
157	Garryaceae
80	Geissolomataceae
239	Gentianaceae
67	Geraniaceae
256	Gesneriaceae
260	Globulariaceae
12	Gomortegaceae
129	Gonystylaceae
245	Goodeniaceae
140	Greyiaceae
141	Grossulariaceae
187	Grubbiaceae
126	Guttiferae
78	Haloragaceae
151	Hamamelidaceae
13	Hernandiaceae
192	Heteropyxidaceae
4	Himantandraceae
178	Hippocrateaceae
134	Humiriaceae
26	Hydnoraceae
142	Hydrangeaceae
248	Hydrophyllaceae
51	Hydrostachyaceae
123	Hypericaceae
179	Icacinaceae
58	Illecebraceae
207	Juglandaceae
208	Julianiaceae
264	Labiatae
31	Lacistemataceae
5	Lactoridaceae
21	Lardizabalaceae
11	Lauraceae
119	Lecythidaceae
158	Leitneriaceae
220	Lennoaceae
254	Lentibulariaceae
68	Limnanthaceae
65	Linaceae
227	Lissocarpaceae
35	Loasaceae
244	Lobeliaceae
228	Loganiaceae
185	Loranthaceae
72	Lythraceae
1	Magnoliaceae
100	Malesherbiaceae
133	Malpighiaceae
132	Malvaceae
110	Marcgraviaceae
109	Medusagynaceae
120	Melastomataceae
197	Meliaceae
202	Melianthaceae
23	Menispermaceae
147	Mimosaceae
54	Molluginaceae
10	Monimiaceae
218	Monotropaceae
167	Moraceae
37	Moringaceae
261	Myoporaceae
159	Myricaceae
14	Myristicaceae
153	Myrothamnaceae
223	Myrsinaceae
118	Myrtaceae
188	Misodendraceae
27	Nepenthaceae
83	Nyctaginaceae
18	Nymphaeaceae
211	Nyssaceae
114	Ochnaceae
184	Octoknemaceae
182	Olacaceae
229	Oleaceae
76	Oliniaceae
77	Onagraceae
183	Opiliaceae
253	Orobanchaceae
69	Oxalidaceae
177	Pandaceae
32	Papaveraceae
148	Papilionaceae
101	Passifloraceae
258	Pedaliaceae
82	Penaeaceae
59	Phytolaccaceae
28	Piperaceae
88	Pittosporaceae
242	Plantaginaceae
155	Platanaceae
241	Plumbaginaceae
50	Podostemaceae

247	Polemoniaceae
42	Polygalaceae
57	Polygonaceae
56	Portulacaceae
240	Primulaceae
84	Proteaceae
75	Punicaceae
125	Quiinaceae
25	Rafflesiaceae
15	Ranunculaceae
41	Resedaceae
190	Rhamnaceae
122	Rhizophoraceae
143	Rosaceae
232	Rubiaceae
194	Rutaceae
201	Sabiaceae
156	Salicaceae
180	Salvadoraceae
94	Samydaceae
186	Santalaceae
198	Sapindaceae
222	Sapotaceae
22	Sargentodoxaceae
49	Sarraceniaceae
113	Saurauiaceae
29	Saururaceae
47	Saxifragaceae
3	Schisandraceae
252	Scrophulariaceae
168	Scyphostegiaceae
127	Scytopetalaceae
262	Selaginaceae
195	Simaroubaceae
250	Solanaceae
74	Sonneratiaceae
150	Stachyuraceae
181	Stackhousiaceae
204	Staphyleaceae
130	Sterculiaceae
246	Stylidiaceae
224	Styracaceae
225	Symplocaceae
98	Tamaricaceae
108	Theaceae
81	Thymelaeaceae
128	Tiliaceae
38	Tovariaceae
90	Tremandraceae
43	Trigoniaceae
6	Trochodendraceae
70	Tropaeolaceae
34	Turneraceae
165	Ulmaceae
213	Umbelliferae
169	Urticaceae
216	Vacciniaceae
235	Valerianaceae
263	Verbenaceae
40	Violaceae
193	Vitaceae
44	Vochysiaceae
2	Winteraceae
66	Zygophyllaceae

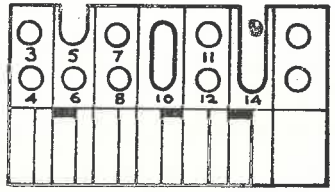
Appendix D

SCHEDULE OF BARS

A "bar" placed against the number for a feature on the edge of the card indicates that the feature concerned occurs only occasionally or is only partly developed in the family. "Bars" have not been marked on the sets of cards supplied, since the hand work involved would have very materially increased the cost. THE ABSENCE OF THE "BARS" DOES NOT IN ANY WAY AFFECT THE USE OF THE CARD SORTING KEY. The "bars" represent auxiliary information which provides a more comprehensive description of the family.

The schedule provided below lists the family in the numerical sequence of Hutchinson's classification and indicates the features to which "bars" apply.

The "bars" may be placed on the cards, by those who desire to do so, in the following manner:



Family	*Coding features to be "barred"*
1	38, 58, 117.
2	58, 105, 117.
3	36.
4	22, 64, 117, 133.
5	—
6	36, 47, 117, 121.
7	121.
8	36, 57-58, 71, 86, 87, 101, 108, 113, 115, 117, 121, 145, 153.
9	—
10	24, 31, 33, 46, 47, 53, 61, 69, 70, 78, 93, 97, 103, 105, 113, 117, 122, 136.
11	23, 24, 27, 32, 33, 35, 36, 46, 58, 69, 105, 113, 114, 118, 142.
12	113.
13	67, 81, 97.
14	22, 57, 74, 75, 103, 104, 113.
15	22, 24, 26, 32, 33, 41, 50, 51, 54, 57, 58, 65, 70, 78, 97, 117, 121, 122.
16	—
17	113.
18	40, 113, 145, 153, 156.
19	21, 36, 41, 47, 64, 113, 123, 132, 153, 157.
20	—
21	46, 59, 73, 92, 132, 147.
22	39, 78, 139

Family	Coding features to be "barred"
23	21, 22, 38, 40, 46, 61, 78, 82, 121, 123, 125, 126, 132, 155.
24	21, 38, 44, 60, 66, 80, 105, 119, 144, 146, 151.
25	48, 65, 70, 80, 81, 87, 88, 89, 90, 145.
26	75.
27	24, 67, 103, 104, 113, 121.
28	21, 32, 33, 106.
29	26, 98, 99, 119, 130, 132, 142, 144.
30	106.
31	41, 121.
32	21, 22, 74, 116, 123, 124, 125, 126, 127, 146, 153.
33	32, 48, 51, 53, 82.
34	21, 22, 41, 52.
35	22, 24, 29, 34, 51, 53, 67, 76, 77, 89, 90, 98, 99, 103, 104, 106, 119, 150, 157.
36	24, 29, 32, 35, 58, 61, 73, 75, 76, 77, 82, 86, 123, 124, 125, 132, 154, 161.
37	41, 63, 151.
38	121.
39	22, 29, 32, 33, 46, 57, 58, 61, 67, 70, 78, 99, 100, 102, 103, 106, 123, 132, 154, 159.
40	24, 29, 32, 34, 56, 58, 67, 78, 105, 108, 132, 133, 134, 148, 151, 153.
41	22, 58, 60, 78, 103, 104, 121, 138.
42	21, 29, 32, 33, 35, 47, 65, 74, 76, 77, 78, 83, 91, 97, 98, 99, 100, 119, 133, 134, 135, 152, 153, 156.
43	43, 86, 103, 106, 132, 148, 150.
44	23, 31, 118, 128, 131, 148, 152, 154.
45	24, 34, 36, 40, 58, 92. 93. 97, 115, 117, 130, 132, 133, 134, 156.
46	—
47	25, 32, 36, 46, 47, 58, 61, 63, 86, 102, 113, 115, 116, 128, 129, 132, 151, 152.
48	22, 33, 57, 77, 90, 99, 101, 102, 103, 104, 108, 110, 119, 123, 124, 125, 126, 127, 129, 134, 156.
49	—
50	40, 92, 113, 121.
51	—
52	57, 76, 89, 113.
53	22, 29, 31, 33, 41, 50, 57, 58, 92, 109, 113, 121, 144, 146.
54	25, 33, 41, 116, 146, 153, 158.
55	58, 70, 73, 98, 103, 113, 132, 150.
56	22, 43, 52, 53, 58, 74, 75, 76, 86, 93, 107, 109, 113, 119, 146, 151, 156, 159.
57	21, 32, 35, 40, 46, 92, 97, 98, 102, 103, 108, 113, 155.
58	22, 38, 43, 92, 133.
59	29, 41, 57, 61, 92, 103, 104, 105, 108, 113, 118.
60	—
61	21, 32, 46, 57, 61, 64, 70, 92, 97, 106, 113, 114, 118, 119, 144.
62	55.
63	21, 22, 24, 29, 38, 58, 91, 113, 133, 134, 135, 144.
64	22, 25, 58, 93.
65	33, 38, 91, 92, 101, 102, 104, 108, 114, 115, 124, 125, 157.
66	21, 29, 31, 36, 57, 58, 67, 70, 74, 76, 78, 83, 86, 87, 95, 112, 115, 121, 123, 127.
67	21, 22, 29, 37, 39, 43, 70, 74, 77, 85, 86, 87, 90, 91, 92, 98, 99, 114, 115, 127, 134, 135, 154, 159.
68	71, 94.

Family	Coding features to be "barred"
69	21, 39, 49, 51, 54, 78, 92, 103, 109, 144, 146.
70	35, 38, 40, 41, 51, 148, 150.
71	26, 51, 75, 103, 113, 146, 148.
72	29, 31, 38, 41, 58, 69, 98, 102, 113, 114, 118, 121, 122, 131, 134, 146.
73	48, 115, 124.
74	—
75	33, 124.
76	57, 87.
77	21, 22, 29, 33, 34, 41, 47, 52, 53, 61, 65, 73, 76, 78, 86, 89, 96, 97, 98, 114, 119, 123, 126, 127, 151, 152.
78	22, 34, 35, 37, 41, 64, 76, 84, 85, 88, 105, 113, 126, 150.
79	33, 47, 121, 125.
80	154.
81	23, 24, 36, 46, 56, 57, 61, 66, 69, 73, 76, 78, 86, 104, 105, 114, 121, 123, 129, 145, 152, 153.
82	41, 45.
83	29, 33, 38, 46, 58, 73, 74, 76, 77, 92, 150.
84	23, 32, 33, 37, 58, 66, 69, 80, 91, 106, 137, 151.
85	23, 32, 34, 35, 36, 40, 49, 73, 77, 86, 90, 97, 98, 115, 117, 129, 153.
86	154.
87	58, 154.
88	36, 38, 57, 58, 61, 81, 82, 92, 113, 121, 122, 143, 150, 151.
89	93
90	29, 35, 45, 73, 86, 134, 152, 153.
91	21, 24, 74, 87, 123.
92	96.
93	24, 32, 57, 62, 64, 68, 82, 99, 100, 101, 118, 119, 142, 145, 153.
94	73, 76, 86, 89, 99, 100, 119.
95	50, 53, 157.
96	29, 33, 34, 36, 49, 73, 97, 113, 137.
97	22, 52, 92, 103, 132, 137.
98	23, 58, 92, 109, 113, 151.
99	25, 35, 92, 156.
100	22, 37.
101	29, 53, 56, 58, 64, 73, 76, 77, 78, 79, 81, 86, 89, 90, 92, 97, 104, 153.
102	22, 24, 41, 92, 97, 121, 133, 134.
103	21, 22, 35, 37, 40, 50, 51, 52, 57, 59, 61, 66, 73, 74, 76, 86, 87, 89, 97, 99, 100, 111, 116, 128, 132, 133, 134, 145, 150.
104	22, 46, 49, 60, 67, 75, 76, 77, 81, 89, 90, 97, 99, 112, 116, 119, 122, 126, 127, 131, 144, 146, 154.
105	59, 154.
106	—
107	58, 61, 64, 101, 108, 142, 145, 151, 153, 154.
108	24, 36, 49, 53, 58, 62, 74, 76, 77, 87, 89, 90, 92, 93, 100, 101, 103, 104, 119, 132, 142, 145, 154.
109	—
110	21, 67, 74, 87, 134, 154, 157.
111	22, 43, 51, 97, 122, 123, 154.
112	46, 56, 67, 81, 93, 104, 129, 133.
113	58, 142, 145, 157.
114	23, 29, 40, 46, 61, 73, 77, 96, 97, 103, 104, 108, 116, 129, 131, 141, 151, 157.
115	38, 43, 105.
116	22, 67, 104, 111, 112, 119, 131, 149.
117	41, 75, 92, 93, 101, 115, 122, 125, 126, 143, 148.

Family	Coding features to be "barred"
118	31, 33, 36, 38, 41, 56, 61, 78, 88, 89, 95, 99, 100, 101, 103, 114, 119, 128, 129, 131, 132, 133, 134, 148, 151, 152, 154.
119	47, 51, 53, 54, 56, 71, 77, 78, 90, 91, 113, 114, 138, 145, 151.
120	24, 29, 31, 46, 47, 58, 70, 81, 89, 99, 100, 103, 114, 120, 122, 124, 129, 131, 132, 151.
121	33, 58, 61, 90, 94, 95, 97, 98, 102, 119, 142, 145, 161.
122	31, 33, 38, 43, 53, 57, 58, 78, 113, 122, 134, 135, 142, 145, 150, 151, 153.
123	24, 91, 101, 115, 122, 131.
124	22, 125.
125	92, 93, 154.
126	31, 59, 77, 83, 90, 99, 100, 101, 108, 131.
127	69, 92, 145.
128	23, 32, 51, 58, 73, 74, 78, 86, 87, 92, 100, 103, 104, 106, 113, 150, 152, 156, 157.
129	74.
130	23, 24, 32, 43, 46, 61, 64, 66, 76, 77, 87, 91, 94, 99, 104, 127, 129, 131, 132, 136, 144, 151, 153, 154.
131	45, 61, 71, 144, 153, 154, 156.
132	36, 40, 47, 50, 52, 58, 78, 93, 122, 144, 145, 152.
133	31, 33, 38, 46, 47, 58, 61, 67, 70, 78, 91, 98, 99, 102, 113, 122, 123, 125, 126.
134	84, 85, 92, 104.
135	32, 38, 58, 76, 85, 92, 108, 123, 125, 156.
136	32, 33, 43, 61, 65, 109, 110, 122, 123, 125, 127, 133.
137	33, 39, 43, 73, 76, 115.
138	29, 123, 124.
139	32, 33, 66, 99, 101, 105, 116.
140	126.
141	46.
142	53, 92, 104, 144, 146, 151.
143	32, 34, 43, 56, 58, 61, 62, 70, 73, 76, 78, 86, 89, 90, 92, 97, 98, 99, 100, 101, 108, 115, 150, 152, 154.
144	58, 61, 67, 144.
145	36, 69.
146	23, 38, 39, 41, 60, 68, 70, 73, 74, 102, 153.
147	23, 71, 74, 76, 87, 98, 99, 104, 121, 153.
148	54, 58, 146, 153, 159.
149	46, 74, 87, 92, 93, 107, 108, 114, 116, 124, 153.
150	36, 41, 58.
151	32, 36, 43, 61, 76, 77, 89, 90, 102, 103, 120, 151.
152	105.
153	29, 55, 98.
154	23, 31, 59, 75, 76, 77, 102, 105, 108, 110, 123, 125, 128, 132, 156.
155	57, 97, 121, 133, 145, 154.
156	32, 108, 121.
157	21, 37, 55, 148.
158	55, 154.
159	36, 41, 92, 113.
160	33, 38, 105, 129.
161	54, 105, 122, 160.
162	21.
163	59, 77, 115, 128, 129, 132.
164	113, 132.
165	29, 32, 61, 70, 73, 102, 121, 144.

Family	Coding features to be "barred"
166	47, 105.
167	23, 24, 29, 32, 73, 75, 76, 101, 108, 109, 114, 123, 133, 149, 150, 159.
168	—
169	21, 22, 24, 43, 64, 97, 121, 156.
170	—
171	36, 41, 46, 73, 76, 89, 93, 101.
172	58, 113, 138.
173	33, 35, 70, 78, 81, 82, 83, 85, 101, 102, 113, 118, 129, 131, 150, 156, 157.
174	110.
175	21, 36, 95, 113, 128, 150.
176	—
177	114, 121, 130.
178	31, 58, 67, 74, 87, 92, 93, 94, 99, 100, 103, 106, 107.
179	23, 29, 36, 49, 50, 56, 57, 58, 64, 70, 78, 84, 93, 105, 113, 142, 150, 156.
180	41, 43, 92, 93, 103, 113, 149.
181	25, 41, 46, 114, 150.
182	27, 30, 32, 38, 56, 58, 69, 86, 92, 118, 119, 128, 129, 136, 156.
183	58, 64, 78, 93, 99, 114, 142.
184	113.
185	21, 31, 36, 78, 105.
186	71, 80, 81, 83, 84.
187	96, 131.
188	—
189	53, 59, 106, 113, 115, 125, 126, 127, 128, 130.
190	23, 35, 58, 113, 118, 153, 156.
191	29, 75, 76, 100, 118, 154.
192	—
193	21, 32, 35, 73, 76, 77, 78, 86, 89, 90, 98, 101, 113, 114, 119, 122, 124, 125, 126, 127, 155.
194	23, 24, 35, 38, 49, 50, 51, 58, 61, 67, 78, 82, 83, 92, 93, 102, 116, 122, 160.
195	29, 32, 35, 39, 41, 59, 78, 82, 102, 113, 133, 134, 135, 145, 154.
196	32, 39, 41, 44, 78, 97, 103, 113, 132, 142, 145.
197	23, 39, 45, 58, 70, 91, 100, 122, 123, 127, 132, 134, 135, 151.
198	23, 29, 30, 32, 37, 41, 56, 57, 59, 70, 89, 90, 103, 122, 123, 125, 134, 135, 144, 159.
199	29, 100, 153.
200	30, 103, 104.
201	58, 61, 86, 154.
202	39, 92, 104, 122, 153.
203	59, 92, 97, 104.
204	58, 76, 101, 108, 122, 129, 132, 148, 153.
205	32, 41, 61, 63, 81, 92, 98, 99, 100, 102, 103, 108, 113, 114, 116, 119, 121, 123, 124, 125, 126, 127, 150, 154.
206	39, 61, 76, 83, 92, 149, 159.
207	22, 32, 46, 113, 143.
208	—
209	23, 38, 46, 64, 76, 86, 89, 90, 93, 98, 101, 115, 131.
210	81, 92, 93, 104, 123.
211	22, 46, 59, 104, 127, 141, 150, 154.
212	32, 33, 43, 84, 86, 102, 104, 119, 128, 150, 155.
213	22, 26, 29, 32, 34, 37, 39, 41, 52, 54, 64, 78, 84, 128, 143.
214	36, 37, 66, 126, 150.
215	21, 23, 24, 32, 33, 36, 61, 66, 80, 81, 92, 93, 99, 100, 103, 108, 132.
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218	78, 85, 92, 103.
219	22, 52, 91, 113, 157.
220	67, 105, 115.
221	38, 59, 77, 93, 94, 98, 100, 103, 114, 128, 142, 145, 155, 157.
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223	23, 32, 33, 36, 58, 77, 105, 113, 118, 137, 138, 145, 155, 157.
224	38, 56, 57, 80, 81, 91, 92, 122, 150, 157.
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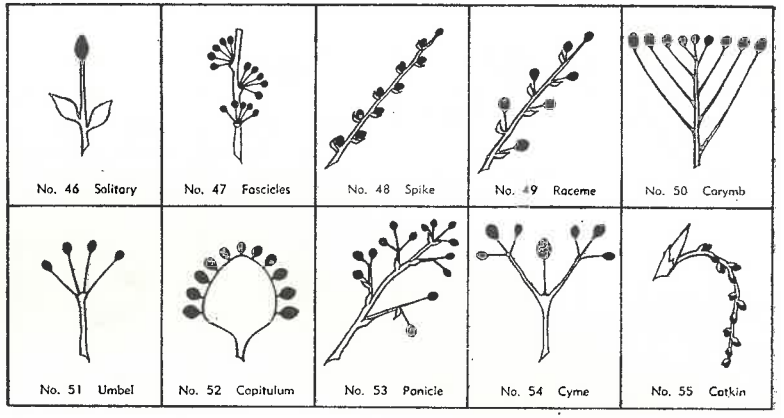
226	105, 152, 154.
227	—
228	31, 58, 71, 73, 76, 77, 98, 104, 105, 108, 119, 122, 132, 134.
229	31, 58, 64, 75, 76, 77, 86, 99, 100, 105, 125, 132, 134, 135, 156, 157.
230	23, 29, 31, 41, 42, 66, 74, 83, 87, 92, 99, 119, 150, 153, 156, 160.
231	21, 25, 31, 38, 46, 53, 81, 105, 117, 119, 141, 154.
232	23, 29, 38, 58, 61, 105, 119, 120, 122, 131, 151, 156.
233	23, 41, 48, 51, 113, 122, 131.
234	104
235	22, 24, 39, 124.
236	22, 40, 86, 98, 103, 105, 154.
237	22, 58, 92, 154.
238	21, 24, 26, 29, 33, 41, 45, 47, 50, 53, 64, 99, 144, 157.
239	22, 31, 47, 48, 49, 58, 61, 76, 77, 83, 84, 130, 146, 151.
240	22, 29, 48, 61, 78, 105, 119, 138, 151.
241	22, 51, 80, 91, 93, 121, 145.
242	22, 33, 38, 46, 58, 91, 93, 98, 122, 124, 125, 157.
243	21, 22, 32, 58, 61, 80, 90, 92, 93, 119, 120, 128, 129, 157.
244	22, 26, 32, 58, 122.
245	22, 29, 32, 66, 73, 93, 119, 120, 125, 138.
246	22, 33, 41, 46, 48, 60, 74, 80, 89, 122, 146.
247	21, 46, 61, 123, 146, 157.
248	22, 32, 40, 85, 93, 96, 130, 146, 151, 156.
249	24, 29, 32, 34, 46, 58, 61, 70, 74, 76, 77, 87, 89, 90, 99, 101, 113, 114, 125, 154, 160.
250	21, 24, 32, 57, 61, 71, 73, 77, 87, 99, 105, 106, 115, 122, 124, 125, 126, 132, 139, 148.
251	21, 41, 50, 51, 58, 67, 87, 99, 108, 113, 129, 154, 156, 159, 161.
252	21, 24, 51, 60, 73, 89, 90, 100, 106, 115, 122, 134, 157.
253	58, 103, 123.
254	71, 87, 134.
255	71.
256	21, 31, 33, 60, 71, 91, 100, 103, 123, 125, 130, 144, 146, 156.
257	23, 29, 56, 60, 73, 74, 89, 90, 91, 97, 100, 157.
258	22, 26, 83, 98, 118, 129, 150.
259	21, 22, 32, 77, 92, 100, 106, 115, 154, 157.
260	38.
261	21, 32, 57, 60, 74, 89, 100, 103, 128, 132, 142, 154, 157.
262	22, 32, 66, 73, 103.
263	31, 58, 60, 76, 77, 83, 86, 89, 90, 98, 100, 101, 131, 145, 147, 154.
264	21, 22, 24, 29, 34, 35, 47, 60, 73, 74, 92, 97, 106, 125, 144, 154, 157.

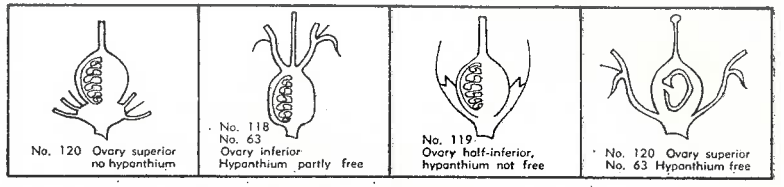
ILLUSTRATIONS OF FEATURES

Plate 1

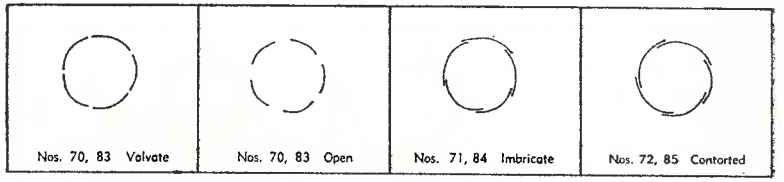
INFLORESCENCE, Nos. 46-55



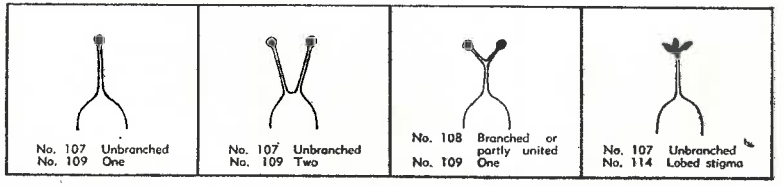
HYPANTHIUM, No. 63 and POSITION OF OVARY, Nos. 118-120



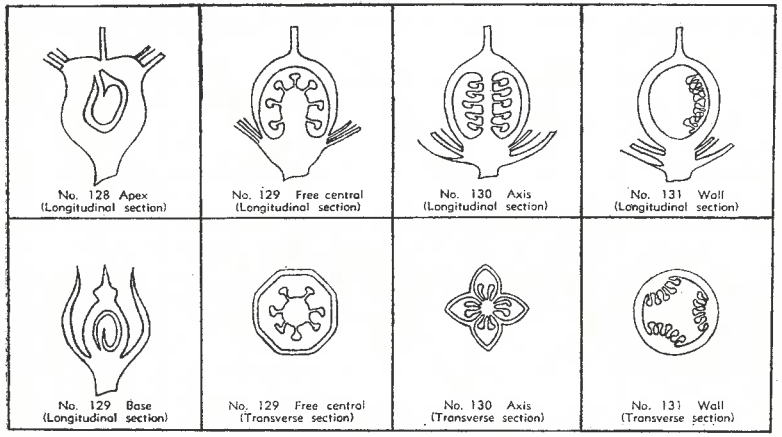
IMBRICATION OF SEPALS, Nos. 70-72, and Petals, Nos. 83-85
(Only one whorl shown for simplicity in diagrams)



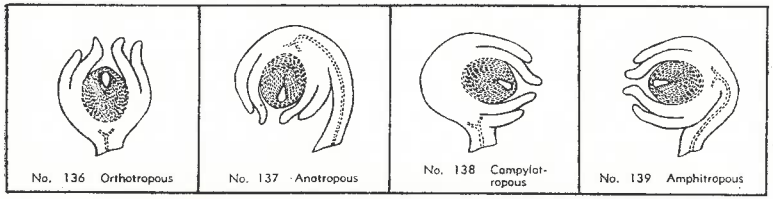
STYLE, Nos. 107-110, and STIGMA, No. 114



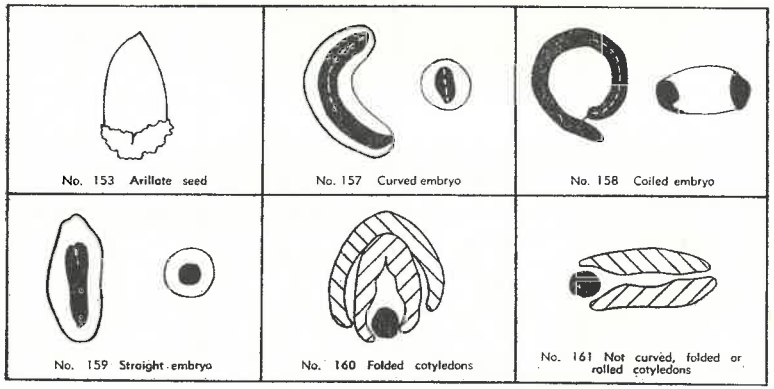
ATTACHMENT OF OVULES, Nos. 128-131



TYPE OF OVULE, Nos. 136-139



SEED, No. 153, EMBRYO, Nos. 157-159, COTYLEDONS, Nos. 160-1



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