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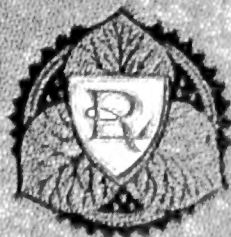
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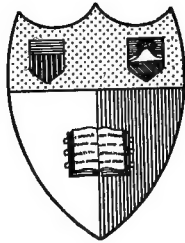
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NATURAL HISTORY  
OF PLANTS.

BAILLON.





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THE  
NATURAL HISTORY  
OF  
PLANTS.

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VOL. II.



THE  
NATURAL HISTORY  
OF  
PLANTS.

BY

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OF THE FACULTY OF MEDICINE OF PARIS.

TRANSLATED BY

MARCUS M. HARTOG, B. Sc. (LOND.).

SCHOLAR OF TRINITY COLLEGE, CAMBRIDGE.

VOL. II.

CONNARACEÆ, LEGUMINOSÆ-MIMOSEÆ, LEGUMINOSÆ-  
CÆSALPINIÆ, LEGUMINOSÆ-PAPILIONACEÆ, PROTEACEÆ,  
LAURACEÆ, ELÆAGNACEÆ, AND MYRISTICACEÆ.

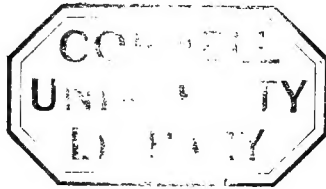
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## TRANSLATOR'S PREFACE.

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IN bringing this second volume of Professor Baillon's *Histoire des Plantes* before the English reader, I think it well to say a word on what I have held to be the duty of the translator, and how I have attempted to fulfil it. The former may be very shortly summarized: to present the book as the Author might have done had he written in English. This I have tried to carry out by striving in all cases to master the sense accurately in the first instance; in the few cases where the text was ambiguous or obscure I have consulted other authorities. Where the sense of an English writer is given I have given or condensed the original, following the plan of the French text. Many of the references have been collated and, where necessary, corrected; while I have added a number referring to Vol. II. of Professor Oliver's *Flora of Tropical Africa*, and Vol. V. of Mr. Bentham's *Flora Australiensis*, which have been published since the issue of the French edition.

In this volume I have again to acknowledge the aid of my brother Numa. He translated the "genera" of *Connaraceæ*, *Leguminosæ* (up to No. 293 of *Papilionaceæ*), *Elæagnaceæ*, *Myristicaceæ*, and the first few of *Proteaceæ* and *Lauraceæ*. To free me partially for a heavy press of academic work, he, with rare kindness, undertook this task, which was stopped by his fatal illness. I cannot refrain

from mentioning how much I have always owed to his unfailing brotherly love and sympathy. But words are powerless to express feelings, and I have no right to say more here on this matter; so much I could not omit.

One word on the unfortunate delay in the appearance of this volume. It is due to various causes, whereof I may mention severe domestic losses, and heavy examination work; while the printers' strike caused still more delay. I trust this will not occur with the next volume, which is now fairly in hand.

MARCUS M. HARTOG.

TRINITY COLLEGE, CAMBRIDGE,  
*September, 1872.*

# NATURAL HISTORY OF PLANTS.

## VII. CONNARACEÆ.

### I. CONNARUS SERIES.

*Connarus*<sup>1</sup> (figs. 1-8) has regular hermaphrodite flowers. Its receptacle is convex, or slightly concave at the apex, and bears successively

*Connarus (Omphalobium) Patrisii.*



FIG. 1.—Habit.

<sup>1</sup> L., *Gen.*, n. 830.—ADANS., *Fam. des Pl.*, ii. 94; *Suppl.*, ii. 343; *Ill.*, t. 572.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 359.—B. BR., *Congo*, 433;

a calyx of five free sepals,<sup>1</sup> quincuncially imbricated in the bud, and a corolla of five alternating petals,<sup>2</sup> also free and imbricated in the bud. The androceum consists of two whorls of stamens, cohering by the bases of the filaments, which are then free for the greater part of the

*Connarus (Omphalobium) Patrisii.*



FIG. 2.  
Flower.



FIG. 7.  
Seed.

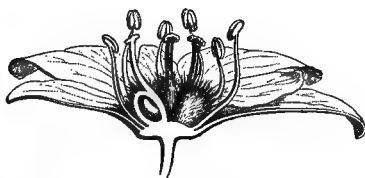


FIG. 4.  
Longitudinal section of flower.

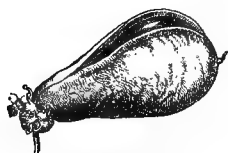


FIG. 5.  
Fruit.

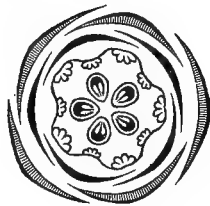


FIG. 3.  
Diagram.

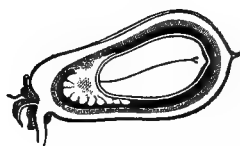


FIG. 6.  
Longitudinal section of fruit.

length, and bear introrse two-celled anthers dehiscing by two longitudinal clefts. The five stamens superposed to the petals have usually shorter filaments and smaller anthers than in the alternipetalous stamens, and their anthers may even become sterile. There is no true disk.<sup>3</sup> The gynæceum consists of five free oppositipetalous<sup>4</sup>

*Misc. Works*, ed. BENN., i. 113.—DC., *Mém. sur les Connarus et Omphalobium, ou sur les Connaracées Sarcobolées* (in *Mém. Soc. Hist. Nat. de Par.*, ii. 383, t. 16, 17); *Prodr.*, ii. 84.—ENDL., *Gen.*, n. 5948.—B. H., *Gen.*, 432, 1001, n. 5.—H. BN. in *Ann. de la Soc. Linn. de Maine-et-Loire*, ix. 57; *Adansonia*, vii. 233.—*Tapomana* ADANS., *loc. cit.*—*Omphalobium* GÆRTN., *Fruct.*, i. 217, t. 46.—DC., *loc. cit.*, 386.—ENDL., *Gen.*, n. 5949.—*Santaloides* L., *Fl. Zeyl.*, n. 408?—*Malbrancia* NECK., *Elem.*, 1171.—*Erythrostigma* HASSK., in *Bot. Zeit.*, xxv. Beibl., ii. 45; *Cat. Hort. Bogor.*, 246.—*Anisostemon* TURCZ., in *Bull. Mosc.* (1847), ii. 152.

<sup>1</sup> They are elongated, usually thickened, and becoming more or less succulent at the base. There is often a projecting dorsal rib.

<sup>2</sup> They are narrow and elongated, contracted near the base, and thinning off at the edges, by

which they often stick together at the points of contact. They are always longer than the sepals, and usually extend a good way beyond them. They are almost always sprinkled with irregular blackish or dark purple spots. Sometimes these are of very unequal size, and the limb of the petal looks like "chiné" stuff. In several of our herbarium species, collectors have remarked that the corolla is very odoriferous, and that its scent attracts numbers of insects.

<sup>3</sup> What has been described as such is probably the circular swelling of the base of the androceum, which is so well marked in certain African species, especially in our *C. Duparquetianus* (see *Adansonia*, *loc. cit.*, 236, note 1).

<sup>4</sup> R. BROWN thought that the fertile carpel of *Omphalobium* was superposed to a sepal, not a petal. But we have shown that there is in this respect no difference between the two types (see *Adansonia*, *loc. cit.*, 233).

carpels of unequal development, one or more of which may abort when the flower has attained a variable age.<sup>1</sup> Each carpel is formed of a one-celled ovary, tapering above into a style of variable length, which dilates at the tip into a stigmatiferous head.<sup>2</sup> In the ventral angle of the ovary-cell, and somewhere near its base, is seen a placenta bearing two collateral ascending ovules, which are orthotropous, or nearly so,<sup>3</sup> so that the micropyle is quite superior. The fruit, which may be accompanied by the remains of the non-acrescent calyx,<sup>4</sup> consists of only a single fertile follicle (figs. 5 and 8), which is stipitate, with a more or less elongated dry coriaceous pericarp,<sup>5</sup> dehiscing over a variable extent, beginning at the ventral angle. It contains a single erect orthotropous or suborthotropous seed,<sup>6</sup> at whose base is a lobed fleshy umbilical aril of variable form and size (figs. 6 and 7). Within the seed coats is a large fleshy exalbuminous embryo, with a superior radicle and thick plano-convex cotyledons. The genus *Connarus* consists of half a hundred species of trees and shrubs from the tropical parts of America,<sup>7</sup> Africa,<sup>8</sup> and Asia,<sup>9</sup> and, in a few rare cases, Oceania.<sup>10</sup> Their branches, which are sometimes sarmentose, bear persistent alternate exstipulate leaves, imparipinnate, or more rarely trifoliolate. The flowers are in racemes, simple or with cymose ramifications; these racemes, usually many-flowered, are axillary to the leaves, or terminate the branches.

*Connarus africanus.*FIG. 8.  
Fruit.

<sup>1</sup> On this character alone was founded the genus *Omphalobium*, whose flowers have often, though not constantly, only a single well-developed carpel at anthesis, and have normally but one capsule in the ripe fruit. Some fruits of *Connarus Patrisii* are however exceptional, and consist of two carpels (fig. 1).

<sup>2</sup> In this genus, as in several others, the form of this dilatation is very variable—sometimes regular and subcircular, sometimes flattened and turned outwards, here entire, there more or less deeply two-lobed.

<sup>3</sup> The hilum is not constantly basilar, and diametrically opposed to the micropyle; but is often some way up the side of the ovule, looking towards the ventral angle of the ovary. The first step towards the incomplete anatropy of the ovule, which we shall find in several genera; and this shows how little real value should be attached to this character of orthotropy which, as we shall see, is not absolute, in all the genera of this order, and of several others.

<sup>4</sup> When the calyx persists, as is usually the

case, its leaves are pretty closely applied to the stalk of the fruit it surrounds.

<sup>5</sup> Always slightly oblique and unsymmetrical when we get its exact profile, looking at it so that the midrib of the pericarp is on the one side, and the ventral angle on the other.

<sup>6</sup> The hilum varies in situation just like the ovule.

<sup>7</sup> PL., in *Linnaea*, xxiii. 429.—GRISEB., *Fl. Brit. W. Ind.*, 228.—KARST., *Fl. Columb.*, t. 137.—H. BN., in *Adansonia*, ix. 151, u. 25.

<sup>8</sup> SCHUM. & THÖNN., *Beskr.*, 299.—LAMK., *Dict.*, ii. 95.—GUILL. & PERR., *Fl. Seneg., Tent.*, 156.—H. BN., in *Adansonia*, vii. 235.—BAKER, in OLIV. *Fl. Trop. Afric.*, i. 456.

<sup>9</sup> W., *Spec.*, iii. 692.—GERTN., *Fruct.*, i. 27.—CAV., *Dissert.*, vii. 375.—PL., *loc. cit.*, 425.—THW., *Enum. Pl. Zeyl.*, 80.

<sup>10</sup> BL., *Mus. Bot. Lugd.-Bat.*, 266.—MIQ., *Fl. Ind.-Bat.*, i. p. 2, 662; Suppl., i. 529.—A. GRAY, in *Unit. States Expl. Exped. Bot.*, 375, t. 45.—WALP., *Ann.*, ii. 300; iv. 451.

*Agelæa*,<sup>1</sup> formerly confounded with *Connarus*, is only distinguished from it by characters of very slight importance. The leaves are always trifoliolate; the calyx persists around the fruit, without, however, being closely applied, as in *Connarus*, to its foot, which is here shorter, or even quite wanting. The petals and stamens offer several variations in form and size.

To the genus *Agelæa* botanists are generally agreed in adding *Hemiandrina*,<sup>2</sup> which consists of plants from India and the Indian Archipelago, whose flowers are usually trimerous or tetramerous, and only rarely pentamerous, with the petals narrow and elongated, and the sepals valvate, or scarcely imbricate in the bud.<sup>3</sup> Thus constituted, the genus *Agelæa* consists of half a score species<sup>4</sup> from the tropical regions of the Old World, namely, Guinea, Madagascar, India, and the Indian Archipelago. They are bushy shrubs, erect or climbing, with trifoliolate leaves, whose lateral leaflets are unsymmetrical, and with usually numerous flowers in axillary or lateral ramified racemes of cymes.

*Rourea*<sup>5</sup> (Fr., *Rourelle*), with all the floral characters of *Connarus*, differs from it in the two following points:—The carpels, variable in number, which go to form the fruit, are sessile instead of possessing a slender foot; and the calyx begins enlarging around them from the moment the fruit sets, so as to hide it more or less completely. About two score species are known, trees or shrubs (sometimes climbing) from tropical Asia,<sup>6</sup> Africa,<sup>7</sup> and America.<sup>8</sup> The leaves are

<sup>1</sup> SOLAND., ex PL., in *Linnaea*, xxiii. 437.—B. H., *Gen.*, 432, n. 3.—H. BN., in *Adansonia*, vii. 237.

<sup>2</sup> HOOK. F., in *Trans. Linn. Soc.*, xxiii. 171, t. 28.—*Troostwyckia* MIQ., *Fl. Ind.-Bat.*, Suppl., i. 531; in *Ann. Mus. Lugd.-Bat.*, iii. 88.—B. H., *Gen.*, 434, n. 12.

<sup>3</sup> J. HOOKER has made use of these variable characters to split up *Agelæa* into five sections, characterized as follows:—"1. *Petala libera. Stamina 5 libera inclusa.*—2. *Petala libera. Stamina 10 basi breviter connata exserta. Ovaria 5.*—3. *Petala leviter connata. Stamina 10 basi connata exserta. Ovaria 5.*—4. *Petala libera. Stamina 5 libera; filamentis sæpe apice recurvis; antherarum loculis denum confluentibus. Ovaria 3-5.*—5. *Petala libera. Stamina 10 libera; antheris recurvis extrorsum spectantibus (Hemiandrina)."*

<sup>4</sup> DC., *Prodr.*, ii. 86.—DELESS., *Icon. Select.*, iii. 35, t. 58.—TURP., in *Dict. des*

*Sc. Nat.*, t. 276.—WALP., *Ann.*, ii. 305.—H. BN., *loc. cit.*, 240.—BAKER, *loc. cit.*, 453.

<sup>5</sup> *Rourea* AUBL., *Guian.*, i. 467, t. 187.—J., *Gen.*, 369.—LAMK., *Dict.*, vi. 317.—B. H., *Gen.*, 432, n. 4.—H. BN., in *Adansonia*, vii. 228.—*Robergia* SCHREB., *Gen.*, 309.—*Canicidia* VELLOZ., *Fl. Flum.*, iv. t. 129.—*Roureopsis* PL., in *Linnaea*, xxiii. 423.—*Connari* spec. DC., *Prodr.*, ii. 85.—ENDL., *Gen.*, n. 5948.—? *Santaloides* L., *Fl. Zeyl.*, n. 408.

<sup>6</sup> VAHL., *Symb.*, iii. 87.—WIGHT & ARN., *Prodr.*, 144.—HOOK. & ARN., *Bot. Beech. Voy.*, 179.—MIQ., *Fl. Ind.-Bat.*, i. p. 2, 657; Suppl., i. 528.—BL., *op. cit.*, 262.

<sup>7</sup> PAL. BEAUV., *Fl. Ow. et Ben.*, i. 98, t. 60.—H. BN., *loc. cit.*, 230-232; viii. 198.—BAKER, *loc. cit.*, 455. See also for the species of different countries, PL., in *Linnaea*, xxiii. 413.—WALP., *Ann.*, ii. 295.

<sup>8</sup> GRISEB., *Fl. Brit. W. Ind.*, 228.—PL., *loc. cit.*, 414.—H. BN., in *Adansonia*, ix. 149, n. 23.

alternate imparipinnate,<sup>1</sup> and the flowers are axillary to the leaves, as in *Connarus*.

A distinct genus has been made of *Byrsocarpus*,<sup>2</sup> in which the calyx, instead of being closely applied to the base of the fruit, diverges more or less, or even becomes spreading at maturity. But this character is often ill-marked,<sup>3</sup> and is, moreover, of so very little value that it will only allow us to consider *Byrsocarpus* as a section of the genus *Rourea*, of which it has altogether the floral and vegetative organs.<sup>4</sup> This little group contains seven or eight African species, some from the west coast,<sup>5</sup> and others from the east coast and Madagascar.<sup>6</sup>

So we have been unable to exclude from the genus *Rourea* the Brazilian species *Bernardinia fluminensis*,<sup>7</sup> in which the calyx falls off before the fruit is ripe.<sup>8</sup> Thus we admit three sections<sup>9</sup> in the genus *Rourea*, often difficult of clear discrimination by these characters drawn from the calyx.

## II. CNESTIS SERIES.

*Cnestis*<sup>10</sup> (figs. 9–11) has hermaphrodite or polygamous flowers. In the former the receptacle is the same as in *Connarus*. The calyx consists of five free sepals, valvate in the bud, while the alternating petals, of the same number as the sepals but usually shorter,<sup>11</sup> have

<sup>1</sup> Sometimes reduced to three leaflets, or even to a single one; these variations may be met with on one and the same plant, as indicated by the specific name of *R. heterophylla*.

<sup>2</sup> SCHUM. & THÖNN., *Beskr.*, 226.—B. H., *Gen.*, 431, n. 1.—H. BN., in *Adansonia*, vii. 229.

<sup>3</sup> "In the series of species from Madagascar we find every intermediate stage in this respect between the Bengal species of *Byrsocarpus*, with spreading sepals, and those mimosoid *Roureas* from Tropical Africa, where the calyx is more or less markedly constricted." (See H. BN., *loc. cit.*, 229.)

<sup>4</sup> And again, we have observed, "If *Byrsocarpus* were considered as a section of the genus *Rourea*, it would be very difficult to separate this section from *Euroourea*, which would contain *Rourea* proper."

<sup>5</sup> PL., in *Linnaea*, 412.—HOOK., *Niger.*, 290.—BAKER, *loc. cit.*, 452.—WALP., *Ann.*, ii. 294.

<sup>6</sup> H. BN., *loc. cit.*, 230–234.

<sup>7</sup> PL., in *Linnaea*, xxiii. 412.—B. H., *Gen.*, 431, n. 2.—WALP., *Ann.*, ii. 295.

<sup>8</sup> See *Adansonia*, vii. 232. It is not usual to separate those species of *Connarus* in which the calyx thus comes off from the base of the fruit, from the rest of the genus.

<sup>9</sup> 1. *Euroourea*, 2. *Byrsocarpus*, 3. *Bernardinia*.

<sup>10</sup> J., *Gen.*, 374.—LAMK., *Dict.*, iii. 23; *Suppl.*, ii. 828; *Ill.*, t. 387.—R. BR., *Congo*, 423; *Misc. Works*, ed. BENN., i. 113.—DC., *Prodr.*, ii. 86.—K., in *Ann. Sc. Nat.* sér. 1, ii. 359.—ENDL., *Gen.*, n. 5950.—B. H., *Gen.*, 433, n. 8.—H. BN., in *Adansonia*, vii. 240.

<sup>11</sup> Their breadth is often nearly equal to their length, and the apex is rounded or emarginate, but in some species they are more elongated like ribbons. In *C. corniculata* LAMK. (*Dict.*, iii. 23, n. 3;—*Agelæa pruriens* SOLAND., herb.;—*Spondioides pruriens* SMEATHM., herb.), the petals may exceed the sepals in length by a variable extent. So too in *C. polyphylla* LAMK. (*Dict.*, *loc. cit.*, n. 2).

a variable præfloration. Thus in *C. glabra*,<sup>1</sup> they are valvate, or may even not touch at all by their edges in the very young bud (fig. 11). In other species, such as *C. ferruginea*,<sup>2</sup> they are narrowly imbricated, or more rarely contorted. The androceum consists of ten stamens, five superposed to the sepals, and five, smaller, to the petals; for a short distance they are all united by the base of their filaments, which then become free, and bear an introrse two-celled anther dehiscing longitudinally.<sup>3</sup> On the expansion of the flower



the much elongated apex of the filament is reflexed outwards, inverting the anther so as to make it extrorse. The gynæceum consists of five oppositipetalous carpels, whose ovaries are sessile, each surmounted by a usually short style, truncate or more or less dilated and stigmatiferous at the apex. In each ovary we find two collateral ascending orthotropous or suborthotropous ovules, inserted towards the base of the ovary; their micropyles are superior. The calyx may or may not be persistent, often reflexed around the fruit, but it is never accrescent; the fruit consists of one or more sessile follicles, often tapering at the base, covered with velvety down, and lined by long, rigid, stinging hairs.<sup>4</sup> They contain an erect seed,

<sup>1</sup> LAMK., *Dict.*, loc. cit., n. 1; *Ill.*, t. 387, fig. 1.—DC., *Prodr.*, n. 1.—*Sarmienta cauliflora* SIEB., *Fl. Maur. Ess.*, p. ii. n. 285.

<sup>2</sup> DC., *Prodr.*, ii. 87, n. 3.—*C. fraterna* PL., loc. cit., 440.—*Spondioides ferruginea* SMEATHM., herb.

<sup>3</sup> In certain species such as *C. ferruginea* DC., each anther-cell is prolonged downwards into a sort of point which is turned up when the anther is reversed so as to be extrorse.

<sup>4</sup> The hairs have two different seats in the fruit of *Cnestis*. One kind of hair (only found in certain species) is found on the exterior epidermis of the pericarp. The hairs are greatly developed in *C. corniculata* LAMK.,

where they are stinging, which fact accounts for the name *Agelæa pruriens*, given to that species by SOLANDER. Under a sufficient magnifying power they appear simple, unicellular, and tapering to a long point. Around the base are seen a large number of younger hairs, projecting but slightly, though similar in form; besides prominent conical obovate or clavate nucleated cells containing a coloured fluid. On the whole of the inner surface of the pericarp all the species possess similar pointed unicellular hairs in great abundance and closely pressed together; in some pericarps they may be counted by thousands. These also sting, we are told, in the fresh state. This property has given the names of *Grattelier*



within whose coats is found a fleshy albumen, at whose apex is a pretty long embryo, with its radicle superior. Sometimes the seed has no aril; sometimes on the contrary this organ is represented by a sort of fleshy frill near the hilum, with its superior edge irregularly divided.<sup>1</sup> *Cnestis* consists of bushy shrubs, often sarmentose, with alternate, imparipinnate, exstipulate leaves; the flowers are in racemes, simple or composed of cymes, axillary or terminal, or more rarely grouped in numbers on peculiar short woody branches. About a dozen species are known, natives of tropical Asia<sup>2</sup> and Africa,<sup>3</sup> the Indian Archipelago, the Mascarene Islands, and Madagascar and the neighbouring islands.<sup>4</sup>

*Cnestidium*<sup>5</sup> is a New World type, closely analogous to *Cnestis*. The perianth and androceum are nearly the same, but the valvate calyx has sometimes only three or four sepals instead of five.<sup>6</sup> The petals are longer than the sepals, tapering at the base and imbricated in the bud. There are ten stamens, of which the five opposite-petalous are the smaller; they all cohere at the base into a very short ring, above which the slender filaments become free and taper towards the reflexed apex, ending in introrse two-celled anthers, also finally reflexed. The carpels are sessile, the ovaries being as in *Cnestis*; but the style is long, slender and reflexed, with an entire or two-lobed, dilated, stigmatiferous head. The fruit is sessile, velvety outside, glabrous within; the seed possesses a fleshy aril. Only one species of this genus is known,<sup>7</sup> a tree from Mexico and the north of Colombia. It has velvety imparipinnate leaves, with the leaflets symmetrical at the base; the flowers are numerous, in multiple ramified racemes of cymes, axillary to the leaves or terminating the branches.<sup>8</sup>

and *Poilâgratter* to several species of *Cnestis*, such as *C. glabra* LAMK., from Bourbon and Mauritius; it appears to be due not only to the mechanical action of the hair, which easily comes off and remains sticking in the skin, but perhaps also to a brownish liquid which it contains and which fills its cavity more or less completely in the dry herbarium specimens.

<sup>1</sup> In *C. polyphylla* LAMK., for instance, this frill surrounds the lowest quarter of the seed, which tapers in this part. Thus botanists are wrong in characterizing *Cnestis* as exarillate.

<sup>2</sup> ROXBURGH (*Cat. Hort. Calc.*, 34) only describes a single species in this country; namely *C. monadelphæ* (DC., n. 5); but the genus is certainly represented by other species in India and the neighbouring countries.

<sup>3</sup> BENTH., *Niger*, 290.—PL., in *Linnaea*, xxiii. 440.—H. BN., *loc. cit.*, 242, not. 1.—BAKER, in *OLLV. Fl. Trop. Afr.*, i. 460.—WALP., *Ann.*, ii. 306.

<sup>4</sup> H. BN., *loc. cit.*, 244, not. 1.

<sup>5</sup> PL., in *Linnaea*, xxiii. 438.—B. H., *Gen.*, 433, n. 7.

<sup>6</sup> And in that case they are often unequal.

<sup>7</sup> *C. rufescens* PL., *loc. cit.*—WALP., *Ann.*, ii. 305.

<sup>8</sup> The genus *Tamiochloana* (HOOK. F., *Gen.*, 433, n. 10) comes extremely near to *Cnestidium* and *Cnestis*, and we doubt whether it ought to be separated from the latter genus. It is distinguished chiefly by the three following characters. 1st. The form of its floral receptacle, which is nearly hemispherical, owing to the

*Manotes*,<sup>1</sup> closely analogous to *Cnestis*, has pentamerous hermaphrodite flowers; the calyx consists of five valvate sepals persisting around the fruit, though without any increase in size; the corolla, of five longer imbricated caducous petals. But a little while before the flower expands, the receptacle elongates above the perianth into a column with a thickened base, bearing on its apex five oppositipetalous carpels, with ten stamens inserted close below their ovaries. The staminal filaments are free, with subintrorse two-

*Manotes Griffoniana*.

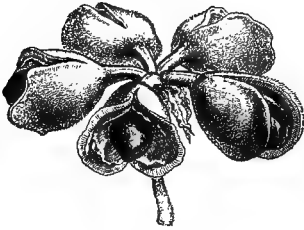


FIG. 12.  
Fruit.

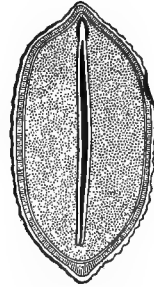


FIG. 13.  
Longitudinal section of seed.

celled anthers dehiscing longitudinally. The ovaries are one-celled, tapering at the apex into a slender reflexed style, which ends in a capitate stigma. In the ventral angle of the ovary are inserted two collateral descending subanatropous<sup>2</sup> ovules, whose micropyles look upwards and outwards. The fruit (fig. 12) consists of a variable

sudden swelling of the pedicel as it passes into it; 2ndly. The form of the petals, which are long ligulate glabrous straps; 3rdly. The state of the interior surface of the pericarp which is said to be very glabrous. The flower has a calyx of five valvate sepals reflexed after anthesis and during maturation; ten stamens (of *Cnestis*) with filaments slightly united at the bases with short anthers reflexed after anthesis; and five carpels each with a biovulate ovary, a short style and a dilated stigma. The fruit consists of one or several sessile capsules, pubescent externally and containing a single arillate seed with a smooth testa. The only known species of this genus is *T. Griffithii* HOOK. F., a nearly sarmatose shrub from Malaysia, with rounded glabrous branches. Its leaves are glabrous and imparipinnate with sessile coriaceous obtuse leaflets, more or less bifid at the apex. The flowers are in axillary racemes of cymes. As regards the form and dimensions of *Teniochloana*, we should bear in mind that in certain species of

*Cnestis* proper, such as *C. corniculata* LAMK., the petals form narrow tongues longer than the sepals at anthesis, so that we must not treat this character as of more than relative value (see above, p. 5, note 11; also *Adansonia* vii. 241).

<sup>1</sup> SOLAND., ex PL., in *Linnaea*, xxiii. 438.—B. H., *Gen.*, 433, n. 6.—H. BN., in *Adansonia*, vii. 244.

<sup>2</sup> More or less anatropous according to the height on the ventral angle at which their umbilicus is inserted. Thus it is sometimes close to the base, when the ovule becomes nearly orthotropous. But in *M. Griffoniana* H. BN. (*Adansonia*, loc. cit., note 1), the attachment of the ovule is high up, and close to the micropyle. It is, however, near the middle of the upper edge of the ovule at anthesis, and rises gradually after fecundation. At the same time the chalazal end of the ovule tapers to a point, and insinuates itself into the narrow part of the cell of the ovary corresponding with the foot of the carpel.

number of free follicles, tapering at the base, then swelling out, and tipped by a little reflexed apiculus. Each follicle opens at maturity along its ventral angle, we may then easily distinguish the rather fleshy pericarp from the woody endocarp, which is a little shorter ventrally than the rest of the pericarp.<sup>1</sup> Hence it gapes on this side and parts from the contained seed a little above its micropyle. The seed (fig. 13), now free in the endocarp,<sup>2</sup> incloses in its coats a copious, nearly horny albumen, in whose axis is a long green embryo with flattened cotyledons and a superior radicle. The whole of the outer surface of the seed consists of a fleshy tissue, which, as in *Magnolia*, represents the external coat thus modified throughout; it may be viewed as an aril, generalized in *Manotes*, but specialized in *Connarus* and its allies. Three species of *Manotes* are known, all natives of the west of tropical Africa.<sup>3</sup>

In *Tricholobus*<sup>4</sup> (fig. 14) we find the habit and foliage of *Connarus*, with flowers whose perianth and androceum resemble those of *Manotes*; the five sepals are valvate; the five longer alternating petals are imbricated or twisted in the bud; and the monadelphous androceum consists of ten stamens, whose filaments are free above, and bear introrse two-celled anthers dehiscing longitudinally. The five stamens superposed to the petals are the shorter, and may even become altogether sterile. But the gynæceum never at any age consists of more than one carpel, whose free one-celled ovary is surmounted by a style of variable length, dilated at the tip into a stigmatiferous head. The fruit is a sessile or stipitate pod,<sup>5</sup> surrounded at the base by the non-acrescent calyx, and containing within a pericarp of variable consistency an ascending seed,<sup>6</sup> which possesses a somewhat lateral, irregularly-lobed aril, and a thick, fleshy, exalbuminous embryo, with its radicle superior.

*Tricholobus cochinchinensis.*



FIG. 14.  
Fruit, right valve removed.

<sup>1</sup> The woody endocarp sends a long hard tail into the stalk of the follicle.

<sup>2</sup> This it is which PLANCHON described as an aril, also mistaking the lower hard contracted part of the endocarp for a funicle (see *Adansonia*, loc. cit., 246).

<sup>3</sup> BAKER, loc. cit., 459.

<sup>4</sup> BL., *Mus. Bot. Lugd.-Bat.*, i. 236.—B.H., *Gen.*, 433, n. 9.

<sup>5</sup> This is the only name which can be used to describe it, as it opens by two longitudinal clefts into two valves, which are altogether free from each other and only adhere to the receptacle by their bases. One of these valves has been detached in fig. 14, where we only see its cicatrix.

<sup>6</sup> Its attachment may be altogether basilar as in *T. cochinchinensis* H. BN. But, as in *Con-*

*Tricholobus* consists of trees from the Indian Archipelago<sup>1</sup> and Cochin China,<sup>2</sup> with alternate imparipinnate, glabrous or hairy leaves; the flowers are in axillary or terminal racemes of cymes. As yet three species are known.

As in the genus *Rourea*, with the greater number of species possessing plurifoliolate leaves, we find some species in which they are unifoliolate; so in some species of *Tricholobus* from India and Malaysia, to which the name *Ellipanthus*<sup>3</sup> has been given, the leaves have only a single leaflet: but as all the essential characters of flower and fruit are identical, we can only make this a section of the genus *Tricholobus*. Four species are known, natives of India and Malaysia.<sup>4</sup>

This small order, as we have just studied it, dates no great way back. A. L. DE JUSSIEU<sup>5</sup> followed his predecessors in putting *Connarus*, *Omphalobium*, and *Cnestis*, the only genera of the order then known, in *Terebinthaceæ*. It was R. BROWN who, in his celebrated work on the plants of western tropical Africa,<sup>6</sup> proposed in 1818 to found an order *Connaraceæ*, which should include the three genera *Connarus*, *Cnestis*, and *Rourea*. He considered that the insertion of the stamens was only doubtfully hypogynous; but that the most important character of the group lay in the attachment of the collateral ovules by a basilar or subbasilar hilum; while in the seed the radicle of the embryo was superior. Thus, he distinguished *Connaraceæ* sharply from *Terebinthaceæ*, making the ovule and seed orthotropous in the former, and anatropous in the latter. KUNTH<sup>7</sup> in 1824 simply followed BROWN, admitting *Connaraceæ* without comment as a distinct order just like *Juglandææ*, *Amyrideææ*, &c.; including the three genera given by R. BROWN, and adding *Brunellia*<sup>8</sup> and *Brucea* as “genera *Connaraceis affinia*.” ENDLICHER<sup>9</sup> retained the

*narus*, *Manotes*, &c., it may be much higher. This is the case in *T. fulvus* BL., whose ovule has hence been described as anatropous. In this species the micropyle tips the very long tapering conical apex of the ovule, and is quite superior, while the attachment of the ovule is at nearly one-third its length from its base. Hence the anatropy is very incomplete, and especially less complete than in certain species of *Manotes*.

<sup>1</sup> BL., *loc. cit.*—MIQ., *Fl. Ind.-Bat.*, i, p. 2, 666.—WALP., *Ann.*, ii, 304.

<sup>2</sup> H. BN., in *Adansonia*, ix, 150, n. 24.

<sup>3</sup> HOOK. F., *Gen.*, 434, n. 11.

<sup>4</sup> WALL., *Cat.*, n. 8551 (*Connarus monophyllus*).—THW., *Enum. Pl. Zeyl.*, 80, 410 (*C. unifoliatus*).

<sup>5</sup> *Genera Plantarum* (1789), 369.—DE CANDOLLE (*Prodr.*, ii, 84) also made *Connaraceæ* a tribe (seventh) of his *Terebinthaceæ*.

<sup>6</sup> *Congo*, 431; *Misc. Works*, ed. BENN., i, 112.

<sup>7</sup> Saying however of this genus, “*Diosmeis propior*.”

<sup>8</sup> In *Ann. Sc. Nat.*, sér. 1, ii, 359.

<sup>9</sup> *Genera Plantarum* (1836-1840), 1139, Ordo cccxlvii.

order, but unfortunately added<sup>1</sup> *Thysanus*, *Eurycoma*, *Suriana*, *Cneorum*, and *Heterodendron*. LINDLEY<sup>2</sup> only retained the first two of these genera, and that doubtfully. In 1850 PLANCHON<sup>3</sup> undertook the revision of the whole of the order, from which he finally excluded the genera *Eurycoma*, *Cneorum*, *Suriana*, *Heterodendron*, *Brunellia*, *Brucea*, and *Ailanthus*. At the same time he included both SOLANDER'S genera *Manotes* and *Agelæa*, and created three new generic types—*Cnestidium*, *Roureopsis* (which is only a *Rourea*), and *Bernardinia* (also referred by us to *Rourea*). In the same year BLUME<sup>4</sup> created his genus *Tricholobus* for some plants from the Indian Archipelago. The genera proposed latterly are due to J. HOOKER and to MIQUEL; to the former belong *Hemiandrina*<sup>5</sup> (later on restored by him to *Agelæa*), *Teniochlæna*, and *Ellipanthus*,<sup>6</sup> which last we only make a section of *Tricholobus*; to the latter *Troostwyckia*, which does not differ from *Hemiandrina*, and *Nothocnestis*,<sup>7</sup> whose organization is imperfectly known, and whose natural relations are even at this moment under discussion.

AFFINITIES.—ENDLICHER<sup>8</sup> has so well summed up all the affinities recognised by previous authors that we cannot do better than quote his very words:—"Anacardiaceis, mediante *Buchanania*, et *Zanthoxyleis* per *Brunelliam* propius accedunt, embryone antitropo diversæ, hinc per *Cnestin*, mediante *Averhoa*, Oxalideis, illinc Leguminosis Detarieis, vix nisi ovariorum numero, embryonis situ et stipularum defectu distinguendis, accedunt."<sup>9</sup> In fact, *Buchanania*, with its free carpels and diplostemonous androceum, only differs from *Con-*

<sup>1</sup> Only as *genera affinia*, it is true.

<sup>2</sup> *Veg. Kingd.* (1846), 468, Ordo clxxv.

<sup>3</sup> In *Linnaea*, xxiii. 412.

<sup>4</sup> *Mus. Lugd.-Bat.*, i. 236.

<sup>5</sup> In *Trans. Linn. Soc.*, xxiii. 171, t. 28 (1860).

<sup>6</sup> *Gen.*, 433, 434, n. 10, 11 (1862).

<sup>7</sup> The Sumatran plant which is the only member of this genus, belongs according to BENTHAM & HOOKER (*Gen.*, 431) not to *Connaraceæ* but to *Leguminosææ*. Still MIQUEL who established the genus in 1861, in the *Flor. Ind.-Bat.*, Suppl., i. 531, in 1867, still maintained in the *Ann. Mus. Lugd.-Bat.*, iii. 88, that it should be left in the former order, and made some corrections in his original description. We can pronounce no opinion on this subject, having been unable to study the very imperfect specimens in the herbarium of Leyden. We only know through MIQUEL, that *N. sumatrana* is a tree with simple entire leaves and pentandrous flowers,

whose partite calyx is in part persistent about the fruit; there is an annular disk, around which are inserted the stamens, five (?) in number, and a fruit of a solitary central follicle whose dorsal and ventral sutures project both outside and inside, but especially inside, to form a very incomplete spurious dissepiment. The unilateral dehiscence of this fruit frees a seed inserted somewhat obliquely on a basilar placenta, almost entirely enveloped in a succulent membranous aril, and containing an embryo surrounded by a thin layer of albumen.

<sup>8</sup> *Op. cit.*, 1139.

<sup>9</sup> AGARDH on the whole admits the same affinities, considering as he does (*Theor. Syst. Plant.*, 229) that the *Connaraceæ* by the form of their fruits form a transition between *Leguminosææ* and *Terebinthaceææ*, and that *Detarieææ*, as they possess a corolla, are a more perfect form of *Connaraceææ*.

*naraceæ* in the complete anatropy of its ovule, and we now know of *Connaraceæ* in which this anatropy is, as it were, sketched out. The same may be said of *Rutaceæ* and *Simarubeæ*, groups to which *Brunellia* has been successively referred, though they are usually characterized either by glands with odoriferous essential oil, or the marked bitterness of all the parts; while *Averrhoa*, among *Oxalideæ*, is now most closely allied to *Connaraceæ*<sup>1</sup> through *Connaropsis*, which would be a *Cnestis* were its carpels but free instead of being united into a five-celled ovary. As for the *Detarieæ* and *Copaifereæ*, they are so close to the unicarpellary species of *Connarus* (*Omphalobium*), and to *Tricholobus*, where the carpel is also solitary, that there is no collection where the two groups are not to be found intermixed. There are really two points in which these reduced *Leguminosæ* differ from *Connaraceæ*; they possess stipules and a completely reflexed ovule; all other characters being similar, there is a very close affinity between the two groups. One more alliance remains to be pointed out—that between this Order and the series *Spirææ* of *Rosaceæ*. Nothing can bear closer resemblance to certain plants of this series with biovulate carpels than do *Agelea*, *Manotes*, and several other *Cnestideæ*; the perianth, the diplostemonous androceum, the five free biovulate carpels, are all identical; and as these last are often nearly anatropous in *Manotes*, which moreover possesses alternate pinnate leaves and a paniced inflorescence, all that we have left to separate the two types is that certain *Spirææ* have stipules and that their seeds are usually exalbuminous. But as these two features are not even constant, the reasons which have led us to place *Connaraceæ* between *Rosaceæ* and *Leguminosæ* will easily be understood.

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What then are the characters by help of which we can subdivide *Connaraceæ*? What characters are constant in this small order? Of the latter there are several, by no means without importance—the independence of the carpels, their number (never greater than that of the petals), and the number of ovules in each, the upturning of the micropyle, the consistency of the pericarp (always dry and finally dehiscent), the true diplostemony of the androceum, the alternation of the leaves, the absence of stipules,

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<sup>1</sup> Its affinities with which were long since demonstrated by R. BROWN.

and the woody consistency of the stem. Other characters again are both very valuable and nearly constant—namely, the pinnate leaves, the orthotropous or nearly orthotropous ovules, the seeds possessing an aril of variable thickness and localized or generalized. In the third place come two characters, each present in about half the Order and absent in the rest—a valvate calyx and an albuminous seed. To these, however, an unequal value has been assigned, as we shall now see.

The character of the præfloration of the calyx has been held of sufficient importance to serve to divide all the known *Connaraceæ* into two tribes or series: the one, *Connareæ*, in which the sepals are imbricated in the bud, the other, *Cnestideæ*, in which they are valvate. If this clear demarcation came out in accordance with the facts, this division of course would be most convenient in practice; and we have retained it for its convenience. But we cannot regard it as being also absolutely natural. This position may be illustrated by the fact that *Troostwickya* was placed by BENTHAM and HOOKER among *Cnestideæ*, because of its valvate calyx; now this name is exactly synonymous with *Hemiandrina*, a genus now suppressed, and rightly considered a mere section of *Agelæa*, whose calyx is usually imbricated, as befits the *Connareæ*. Again, many species of *Tricholobus* have altogether the flower of *Omphalobium* or *Connarus*, with the gynæceum finally unilocular; and a large number of them have also the same vegetative organs; still, of these two types, so closely allied in all their characters, *Tricholobus* is referred for its valvate calyx to *Cnestideæ*, and *Omphalobium*, for its imbricate calyx, to *Connareæ*. Never was there artificial classification more convenient, we must allow; but at the same time, never was there one that took less account of the generality of common characters.

The character derived from the albumen is of even less import. True, albumen is never found in any known member of the *Connareæ*; but while in half the genera of *Cnestideæ* the seeds possess albumen, in the other half they lack it.

The other characters serve only to distinguish the several genera. They are as follows:—1. The prolongation of the receptacle above the perianth into a column bearing the sexual organs: this peculiarity occurs only in *Manotes*. 2. The stalk to the base of each carpel; wanting in *Rourea*, present in *Connarus*. The absolute number of elements to the gynæceum: the specimens of *Tricholobus*

which we have been able to study have only one carpel at all ages, while in the other types, whose fruit is unicarpellary when adult, there was a larger number of carpels at some earlier period. 4. The state of the interior surface of the pericarp: this is covered with peculiar hairs in *Cnestis*, but remains glabrous in the neighbouring genera *Cnestidium* and *Tæniochlæna*. As regards the persistence or precocious fall of the calyx, the degree of closeness with which it embraces the base of the fruit, the presence or absence of an aril—in our eyes these characters are not even of generic value, inconstant as they are; in certain genera which our predecessors have regarded as perfectly homogeneous. Thus several authors have held *Rourea* generically distinct from *Byrsocarpus* and *Bernardinia*, in that its calyx persists, closely applied to the base of the fruit, while in the other two it diverges from it, even falling off after anthesis in *Bernardinia*. But we have shown<sup>1</sup> that “in the series of species from Madagascar we find every transition from the Senegal species of *Byrsocarpus* with spreading sepals, and those of the mimosoid *Roureas* from tropical Africa in which the appressed calyx is most marked. . . ” In fact this is only a question of degree, so that “it is impossible to lay down the law, at what point in this series of species the calyx ceases to be that of a *Byrsocarpus*, and becomes that of a true *Rourea*.” The non-persistent calyx of *Bernardinia* is equally insufficient to make it a distinct genus from *Rourea*, for in the genus *Connarus* itself, species with persistent sepals, are united to others with caducous sepals, without our being able to use these differences to found even distinct sections; these two characters can then afford no acceptable generic distinctions. This will not apply to the accrescence of the calyx, for it is sufficient to separate *Rourea* and *Connarus*, which genera we have already seen are perfectly distinguished by another character.

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*Connaraceæ* are distributed<sup>2</sup> over no wide zone of latitude, but are found under almost every degree of longitude in all the warm regions of the globe. Not one species it is true has been found in tropical Australia, and only one in the Islands of the Pacific. But the hundred and fifty described species are nearly equally distributed over the whole of the warm districts of Asia, Africa, and tropical

<sup>1</sup> *Adansonia*, vi. 228 (see above, p. 5, note 3).

<sup>2</sup> LINDL., *Veg. Kingd.*, 468.



America. *Tricholobus*, *Tænioclæna*, *Manotes*, and *Agelæa* are found only in the Old World, *Cnestidium* only in the New. *Manotes* has only been found in the west of tropical Africa. *Connarus* and *Rourea* belong to both Worlds. The order does not extend beyond 25° N. lat., or 30° S.

The uses of *Connaraceæ* are not very numerous. They generally contain in their tissues a certain amount of resinous balsamic matter, hence certain species are used as tonics or astringents. This is the case with several of the genus *Connarus*, especially *C. africanus* CAV., the infused bark of which is applied by the negroes to wounds and burns,<sup>1</sup> and *C. pinnatus*, whose bark is employed in India in the treatment of aphthæ.<sup>2</sup> *Rourea hirsuta* has a tonic balsamic bark. *Agelæa Lamarckii* PL., passes for a powerful astringent in Madagascar. We are also told, it is true, that if abused, this drug produces very severe dysentery, but still its value is recognised in several discharges.<sup>3</sup> The red or orange fruits of very many of the species render these plants highly ornamental, according to WIGHT, who also extols the scent of their flowers.<sup>4</sup> The aril is sometimes edible, as in *Connarus edulis*,<sup>5</sup> *C. Roxburghii* W. & ARN. & *C. Lambertii*.<sup>6</sup> The inside of the seed may be rich in oil, as in *C. pinnatus* DC., *C. Lambertii*, &c. The embryo of *Cnestis ferruginea* DC. tastes like the hazel nut. The fruits of most species of the last genus are coated inside and even outside with irritant hairs, sometimes stinging severely.<sup>7</sup> We may cite the *Oboqui* of the Gaboon (*C. corniculata* LAMK.),<sup>8</sup> the *Gratteliers* of Bourbon and Madagascar (*C. glabra* LAMK. & *C. polyphylla* LAMK.),<sup>9</sup> which cause very smart itching, and are used like the true cowhage (*poils à gratter*) furnished by *Mucuna pruriens* and several other *Leguminosæ*. One variety of *Agelæa Lamarckii*, from Madagascar, we have called *emetica*,<sup>10</sup> because it is used in that country as an emetic. It is generally admitted after SCHOMBURGK,<sup>11</sup> that the *zebra wood* (bois de zèbre) so highly prized by cabinet makers is a *Connarus* from Guyana, namely *C. (Omphalobium) Lambertii*, mentioned above.

<sup>1</sup> DUCH., *Répert.*, 289.

<sup>2</sup> ROSENTH., *Syn. Plant. Diaphor.*, 868.

<sup>3</sup> See *Adansonia*, vii. 239. It is the *Soandrou* or *Céphan-mahi* of the Malagasy.

<sup>4</sup> This scent resembles that of the Lilac (see LINDL., *Veg. Kingd.*, 468). PERVILLE has observed this in the flowers of *Agelæa Lamarckii* also (see *Adansonia* vii. 239).

<sup>5</sup> ENDL., *Enchir.*, 605.

<sup>6</sup> *C. guianensis* LAMB., mss., ex PL. — *Omphalobium Lambertii* DC., *Prodr.*, n. 4.

<sup>7</sup> See *Adansonia*, vii. 243.

<sup>8</sup> *Spondioides pruriens* SMEATHM. — *Agelæa pruriens* SOLAND. (See above, p. 5, note 11.)

<sup>9</sup> *Dict.*, n. 1, 2.

<sup>10</sup> The Malagasy call it *Vahé-mainti* (see *Adansonia*, vii. 240).

<sup>11</sup> LINDL., *loc. cit.* — ROSENTH., *op. cit.*, 869.

## GENERA.

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### I. CONNAREÆ.

1. **Connarus** L.—Flowers hermaphrodite; receptacle conical, or slightly depressed at apex. Sepals 5, imbricated in æstivation, persistent or deciduous. Petals 5, longer than the sepals, and alternating with them, free, sometimes cohering by the margins, imbricated in æstivation. Stamens 10, 5 longer alternipetalous, 5 shorter oppositipetalous; filaments connate close to more or less thickened and disciform base, monadelphous, later free filiform; anthers 2-celled introrse, dehiscing longitudinally, finally reflexed or versatile; in oppositipetalous stamens, sometimes sterile or wanting. Carpels 5, oppositipetalous; 1–4 usually smaller, sooner or later aborting; fertile ovary 1-celled, tapering into a terminal style, with dilated stigmatiferous apex. Ovules 2, collateral, inserted at a variable distance from base of cell, orthotropous or suborthotropous; umbilicus basilar or more or less lateral; micropyle superior. Fruit dry capsular stipitate; calyx either persistent, not accrescent, embracing the stalk, or deciduous, its position marked by scars; pericarp oblique oblong, obtuse or slightly apiculate, coriaceous, dehiscing by ventral suture, 1-seeded. Seed suberect, furnished at base with a more or less lateral fleshy lobed aril; testa externally smooth shining; embryo inverted exalbuminous; cotyledons thick, fleshy amygdaloid; radicle short, superior.—Trees or shrubs, often scandent; leaves alternate imparipinnate, or more rarely 3-foliolate, evergreen exstipulate; flowers minute crowded in simple or oftener very much branched cymiferous racemes; pedicels usually articulated (*Tropical America Africa and Asia, Indian Archipelago, South Sea Islands*). See p. 1.

2. **Agelæa** SOLAND.—Flowers hermaphrodite, either altogether similar to or scarcely differing from those of *Connarus*; calyx 5-, or more rarely 3, 4-partite; sepals imbricated, subvalvate or valvate. Petals 5, or more rarely 3, 4, free or connate, either oblong or lanceolate, or more rarely ligulate long filiform. Stamens 10 (of *Connarus*); 5 or more rarely 3, 4 alternipetalous, often sterile or antherless; fila-

ments connate or more rarely almost free at base, usually reflexed at apex; anthers introrse. Carpels 3-5 (of *Connarus*); style slender; apex dilated stigmatiferous, simple or 2-lobed. Capsules 1-3, more rarely 4, 5, sessile or shortly stipitate, 1-seeded; calyx persistent, not embracing base of fruit. Seed of *Connarus*.—Trees or erect or climbing shrubs; leaves alternate 3-foliolate; inflorescence of *Connarus* (*Tropical Africa, Madagascar, Tropical India, Indian Archipelago*). See p. 4.

3. **Rourea** AUBL.—Flowers hermaphrodite (of *Connarus*); calyx erect, much imbricated, either accrescent and finally embracing base of sessile fruit (*Euroourea*), or more or less spreading and not closely embracing capsule (*Byrsocarpus*), or more rarely deciduous (*Bernardinia*). Other characters of *Connarus*.—Small trees or shrubs, sometimes climbing; leaves pinnate or very rarely 3-foliolate, persistent; flowers in simple or more often compound, cymiferous, axillary or terminal racemes (*Tropical America, Asia, and Africa, Madagascar*). See p. 4.

## II. CNESTIDEÆ.

4. **Cnestis** J.—Flowers hermaphrodite or polygamous; receptacle shortly conical or depressed at apex. Calyx 5-partite valvate. Petals 5, alternate, often shorter than sepals, valvate or imbricated in æstivation. Stamens 10; filaments connate close to base or free; 5 oppositipetalous reflexed at apex; anthers 2-celled introrse, finally extrorse, 2-rimose. Carpels 5, oppositipetalous sessile; styles short; apices obtuse or capitellate, stigmatiferous; ovules 2 (of *Connarus*). Capsules 1-5, surrounded at base by spreading persistent non-acrescent calyx, velvety or pilose outside, covered with close stiff, stinging hairs within. Seed erect or suberect, arillate or exarillate; albumen fleshy; embryo inverted; cotyledons foliaceous; radicle short superior.—Shrubs or small trees; leaves alternate imparipinnate; flowers in simple or cymiferous, usually axillary, racemes; pedicels often articulated (*Tropical Asia and Africa, Indian Archipelago*). See p. 5.

5. **Cnestidium** PL.—Flowers hermaphrodite (of *Cnestis*); perianth 5- or more rarely unequally 3-, 4-partite. Calyx valvate. Corolla

longer than calyx, valvate. Stamens 10 (of *Cnestis*); filaments connate close to base. Carpels 5, oppositipetalous sessile; style slender elongated; apex thickened, entire or 2-lobed, stigmatiferous. Capsule solitary sessile velvety, glabrous within. Seed furnished at base with a fleshy adnate dimidiate aril.—A velvety-pubescent tree or shrub; leaves alternate-imparipinnate; flowers axillary and terminal, in crowded branched many-flowered cymiferous racemes; pedicels bracteate at base (*Panama, Mexico*). See p. 7.

6. *Tæniochlæna* HOOK. F.—Calyx 5-partite; sepals inserted on a small hemispherical or obconical receptacle, revolute in the fruit, valvate in æstivation. Petals long ligulate glabrous. Stamens 10, and carpels 5 (of *Cnestis*). “Capsules 1–3 sessile ovoid subcompressed obtuse pubescent, quite glabrous within. Seed oblong, base supported on an adnate dimidiate aril; testa shining; cotyledons amygdaloid.”—A subsucculent shrub; branches glabrous; leaves imparipinnate quite glabrous; leaflets subsessile oblong, 2-lobed at apex, coriaceous; flowers axillary cymoso-racemose; inflorescence tomentose, shorter than the leaf; pedicels slender (*Malaysia*). See p. 7.

7. *Manotes* SOLAND.—Flowers hermaphrodite; receptacle conical, produced beyond corolla into a slender erect column bearing carpels at its apex. Calyx 5-partite valvate. Petals 5, alternate linear longer than sepals, imbricated in æstivation, caducous. Stamens 10, inserted below carpels, free, oppositipetalous stamens shorter; anthers introrse 2-rimose, finally reflexed. Carpels 5, oppositipetalous; ovaries free, borne on summit of column; styles linear reflexed; apices capitate stigmatiferous; ovules 2, collateral, inserted either at base or at a variable height on internal angle of ovary, orthotropous or subanatropous; micropyle superior. Capsules 1–5 borne on a common stalk, separately stipitellate, reflexed; pericarp subdrupaceous; epicarp pubescent; mesocarp thin; endocarp woody, much shorter than mesocarp, finally dehiscing as a follicle ventrally. Seed subanatropous descending; external integument cellular even; albumen hard copious; embryo green inverted; radicle short superior; cotyledons foliaceous.—Trees or shrubs, pubescent; leaves imparipinnate; flowers in compound cymiferous, terminal or axillary racemes; pedicels bracteolate articulated (*Western Tropical Africa*). See p. 8.

8. **Tricholobus** BL.—Flowers hermaphrodite; receptacle short conical. Calyx 5-partite valvate, not growing after anthesis. Petals 5, alternisepalous, longer than sepals, imbricated or contorted in æstivation. Stamens 10 (of *Connarus*); 5 oppositipetalous shorter, with sterile anthers or antherless; filament finally elongated, reflexed at apex. Carpel 1; ovary sessile, tapering into a terminal style, with dilated stigmatiferous apex. Ovules 2, collateral, orthotropous or subanatropous; micropyle superior. Fruit sessile or stipitate: pericarp glabrous within, finally dehiscent longitudinally by 2 sutures. Seed of *Connarus*, supported on a basilar aril of variable form; embryo fleshy, thick exalbuminous.—Trees or shrubs; leaves alternate imparipinnate or 1-foliolate (*Ellipanthus*); flowers in axillary or terminal, simple or compound, racemes (*India, Indian Archipelago, Malaysia, Cochin-China*). See p. 9.

## VIII. LEGUMINOSÆ.

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*Leguminosæ*<sup>1</sup> are plants whose fruit is nearly always a pod or *legume* (Fr., *gousse*; Lat., *legumen*). Their gynæceum also almost invariably consists of a single free excentric carpel, whose unilocular ovary contains a pluriovulate, or more rarely uniovulate, parietal placenta. Most of the other characters are variable and have warranted the separation of this order into three suborders, received as such by most authors, but by some considered as so many distinct orders. These three groups we shall be compelled to study separately; we shall therefore follow other botanists, and first point out the distinctive features of each.

I. PAPILIONACEÆ.—Flowers with an irregular corolla known as *papilionaceous*, the standard outside the other petals in the bud. Receptacle concave, of a single piece, and bearing on its edges the perianth and androceum. Radicle of embryo inflexed, accumbent, rarely very short and straight.

II. CÆSALPINIÆÆ.—Flowers with an imbricated corolla, the petal corresponding to the standard overlapped on both edges (more rarely on one only, or even uncovered) by the two neighbouring lateral petals. Receptacle convex with hypogynous insertion, or concave with perigynous insertion of perianth and androceum. Radicle of embryo straight, rarely slightly oblique.

III. MIMOSEÆÆ.—Flowers regular, usually small, with a concave or convex receptacle. Calyx valvate (rarely imbricate), usually gamosepalous, petals valvate, free or coherent to a variable height. Embryo usually straight.

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<sup>1</sup> *Leguminosæ* J., *Gen.*, 345.—GÆRTN., *Prælect.* ed. GIES., 415.—*Papilionaceæ* et *Fruct.*, ii. 301.—DC., *Mém. Légum.* (1825); *Cæsalpinieæ* R. BR., in *Flind. Voy.*, ii. 551.—*Prodr.*, ii. 93.—ENDL., *Gen.*, 1253.—B. H., *Swartzieæ* et *Mimoseæ* ENDL., *op. cit.*, 1321, *Gen.*, 434.—*Papilionaceæ* et *Lomentaceæ* L., 1323.—*Fabaceæ* LINDL., *Veg. Kingd.*, 544.

## SUB-ORDER MIMOSEÆ.

### I. ADENANTHERA SERIES.

*Adenantha*<sup>1</sup> (Fr., *Condori*—figs. 15–19) has regular hermaphrodite flowers, with a short, hollow, cornet-shaped receptacle, bearing a

*Adenantha pavonina* (Red Sandal-wood Tree).

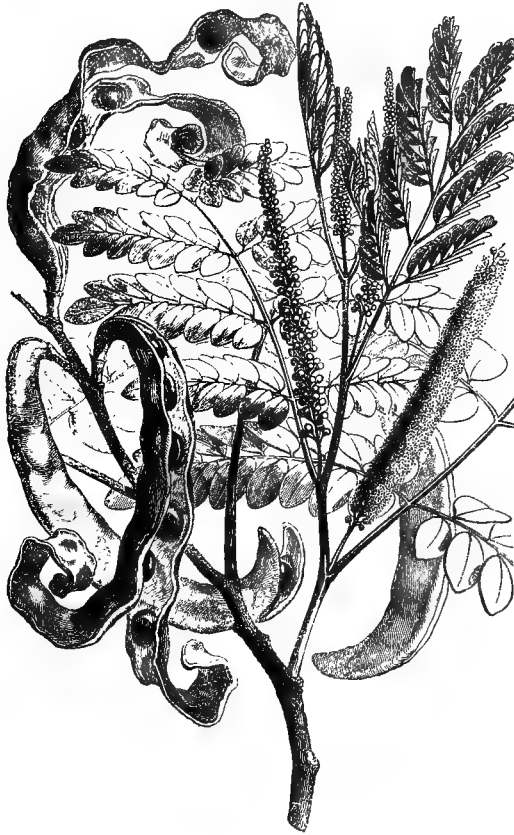


FIG. 15.—Habit.

calyx of five<sup>2</sup> valvate teeth, and a corolla of as many alternating

<sup>1</sup> *Adenantha* L., *Gen.*, 526. — J., *Gen.*, 349. — GÆRTN., *Fruct.*, ii. 149. — LAMK., *Dict.*, ii. 76; *Ill.*, t. 334. — DC., *Prodr.*, ii. 446. — SPACH, *Suit. à Buffon*, i. 61. — ENDL., *Gen.*, n. 6820. — B. H., *Gen.*, 590, n. 378. — *Clypearia* RUMPH., *Herb. Amb.*, iii.

t. 109, 111, 112. — *Stachydrisum* BOJ., *Hort. Maur.*, 114. — *Gonsii* BRAM., ex ADANS., *Fam. des Pl.*, ii. 318?

<sup>2</sup> The flowers are exceptionally tetramerous. The gynæceum very rarely remains rudimentary, so that the flowers are male.

free<sup>1</sup> petals, much longer than those teeth, and valvate in the bud.<sup>2</sup> The androceum consists of ten stamens, the five superposed to the teeth of the calyx larger than those alternating with them. Each has a free exerted filament<sup>3</sup> and an introrse two-celled anther, which

*Adenantha pavonina.*

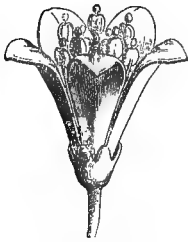


FIG. 16.  
Flower.

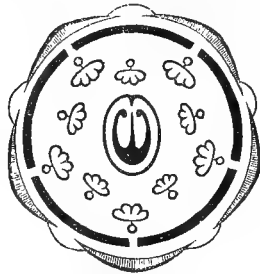


FIG. 18.  
Diagram.

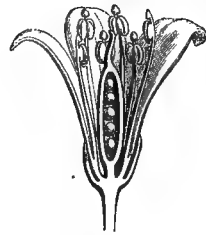


FIG. 17.  
Longitudinal section of flower.

dehisces longitudinally,<sup>4</sup> and is surmounted by a prolongation of the connective, forming a little caducous glandular ball. The gynæceum, inserted in the very bottom of the receptacle, consists of a single carpel superposed to one of the sepals. Its ovary, subsessile free and one-celled, tapers above into a slender style, scarcely dilated at the stigmatiferous apex. Inside the cell of the ovary and opposite to one of the petals<sup>5</sup> is a longitudinal parietal placenta, whose two vertical lips bear each a variable number of ovules in a row.<sup>6</sup> They are descending and anatropous, with the micropyles upwards and outwards. The fruit is a narrow elongated pod, straight or curved. The pericarp opens lengthwise into two valves which usually curl back, their inner faces presenting the rudimentary false dissepiment which had hitherto separated the seeds (fig. 15). These are thick and sublenticular, containing in their coats a nearly horny albumen surrounding a

*Adenantha pavonina.*

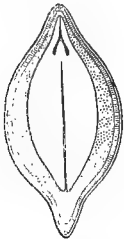


FIG. 19.  
Longitudinal section of seed.

<sup>1</sup> Their edges may sometimes stick together for a variable distance.

<sup>2</sup> Or slightly imbricate near the apex.

<sup>3</sup> The insertion of the filament is peculiar, as will be seen on referring to fig. 17. The corolla and androceum rise in fact from the rim of a little obconical common tube, inserted below, and external to the foot of the ovary; and at the same point comes off the base of the calyx, seated evidently much lower down than the point where

the stamens and petals separate, this peculiar insertion of the floral verticils is yet more marked in certain other *Mimoseæ*.

<sup>4</sup> The pollen consists of a large number of free grains, as is the case in all *Adenanthereæ* in which this point has been studied.

<sup>5</sup> Called the *vevillary* petal.

<sup>6</sup> There are five or six in each row in *A. pavonina* L. (*Spec.*, 550;—*JACQ.*, *Collect.*, iv. 212, t. 23;—*DC.*, *Prodr.*, n. 1).



large fleshy embryo. The superior radicle is surrounded by a sheath longer than itself, formed by the approximated decurrent bases of the auriculate cotyledons (fig. 19). Of the genus *Adenanthera* two or three species are known,<sup>1</sup> unarmed trees from Asia, Australia, Africa, and tropical America, with alternate bipinnate leaves possessing two lateral stipules. The flowers<sup>2</sup> are in axillary racemes, or are collected into compound racemes terminating the branches.

The genera which have been placed near *Adenanthera* differ in but few characters, which here assume an importance greater than is assigned them elsewhere. But we must remember that it is a very natural group that we have to deal with, and so closely are its component genera allied that they were all formerly considered as members of either *Acacia* or *Mimosa*. These differentiating characters are drawn from the structure, form, and dehiscence of the fruit; besides several of less value derived from the organization of the flower.

Thus *Elephantorrhiza*<sup>3</sup> has altogether the pedicellate flower<sup>4</sup> and the inflorescence of *Adenanthera*; but its fruit is broad and flattened, with a coriaceous pericarp. At maturity the two sutures, one on either edge, remain *in situ*, while the valves of the pericarp separate, forming two flaps; these again each split into two leaves, the endocarp coming away from the mesocarp. Two species of this genus are known,<sup>5</sup> undershrubs from the Cape of Good Hope, with a thick rhizome, a humble stem, and bipinnate eglandular leaves. The flowers, which may be polygamous, are in racemes, either solitary axillary, or ramified on certain axes which only bear bracts instead of leaves.

In *Stryphnodendron*,<sup>6</sup> too, the flowers are closely similar to those of *Adenanthera*, and are borne on short pedicels as in *Elephantorrhiza Burchellii*, or are sometimes subsessile.<sup>7</sup> But the receptacle is already

<sup>1</sup> WIGHT., *Ill.*, i. t. 84 (80).—WIGHT & ARN., *Prodr.*, ii. 271.—THW., *Enum. Pl. Zeyl.*, 98.—BENTH., *Fl. Austral.*, ii. 298.—HARV. & SONDR., *Fl. Cap.* ii. 276, n. 2<sup>a</sup>.—H. BN., in *Adansonia*, vi. 207.—WALP., *Rep.*, v. 580; *Ann.*, iv. 613.—OLIV., *Fl. Trop. Afr.*, ii. 329.

<sup>2</sup> They are usually echeloned in pairs on the rachis of the inflorescence.

<sup>3</sup> BENTH., in *Hook. Journ.*, iv. 344.—B. H., *Gen.*, 590, n. 379.

<sup>4</sup> In *E. Burkei* BENTH. the pedicel is nearly as long as in *Adenanthera*, but it becomes even shorter than the calyx in *E. Burchellii* BENTH.

(*Acacia elephantorrhiza* DC., *Prodr.*, ii. 457;—*A. elephantina* BURCH., *Trav.*, ii. 236;—*Prosopis elephantorrhiza* SPRENG;—*P. elephantina* E. MEX.). The glands surmounting the anthers are borne on slender stalks, and fall very early in this species. The stamens are inserted exactly as in *Adenanthera*.

<sup>5</sup> HARV. & SONDR., *Fl. Cap.*, ii. 277.

<sup>6</sup> MART., *Herb. Fl. Bras.*, 117.—ENDL., *Gen.*, n. 6837 a.—B. H., *Gen.*, 590, n. 377.

<sup>7</sup> There is usually one articulation at either end of the pedicel.

more flattened out than in the preceding genera, and is lined by a thick disk whose rim presents ten projections, alternating with which are as many notches corresponding with the stamens. These last are more external, and their filaments, exerted in anthesis, are twisted or corrugated in the bud. The gynæceum is borne on a slender stalk, and the style ends in a slight stigmatic dilatation. The pod is compressed and thick-walled, the endocarp projecting between the seeds to form more or less complete partitions. The pericarp finally opens down both edges. The seeds are attached to its interior by elongated funicles more or less bent on themselves. *Stryphnodendron* consists of trees or shrubs from tropical America. Their leaves are bipinnate, whose usually sessile leaflets, nearly as broad as long, have hairs scattered irregularly over their surface. Their flowers are also sometimes polygamous; they grow in axillary racemes like those of *Adenantha*. About half a dozen species are known.<sup>1</sup>

The flowers of *Piptadenia*<sup>2</sup> resemble those of *Stryphnodendron*,<sup>3</sup> and are sessile or shortly pedicellate.<sup>4</sup> They are hermaphrodite or polygamous, arranged either in more or less elongated racemes, or in spikes, which again may be also elongated, or else very short and sometimes globular (capitula). These inflorescences are pedunculate, axillary or terminal, either simple and solitary, or ramified. The pod, sessile or more frequently stipitate, opens like that of *Stryphnodendron*, by two longitudinal clefts; but it has only a single cavity containing seeds suspended by slender funicles, for its membranous or coriaceous walls present no thickenings or false dissepiments between the seeds. In *Piptadenia* proper<sup>5</sup> the pericarp is thin and smooth or reticulate. In *Pytirocarpa*<sup>6</sup> the valves, thicker and more or less wrinkled on the surface, have their edges more or less pushed inwards in the intervals between the seeds. In both of these subgenera the flowers are racemose. But *Niopa*, with the fruit of *Pytirocarpa*, has a caputular inflorescence; while in a fourth small group, which we may term *Piptoniopa*, the fruit is that of *Piptadenia*

<sup>1</sup> AUBL., *Guian.*, ii. 938, t. 357.—VELLOZ., *Fl. Flum.*, xi. t. 7.—PEPP. & ENDL., *Nov. Gen. et Spec.*, iii. t. 291.—WALP., *Rep.*, i. 860; v. 579.

<sup>2</sup> BENTH., in *Hook. Journ.*, iv. 334.—B. H., *Gen.*, 589, n. 376.

<sup>3</sup> These flowers are normally pentamerous, the receptacle is small and cupuliform with rounded fleshy edges; the stamens are first cor-

rugated in the bud, but are afterwards long and exerted in the flower, the ovary is stipitate, often hairy, and is surmounted by a truncate style; the ovules are descending, with the micropyles looking upwards and outwards.

<sup>4</sup> The pedicels are articulated at either end.

<sup>5</sup> *Eupiptadenia* B. H., *Gen.*, 590.

<sup>6</sup> B. H., *Gen.*, loc. cit.

proper, while the flowers are in globular heads. Altogether about thirty species of *Piptadenia* are known ;<sup>1</sup> with the exception of two doubtful species from tropical Africa,<sup>2</sup> they are all natives of tropical America. They are trees or shrubs, naked or covered with prickles, with bipinnate leaves whose petiole and rachis are almost always glandular.

In habit and inflorescence *Plathymenia*<sup>3</sup> is very like *Stryphnodendron*, or the racemose species of *Piptadenia*. Its flowers are altogether those of the former genus in perianth,<sup>4</sup> androceum, and stipitate ovary, down to the disk internal to the androceum. But the fruit differs from that of *Piptadenia*, *Elephantorrhiza*, and *Entada*, though possessing features of each. Thus the cavity of the pericarp is single, and its exocarp<sup>5</sup> splits along the sutures into two valves, as in *Piptadenia*. But, as in *Elephantorrhiza*, this separates from the endocarp ; which last divides transversely, as in *Entada*, into as many indehiscent joints as there are seeds. These resemble those of *Stryphnodendron*, and are attached by long slender funicles. This genus is Brazilian, comprising two species,<sup>6</sup> shrubs, with bipinnate leaves whose petiole and rachis are usually glandular.

In *Xylia*,<sup>7</sup> as in the section *Niopa* of *Piptadenia*, the flowers are arranged in pedunculate globular capitula, either solitary axillary, or collected into terminal racemes. Each flower, often hermaphrodite, pentamerous or tetramerous, is sessile in the axil of a bract. Its receptacle forms a little corinet, on whose rim are inserted a gamosepalous calyx with four or five valvate teeth, a corolla whose petals are also valvate and free, or slightly coherent at the base, and eight or ten stamens arranged in two whorls, with free filaments and introrse two-celled anthers, each surmounted by a little stipitate gland which falls very early.<sup>8</sup> The gynæceum is the same as in *Adenantha*. The fruit is a thick, woody, compressed, sickle-shaped, sessile, bivalve pod, with false dissepiments interposed between the obovate

<sup>1</sup> VELLOZ., *Fl. Flumin.*, xi. t. 6, 16, 40.—K., *Mimos.*, t. 25, 30.—WALP., *Rep.*, i. 858 ; v. 578 ; *Ann.*, ii. 450.

<sup>2</sup> HOOK. F., *Niger*, 330.—H. BN., in *Adansonia*, vi. 211.—OLIV., *Fl. Trop. Afr.*, ii. 328.

<sup>3</sup> BENTH., in *Hook. Journ.*, iv. 333.—B. H., *Gen.*, 589, n. 375.—*Chrysoxylon* CASAR., *Nov. Stirp. Decad.*, 59.

<sup>4</sup> The upper part of the corolla is sometimes slightly imbricated.

<sup>5</sup> We use this word for shortness to designate the epicarp and mesocarp together.

<sup>6</sup> VELLOZ., *Fl. Flumin.*, iv. t. 72, ex CASAR. (?).—WALP., *Rep.*, i. 858.

<sup>7</sup> BENTH., in *Hook. Journ.*, iv. 417.—B. H., *Gen.*, 594, n. 390.

<sup>8</sup> The existence of this gland has been overlooked, so that *Xylia*, which possesses the inflorescence of *Leucæna* has been hitherto placed near it ; but yet, despite the slight value of such a character, if we use it to distinguish *Adenantha*, and absolutely refuse it to *Eumimoseæ*, *Xylia* must perforce be intercalated in the series under consideration.

seeds suspended on fleshy funicles. *X. dolabriformis*,<sup>1</sup> the only species of this genus, is a lofty unarmed tree, from tropical Asia. Its leaves are bipinnate, with a few broad leaflets possessing petiolar glands.

*Entada*,<sup>2</sup> too, possesses the flowers of *Adenantha*, *Elephantorrhiza*, &c. The receptacle forms a shallow cup lined by a glandular disk, external to which are inserted the stamens. The petals are free, but their edges often stick together for some way up from the base.

*Entada polystachya*.

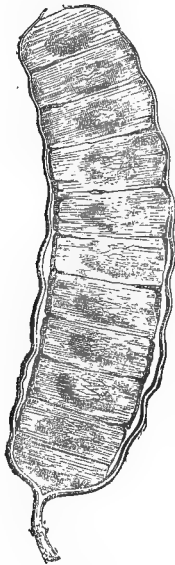


FIG. 20.  
Fruit.

The gynæceum is sessile or nearly so. Hence, to find characters peculiar to the genus we must turn our attention elsewhere. In the fruit alone will such be found. It forms a flattened pod, straight or curved edgewise, as the pericarp is thin or thick and woody. At maturity the marginal sutures persist (fig. 20), while the valves separate into as many joints as there are seeds. The lines of demarcation are transverse and very sharp; and at each line the two walls of the endocarp touch, the pericarp forming as many rectangular segments, usually transversely elongated and persisting around the seeds, which they envelope completely. Each seed contains within its coriaceous coats a large exalbuminous embryo. *Entada* consists of ten or twelve species<sup>3</sup> of tropical plants, of which one-third belong to Africa and another to America; while one species, *E. scandens*, BENTH.,<sup>4</sup> is naturalized on the coasts of all warm countries. The genus consists of shrubs, often climbing and holding on by tendrils representing the terminal leaflets of their bipinnate leaves; these are not glandular, and possess two lateral stipules. The flowers, hermaphrodite or polygamous, form slender spikes, terminal or axillary, solitary or geminate, or even collected at the ends of the branches

<sup>1</sup> BENTH., *loc. cit.*—WALP., *Rep.*, v. 587.—*Mimosa dolabriformis* ROXB., *Pl. Coromand.*, i. t. 100.

<sup>2</sup> ADANS., *Fam. des Pl.*, ii. 318.—DC., *Mém. Légum.*, 419, t. 61, 62; *Prodr.*, ii. 424.—ENDL., *Gen.*, n. 6832.—B. II., *Gen.*, 589, n. 374.—*Gigalobium* P. BE., *Jamaic.*, 362.—*Pursatha* L., *Fl. Zeyl.*, 644.—*Adenopodia* PRESL., *Epimel.*, 206.

<sup>3</sup> JACQ., *Amer.*, t. 183, fig. 93.—WIGHT & ARN., *Prodr.*, i. 267.—MIQ., *Fl. Ind.-Bat.*,

i. 75.—RICH., GUILL. & PERR., *Fl. Seneg. Tent.*, i. 233.—H. BN., in *Adansonia*, vi. 208.—HARV. & SOND., *Fl. Cap.*, ii. 276.—WALP., *Rep.*, i. 858; v. 578; *Ann.*, ii. 450; iv. 616.

<sup>4</sup> *E. Gigalobium* DC., *Mém. Légum.*, 12; *Prodr.*, n. 1.—*E. Pursatha* DC., *loc. cit.*, n. 2.—*E. monostachya* DC., *loc. cit.*, n. 3.—*Mimosa scandens* Sw., *Obs.*, 389.—ROXB., *Cat.*, 40.—*M. Entada* W., *Spec.* iv. 1041.—*Entada* RHEED, *Hort. Malab.*, ix. t. 77.

into a single large common ramified raceme. Each flower is articulated at the base on the common rachis.<sup>1</sup>

*Tetrapleura*<sup>2</sup> has the axillary inflorescence and the shortly pedicellate flowers of *Styphnodendron*. According to THÖNNING'S description<sup>3</sup> all the parts of the flower are exactly similar to what is known of *Entada* and *Adenanthera*. But the pod, which is alone to be studied in our collections, is a peculiar conformation, and suffices to distinguish this genus from the preceding ones. This pod, either straight or bowed, thick coriaceous and indehiscent, bears along its whole length four nearly equal projecting angles or wings; the ventral placentary suture corresponding to one of the intervening furrows. The indefinite seeds are separated by thickenings of the endocarp. The only known species<sup>4</sup> is a lofty tree, from the west of tropical Africa. It is said that its bipinnate leaves are opposite, and that its flowers are grouped in axillary racemes.

*Gagnebina*<sup>5</sup> is easily distinguished from all the preceding genera by characters, which, though very important elsewhere, are here altogether secondary. The floral receptacle is convex, so that the insertion of the perianth and androceum is really hypogynous. The calyx is gamosepalous, five-toothed, and membranous, valvate in the bud. There are five free valvate petals, and ten free stamens with narrow elongated sagittate introrse two-celled anthers, each crowned by a little glandular swelling. The stipitate ovary contains numerous descending subanatropous ovules, in two vertical rows. The fruit is stipitate, oblong, compressed, slightly bowed or sinuous, indehiscent. Its two marginal sutures project distally into membranous wings of sinuous outline. The endocarp grows in between the seeds, including each in a little separate cell. Within the seed coats is a fleshy embryo, surrounded by no great quantity of albumen. The only known species<sup>6</sup> of this genus is a tree from Mada-

<sup>1</sup> Usually the pedicel is very slender, and is received into a little conical hollow in the base of the flower; so that the bud appears sessile and covers the short pedicel with a sort of cap or bell, whose free rim is more or less thickened.

<sup>2</sup> BENTH., in *Hook. Journ.*, iv. 345.—H. BN., in *Adansonia*, vi. 192, 211, t. iv. fig. 5.—B. H., *Gen.*, 590, ii. 380.

<sup>3</sup> *Beskr.*, 233.

<sup>4</sup> *T. Thönningii* BENTH., *loc. cit.*; *Niger*, 211.—WALP., *Rep.*, v. 581.—*Adenanthera tetraptera* SCHUM. & THÖNN., *loc. cit.* [OLIVER,

*op. cit.*, ii. 331, gives another species, *T. andongonensis*, WELW., *Mss.* and adds, "Besides the above, Dr. Welwitsch collected . . . the fruit of probably a third species of *Tetrapleura* (*T. obtusangula* WELW.)."]

<sup>5</sup> NECK., *Elem.*, n. 1296.—DC., *Mém. Légum.*, 423, t. 64; *Prodr.*, ii. 431.—ENDL., *Gen.*, n. 6833.—B. H., *Gen.*, 591, n. 381.

<sup>6</sup> *G. tamariscina* DC.—*G. axillaris* DC.—*Mimosa tamariscina* LAMK., *Dict.*, i. 13.—*M. pterocarpa* LAMK., *loc. cit.*—*Acacia tamariscina* W., *Spec.*, iv. 1062.

gascar, with bipinnate setaceous leaves possessing a glanduliferous rachis and two lateral stipules. The flowers are collected into cylindrical spikes, solitary or fascicled in the axils of the leaves, or of the bracts that take the place of leaves at the ends of the branches.

*Prosopis*,<sup>1</sup> with the flower of the preceding genera, and especially of *Piptadenia*, has indehiscent fruits like *Gagnebina*, but they are wingless, and vary greatly in general form. The pericarp is always coriaceous, with a thick, spongy or suberous mesocarp, and a cartilaginous or papery endocarp, continuous with the septa between the seeds, and even forming a sort of stone of variable thickness round each. In the species of the section *Anonychium*<sup>2</sup> the pod is

*Prosopis*  
(*Strombocarpus*)  
*strombulifera*.



FIG. 21.  
Fruit.

straight, hard, and very thick. In *Adenopis*<sup>3</sup> it is cylindroidal, elongated, torulose,<sup>4</sup> or irregularly thickened or distorted.<sup>5</sup> The fruit of *Algarobia*<sup>6</sup> is elongated, straight, or bowed, cylindrical or compressed, narrower between the seeds, and hence moniliform. The pod of *Circinaria*<sup>7</sup> is not only bowed, but twisted more or less into a spiral; and as its turns are not all quite in one and the same plane, this fruit affords a transition to *Strombocarpus*,<sup>8</sup> which is rolled up like a corkscrew, either loosely and irregularly, or very regularly (fig. 21) and with the turns of its spiral in very close contact. Thus constituted, the genus *Prosopis* contains some fifteen species<sup>9</sup> from all tropical and subtropical regions. They are naked or spiny trees or shrubs, with stipulate or exstipulate leaves, whose petioles may or may not possess glands.

The flowers, usually axillary, form spikes, cylindrical, or more rarely globular or ovoidal.

<sup>1</sup> L., *Mantiss.*, n. 1260.—J., *Gen.*, 348.—K., *Mimos.*, 106.—DC., *Prodr.*, ii. 446.—ENDL., *Gen.*, n. 6821.—B. H., *Gen.*, 591, n. 382.—OLIV., *Fl. Trop. Afr.* ii. 331.

<sup>2</sup> BENTH., *Gen.*, loc. cit., 2. This section includes two African species, with velvety ovaries and internally glabrous petals.

<sup>3</sup> DC., *Prodr.*, sect. 1.—*Lagonychium* BIEB., *Fl. Taur.-Cauc.*, iii. 288.—DC., *Prodr.*, ii. 448.—DELESS.,  *Ic. select.*, iii. 42, t. 75.—ENDL., *Gen.*, n. 6822. The petals are also glabrous internally, but the ovary is glabrous as well, the branches are often covered with scattered prickles.

<sup>4</sup> As in *P. spicigera* L. (*Mantiss.*, 68,) an Indian species (BURM., *Ind.*, t. 25, fig. 3.—ROXB., *Pl. Coromand.*, t. 63).

<sup>5</sup> In a second species from Western Asia, *P. Stephaniana* (*Lagonychium Stephanianum*, BIEB., *op. cit.*, 288;—*Acacia Stephaniana*, BIEB., *op. cit.*, ii. 449).

<sup>6</sup> BENTH., *Pl. Hartweg.*, 13.—TORR. & GR., in *Ann. Lyc. New York*, ii. t. 12; *Fl. N. Amer.* 399.—K., *Mimos.*, t. 33, 34.—DC., *Prodr.*, sect. ii.—ENDL., *Gen.*, n. 6823.

<sup>7</sup> B. H., *Gen.*, loc. cit., 4. This section has only a single species from tropical Africa.

<sup>8</sup> A. GRAY, *Pl. Lindl. heym.*, i. 35.—TORR., in *Frem. Rep.*, t. 1.—BENTH., *Gen.*, loc. cit., 5.—WALP., *Ann.* iv. 614. This section is made up of five American species.

<sup>9</sup> WALP., *Rep.*, i. 861; x. 582; *Ann.*, i. 259.

*Xerocladia*<sup>1</sup> is a small bushy shrub, of the habit of several species of *Strombocarpus*, with recurved spinescent stipules, and its flowers collected into globular, axillary, pedunculate capitula. But the sessile ovary only contains a single ovule,<sup>2</sup> and becomes, we are told, a flattened, ovate-falciform, or half orbicular, indehiscent, one-seeded fruit, with the inferior suture flattened out into a wing. *X. Zeyheri* HARV., is the only known species of this genus, and is found at the Cape of Good Hope.

The genus *Dichrostachys*<sup>3</sup> derives its name from the peculiar appearance of the expanded inflorescence, due to the two kinds of flowers composing it. Those of the upper part of the spike<sup>4</sup> are fertile and hermaphrodite, like those of *Gagnebina*; while towards the base they are neuter or male<sup>5</sup> through some of their stamens becoming much elongated and bearing pollen; but the gynæceum still remains sterile and rudimentary. In the hermaphrodite flowers, the stamens are much shorter and hypogynous, and their anthers are surmounted by a globular gland, which is borne on a filiform, relatively much elongated stalk. The fruit is a pod of a single cavity, compressed and more or less irregularly bent on itself, with a coriaceous pericarp, either indehiscent or dehiscing irregularly by the separation of its valves and sutures. The seeds are those of *Aden-anthera*, but more elongated and obovate, and the embryo is surrounded by a coriaceous albumen. Four or five species of this genus<sup>6</sup> are known, one African, one Australian, and the rest Asiatic. They are shrubs, whose branches often abort to some extent and are transformed into spines, with alternate bipinnate leaves, and solitary or geminate spikes, often drooping and usually borne on little peculiar branches that end in a spine, and bear closely-set leaves, inserted with numerous bracts towards the base.

In inflorescence, *Neptunia*<sup>7</sup> comes very near *Dichrostachys*; for

<sup>1</sup> HARV., *Fl. Cap.*, ii. 278.—B. H., *Gen.*, 591, n. 383 (a very doubtful genus).

<sup>2</sup> "1.-(v. 2.)-ovulatum" (B. H., *loc. cit.*).

<sup>3</sup> DC., *Mém. Légum.*, 428, t. 67; *Prodr.*, ii. 445.—WIGHT & ARN., *Prodr.*, i. 271.—B. H., *Gen.*, 592, n. 384.—*Caillea* GUILL. & PERR., *Fl. Seneg. Tent.*, i. 239.—ENDL., *Gen.*, n. 6826.

<sup>4</sup> Its axis is here swollen. The surface is pitted with hollows in which the flowers, axillary to narrow bracts, are inserted.

<sup>5</sup> These are white lilac or red, while the upper flowers are yellow.

<sup>6</sup> ROXB., *Pl. Coromand.*, t. 174.—WIGHT, *Icon.*, t. 357.—BENTH., in *Hook. Journ.*, iv. 353; *Fl. Austral.*, ii. 299.—HARV. & SONDR., *Fl. Cap.*, ii. 278.—WALP., *Rep.*, i. 863; *Ann.*, iv. 615.—OLIV., *Fl. Trop. Afr.*, ii. 332. This author admits two species.

<sup>7</sup> LOUR., *Fl. Cochinch.*, éd. 1 (1790), 654.—DC., *Prodr.*, ii. 445.—ENDL., *Gen.*, n. 6828, a.—B. H., *Gen.*, 592, n. 385. Most authors make this genus only a section of *Desmanthus*; but the anthers of the latter lack the terminal gland.

the short spikes possess long axillary peduncles, and the inferior flowers differ from the superior in that the former are sterile, possessing long exerted petaloid blades, which are membranous staminodes, with or without rudiments of anthers at the apex; while the latter are, on the contrary, hermaphrodite, much smaller, and usually much less bright in colour. They possess a gamosepalous calyx with five valvate teeth, five valvate petals, ten stamens with apical glands, and an ovary with a variable number of descending ovules in two vertical rows.<sup>1</sup> In the basal flowers the gynæceum is rudimentary or absent, and the perianth much less developed; all that we see, so to say, is the large petaloid staminodes.<sup>2</sup> The fruit is a compressed, oblong, coriaceous, two-valved pod, bent at an angle with its stalk, with false dissepiments interposed between the oval compressed seeds. *Neptunia* is of peculiar habit; the genus consists of herbaceous or suffrutescent herbs, often floating, with thick, compressed, or triquetrous branches, usually bearing adventitious roots. The leaves are alternate, bipinnate, with obliquely cordiform membranous stipules. In the more or less submerged species the leaves and inflorescences rise to the surface before expansion. Seven or eight species of this genus are known;<sup>3</sup> inhabiting the warmer regions of America, North and South, Asia, and Africa.

## II. MIMOSA SERIES.

In *Mimosa*<sup>4</sup> (Fr., *Mimeuse*—figs. 22, 23) the flowers are hermaphrodite, or more rarely polygamous.<sup>5</sup> In the different species of this genus, some two hundred in number, we find pretty considerable

<sup>1</sup> The young style is like a broad funnel with a papillose rim. Later on it is much elongated, so that the terminal stigmatiferous dilatation becomes relatively ill marked.

<sup>2</sup> There are really three sorts of flowers in many species, hermaphrodite flowers at the apex, flowers with a gynæceum (except a rudimentary ovary), and with large petaloid staminal filaments altogether sterile, at the base; and between the two sets others, some of whose stamens are fertile, with more or less elongated flattened filaments.

<sup>3</sup> MILL., *Icon.*, t. 282.—ROXB., *Pl. Coromand.*, t. 119.—JACQ., *F.*, *Eclog.*, t. 50.—

H. B. K., *Nov. Gen. et Spec.*, i. t. 16.—WIGHT, *Icon.*, t. 756.—*Bot. Mag.*, t. 4695.—*Bot. Reg.* (1846), t. 3.—RICH., GUILL. & PERB., *Fl. Seneg. Tent.*, i. 238.—WALP., *Rep.*, i. 863; v. 583; *Ann.*, iv. 614.—OLIV., *Fl. Trop. Afr.*, ii. 333.

<sup>4</sup> *Mimosa* L., *Gen.*, n. 1158 (part.).—ADANS., *Fam. des Pl.*, ii. 3119.—J., *Gen.*, 346.—POIR., *Dict.*, Suppl., i. 49.—GÆRTN., *Fruct.*, ii. 344.—K., *Mimos.*, 1.—DC., *Prodr.*, ii. 425.—SPACH, *Suit. à Buffon*, i. 51.—ENDL., *Gen.*, n. 6831.—B. H., *Gen.*, 593, n. 387.

<sup>5</sup> Usually 4-5-merous, more rarely 4-6-merous.



variations in the structure of the flowers. Let us, for instance, first analyze those of the Sensitive plant (*Mimosa pudica*;<sup>1</sup> Fr., *Sensitive*). We find that the receptacle forms a tiny inverted cone, round whose base are inserted the tetramerous calyx, corolla, and androceum, and a unicarpellary gynæceum. The calyx is very short, gamosepalous, and membranous, with four valvate teeth, two anterior and two

*Mimosa pudica* (*Sensitive Plant*).



FIG. 22.  
Branch.

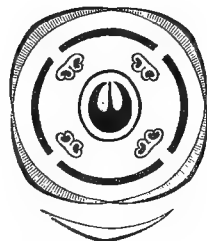


FIG. 23.  
Diagram.

posterior. The corolla is much longer and tubular, with four valvate leaves, alternating with the calyx-lobes and united by their edges for a variable distance. The stamens are alternipetalous, inserted below the foot of the ovary, with free filaments doubled up in the bud, but much exerted in anthesis and bearing introrse two-celled anthers,<sup>2</sup> dehiscing longitudinally. The stipitate one-celled ovary, ending in a long style undilated at its stigmatiferous apex, contains four ovules inserted in pairs on a posterior oppositipetalous parietal placenta (fig. 25). These ovules are anatropous and descending, with the micropyle upwards and outwards. The fruit is a pod, whose pericarp is edged by a continuous string covered with soft prickles. From the whole length of this the two glabrous valves separate at maturity, dividing into as many joints as there are seeds. These contain a fleshy embryo surrounded by pretty copious albumen.

All the *Mimosas* which approach this species and possess isostemonous flowers belong to the section of the genus named *Eumimosa*.<sup>3</sup>

<sup>1</sup> L., *Spec.*, 1501.—H. B. K., *op. cit.*, vi. 252.—DC., *Prodr.*, ii. 426, n. 12.

<sup>2</sup> The cells are nearly lateral, and as it were

suspended on top of the filament. The pollen is in numerous grains as in *Adenanthera*.

<sup>3</sup> DC., *Mém. Légum.*, 12; *Prodr.*, sect. 1.

Their flowers are rarely tetramerous, but more frequently penta- or hexamerous. Their pod breaks up into one-seeded joints, and its marginal string is glabrous or provided with prickles of little rigidity. All are trees or shrubs from tropical America,<sup>1</sup> with alternate bipinnate sensitive<sup>2</sup> leaves (fig. 22) and non-glandular petioles. The flowers form short spikes or globular capitula, differently situated even in one and the same plant.<sup>3</sup> Each flower is axillary to a bract. Sometimes the calyx is rudimentary and reduced to a few short ciliate bristles.

In all the other *Mimosas* the androceum is diplostemonous, there being oppositisepalous stamens in addition to those of which we have spoken. The number of parts in the floral whorls varies from three to five or six, but is usually four or five. In some species, forming the section *Habbasia*,<sup>4</sup> the pods separate into joints as in *Eumimosa*; the marginal cords are naked or bear prickles, often hooked. This section consists of trees or shrubs, sometimes climbing, rarely herbs, from tropical America, Asia, and Africa, with glandular or eglandular leaves bearing long rigid bristles between the pinnules.<sup>5</sup> In the remaining species, however, the valves of the fruit fall in single pieces; the petioles very seldom possess glands or bristles between the pinnules; the leaves are even sometimes absent or replaced by phyllodes. They are trees, or rarely herbs, from America, and make up the section *Ameria*.<sup>6</sup>

The flowers of *Schranckia*<sup>7</sup> resemble those of *Mimosa*, with the

<sup>1</sup> There are upwards of a hundred. VELLOZ., *Fl. Flum.*, xi. t. 31, 33, 34.—H. B. K., *Nov. Gen. et Spec.*, vi. 248.—K., *Mimos.*, t. 1-5.—HOOK., *Icon.*, t. 373.—*Bot. Reg.*, t. 25, 941.—KARST., *Fl. Columb.*, t. 130, 131.

<sup>2</sup> Several species have leaves which fold up quickly under different influences, especially that of any shock or touch. In *M. pudica* the leaflets rise up and fold together, overlapping like tiles; the secondary petioles are approximated, while the common petiole descends on the branch.

<sup>3</sup> The inflorescences are often axillary. In *M. floribunda* W., and very many allied species, there are two pedunculate capitula in the axil of a single leaf. They are really inserted on a little axillary branch which ends in a bud. In *M. pudica* this short axillary branch ends in a bud, and bears first a capitulum on either side above the stipules of the axillant leaf, next two others, one between either of the former and the

little bud, and so on. In certain species there are only bracts instead of leaves at the summit of the branches; in that case we have terminal racemes of capitula or spikes.

<sup>4</sup> DC., *op. cit.*, 428, sect. ii. (incl. *Bataucolon* DC., *op. cit.*, 428, sect. iii.).

<sup>5</sup> This genus includes some sixty species. CAV., *Icon.*, t. 295.—ROXB., *Pl. Corom.*, t. 200.—VELLOZ., *op. cit.*, xi. t. 35.—K., *Mimos.*, t. 6-10, 23.—DC., *Mém. Légum.*, t. 63.—HOOK., *Icon.*, t. 456.—KARST., *op. cit.*, t. 132, 133.—OLIV., *Fl. Trop. Afr.*, ii. 335.

<sup>6</sup> BENTH., *loc. cit.* About fifty species are known. K., *op. cit.*, t. 26.—REICH., *Icon. Exot.*, t. 63.—*Bot. Reg.* (1842), t. 33. For the species of this genus generally see WALP., *Rep.*, i. 864; ii. 905; *Ann.* i. 260; ii. 450; iv. 615.

<sup>7</sup> W., *Spec.*, iv. 1041 (nec MEDIK).—DC., *Prodr.*, ii. 443.—ENDL., *Gen.*, n. 6829.—B. H., *Gen.*, 593, n. 388.—*Leptoglottis* DC., *Mém. Légum.*, 451.

same variations in the numbers of all the parts.<sup>1</sup> But the pods, covered with prickles, open in a way peculiar to themselves, separating into four panels by as many longitudinal clefts. Of these panels two are lateral and are usually the narrower; they correspond to the ordinary valves of a Leguminose pod. The two others, despite their breadth, represent the dorsal and ventral edges. This latter edge bears the seeds<sup>2</sup> attached to the middle of its interior face by very slender funicles. This genus contains half a score known species,<sup>3</sup> prickly herbs or undershrubs with the bipinnate leaves of *Mimosa*. Their inflorescence consists of axillary spikes, short and globular in *Euschranchia*,<sup>4</sup> elongated and cylindrical in the section *Rhodostachys*.

*Leucæna*<sup>5</sup> has the pentamerous flowers of a diplostemonous *Mimosa*, possessing a gamosepalous calyx with valvate teeth, and five alternating free petals, not touching at all by their contracted bases and valvate above. The ten stamens superposed to the perianth-leaves possess free filaments inserted beneath the foot of the ovary, and glandular introrse two-celled anthers. The shortly stipitate ovary is multi-ovulate, and is surmounted by a style, dilated and hollow at its stigmatiferous apex. The pod is straight and flattened, with a rigid pericarp opening simply into two longitudinal valves. There are no complete false septa separating the rather oblique seeds. *Leucæna* consists of unarmed trees and shrubs; seven or eight species are known,<sup>6</sup> all from the warmer regions of America, except one alone, a native of the Pacific which has spread over all the warm countries of the globe. The leaves are alternate bipinnate; the petioles often glandular. The flowers form globular pedunculate capitula, either connected into racemes, or in pairs, each pair on a very short rudimentary axillary branch. Each flower is axillary to a bract tapering at the base and dilated at the apex.

*Desmanthus*<sup>7</sup> has little flowers, formed like those of *Leucæna* and

<sup>1</sup> Their petals usually cohere to a greater extent, sometimes forming an infundibuliform corolla (usually pink). Some flowers are polygamous.

<sup>2</sup> They are angular, and compressed against one another at either end.

<sup>3</sup> All are American, except a single species common to America and the west of tropical Africa.—VENT., *Choix de Plant.*, t. 28.—WALP., *Rep.*, i. 883; v. 586; *Ann.*, i. 263; ii. 451.—OLIV., *Fl. Trop. Afr.*, ii. 336.

<sup>4</sup> It is only in this section that the species are not constantly pentamerous.

<sup>5</sup> BENTH., in *Hook. Journ.*, iv. 416.—B. H., *Gen.*, 594, n. 389.

<sup>6</sup> JACQ., *Hort. Schænbr.*, t. 394.—DC., *Prodr.*, ii. 467, n. 192.—WALP., *Rep.*, i. 884; v. 586; *Ann.*, i. 263; iv. 616.

<sup>7</sup> W., *Spec.*, iv. 1044 (part.).—GERTN., *Fruct.*, ii. t. 148.—K., *Mimos.*, 115.—DC., *Prodr.*, ii. 443 (sect. 2, *Desmanthea*, excl. sect. 1, 3).—ENDL., *Gen.*, n. 6828 (part.).—B. H., *Gen.*, 592, n. 386.

nearly always pentamerous. Their petals are free or coherent, and there are sometimes only five stamens. The fruit is linear and straight, or slightly curved in the species which has been made into the genus *Darlingtonia*;<sup>1</sup> it opens longitudinally into two valves, and the oblique seeds, variable in number, are only separated by incomplete projections of the pericarp. But *Desmanthus* is a genus of very peculiar habit, consisting of herbs or humble undershrubs, whose bipinnate leaves possess setaceous persistent stipules, and often a gland on the petiole at the origin of the lowest pair of leaflets. The flowers form little solitary axillary pedunculate capitula, globular or ovoid, often few-flowered. They are hermaphrodite or polygamous; those of the base of the capitulum being male or even neuter. In this case the latter often possesses an ill-developed corolla and elongated petaloid staminodes. In this feature *Desmanthus* comes very near *Neptunia*, but differs in not possessing the gland crowning the anther, or the peculiar habit. But this is none the less a common point where the two series *Eumimoseæ* and *Adenanthereæ* are almost united. The seven or eight known species of *Desmanthus* inhabit North and South America, except one<sup>2</sup> which is widely diffused over all tropical regions.<sup>3</sup>

### III. PARKIA SERIES.

The flowers of *Parkia*,<sup>4</sup> (figs. 24–27) are hermaphrodite and neuter, or polygamous; that is to say, in the singular pyriform inflorescence of these plants (fig. 24), the flowers axillary to the lower bracts are male, or have only the abortive organs of both sexes, while the flowers of the upper swollen part are hermaphrodite. In these last the receptacle bears a long tubular calyx, divided above into five very unequal lobes and quincuncially imbricated in the bud. Lobes 1 and 3, which are anterior, are the largest of all,

<sup>1</sup> DC., in *Ann. Sc. Nat.*, sér. 1, iv. 97; *Mém. Légum.*, 427, t. 66; *Prodr.*, ii. 443.—TORE. & GR., *Fl. N. Amer.*, i. 501.—ENDL., *Gen.*, ii. 6830.—*Mimosa glandulosa* MICHX., *Fl. Bor. Amer.*, ii. 254.—VENT., *Ch. de Pl.*, t. 27.

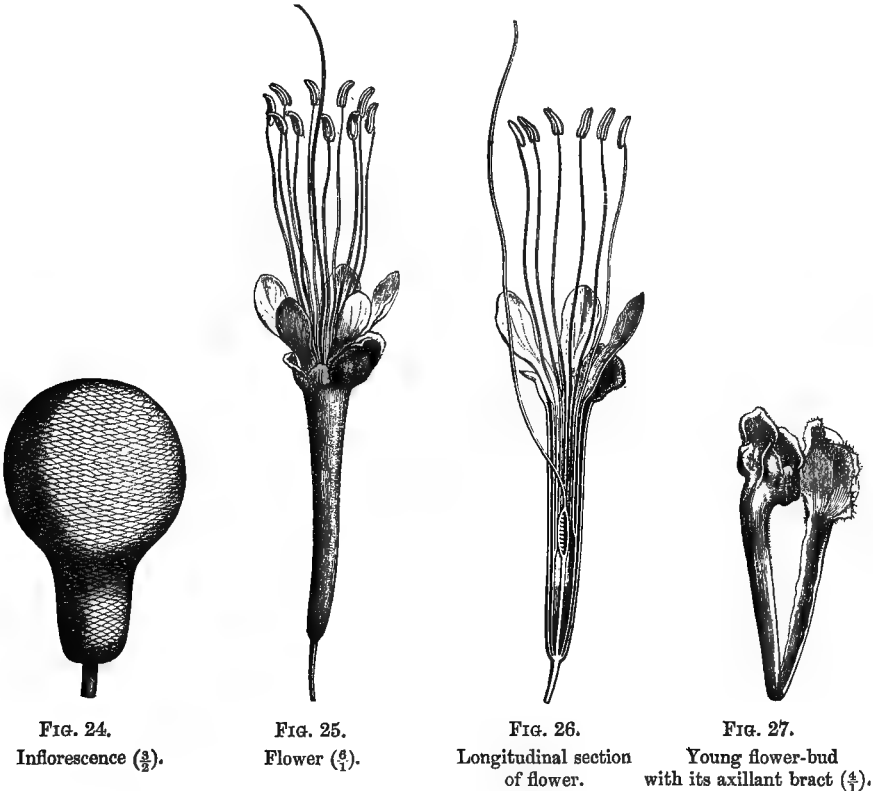
<sup>2</sup> *D. virgatus* W., *Spec.*, iv. 1047.—DC., *Prodr.*, n. 10.—*Mimosa virgata* L., *Spec.*, 1502.—JACQ., *Hort. Vindob.*, t. 80.—OLIV., *Fl. Trop. Afr.*, ii. 334.

<sup>3</sup> K., *Mimos.*, t. 35.—JACQ., *loc. cit.*—HOOK., in *Bot. Mag.*, t. 2454.—WALP., *Rep.*, i. 864; *Ann.*, i. 260.

<sup>4</sup> R. BR., in *Oudn., Denh. & Clapp. App.*, 234.—RICH., GUILL. & PERR., *Fl. Seneg. Tent.* i. 237.—ENDL., *Gen.*, ii. 6819.—BENTH., in *Hook. Journ.*, iv. 329.—REICHB., *Fl. Exot.*, t. 231.—B. H., *Gen.*, 588, n. 373.—*Parypsphæra* KARST., *Fl. Columb.*, ii. 7, t. 104.

and 2, which is posterior, is also more developed than 4 or 5. There are five equal petals, free or united into a tube below, alternating with the calyx-lobes and valvate in the bud. The androceum consists of ten stamens superposed to the perianth-leaves. Below the filaments form a tube, united for some distance to the petals; they then become

*Parkia biglobosa.*



free before splitting up into ten exserted linear strips, each supporting an introrse two-celled anther of longitudinal dehiscence, tipped by a little gland. The free central gynæceum consists of a sessile or stipitate one-celled ovary, including an indefinite number of anatropous ovules, and surmounted by an exserted terminal style, truncate or scarcely dilated at its stigmatiferous apex. The fruit is a straight or bowed narrow elongated pod, dehiscing by two valves and enclosing in suberous pulp a variable number of seeds. These contain a fleshy embryo, with thick cotyledons whose decurrent bases envelope the radicle. *Parkia* consists of seven or eight species

of trees from tropical Asia, Africa, and America,<sup>1</sup> with alternate leaves and a very peculiar form of inflorescence. It consists of a sort of globular or pyriform capitulum (fig. 24), ending a long naked peduncle, either solitary axillary pendulous, or approximated to other similar peduncles to form a sort of terminal raceme. The whole of the swollen part of these inflorescences is covered with alternate, very closely imbricated bracts. Axillary to each is a compressed flower (fig. 27), which later on protrudes from the interval between the bracts, and if fertile expands its anthers and style outside. From the flowers at the base of the capitulum protrude coloured<sup>2</sup> monadelphous staminodes; the gynæceum is altogether absent, or reduced to a little sessile rudimentary ovary.

*Pentaclethra*<sup>3</sup> has also pentamerous flowers with an imbricate calyx and a valvate corolla; they are hermaphrodite or dicecious. The calyx, inserted at the very base of the flower, forms a sac whose mouth alone is divided into five deep teeth, obtuse at the apex and much overlapping. Internal to this is a hollow thick-walled cornea, with which the limb of the corolla and the stamens do not split off until a certain height.<sup>4</sup> Its cavity is lined by a glandular disk with five lobes or crenulations of variable form. The androceum consists in *P. filamentosa*,<sup>5</sup> a species from tropical America, of ten stamens, monadelphous at the base, and superposed five to the petals, five to the calyx-lobes. This latter set alone are fertile, consisting of a filament free above, and an introrse two-celled anther of longitudinal dehiscence surmounted by a large depressed gland. The five other stamens are very long narrow exserted tongues, completely sterile. In *P. macrophylla*,<sup>6</sup> on the contrary, from the west of tropical Africa, there is a larger number of pieces in the androceum, namely, five fertile alternipetalous stamens, the anther bearing an introrse gland between its two cells, and opposite each petal, instead of a single staminode, two or three slender subulate scales much

<sup>1</sup> W., *Spec.*, iv. 1025.—DC., *Prodr.*, ii. 442, n. 106.—PAL. BEAUV., *Fl. Ow. et Ben.*, ii. 53, t. 90.—JACQ., *Stirp. Amer.*, t. 179, fig. 87.—SAB., in *Trans. Hort. Soc.*, v. 444.—ROXB., *Fl. Ind.*, ii. 551.—W. & ARN., *Prodr.*, i. 279.—MIQ., *Fl. Ind.-Bat.*, Suppl., i. 283.—WALP., *Rep.*, i. 857; *Ann.* ii. 449; ii. 612.—OLIV., *Fl. Trop. Afr.*, ii. 323.

<sup>2</sup> White or red, while the upper flowers are brownish, yellowish, or reddish.

<sup>3</sup> BENTH., in *Hook. Journ.*, ii. 127; iv. 330.—B. H., *Gen.*, 588, 1004, n. 372.—H. BN., in *Adansonia*, vi. 204.—OLIV., in *Trans. Linn. Soc.*, xxiv. 415, t. 37; *Fl. Trop. Afr.*, ii. 323.

<sup>4</sup> So that there is some doubt as to the morphological signification of the base of this tube.

<sup>5</sup> BENTH., *loc. cit.*, n. 1, 2.—WALP., *Rep.*, i. 857.

<sup>6</sup> BENTH., *loc. cit.*, iv. 330.—OLIV., *loc. cit.*—*Owala* of the Gaboon River natives.

shorter than in the American species. The gynæceum is inserted in the very bottom of the corolla at the base of the corolla. In the male flowers it is only a little rudimentary ovary; in the female or hermaphrodite flowers it is a long sessile ovary, containing numerous descending ovules in two vertical rows, and surmounted by a style, whose stigmatiferous head is somewhat dilated and concave. The fruit is a large compressed pod with very thick woody walls, opening into two valves, which become recurved outwards with considerable elastic force. The seeds, of variable number, are flattened and of irregular oval outline; their coriaceous integuments enclose a compressed fleshy exalbuminous embryo, whose cotyledons are decurrent at the base, enclosing the radicle in a sort of nearly complete sheath. *Pentaclethra* consists of trees whose alternate bipinnate leaves possess numerous leaflets, with lanceolate stipules and setaceous stipels. The flowers are arranged in ramified spikes. Besides the two species just mentioned, the west of tropical Africa produces a third, recognised only as a doubtful member of the genus, namely, *P. (P) Griffoniana*.<sup>1</sup>

#### IV. ACACIA SERIES.

The *Acacias*<sup>2</sup> (figs. 28–35) have regular hermaphrodite or polygamous flowers. In the former the receptacle may be convex or more or less concave; it supports a calyx of five, or more rarely four or even three, leaves, cohering to a variable extent and valvate in the bud, rarely reduced to little scales or cilia. The corolla consists of an equal number of valvate petals, free or united for a variable distance.<sup>3</sup> The stamens are indefinite in number, usually very numerous, inserted either beneath the gynæceum, or at a certain height above its base, beneath the edges of the receptacular cup; or even outside a glandular cupule, which lines the cavity of the receptacle and expands more or less beyond it. The filaments are free, or more rarely coherent below for a short distance into one or several bundles. The anthers are two-celled introrse, dehiscing longitudinally.<sup>4</sup> The

<sup>1</sup> H. BN., in *Adansonia*, vi. 205.

<sup>2</sup> *Acacia* T., *Instit.*, 605, t. 375.—ADANS., *Fam. des Pl.*, ii. 319.—J., *Gen.*, 346.—NECK., *Elem.*, n. 1297.—LAMK., *Dict.*, i. 8.—W., *Spec.*, iv. 1049.—K., *Mimos.*, 74.—DC., *Prodr.*, ii. 448.—SPACH, *Suit. à Buffon*, i. 63.—ENDL.,

*Gen.*, n. 6834.—B. H., *Gen.*, 594, n. 391.—H. BN., in *Adansonia*, iv. 45.

<sup>3</sup> Either because the corolla is gamopetalous, or through its pieces simply sticking together edge to edge up to a certain height.

<sup>4</sup> The pollen has in this series generally a pe-

gynæceum is unicarpellary, with a sessile or stipitate one-celled ovary, surmounted by a terminal style whose stigmatiferous apex

*Acacia arabica* (*Gum-Arabie Plant*).

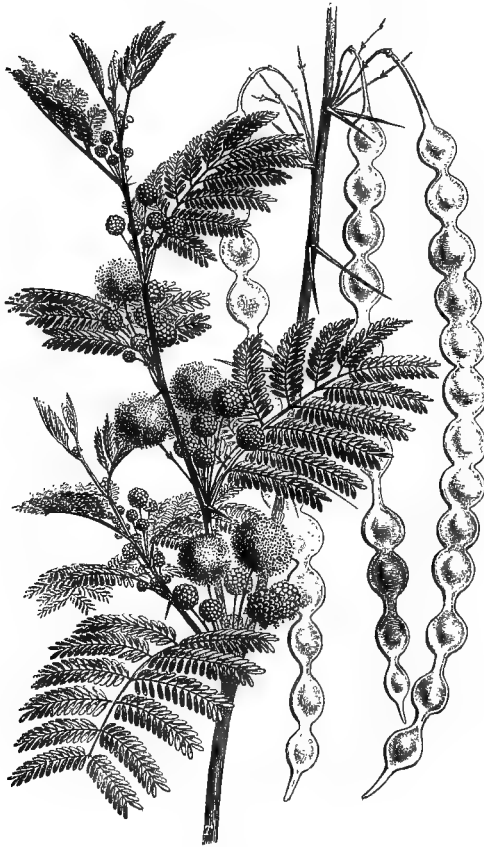


FIG. 23.  
Habit ( $\frac{3}{8}$ ).

may or may not be dilated and convex or concave.<sup>1</sup> Within the

cular structure, presenting what H. MOHL has termed (*Ann. Sc. Nat.*, sér. 2, iii. 229, t. 10, 11, figs. 42, 43,) "the form of the *Mimoseæ*." He writes: "Each separate pollen grain (and there are but eight to each anther) consists of sixteen cells closely bound together, and arranged so that there are two layers of four cells each in the centre, with a rim of eight cells around them, so that the whole grain is lenticular." Other grains, he says, consist of eight cells, the four above alternating with the four below. S. ROSANOFF (*Jahrb. f. Wiss. Bot.*, iv. 441) has observed that in an empty anther-cell of an *Acacia* there are four excavations separated by crucial septa. The four cells which corresponded with these were

four mother-cells of the compound pollen-grain. These cells, says he, divide by centripetal septa springing from the wall of the mother-cell. Later on the layers interposed between the mother-cells undergo partial absorption and granular degeneration. BENTHAM (*Gen.*, 464) describes the pollen grains as aggregated in each cell, from two to six in number. In the species belonging to the section *Abuzzia*, MOHL seems to have found the number of eight in each anther quite constant.

<sup>1</sup> The summit of the style is usually bent on itself in a variable way in the bud, as are the staminal filaments by which it is surrounded.



ovary is seen a parietal placenta superposed to a sepal, bearing a variable number of descending ovules in two vertical rows (from one to twenty in each); they are more or less completely anatropous,<sup>1</sup> with the micropyle upwards and outwards. The fruit is a pod, oval oblong or linear, straight curved or more or less distorted, cylindrical convex or flat, membranous coriaceous or woody, bivalved or indehiscent; its cavity is continuous or divided into compartments by false septa between the seeds, and it rarely divides into transverse joints on dissemination. The seeds are usually flattened, oval, or

*Acacia Catechu.*

FIG. 29.  
Flower ( $\frac{2}{3}$ ).



FIG. 30.  
Longitudinal section of flower.

ellipsoidal; the funicle is thick or slender, flesh-coloured, straight or bent once or several times on itself, or surrounding the seed or more or less dilated towards the hilum, as a sort of arillary body. Under the coats<sup>2</sup> is a thick fleshy embryo, sometimes coloured, which may or may not be surrounded by a fleshy or horny albumen, of variable thickness.

The genus *Acacia* consists of trees or shrubs, rarely herbs, whose stems and branches are unarmed or prickly. The abortive branches are sometimes transformed into spines. The leaves are alternate bipinnate, or else the petiole is dilated into a laterally compressed

<sup>1</sup> In those species we have been able to examine we have found the conical apex of the nucleus projecting considerably beyond the mouth of the only ovular envelope we were able to perceive. The axis of the nucleus is almost always oblique.

<sup>2</sup> Outside there is usually on either lateral face a lunula or subelliptical stain whose edges are parallel to those of the seed itself, nearly as in *Adenanthera* and many other *Leguminosæ*, both *Mimosæ* and *Casalpinieæ*.

phyllode (figs. 32, 33), while the leaflets abort more or less completely. The petiole often bears one or several glands. The stipules may be membranous, absent, ill-developed, or transformed into spines of sometimes considerable length (fig. 28). The flowers are generally small, forming globular capitula (figs. 28–32) or cylindrical cymes (fig. 31), each axillary to a bract, and sometimes articulated at the base. The spikes and capitula are solitary axillary, collected into racemes, or forming more or less ramified inflorescences terminating the branches. About four hundred species have been described in this genus; they have been grouped into more or less natural sections, based on the habit and inflorescence; for the characters of the fruits have been found inadequate to found well-defined subdivisions. *Acacias* are especially abundant in Australia and Africa, but species are also found in warm countries all over the world.<sup>1</sup>

<sup>1</sup> It was found impossible to divide the known species, upwards of four hundred in number, into subgenera or sections founded on the pod, for that is polymorphous, and every possible transition between the various forms is found. BENTHAM, who has so long occupied himself in the study of this genus, has divided it into six secondary series based on the habit and inflorescence. These are as follows:—

I. *Phyllodineæ*.—Species with laterally flattened or rounded phyllodes, the leaflets abortive, except in the first leaves of the plant, or on some adult branches (fig. 33). Sometimes the leaves are replaced by short scales or bracts. To this group belong the genera *Chitonanthus* and *Tetracheilos* of LEHMANN (*Plant. Preiss.*, ii. 368), founded only on the form of the fruit. This genus contains nearly three hundred Australian species, besides five or six from the islands of the Pacific. (LAMK., in *Journ. Hist. Nat.*, i. t. 15.—LABILL., *Sert. Austr.-Caled.*, t. 88, 89.—A. GRAY, *Bot. Unit. States Expl. Exped.*, t. 53.—R. BR., in *Ait. Hort. Kew.*, ed. 3, v. 464.—LINDL., *Swan Riv.*, App., 15.—MEISSN., in *Pl. Preiss.*, ii. 199.—A. CUNN., in *Field N. S. Wales*, 343.—BENTH., in *Hook. Journ.*, i. 323; *Fl. Austral.*, ii. 319.—F. MUELL., *Fragm.*, iii. 127, 151.)

II. *Botrycephalæ*.—Australian species, ten in number, with flowers forming globular capitula collected into simple or ramified axillary or terminal racemes. Leaves bipinnate, stipules absent or ill-developed. (VENT., *Jard. Cels.*, t. 1; *Jard. Malmais.*, t. 21, 61.—ANDR., in *Bot. Repos.*, t. 235.—SWEET, *Fl. Austral.*, t. 12.—HOOK., in *Bot. Mag.*, t. 1263, 1750.—*Bot. Reg.* (1843), t. 46.—REICHB., *Icon. et Descr. Plant.*, t. 73.—LINK., *Enum. Hort. Berol.*, 445.—R. BR., in *Ait. Hort. Kew.*, ed. 3,

v. 467.—BENTH., in *Hook. Journ.*, i. 383; *Fl. Austral.*, ii. 413.)

III. *Pulchellæ*.—Low trees, much branched unarmed, rarely possessing axillary spines; leaves bipinnate; stipules absent or ill-developed. Flowers in globular capitula, rarely spicate; peduncles axillary, solitary or fascicled. Species Australian, numerous. (LABILL., *Nouv.-Holl.*, ii. 88, t. 238.—A. DC., *Pl. Rar. du Jard. de Genève*, note 6, t. 3.—HOOK., in *Bot. Mag.*, t. 2188, 4588, 4653, 5191.—*Bot. Reg.*, t. 1521.—F. MUELL., *Pl. Victor.*, ii. t. Suppl. 12.—LINDL., *Swan Riv.*, App., 15.—LINK., *Enum. Hort. Berol.*, ii. 444.—MEISSN., in *Pl. Preiss.*, ii. 204.—BENTH., in *Hook. Journ.*, i. 387; *Fl. Austral.*, ii. 416.)

IV. *Gummiferae*.—Trees and shrubs with bipinnate leaves, and stipules all or part transformed into spines, sometimes of enormous size; otherwise unarmed. Flowers in axillary capitula or spikes, fascicled or united into simple or compound racemes towards the ends of the branches. Species especially American and African, some Asiatic, few Australian; about fifty in number. (K., *Mimos.*, t. 28, 29.—JACQ., *Hort. Schœnbrun.*, t. 393.—VELLOZ., *Fl. Flum.*, xi. t. 39.—ROXB., *Plant. Coromand.*, t. 149, 150, 199.—DELILE, *Fl. Ægypt.*, t. 52, fig. 2.—WIGHT, *Icon.*, t. 1157.—NEES D'ESSEN., *Plant. Offic.*, n. 332–336.—*Bot. Reg.*, t. 1317.—F. MUELL., in *Journ. Linn. Soc.*, iii. 147.—BENTH., in *Hook. Journ.*, i. 499; in *Linnaea*, xxvi. 629; *Fl. Austral.*, ii. 419.—BURCH., *Trav.*, ii. 240, t. 6.—E. MEX., *Comm.*, 167.—HAEV. & SOND., *Fl. Cap.*, ii. 280.)

V. *Vulgares*.—Lofty trees or shrubs, often climbing, American, African or Asiatic, rarely unarmed, usually covered with prickles disseminated over the branches or planted in the pul-

*A. Farnesiana*,<sup>1</sup> a species often cultivated in the south of Europe, has been made by some authors the type of a genus apart,<sup>2</sup> on account of the structure of its fruit, which is irregularly cylindrical, somewhat curved, and as thick as it is broad; it is filled by a pulp which dries up and isolates the seeds, arranged obliquely in two rows, as if in complete or incomplete cells. Botanists are now agreed in making it only a section of the genus *Acacia*, of which that plant has the habit, the foliage, and very nearly the flower.

*A. lophanta*,<sup>3</sup> a species also cultivated in our conservatories, has become the type of a separate genus, under the name of *Albizzia*,<sup>4</sup> because its stamens are monadelphous, instead of being quite free, as is the case in many *Acacias*. But all the other characters being identical in both types, neither fruit, flower, nor vegetating organs presenting any marked differences, we are absolutely compelled to leave *A. lophanta* in the genus *Acacia*, where we have already seen species with their staminal filaments united for some short distance. Thus, too, it seems impossible to us to make a separate genus for

vinera of the bipinnate leaves which have glandular petioles and non-spinescent stipules. Flowers in capitula or spikes fascicled axillary, or collected into racemes at the end of the branches. Species about sixty. (JACQ., *op. cit.*, t. 396.—VELLOZ., *loc. cit.*, t. 23, 29, 36–38.—ROXB., *op. cit.*, t. 175, 225.—WALL., *Pl. Asiaticar.*, t. 130.—NEES., *op. cit.*, n. 337.—RICH., GUILLEM. & PERR., *Fl. Seneg. Tent.*, i. 244, t. 56.—*Bot. Mag.*, t. 3366, 3408.—SCHWEINF., *Pl. Natal.*, t. 1.—HARV. & SOND., *op. cit.*, 282.) To this group belongs *A. concinna* DC. (*Prodr.*, ii. 464, n. 159), whose fruit separates into one-seeded joints, and which HASSKARL has made the type of the genus *Arthrosporion* (*Betzia*, i. 112). *Besenna anthelmintica* A. RICH. (*Fl. Abyss.*, i. 253), attributed to this by BENTHAM (*Gen.*, 595), certainly belongs to the group *Albizzia*.

VI. *Filicinae*.—Woody or rarely herbaceous unarmed plants; leaves bipinnate without petiolar glands. Capitula globular or elongated, axillary fascicled flowers sometimes shortly pedicellate. Species about ten, from North or Central America. (JACQ., *Eclog. Amer.*, t. 78.—K., *op. cit.*, t. 31.)

For the species of *Acacia* proper of different countries see also DC., *Prodr.*, ii. 448–471.—WALP., *Rep.*, i. 884; v. 587; *Ann.*, i. 264; ii. 452; iv. 617.—OLIV., *Fl. Trop. Afr.*, ii. 337.

<sup>1</sup> W., *Spec.*, iv. 1083.—DC., *Prodr.*, ii. 138.—*A. lenticellata* F. MUELL., in *Journ. Linn. Soc.*, iii. 147.—*Mimosa Farnesiana* L., *Spec.*, 1506.—*M. scorpioides* FORSK. The corolla of

this species is gamopetalous and valvate or very slightly imbricate near the apex in the young bud. The stamens are free for the greater part of their length; but towards the base they cohere into one or several bundles, and are inserted on the base of the corolla. The ovules are numerous, and at first arranged in two vertical rows, with their raphe facing. Later on they appear to form a single row. The style is slightly dilated at the apex. BENTHAM refers this species to the section *Gummiferae*. It is true that its fruit is nearly cylindrical or slightly torulose; and the pericarp forms oblique septa between the seeds marking out one-seeded compartments arranged alternately in two rows. But *A. tortuosa* W. (*Spec.*, iv. 1083;—DC., *Prodr.*, n. 132), and some other species of the section *Gummiferae* have already a thickened pod with the seeds contained in incomplete cells, and thus affording a transition towards *A. Farnesiana*.

<sup>2</sup> *Vachellia* W. & ARN., *Prodr.*, i. 272.—ENDL., *Gen.*, n. 6835.—*Aldina* E. MEY., *Comment.*, 171, not. (nec ENDL.).—*Farnesia* GASPARR., *Descr. Nov. Gen.* (1838), icon.

<sup>3</sup> W., *Spec.*, iv. 1070.—DC., *Prodr.*, ii. 93.—*Mimosa distachya* VENT., *Jard. Cels.*, t. 20 (nec CAV.).—*M. Elegans* ANDR., *Bot. Repos.*, t. 563.

<sup>4</sup> DURAZZ. (in an unknown Italian scientific *Recueil*.)—BOIV., in *Encycl. du xix. Siècle*, ii. 32.—FOURN., in *Ann. Sc. Nat.*, sér. 4, xiv. 368.—B. H., *Gen.*, 596, n. 394.—H. BN., in *Dict. Encycl. des Sc. Médic.*, ii. 416.

*A. Lebbek*,<sup>1</sup> *Julibrissin*,<sup>2</sup> *odoratissima*,<sup>3</sup> *montana*,<sup>4</sup> *lebbekioides*,<sup>5</sup> &c., which have the flowers of *A. lophanta*, but with a longer staminal tube,<sup>6</sup> nor for *Zygia*<sup>7</sup> (figs. 34, 35), in which this tube



FIG. 31.  
Inflorescence.

is excessively developed, extending far beyond the corolla, and twisted into a spiral within the perianth before the expansion of the flower. We shall then have four new sections to add to the genus *Acacia*, under the names of *Vachellia*, *Lophanta*, *Albizzia*, and *Zygia*, including twenty-five species from warm countries all over the world. *Zygia* is found in tropical Africa and Asia;<sup>8</sup> *Albizzia*, in the same regions in temperate Asia, Java, Australia, and the neighbouring islands.<sup>9</sup>

The flowers of *Inga*<sup>10</sup> are like those of *Albizzia*, with indefinite monadelphous stamens.<sup>11</sup> But the leaves are simply pinnate, and the pod is linear, straight or slightly curved, flat tetragonal or subcylindrical, coriaceous or almost fleshy, scarcely dehiscent, with both dorsal and ventral sutures often thickened prominent dilated and grooved longitudinally. The genus consists of trees and shrubs

*Acacia alata*.



FIG. 32.  
Floriferous branch.

<sup>1</sup> W., *Spec.*, iv. 1066.—*A. speciosa* W., *loc. cit.*, 1069.—*Mimosa Lebbek* L.—*Albizzia Lebbek* BENTH., in *Hook. Journ.*, iii. 87.—*A. latifolia* BOIV., *loc. cit.*, 32.

<sup>2</sup> W., *loc. cit.*, 1065.—*Mimosa Julibrissin* SCOP., *Del. Fl. Insurbr.*, i. 18.—*M. arborea* FORSK., *Eg.-Arab.*, 177.—*Albizzia Julibrissin* DURAZZ., *loc. cit.*

<sup>3</sup> W., *loc. cit.*, 1063.—*Mimosa odoratissima* L., *Suppl.*, 437.—*Albizzia odoratissima* BENTH., *loc. cit.*, 88.—*A. micrantha* BOIV., *loc. cit.*, 34.

<sup>4</sup> JUNGH., *Tijdschr. Nat. Gesch.*, x. 246.—*A. vulcanica* KORTH., in *Flora* (1827), 705.—*Inga montana* JUNGH., *Reis.*, 288.—*Albizzia montana* BENTH., *Pl. Jungh.*, 267.

<sup>5</sup> DC., *Prodr.*, ii. 467, n. 187.—*Albizzia lebbekioides* BENTH., *loc. cit.*, iii. 89.

<sup>6</sup> GEISEBACH has already (*Fl. Brit. W. Ind.*, 233), referred *Albizzia* to *Acacia*.

<sup>7</sup> BENTH., in *Hook. Journ.*, iii. 92 (nec P. BR.).—ENDL., *Gen.*, n. 6836?

<sup>8</sup> DC., *Mém. Légum.*, xii. t. 65; *Prodr.*,

ii. 440, n. 91, 92.—BRUCE., *Voy.*, t. 4, 5.—PETERS., *Mossamb.*, t. 1.—OLIV., *Fl. Trop. Afr.*, ii. 361.

<sup>9</sup> VENT., *Jard. Cels.*, t. 20.—LABILL., *Sert. Austr.-Caled.*, 67, t. 66, 67.—JACQ., *Icon.*, t. 198.—ROXB., *Pl. Coromand.*, t. 120-122.—WALL., *Pl. Asiat. Rar.*, ii. t. 177.—BENTH., *Fl. Austral.*, ii. 421.—HARV. & SONN., *Fl. Cap.*, ii. 284.—WALT., *Rep.*, v. 595; *Ann.*, i. 266; ii. 457; iv. 457.—OLIV., *Fl. Trop. Afr.*, ii. 355.

<sup>10</sup> PLUM., *Gen.*, 13, t. 25.—W., *Spec.*, iv. 1004 (part.)—K., *Mimos.*, 35.—DC., *Prodr.*, ii. 432.—SPACH, *Suit. à Buffon*, i. 55.—ENDL., *Gen.*, n. 6837.—B. H., *Gen.* 599, n. 398.

<sup>11</sup> The lower part of the tube they form is often united for some distance with the base of the corolla tube, just as in *Pentaclethra*. We shall find this arrangement in all the remaining *Mimoseæ*. It does not usually occur in *Acacia* proper or in *Albizzia*. Organogenic investigations can alone reveal the signification of the

from the hot districts of America. The flowers are very variably arranged on the stems.<sup>1</sup>

*Calliandra*,<sup>2</sup> on the contrary, has decomposed bipinnate leaves, though with the flowers of *Inga*. But the fruit is a straight or somewhat bowed pod, whose two valves separate elastically, the apex bending back towards the base. The stamens are usually very numerous, rarely only ten or fifteen in number. Some eighty species of this genus are known,<sup>3</sup> trees or shrubs from tropical or sub-tropical Africa; one species<sup>4</sup> is found in India. The flowers are always grouped in capitula (fig. 36), terminating axillary peduncles or collected into terminal racemes.

*Lysiloma*,<sup>5</sup> with the habit of *Mimosa*, and the oligandrous flowers of *Calliandra*,<sup>6</sup> has bipinnate leaves, and an inflorescence of capitula

tube common to the base of the androceum and the corolla, and will tell us whether it be not of receptacular nature. It was no doubt this arrangement that led A. RICHARD to refuse to consider as a calyx the organ generally known as such and inserted considerably below the petals and stamens.

The pollen of *Inga anomala* has been described by H. MOHL (*Ann. Sc. Nat.*, sér. 2, iii. 230, 342, t. xi. fig. 43), as having each mass composed of eight grains placed on a single plane and porous at the angles, with a lot of little viscid cells collected at the point of the mass. There are eight masses in each anther, and the point of each looks towards the centre of the cell.

<sup>1</sup> The inflorescence is the chief character employed to group the species (some hundred and fifty) of this genus into sections. BENTHAM admits the five following:—

I. *Ewinga*.—Flowers collected into lax oval spikes, short or elongated, interrupted towards the base. Flowers large or very large, sessile or shortly pedicellate, villose or tomentose. Calyx campanulate or tubular. Pods thick with dilated edges, often even broader than the faces of the valves. Species about fifty (VELLOZ., *Fl. Flum.*, xi. t. 3, 12, 14, 21.—VAHL, in *Act. Soc. Hafn.*, ii. t. 10.—K., *op. cit.*, t. 11-14.—HOOK., in *Bot. Mag.*, t. 5075).

II. *Pseudinga*.—Inflorescence of *Ewinga*. Flowers a fair size, sessile or very shortly pedicellate, glabrous or pubescent. Calyx of *Ewinga*. Pod flattened, usually pretty broad, with very thick edges. Species about forty (VAHL, *Eclog. Amer.*, iii. t. 24.—PRESL, *Symb. Bot.*, i. t. 42; ii. t. 58.—LEM., *Jard. Fleur.*, iii. t. 399).

III. *Burgonia*.—Flowers sessile, small, numerous, glabrous, or sub-pubescent, in cylindrical shortly pedunculate, usually axillary spikes.

Calyx campanulate, much shorter than corolla. Species about fifteen (AUBL., *Guian.*, ii. 941, t. 358.—VELLOZ., *Fl. Flum.*, xi. t. 5, 8, 9).

IV. *Diadema*.—Flowers sessile or more rarely pedicellate, small, narrow, glabrous. Inflorescence of globular capitula, with long peduncles. Species about ten (VELLOZ., *op. cit.*, xi. t. 44, 45.—SEEM., *Bot. Her.*, t. 23).

V. *Leptinga*.—Flowers with slender, well developed pedicels, usually longer than calyx, unless this be very large; small, glabrous, rarely pubescent, in umbels, on sub-globular receptacles. Species about twenty (VELLOZ., *op. cit.*, t. 10, 27.—PÆPP. & ENDL., *Nov. Gen. et Spec.*, iii. t. 289).

For the species generally, see K., *Mimos.*, *loc. cit.*—H. B. K., *Nov. Gen. et Spec.*, vi. 248.—WALP., *Rep.* v. 623; *Ann.* i. 268; ii. 459; iv. 635.

<sup>2</sup> BENTH., in *Hook. Journ.*, ii. 138.—B. H., *Gen.*, 596, n. 393.—*Ameslea* SALISB., *Parad. Lond.*, t. 64 (nec WALL.).—*Clelia* CASAR., *Nov. Stirp. Decad.*, 83.—? *Codonandra* KARST., *Fl. Columb.*, 43, t. 122.

<sup>3</sup> JACQ., *Icon. Rar.*, iv. t. 632, 633.—DC., *Mém. Légum.*, t. 68.—K., *Mimos.*, t. 17, 19, 20, 22, 32.—NEES, in *Nov. Act. Nat. Cur.*, xii. t. 5.—COLLA, *Hort. Ripul.*, ii. t. 9.—PÆPP. & ENDL., *Nov. Gen. et Spec.*, iii. t. 290.—BENTH., *Sulph.*, t. 11.—SEEM., *Bot. Her.*, t. 22.—KARST., *Fl. Columb.*, 79, 103, 121.—*Bot. Reg.* t. 98, 129, 721; (1849), t. 41.—*Bot. Mag.*, t. 2651, 4188, 4500, 5181.—PAXT., *Magaz.*, xi. 147, icon.—LEM., in *Jard. Fleur.*, t. 305.—WALP., *Rep.*, v. 599 (part.); *Ann.*, i. 266; ii. 458; iv. 634.—OLIV., *Fl. Trop. Afr.*, ii. 356.

<sup>4</sup> *I. umbrosa* WALL., *Pl. Asiat. Rar.*, ii. t. 124.

<sup>5</sup> BENTH., in *Hook. Journ.*, iii. 82.—B. H., *Gen.*, 595, n. 392.

<sup>6</sup> It has often only from twelve to fifteen stamens.

or cylindrical spikes. But the pod is linear, compressed, and flattened, straight or slightly curved, with a thin submembranous pericarp, whose two valves, continuous or dividing off into transverse joints, separate at maturity from the entire persistent border of the fruit.

*Acacia heterophylla.*



FIG. 33.  
Leaf-bearing branch.

Some half score species of this genus are known,<sup>1</sup> unarmed shrubs from equinoctial America and the Antilles.<sup>2</sup>

*Pithecolobium*<sup>3</sup> too has hermaphrodite or polygamous flowers<sup>4</sup> in spikes or capitula, and bipinnate leaves, as in *Lysiloma* and *Calliandra*. But the fruit is flat or compressed, falciform circinate or more or less distorted, rarely almost straight, coriaceous or nearly fleshy, indehiscent or more frequently two-valved, or dehiscing along the

<sup>1</sup> K., *Mimos.*, t. 24.—BENTH., *Sulph.*, v. t. 31.—GRISEB., *Fl. Brit. W. Ind.*, 223.—WALP., *Rep.*, v. 594; *Ann.* iv. 635.

<sup>2</sup> In its flowers this genus does not differ from the monadelphous *Acacias*; but the structure and dehiscence of its fruit suffice to distinguish it from them.

<sup>3</sup> MART., *Herb. Flor. Bras.*, 114; *Cat. Hort.*

*Monac.*, 188.—ENDL., *Gen.*, n. 6837 c.—B. H., *Gen.*, 597, n. 395.—*Cathormion* HASSK., *Retzia*, i. 231.

<sup>4</sup> The stamens united with the corolla below contain in their anthers a pollen, in masses analogous to that of *Inga* (see above, p. 42, note 11).

ventral suture by curved clefts prolonged between the seeds so as to form as many distinct cells united by the persisting dorsal suture; this is bent or twisted on itself, so that the one-seeded divisions of

*Acacia (Zygia) Sassa.*



FIG. 35.  
Flower ( $\frac{1}{2}$ ).



FIG. 34.  
Longitudinal section of flower.

the same pod have all different inclinations to the horizontal. But the pod never opens elastically as in *Calliandra*, and this is the character, artificial indeed though it be, which suffices in practice to distinguish the genus *Pithecolobium*. The species, about one hundred in number,<sup>1</sup> are trees and shrubs from all warm regions, especially tropical Asia and America. Their habit and inflorescence are very variable.<sup>2</sup>

<sup>1</sup> WALP., *Rep.*, v. 609; *Ann.*, i. 267; ii. 458; iv. 636.

<sup>2</sup> These characters have been chiefly used to subdivide this large genus into sections. The fruit varies greatly in form, but with innumerable transitions between its variations. BENTHAM admits the seven following sections:—

I. *Samanea*.—This section whose type is, as indicated by its name, *P. Saman* BENTH. (*Inga Saman* W., *Spec.*, iv. 1026;—*I. salutaris* H. B. K., *Nov. Gen. et Spec.*, vi. 304;—*Mimosa Saman* JACQ., *Fragm.*, t. 9;—*Calliandra tubulosa* BENTH.), contains twenty-five species of unarmed trees with stipules ill developed or

absent. The pinnules are indefinite in number. The inflorescences are axillary, fasciated or collected into terminal panicles. The pod is straight, bowed, circinate or cochlear, coriaceous thick and indehiscent, or dehiscent without subsequent distortion of the valves. The seeds are arillate. (VELLOZ., *Fl. Flum.*, xi. t. 24, 30 (?).—JACQ., *Fragm.*, t. 9.—K., *Mimos.*, t. 21.—GRISEB., *Fl. Brit. W. Ind.*, 225). This last author makes the species of the section belong to *Calliandra*, though the pods do not present the dehiscence peculiar to that genus.

II. *Chloroleucon*.—Trees unarmed or occasionally possessing axillary spines, stipules

*Enterolobium*<sup>1</sup> has all the characters of *Pithecolobium* in inflorescence and vegetative organs. But its pod is broadly circinate or incurved-

*Calliandra brevipes.*



FIG. 36.  
Inflorescence.

reniform, thick compressed hard and indehiscent, with a spongy mesocarp finally indurated, and an endocarp prolonged inwards to form strong septa, separating the compressed transverse seeds. The three or four known species of this genus<sup>2</sup> are unarmed trees from tropical America, with the flowers in globular capitula, collected into spikes or racemes.

All these genera, so difficult to separate at all clearly, have small flowers, with the exception of certain of the species of *Inga*.

The flowers become relatively voluminous in the three remaining genera of this group—*Serianthes*, *Affonsea*, and *Archidendron*. The first consists of unarmed trees, with large bipinnate leaves.<sup>3</sup> The flowers, forming short corymbose racemes, have a thick coriaceous gamosepalous calyx, with five valvate teeth, a gamopetalous corolla, also valvate and five-lobed, and an androceum consisting of a very large number of stamens, whose filaments cohere into a tube, adherent for

membranous, caducous, or absent. Peduncles axillary, solitary or geminate. Pod thick (indehiscent?) straight or bowed. Seeds exarillate. Species five, American. GRISEBACH refers this species also to *Acacia*.

III. *Caulanthon*.—Unarmed trees with caducous or persistent stipules and paucifoliolate leaves. Inflorescences pedunculata, fascicled on the trunk or branches. Pod usually two-valved, straight or bowed. Seeds exarillate. Species fifteen, American. (VAHL., *Eclog.*, iii. t. 27.—VELLOZ., *op. cit.*, xi. t. 43.—MIQ., *Stirp. Surin.*, t. 1). To this section belongs *Zygia* P. BR. (*Jam.*, 279, t. 22, fig. 3, nec *Auctt.*). GRISEBACH (*op. cit.*, 225) refers it to the genus *Calliandra*.

IV. *Cathormion*.—Unarmed trees; inflorescence solitary or subfasciculate in axils of leaves. Flowers often pedicellate. Pod nearly straight, bowed, or circinate, two-valved or indehiscent, with false septa between the seeds, and sometimes parting into one-seeded joints at maturity. Species ten, all natives of the Old World, mostly Asiatic (including *Concordia* BENTH., part.), two Australian (BENTH., in *Hook. Journ.*, iii. 211; *Fl. Austral.*, ii. 423), and one from tropical Africa (*P. altissimum*, BENTH., *op. cit.* 197.—OLIV., *Fl. Trop. Afr.*, ii. 364.—*Albizzia altissima* HOOK. F., *Niger*, 332).

V. *Abaremotemon*.—Unarmed trees; stipules absent or ill developed. Leaflets usually numerous. Peduncles axillary, solitary or rarely fascicled. Pod broad, distorted, cochlear. Species about fifteen, American (VAHL., *op. cit.*, iii. t. 28.—VELLOZ., *op. cit.*, xi. t. 13, 14.—KL., ap. HAYN., *Arzneig.*, xiv. 13).

VI. *Unguis-cati*.—Trees; leaves with wholly or partly spinescent stipules, pinnules unijugate or unequally bijugate. Peduncles axillary or panicled, solitary or fascicled. Pod cochlear, valves variably twisted after dehiscence. Species about twenty, two Asiatic; the rest American. (K., *Mimos.*, t. 15, 16, 18.—VAHL., *op. cit.*, iii. t. 25, 26.—JACQ., *Hort. Schönbr.*, t. 392.—ROXB., *Pl. Coromand.*, t. 99.—WIGHT, *Icon.*, t. 198).

VII. *Clypearia*.—Unarmed trees. Inflorescences in numerous pedunculate panicles, whose ramifications are more or less obliquely superposed. Pod broad, contorted, cochlear, often woody. Aril present or wanting. Species ten, Asiatic.

<sup>1</sup> MART., *Herb. Fl. Bras.*, 117, 128.—ENDL., *Gen.*, n. 6837 d.—B.H., *Gen.*, 598, n. 396.

<sup>2</sup> VELLOZ., *Fl. Flum.*, xi. t. 25, 26.—GRISEB., *Fl. Brit., W. Ind.*, 226.—WALP., *Rep.*, v. 621.

<sup>3</sup> BENTH., in *Hook. Journ.*, iii. 225.—B. H., *Gen.*, 599, 1004, n. 397.



some distance to that of the corolla.<sup>1</sup> The ovary, tapering above into a long slender style, contains a variable number of descending ovules, in two rows. The pod is oval or oblong, straight or somewhat bowed, woody, and indehiscent, with transverse false septa separating the seeds. The two known species of the genus *Serianthes* are inhabitants of tropical Africa and the Pacific;<sup>2</sup> one of them is also found in New Caledonia.

*Affonsea*<sup>3</sup> has altogether the habit, simply pinnate leaves, and large flowers of certain species of *Inga*. But its gynæceum consists of a number of free carpels (from two to six), each, however, being formed as in *Inga*, and similarly becoming a few- or many-seeded pod. The androceum and corolla are united for a certain distance at the base, and the calyx forms a large sac, often vesicular, with five valvate teeth. The four known species of this genus<sup>4</sup> are Brazilian trees, with paripinnate leaves, possessing persistent stipules, and sessile or pedicellate racemose flowers.

The flowers of *Archidendron*<sup>5</sup> come very near *Affonsea* in corolla, androceum, and gynæceum. This last is composed of from five to fifteen carpels; but the calyx here presents a tubular sac, whose mouth is truncate and entire; the pod is coriaceous, bowed, irregularly twisted, and finally opens into two valves. *A. Vaillantii*,<sup>6</sup> the only known species, is an Australian tree, with bipinnate leaves, and shortly pedicellate flowers in axillary umbels. Omitting the form of the calyx, *Archidendron* may then be described as an *Affonsea*, with decomposed leaves and the fruit of *Pithecolobium*.

*Affonsea juglandifolia.*

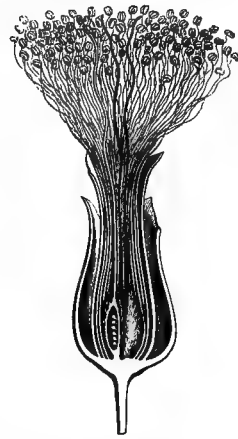


FIG. 37.  
Longitudinal section of  
flower.

Among the large Order *Leguminosæ*, or pod-bearing plants, hardly any representatives of the *Mimosææ* were known to the older bota-

<sup>1</sup> In *S. grandiflora* BENTH., the filament is inserted in the centre of a glandular connective bearing the two cells of an introrse anther of longitudinal dehiscence; externally this anther appears as though formed of four indistinct lobes.

<sup>2</sup> WALP., *Rep.*, v. 623; *Ann.*, iv. 639.

<sup>3</sup> A. S. H., *Voy. dans la Prov. des Diam.*, i.

387.—ENDL., *Gen.*, n. 6838.—BENTH., in *Hook. Journ.*, v. t. 1.—B. H., *Gen.*, 599, n. 399.

<sup>4</sup> WALP., *Rep.*, i. 644.

<sup>5</sup> F. MUELL., *Fragm. Phyt. Austral.*, v. 59.—B. H., *Gen.*, 1004, n. 397 a.

<sup>6</sup> F. MUELL., *loc. cit.*—*Pithecolobium Vaillantii* F. MUELL., *Fragm.*, v. 9.—*Albizzia (Pleiophaca) Vaillantii* F. MUELL., *Coll.*

nists, except *Mimosa*, *Acacia*,<sup>1</sup> and *Inga* ;<sup>2</sup> and even as late as 1783 we find LAMARCK<sup>3</sup> uniting these into a single genus, which he called in French *Acacie* (*Acacia*), in Latin *Mimosa*. This was a retrogression, for one hundred years since TOURNEFORT had separated the genera *Mimosa* and *Acacia*, calling the latter *Casse*<sup>4</sup> (*Cassia*). From these several small genera, then containing only one or very few species, were distinguished towards the end of last century, viz., *Adenanthera*<sup>5</sup> and *Prosopis*<sup>6</sup> by LINNÆUS, *Entada*<sup>7</sup> by ADANSON, *Zygia*<sup>8</sup> by P. BROWNE, *Gagnebina*<sup>9</sup> by NECKER, and *Neptunia*<sup>10</sup> by LOUREIRO. A. L. DE JUSSIEU, who knew five of the preceding genera, places them without special comment in the *Leguminosæ*, with regular corollas. In 1814 R. BROWN<sup>11</sup> proposed to make a separate order for *Mimoseæ*, which DE CANDOLLE<sup>12</sup> and LINDLEY<sup>13</sup> considered only a tribe or suborder of *Leguminosæ*, while ENDLICHER,<sup>14</sup> too, made them an order altogether distinct. The most recent authors, such as BENTHAM & HOOKER,<sup>15</sup> retain it merely as a suborder.

Few of the genera, except those above-mentioned, date more than sixty-four years back at the very outside. To WILLDENOW<sup>16</sup> are due two, *Schranckia* and *Desmanthus*; to DE CANDOLLE one, *Dichrostachys* ;<sup>17</sup> to VON MARTIUS, *Pithecolobium*, *Enterolobium*, and *Stryphnodendron* ;<sup>18</sup> to R. BROWN, *Parkia* ;<sup>19</sup> and *Affonsea* to A. DE SAINT-HILAIRE.<sup>20</sup> Excepting *Xerocladia*, recently proposed by HARVEY,<sup>21</sup> and *Archidendron*, just characterized by F. MUELLER,<sup>22</sup> all the other genera of *Mimoseæ* (viz., *Calliandra*, *Serianthes*, *Lysiloma*, *Leucæna*, *Xylia*, *Pentaclethra*, *Plathymenia*, *Elephantorrhiza*, and *Tetrapleura*), were established between 1842 and 1845 by BENTHAM,<sup>23</sup> who has studied this group with no less diligence and success than the rest of the enormous Order *Leguminosæ*.

The suborder *Mimoseæ*, thus comprising twenty-eight genera,

<sup>1</sup> T., *Instit.*, 605, t. 375.

<sup>2</sup> PLUM., *Gen. Amer.*, 13, t. 25 (1703).

<sup>3</sup> *Dict.*, i. 8; *Suppl.*, i. 35.

<sup>4</sup> He took *Acacia Farnesiana* as the type of this genus (see above, p. 41).

<sup>5</sup> *Gen.*, n. 526 (1737).

<sup>6</sup> *Mantiss.*, n. 1260 (1767).

<sup>7</sup> *Fam. des Plant.*, ii. (1763), 318.

<sup>8</sup> *Jam.*, 279, t. 22 (1756).

<sup>9</sup> *Elem.*, ii. 1296 (1791).

<sup>10</sup> *Fl. Cochinch.*, ed. Ulyssip. (1790), 653.

<sup>11</sup> *Gen. Rem.*, 19; *Congo*, 10.

<sup>12</sup> *Mém. Légum.* (1825); *Prodr.*, ii. (1825), 424.

<sup>13</sup> *Veg. Kingd.* (1846), 552, Ord. ccix.

<sup>14</sup> *Gen.* (1840), 1323, Ord. cclxxvii.

<sup>15</sup> *Gen.*, 436, 482, 588 (1865).

<sup>16</sup> *Spec. Plant.*, iv. 1041, 1044 (1805).

<sup>17</sup> *Mém. Légum.*, 428, t. 67 (1825).

<sup>18</sup> *Herb. Fl. Brasil.*, 114, 117, 128 (1837).

<sup>19</sup> In *App. Denh. & Clappert.*, 234 (1826).

<sup>20</sup> *Voy. dans la Prov. des Diam.*, i. 387 (1833).

<sup>21</sup> *Fl. Cap.*, ii. 273 (1861, 62).

<sup>22</sup> *Fragm., Phyt. Austral.*, v. 59 (1867).

<sup>23</sup> In *Hook. Journ.*, ii.-iv.

including about eleven hundred species, presents so many constant characters that to subdivide it we must fall back upon features which are elsewhere deemed of wholly secondary value. Thus we have seen that the genera are mainly based on the form and dehiscence of the fruits and the relations of the endocarp to the seeds, and the degree of complexity of the leaves, which are either simply pinnate or bipinnate. The series or tribes are based on the præ-floration of the calyx, the number of stamens, and the presence or absence of a sort of glandular prominence on top of their connectives. Hence we get the four following series, which alone do we retain:—

I. ADENANTHEREÆ.—Calyx valvate; androceum diplostemonous; stamens free, usually<sup>1</sup> tipped by a gland.

II. EUMIMOSÆÆ.—Calyx valvate; androceum isostemonous or diplostemonous; stamens free, without apical glands.

III. PARKIÆÆ.—Calyx imbricate; androceum diplostemonous or pleiostemonous, with only five fertile stamens; apical glands present or absent.

IV. ACACIÆÆ.—Calyx valvate; stamens indefinite, free, monadelphous or polyadelphous.<sup>2</sup>

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The *Mimoseæ* are plants from warm climates, abounding in the tropical and subtropical zones of both hemispheres, and hardly extending more than forty degrees on either side of the Equator. Of the twenty-eight genera retained by us, five alone are peculiar to America, viz., *Plathymenia*, *Stryphnodendron*, *Lysiloma*, *Enterolobium*, and *Affonsea*; and eight to the Old World—viz., *Pentaclethra*, *Elephantorrhiza*, *Gagnebina*, *Tetrapleura*, *Xerocladia*, *Serianthes*, *Xylia* and *Archidendron*. Of these last the five former have only been observed in tropical Africa or Madagascar; the three latter in Asia or Oceania. *Archidendron*, a monotypical genus, is only Australian; but the genera found in nearly every warm climate are very unevenly distributed as a rule. Thus, *Mimosa*, *Calliandra*, *Pithecolobium*, and *Acacia* have species in all the countries of the world, but *Calliandra*, out of eighty species, has only one in the Old World. Those of

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<sup>1</sup> This gland is almost entirely absent in one section of the genus *Prosopis*. In *Xylia* it may disappear so early that until now its presence has not been recognised.

<sup>2</sup> The freedom or union of the staminal filaments is used by BENTHAM to distinguish two series, *Acaciææ* and *Ingeææ*, which we are unable to separate for the reasons given above (pp. 41, 42).

*Pithecolobium* are very rare in Africa and Asia, though, on the contrary, widely spread in America. *Mimosa*, too, is chiefly American. As for *Acacia*, it is commoner in tropical and Southern Africa than many other parts of the Old World. The Floras of the Cape, Senegal, and Abyssinia include upwards of fifty species, but it chiefly affects a favoured zone in Australia and the neighbouring parts of Oceania, so that at the present day nearly three hundred species, that is, a little less than three-quarters of the entire genus, are known to occur spontaneously in New Holland.

The *Mimoseæ* possess numerous properties,<sup>1</sup> of which the most remarkable are the astringency of the bark and pericarp, and the presence of a gummy substance in the former, analogous to that of the *Prunææ*. Gum arabic and all other gums resembling it in solubility in water, and chemical reactions generally, are furnished by the *Mimoseæ*, and also especially the genus *Acacia*.<sup>2</sup> It is well known that most of the gums called Arabic and Senegal gums are produced by *A. arabica*,<sup>3</sup> a species spread over India, Egypt, Arabia, Senegal, and even as far south as the Cape. It has four chief forms or varieties,<sup>4</sup> called *nilotica*,<sup>5</sup> *tomentosa*,<sup>6</sup> *indica*,<sup>7</sup> and *Kraussiana*.<sup>8</sup> It is the first of these varieties which, at least in great part, constitutes the *A. vera*<sup>9</sup> of authors, a plant long supposed to be the only source of gum arabic. Senegal gum is exuded chiefly from the variety *tomentosa*, and the Indian gum from *indica*. However, in places whence such gums are obtained there are other *Acacias* of different species which supply it. Such are *A. adstringens*,<sup>10</sup> giving gum *gonaté* or *gonatié*, *A.*

<sup>1</sup> ENDL., *Enchirid.*, 688. — LINDL., *Veg. Kingd.*, 552; *Fl. Medic.*, 268. — GUIB., *Drog. Simpl.*, éd. 4, iii. 300. — ROSENTH., *Syn. Plant. Diaphor.*, 1051, 1065.

<sup>2</sup> H. BN., in *Dict. Encycl. des Sc. Medic.*, i. 254; *Révision des Acacia Médicinaux*, in *Adansonnia*, iv. 85.

<sup>3</sup> W., *Spec.*, iv. 1085. — DC., *Prodr.*, ii. 461, n. 135. — H. BN., *loc. cit.*, 91, n. 8.

<sup>4</sup> BENTH., in *Hook. Journ.*, i. 500.

<sup>5</sup> *A. nilotica* DEL., *Fl. Egypt.*, 79. — *A. aegyptiaca* FABR. — *Mimosa arabica* POIR., *Dict.*, Suppl., i. 19. — *Spina aegyptiaca* PLUK., *Almag.*, 3. — *Spina Acacia* LOBEL. — *Sant, Sunt* of the Egyptians (see GUIB., *op. cit.*, iii. 363. — H. BN., *loc. cit.*, 95 B.).

<sup>6</sup> BENTH., *loc. cit.* — H. BN., *loc. cit.*, 94 A. — *Acacia arabica* W., *Spec.*, iv. 1085. — DC., *Prodr.*, n. 134. — *Neb-neb* of Senegal. — *Gommier rouge Neb-neb* ADANS.

<sup>7</sup> BENTH., *loc. cit.* — *Mimosa arabica* ROXB., *Pl. Coromand.*, ii. 26, t. 149. — *Acacia vera altera* PLUK., *Almag.*, 3 (*Babool, Babula* in Bengalli, *Burbura* in Sanscrit, *Nella Tooma* in Cingalese).

<sup>8</sup> BENTH., *loc. cit.* — H. BN., *loc. cit.*, 96 D.

<sup>9</sup> W., *Spec.*, iv. 1085. — DC., *Prodr.*, n. 134. — VALM. DE BOM., *Dict.*, i. 81.

<sup>10</sup> H. BN., *loc. cit.*, 88. — *A. Adansonii* GUILLEM. & PERR., *Fl. Seneg. Tent.*, i. 249. — *Mimosa adstringens* SCHUM. & THÖNN., *Beskr.*, 2. — *Gommier rouge Gonaké* or *Gonatié* ADANS.

*fasciculata*,<sup>1</sup> *Neboueb*,<sup>2</sup> *Senegal*,<sup>3</sup> *Seyal*,<sup>4</sup> and *Verek*,<sup>5</sup> in Senegal; *A. gummifera*,<sup>6</sup> in Mauritania; *A. Ehrenbergii*,<sup>7</sup> *Seyal*,<sup>8</sup> and *tortilis*,<sup>9</sup> in Arabia and Eastern Africa; *A. capensis* and *horrida*, in South Africa; *A. leucophlœa*, in India; *A. decurrens*,<sup>10</sup> *homalophylla*,<sup>11</sup> *melanoxyylon*,<sup>12</sup> *mollissima*,<sup>13</sup> *pycnantha*,<sup>14</sup> and *Sophora*,<sup>15</sup> in Australia.

Others, too, of the *Mimoseæ* besides the true *Acacias* also exude gummy products, notably certain species of the sections *Albizzia* and *Zygia*. A sort of gum is obtained in India from *Acacia procera*;<sup>16</sup> another kind, analogous to gum arabic, is obtained from *Acacia Lebbek*;<sup>17</sup> while *A. stipulata*<sup>18</sup> in Java furnishes a similar product. The prototype species of the section *Vachellia*, *A. Farnesiana*,<sup>19</sup> is also prized in Java for the gum it furnishes. In North America, again, a peculiar gum is known called *mezquite*,<sup>20</sup> which flows from the trunk of *Prosopis glandulosa*;<sup>21</sup> and another kind called *copaltic* sweats from the bark of *Calliandra portoricensis*.<sup>22</sup> The gum of *Sassa*, whose properties come nearer that of gum-tragacanth, comes, we are told, from one of the *Sassas* of BRUCE,<sup>23</sup> now referred to the section *Zygia* of the genus *Acacia* (figs. 34, 35).

Next the gums come several mucilaginous products, also due to

<sup>1</sup> GUILL. & PERR., *op. cit.*, 252.—H. BN., *loc. cit.*, 106, n. 15.—*Troisième espèce de Gommier ADANS.*

<sup>2</sup> This name perhaps refers to one of the forms of *A. arabica* (see H. BN., *loc. cit.*, 117, n. 29).

<sup>3</sup> W., *Spec.*, iv. 1077?—H. BN., *loc. cit.*, 121, n. 42.

<sup>4</sup> DEL., *Fl. Egypt.*, 142, t. 52, fig. 2.—H. BN., *loc. cit.*, n. 43.—OLIV., *Fl. Trop. Afr.*, ii. 351.

<sup>5</sup> GUILL. & PERR., *op. cit.*, 245, t. 56.—GUIB., *op. cit.*, iii. 408.—H. BN., *loc. cit.*, 125, n. 49.—OLIV., *loc. cit.*, 342.

<sup>6</sup> W., *Spec.*, iv. 1056.—DC., *Prodr.*, n. 67.—BENTH., *loc. cit.*, 500, n. 256.—GUIB., *loc. cit.*, 408.—H. BN., *loc. cit.*, 108, n. 17.

<sup>7</sup> NEES, *Pl. Medic.*, 413.—H. BN., *loc. cit.*, 104, n. 13.

<sup>8</sup> See note 4.

<sup>9</sup> FORSK., *Fl. Egypt. Arab.*, i. 176.—H. BN., *loc. cit.*, 124, n. 46.—OLIV., *loc. cit.*, 352.

<sup>10</sup> W., *Spec.*, iv. 1072.—H. BN., *loc. cit.*, 103, n. 12.—*Mimosa decurrens* VENT., *Malm.*, t. 61.

<sup>11</sup> A. CUNN., ex BENTH., *loc. cit.*, 365, n. 148.—H. BN., *loc. cit.*, 109, n. 19.

<sup>12</sup> R. BR., *Hort. Kew.*, v. 462.—H. BN., *loc. cit.*, 114, n. 27.

<sup>13</sup> W., *Enum.*, 1053.—DC., *loc. cit.*, n. 221.—LINDL., *Fl. Med.*, 270.—H. BN., *loc. cit.*, 116, n. 28.—*Wattle* of the Australians.

<sup>14</sup> BENTH., *loc. cit.*, 351, n. 98.—H. BN., *loc. cit.*, 119, n. 38.

<sup>15</sup> R. BR., *Hort. Kew.*, v. 462.—H. BN., *loc. cit.*, 122, n. 44. Besides various astringent substances, the five last species furnish the *South Australian gum* of the English (see LINDL., *Fl. Med.*, 270).

<sup>16</sup> W., *Spec.*, iv. 1063.—*Mimosa procera* ROXB., *Pl. Coromand.*, ii. 12, t. 121; *Fl. Ind.*, ii. 548.—*M. coriacea* BLANC., *Fl. d. Philipp.*, 734?—*Albizzia procera* BENTH., in *Hook. Journ.*, iii. 89.

<sup>17</sup> W., *loc. cit.*, 1066.—*A. speciosa* W., *loc. cit.*—*Mimosa Sirissa* ROXB., *Fl. Ind.*, ii. 544.—*M. Lebbek* L.—*Albizzia Lebbeke* BENTH., *loc. cit.*, 87.—OLIV., *loc. cit.*, 358.—It is the *Bois à frire* or *à friture* (frying-wood) of the Antilles; *Cirsia* or *Shirisha* of Bengal; *Cottonvaray* of Coromandel.

<sup>18</sup> DC., *Prodr.*, *loc. cit.*, 460, n. 209.—*Mimosa stipulata* ROXB., *Cat.*, 40.—*Albizzia stipulata* BOIV., *loc. cit.*

<sup>19</sup> See page 41, note 1.—GUIB., *Drog. Simpl.*, éd. 4, iii. 366, fig. 358.—ROSENTH., *op. cit.*, 1058.

<sup>20</sup> ROSENTH., *op. cit.*, 1052.

<sup>21</sup> TORE., in *Ann. Lyc. New-York*, ii. t. 2.—*Algarobia glandulosa* TORE. & GR.

<sup>22</sup> BENTH., in *Hook. Journ.*, ii. 138.—*Acacia portoricensis* W., *loc. cit.*, 1067.

<sup>23</sup> See trad. CASTER., v. 39, t. 4, 5.

several *Mimoseæ*. *Acacia concinna*,<sup>1</sup> from India, and introduced into Bourbon and Mauritius, has also been called *Mimosa Saponaria*,<sup>2</sup> because it froths in water. It is employed like our *Saponarias* in medicine and domestic economy. We find in and around the seeds and the enormous pods of *Entada scandens*,<sup>3</sup> when still green, a mucilaginous substance, also existing in the liber; it is used in India to prepare a decoction for washing the head and hair.

Several *Mimoseæ* furnish aliments or fermented drinks by their seeds, which contain starch, sugar, or fatty matters. *Parkia biglobosa*<sup>4</sup> is celebrated on this account in Africa. Its seeds are roasted like coffee beans, broken up, and then left in water to ferment. When putrefaction sets in they are washed and reduced to powder. Thus is obtained a sort of nutritive flour, which is made up into tablets like chocolate; it is used as a condiment to mix with cooked meat. The seeds are surrounded by a floury matter used to prepare an aliment and a drink. The *Pois doux* (Sweet pea) of St. Domingo, *Prosopis faculifera* DESVX., contains a sweet nutritive pulp. In Tasmania they roast the pods of *Acacia Sophoræ*<sup>5</sup> and eat the feculent seeds. The seeds of *Inga tetraphylla* MART. are also surrounded by a sweet perfumed substance. The seeds of *Prosopis Algarobia*<sup>6</sup> are also sweet and nutritive. Accordingly, we are told that the drink called *chica* in South America is often prepared from these pods and their seeds. It is related that the old women pass their time in that country in chewing these fruits, so that the saliva transforms the starch into grape-sugar or glucose; the bolus then treated with water readily undergoes alcoholic fermentation. Several other species of the section *Algarobia* of *Prosopis* have more or less sweet, pulpy, edible fruits, especially *P. dulcis* K.,<sup>7</sup> from New Spain; *P. horrida* K.,<sup>8</sup> the *Algarobe* of the Andes, and *P. iuliflora* DC.,<sup>9</sup> of

<sup>1</sup> DC., *loc. cit.*, 464, n. 159.—H. BN., *loc. cit.*, 100, n. 11.—*Mimosa concinna* W., *loc. cit.*, 1039.

<sup>2</sup> ROXB., in herb. LAMB., ex DC., *loc. cit.*

<sup>3</sup> *E. Gigalobium* DC., *Mém. Légum.*, 12.—*E. Pursaetha* DC., *loc. cit.*—*Mimosa scandens* L., W., SW., ROXB. (See above, p. 26, note 4.—GUILB., *op. cit.*, iii. 300.—ENDL., *Enchirid.*, 683.—ROSENTH., *op. cit.*, 1054).

<sup>4</sup> *P. africana* R. BR., in *App. Denk.*, 234.—*Inga biglobosa* W., *Spec.*, iv. 1025?—P. BEAUV., *Fl. Owar. et Ben.*, ii. 53, t. 90. Several Indian *Parkias* have similar properties. Their seeds are often bitter (see ROSENTH., *op. cit.*, 1051).

<sup>5</sup> R. BR., *Hort. Kew.*, ed. 3, v. 462.—

H. BN., *loc. cit.*, 123, n. 44.—BENTH., *Fl. Austral.*, ii. 398 b.

<sup>6</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, ii. 746.

<sup>7</sup> *Mimos.*, 110, t. 34.—H. B. K., *Nov. Gen., et Spec.*, vi. 307.—DC., *Prodr.*, ii. 447, n. 4.—*Acacia levigata* W., *Spec.*, iv. 1059.—*A. edulis* W., *Enum.*, 1056? The same properties are attributed to *P. Siliquastrum* DC. (n. 8), and *fleuvosa* DC. (n. 9), inhabitants of Chili (see ROSENTH., *op. cit.*, 1052).

<sup>8</sup> *Mimos.*, 106, t. 33.—DC., *loc. cit.*, n. 1.

<sup>9</sup> DC., *loc. cit.*, n. 13.—*Mimosa iuliflora* Sw., *Prodr.*, 85.—*M. piliflora* Sw., *Fl. Ind. Occ.*, 986.—*Acacia falcata* DESF.? (see H. BN., *loc. cit.*, n. 3).

the Antilles, the *Smaller Algarobe*, *Algaroville* or *Cashew*, which yields a certain amount of gum on incision, and whose fruits serve as fodder.<sup>1</sup> Again, the fruits of many species of *Inga*, *Pithecolobium*, *Leucæna*, &c., are also cited as food stuffs.<sup>2</sup>

It has, however, been remarked that dangerous acrid principles may here and there occur mixed with the nutritive substances in these fruits or seeds. Thus *P. viliflora* itself may become deleterious under certain circumstances.<sup>3</sup> The seeds of *Entada scandens* are used as emetics in India and Java. Several *Mimosas* are purgative, and the pulp of *Inga vera*<sup>4</sup> is a laxative. By distilling the bark of *Acacia ferruginea*<sup>5</sup> and *leucophlæa*<sup>6</sup> with the sweet juice of the Palms a poisonous fermentible liquor is obtained in India. The root of several Brazilian *Mimosas* is venomous, and that of *M. pudica*, of disagreeable scent, is an irritant. The powdered seed of *M. acaciodes* BENTH. is used in Guiana as a sternutatory. It is no doubt a similar virtue which makes the *Mouçenna*<sup>7</sup> of Abyssinia so excellent a remedy for worms, and especially tapeworms. It is the bark of *A. anthelminthica*<sup>8</sup> which has this quality, analogous to that of *Koussou*, though it would seem more marked; for in Abyssinia *Mouçenna* is regarded as of more certain action, invariably killing the tapeworm, of which *Koussou* often expels a portion only.<sup>9</sup>

Astringency is one of the most marked qualities of the *Mimoseæ*,

<sup>1</sup> As useful as the cereals, according to MACFADYEN (*Fl. Jam.*, i. 312).

<sup>2</sup> See ROSENTH., *op. cit.*, 1063-1065.—This is especially the case with *Pithecolobium dulce* BENTH., *salutare* BENTH., and *parvifolium* BENTH., *Inga edulis* MART., *sapida* H. B. K., *dulcis* MART., *punctata* W., etc.

<sup>3</sup> According to MACFADYEN it is after rain has moistened the seeds, so that they germinate and evolve carbonic acid in the stomachs of the cattle.

<sup>4</sup> W., *Spec.*, iv. 1014.—DC., *Prodr.*, n. 18.—*Mimosa Inga* L., *Spec.*, 1493 (see ROSENTH., *op. cit.*, 1064).

<sup>5</sup> DC., *op. cit.*, 458, n. 105.—H. BN., *loc. cit.*, 107, n. 16.—*Mimosa ferruginea* ROXB., *Fl. Ind.*, ii. 561.

<sup>6</sup> W., *Spec.*, iv. 1063.—DC., *loc. cit.*, 462, n. 12.—H. BN., *loc. cit.*, 113, n. 25. This species has been supposed to produce the gum *Kutera* (now referred by GUIBOURT, *op. cit.*, iii. 421), to one of the *Cactaceæ* or *Ficoideæ*.

<sup>7</sup> Or *Abousenna*, *Boucenna*, *Bessenna*, *Messenna*, *Mussena*; the *Bicinna* of Tigré and *Kumada* of Sawa.

<sup>8</sup> *Besenna anthelminthica* A. RICH., *Tent. Fl. Abyss.*, i. 253.—*Albizzia anthelminthica* AD. BR., in *Bull. Soc. Bot. de Fr.*, vii. 902.—FOURN., *Des. Ténif. empl. en Abyss.*, *Thèses de Par.* (1861), 37; in *Ann. Sc. Nat.*, sér. 4, xiv. 380, t. 14.—MOQ., *Bot. Med.*, 145.—H. BN., in *Dict. Encycl. des Sc. Médic.*, ii. 416.

<sup>9</sup> *Mouçenna*, on the contrary, reduces the worm to a sort of pulp, and is considered in Abyssinia of more powerful action than *Koussou*; but the latter is employed in preference because the people do not wish as a rule to get rid of the tapeworm completely. The powdered bark is employed in doses of about sixty grammes. This bark is from 2 to 5 millimetres thick, smooth or cracked, greyish outside, and pale yellow within. Its taste is first sweet, then astringent, and finally nauseous. From the bark an extract has been prepared, which has sometimes been found useful. The bark of the large branches is supposed to be the more active. From this drug has been extracted a very sapid acrid acid greyish resin soluble in ammonia. The results of the administration of *Mouçenna* in Europe are very contradictory.

rich as they are in tannin. They contain a large quantity in their fruits, for the *Bablabs*<sup>1</sup> of commerce, so much used in dyeing and tanning, are fruits of various species, either belonging or very nearly allied to *Acacia* proper. Those of *A. arabica*, *A. Adansonii*, and *A. Seyal*<sup>2</sup> are frequently imported into Europe. Those of *A. Farnesiana* are usually called *Balibabulah*.<sup>3</sup> All are employed in their native countries in the preparation of astringent infusions and decoctions, especially recommended in inflammatory affections of the skin, mucous membranes, eyes, and throat. The fruits of *Parkia*<sup>4</sup> have also an astringent pericarp, as is the case, too, with *Prosopis* (called *Algarobo* in South America), the *Angico* and *Barbatimáo* of Brazil, of which we shall treat below, *Inga* (often termed *Algarovilla*<sup>5</sup> in America), and the American species of *Enterolobium*<sup>6</sup> and *Pithecolobium*.<sup>7</sup> It is from the pericarp of several Egyptian *Acacias*, especially *A. arabica*, var. *nilotica*, that Acacia juice is extracted. This juice, now so rare in Europe, is obtained by pounding and pressing the unripe pods; it has been recommended in ophthalmia, dysentery, and scurvy. The fruits of the Australian species, *A. melanoxyylon* and *homalophylla*, may, we are told, furnish a similar juice. This astringency also occurs in certain morbid products analogous to our galls or bedeguars, produced by a gall-insect on the branches of *A. Raddiana*<sup>8</sup> in Egypt, and used in toothache.

The astringency is often still better marked in the bark and wood of the stem and branches. Various kinds of Indian Catechu are extracted by infusion from *Acacia Catechu*.<sup>9</sup> the chief kinds are those which GUIBOURT<sup>10</sup> has named as follows: *Cachou brun siliceux, noir mucilagineux*; *C. du Pégu en masses, lenticulaire*; *C. terne parallépipède*; *C. brun siliceux, brun rouge polymorphe*, and *blanc enfumé*. PEREIRA asserts,<sup>11</sup> that the Catechus from Bengal, extracted from

<sup>1</sup> From the Indian *Babul*, *Babula* (see GUIB., *Drog. Simpl.*, éd. 4, iii. 365.—H. BN., in *Dict. Encycl. des Sc. Méd.*, viii. 2). The *Bablabs* of Egypt, India, and Senegal are distinguished from each other.

<sup>2</sup> This species is the Senegal *Bablabs*.

<sup>3</sup> Or *Balibulah* (see H. BN., *loc. cit.*).

<sup>4</sup> ROSENTH., *op. cit.*, 1051. The seeds of *P. intermedia* HASSK. are bitter and tonic.

<sup>5</sup> See GUIB., *op. cit.*, 369.—H. BN., in *Dict. Encycl. des Sc. Médic.*, ii. 746.

<sup>6</sup> *Jaboncillo* of the Colombians.

<sup>7</sup> See ROSENTH., *op. cit.*, 1063.

<sup>8</sup> SAVI., *S. Alc. Acac. Egiz.*, Pisa, 1830.—H. BN., in *Adansonia*, iv. 120, n. 39.

<sup>9</sup> W., *Spec.*, iv. 1079.—H. BN., in *Adansonia*, iv. 98, n. 10.—*A. polyacantha* W., *loc. cit.*—*A. catechuoides* ROXB., *Fl. Ind.*, ii. 562?—*A. Wallichiana* DC., *Prodr.*, ii. 458.—*Mimosa Catechu* ROXB., *op. cit.*, 563. (See above, p. 39; figs. 29-31.)

<sup>10</sup> *Drog. Simpl.*, éd. 4, iii. 374, 383.

<sup>11</sup> *Elem. Mat. Med.*, ed. 5, ii. p. 2, 339.—LINDL., *Fl. Med.*, 268.—ROSENTH., *op. cit.*, 1057.



*Acacias*, are of inferior quality. Many other *Acacias* have a very astringent bark, used either in medicine or for dyeing and tanning. This is the case with nearly all the gum species, especially *A. arabica*, *Adansonia*, *Ehrenbergii*, *peregrina*, *Seyal*, *Verek*, &c. What is called *Mimosa-bark Extract* in England is obtained from the Australian species with gummy juice, and chiefly from *A. decurrens*, *homalophylla*,<sup>1</sup> *melanoxylon*, *mollissima*,<sup>2</sup> *pycnantha*, &c.<sup>3</sup> The barks of many other species of *Acacia* proper are rich in tannin : but astringency seems most developed in the old species of *Mimosa* and *Acacia*, vulgarly known in Brazil as "Bark of youth and of virginity"<sup>4</sup> especially *Angico*,<sup>5</sup> *Barbatimao*,<sup>6</sup> *Avaremotemo*,<sup>7</sup> and *Jurema*.<sup>8</sup> Many *Calliandras*, such as the *Tendre-à-caillon*<sup>9</sup> and *C. grandiflora*<sup>10</sup> of Mexico, have similar properties ; the latter species is especially recommended in fluxes and chest diseases. No doubt it is for its astringent properties that *Mimosa sensitiva*<sup>11</sup> is so highly valued in America in the treatment of fistula and piles ; just like *Adenantha pavonina* (Red Sandalwood ; Fr., *Condori d'Inde*),<sup>12</sup> in rheumatism and inflammations of the mucous membranes, and *Pithecolobium Unguiscati*,<sup>13</sup> *Inga vera*,<sup>14</sup> and *I. Burgonia*,<sup>15</sup> in fluxes and catarrhal phlegmasiæ ; and in tropical Asia the decoctions of several species of *Mimosa*, *Leucaena* and *Acacia*,<sup>16</sup> are used as lotions to bruised or inflamed parts. So, too, several *Albizzias* are similarly employed, especially *A. micrantha*,<sup>17</sup> which affords a sort of Catechu ; in Java and the Indian Archipelago

<sup>1</sup> Myall tree of the Australians.

<sup>2</sup> Silver-Wattle of the Australians.

<sup>3</sup> See LINDL., *Fl. Med.*, 270.—H. BN., in *Adansonia*, iv. 103, 109, 114, 116, 119.

<sup>4</sup> Pis., *Brasil.*, 77.

<sup>5</sup> *Piptadenia colubrina* BENTH., in *Hook. Journ.*, iv. 334.—*Acacia angico* MART.—SALDANHA, *Config. . . . das Pr. Madeir.*, &c. (1865), 126, *Icon*.

<sup>6</sup> *Stryphnodendron Barbatimao* MART.—GUIB., *Drog. Simpl.*, éd. 4, iii. 306.—H. BN., in *Dict. Encycl. Sc. Méd.*, viii. 340.—*Inga Barbatimao* ENDL.—*Acacia adstringens* MART. It is prescribed in Brazil in cases of wounds, burns, and even hernias.

<sup>7</sup> *Pithecolobium Avaremotemo* MART.—*Inga Avaremotemo* ENDL.—*Mimosa cochliocarpos* GOM.—*Acacia virginialis* POHL.—*Avaremotemo* PIS., *loc. cit.*—*Brincos de Sahoim* of the Brazilians (see ROSENTH., *op. cit.* 1063).

<sup>8</sup> *Stryphnodendron Jurema* LINDL., *Veg. Kingd.*, 553.—*Acacia Jurema* MART.—GUIB., *op. cit.*, 306.—ROSENTH., *op. cit.*, 1059. The *Nupa* or *Nuipa* of the Americans (*Acacia*

<sup>9</sup> *Niopo* H. B. K.), has similar properties ; but it is also a stimulant, and is powdered as a snuff just like *Mimosa acacioides*.

<sup>10</sup> *C. tetragona* BENTH.—*Acacia tetragona* W.—*A. quadrangularis* LAMK.

<sup>11</sup> BENTH.—*Acacia grandiflora* W.—*Inga anomala* DC., part. (ROSENTH., *op. cit.*, 1062.)

<sup>12</sup> L., *Spec.*, 1501.—DC., *Prodr.*, n. 3.—ROSENTH., *op. cit.*, 1053.

<sup>13</sup> L. (see above, pp. 21, 22, fig. 15-19).—ROSENTH., *op. cit.*, 1051.

<sup>14</sup> BENTH.—*Inga Unguis-cati* W., *Spec.*, iv. 1006.—*I. guadalupensis* DESVX.

<sup>15</sup> W., *op. cit.*, iv. 1014.—DC., *Prodr.*, ii. 433, n. 18.

<sup>16</sup> DC., *op. cit.*, n. 26.—*Mimosa Bourgoni* AUBL., *Guian.*, ii. t. 358.—*M. fagifolia* L., *Spec.*, 1498.

<sup>17</sup> See ROSENTH., *op. cit.*, 1053-1062.

<sup>18</sup> *Acacia odoratissima* W., *op. cit.* 1063.—*Albizzia micrantha* BOIV., in *Encyc. du xix<sup>e</sup>. Siècle*, ii. 34.—*Cherymaram* of Malabar.—*Tarriesia* HASSK., *Cart. Hort. Bog.*, 291.

several species of *Pithecolobium* are used in phlegmasiæ of the skin, pharynx, urinary canals, and respiratory organs,<sup>1</sup> and *A. ferruginea*<sup>2</sup> is recommended in scurvy.

Several *Mimoseæ*, such as *Acacia lucida*,<sup>3</sup> *Pithecolobium lobatum*,<sup>4</sup> &c., have edible oily seeds, tasting something like the hazel nut. The embryo of *Pentaclethra macrophylla*<sup>5</sup> of the Gaboon, often eaten by the natives, is very rich in oil, which might be turned to good account. In several *Neptunias*, the edible parts are the leaf, buds, and young shoots, which are dressed as vegetables.<sup>6</sup> Several species contain an odoriferous volatile oil; this is very abundant in the usually yellow, very sweet scented flowers of the Australian *Acacias*, which come out towards the end of the winter to adorn our cold and temperate conservatories. The sweetest is the so-called *Cassia*, i.e., *A. Farnesiana*,<sup>7</sup> from which is extracted a stimulating essence of delicious perfume. Some other species again have aromatic leaves, used in infusion like tea; we may mention *Acacia Julibrissin* W., and *angustifolia*, WENDL.<sup>8</sup>

Colouring matters are rare in this group. However, *Adenantha pavonina* (Red Sandal-wood, *Condori d'Inde*) supplies a red dye, the *rukta-chundun* of the Hindoos. The pods of *Acacia Bambola* ROXB., the Indian gall-tree, constitute one kind of *Bablabs*, and are rich in colouring matter. The wood of *A. heterophylla* W., from the Sandwich islands is impregnated with yellow pigment, and is speckled with darker spots. *Pithecolobium Clypearia*,<sup>9</sup> from south-eastern Asia, contains beside a quantity of tannin, a dye used for colouring nets, which it preserves from decay. A lovely crimson is contained in the flowers of *P. Junghuhnianum* BENTH., which is, when in flower, one of the handsomest trees in Japan. *P. parvifolium*,<sup>10</sup> from the West Indies, contains a fine orange yellow dye-stuff in its pods, obtained by crushing the pulp; and the bark of *Inga marginata*,<sup>11</sup> from

<sup>1</sup> ROSENTH., *op. cit.*, 1063.

<sup>2</sup> DC., *Prodr.*, ii. 458, n. 105.—H. BN., in *Adansonia*, ix. 107, n. 16.—*Mimosa ferruginea* ROXB., *Fl. Ind.*, ii. 561.

<sup>3</sup> *Mimosa lucida* ROXB., *Fl. Ind.*, ii. 544.—*Albizia lucida* BENTH., in *Hook. Journ.*, iii. 86.

<sup>4</sup> BENTH.—ROSENTH., *op. cit.*, 1063.—*Mimosa Jiringa* JACK.—*M. Kœringa* ROXB.

<sup>5</sup> BENTH.—H. BN., in *Adansonia*, vi. 204, t. iv. fig. 5.—*Owala* of the natives of the Gaboon.

<sup>6</sup> LAMUR., *Fl. Cochinch.*, ed. Ulyssip. (1790), 654.—ROSENTH., *op. cit.*, 1053.

<sup>7</sup> See p. 41, notes 1, 2.

<sup>8</sup> *A. odorata* DESVX.

<sup>9</sup> BENTH.—ROSENTH., *op. cit.*, 1063.—*Inga Clypearia* JACK.—*Acacia magnifolia* JUNGH.—*Mimosa trapezifolia* ROXB.

<sup>10</sup> BENTH.—*Inga Marthæ* SPRENG., ex DC., *Prodr.*, ii. 441, n. 103. The fruit shares the name of *Algarovilla* with several others in the Antilles.

<sup>11</sup> W. (nec H. B. K., *Nov. Gen. et Spec.*, vi. 285).—*Mimosa fagifolia* L. (ex ROSENTH., *op. cit.*, 1065).

Guiana and the neighbouring countries, is rich in tannin, and serves to dye coarse fabrics and even to stain woods.

The wood of the *Mimosæ*, though much less useful in this respect than that of the *Cæsalpiniceæ*, is still frequently of good quality, and is prized by the carpenter, the cabinet-maker, and the turner. *A. arabica* and *Farnesiana* are used in India for making axletrees and wheels. The wood of *A. cinerea*, *odoratissima*, *Sundra*, and *stipulata* have their value; and that of *A. speciosa*, dark and fine-grained, is used for furniture. It is a *Mimosa* from the forests of Brazil, that is said to furnish the handsome wood known as *Jacandra*- or Rose-wood of commerce; it possesses an excellent perfume when fresh.<sup>1</sup> The useful woods of the same country, known by the names of *Cabuy*, *Jacaré*, *Monjolo-ferro*,<sup>2</sup> are also attributed to this group. The Angico-wood of commerce comes, we are told, not from the *Piptadenia* which furnishes the Angico-pods,<sup>3</sup> but from *Pithecolobium gummiferum*.<sup>4</sup> *P. filicifolium* BENTH.,<sup>5</sup> from Mexico and the Antilles, is used for cabinet-making; so, too, are *P. unguis-cati* of the West Indies, which supplies one kind of *Tendre-à-caillou* (so named from its hardness) of the Antilles; *P. montanum* BENTH.,<sup>6</sup> from the Indian Archipelago, whose wood is solid and flexible; and *P. umbellatum* BENTH.,<sup>7</sup> whose hard compact wood is cleft with difficulty. The stem of *P. chypearia* is used for making boats in tropical Asia; but its resistance to the action of water and its durability are alike very limited. The wood of *Calliandra tetragona*<sup>8</sup> is the true *Tendre-à-caillou* of Caraccas. *Lysiloma Sabica* BENTH., from Cuba, is a fine tree which gives the true *Sabica* wood of the Antilles.

In *Inga* the stem is rarely very large. That of *I. Bourgoni* is used in Guiana, under the name of *Palétuvier de montagne* (Mountain Mangrove). The Red Sandal-wood (Fr., *Bois de Condori*) is used as timber; and *A. falcata* L., from the Moluccas, makes strong shields. Arms and tools are also made in Oceania from the wood of *Leucæna glauca*.<sup>9</sup> That of *L. odoratissima* HASSK. is highly prized for building,

<sup>1</sup> See LINDL., *Veg. Kingd.*, 553.

<sup>2</sup> SALDANHA, *op. cit.*, 126, n. 33-35.

<sup>3</sup> Whose wood is, however, also of good quality, and fairly prized. Its specific gravity is 1.063 (SALDANHA, *op. cit.*, 92).

<sup>4</sup> MART., ex ROSENTH., *op. cit.*, 1064. The tree also furnishes gum.

<sup>5</sup> *Acacia arborea* W., *op. cit.*, iv. 1064.—*Mimosa filicifolia* LAMK., *Dict.*, i. 12.

<sup>6</sup> *P. filicifolium* HASSK.

<sup>7</sup> *Mimosa umbellata* VAHL., *Symb. Bot.*, ii. 103.—*Inga umbellata* W., *op. cit.*, iv. 1027.

<sup>8</sup> BENTH., in *Hook. Journ.*, ii. 139.—*Acacia tetragona* W.

<sup>9</sup> BENTH., in *Hook. Journ.*, iv. 416.—*Acacia glauca* W.

as is that of *Xylia dolabriformis*,<sup>1</sup> in the East Indies. Oars are made from the branches of *Dichrostachys cinerea*<sup>2</sup> in the same country. Many species of *Acacia* proper, including the gum species, have a valuable wood, more or less hard and coloured. The light red wood of *A. arabica*, is the *Diababul wood*<sup>3</sup> of authors. *A. Cavenia*,<sup>4</sup> *catechuoides* ROXB. and *horrida* W. are valued for building purposes and for fuel; the ashes of the first are used in soap-boiling in South America, and the last is used at the Cape in fumigations for cases of cramp, epilepsy, &c. The variegated yellow wood of *A. heterophylla* is used for boat-building. That of *A. Coa* A. GRAY, the *Koa* of the Sandwich Islands, is as much prized as that of *A. tenuifolia* W., *Kalkona* ROXB., *floribunda* W., and *dodonæifolia* DESF., for carpentry and cabinet work. The lovely blackish wood of *A. melanoxyton*<sup>5</sup> (*Black-wood* or *Light-wood*), and the charming sweet-scented *Violet-wood* or *Myall-wood*, from *A. homalophylla*,<sup>6</sup> are among the most remarkable products furnished by Australian *Leguminosæ* to the cabinet-maker. *A. scleroxyton* Tuss. is another *Tendre-à-caillou* of the Antilles. In the section *Albizzia*, several species furnish valuable wood, such as *A. odoratissima*,<sup>7</sup> *Lebbek*,<sup>8</sup> *Julibrissin*,<sup>9</sup> and *stipulata*.<sup>10</sup> *A. montana*,<sup>11</sup> from Java, is the *Caju Ticcos major*, or *Large Mouse-wood* (Fr., *Grand Bois de souris*), very pretty, and easy to polish, and used to make elegant boxes. But it has a peculiar smell, which attracts mice; it is, however, sometimes used as a condiment in cooking.

<sup>1</sup> See page 26, note 1.

<sup>2</sup> W. & ARN., *Prodr.*, i. 271.—*Desmanthus cinereus* W., *op. cit.*, iv. 1048.—*Mimosa cinerea* L., *Spec.*, 1505.

<sup>3</sup> GIBB., *op. cit.*, iii. 326.

<sup>4</sup> HOOK. & ARN., *ap. Beech. Voy. Bot.*, 21.—ROSENTH., *op. cit.*, 1060. (*Caven*, *Espino*, *Flor de aroma* of the Chilians.)

<sup>5</sup> R. BR., in *Ait. Hort. Kew.*, v. 462.—H. BN., in *Adansonia*, iv. 114, n. 27 (*Black wood* of the Australians).

<sup>6</sup> A. CUNN., *ex BENTH.*, in *Hook. Journ.*, i. 365, n. 148.—H. BN., in *Adansonia*, iv. 109, n. 19.

<sup>7</sup> W., *op. cit.*, iv. 1063.—*A. similis* ZOLL.—*Mimosa odoratissima* L., *Suppl.*, 437.—*Albizzia micrantha* BOIV.—*A. odoratissima* BENTH., *loc. cit.*

<sup>8</sup> *A. speciosa* W., *ex W. & ARN., Prodr.*, i. 275.—*Mimosa Sirissa* ROXB., *Fl. Ind.*, ii. 554.—*M. Lebbek* BLANC., *Fl. d. Philipp.*, 133.—*Albizzia Lebbek* BENTH., in *Hook. Journ.*, iii. 87 (*Cotton varay* of the Malabars, *Bois noir* or *Black wood* of Pondicherry).

<sup>9</sup> W., *op. cit.*, iv. 1065.—*Albizzia Julibrissin* DURAZZ., *loc. cit.*

<sup>10</sup> DC., *Prodr.*, ii. 469, n. 209.—*Mimosa stipulacea* ROXB., *Cat. Hort. Calc.*, 40.—*Albizzia stipulata* BOIV.—*Inga purpurascens* BL.—*I. umbraculiformis* JUNGH. (*Amlocko* of the Bengalese, *Sengon*, *Djindjing* of the Javanese).

<sup>11</sup> JUNGH., *Tijd. Nat. Gesch.*, x. 246.—*A. vulcanica* KORTH., in *Flora* (1827), 705.—*Inga montana* JUNGH., in *Top. Nat. Reis.*, 288.—*Albizzia montana* BENTH., in *Plant. Jungh.*, 267.

## GENERA.

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### I. ADENANTHEREÆ.

1. **Adenantha** L.—Flowers generally hermaphrodite, more rarely polygamous; receptacle short concave. Calyx gamosepalous 5-, or very rarely 4-toothed, valvate. Petals 5, or very rarely 4, cohering by margins to a variable height, valvate, or more rarely subimbricate at apex. Stamens 10, 5 alternipetalous, 5 shorter oppositipetalous; filaments inserted a little above base of corolla, free; anthers introrse 2-celled, 2-rimose; connective crowned by a deciduous shortly-stipitate gland; pollen-grains  $\infty$ . Germen sessile or shortly-stipitate, tapering at apex into a slender style; stigma small terminal; ovules  $\infty$ , parietal 2-seriate descending anatropous; micropyle extrorse superior. Legume linear, often curved or falciform, compressed, or swollen over the seeds, 2-valved; valves entire convex, usually finally contorted, often divided within between the seeds by septa continuous with endocarp. Seeds thick; integuments hard, uniform in colour or of two colours, enveloped by an epidermal pulp; albumen pretty copious, fleshy or horny; embryo inverted; radicle short superior; cotyledons thick fleshy at base, auriculate and coalescing to form a short sheath round radicle.—Unarmed trees; leaves 2-pinnate; leaflets  $\infty$ -jugate; flowers in racemes or spikes, axillary or paniced at extremities of branches (*Asia, Africa, tropical Australia*).—See p. 21.

2. **Elephantorrhiza** BENTH.—Flowers hermaphrodite, more rarely polygamous (of *Adenantha*). Legume almost straight, plano-compressed thick coriaceous; sutures persistent continuous; valves becoming free; endocarp coming away entire from exocarp. Seeds transverse orbiculate compressed.—Low undershrubs; rhizome thick; leaves 2-pinnate; leaflets small  $\infty$ -jugate; glands 0; flowers in cylindrical racemes; racemes either axillary or several inserted on a short leafless scape (*Southern Africa*).—See p. 23.

3. **Stryphnodendron** MART.—Flowers of *Adenantha*; recep-

tacle a little wider, lined by a 10-crenate glandular disk. Legume linear compressed or subcylindrical thick, more or less divided within between seeds by septa continuous with endocarp; mesocarp fleshy subpulpy indehiscent? Seeds transverse.—Small unarmed trees; leaves 2-pinnate; leaflets  $\infty$ -jugate usually rather broad, unequal at base, bearded on under surface at axils of veins; petiolar gland considerable; jugal glands few; flowers in axillary shortly-pedunculate racemes; pedicels short (*Tropical America*).—See p. 23.

4. **Piptadenia** BENTH.—Flowers of *Stryphnodendron*. Legume stipitate or sessile, broadly linear, membranous or coriaceous, 2-valved, continuous and wanting pulp within; valves entire; seeds compressed.—Trees or shrubs, unarmed or prickly; leaves 2-pinnate; leaflets small  $\infty$ -jugate, or more rarely larger paucijugate; petiolar and jugal glands rarely absent; flowers in spikes or racemes; inflorescence either long cylindrical or globose, pedunculate, solitary axillary, or often paniced at extremities of twigs (*Tropical America and Africa*).—See p. 24.

5. **Plathymenia** BENTH.—Flowers of *Stryphnodendron*. Legume broadly-linear straight plano-compressed thin; exocarp continuous 2-valved; endocarp separating from it, lomentaceous, transversely articulated; segments persisting round single included transverse seeds.—Trees or shrubs, unarmed; leaves 2-pinnate; leaflets and pinnæ usually  $\infty$ -jugate; petiolar and jugal glands very rarely absent; flowers in cylindrical pedunculate, supra-axillary or paniced, spikes or racemes; axil of leaf often sheltering a gland or bud below inflorescence (*Brazil*).—See p. 25.

6. **Xylia** BENTH.—Flowers (of *Adenanthera*) 4-, 5-merous; receptacle obconical; stamens 8–10; anthers crowned by a minute stipitate deciduous gland. Legume sessile broadly falciform plano-compressed thick, woody 2-valved, spuriously septate within between transverse obovate compressed seeds.—An unarmed tree; leaves 2-pinnate; pinnæ 1-jugate; leaflets large paucijugate; petiolar glands more or less prominent; stipules minute deciduous; inflorescence capitata; heads globose pedunculate axillary fascicled, or racemose at extremities of branches (*Tropical Asia*).—See p. 25.

7. **Entada** ADANS.—Flowers of *Adenanthera*; receptacle short cupuliform, lined by a disk. Legume straight or bowed (in a few species very large), plano-compressed; margins straight or somewhat constricted between seeds; pericarp thin submembranous or coriaceous, or more rarely woody; sutures thick persistent continuous; valves lomentaceous transversely articulated, separating between the sutures; endocarp in separate 1-seeded segments persisting round the orbiculate thick included seed and separating from exocarp.—Shrubs, often high-climbing, unarmed; leaves 2-pinnate; pinnæ of highest row sometimes changed into spiral tendrils; leaflets either small numerous or larger few; stipules small setaceous; petiolar glands 0; flowers in spikes; spikes thin solitary or geminate, placed at extremities of twigs, sometimes approximated to form a leafless racemose panicle (*Tropical America, Asia, Oceania, and Africa*).—See p. 26.

8. **Tetrapleura** BENTH.—“Flowers of *Entada*.” Legume oblong 4-gonous, nearly straight or subfalciform, indehiscent thick; sutures 2 and faces 2 produced to form thick angular longitudinal cruciate wing; endocarp thick, spuriously septate within between separate compressed transverse seeds.—An unarmed tree; “leaves opposite 2-pinnate; small leaflets and pinnæ  $\infty$ -jugate; flowers in spiciform cylindrical axillary racemes” (*Western tropical Africa*).—See p. 27.

9. **Gagnebina** NECK.—Flowers of *Adenanthera*, but with convex receptacle and hypogynous perianth. Legume linear-oblong somewhat thick compressed indehiscent; sutures with membranous wings; endocarp thick projecting within between seeds; locelli  $\infty$ , each containing 1 transverse ovate seed.—An unarmed tree; leaves 2-pinnate; small leafless and pinnæ  $\infty$ -jugate; petiolar gland broad; jugal glands small setaceous; flowers in spikes; spikes cylindrical pedunculate, fascicled in higher axils, or paniced at extremities of twigs (*Madagascar*).—See p. 27.

10. **Prosopis** L.—Flowers of *Piptadenia*; staminal gland of variable form, usually deciduous, more rarely 0. Legume linear thick compressed or subterete, straight or falciform, hard and circinate (*Circinaria*) or variously contorted, more rarely bent into a more or less regular and close spiral (*Strombocarpus*), sometimes straight very

thick (*Anonychium*), sometimes elongated plano-convex or moniliform (*Algarobia*), more rarely irregularly thickened, corrugated twisted (*Adenopis*); indehiscent; endocarp cartilaginous or papyraceous, usually produced into septa between separate seeds, more rarely continuous by disappearance of septa; mesocarp thin or more usually thick, spongy. Seeds ovate or oblong, compressed.—Trees or shrubs, prickly, usually armed with axillary spines; leaves 2-pinnate; pinnæ 1-, 2-, or rarely  $\infty$ -jugate; leaflets often somewhat rigid, pauci- or multi-jugate; stipules small or 0; flowers in solitary or fascicled axillary racemes spikes or globose heads (*All tropical and subtropical regions*).—See p. 28.

11. ? *Xerocladia* HARV.—Flowers 5-merous (of *Prosopis*); calyx deeply cleft; petals cohering below the middle. Stamens shortly exerted. Ovary 1- or pauciovulate. Legume sessile plano-compressed indehiscent, 1-2-seeded, “broadly falciform-ovate or semi-orbicular, bowed tapering winged at inferior suture.” A small shrub, rigid much-branched; leaves few 2-pinnate; pinnæ 1-2-jugate; leaflets small pauci-jugate; stipules spinescent curved; flowers in short subcapitate axillary spikes; peduncle short (*Southern Africa*).—See p. 29.

12. *Dichrostachys* DC.—Flowers 5-merous differing in colour, hermaphrodite or polygamous, inferior neuter. Calyx toothed. Petals cohering below the middle, valvate. Stamens 10; filaments in hermaphrodite flower free slender; in neutral and female petaloid or filiform, elongated coloured; anthers introrse, crowned by a stipitate gland, in neutral and female flowers small or sterile or usually 0. Gynæceum of *Prosopis*. Legume linear compressed twisted coriaceous indehiscent, continuous within; valves rarely separating irregularly from sutures. Seeds obovate compressed.—Shrubs; twigs often short, sometimes spinescent leafless; leaves 2-pinnate, often fascicled on floriferous branches; leaflets small  $\infty$ -jugate; stipules small or deciduous, or on floriferous twigs, broader imbricated; flowers in spikes; spikes cylindrical pedunculate, solitary or geminate, often nutant, either axillary or terminal on very short fascicled-leaved twigs; upper flowers hermaphrodite, lower neuter, middle often unisexual (*Tropical Asia, Africa, and Australia*).—See p. 29.



13. *Neptunia* Lour.—Flowers of *Dichrostachys*, upper flowers hermaphrodite, lower usually male or neuter. Stamens 10 or more rarely 5. Gynæceum of *Prosopis*; stigma terminal concave. Legume obliquely oblong, inclined to stalk, plano-compressed membranous-coriaceous, 2-valved, spuriously subseptate within between transversely-compressed seeds.—Perennial herbs or diffuse or prostrate undershrubs, often floating; twigs compressed or triquetrous; leaves 2-pinnate; leaflets small; petiole rarely glandular; stipules membranous, obliquely cordate; flowers in ovate-globose, more rarely obovate, pedunculate axillary solitary heads; lower neuter or male flowers containing long petaloid coloured filaments (*Tropical and subtropical America, Asia, and Africa*).—See p. 29.

## II. EUMIMOSÆ.

14. *Mimosa* L.—Flowers 4-, 5-, more rarely 3-, 6-merous, hermaphrodite or polygamous; receptacle shortly concave. Calyx gamosepalous membranous toothed, valvate, or else paleaceous-ciliate, more rarely nearly absent. Petals connate to a variable height, valvate. Stamens as many or twice as many as petals, free exserted; anthers 2-celled, introrsely rimose glandless; pollen-grains  $\infty$ . Germen sessile or shortly stipitate; style terminal; apex truncate or capitate, stigmatiferous; ovules 2– $\infty$ , descending; micropyle extrorse superior. Legume oblong or linear, compressed or more or less thickened, membranous or coriaceous, continuous or septate within; valves either separating entire from continuous margin, or divided by transverse articulations. Seeds ovate or orbiculate, plano-compressed, often albuminous.—Herbs or shrubs, sometimes climbing; more rarely trees, unarmed or prickly; leaves 2-pinnate, more rarely phyllodes, often sensitive; petioles rarely glandular, usually stipellate; stipules lateral membranous or very small; flowers in spikes or globose heads; heads axillary, solitary or geminate (i.e., on either side of a short axillary twig), rarely fascicled, sometimes racemose at extremities of twigs (*Tropical America, Asia, and Africa*).—See p. 30.

15. *Schranckia* W.—Flowers 4–5-merous (of *Mimosa*). Legume linear, prickly on all sides, acute or acuminate at apex; valves

separating from and narrower than dilated persistent margin, more rarely broader not articulated. Seeds oblong, sub-4-gonal; funicle short.—Herbs or undershrubs, prickly; leaves (of *Mimosa*) often sensitive; petiole glandless, often setigerous between pinnæ; stipules setaceous; flowers in spikes or heads; inflorescence axillary solitary or fascicled (*Tropical America and Africa*).—See p. 32.

16. *Leucæna* BENTH.—Flowers 5-merous (of *Mimosa*), hermaphrodite or polygamous. Petals free valvate. Stamens 10, hypogynous. Germen stipitate  $\infty$ -ovulate; stigma dilated concave. Legume stipitate broadly-linear plano-compressed rigid membranous, continuous within, 2-valved. Seeds transverse ovate compressed.—Trees or shrubs, unarmed; leaves small or large, pauci- or  $\infty$ -jugate, oblique; petiole often glandular; stipules minute or setaceous; flowers in globose heads, sometimes bracteate at base, or in a terminal leafless raceme (*All tropical regions, Pacific Ocean*).—See p. 33.

17. *Desmanthus* W.—Flowers minute (of *Mimosa*) 5-merous, hermaphrodite or polygamous, lower often male or neuter. Calyx shortly toothed, valvate. Petals free or cohering to a variable height, valvate. Stamens 5–10, free. Germen  $\infty$ -ovulate. Legume linear, straight or more rarely falciform, plano-compressed acute membranous-coriaceous, continuous or subseptate within, 2-valved. Seeds oblique or descending ovate compressed.—Undershrubs or perennial herbs; branches slender angularly striated; leaves 2-pinnate; leaflets minute; stipules setaceous persistent; petiolar gland usually 1 between lowest pair of pinnæ; flowers in minute few-flowered ovate-globose pedunculate axillary solitary heads (*All tropical regions, North and South America*).—See p. 34.

### III. PARKIÆ.

18. *Parkia* R. BR.—Flowers 5-merous, either all hermaphrodite or the lower male or neuter; receptacle long tubular. Calyx gamosepalous tubular, 5-lobed at apex; lobes unequal imbricated 2-labiate; 2 anterior lobes larger. Petals 5, equal linear-spathulate, free or connate to a variable height, valvate. Stamens 10; filaments monadelphous at base, adnate to or free from corolla, finally becoming free

consecutively, much exerted; anthers 2-celled introrse 2-rimose, crowned by a gland; pollen-masses composed of  $\infty$  grains collected in 2 rows in each cell. Gynæceum central free, inserted in bottom of receptacular tube; ovary supported on a long stalk or more rarely sessile; style filiform exerted; apex minutely capitate stigmatiferous; ovules  $\infty$ , 2-seriate descending. Legume straight or bowed, more or less elongated compressed coriaceous or sub-carnose, 2-valved. Seeds transverse thick compressed; embryo exalbuminous; cotyledons thick fleshy; radicle superior included.—Trees, unarmed; leaves alternate 2-pinnate; leaflets numerous small; flowers very numerous in pyriform or depressed-globose heads, singly situate in axils of closely imbricated bracts; peduncles long, either axillary solitary pendulous or in racemes at extremities of branches (*Tropical Asia Africa and America*). See p. 34.

19. **Pentaclethra** BENTH.—Flowers 5-merous, hermaphrodite or dicecious; receptacle shortly campanulate or tubular, lined by a glandular 10-crenate or 10-lobed disk. Calyx deeply 5-toothed, much imbricated. Petals both connate and adnate to stamens to a variable height, valvate. Stamens 10–20, perigynous; 5 alternipetalous fertile; anthers introrse 2-celled 2-rimose bearing a deciduous gland; 5 oppositipetalous (or 10–15, 2, 3 opposite each petal) sterile, subulate or very elongated linear, much exerted, coloured; all filaments monadelphous to a variable height. Ovary scarcely stipitate  $\infty$ -ovulate; style slender; apex slightly dilated concave stigmatiferous. Legume elongated, narrow at base, more or less oblique, compressed coriaceous-ligneous, often very thick; valves becoming revolute by elasticity on dehiscence. Seeds broad compressed unequal; embryo exalbuminous thick oily; radicle included.—Trees, unarmed; leaves 2-pinnate; pinnæ and leaflets  $\infty$ , unequal; stipules small caducous; stipellæ setaceous; glands 0; flowers small crowded on elongated, simple or more often branched, spikes (*Tropical America and Africa*). See p. 36.

#### IV. ACACIÆÆ.

20. **Acacia** T.—Flowers 4-, 5-, more rarely 3-, 6-merous, hermaphrodite or polygamous; receptacle more or less, usually slightly, concave, glandular within, rarely subplane or slightly convex at

apex. Calyx toothed or lobed, more rarely polysepalous and short or nearly absent or composed of minute cilia. Petals free or oftener both connate and adnate to stamens to a variable height, valvate in æstivation. Stamens  $\infty$ , usually very numerous; filaments slender exerted, hypogynous or oftener somewhat perigynous, inserted at summit of receptacle or under disk either free, or monadelphous (*Lophanta*) or polyadelphous just at base or rarely to a greater height (*Albizzia*), or monadelphous forming a long exerted tube (*Zygia*), always free at apex; anthers small introrse 2-celled 2-rimose; pollen-grains usually aggregated in 2-4 masses in each cell. Germen sessile or stipitate, 2- $\infty$ -ovulate; ovules 2-seriate descending; micropyle extrorse superior; style slender; apex truncate or minutely capitate, stigmatiferous. Legume ovate, oblong or linear, plane convex or terete, straight or bowed, more rarely variously twisted, membranous coriaceous or ligneous, 2-valved or indehiscent, continuous, stuffed or septate within, more rarely separating transversely into 1-seeded segments. Seeds transverse or descending, ovate or suborbicular, compressed; funicle short straight or longer pendulous, more rarely very long corrugated or folded, variably dilated into a fleshy aril.—Trees or shrubs, very rarely herbs, unarmed prickly or spiny; leaves alternate 2-pinnate; leaflets usually minute  $\infty$ -jugate, more rarely reduced to a compressed leaf-like petiole or phyllode; petiolar gland often more or less conspicuous; stipules 0, or of variable form, minute, more rarely broader membranous, sometimes spinescent straight or curved; flowers small, usually crowded, in globose heads or cylindrical dense or interrupted pedunculate spikes; peduncles axillary, solitary or geminate or more rarely fascicled or else in racemes at extremities of branches (*Tropical Australia and Africa, all hot regions*). See p. 37.

21. *Inga* PLUM.—Flowers 5-, more rarely 6-merous (of *Acacia*), hermaphrodite or more rarely polygamous; stamens connate at base to a variable height, forming a tube, usually at the same time adnate to base of corolla. Ovary sessile  $\infty$ -ovulate; style subulate; apex truncate or capitate, stigmatiferous. Legume linear, straight or slightly curved, plane 4-gonous or terete, coriaceous or subcarnose, scarcely dehiscent; sutures usually dilated thick furrowed. Seeds bare or enveloped in a sweet pulp.—Trees or shrubs, unarmed; leaves abruptly pinnate; leaflets often large; petiole generally winged

between the juga; usually 1 interfoliolar gland; stipules minute caducous, or more rarely broad lanceolate persistent; flowers in globose umbels, or heads, or short or more rarely elongated and loose spikes; peduncles solitary or fascicled axillary, or more rarely in racemes at extremities of branches (*Tropical South America*). See p. 42.

22. **Calliandra** BENTH.—Flowers 5-, 6-merous, hermaphrodite or polygamous (of *Inga*); stamens much exerted. Legume linear, straight or more rarely slightly falcate, plano-compressed with thickened margins or more rarely subterete, 2-valved; valves bending back from apex to base by elasticity on dehiscence; endocarp containing no pulp.—Small trees or shrubs; leaves 2-pinnate; stipules usually persistent, membranous or spinescent, more rarely 0; umbellate or capitate inflorescence of *Inga* (*Tropical and subtropical America, East Indies*).—See p. 43.

23. **Lysiloma** BENTH.—Flowers 5-merous polygamous (of *Calliandra*); stamens  $\infty$ , rarely few (12–25), monadelphous at base. Legume (of *Acacia*) linear, or more frequently broad, straight, or falcate, plano-compressed submembranous, continuous within; valves separating at maturity from entire persistent sutures.—Trees or shrubs, unarmed; leaves 2-pinnate; flowers in globose heads or cylindrical spikes; peduncles axillary, solitary or fascicled, or more rarely in short racemes (*Tropical and subtropical America*). See p. 43.

24. **Pithecolobium** MART.—Flowers hermaphrodite or polygamous (of *Inga* or *Calliandra*). Legume flat or compressed, almost straight, or more frequently falcate or twisted, coriaceous thick or subcarnose, 2-valved or more rarely indehiscent, or separating into 1-seeded segments; valves usually finally twisted (but not curling up elastically). Seeds lodged in thin pulp.—Trees or shrubs, unarmed or spinescent; 2-pinnate leaves and inflorescence of *Calliandra* (*Tropical America, Asia, Africa, and Australia*). See p. 44.

25. **Enterolobium** MART.—Flowers of *Pithecolobium*. Legume broad, circinate or curved reniform, compressed, thick, hard septate between thick seeds, indehiscent.—Trees, unarmed; leaves 2-pinnate (of *Pithecolobium*); heads globose pedunculate axillary, solitary or

fascicled, or more rarely in short racemes (*Tropical America*). See p. 46.

26. **Serianthes** BENTH.—Flowers 5-merous (parts in order of magnitude), hermaphrodite or more rarely polygamous (of *Inga*). Calyx thick, widely campanulate, 5-lobed valvate. Petals adnate at base to staminal tube, valvate. Stamens  $\infty$  (very numerous), monadelphous. Germen sessile  $\infty$ -ovulate; style thin; apex scarcely dilated, stigmatiferous. Legume oblong-ovate, straight or falcate, plano-compressed or undulate, woody indehiscent, septate between transverse compressed seeds.—Trees, unarmed; leaves large 2-pinnate; pinnæ and leaflets unsymmetrically  $\infty$ -jugate; petiolar and jugal glands rather prominent; stipules minute or obsolete; flowers in subcorymbose racemes near extremities of branches (*Tropical Asia, South Sea Islands*). See p. 46.

27. **Affonsea** A. S. H.—Flowers hermaphrodite or polygamous (of *Serianthus*). Carpels 2–6, free; ovaries  $\infty$ -ovulate. Legume (when young) linear, thick, straight; funicle of seed dilated into a fleshy aril.—Trees; leaves (of *Inga*) abruptly pinnate; stipules persistent, not spinescent; flowers in loose or subracemose axillary terminal spikes (*Brazil*). See p. 47.

28. **Archidendron** F. MUELL.—Flowers of *Affonsea*; calyx entire, evenly truncated; carpels 5–15,  $\infty$ -ovulate. Legume indurated coriaceous, bowed or variously twisted, without pulp, dehiscing late. Seeds transverse exalbuminous; funicle short.—A tree; leaves 2-pinnate; pinnæ 1- or paucijugate; flowers umbellate-capitate near axils (*Eastern subtropical Australia*). See p. 47.

## SUB-ORDER CÆSALPINIÆ.

### I. CADIA SERIES.

*Cadia*<sup>1</sup> (figs. 33-44) has regular hermaphrodite flowers, usually pentamerous.<sup>2</sup> The receptacle forms a pretty deep cup (fig. 41), lined by a glandular disk,<sup>3</sup> and bearing the perianth and androceum

*Cadia varia.*



FIG. 38.  
Habit ( $\frac{1}{2}$ ).

on its edges, with the gynæceum in its centre. The calyx consists of five sepals coherent below, and valvate in the bud.<sup>4</sup> The petals are all equal in size, shortly unguiculate and free, contorted (fig. 40) or variably imbricated in the bud.<sup>5</sup> The stamens are inserted within the petals, outside the crenate rim of the glandular disk. The five superposed to the sepals are at first the longer; the other five are

<sup>1</sup> FORSK., *Fl. Ægypt.-Arab.*, 90. — DC., *Prodr.*, ii. 486. — SPACH, *Suit. à Buffon*, i. 108. — ENDL., *Gen.*, n. 6776. — B. H., *Gen.*, 560, n. 290. — *Panciatica* PICCIV., *Hort. Paniel.*, 9, icon. — *Spaendoncea* DESF., *Dec. Phil.*, vii. 259. — LAMK., *Dict.* vii. 301; *Ill.*, t. 948.

<sup>2</sup> FORSKHAL has seen 6-7-merous flowers in *C. varia*.

<sup>3</sup> The edges of the disk form as many little festoons as there are stamens.

<sup>4</sup> Or very slightly reduplicate.

<sup>5</sup> The vexillary petal, described as external in the bud by BENTHAM & HOOKER (*loc. cit.*), may be altogether internal, as we have several times made out, and is of necessity overlapping one side and overlapped the other when the corolla is contorted.

superposed to the petals.<sup>1</sup> Each has a free filament, swollen and

*Cadia varia.*



FIG. 39.  
Flower.

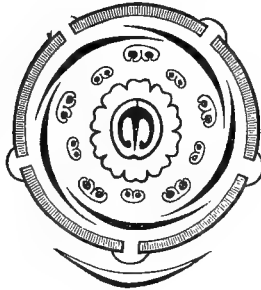


FIG. 40.  
Diagram.

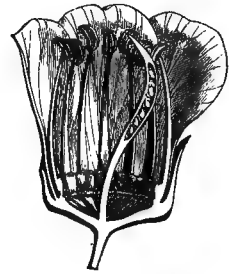


FIG. 41.  
Longitudinal section of flower.

articulated at the base and tapering at the apex, and an introrse two-celled anther of longitudinal dehiscence. The

*Cadia varia.*

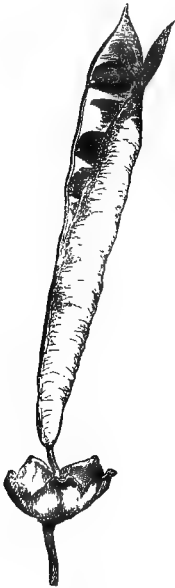


FIG. 42.  
Fruit ( $\frac{2}{3}$ ).

free central ovary is that of a Leguminose. Its ovary, supported on a slender foot, contains an indefinite number of ovules in two vertical rows on a placenta superposed to the anterior petal; they are anatropous and descending or horizontal, with the micropyle looking upwards and outwards (fig. 41).<sup>2</sup> The style is short and bowed, and its apex curving towards the placenta dilates into a very little papillose stigmatiferous head. The fruit is a pod, supported on a slender foot, whose base is surrounded by the persistent calyx and receptacle (fig. 42). It is slender elongated coriaceous and glabrous, enclosing a variable number of seeds (figs. 43, 44), which contain within their coats a fleshy exalbuminous embryo, with an inflexed radicle accumbent on the two lateral cotyledons. *Cadia* consists of shrubs from the coast and islands of tropical Africa, with alternate imparipinnate leaves possessing two lateral stipules.

The flowers are in few- or one-flowered racemes,<sup>3</sup> terminating

<sup>1</sup> These five stamens are at first shorter than the rest, and are originally inserted outside of them.

<sup>2</sup> These ovules have two coats, and are at first arranged in two parallel rows. Their final

direction is often such that the raphe is inferior and quite horizontal.

<sup>3</sup> In *C. varia*, there are few flowers on each axis; or there is a single flower terminating a little axillary branch, which bears one or few bracts below it.



the branches or axillary to the upper leaves. Two species are known.<sup>1</sup>

The thorough regularity of the flower of *Cadia* leads us to consider this genus as the most perfect type to be found in the *Leguminosæ* (excluding *Mimoseæ*), and to place them at the head of this group in a series apart, the artificial nature of which does not, however, escape our notice. The series remaining to be reviewed will be referred to *Cæsalpinieæ* and *Papilionaceæ*, between which there is only one absolute difference. If the axillary petal, in *Cadia* usually overlapped on the one side and overlapping on the other, becomes overlapped on both sides, the plant belongs to *Cæsalpinieæ*; if on the contrary it overlaps on both sides, to *Papilionaceæ*. As in *Cadia* we may find either arrangement,<sup>2</sup> we place it at the head of the two sub-orders we are now about to describe.

*Cadia varia.*FIG. 43.  
Seed ( $\frac{2}{3}$ ).FIG. 44.  
Longitudinal  
section of seed.

## II. CÆSALPINIA SERIES.

*Cæsalpinia*<sup>3</sup> (Fr., *Brésillet*—figs. 45–48), has more or less irregular hermaphrodite flowers. The receptacle forms a broad shallow cup, lined by a glandular tissue, somewhat thickened near the rim. The five sepals may be equal or unequal; if unequal, the anterior is the largest, indicating by its position that the flower is resupinate. By this the two lateral sepals are broadly overlapped, and they themselves again overlap the two posterior, of which one is quite internal (fig. 47). The corolla consists of five free alternating petals, either sub-equal or unequal, the posterior petal being in the latter case the smallest, and overlapped by the two lateral petals, which are themselves overlapped by the posterior pair. There are ten stamens, five

<sup>1</sup> Perhaps three (FORSK., *loc. cit.*;—LHÉRIT., in *Mag. Encycl.*, v. 29;—A. RICH., *Tent. Fl. Abyss.*, i. 248, t. 46.—BAKER, in OLIV., *Fl. Trop. Afr.*, ii. 253).

<sup>2</sup> See p. 69, note 5.

<sup>3</sup> *Cæsalpinia* PLUM., *Nov. Gen.*, 28, t. 9.—L., *Gen.*, n. 516.—ADANS., *Fam. des Pl.*, ii.

318.—J., *Gen.*, 349.—GÆRTN., *Fruct.*, ii. t. 144.—LAMK., *Dict.*, i. 460; *Suppl.*, i. 698; *Ill.*, t. i. 100.—H. B. K., *Nov. Gen. et Spec.*, vi. 326.—DC., *Prodr.*, ii. 481.—SPACH, *Suit. à Buffon*, i. 100.—Vog., in *Linnaea*, xi. 406.—ENDL., *Gen.*, n. 6765.—B. H., *Gen.*, 565, n. 308.

superposed to the sepals, five to the petals. The latter are the smaller, and form a whorl internal to the former. Each stamen is formed of a declinate filament, villous or glandular at the base, and

*Casalpinia Sappan.*



FIG. 45.  
Habit ( $\frac{1}{2}$ ).

an introrse two-celled anther dehiscing by two longitudinal clefts.<sup>1</sup> The gynæceum, composed of a single carpellary leaf superposed to the anterior sepal, consists of a sessile ovary tapering at the tip into a style, whose stigmatiferous apex forms a funnel, with a large gaping mouth of variable size and a more or less thickened reflexed rim. On the side next the posterior petal the ovary contains a parietal placenta bearing several descending anatropous ovules<sup>2</sup> in two vertical rows; the micropyles look upwards and outwards—that is, to the anterior

<sup>1</sup> The pollen is spherical in *C. pulcherrima* (formerly referred to the genus *Poinciana*), with a punctate outer coat, and three flat strongly punctate bands meeting at the poles

(H. MOHL, *Ann. Sc. Nat.*, sér. 2, iii. 342).

<sup>2</sup> They have two coats in the species we have under cultivation, *C. pulcherrima* and *Gilliesii*.

side of the flower. In the species nearest to that under consideration, belonging to the section *Sappania*,<sup>1</sup> the fruit forms a straight or sickle-shaped pod, with two glabrous coriaceous valves, finally

*Cæsalpinia Sappan.*



FIG. 46.  
Flower ( $\frac{2}{3}$ ).

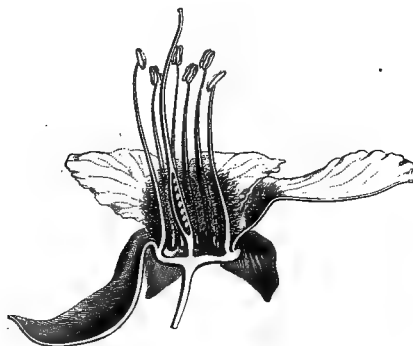


FIG. 48.  
Longitudinal section of flower.

separating to free several exalbuminous seeds, with rather long funicles, thick coats, and fleshy embryos. All these species are shrubs (usually climbing) or prickly trees (fig. 45), whose alternate bipinnate leaves possess numerous little unsymmetrical leaflets and lateral caducous stipules. The flowers form axillary or terminal racemes, each flower axillary to its bract. This section only includes three species, natives of the warmer parts of Asia.<sup>2</sup>

The section *Cæsalpinaria*<sup>3</sup> is, on the contrary, American; but its species are very close to the last. They are unarmed, sometimes with large leaflets, and possess an oblong or lanceolate oblique or falciform pod, which in *C. echinata*<sup>4</sup> is covered with prickles. In *C. insignis*<sup>5</sup> and *pulcherrima*,<sup>6</sup> the long staminal filaments

*Cæsalpinia Sappan.*

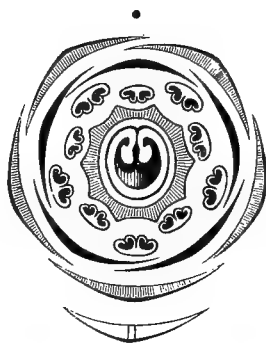


FIG. 47.  
Diagram.

<sup>1</sup> DC., *op. cit.*, 482, sect. iii. (part.).—*Campecia* ADANS., *loc. cit.*—*Biancæa* TODAR., *Nov. Gen.*, 21.

<sup>2</sup> ROXB., *Plant. Coromand.*, t. 16.—WIGHT, *Icon.*, t. 37, 392.

<sup>3</sup> B. H., *Gen.*, 566, 4.—*Poinciana* K., *Mimos.*, t. 44.—MAUND., *Bot.*, t. 151 (nec L.).

<sup>4</sup> LAMK., *Dict.*, i. 434; *Ill.*, t. 336.

<sup>5</sup> *Poinciana insignis* K., *loc. cit.*

<sup>6</sup> SW., *Obs.*, 166.—GÆRTN., *Fruet.*, ii. t. 150.—*Bot. Mag.*, t. 995.—*Poinciana pulcherrima* Auctt.

are much exerted. This section includes some dozen unarmed species.<sup>1</sup>

Under the name of *Guilandina*<sup>2</sup> (Fr., *Bonducs* or *Cniquiers*) a special genus has been made of two prickly climbing species of *Cæsalpinia*, with swollen pods, whose thin pericarp thickly covered with prickles contains only a few large grey or yellow seeds with very hard coats. The two species of this section<sup>3</sup> are found on the sea coast in all warm countries.

In *Pomaria*<sup>4</sup> the calyx, fruit, and most of the vegetative organs are covered with more or less prominent glands instead of prickles. In all other respects the five or six American species<sup>5</sup> of this section resemble *Cæsalpinaria*. *Erythrostemon*<sup>6</sup> has been placed alone in a neighbouring section because its pod is less glandular, and its stamens have red, much-exserted filaments, as in *C. pulcherrima*. It is a plant from temperate and South America,<sup>7</sup> which flowers well in our gardens.

*Nugaria*,<sup>8</sup> on the contrary, consists of prickly climbers like *Guilandina*; but forms a distinct section because the pod is unarmed and the breadth of the seed exceeds its length. It includes two species<sup>9</sup> from Asia and Australia. In all the foregoing sections the pod dehisces at maturity by two longitudinal clefts.

In all the remaining species of *Cæsalpinia* the dehiscence is incomplete or very tardy, or the fruit is indehiscent. The sutures may be thickened, as occurs in *Cinclidocarpus*,<sup>10</sup> a section containing three or four species of prickly climbing shrubs from tropical Asia, resembling *Nugaria*. In *Libidibia*<sup>11</sup> (the Divi-divi Trees; Fr., *Libidibis*), which contains five American species,<sup>12</sup> the sutures of the pod are

<sup>1</sup> DC., *Mém. Légum.*, 11, t. 23, fig. 111; *Prodr.*, ii. 484.—REICHB., *Gart. Mag.*, t. 93.—BURM., *Fl. Ind.*, 133.

<sup>2</sup> L., *Gen.*, n. 517.—J., *Gen.*, 350.—GÆRTN., *Fruct.*, ii. t. 148.—LAMK., *Dict.*, i. 434 (part.); *Ill.*, t. 336.—DC., *Prodr.*, ii. 480.—SPACH, *Suit. à Buffon*, i. 98.—*Bonduc* PLUM., *Nov. Gen.*, 25.

<sup>3</sup> RUMPH., *Herb. Amboin.*, t. 48, 49.—AIT., *Hort. Kew.*, iii. 32.

<sup>4</sup> CAV., *Icon.*, v. 1, t. 402.—ENDL., *Gen.*, n. 6771.—*Cladotrichium* VOG., in *Linnaea*, xi. 401.

<sup>5</sup> DC., *Prodr.*, ii. 485.—CLOS, ap. C. GAY, *Fl. Chil.*, ii. 223.

<sup>6</sup> KL., ap. LINK KL. & OTT., *Icon.*, i. 97, t. 39.

<sup>7</sup> *C. Gilliesii*.—*Poinciana Gilliesii* HOOK.,

*Bot. Misc.*, i. t. 34; *Bot. Mag.*, t. 406.—LINDL. & PAXT., *Mag.*, i. t. 28.

<sup>8</sup> DC., *Mém. Légum.*, xiii.; *Prodr.*, ii. 481, sect. ? i.—*Ticanto* ADANS., *loc. cit.*, 319.

<sup>9</sup> BURM., *Fl. Ind.*, 99.—RUMPH., *Herb. Amboin.*, v. t. 50.—AIT., *Hort. Kew.*, iii. 32.—WIGHT, *Icon.*, t. 36.—BENTH., *Fl. Hongk.*, 97.

<sup>10</sup> ZOLL., in *Nat. Gen. Arch.*, iii. 74, 81.—MIQ., *Fl. Ind.-Bat.*, i. p. 1, 110.—WIGHT, *Icon.*, t. 37.

<sup>11</sup> *Libidibia* DC., *op. cit.*, 483, sect. iv.—CHAM., in *Linnaea*, v. 192.

<sup>12</sup> K., *Mimos.*, t. 45.—W. *Spec.*, ii. 432.—JACQ., *Amer.*, 123, t. 175, fig. 36.—BONPL., *Pl. Æquin.*, t. 137.—KARST., *Fl. Columb.*, t. 101, 129.

scarcely prominent, the vegetative organs are unarmed, and the calyx is sometimes fringed and glandular at the edges. These glands become very prominent and fringe the inferior sepal in *Coulteria*,<sup>1</sup> of which some have hence wished to make a separate genus; it consists of two species of unarmed trees, the one Mexican, the other Chilian.<sup>2</sup> *Balsamocarpon*<sup>3</sup> is also a Chilian section, consisting of a single species,<sup>4</sup> with a slightly irregular corolla, a thick subtorulose fruit, and a fimbriate calyx whose outer surface is covered with glandular hairs; the leaves are altogether those of *Pomaria*.

There are some *Cæsalpinias* with altogether the flower and fruit of all the preceding species, but whose leaves are simply paripinnate, not bipinnate.<sup>5</sup> But this is insufficient of itself to warrant their relegation to a distinct genus, so that we are compelled to make *Cenostigma*<sup>6</sup> a simple section of *Cæsalpinia*, though it has even been placed in a different series—*Sclerobieæ*. *Cenostigma* has, indeed, the perianth<sup>7</sup> and androceum of the true *Cæsalpinias*, also borne on a receptacle forming a broad inverted cone. The central gynæceum consists of a subsessile pauciovulate ovary, bearing a style whose tip is by a little opening with ciliate edges leading to an irregularly sacciform cavity of variable depth.<sup>8</sup> The fruit is a flattened, elongated, bivalved pod of nearly woody consistency, containing a few exalbuminous seeds.<sup>9</sup> But *Cenostigma*, like *Cæsalpinia monosperma* and *marginata* TUL., has simply-pinnate leaves. The flowers of the two Brazilian species<sup>10</sup> which form this section are collected into simple or ramified racemes terminating the branches.

In certain of the *Cæsalpinias* with an indehiscent fruit whose edges taper into a narrow blade, the style is dilated at the tip into a sort of peltate disk; whence the name *Peltophorum*<sup>11</sup> given to this group.

<sup>1</sup> H. B. K., *op. cit.*, vi. 328, t. 568, 569.—DC., *op. cit.*, 480.—SPACH, *Suit. à Buff.*, i. 99.—ENDL., *Gen.*, n. 6764.—*Adenocalyx* BERT., ex DC., *loc. cit.*—TARA MOL., *Chil.*, ed. gall. (2), 283.—SCHULT., *Syst.*, n. 978.

<sup>2</sup> DC., *Cat. Hort. Monsp.*, 84; *Prodr.*, *loc. cit.*, 481.—TURP., in *Dict. Sc. Nat.*, icon.—CLOS, ap. C. GAY, *Fl. Chil.*, ii. 2, 221.

<sup>3</sup> CLOS, *loc. cit.*, 226, t. 20.

<sup>4</sup> *Cæsalpinia brevifolia* BENTH.—*Balsamocarpon brevifolium* CLOS, *loc. cit.*, 228.

<sup>5</sup> This fact has appeared constant in the numerous specimens we have observed of *Cæsalpinia monosperma* TUL. (in *Arch. Mus.*, iv. 148), which plant we make the type of the section *Paripinnaria*, but its flowers are

exactly like those of the other pauciovulate *Cæsalpinias*.

<sup>6</sup> TUL., *Ann. Sc. Nat.*, sér. 2, xx. 140, t. 3; *Arch. Mus.*, iv. 151.—B. H., *Gen.*, 564, n. 302.

<sup>7</sup> The calyx is sometimes denticulate and glandular on the edges. The anterior sepal is usually the most concave and the largest of all, as in most of the true *Cæsalpinias*.

<sup>8</sup> This stigmatic apex strongly recalls that of certain of the *Violariæ*; it occurs in several other *Cæsalpinias* and in *Mezoneurum*.

<sup>9</sup> Between which the tissue of the pericarp is hypertrophied and projects.

<sup>10</sup> WALP., *Rep.*, v. 556.

<sup>11</sup> VOG., in *Linnaea*, xi. 406.—B. H., *Gen.*, 565, n. 306.—*Brasiietta* DC., *loc. cit.*, 481 (part.).

Some authors have considered this a distinct genus; we can only make it a section of the genus *Cæsalpinia*. It contains half a dozen species,<sup>1</sup> one a native of eastern Africa, two others of the Indian Archipelago and Australia, and the three remaining species of tropical America. They are trees whose bipinnate leaves possess numerous small leaflets, and whose flowers form simple or compound racemes.

Another distinct genus has been made of *Hoffmanseggia*,<sup>2</sup> which has the flower and glandular calyx of certain *Cæsalpinias*. The species are often of humble stature and herbaceous consistency. But several are suffrutescent like certain *Pomarias*, of which they have often the habit and foliage. The fruit has a thin glandular pericarp, not that of the true *Cæsalpinias*, but coming closer to that of *Erythrostemon*, though a little thinner. The calyx is not always imbricated, but sometimes valvate; a character which cannot be unimportant by reason of its variability in this same small group *Hoffmanseggia*. Hence we cannot separate these plants from *Cæsalpinia*. There are some twelve species<sup>3</sup> from Mexico and South America, besides two more, whose flowers have well-developed blackish calycine glands, and which are natives of the Cape and have been made into the genus *Melanosticta*.<sup>4</sup> Thus, our genus *Cæsalpinia* will consist of no less than fifteen sections,<sup>5</sup> comprising some threescore species from the warm and temperate regions of all parts of the world.

The far-distant series *Copaifereæ* has been indicated as the place for *Zuccagnia punctata*,<sup>6</sup> a small shrub from the Chilian Andes,

<sup>1</sup> MIQ., *Fl. Ind.-Bat.*, Suppl., 292.—HARV. & SOND., *Fl. Cap.*, ii. 270.—BENTH., *Fl. Austral.*, ii. 279.—WALP., *Rep.*, v. 557.—OLIV., *Fl. Trop. Afr.*, ii. 260.

<sup>2</sup> CAV., *Icon.*, iv. 63, t. 392, 393.—DC., *Prodr.*, ii. 484.—ENDL., *Gen.*, n. 6774.—B.H., *Gen.*, 567, n. 309.—H. BN., *Adansonia*, ix. 220, *Sur la valeur du genre Hoffmanseggia*.

<sup>3</sup> CLOS, ap. C. GAY, *Fl. Chil.*, ii. 233 (part.).—PHILIPP., *Fl. Atacam.*, 17.—WALP., *Rep.*, i. 811; v. 559; *Ann.*, i. 257; ii. 443; iv. 592.

<sup>4</sup> DC., *Mém. Légum.*, 474, t. 69; *Prodr.*, ii. 485.—ENDL., *Gen.*, n. 6772.—HARV., *Thes. Cap.*, t. 2.—HARV. & SOND., *Fl. Cap.*, ii. 270.—A. GRAY, *Pl. Wright.*, i. 54.—[*H. (Melanosticta) Burchellii* grows within the tropics.—(OLIV., *Fl. Trop. Afr.*, ii. 263)].

*Cæsalpinia* { a. folia 2-pinnata.  
Sects. 15. { 1. *Sappania*.

2. *Cæsalpinaria*.  
3. *Libidibia*.  
4. *Guilandina*.  
5. *Nugaria*.  
6. *Peltophorum*.  
7. *Cinclidocarpus*.  
8. *Coulteria*.  
9. *Balsamocarpon*.  
10. *Erythrostemon*.  
11. *Pomaria*.  
12. *Hoffmanseggia*.  
13. *Melanosticta*.  
    b. folia pinnata.  
14. *Paripinnaria*.  
15. *Cenostigma*.

<sup>5</sup> CAV., *Icon. Plant.*, v. 2, t. 403.—DC., *Prodr.*, ii. 486.—ENDL., *Gen.*, n. 6773.—C. GAY, *Fl. Chil.*, ii. 229 (part.).—B. H., *Gen.*, 587, u. 368.—H. BN., in *Adansonia*, ix. 226, *Sur les Zuccagnia de la Flore du Chili*.

because its stipitate gynæceum consists of a one-celled ovary surmounted by a filiform style with a concave ciliate stigma, while its anatropous suspended ovule, whose micropyle looks upwards and outwards, becomes an oval exalbuminous seed with a fleshy embryo and straight radicle in the short oval compressed bivalve fruit. But the flower is otherwise altogether similar to that in any of the sections *Pomaria*, *Cladotrichium*, *Hoffmanseggia*, &c., of *Cæsalpinia*; we have the same concave receptacle lined with glandular tissue, the same irregular imbricated calyx with a large anterior sepal enveloping the rest, the same irregular corolla with the vexillary petal internal, and the same perigynous androceum whose ten stamens have the lower part of their declinate filaments covered with hairs. Again, the alternate pinnate leaves of *Zuccagnia*, with their small leaflets, are glutinous, as is the case with nearly the whole surface of the plant; and the flowers form racemes resembling those of *Hoffmanseggia*. From all these reasons we conclude to regard *Zuccagnia* as *Cæsalpinia* with a uniovulate ovary, simply-pinnate leaves, and a one-seeded fruit; the two last characters bringing it very near the sections *Pomaria* and *Paripinnaria* of this genus.

*Parkinsonia*<sup>1</sup> has altogether the flowers of *Cæsalpinia*: the same perianth, sexual organs, and cup-shaped receptacle. The style, however, is not dilated at the apex, but is more or less obliquely truncate, while the fruit is very different. It is a rounded torulose elongated pod, dehiscing more or less completely in two valves, and containing at each of the dilatations of the rather thin pericarp a descending seed, whose coats contain a fairly copious albumen, and an embryo with its radicle superior. *Parkinsonia* consists of trees from tropical America and South Africa, with bipinnate leaves of very peculiar form, possessing a very short rachis, from either side of which arises a secondary rachis bearing numerous leaflets. The stipules are ill-developed or spinescent, and the flowers form axillary racemes. Three species are known.<sup>2</sup>

*Cercidium*,<sup>3</sup> like *Parkinsonia*, differs but slightly in flower from

<sup>1</sup> PLUM., *Nov. Gen. Amer.*, 25.—L., *Gen.*, n. 513.—J., *Gen.*, 347.—LAMK., *Dict.*, v. 21; *Suppl.* iv. 302; *Ill.*, t. 336.—DC., *Mém. Légum.*, t. 21, fig. 112; *Prodr.*, ii. 486.—SPACH, *Suit. à Buffon*, i. 107.—ENDL., *Gen.*, ii. 6775.—B. H., *Gen.*, 570, n. 321.

<sup>2</sup> JACQ., *Amer.*, t. 80.—H. B. K., *Nov. Gen. et Spec.*, vi. 335.—HARV. & SONDR., *Fl. Cap.*, ii.

269.—WALP., *Ann.*, ii. 441; iv. 594.—OLIV., *Fl. Trop. Afr.*, ii. 266.

<sup>3</sup> TUL., *Arch. Mus.*, iv. 133.—B. H., *Gen.*, 570, 1002, n. 320.—*Retinophleum* KARST., *Fl. Columb.*, ii. 25, t. 113.—*Hoopesia* BUCKL., in *Proceed. Ac. Nat. Sc. Philad.* (part.), ex A. GRAY, *ibid.* (1862), 163.

*Cæsalpinia*; the sepals are valvate or nearly so,<sup>1</sup> instead of being decidedly imbricated, and the anterior sepal is no larger than the rest, instead of enveloping them, as in the preceding genera. The fruit is a compressed, membranous, coriaceous, bivalve pod, with albuminous seeds. The habit is quite different, for the three or four species of this genus, from the warm and temperate parts of America<sup>2</sup> are trees or shrubs with knotted or twisted branches, axillary spinescent twigs, and bipinnate leaves, with the pinnules and leaflets few and small. The flowers form short lax racemes, often grouped in small numbers at the projecting nodes of the fallen leaves.

*Mezoneurum*<sup>3</sup> has the perianth and androceum of *Cæsalpinia*; but the flowers are far more irregular,<sup>4</sup> owing to the deformity of the receptacle.<sup>5</sup> This assumes an unequal development, so that its rim is very oblique, the mouth tapering like a beak towards the posterior petal and the placenta. The ovary resembles that of *Cæsalpinia*, and contains two seeds and upwards. The fruit is flattened, membranous and coriaceous, indehiscent or nearly so, and has its placentary edge dilated all the way up into a wing which is flattened out towards the free border. The seeds vary in number and resemble those of *Cæsalpinia*. The genus *Mezoneurum* consists of trees or climbing shrubs from tropical Asia and Africa, and Australia,<sup>6</sup> with bipinnate leaves, and the flowers in axillary or terminal racemes.

The flower is on the contrary, much more regular in *Hematoxylon*<sup>7</sup> (figs. 49-51), as regards receptacle, corolla and androceum. The calyx alone has still the anterior sepal larger than the rest which it envelopes; all the sepals become reflexed on anthesis. The petals are nearly similar to one another, and are imbricated as in *Cæsalpinia*. The receptacle is lined with glandular tissue; in the bottom of it is inserted the gynæceum, consisting of a shortly stipitate ovary, sur-

<sup>1</sup> The edges are as it were bevelled, and touch obliquely; or else the inner sheet of the sepal alone projects beyond its edge on the side where it should be overlapped in the bud.

<sup>2</sup> WALP., *Rep.*, v. 552; *Ann.*, iv. 594 (besides *Cæsalpinia? cassioides* W., *Enum.*, 444).

<sup>3</sup> DESF., in *Mém. Mus.*, iv. 245, t. 10, 11.—DC., *Prodr.*, ii. 484.—ENDL., *Gen.*, n. 6768 (*Mezoneuron*).—B. H., *Gen.*, 565, n. 307.

<sup>4</sup> The vexillary petal may not only differ from the rest in form and size, but also bear an internal appendage on the base of the limb, analo-

gous to what is found in certain *Sapindaceæ* and *Erythroxyloceæ*.

<sup>5</sup> In the section *Tubicalyx* (MIQ., *Fl. Ind.-Bat.*, i. p. 1, 1081), this part of the flower forms an elongated tube.

<sup>6</sup> BENTH., *Fl. Austral.*, ii. 278.—H. BN., in *Adansonia*, vi. 196.—WALP., *Rep.*, i. 811.—*Ann.*, iv. 590.—OLIV., *Fl. Trop. Afr.*, ii. 260.

<sup>7</sup> L., *Gen.*, n. 525.—J., *Gen.*, 348.—LAMK., *Dict.*, i. 591; *Suppl.*, i. 654; *Ill.*, t. 340.—DC., *Prodr.*, ii. 485.—SPACH, *Suit. à Buffon*, i. 106.—ENDL., *Gen.*, n. 6777.—B. H., *Gen.*, 567, n. 310.



mounted by a style whose apex is hollowed out, with stigmatic papillæ surrounding its aperture. The ovary contains only two ovules or rarely more. The fruit is a membranous pod, externally resembling that of *Mezoneurum*; it dehisces in a very peculiar way, not down its edges, but along the line which would correspond to

*Hæmatoxylon campechianum* (Logwood-tree).



FIG. 49.  
Habit ( $\frac{1}{2}$ ).

the junction of the wing and the body of the pod in *Mezoneurum*. It contains one or few seeds; the seed is flattened and much elongated transversely, and is attached by the middle of its ventral edge. It contains an embryo whose long axis is also transverse, and possesses a cylindrical slightly curved radicle, a gemmule with imbricated leaves and two very peculiar cotyledons which are very short and broad, each divided into two lobes which are folded together, and reflexed where they come in contact with the radicle. The only known species of this genus is the Logwood-tree (Fr., *Bois de*

*Campêche*), *Hæmatoxylon campechianum*<sup>1</sup> a tree from equinoctial America, which has been introduced into all warm countries. It has glabrous branches with pinnate or bipinnate leaves, whose stipules are caducous and membranous, or persistent and changed into spines. The flowers form axillary racemes and articulate with their common peduncle.

*Poinciana*<sup>2</sup> (Flower-fence) has expanded flowers very near those of certain *Cæsalpinias*, and nearly regular as in *Hæmatoxylon*, with ten long exserted stamens and the five petals subequal, or more rarely

*Hæmatoxylon campechianum*.



FIG. 50.  
Flower ( $\frac{2}{3}$ ).



FIG. 51.  
Longitudinal section of flower.

the axillary petal overlapped in the bud different from the rest. But the calyx consists of five equal or subequal sepals, inserted on the rim of a pretty deep receptacle, thickened or quite valvate at the edges. The gynæceum, central or scarcely excentric,<sup>3</sup> becomes a bivalve many-seeded pod with the pericarp thickened in the intervals between the seeds.<sup>4</sup> Three species of this genus<sup>5</sup> are known, unarmed trees from India, Madagascar, and the east coast of tropical Africa, with bipinnate leaves and large flowers in terminal racemes.

*Colvillea*<sup>6</sup> has the general characters of habit and the racemes

<sup>1</sup> L., *Spec.*, 549.—SLOAN., *Hist.*, 2, t. 10, figs. 1-4.—BLACKW., *Herb.*, t. 463.—HAYN., *Arzneig.*, ix. t. 44.—H. B. K., *Nov. Gen. et Spec.*, vi. 325.

<sup>2</sup> L., *Gen.*, n. 515 (part.).—DC., *Prodr.*, ii. 483 (part.).—ENDL., *Gen.*, n. 6766 (part.).—B. H., *Gen.*, 569, n. 317 (nec T., *Inst.*, 619, t. 391.—GÆRTN., *Fruct.*, ii. 150, t. 150.—K., *Mimos.*, t. 44).

<sup>3</sup> The foot of the ovary is stumpy and obliquely inserted, and usually compressed.

The style and stamens are involute in the bud.

<sup>4</sup> These are supported on well-developed funicles, and possess copious very hard albumen; the embryo is often yellowish green.

<sup>5</sup> DC., *loc. cit.*, n. 3.—HOOK., in *Bot. Mag.*, t. 2884.—OLIV., *Fl. Trop. Afr.*, ii. 265.

<sup>6</sup> BOJ., in *Bot. Mag.*, t. 3325, 3326; in *Ann. Sc. Nat.*, sér. 2, iv. 294.—ENDL., *Gen.*, n. 6767.—B. H., *Gen.*, 569, n. 316.—WALP., *Rep.* v. 558.

of showy flowers of *Poinciana*; but the calyx is very peculiar; it is thick, coriaceous, and sac-shaped, divided above into four valvate teeth of which the posterior one represents two sepals, and is hence larger than the rest. The whole calyx comes off at the base in a circular piece. The corolla resembles that of *Cæsalpinia*, except that the vexillary petal, closely overlapped in the bud, is much larger than the others. The androceum consists of ten free perigynous stamens. The scarcely excentric gynæceum has a pluriovulate ovary surmounted by a style which is at first bent on itself and which ends in an obtuse undilated stigmatiferous surface. The pod is turgid, elongated and bivalved. The only known species of this genus is *C. racemosa* BOJ., an unarmed tree from Madagascar whose bipinnate leaves have small and numerous leaflets, and little caducous stipules. The carmine flowers are grouped in a large ramified many-flowered raceme bearing coloured membranous caducous bracts.

*Acrocarpus*<sup>1</sup> has the subregular flowers of certain species of *Poinciana*, with narrow petals and a central gynæceum; but the androceum consists of but five long exerted alternipetalous stamens. Till recently the only known species of the genus was *A. fraxinifolius*,<sup>2</sup> an enormous tree from the mountains of India, with bipinnate leaves, before the expansion of which the flowers come out in large axillary reflexed racemes. A second species, *A. grandis*,<sup>3</sup> has lately been observed in the Indian archipelago.

*Wagatea*<sup>4</sup> was formerly confounded with the large genus *Cæsalpinia*, possessing the same floral symmetry, while the sepals and oblong petals are similarly imbricated; but the receptacle lined with glandular tissue is different, being deeper and campanulate, and a little contracted towards its mouth, where it bears ten short stamens. Moreover the flowers are sessile on long simple or ramified spikes, the thick rachis being hollowed into pits to receive them. *Wagatea* consists of one or two interesting species, climbing trees from India and the surrounding regions,<sup>5</sup> which have bipinnate leaves and are covered with prickles.

<sup>1</sup> WIGHT, ex ARN., in *Jard. Mag. Zool. et Bot.*, ii. 547.—ENDL., *Gen.*, n. 6810<sup>2</sup>.—B. H., *Gen.*, 568, n. 314.

<sup>2</sup> WIGHT, *loc. cit.*; *Icon.*, t. 254.—WALP., *Rep.*, v. 573.

<sup>3</sup> MIQ., in *Mus. Lugd.-Bat.*, iii. 87.

<sup>4</sup> DALZ., in *Hook. Journ.*, iii. 90.—B. H., *Gen.*, 568, n. 315.

<sup>5</sup> WIGHT, *Icon.*, t. 1995.—WALP., *Ann.*, iv. 588.

*Pterolobium*<sup>1</sup> has nearly regular flowers, whose receptacle forms a shallow cupule lined by a glandular disk, and bearing on its rim five imbricate sepals, five imbricate petals like those of *Cæsalpinia*, and ten free stamens superposed to the perianth-leaves, each possessing an introrse two-celled anther dehiscing longitudinally. The ovary, inserted nearly in the centre of the receptacle, contains one or two descending ovules, with the micropyles upwards and outwards; it is surmounted by a style whose stigmatic apex is truncate, or hollow and funnel-shaped. The fruit is an indehiscent samara, the upper part being prolonged into an oblique wing, just like the "key" of a Maple. On the same side as the insertion of this wing is attached the seed, suspended by a slender funicle, and containing within its coats a fleshy exalbuminous embryo or a straight superior radicle. *Pterolobium* consists of trees or climbing shrubs. Their leaves are bipinnate with numerous small leaflets. The flowers are grouped in simple or ramified racemes, each axillary to a caducous bract. The three known species<sup>2</sup> of this genus inhabit tropical Asia, Africa, and Australia.

The flowers of *Barklya*<sup>3</sup> are very like those of *Pterolobium*, and possess the same shallow cupuliform receptacle lined with glandular tissue. The gamosepalous calyx has five short slightly imbricated lobes. The corolla consists of as many nearly equal petals, with the vexillary petal usually overlapped on both sides in præfloration.<sup>4</sup> The stamens are free perigynous and arranged in two whorls, as in *Pterolobium*; each has a glabrous filament and an introrse sagittate two-celled anther of longitudinal dehiscence. The gynæceum is stipitate, with the ovary ending in a little stigmatiferous terminal point. The ovules are few in number,<sup>5</sup> descending; the micropyles look upwards and outwards. The fruit is a stipitate oblong-lanceo-

<sup>1</sup> R. BR., in *App. Salt. Abyss.*, 64.—W. & ARN., *Prodr.*, i. 283.—ENDL., *Gen.*, n. 6769.—B. H., *Gen.*, 567, n. 311.—*Kantuffa* BRUCE, *Voy.*, trad. CASTER., v. 64, t. 14.—*Reichardia* ROTH., *Nov. Gen. et Spec.*, 210 (part.).—*Quartinia* A. RICH., in *Ann. Sc. Nat.*, sér. 2, xiv. 259; xv. 179.

<sup>2</sup> WIGHT, *Icon.*, t. 196.—MIQ., *Fl. Ind.-Bat.*, i. 106.—BENTH., *Fl. Austr.*, ii. 279.—OLIV., *Fl. Trop. Afr.*, ii. 264.—WALP., *Rep.*, i. 811; *Ann.*, ii. 443; iv. 592.—"SCHWEINFURTH (*Fl. Æthiop.*, 5, 255), indicates a second species as occurring in Abyssinia and Senaar. No name or description is given" (OLIV., *loc. cit.*).

<sup>3</sup> F. MUELL., in *Journ. Linn. Soc.*, iii. 158; *Fragm. Phyt. Austr.*, i. t. 3.—BENTH., *Fl. Austr.*, ii. 275.—B. H., *Gen.*, 559, n. 289.

<sup>4</sup> Perhaps the æstivation is not constant, and hence it is, no doubt, that BENTHAM and HOOKER have placed *Barklya* among *Papilionaceæ-Sophorææ*; but we do not leave it there, because on dissecting a very large number of flower buds, we have never seen the petal to which the placenta is superposed overlapping the two lateral petals on both sides, as is normally the case in *Papilionaceæ*.

<sup>5</sup> There are usually two or three, more rarely only one.

late flattened subdehiscent pod, containing one or two seeds, in which a thin layer of albumen surrounds the fleshy embryo. *B. syringæfolia* F. MUELL., the only species of this genus, is an unarmed tree from tropical Australia, whose pinnate leaves are reduced to a single large leaflet, accompanied by two little lateral stipules. The inflorescence is the same as in *Pterolobium*.

It has only been with some hesitation that the two following genera, *Gleditschia* and *Gymnocladus*, have been placed in this series; they are closely allied to each other, and agree in having the petals of variable number and of nearly the colours and consistency of the sepals, by which they are usually very incompletely covered in the bud.

*Gymnocladus*<sup>1</sup> has a nearly regular perianth, inserted on the mouth of the elongated tubular receptacle, which is lined with glandular tissue. There are five sepals, valvate or slightly imbricated in the bud. The petals are four or five in number, also imbricated in the bud. There may be ten stamens inserted on the rim of the receptacle, of which five, larger than the rest, are superposed to the sepals. Their anthers, sterile in the female flowers, are well-developed, introrse two-celled, and of longitudinal dehiscence in the male and hermaphrodite. The gynæceum, reduced in the male flowers to a little sterile conical body, is inserted in the bottom of the receptacular tube; it consists of a sessile ovary tapering above into a style, whose ventral angle is traversed by a longitudinal groove. The broad lips of this groove separate above and become reflexed and covered with stigmatic papillæ. The placenta, superposed to the posterior petal, bears several incompletely campylotropous ovules with their micropyles superior. The fruit is a pod, whose hard flattened pericarp finally opens in two valves. Inside is a fleshy pulp<sup>2</sup> surrounding the obovate seeds which have pretty long funicles. Each seed contains a fleshy embryo surrounded by horny albumen (figs. 52, 53).<sup>3</sup>

*Gymnocladus dioica.*



FIG. 52.  
Seed ( $\frac{3}{2}$ ).

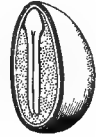


FIG. 53.  
Longitudinal section of seed.

<sup>1</sup> LAMK., *Dict.*, i. 733 (part.); *Ill.*, t. 823.—J., *Gen.*, 346 (part.).—DC., *Prodr.*, ii. 479.—SPACH, *Suit. à Buffon*, i. 89.—ENDL., *Gen.*, ii. 6757.—B. H., *Gen.*, 568, n. 312.

<sup>2</sup> It is rather sweet, greenish-yellow, forming a thin layer inside the brown dry layer of the pericarp.

<sup>3</sup> A pretty long curved funicle bears the seed:

The only known species of this genus is *G. dioica*,<sup>1</sup> the Nicker Tree or Kentucky Coffee Tree (*Chicot de Canada*), a large unarmed tree with alternate pinnately-decompound leaves. The common rachis bears first a pair of petiolulate leaflets, and above this secondary

*Gleditschia ferox.*

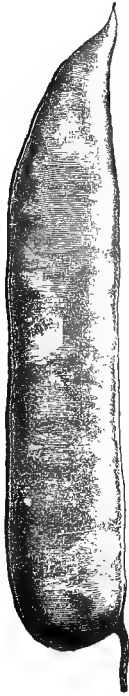


FIG. 54.  
Fruit ( $\frac{1}{2}$ ).

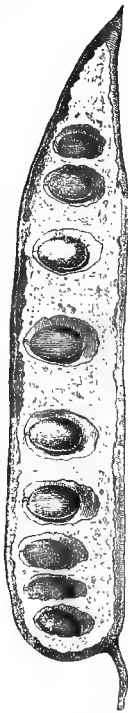


FIG. 55.  
Longitudinal  
section of fruit.

ribs also charged with leaflets, borne on stalks of the third order. On the midrib, as on the secondary ones, the arrangement is paripinnate, the ends of the ribs aborting and being reduced to a thin sterile filament which withers early. Both secondary and tertiary ribs have each one a stipellary tongue at the articulated base, and the leaf itself has also ill-developed pectinate lateral stipules at the base.<sup>2</sup> The flowers are in simple or ramified terminal racemes.

*Gleditschia*<sup>3</sup> (Fr., *Févier*) has a turbinate or campanulate receptacle, from three to five sepals, as many petals, and a variable number of stamens in two pentamerous or incomplete verticils. The ovary contains either two ovules or an indefinite number, and the terminal style ends in an irregularly-swollen simple or bifid head, sometimes reflexed, and covered with large stigmatic papillæ. The fruit is a large straight flattened pod, tapering at both extremities and indehiscent, or incom-

pletely and irregularly dehiscent. The outside of the pericarp

the cotyledons are often somewhat folded on themselves, and their bases form a sheath around the radicle. The seed-coat is triple. Outside is a thin smooth, softish membrane. The second coat is a thick horny layer, on whose surface is seen the raphe. The albumen often becomes a light ink colour. It is unequal, sending oblique projections into the depressions of the embryo.

<sup>1</sup> *G. canadensis* LAMÉ., *loc. cit.*; Suppl., ii. 229.—MICHX., *Fl. Bor.-Amer.*, ii. 241, t. 51.—A. GRAY, *Man.*, 109.—*Guilandina dioica* L., *Spec.*, 546.

<sup>2</sup> Axillary to each leaf are two superposed buds. The lower and younger, though hidden by the dilated base of the petiole, is not completely enveloped by it.

<sup>3</sup> L., *Gen.*, ii. 1159 (*Gleditsia*).—ADANS., *Fam. des Pl.*, ii. 319.—J., *Gen.*, 346.—GÆRTN., *Fruct.*, ii. 311, t. 146.—POIR., *Dict.*, 641, Suppl., ii. 641; *III.*, t. 857.—DC., *Mém. Légum.*, i. t. 22; *Prodr.*, ii. 479.—SPACH, *Suit. à Buffon*, i. 90.—ENDL., *Gen.*, ii. 6756.—B. H., *Gen.*, 568, 1002, n. 313.

consists of a thick dry coriaceous layer. Inside it contains a pretty large number of one-seeded chambers, each lined by a thin membrane which is also dry. But between these and the hard outer coat is a thick layer of cellular pulp which completely isolates the separate chambers.<sup>1</sup> The ovoidal seeds are attached by slender filiform funicles of variable length and more or less bent on themselves. Under the coriaceous seed-coats is a thick transparent horny albumen, in the centre of which is an embryo with large flattened oval cotyledons and a conical radicle. The five or six species of this genus are trees from North America<sup>2</sup> and temperate Asia and Africa.<sup>3</sup> The branches and axes of the inflorescence are often transformed into strong simple or ramified spines.<sup>4</sup> The leaves may be some pinnate and some bipinnate on one and the same tree.<sup>5</sup> The flowers form simple or ramified racemes in the axils of the leaves or on the wood of the branches.

### III. SCLEROLOBIUM SERIES.

*Sclerolobium*<sup>6</sup> (figs. 56–59) has regular hermaphrodite flowers. The receptacle forms an obconical or hemispherical cup of variable depth,

*Sclerolobium (Cosymbe) aureum.*



FIG. 56.  
Flower ( $\frac{1}{2}$ ).



FIG. 57.  
Longitudinal section of flower.

lined by glandular tissue, which is sometimes covered with hairs.

<sup>1</sup> This represents the mesocarp; the fruit is hence a drupaceous pod.

<sup>2</sup> DUHAM., *Arbr.*, ii. t. 10; iii. t. 10.—WALP., *Rep.*, i. 856.

<sup>3</sup> BENTH., in *Trans. Linn. Soc.*, xxv. 304.—OLIV., *Fl. Trop. Afr.*, ii. 265.

<sup>4</sup> We have cited an example of this transformation of the axes of inflorescence into branched spines in *G. ferox* (see *Bull. Soc. Bot. de Fr.*, v. 316).

<sup>5</sup> MACAIRE, *Sur la Soudure Natur. des Feuilles du Gleditzia triacanthos* (in *Bibl. de Gen.*, xvii. 142). *Gleditschia* has often been remarked as possessing in the axils of its single leaves several superposed buds, some being flower-buds, others leaf-buds. In *G. triacanthos* we may often find in one axil, first an inflorescence, below this a young branch, and still lower a younger leaf-bud.

<sup>6</sup> VOG., in *Linnaea*, xi. 395.—ENDL., *Gen.*, n. 6755.—B. H., *Gen.*, 562, n. 296.

On its horizontally (fig. 57) or obliquely (fig. 58) truncate rim are inserted the perianth and androceum, while the gynæceum springs from the very bottom. The calyx consists of five unequal sepals quincuncially imbricated in the bud. The corolla consists of as many alternately imbricated petals, which may be equal, or nearly so, to one another, or unequal, the vexillary petal becoming very small or even disappearing entirely. In certain of the species the petals are reduced to equal or unequal slender subulate tongues of

*Sclerolobium* (*Cosymba*) *Pæppigianum*.

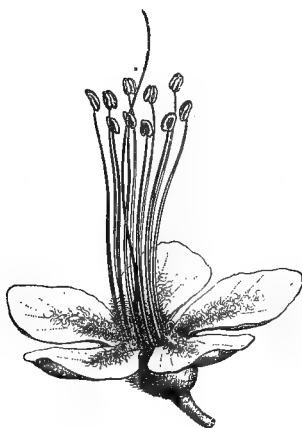


FIG. 58.  
Flower ( $\frac{5}{8}$ ).

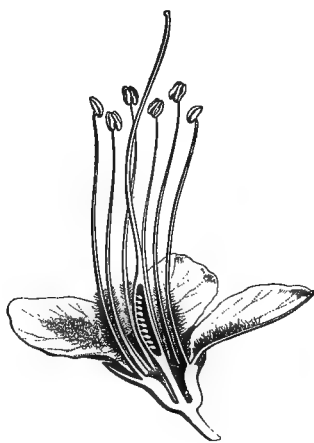


FIG. 59.  
Longitudinal section of flower.

nearly the same form as the filaments of the stamens.<sup>1</sup> These are ten in number—five superposed to the sepals, and five shorter to the petals. Each consists of a free, sometimes hairy filament, more or less folded on itself in the bud near its apex, which bears an introrse two-celled anther of longitudinal dehiscence. The gynæceum consists of a shortly stipitate ovary,<sup>2</sup> surmounted by a terminal style which is tapering, truncate or slightly dilated at its stigmatiferous apex; in the angle of the ovary towards the vexillary petal are several de-

<sup>1</sup> This is the character of *Sclerolobium* proper, as it was at first known to VOGEL. The spreading membranous petals, resembling those of *Leptolobium* and *Tachigalia*, characterize a distinct section, called *Cosymba* by TULASNE (*Arch. Mus.*, iv. 168), who is wrong in referring it to the genus *Tachigalia*, for in this section we find neither the elliptical mouth to the receptacle nor the lateral insertion of the gynæceum

of this last-mentioned genus. *Chrysostachys?* *glabra* PÆPP. (*ews.*, n. 2837) and *Leptolobium?* *luteum* MART. (*Herb. Fl. Bras.*, n. 1148) belong to this section.

<sup>2</sup> Often covered with hairs analogous to those of the disk and the lower part of the staminal filaments. The direction of the foot of the ovary is continuous with that of the pedicels (figs. 57, 59).



scending ovules, whose micropyles look upwards and outwards. The fruit is a shortly-stipitate compressed indehiscent pod, containing one or two large seeds, whose embryo has a straight radicle and broad foliaceous cotyledons, cordate at the base. *Sclerolobium* consists of half a score species of trees from Brazil and Guiana.<sup>1</sup> They have alternate imparipinnate leaves, with stipules which vary greatly in size, and which may be simple or trifoliolate. The flowers are small and very numerous, in numerous racemes which are often much ramified. Each flower is axillary to a caducous bract.

*Diptychandra*<sup>2</sup> has the flowers of the section *Cosymbe* of *Sclerolobium*. The imbricate sepals are all nearly equal, and are inserted on the rim of a hollow obconical receptacle. The staminal filaments, too, are bent on themselves in the bud, and the stipitate pauciovulate ovary is surmounted by a style which is hollowed out at its truncate apex. The fruit is a flattened bivalve pod, containing one or more seeds which are flattened out transversely and attached to the pericarp by one of their edges, just as in *Hæmatoxylon*; and a membranous wing formed by the extension of their coats runs all round them. The broad flattened embryo, with more or less deeply auriculate cotyledons, is exalbuminous. Two or three species of *Diptychandra* are known, trees or shrubs from Brazil and Bolivia,<sup>3</sup> with pinnate leaves and flowers in axillary or terminal racemes.

*Pæppigia*<sup>4</sup> has not only the vegetative characters of *Diptychandra* and *Sclerolobium* with the flowers in compound terminal racemes, but the same floral receptacle, the same centrally inserted gynæceum,<sup>5</sup> the same corolla and disk. The calyx, however, divided above into five slightly imbricate lobes, is continuous and gamosepalous below. The staminal filaments are erect and straight, not bent in the bud. The ovules are numerous; the style is truncate, not dilated, at its stigmatiferous apex. The fruit is equally characteristic: it has a slender foot, and is a flattened elongated membranous leaf-like many-seeded pod, probably indehiscent. Its placentary margin is

<sup>1</sup> PÆPP. & ENDL., *Nov. Gen. et Spec.*, t. 266.—TUL., *loc. cit.*, 168, 169.—WALP., *Rep.*, i. 809; v. 551; *Ann.*, ii. 440.

<sup>2</sup> TUL., in *Ann. Sc. Nat.*, sér. 2, xx. 139; in *Arch. Mus.*, iv. 127, t. 8.—B. H., *Gen.*, 562, n. 297.

<sup>3</sup> WALP., *Rep.*, v. 551.

<sup>4</sup> PRESL., *Symb. Bot.*, i. 15, t. 8.—ENDL.,

*Gen.*, n. 6762.—B. H., *Gen.*, 562, n. 298 (nec BERT., nec KUNZ.).—*Ramirezia* A. RICH., *Fl. Cub.*, ii. 218 (*Pæppigia*), t. 39.

<sup>5</sup> The foot bearing the ovary dilates gradually down towards its base; but we have seen it inserted in the very bottom of the ovary, contrary to the description of authors.

all along dilated into a very narrow membranous wing. The genus consists of unarmed trees from tropical Africa.<sup>1</sup>

*Batesia*,<sup>2</sup> too, has nearly the flowers of a *Sclerolobium*: five free imbricate sepals, as many subequal imbricate petals, and ten stamens inflexed in the bud, so that their anthers are then lodged in the cavity of the receptacle between the disk lining its wall and the foot of the ovary. The linear anther-cells are applied to a thick connective, and the form of the gynæceum is altogether peculiar. Its foot, which is central, is obliquely dilated above into an elliptical inclined plane edged with down; this bears a pauciovulate ovary, scarcely tapering at the apex into a style which is at once truncated, and stigmatiferous and ciliate at the end. The pod is bowed coriaceous and turgid, dehiscent by a single cleft, and contains two or three compressed seeds whose embryo is surrounded by albumen. The only known *Batesia*<sup>3</sup> is a tree from North Brazil with imparipinnate leaves and ramified terminal racemes.

Next to *Batesia* we have placed a reduced type which AUBLET named *Vouacapoua*<sup>4</sup> (figs. 60–62), and which is to *Sclerolobium* and *Batesia* exactly what *Zuccagnia* is to *Cæsalpinia*.<sup>5</sup> The receptacle, the pentamerous imbricate calyx and corolla, are those of the two former genera. The androceum, too, consists of ten stamens, of which the five oppositipetalous are the shorter; but their filaments are erect and the cells of their sagittate anthers diverge below. The gynæceum has lost the obliquely dilated foot of *Batesia*, and is directly inserted into the bottom of the receptacle; its ovary contains only a single descending anatropous ovule, whose micropyle is upwards and outwards. The ovary tapers above into a style, leaning slightly towards the placenta, and possessing at its apex a little cavity with a ciliate circular rim (fig. 62). *V. americana*, the only known species of this genus, has not only the paniced inflorescence and the flowers themselves like those of most *Connaraceæ*, but also their

<sup>1</sup> TUL., in *Arch. Mus.*, iv. 120.—WALP., *Rep.*, v. 552. The three described species of this genus BENTHAM would rather make mere varieties of the single species *B. procera* PRESL. (*Ramirezia cubensis* A. RICH.).

<sup>2</sup> SPRUCE, ex B. H., *Gen.*, 563, n. 300.

<sup>3</sup> *B. erythrosperma* BENTH., in *Trans. Linn. Soc.*, xxv. 302, t. 37.—*Tachigalia erythrosperma* SPRUCE, *exs.*, n. 2780.

<sup>4</sup> AUBL., *Guian.*, Suppl., 9, t. 373.—H. BN., in *Adansonia*, ix. 206, t. iv.

<sup>5</sup> This character, strictly applied, might have placed them in *Copaiferea*, as has been done to *Zuccagnia*, but its affinities with *Batesia* seem to us far closer. *Batesia* is perhaps really only a species of *Vouacapoua* with a pluriovulate ovary, so that it should form a simple section of the genus characterized by this feature, and also by the oblique dilatation at the base of the foot of the ovary.

alternate imparipinnate leaves, which once more demonstrates the close relations between that order and *Leguminosæ*. *V. americana* inhabits Guiana and North Brazil.

*Vouacapoua americana*.



FIG. 60.  
Habit ( $\frac{1}{2}$ ).

The flowers of *Melanoxylon*<sup>1</sup> come very near those of *Pæppigia*. The campanulate receptacle is still deeper, the scarcely irregular pentamerous calyx and corolla are imbricated, and the ten filaments have straight anthers villous at the base. The gynæceum is central or subcentral, and the ovary is borne on a long thick foot;<sup>2</sup> it contains numerous ovules, and is surmounted by a style with a concave truncate apex, edged by stigmatic papillæ. The fruit has a large

<sup>1</sup> SCHOTT, ap. SPRENG., *Syst., Cur. Post.*, 406.—ENDL., *Gen.*, n. 6761.—B. H., *Gen.*, 563, n. 301.—*Perittium* Vog., in *Linnaea*, xi. 408.

<sup>2</sup> It has been described as sessile, but its elongated flattened base is solid, and must hence be regarded as a foot.

compressed oblong-falciform coriaceous pod. The seeds have winged edges and are surmounted by a sort of falciform blade, and contain within their coats a fleshy embryo thinly surrounded by albumen. The only known species of this genus<sup>1</sup> is a large Brazilian tree,

*Vouacapoua americana.*



FIG. 61.  
Flower ( $\frac{1}{2}$ ).



FIG. 62.  
Longitudinal section of flower.

covered with rust-coloured down; its leaves are alternate imparipinnate, and its flowers form a large terminal ramified raceme.

The flowers of *Thylacanthus*<sup>2</sup> resemble those of *Batesia*: we find the same imbricated perianth, with the petals tapering towards their base; the same androceum of ten stamens, with inflexed filaments; the same central gynæceum, with a pauciovulate ovary. But the style is long and slender, revolute in the bud, and ends in a broad peltate stigmatiferous dilatation; and the flower, axillary to a caducous bract, is accompanied, as in the *Amherstieæ*,<sup>3</sup> by two pretty thick lateral bractlets of nearly equal size, and which by touching edge to edge form a complete envelope to the flower-bud. They separate at the apex on anthesis to free the flower. The inflorescence consists of ramified racemes towards the end of the branches. *T. ferrugineus* TUL., the only species of this genus at first known, is an unarmed tree from North Brazil, with alternate paripinnate leaves.

*Dicymbe corymbosa*<sup>4</sup> is a small unarmed tree from North Brazil, with alternate pinnate leaves, and large pseudo-corymbose flowers, whose receptacle forms a deep inverted cone, lined with glandular tissue. On its rim are inserted four<sup>5</sup> or five imbricated sepals, and

<sup>1</sup> *M. Brauna* SCHOTT.—*Perittium ferrugineum* VOG., *loc. cit.*

<sup>2</sup> TUL., in *Arch. Mus.*, iv. 175.

<sup>3</sup> To which we do not refer the two species of *Thylacanthus*, because of the central insertion of the gynæceum.

<sup>4</sup> SPRUCE, ex B. H., *Gen.*, 564, 1002, n. 304. —BENTH., in *Trans. Linn. Soc.*, xxv. 303, t. 38.

<sup>5</sup> In this case the apex of the posterior sepal is more or less deeply emarginate, indicating that it really represents two calycine leaves.

five large nearly equal alternating petals, also imbricate in the bud. The stamens, ten in number, have their filaments inflexed in the bud; and hence the anthers are contained in the concavity of the receptacle. The ovary is central and multiovulate, surmounted by a style, which is at first involute and is dilated above into a peltate stigma. Thus, the flowers of this plant in all respects resemble those of *Thylacanthus ferrugineus*; but the peculiar character of *Dicymbe* lies in the lateral bractlets enveloping the flower, each forming a hollow coriaceous hemisphere, so that when applied to one another by their thick edges they form a regular globular box. This sac is not nearly so thick in *T. ferrugineus*, whose calyx is always pentamerous, whose petals have far narrower bases, and whose ovules are less numerous. For these reasons we make *Dicymbe* a simple section of the genus *Thylacanthus*, with the specific name of *T. corymbosa*.

*Campsiandra*,<sup>1</sup> with the general characters of the preceding genera, and especially of *Melanoxydon*, presents an androceum of more than

*Campsiandra comosa*.

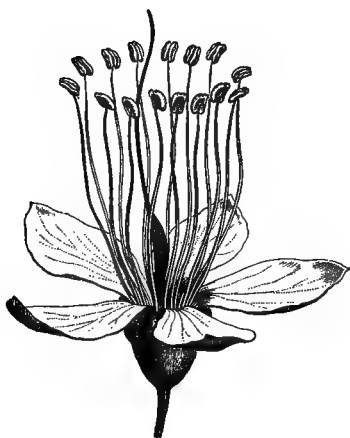


FIG. 63.  
Flower ( $\frac{2}{3}$ ).



FIG. 64.  
Longitudinal section of flower.

ten stamens; it has from fifteen to twenty, whose long filaments are reflexed in the bud, but are later much exerted; their anthers are at first lodged in the deep cavity of the receptacle between its walls

<sup>1</sup> BENTH., in *Hook. Journ.*, ii. 93.—PEPP. & ENDL., *Nov. Gen. et Spec.*, t. 268.—ENDL., *Gen.*, n. 6810<sup>1</sup>.—B. H., *Gen.*, 563, n. 299.

and the foot of the gynæceum. This last is nearly or quite central. Its ovary, borne on a pretty long foot, ends in a slender style which is dilated truncate and stigmatiferous at the tip.<sup>1</sup> The fruit is a large bivalve pod, with a thick straight or bowed compressed woody pericarp, containing large exalbuminous seeds with fleshy embryos, often deformed by mutual compression. *Campsiandra* consists of three or four species<sup>2</sup> of unarmed trees from tropical America; their leaves are alternate and pinnate, and their flowers form axillary or terminal simple or much ramified racemes.

*Phyllocarpus*,<sup>3</sup> an abnormal genus of this group, has a concave receptacle lined by glandular tissue, with four free imbricated sepals, and three petals, of which one is posterior and overlapped by the two lateral ones. The stamens are diadelphous, as in many of the *Papilionaceæ*,<sup>4</sup> nine being united into a sheath split open above, with the tenth free. All possess a versatile introrse two-celled anther of longitudinal dehiscence. The gynæceum consists of a central stipitate pauciovulate ovary surmounted by a style which is at first convolute and ends in a truncate scarcely dilated stigmatiferous apex. The fruit is a straight or slightly bowed compressed leaf-like indehiscent (?) oblong pod, whose ventral suture is produced into a narrow wing. Only one species of this genus is known,<sup>5</sup> a tall unarmed tree from tropical Brazil. It has alternate pinnate leaves or numerous leaflets. Its flowers form short racemes, solitary or fasciated in the leafless nodes of last year's leaves.

#### IV. AMHERSTIA SERIES.

The magnificent Asiatic tree named *Amherstia*<sup>6</sup> (figs. 65-67) is considered as the type of a distinct series, because the very deep narrowly-tubular floral receptacle bears the gynæceum close to its mouth (R, fig. 67), and not in the bottom of its cavity. The rim of

<sup>1</sup> This style usually becomes much exerted, like the stamens. In certain flowers, however, it remains very short, included and straight, and is much dilated at its apex, which does not extend beyond the mouth of the floral receptacle. The ovules also then remain ill developed, so that these flowers must probably be considered as male through abortion of the gynæceum. In this case *Campsiandra* would be polygamous.

<sup>2</sup> WALP., *Rep.*, v. 568.

<sup>3</sup> RIED., ex TUL., in *Ann. Sc. Nat.*, sér. 2, xx. 142; in *Arch. Mus.*, iv. 171, t. 10.—ENDL., *Gen.*, n. 6720<sup>1</sup>.—B. H., *Gen.*, 564, n. 305.

<sup>4</sup> To which group *Phyllocarpus* should perhaps be referred.

<sup>5</sup> *P. Riedeli* TUL., *loc. cit.*—WALP., *Rep.*, v. 546.

<sup>6</sup> WALL., *Pl. Asiat. Rar.*, i. 1, t. 1, 2.—ENDL., *Gen.*, n. 6793.—B. H., *Gen.*, 578, n. 340.

this receptacle supports a calyx of four sepals imbricated in the bud (fig. 67). The posterior sepal really represents two of the true calyx-leaves, being inserted right under the vexillary petal, which is altogether covered by the two lateral petals in the bud. The two anterior petals often remain rudimentary. The androceum, also inserted in the mouth of the receptacular tube, consists of ten diadelphous stamens.

*Amherstia nobilis.*



FIG. 65.  
Flower ( $\frac{1}{2}$ ).



FIG. 66.  
Longitudinal section of flower.

The nine anterior are united below into a broad trough-like sheath. The free parts of the filaments are very unequal in length; the five alternipetalous being very long, and the four others very short in proportion. Each bears an introrse two-celled anther of longitudinal dehiscence. This is also the case with the tenth stamen, superposed to the vexillary petal and standing free on the posterior side of the flower. The gynæceum consists of a shortly stipitate ovary, inserted very obliquely on the vexillary wall of the receptacle (fig. 66), and surmounted by a slender style, involute in the bud, ending in a little stigmatiferous head. On the posterior wall of the ovary is seen the placenta, which bears an indefinite number of obliquely descending ovules in two vertical rows, with their micro-

pyles upwards and outwards. The bivalve pod is elongated compressed coriaceous and woody, with the placental suture thickened and dilated. The seeds, varying in number, which it encloses, contain within their coats a fleshy exalbuminous embryo. *A. nobilis*,<sup>1</sup>

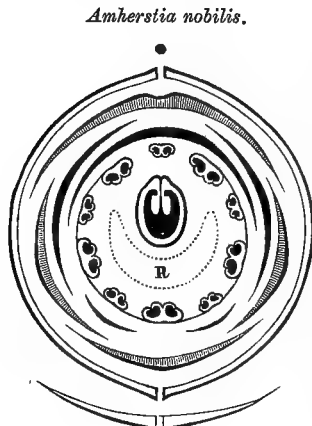


FIG. 67.  
Diagram.

the only species of this genus, comes from Martaban. Its unarmed branches are covered with alternate paripinnate leaves, accompanied by narrow caducous foliaceous stipules, and its flowers are collected into long lax pendulous terminal racemes. Each floral pedicel is axillary to a caducous bract, and bears below the flower two large red lateral bracts, which are at first valvate and form a sort of sheath around the flower-bud, finally separating to free the flower, on either side of which they persist.

The flowers of *Humboldtia*,<sup>2</sup> though much smaller than those of *Amherstia*, resemble them except in one point: their stamens are free instead of being diadelphous. In certain Asiatic species of this genus the oppositipetalous stamens are reduced to short sterile tongues, or even disappear altogether. The four or five species of this genus are natives of the west of tropical Africa,<sup>3</sup> India, and Ceylon.<sup>4</sup> They are unarmed shrubs with paripinnate leaves and flowers in solitary or geminate racemes, which are terminal or inserted on the wood of the old branches. These flowers also are accompanied by two coloured lateral bractlets which touch by their edges and envelope the flower-bud.

*Schotia*<sup>5</sup> has altogether the flower of *Humboldtia*, with the four sepals and five petals similarly imbricated, the ten free or nearly free

<sup>1</sup> WALL., *loc. cit.*—WALP., *Rep.*, v. 567.—HOOK., in *Bot. Mag.*, t. 4453.

<sup>2</sup> VAHL., *Symb. Bot.*, iii. 106.—DC., *Prodr.*, ii. 488.—ENDL., *Gen.*, n. 6792.—B. H., *Gen.*, 579, 1003, n. 341.—*Batschia* VAHL., *op. cit.*, 39, t. 56 (nec GMEL., nec L., nec THUNB.).

<sup>3</sup> The flowers of the African species, which we shall call *H. africana*, have ten fertile stamens, whose filaments are united for a very short distance at the base, and are inflexed in the bud. The ovary usually contains four descending

ovules in two rows. The base of each ovule is more or less completely surrounded by a projection of the placenta, and its micropyle looks upwards and outwards. Near the bottom of the floral receptacle is a gland projecting into its cavity.

<sup>4</sup> R. BR., in *Wall. Pl. As. Rar.*, iii. 17, t. 238.—WIGHT & ARN., *Prodr.*, i. 284.—WIGHT, *Icon.*, t. 1605-1608.—WALP., *Rep.*, i. 844; *Ann.*, iii. 852; iv. 608.

<sup>5</sup> JACQ., *Collect.*, i. 93.—LAMK., *Dict.*, vii.



stamens, and the same gynæceum. The pod, which only opens very incompletely, is oblong compressed, and straight or bowed, and has often a thick narrow rudimentary wing on the parietal suture. The seeds are orbicular compressed, borne on a funicle which is sometimes dilated into an aril.<sup>1</sup> But the flowers of *Schotia* are never enclosed in the two accompanying bractlets, which, like the axillant bracts, are membranous and caducous. The flowers are numerous, in compound racemes that are often much ramified. The four or five species composing this genus are unarmed trees or shrubs from South Africa,<sup>2</sup> with paripinnate leaves possessing short caducous stipules.

*Palovea*<sup>3</sup> has nearly the flower of *Amherstia* and *Humboldtia*. But the corolla is reduced to the three posterior sepals, the two anterior having disappeared; and the stamens, which are free, are only nine in number, owing to the disappearance of the vexillary stamen also. The two accompanying bractlets are united into a tube to a pretty good height, and the leaves are simple and entire, instead of being compound. *P. guianensis*, the only species, is an unarmed tree from Guiana, whose flowers are in short few-flowered spikes terminating the branches.

*Elisabetha*<sup>4</sup> has externally altogether the flower of *Palovea*, with two lateral bractlets united for some distance into a tube, and a corolla of five well-developed petals. But of the nine stamens, which are united for a very short distance at the base of the filament, the three alone that are superposed to the three anterior sepals are large and end in well-developed anthers. The six others have only little sterile anthers, or are reduced to the subulate filaments. The gynæceum and fruit resemble those of *Amherstia* and *Palovea* in *E. coccinea* SCHOMB.,<sup>5</sup> the only known species, an unarmed tree from Guiana, with paripinnate leaves and short terminal racemes, each flower axillary to a large coloured coriaceous bract.

26; Suppl., v. 114; *Ill.*, t. 331.—DC., *Prodr.*, ii. 507.—ENDL., *Gen.*, n. 6785.—B. H., *Gen.*, 581, n. 350.—*Guaiaecum* L., ex J., *Gen.*, 347.—*Theodora* MEDIC., *Monog.*, Mannh. (1796), 16, icon, ex ECKL. & ZEYH., *Enum. Pl. Afr. Austr.*, 261.—*Scotia* THUNB., *Fl. Cap.*, i. 389.—*Omphalobium* JACQ., ex DC., *loc. cit.*, 508 (nec DC.).

<sup>1</sup> The aril exists in *S. latifolia* JACQ. (*Fragm.*, 23, t. 15, fig. 4), which DE CANDOLLE has made the type of his section *Omphalobioides*. *S. (Theodora) speciosa* JACQ., lacks it.

<sup>2</sup> HARV. & SONN., *Fl. Cap.*, ii. 273.—HARV., *Thes. Cap.*, t. 32.—JACQ., *loc. cit.*, 136;  *Ic. Rar.*,

t. 75.—HOOK., *Exot. Flor.*, t. 159; in *Pot. Mag.*, t. 1153.—ANDR., *Bot. Repos.*, t. 348.—BOLLE, in *Pet. Mossamb.*, 18.—H. BN., in *Adansonia*, vi. 187, 197.—OLIV., *Flor. Trop. Afr.*, ii. 309.

<sup>3</sup> AUBL., *Guian.*, 365, t. 141 (*Palowe*).—J., *Gen.*, 351.—LAMK., *Dict.*, iv. 716; Suppl., iv. 265; *Ill.*, t. 323.—DC., *Prodr.*, ii. 518.—ENDL., *Gen.*, n. 6799.—B. H., *Gen.*, 578, n. 339.—*Ginnania* SCOP., *Introd.*, n. 1366.—SCHREB., *Gen.*, 271.

<sup>4</sup> SCHOMB., in *Hook. Journ.*, ii. 92.—ENDL., *Gen.*, n. 6794<sup>1</sup>.—B. H., *Gen.*, 577, n. 337.

<sup>5</sup> WALP., *Rep.*, i. 843.

*Heterostemon* (figs. 68, 69) has nearly the flowers of *Palovea*<sup>1</sup> and *Elisabetha*; the same receptacle and the same calyx, with a corolla of five petals, of which the three posterior are alone well developed. The stamens too resemble those of *Elisabetha*, three being greatly developed, and six short and sterile, or reduced to mere filaments.

*Heterostemon mimosoides.*

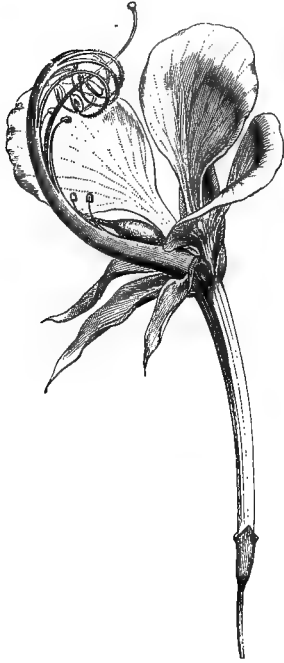


FIG. 68.  
Flower ( $\frac{2}{3}$ ).

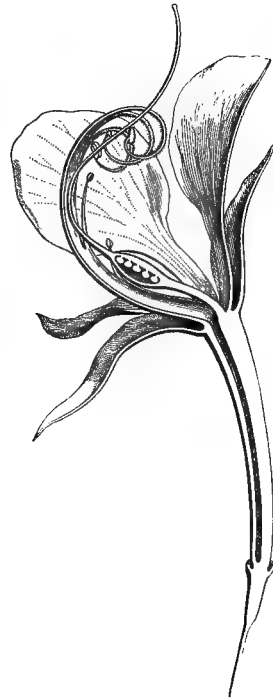


FIG. 69.  
Longitudinal section of flower.

But they are united into a sort of sheath open towards the vexillary petal. The gynæceum, fruit, and seeds are as in the two preceding genera. The five or six known species are unarmed trees or shrubs from tropical America. Their leaves are alternately paripinnate or imparipinnate, or unifoliolate, and the stipules are caducous. The flowers form terminal or lateral racemes, as in *Humboldtia*, and have two bractlets to form a sheath, as in *Elisabetha*; but this sheath is very short, revealing almost the whole of the flower.

<sup>1</sup> DESF., in *Mém. Mus.*, iv. 248, t. 12.—DC., *Prodr.*, ii. 488.—ENDL., *Gen.*, n. 6794.—B. H., *Gen.*, 578, n. 338.

*Brownea*<sup>1</sup> (figs. 70–72) has features of all the preceding genera. They have still the same receptacle, calyx, fruit, and seeds; the corolla consists of five well developed petals, as in *Amherstia*, but there are from ten to fifteen stamens, free or monadelphous to a variable height. The flowers of *Brownea* are united at the ends of the branches in splendid short spikes or heads, each flower axillary to a coloured petal and bract. The bractlets, united edge to edge for a considerable distance, form a long sheath, from which the

*Brownea coccinea.*



FIG. 70.  
Flower.

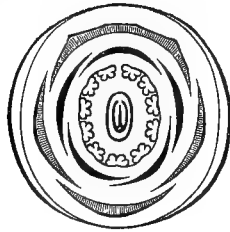


FIG. 71.  
Diagram.



FIG. 72.  
Longitudinal section of flower.

flower emerges on anthesis. About eight species<sup>2</sup> of *Brownea* are known, all fine glabrous trees or shrubs from tropical America; their alternate paripinnate leaves possess caducous, sometimes coloured, leafy stipules. In this respect *Brownea* comes very near *Elisabetha*; but its stamens, which are all fertile, nearly equal, and exserted, resemble those of *Palovea*.

*Saraca*<sup>3</sup> consists of Indian trees, whose flowers are those of *Hum-*

<sup>1</sup> JACQ., *Pl. Amer.*, 194, t. 121; *Fragm.*, t. 16–23.—L., *Gen.*, n. 833.—J., *Gen.*, 366.—LAMK., *Dict.*, i. 471; *Suppl.*, i. 710; *Ill.*, t. 575.—DC., *Prodr.*, ii. 477.—ENDL., *Gen.*, n. 6810.—B. H., *Gen.*, 577, n. 336.—*Hermesia* LÆFL., *It.*, 278? (nec K.)

<sup>2</sup> H. B. K., *Nov. Gen. et Spec.*, vi. 312.—PÆFF. & ENDL., *Nov. Gen. et Spec.*, t. 292.—HOOK., in *Bot. Mag.*, t. 3964, 4839.—*Bot.*

*Reg.* (1841), t. 30.—LINDL. & PAXT., *Fl. Gard.*, t. 59.—WALP., *Rep.*, v. 565.

<sup>3</sup> BURM., *Fl. Ind.*, 85, t. 25, fig. 2.—L., *Mantiss.*, n. 1267.—J., *Gen.*, 422.—B. H., *Gen.*, 583, n. 357.—JONESIA ROXB., in *Asiat. Res.*, iv. 355, icon.; *Fl. Ind.*, ii. 212.—DC., *Prodr.*, ii. 487.—SPACH, *Suit. à Buffon*, i. 110.—ENDL., *Gen.*, n. 6795.—*Asjogam* RHEED., *Hort. Malab.*, v. 117, t. 50.

*boldtia* or *Amherstia*, with the exception of three characters. They have no corolla, and their coloured perianth is of a calycine nature; their axillant bracts are surmounted by two far less developed bractlets, which do not surround the whole flower, and which may overlap by their thin edges; and in certain species the ten stamens are not all fertile, five or six having no anthers. The filaments, too, are neither altogether free, as in *Humboldtia*, nor united for a long way, as in *Amherstia*, but are only monadelphous close to their insertion. The fruit is an elongated, flattened or turgid, bivalve pod. The genus contains three or four species, not very distinct, all Asiatic.<sup>1</sup> Their stems are unarmed, and covered with alternate paripinnate leaves, possessing little caducous stipules. The flowers form compound ramified racemes, often lateral.

*Apalatoa*<sup>2</sup> has the apetalous flowers of *Saraca*, possessing a diplostemonous androceum, of which several pieces may be absent, and a usually pauciovulate androceum. The fruit is orbicular oval or oblong, dehiscing in two valves with thickened edges; it contains one or two flattened exalbuminous seeds. The genus consists of trees with alternate imparipinnate leaves, possessing stipules of variable form and duration. The flowers form simple racemes terminating the young branches, or inserted laterally on those of former years. Each flower is axillary to a bract, and is accompanied by two lateral bractlets, which are sometimes large and spreading, and persist for a good time beside the flower, which they at first enveloped completely. There are some half-score of species, mostly from tropical America;<sup>3</sup> one is found in the west of tropical Africa,<sup>4</sup> one in Ceylon,<sup>5</sup> and one in the Indian Archipelago.<sup>6</sup>

The corolla reappears in *Baikiea*,<sup>7</sup> whose calyx possesses four thick unequal sepals, which only overlap by their bevelled edges. The

<sup>1</sup> WIGHT & ARN., *Prodr.*, ii. 487.—WIGHT, *Icon.*, t. 206.—MIQ., *Fl. Ind.-Bat.*, i. p. 1, 83.—*Bot. Mag.*, t. 3018.—WALP., *Ann.*, iv. 609, 610.

<sup>2</sup> AUBL., *Guian.*, 382.—H. BN., in *Adansoniana*, ix. fasc. 7.—*Crudia*, SCHREB., *Gen.* 282.—B. H., *Gen.*, 584, 1003, n. 358.—H. BN., in *Adansoniana*, vi. 199.—*Crudya* W., *Spec.*, ii. 539.—DC., *Prodr.*, ii. 519.—ENDL., *Gen.*, n. 6802.—*Opalatoa* AUBL., *op. cit.*, t. 147.—*Touchirou* L. C. RICH., ex ENDL.—*Touchiroua* AUBL., *op. cit.*, 384, t. 48.—*Vouarana* AUBL., *Suppl.*, 12, t. 347?—*Cyclas* SCHREB., *loc. cit.* (part.).—*Waldschmidtia* NECK., *Elem.*, n.

1445.—*Pryona* MIQ., *Fl. Ind.-Bat.*, i. p. 1, 1081.

<sup>3</sup> GRISEB., *Fl. Brit. W. Ind.*, 216.—WALP., *Rep.*, i. 854; v. 573; *Ann.*, iv. 611.

<sup>4</sup> *C. senegalensis* PL.—BENTH., *Niger*, 329; in *Trans. Linn. Soc.*, xxv. 314, n. 1.

<sup>5</sup> *C. zeylanica* BENTH., *loc. cit.*, n. 2.—*Detarium zeylanicum* TEW., *Enum. Pl. Zeyl.*, 414.

<sup>6</sup> *Apalatoa bantamensis*.—*Pryona bantamensis*, MIQ., *loc. cit.*, n. 1.

<sup>7</sup> BENTH., *Gen.*, 581, 1003, n. 349; in *Trans. Linn. Soc.*, xxv. 314, t. 41.—OLIV., *Fl. Trop. Afr.*, ii. 308.

petals are five in number, of which the posterior is superposed to the posterior sepals.<sup>1</sup> The stamens are ten in number,<sup>2</sup> and the gynæceum is inserted slightly excentrically by a slender foot. The ovary contains numerous descending ovules, and is surmounted by a style which is slightly dilated at its stigmatiferous apex. Two species<sup>3</sup> of this genus are known, fine trees from the west of tropical Africa; their leaves are paripinnate, with only one or two pairs of broad coriaceous leaflets, and the very large flowers, covered with brownish velvety down, form short subterminal racemes.

The Tamarind-tree<sup>4</sup> (Fr., *Tamarinier*; figs. 73-76) has the same floral symmetry as the preceding genera, but certain abortions occur in the corolla and androceum. The receptacle forms a long tubular cavity, on whose rim are borne four imbricate sepals, of which the posterior one really represents two calycine leaves. The corolla has but three petals, one posterior, and two lateral which overlap the former in the bud.<sup>5</sup> The androceum consists of nine stamens, as in *Heterostemon*, *Elisabetha*, &c., the one exactly superposed to the vexillary petal being absent. The rest are far from being all fertile; this is only the case with those superposed to the three anterior sepals. These three have subulate filaments, becoming free above to support an introrse two-celled anther which dehisces longitudinally; the six others are reduced to sterile tongues above, while the lower parts of their filaments are united into a long curved tube cleft posteriorly. The gynæcetum, inserted on top of the posterior wall of the receptacular tube, consists of a stipitate ovary ending in a curved style, slightly dilated at its stigmatiferous apex. The ovary contains a variable number of slightly descending anatropous ovules, whose micropyles look upwards and outwards. The fruit, or *tamarind* (Fr., *tamarin*), is straight, elongated, subcylindrical or somewhat flattened, with its margins continuous or irregularly pinched in between the seeds (fig. 73). Its epicarp is pretty thick, crustaceous and fragile; the thick pulpy mesocarp, gorged with acidulous juice,

<sup>1</sup> This is the largest of the sepals, and represents the two posterior leaves of the calyx.

<sup>2</sup> Their filaments are reflexed in the bud, and then their versatile anthers are lodged in the space between the gynæceum and the walls of the receptacle.

<sup>3</sup> " *Vel unius varietates.*" (BENTH.)

<sup>4</sup> *Tamarindus* T., *Inst.*, 660, t. 445.—L., *Gen.*, n. 46.—ADANS., *Fam. des Pl.*, ii. 319.—

LAMK., *Dict.*, vii. 561; Suppl., i. 281; *III.*, t. 25.—J., *Gen.*, 347.—GÆRTN., *Fruct.*, ii. 310, t. 146.—DC., *Prodr.*, ii. 488.—SPACH, *Suit. à Buffon*, i. 111.—ENDL., *Gen.*, n. 6778.—B. H., *Gen.*, 581, n. 348.

<sup>5</sup> It is only exceptionally that we find the posterior petal overlapping the lateral ones (as in fig. 75) on both sides or on one only. (See AGARDH, *Theor.*, 212.)

is traversed by ramified woody fibro-vascular bundles. The endocarp is like parchment or more or less leathery, and forms as many completely closed chambers as there are seeds, each chamber separating easily from its neighbours through the double transverse false dis-

*Tamarindus indica.*



FIG. 73.  
Habit ( $\frac{1}{2}$ ).

sepiments. The descending compressed obovate seeds contain within their coriaceous coats a fleshy exalbuminous embryo, whose short superior radicle is completely surrounded by the auricled bases of the cotyledons. Only one species<sup>1</sup> of Tamarind tree is known, a native of tropical Asia or Africa, which has been transported into all warm countries; it is an unarmed tree, whose alternate paripin-

<sup>1</sup> *T. indica* L., *Spec.*, 48.—RHEED., *Hort. Malab.*, i. t. 23.—RUMPH., *Herb. Amboin.*, ii. t. 23.—DC., *Mém. Légum.*, ii. t. 24, fig. 113.—*T. occidentalis* GERTN., *loc. cit.*—DC., *Prodr.*,

*loc. cit.*, n. 2.—JACQ., *Amer.*, 10, t. 10, 179.—*T. officinalis* HOOK., in *Bot. Mag.*, t. 4563.—MIQ., *Fl. Ind.-Bat.*, i. p. i. 82.—WALP., *Ann.*, iv. 595.—OLIV., *Fl. Trop. Afr.*, ii. 307.

nate leaves possess two caducous lateral stipules. The flowers form terminal racemes; each flower is axillary to a coloured caducous

*Tamarindus indica.*



FIG. 74.  
Flower ( $\frac{2}{3}$ ).

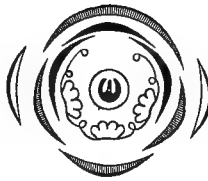


FIG. 75.  
Diagram.



FIG. 76.  
Longitudinal section of flower.

bract, and is accompanied by two large lanceolate lateral bractlets placed edge to edge, and at first enveloping the whole flower-bud.

*Vouapa*<sup>1</sup> (figs. 77–80) comes very near *Tamarindus* in its androceum, the number of fertile stamens being often reduced to three, accompanied by a variable number of staminodes. But the reduction of the corolla is yet more marked; there is only one large petal, the posterior one; the four others are reduced to little tongues or are even altogether absent; and moreover the two accompanying lateral bractlets become large, coriaceous, and concave like the bowl of a spoon, touching by their thick edges, and completely enclosing the bud in a sort of sac before expansion. The four imbricated sepals become quite membranous and are often ill-developed. The other characters are extremely variable in the score or so of species forming

<sup>1</sup> AUBL., *Guian.* (1775), 25, t. 7.—J., *Gen.*, 350.—LAMK., *Dict.*, viii. 699; *Ill.*, t. 26.—DC., *Prodr.*, ii. 511.—SPACH, *Suit. à Buffon*, i. 120.—ENDL., *Gen.*, n. 6803.—H. BN., in *Adansonia*, vi. 177; ix. fasc. 7.—*Outea* AUBL., *op. cit.*, 28, t. 9.—J., *loc. cit.*, 347.—LAMK., *Dict.*, iii. 291; *Suppl.*, iv. 237; *Ill.*, t. 26.—DC., *loc. cit.*, 510.—SPACH, *loc. cit.*, 119.—*Macrolobium* SCHREB., *Gen.*, i. (1789), 30, n. 12.—VAHL,

*Enum.*, ii. 37.—VOG., in *Linnaea*, xi. 411.—ENDL., *Gen.*, n. 6803.—B. H., *Gen.*, 579, 1003, n. 342.—*Kruegeria* NECK., *Elem.*, iii. (1790), 65, n. 1389.—*Anthonota* P. BEAUV., *Fl. Ov. et Ben.*, i. (1804), 70, t. 42.—DC., *loc. cit.*, 510.—DESVX., in *Ann. Sc. Nat.*, sér. 1, ix. 430.—ENDL., *Gen.*, n. 6797.—*Scytodium* VOG., in *Linnaea*, xi. 411.

this genus. Thus the floral receptacle is often long and tubular like that of the Tamarind, as in *V. bifolia* AUBL. (figs. 77, 78). But elsewhere we find it deeper and shallower in proportion, like that of *Baikiaea*, as seen in *V. macrophylla*<sup>1</sup> (figs. 79, 80); and the gynæceum is in this case inserted much further from the posterior rim of the receptacular cavity. The calyx usually consists of four imbricate sepals, and the corolla is represented by the vexillary petal, which is greatly developed and possesses a long claw and a broad limb which is bent on itself in the bud. The four anterior petals are either reduced to very little scales or altogether absent. There are often three fertile

*Vouapa bifolia.*



FIG. 77.  
Flower ( $\frac{2}{3}$ ).

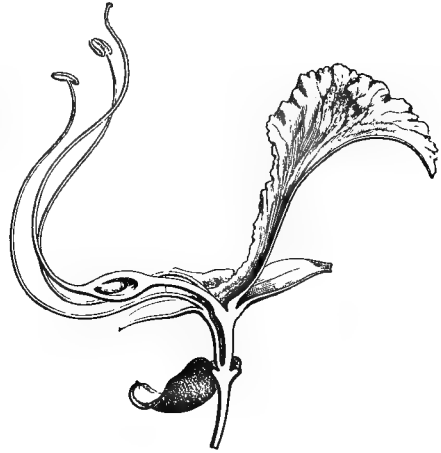


FIG. 78.  
Longitudinal section of flower.

stamens, the other pieces of the androceum becoming quite rudimentary or even disappearing (figs. 77, 78). But in *Anthonota*, from tropical Africa, which should be referred to this genus, there are sometimes as many as nine or ten stamens, all of which may be fertile but one; and this reveals more clearly the fundamental arrangement of the elements of the androceum. Thus *V. macrophylla* has five very unequal petals, and it is the stamen superposed to the vexillary petal which is absent or reduced to a sterile tubercle. The nine others have "an anther which may dehisce longitudinally and

<sup>1</sup> H. BN., in *Adansonia*, vi. 178, t. iii. fig. 6, 7.—*Anthonota macrophylla* P. BEAUV., *Fl. Ow. et Ben.*, i. 71, t. 42 (the analyses of the flower

are inexact and imperfect).—*Macrolobium Pailoti* BENTH., in *Trans. Linn. Soc.*, xxv. 308.—OLIV., *Fl. Trop. Afr.*, ii. 297.



contain a variable amount of pollen." *V. crassifolia*<sup>1</sup> affords a transition between this and the American species in its androceum, possessing three large stamens with fertile anthers, and four little ones of which the two lateral have a small anther, and the two others have only a little glandular swelling at the tip. We have further examined two African species which constitute the types of the sections *Triplisomeris* and *Pentisomeris* of *Vouapa*, which complete our knowledge of the floral symmetry of this group; for the former<sup>2</sup> has only two small petals, the three posterior being of nearly equal size; and the latter<sup>3</sup> has the two posterior sepals quite free instead of being united for some distance, so that the quinary type of the calyx is completely

*Vouapa (Anthonota) macrophylla.*



FIG. 79.  
Flower ( $\frac{3}{4}$ ).



FIG. 80.  
Longitudinal section of flower.

restored. The ovary, inserted at a variable distance from the bottom of the receptacle (figs. 78, 80), contains from two or three to an indefinite number of descending ovules, and ends in a style somewhat dilated at its stigmatiferous apex. The fruit is a few-seeded bivalve pod of very variable form,<sup>4</sup> containing flattened exalbuminous seeds. The genus *Vouapa* consists of unarmed trees from tropical Africa and America; some twenty species, as mentioned above, are known.<sup>5</sup>

<sup>1</sup> H. BN., in *Adansonia*, vi. 179, note 1 ["probably not distinct," from *V. macrophylla* (OLIV., *op. cit.*, ii. 298).]

<sup>2</sup> *V. explicans* H. BN., *loc. cit.*, 181, note 1.

<sup>3</sup> *V. demonstrans* H. BN., *loc. cit.*, 180, note 1, t. iii. figs. 1-5. We must note that in most of these species the vexillary petal being so very large, envelopes all the other elements of the corolla in the bud, and often too even part of the calyx, namely, the three anterior sepals. Thus the ordinary præfloration of the *Cæsalpinieæ* may disappear in this genus, and be replaced by a true vexillary æstivation, as occurs,

though much more rarely, in the Tamarind (p. 99, note 5).

<sup>4</sup> In *V. acaciæfolia* (*Macrolobium acaciæfolium* BENTH.), the fruit is thus described by BENTHAM: "*Legumen læve, suturis non incrassatis et seminis cotyledones insigniter corrugata, sed flores et inflorescentia nequaquam a cæteris speciebus distinguuntur.*"

<sup>5</sup> W., *Spec.*, i. 186.—K., *Zwei Abhandl.*, 13, t. 2.—BENTH., in *Hook. Journ.*, ii. 239; in *Trans. Linn. Soc.*, xxv. 307.—KARST., *Fl. Columb.*, t. 75.—WALP., *Rep.*, i. 845; v. 570; *Ann.*, ii. 448.

The leaves are pari- or imparipinnate, with sometimes three leaflets, but usually with more, and possess caducous lateral stipules. Their flowers form simple or ramified axillary or terminal racemes, which are often reflexed.

The flowers of *Berlinia*,<sup>1</sup> like *Vouapa*, are at first completely enveloped by two coriaceous bracts; but the androceum consists of two quinary rows of fertile stamens as in *Schotia*, *Baikiaea*, &c. The calyx consists of five imbricate sepals like those of *Vouapa*, and the corolla has but one large petal, the vexillary one, the other four being reduced to short scales. The multiovulate ovary is inserted on the posterior edge of the receptacle; the fruit is unknown. Half a dozen species of *Berlinia* are known, fine unarmed trees from tropical Africa.<sup>2</sup> The alternate paripinnate leaves have stipules of variable size, and their lovely scented white flowers form simple or ramified racemes.

The receptacle of *Daniella*<sup>3</sup> forms a thick-walled corset, on whose rim are inserted four imbricate sepals and a vexillary petal superposed to the posterior sepal.<sup>4</sup> The androceum consists of ten free or nearly free stamens, all fertile, in two whorls. The gynæceum is inserted by a slender foot not far from the bottom of the receptacle; its ovary contains numerous descending ovules with their micropyles upwards and outwards, in two vertical rows. The fruit is a flattened elongated stipitate bivalve pod, often one-seeded. The embryo is exalbuminous, and the funicle dilates near the seed into a fleshy aril. At maturity the endocarp separates elastically from the mesocarp. The only known species<sup>5</sup> of this genus is a handsome unarmed resinous tree from the west of tropical Africa. Its paripinnate leaves have unsymmetrical leaflets and caducous leafy stipules. Its numerous flowers form much-ramified compound racemes towards the ends of the branches.

<sup>1</sup> SOLAND, in *Hook. Niger*, 326.—H. BN., in *Adansonia*, vi. 184, t. iii. figs. 8-11.—B.H., *Gen.*, 579, 1003, n. 343.

<sup>2</sup> H. BN., *loc. cit.*, 185.—BENTH., in *Trans. Linn. Soc.*, xxv. 309.—WALP., *Ann.*, ii. 447.—OLIV., *Fl. Trop. Afr.*, ii. 292.

<sup>3</sup> BENN. (J.), in *Pharm. Journ.*, xiv. 251.—H. BN., in *Adansonia*, vi. 186.—B. H., *Gen.*, 580, n. 345.

<sup>4</sup> This petal "is very variable in size and form, and often appears quite solitary when adult. But

an examination of the young flower-bud reveals also two lateral petals besides two smaller (anterior) ones, which usually disappear in the adult flowers. The lateral petals may have their development early arrested, or present all kinds of variations of form and consistency in the adult flowers."

<sup>5</sup> *D. thurifera* BENN., *loc. cit.* ("Species 2 v. *unius varietates*" BENTH., *loc. cit.*)—OLIV., *Fl. Trop. Afr.*, ii. 300. [This last author admits another species, *D. oblonga* OLIV.]

*Eperua*<sup>1</sup> (figs. 81, 82) has nearly the flowers of *Berlinia* and *Daniella*: the same receptacular tube with the foot of the gynæceum similarly inserted on its posterior wall, the same decandrous androceum, and the same corolla reduced to the posterior petal; but this last is very large, completely covering the androceum in the bud. The gamosepalous calyx is divided above into four unequal imbricate lobes. The staminal filaments are free, or very slightly united at the base. This union is a little more marked in *Parivoa grandiflora*,<sup>2</sup> which is only distinguished by this character from *Eperua* proper,

*Eperua (Parivoa) grandiflora.*



FIG. 81.  
Flower.



FIG. 82.  
Longitudinal section of flower.

and which cannot be generically separated from it. The ovary is surmounted by a style which is at first rolled up and ends in a slightly dilated stigmatiferous apex; in the cell are two or more descending anatropous ovules whose micropyles look upwards and outwards. The fruit is a more or less oblique large flattened elongated bivalve pod, containing one or few exalbuminous seeds; the fleshy cotyledons are prolonged into a sort of sheath surrounding the straight superior radicle. *Eperua* consists of unarmed slender subsarmentose trees

<sup>1</sup> AUBL., *Guian.*, i. 369, t. 142.—J., *Gen.*, 350.—DC., *Prodr.*, ii. 510.—SPACH, *Suit. à Buffon*, i. 117.—ENDL., *Gen.*, n. 6800.—B.H., *Gen.*, 580, n. 344.—Rotmannia NECK., *Elem.*, n. 1284.—*Dimorpha* SCHREB., *Gen.*, 493.—Panzeria W., *Spec.*, ii. 540.

<sup>2</sup> AUBL., *op. cit.*, 756, t. 303.—DC., *loc. cit.*, cclvi.—ENDL., *Gen.*, n. 6801.—*Dimorpha* RUDGE, in *Trans. Linn. Soc.*, ix., t. 20.—*Adleria* NECK., *op. cit.*, n. 1286. In habit it differs slightly from *Eperua* proper.

and shrubs; there are six species,<sup>1</sup> all from tropical America and especially Guiana. The alternate pari- or imparipinnate leaves possess few coriaceous leaflets, and either short and narrow or large leafy caducous stipules. The flowers form short racemes, often grouped on a common terminal axis; this may be short and erect, or slender elongated and pendulous. Each flower is axillary to a bract and is accompanied by two caducous lateral bractlets.

The flowers of *Afzelia*<sup>2</sup> resemble those of *Berlinia*, but their lateral bractlets, ill-developed as in *Daniella*, do not cover them completely in the bud. *A. bracteata*, for instance, has a tubular receptacle bearing on its edges a calyx of four sepals, two lateral and two respectively anterior and posterior, by which the former are overlapped. The corolla is only represented by the large posterior petal, and the androceum consists of nine stamens. Of these five are superposed to the sepals and four alternate with them; it is the one which should be superposed to the large single petal which is absent, while the stamen on either side of this is reduced to a sterile tongue. Hence we find (fig. 83), going from before backwards, one large stamen, two smaller, two large ones, two small again, and finally two staminodes; next to these is inserted the gynæceum, towards the posterior edge of the receptacular cavity (R). It consists of a multiovulate ovary, surmounted by a style which is rolled up in the bud

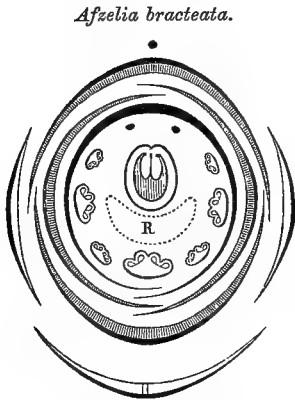


FIG. 83.  
Diagram.

and ends in a little stigmatiferous head. The fruit is a thick flattened elongated pod, divided by transverse false dissepiments into as many chambers as there are seeds. Each of these last has a coloured aril forming a deep cupule at its base. *A. bracteata* is a tree from the west of tropical Africa. The flowers of *A. africana*, which comes from the same parts, lack the posterior staminodes. In *A. madagascariensis*,

<sup>1</sup> K., *Zwei Abhandl.*, 15, t. 3, fig. 4.—WALP., *Ann.*, ii. 447.

<sup>2</sup> SM., in *Trans. Linn. Soc.*, iv. 221.—DC., *Prodr.*, ii. 507.—ENDL., *Gen.*, n. 6796.—HOOK. F., *Niger*, 325, t. 34, 35.—H. BN., in *Adan-*

*sonia*, vi. 183.—B. H., *Gen.*, 580, n. 347 (nec EHRH., nec GMEL.).—?? *Pancovia* W., *Spec.*, ii. 540 (ex SM., in *Rees Cyclop.*, v. 26).—*Pancovia* really belongs to *Sapindaceæ* (H. BN., *Adansonia*, ix. 229).

too, which has been made the type of a distinct genus under the name of *Intsia*,<sup>1</sup> the number of stamens is also reduced to seven. Of these three have well-developed fertile anthers—namely, the two superposed to the lateral sepals and the anterior one. But on either side of this last we only find a staminode or lateral sterile tongue, and on either side of the median line of the posterior petal is a little stamen whose anther is present, but has unequal cells or only one cell, and contains no pollen.<sup>2</sup> Moreover, the pod, dehiscing in two valves, has thinner walls with ill-marked partitions between the seeds, which are exarillate. *Afzelia* may then be split into two subgenera. Some half-score species are known,<sup>3</sup> from tropical countries in the Old World. The alternate leaves are pari- or subimparipinnate, with a few glabrous coriaceous leaflets. The flowers form simple or ramified terminal racemes. Each flower is axillary to a caducous bract, and accompanied by two concave more or less persistent lateral bractlets, which are not sufficiently developed to cover the bud completely.

*Didelotia*<sup>4</sup> is the genus of this group in which this reduction of the perianth is carried to its greatest extent. We only find ten little scales of very variable form on the rim of the concave receptacle, representing the five sepals and the five alternating petals; and even of these several may become almost imperceptible or be quite absent. The protection of the sexual organs, usually assigned to the perianth, here devolves on the two lateral bractlets, which, placed edge to edge, as in *Berlinia*, *Vouapa*, *Humboldtia*, &c., long cover the whole flower-bud. The androceum consists of ten free perigynous stamens; sometimes these are all fertile, with introrse two-celled anthers; sometimes the five that correspond with the petals are reduced to sterile filaments variably developed. The gynæceum is that of the preceding genera, similarly situated on the vexillary side of the receptacle; it becomes a flattened elongated stipitate bivalve pod, with exalbuminous seeds. The genus consists of three species of trees from tropical Africa.<sup>5</sup> The alternate leaves are paripinnate, possessing one

<sup>1</sup> DUP.-TH., *Nov. Gen. Madag.*, 22, n. 75.—DC., *Prodr.*, ii. 509.—ENDL., *Gen.*, n. 6798.—? *Pakudia* MIQ., *Fl. Ind.-Bat.*, i. p. i. 86.—B. H., *Gen.*, 580, n. 346. In this last the stamens are said to be monadelphous, as in the section *Parivoa* of the preceding genus.

<sup>2</sup> This fact is perhaps not constant.

<sup>3</sup> RICH., GUILL. et PERE., *Fl. Seneg. Tent.*, i. 263, t. 57.—COLEBR., in *Trans. Linn. Soc.*,

xii. t. 17.—A. GRAY, *Bot. Unit. States Expl. Exp.*, t. 51.—KL., in *Pet. Moss. Bot.*, 19.—WALP., *Ann.*, ii. 447; iv. 594, 608, 610.—OLIV., *Fl. Trop. Afr.*, ii. 301.

<sup>4</sup> H. BN., in *Adansonia*, v. 367, t. viii.—B. H., *Gen.*, 1003, n. 351 a.—*Brachystegia* BENTH., *Gen.*, 582, n. 351?

<sup>5</sup> BENTH., in *Trans. Linn. Soc.*, xxv. 311 t. 42, B.

or more pairs of unsymmetrical leaflets, and caducous ill-developed stipules. The flowers form usually terminal shortly pedicellate racemes, simple or branched.

*Hymenæa* has the floral symmetry of *Schotia* or *Humboldtia*. Its coriaceous obconical receptacle, lined by a thick disk, bears four slightly imbricate sepals, five subequal imbricate petals, and ten free perigynous stamens, five alternate with the petals, and five shorter superposed to them. The gynæceum, inserted laterally at a variable distance from the bottom of the receptacle, is stipitate, with an ovary containing a few anatropous descending ovules, and bearing a style which is at first folded on itself and ends in a little stigmatiferous head. The fruit is obliquely obovate or oblong, flattened or terete, thick coriaceous nearly woody, and indehiscent. It contains a variable number of seeds with very hard coats and a thick fleshy exalbuminous embryo. They are completely surrounded by a sort of dried up floury pulp.<sup>2</sup>

*Hymenæa*  
(*Trachylobium*)  
*verrucosa*.



FIG. 84.  
Fruit.

*Hymenæa venosa*<sup>3</sup> and *verrucosa*,<sup>4</sup> natives of tropical America and East Africa respectively, have been made the types of the genera *Peltogyne*<sup>5</sup> and *Trachylobium*,<sup>6</sup> which we think we may retain as sections of the genus *Hymenæa*. The former has the stigma more dilated than in *Hymenæa* proper, and a compressed bivalve fruit whose dorsal suture is often, though not constantly, prolonged into a narrow wing. The latter has the two anterior petals rudimentary and its ovary is borne on a foot dilated at the top into a little fringed collar. Its fruit, indehiscent and often one-seeded, is covered with warts (fig. 84).

<sup>1</sup> *Hymenæa* L., *Gen.*, n. 512.—J., *Gen.*, 351.—GÆRTN., *Fruct.*, ii. 305, t. 139, 145.—LAMK., *Dict.*, ii. 147; *Suppl.*, ii. 374; *Ill.*, t. 330.—DC., *Prodr.*, ii. 511.—HAYN., *Arzneig.*, t. 6-19.—SPACH, *Suit. à Buffon*, i. 122.—ENDL., *Gen.*, n. 6788.—B. H., *Gen.*, 583, u. 354.—*Courbaril* PLUM., *Gen.*, t. 36.—ADANS., *Fam. des Pl.*, ii. 317.—*Jetaiba* PIS., *Brasil.*, 60 (ex ADANS.).

<sup>2</sup> Consisting of a large number of hairs, which contain resinous matter, together with a great abundance of starch granules.

<sup>3</sup> VAHL, *Ecl. Amer.*, ii. 31.—DC., *Prodr.*, n. 2.

<sup>4</sup> GÆRTN., *Fruct.*, ii. 306, t. 139, fig. 7.—DC., *loc. cit.*, n. 3.—*Tanroujou* J., *Gen.*, 351, not.

<sup>5</sup> VOG., in *Linnaea*, xi. 410.—ENDL., *Gen.*, n. 6787.—B. H., *Gen.*, 582, n. 353.

<sup>6</sup> HAYN., *Arzneig.*, xi. t. 18, 19 (char. sub. t. 11).—B. H., *Gen.*, 583, u. 355.—OLIV., *Fl. Trop. Afr.*, ii. 311.

Thus constituted,<sup>1</sup> the genus *Hymenæa* contains a dozen species<sup>2</sup> of which two belong to *Trachylobium*<sup>3</sup> and three to *Peltogyne*.<sup>4</sup> All are unarmed trees whose alternate leaves consist of two unsymmetrical coriaceous leaflets and five caducous stipules. Their flowers form ramified racemes (described by some as panicles) at the ends of the branches. The bract and pair of bractlets belonging to each flower usually fall very early.

In *Tachigali*<sup>5</sup> the flowers present the general characters of the preceding genera, but lack the lateral bractlets. The receptacle is cornet-shaped, lined with glandular tissue; its mouth is oblique,<sup>6</sup> and on it are inserted five imbricated sepals,<sup>7</sup> and as many alternating imbricated petals. The androceum consists of ten stamens, five superposed to the sepals and five to the petals, and inserted like them on the edges of the receptacle; each consists of a free filament reflexed in the bud and often velvety at the base, and a versatile introrse two-celled anther of longitudinal dehiscence. As in *Amherstia*, *Schotia*, &c., the gynæceum is inserted on the posterior wall of the receptacle; its pluriovulate stipitate ovary is surmounted by a style slightly dilated at its stigmatiferous apex. The pod is oblong or elongated, compressed membranous and indehiscent. The oval compressed seeds have their embryos surrounded by albumen. Four or five species of *Tachigali* are known,<sup>8</sup> unarmed trees from tropical America, whose alternate paripinnate leaves have two usually caducous stipules. The flowers form racemes which are axillary or approximated to form terminal compound racemes. These plants form a connecting link between *Amherstieæ* and *Sclerobieæ*, possessing the excentric ovary of the former series with the general floral organization of the latter.

1

*Hymenæa* { 1. *Courbaril*.  
Sections 3. { 2. *Peltogyne*.  
                  { 3. *Trachylobium*.

<sup>2</sup> WALP., *Rep.*, i. 846.

<sup>3</sup> GERTN., *loc. cit.*, t. 139.—KL., in *Pet. Moss. Bot.*, t. 2.

<sup>4</sup> H. B. K., *Nov. Gen. et Spec.* vi., 323, t. 567.

<sup>5</sup> AUBL., *Guian.*, 372, t. 143.—*Tachigalia* J., *Gen.*, 349.—LAMK., *Dict.*, vii. 550; *Ill.*, t. 339.—DC., *Prodr.*, ii. 487.—ENDL., *Gen.*, n. 6752.—B. H. *Gen.*, 582, n. 352.—*Cubæa* SCOP., ex SCHREB., *Gen.*, 278.—*Tachia*

PERS., *Syn.*, i. 459 (nec AUBL.).—*Valentinia* NECK., *Elem.*, n. 1283.—*Tassia* RICH. (ex ENDL.).

<sup>6</sup> It is highest behind, so that it slants forwards and downwards. Hence the bud as a whole is curved, the sepals bending outwards above. The same curved club-shaped flower-bud occurs in *Schizolobium*.

<sup>7</sup> Usually quincuncially, sepal 2 being anterior and sepals 1 and 3 posterior.

<sup>8</sup> PÆFF. & ENDL., *Nov. Gen. et Spec.*, t. 265.—MIQ., *Stirp. Surin.*, t. 3.—TUL., in *Arch. Mus.*, iv. 160–168.—WALP., *Rep.*, i. 845; v. 569 (part.); *Ann.*, ii. 448.

*Schizolobium*<sup>1</sup> possesses altogether the flowers of *Tachigali*, and hence seems properly inseparable from it; though it has been placed in a different series, *Eucæsalpinieæ*, because of its bipinnate leaves. The oblique-mouthed receptacle, the imbricated sepals and petals, the decandrous androceum, the pluriovulate gynæceum inserted on the posterior wall of the receptacle, are the same in both genera. The pod is flattened and bivalve; its dry thin endocarp, which separates from the exocarp, contains a compressed seed with a coloured embryo surrounded by copious albumen. This genus contains one or two species from tropical Africa.<sup>2</sup> The leaves have very numerous small leaflets, and the flowers, which also lack lateral bractlets, form simple axillary or ramified terminal racemes. *Schizolobium* by its foliage links *Amherstieæ* with *Eucæsalpinieæ*, as *Tachigali* on the other hand links it with *Sclerolobieæ*.<sup>3</sup>

## V. BAUHINIA SERIES.

*Bauhinia*<sup>4</sup> (figs. 85, 86) has regular hermaphrodite or polygamous flowers, pentamerous or more rarely tetramerous. In those species of the genus where the flower is most complete and often nearly regular, we find a pentamerous calyx and corolla,<sup>5</sup> to whose pieces the ten free stamens are superposed, all inserted on a more or less

<sup>1</sup> Vog., in *Linnaea*, xi. 399.—ENDL., *Gen.*, n. 6760.—B. H., *Gen.*, 569, n. 318.

<sup>2</sup> TUL., in *Arch. Mus.*, iv. 157.—WALP., *Rep.*, v. 557.

<sup>3</sup> Among *Amherstieæ* has been placed, with doubt, the very little known genus *Westia* (VAHL, *Skriv. Nat. Selsk.*, vi. 117), containing two (?) species from tropical America, which have been referred by some authors, though doubtfully, to the genus *Vouapa* (ENDL., *Gen.*, 1427, n. 6797). It is thus characterized by BENTHAM and HOOKER (*Gen.*, 583, n. 356):—"Calyx? (corolla, VAHL) *tubus discifer elongatus; segmenta* (4?) *spatulata, imbricata* (Petala 0?). *Stamina* 10, *libera*. *Ovarium stipitatum*  $\alpha$ -*ovulatum*. *Legumen stipitatum, e stipite erecto horizontali compressum coriaceum, suturis incrassatis*.—*Arbor. Folia imparipinnata; foliolis paucijugis coriaceis. Flores majusculi racemosi; racemis in paniculum terminalem dispositis. Bractea ovata. Bracteolæ (calyx diphyllus, VAHL) amplæ, ante anthesin flores includentes, alabastro*

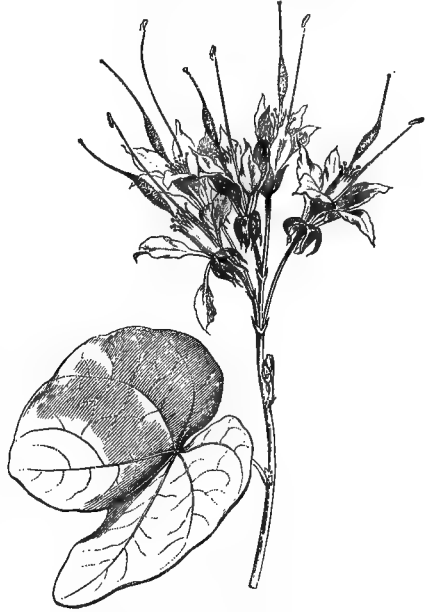
*clavato*."—[OLIVER (*Fl. Trop. Afr.*, ii. 294), having examined one of VAHL's species, *W. grandiflora*, writes:—"This turns out to be *Berlinia acuminata* SOL. As *W. parviflora* must be generically distinct, the right course appears to be simply to suppress the genus."—As this sheet is passing through the press I learn that *W. parviflora* has been determined by Prof. BAILLON to belong to *Sapindaceæ*.—TR.]

<sup>4</sup> *Bauhinia* PLUM., *Nov. Gen.*, t. 13.—L., *Gen.*, n. 511.—ADANS., *Fam. des Pl.*, ii. 317.—J., *Gen.*, 351.—LAMK., *Dict.*, i. 388; Suppl., i. 598; *Ill.*, t. 329.—K., in *Ann. Sc. Nat.*, sér. 1, i. 84.—DC., *Prodr.*, ii. 512.—SPACH, *Suit. à Buffon*, i. 123.—ENDL., *Gen.*, n. 6790.—B. H., *Gen.*, 575, n. 333 (incl.: *Cusparia* K., *Amaria* MUT., *Schnella* RADD., *Caulotretus* RICH., *Lacara* SPRENG., *Perlebia* MART., *Pauletia* CAV., *Phanera* LOUB., *Pileostigma* HOCHST., *Lasiothema* MIQ.).—*Causchenapou* RHEED. (ex ADANS.).

<sup>5</sup> There are often tetramerous flowers even on the plants bearing the pentamerous ones.



concave receptacle lined by a glandular disk. The calyx is tubular<sup>1</sup> and gamosepalous, divided above into five dentate teeth, valvate or imbricate in the bud. Usually it divides on anthesis into a certain number of parts marked off by longitudinal clefts, but it often opens into a single spathe-like piece owing to there being but one of these clefts, more or less perfect. The petals are of nearly equal size or unequal, as the vexillary petal may be larger or smaller; the rest differ in form or colour. The præfloration is imbricate, with the vexillary petal overlapped<sup>2</sup> by the two lateral ones, and these again by the anterior pair. The stamens are in two whorls, superposed to the sepals and petals respectively; the former set are the larger. Each stamen consists of a filament and an introrse two-celled anther of longitudinal dehiscence.<sup>3</sup> The gynæceum is borne on a foot of variable length, inserted either in the bottom of the receptacle as in *Sclerolobieæ*, or at a variable height inside its walls, though in this case *anteriorly*, not *posteriorly* as in that series. The one-celled ovary contains a variable number<sup>4</sup> of descending ovules on a placenta looking towards the vexillary petal.<sup>5</sup> It ends in a style whose stig-

*Bauhinia (Casparia) porrecta.*FIG. 85.  
Inflorescence ( $\frac{3}{8}$ ).

<sup>1</sup> Lined by a layer of glandular tissue, often very thin, but sometimes, though rarely, thickened, especially near the edges.

<sup>2</sup> Sometimes only one edge is overlapped. When the posterior sepal is absent, a single sepal occupies the place of the two posterior ones of the resupinate pentamerous flower, and to this it is that the placenta is superposed.

<sup>3</sup> The top of the filament is often bent in the bud. The anthers are usually versatile.

<sup>4</sup> Often indefinite. The ovules form two rows, and are descending and anatropous, or incompletely campylotropous with their micropyles up-

wards and outwards. Certain species have only two or three ovules.

<sup>5</sup> While this relation remains unchanged, and remains what it is in *Leguminosæ* generally, the gynæceum when inserted excentrically on the walls of the receptacle, is here on the anterior side of the flower (see *Adansonia*, ix. fasc. 7). Hence the cavity of the receptacle, which is sometimes well marked, is interposed between the placental edge of the ovary and the vexillary petal; while in *Amherstieæ*, on the contrary, the receptacular sac lies between the anterior petals and the gynæceum, which is inserted on its posterior wall.

matiferous apex is more or less dilated into a terminal or oblique head. The pod varies greatly in form, being indehiscent or bivalve, with its cavity continuous or divided by false dissepiments of variable thickness into as many spurious cells as there are seeds. Within the seed-coats is a fleshy embryo surrounded by a variable thickness of albumen.

The *Bauhinias* constructed on the above described plan have been made into seven sections, which some authors have considered distinct genera. In *Adenolobus*,<sup>1</sup> *Pauletia*,<sup>2</sup> *Perlebia*,<sup>3</sup> *Pileostigma*,<sup>4</sup> and *Schnella*<sup>5</sup> the gynæceum is inserted in the bottom of the receptacle, while in *Amaria*<sup>6</sup> and *Lysiphyllum*<sup>7</sup> it is inserted laterally on its wall. The species whose androceum always consists in part of sterile stamens are comprised in the sections *Casparia*,<sup>8</sup> *Loxocalyx*, *Phanera*, and *Lasiobema*. In the first section the only well developed stamen is that superposed to the carpel, which is very large (fig. 86), and the rest are monadelphous, sterile, or more rarely with from two to four fertile towards the posterior side of the flower.<sup>9</sup> In *Loxocalyx*<sup>10</sup> there

<sup>1</sup> HARV. & SONN., *Fl. Cap.*, ii. 275. In the single species of this section the calyx has only five teeth, and there are ten stamens.

<sup>2</sup> CAV., *Icon.*, v. 5, t. 409, 410. This section contains two-score species from America, and eight or nine from tropical Asia and Africa. The calyx opens nearly to the base by five clefts, or is one cleft in a single piece. The stamens are all fertile, or more rarely the five oppositipetalous or the vexillary alone is sterile. The leaves are entire or two-lobed on slender unarmed or prickly stems. (JACQ., *Amer.*, t. 177; *Fragm.*, t. 15, fig. 1.—BONG., in *Mém. Acad. Petrop.*, sér. 6, iv. t. 4-7.—DC., *Prodr.*, ii. 513.—HOOK., in *Bot. Misc.*, ii. t. 91; in *Bot. Mag.*, t. 3741.—MORIC., *Pl. Nouv. Amér.*, t. 51, 52.—REICHB., *Icon. Exot.*, t. 180.—KORTL., *Verh. Nat. Gesch. Bot.*, t. 9.)

<sup>3</sup> MART., *Reis.*, i. 555. In this Brazilian species the pod is said to possess false dissepiments between the seeds.

<sup>4</sup> HOCHST., in *Flora* (1846), 528. Calyx of *Pauletia*, often dehiscing by a single vertical cleft. Stamens ten, fertile, free or slightly monadelphous. Coriaceous or nearly woody, indehiscent or bivalve at a very late stage. Vegetative characters of *Pauletia*. Six or seven species from tropical Asia and Africa. (HOOK., *Icon.*, t. 141.—GUILL. & PERR., *Fl. Seneg. Tent.*, i. 226, t. 60.—FIELD. & GARDN., *Sert. Pl.*, t. 10.)

<sup>5</sup> RADD., *Pl. Bras. Add.*, 33, fig. 4.—*Caulotretus* RICH. & SPRENG., *Syst.*, *Curr. Post.*, 406.—ENDL., *Gen.*, n. 6789.—*Laacara* SPRENG., *Syst.*, ii. 332.—*Tylotæa* VOG., in *Linnaea*, xiii.

312. Calyx swollen, with five narrowly imbricated lobes or teeth. Stamens ten, fertile. Fruit flattened, coriaceous dehiscent, or membranous indehiscent. Leaves two-lobed or 2-foliolate. Species fifteen, all climbing, lianas, with simple racemes, from tropical America. (ATBL., *Guian.*, t. 144, 145.—K., in *Ann. Sc. Nat.*, sér. 1, i. 48; *Mimos.*, t. 469.—H. B. K., *Nov. Gen. et Spec.*, vi. 319.—BONG., in *Mém. Acad. Petrop.*, sér. 6, vi. 109.—JACQ., *Amer.*, t. 173, fig. 3.—LINDL., in *Bot. Reg.*, t. 1133.—MORIC., *Pl. Nouv. Amér.*, t. 53.—MIQ., *Stirp. Surin.*, t. 2.)

<sup>6</sup> MUT., in DC., *Prodr.*, ii. 519. In *B. petiolata* (*Amaria petiolata* MUT.), MUTIS makes the stamens monadelphous at the base, and the gynæceum stipitate, excentric.

<sup>7</sup> BENTH., *Fl. Austral.*, ii. 295.

<sup>8</sup> K., in *Ann. Sc. Nat.*, sér. 1, i. 85.—ENDL., *Gen.*, n. 6791.

<sup>9</sup> This section contains seven or eight species of unarmed erect trees or shrubs from Mexico and the Antilles. Leaves entire or two-lobed. Bud coriaceous, bivalve, often narrow. (L., *Hort. Cliff.*, t. 15.—MILL., *Icon.*, t. 61.—CAV., *Icon.*, t. 404-407.—JACQ., *Hort. Schænbr.*, t. 100.—H. B. K., *Nov. Gen. et Spec.*, vi. 319.—HOOK., in *Bot. Mag.*, t. 1708.)

<sup>10</sup> BENTH., *Gen.*, 576, 6. Section of one climbing cirrhose species, with flowers in simple or forked racemes, and an elongated coriaceous bivalve pod. It comes from tropical Asia (*B. macrostachya* WALL., *Cat.*, n. 5774;—*B. scandens* ROXB., *Fl. Ind.*, ii. 326).

are three fertile stamens; the rest are sterile, and the calyx is recurved; while the insertion of the gynæceum, central in *Casparia*, is here excentric. *Phanera*<sup>1</sup> resembles *Loxocalyx* in the insertion of the pistil; but its calyx splits to the base into long straps, while it is only shortly five-cleft in the former section. In *Lasiobema*<sup>2</sup> the receptacle is shallow, and the number of stamens is often reduced to five, of which the three anterior are alone fertile. The gynæceum, which is often pauciovulate, has behind it a large gland of variable form.

Thus constituted,<sup>3</sup> the genus *Bauhinia* consists of some hundred and twenty-five species<sup>4</sup> of erect or climbing trees or shrubs from all tropical countries. The stem is often flattened and deformed,<sup>5</sup> and there are often simple cirrhi or tendrils at the base of the inflorescence. The leaves are simple alternate, with a variable number of digitate basilar ribs, entire or

*Bauhinia (Casparia) porrecta.*

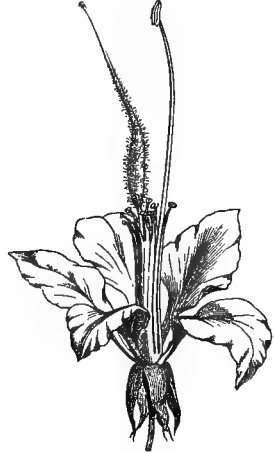


FIG. 86.  
Flower.

<sup>1</sup> LOUR., *Fl. Cochinch.*, 46.—*Symphypoda* DC., *Mém. Légum.*, xiii, t. 70; *Prodr.*, ii, 515. Fertile stamens four or five, the rest sterile or altogether absent. Pod coriaceous bivalve. This section comprises some forty species from tropical Asia and Africa, and from the Cape. Unarmed shrubs either sarmentose and cirrhose or erect, with entire or two-lobed leaves. (VAHL., *Symb. Bot.*, iii, t. 62.—WIGHT, *Icon.*, t. 263, 264.—WALL., *Pl. Asiat. Rar.*, t. 253.—KORTH., *Verh. Nat. Gesch. Bot.*, t. 10, 11, 23, 24.—BENTH., in *Pl. Jungh.*, 263 (part.); *Fl. Hongk.*, 99.—HARV. & SOND., *Fl. Cap.*, ii, 375 [*B. Burkeana*].) [For the African species of this genus see also OLIV., *Fl. Trop. Afr.*, ii, 285.]

<sup>2</sup> KORTH., ex MIQ., *Fl. Ind.-Bat.*, i, p. 1, 71. This section might perhaps be raised to the rank of a distinct genus. The flowers have a very shallow receptacle. In *L. anguinea* GRIFF., the calyx is gamosepalous, five toothed; the petals are markedly imbricate, with the vexillary internal. There are five stamens, alternipetalous, of which the three anterior alone have fertile introrse anthers. The two posterior are short tongues, which may even be absent. Between these two, in the middle line against the placental edge of the ovary, is a large projecting gland. The stipitate ovary is somewhat excentrically inserted; it contains two descending ana-

tropous ovules, and ends in a bowed subulate style. The fruit is short, flattened, and indehiscent. *Lasiobema* consists of cirrhose climbing shrubs, with a compressed undulate stem, entire and two-lobed leaves, and numerous small flowers, in ramified racemes. Only one species is known (ROXB., *Pl. Coromandel.*, t. 285). By the above features *Lasiobema* affords a transition between *Bauhinia* proper and the genera *Sindora* and *Detarium* of the series *Copaifereæ*.

- <sup>3</sup>
- |                              |   |                         |
|------------------------------|---|-------------------------|
| <i>Bauhinia</i><br>Sect. 11. | } | 1. <i>Pauletia</i> .    |
|                              |   | 2. <i>Perlebia</i> .    |
|                              |   | 3. <i>Adenolobus</i> .  |
|                              |   | 4. <i>Schnella</i> .    |
|                              |   | 5. <i>Pileostigma</i> . |
|                              |   | 6. <i>Lysiphyllum</i> . |
|                              |   | 7. <i>Amaria</i> .      |
|                              |   | 8. <i>Casparia</i> .    |
|                              |   | 9. <i>Loxocalyx</i> .   |
|                              |   | 10. <i>Phanera</i> .    |
|                              |   | 11. <i>Lasiobema</i> .  |

<sup>4</sup> DC., *Prodr.*, ii, 512.—GRISEB., *Fl. Brit. W. Ind.*, 213.—HARV. & SOND., *Fl. Cap.*, ii, 275, 596.—BOLLE, in *Pet. Moss. Bot.*, i, 22.—WALP., *Rep.*, i, 847; ii, 904; v, 572; *Ann.*, i, 258; ii, 448; iv, 602.—OLIV., *loc. cit.*

<sup>5</sup> See SCHLEID., *Grundz.*, ed. 3, ii, 167, fig.

two-lobed, more rarely bifoliolate with the petiole prolonged into a point between the two symmetrical leaflets; the lateral stipules vary in form, and are often small and caducous. The flowers are racemes, simple and axillary or terminal, or ramified and terminal.

*Griffonia*<sup>1</sup> comes very near *Bauhinia*, from which it is distinguished by its subcampanulate imbricated calyx, inserted on top of the tubular receptacle. The five petals are nearly equal, and are also imbricate. The ten stamens, inserted in the throat of the receptacle, are free and fertile, with versatile introrse two-celled anthers. The gynæceum, too, is inserted on the edge of the receptacular tube on the side opposite to the vexillary petal. The ovary, borne on a long foot, contains an indefinite number of ovules, whose placenta is on the side next the receptacular cavity; it is surmounted by a short style, tapering at the apex. The fruit is a stipitate obliquely oblong turgid bivalve few-seeded pod. *Griffonia* consists of two or three species of climbing shrubs from the west of tropical Africa,<sup>2</sup> with alternate simple coriaceous leaves, and flowers in simple or compound racemes, terminal, axillary, or more or less supra-axillary.

*Cercis Siliquastrum.*



FIG. 87.  
Inflorescence.

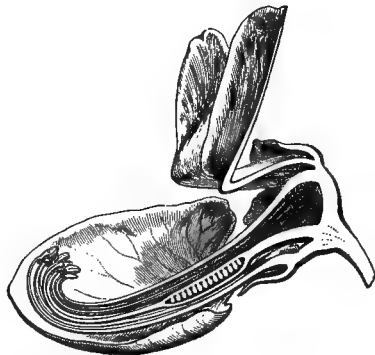


FIG. 88.  
Longitudinal section of flower ( $\frac{3}{1}$ ).

The flowers of the Judas Tree (*Cercis*,<sup>3</sup> Fr., *Gaïnier*; figs. 87–91)

151.—LINDL., *Introd. to Bot.*, 78, fig. 35.—A. RICH., *Elém.*, ed. 9, i. 85.—DUCH., *Elém.*, 166, fig. 77.—NETTO (L.), in *Ann. Sc. Nat.*, sér. 4, xx. 177; in *Compt. Rend. Acad. Sc.*, 14 Mai, 1866.

<sup>1</sup> H. BN., in *Adansonia*, vi. 188, t. 2 (nec B. H.).—*Bandeiræa* WELW., ex B. H., *Gen.*, 577, 1003, n. 335.—OLIV., *Fl. Trop. Afr.*, ii. 284.

<sup>2</sup> H. BN., *loc. cit.*, 229.—BENTH., in *Trans. Linn. Soc.*, xxv. 30, t. 40. Despite the date printed on these *Transactions* the paper was published considerably before BENTHAM & HOOKER'S *Genera*, in which the generic name *Bandeiræa* figures for the first time. Hence the priority belongs altogether to the name *Griffonia*.

<sup>3</sup> *Cercis* L., *Gen.* n. 510.—J., *Gen.*, 351.—

are fairly like those of *Bauhinia*, with an obliquely turbinate receptacle, lined by a glandular disk thickened at the rim. The calyx is gamosepalous, bladder-shaped, and swollen anteriorly. It is divided only at the top into five obtuse teeth, which are imbricated in the very young bud. The corolla consists of five petals, in form resembling those of a papilionaceous corolla, but so arranged in bud that the posterior and smallest petal is inside the two lateral petals, which are themselves overlapped by the outer pair. Each consists of an elongated claw, and a limb which is subauriculate at the base. The stamens are free, in two whorls. Each consists of a declinate perigynous filament, and an introrse two-celled anther of longitudinal dehiscence. The gynæceum, inserted near the bottom of the receptacle,<sup>1</sup> though curving towards its anterior wall in the expanded flower, consists of a shortly stipitate ovary, containing anatropous ovules<sup>2</sup> arranged in two rows down its posterior wall, and a terminal bowed style, whose stigmatiferous apex looks backwards. The pod is narrow elongated and stipitate, edged by a narrow rib down the placentary angle; it dehisces at first down the dorsal angle, and later (not constantly) down the ventral. The shortly funiculate seeds contain within their coats a coloured embryo, surrounded by thick subcorneous albumen.<sup>3</sup> This genus consists of unarmed trees or shrubs from Europe, temperate Asia, and North America. Three or four species are known.<sup>4</sup> The

*Cercis Siliquastrum.*



FIG. 89.  
Fruit.



FIG. 90.  
Seed ( $\frac{2}{3}$ ).

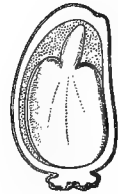


FIG. 91.  
Longitudinal section of seed.

GÆRTN., *Fruct.*, ii. 303, t. 144.—LAMK., *Dict.*, ii. 585; *Suppl.*, ii. 694; *Ill.*, t. 328.—DC., *Prodr.*, ii. 518.—SPACH, *Suit. à Buffon*, i. 124.—ENDL., *Gen.*, n. 6750.—B. H., *Gen.*, 576, n. 334.—*Siliquastrum* GESN.—T., *Instit.*, 646, t. 414.—ADANS., *Fam. des Pl.*, ii. 317.

<sup>1</sup> In *C. canadensis* there is a far larger proportion of the receptacular sac between the foot of the gynæceum and the vexillary petal than on the other side of it; and, as in *Bauhinia* and *Griffonia*, it is on the side of the ovary directed towards this larger depression that

the ovules are inserted. (See *Adansonia*, ix 223.)

<sup>2</sup> They have two coats, and the micropyle is upwards and outwards.

<sup>3</sup> The chalazal projection seen in figs. 90, 91, is the result of an inconstant hypertrophy of the external integument.

<sup>4</sup> DUHAM., *Arbr.*, t. 1.—SIBTH., *Fl. Græc.*, t. 367.—HOOK., in *Bot. Mag.*, t. 1198.—V. HOUTTE, *Fl. des Serres*, viii. t. 849.—A. GRAY, *Unit. States Expl. Exped.*, *Bot.* ii. t. 3.—WALP., *Rep.*, i. 808.

leaves are alternate, simple, entire or two-lobed, with membranous or scaly caducous lateral stipules. The flowers form short, simple or compound racemes (fig. 87), inserted on the branches, or on rugose prominences from the boughs and trunk.<sup>1</sup>

## VI. CASSIA SERIES.

*Cassia*<sup>2</sup> (Fr., *Casse*; figs. 92–105) has irregular hermaphrodite flowers. The receptacle is slightly convex or flat on top, or even

*Cassia floribunda.*



FIG. 92.  
Habit ( $\frac{1}{3}$ ).

slightly concave. The calyx consists of five sepals, nearly always unequal and quincuncially imbricated in the bud. As the flower is resupinate, one is anterior; this is sepal 1, which is the smallest of all, as may be seen in any of these species of *Cassia* which are commonly cultivated in our flower gardens, especially *C. floribunda*<sup>3</sup>

<sup>1</sup> These prominences correspond to old leaf axils. These, as in numerous generations of inflorescences, follow each other every year; and their axes, which remain very short, are gradually confounded into a more or less prominent mass. Thus we have to do with successive series of inflorescences occupying the same seat.

<sup>2</sup> *Cassia*, T., *Inst.*, 619, t. 392.—L., *Gen.*, n. 514.—ADANS., *Fam. des Pl.*, ii. 317.—J., *Gen.*, 348.—GÆRTN., *Fruct.*, ii. 313, t. 146, 147.—LAMK., *Dict.*, i. 641; Suppl., ii. 124;

*Ill.*, t. 332.—DC., *Prodr.*, ii. 489.—COLLAD., *Monogr. des Casses*, Montpell., 1816, icon.—SPACH, *Suit. à Buffon*, i. 113.—VOGEL, *Syn. Gen. Cassiæ*, in *Linnaea*, xi. 651.—ENDL., *Gen.*, n. 6781.—B. H., *Gen.*, 571, 1003, n. 326 (incl.: *Herpetica* RUMPH., *Bactrylobium* W., *Cathartocarpus* PERS., *Chamaecrista* E. MEY. (nec DC.), *Grimaldia* SCHE., *Psilorhegma* VOG., *Macleaya* MONTEIROUZ., *Senna* T.).

<sup>3</sup> CAV., ex COLLAD., *op. cit.*, 88.—DC., *Prodr.*, u. 22.—*C. corymbosa* OET., *Dec.* 124.

(figs. 92–95). It is completely outside the two lateral sepals (4 and 3), of which 4 is overlapped on both sides, while 3 overlaps 5 on the other; this last petal is posterior, like 2, which overlaps on both sides. Sepal 2 is a little larger than 1, while 4 and 5 are much the thinnest and largest of all.<sup>1</sup> The corolla consists of five alternating petals, which may be of nearly equal sizes or else

*Cassia floribunda.*

FIG. 93.  
Flower ( $\frac{3}{4}$ ).

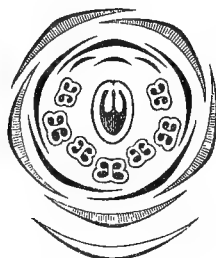


FIG. 94.  
Diagram.



FIG. 95.  
Longitudinal section of fruit.

unequal: the posterior, termed the vexillary petal, is quite internal in the bud, usually most dissimilar to the rest: while the enveloping lateral petals are symmetrical to one another; they are overlapped by the anterior pair, of which again one overlaps the other along the anterior edge (fig. 94). The androceum consists of two quinary whorls of stamens, five superposed to the sepals, five to the petals. Of the former set the three superposed to the anterior sepals are fertile and usually the largest of all; of the latter the four anterior, though much smaller, are also fertile. The remaining three are represented by little membranous sterile scales. Of the seven fertile stamens each possesses a free hypogynous filament, which is longer and more curved as it is more anterior; and a basifixed tetragonal two-celled anther, at first divided into four locelli, and opening at the apex, which forms a beak of variable form, by two short clefts that unite on top, so as to mark out a little introrse triangular flap with its base downwards.<sup>2</sup> The ovary, supported on a foot of variable length

<sup>1</sup> On the floral symmetry of *Cassia*, see H. BN., in *Adansonia*, ix. 212.

<sup>2</sup> The pollen consists of elongated grains in three, or more rarely one or two furrows. H. MOHL (*Ann. Sc. Nat.*, sér. 2, iii. 342.) dis-

tinguishes these species of the genus *Cassia*, where the grains when moistened become spheres with three smooth bands (*C. Trinitalis*), and those where the bands are papillate (*C. biflora*, *laevigata*, *marijandica*.)

and curvature, is surmounted by a style which is tapering, or more rarely dilated and capitate, or ciliate at its stigmatiferous apex.<sup>1</sup> On the posterior wall of the ovary cell is a longitudinal placenta bearing on both of its vertical lips a row of anatropous ovules, indefinite in number, with their micropyles looking outwards from the hilum.<sup>2</sup> The pod of *Cassia* is very variable in form, thickness, and consistency; it is dehiscent or indehiscent, with the pericarp more or less prominent or hypertrophied between the indefinite seeds, to form as many chambers, in each of which is a transverse or oblique funicled seed, with coats of variable thickness, lined by thick fleshy or horny

*Cassia (Senna) obovata.*

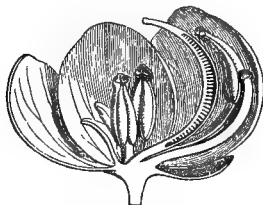


FIG. 96.

Longitudinal section of flower ( $\frac{3}{8}$ ).

albumen enclosing an embryo. This has a straight radicle and parallel, flat or undulate cotyledons. The species that must be retained in this genus<sup>3</sup> are at least two hundred in number. They may present great differences in flower<sup>4</sup> and fruit from those described above, and it is on these differences that a certain number of sections have been founded, which are considered as distinct genera by more than one author.

Thus the *Sennas*<sup>5</sup> (Fr., *Sénés*; figs. 96–102) possess seven fertile stamens, of which the anterior are most developed, with the fruits bivalve or often incompletely dehiscent, and containing vertically or horizontally flattened seeds. This section has been subdivided into *Chamæsenna*,<sup>6</sup> in whose bivalve, often much flattened pod the seeds are also compressed parallel with the valves; *Chamæfistula*,<sup>7</sup> whose pod opens incompletely, and contains horizontally flattened seeds;

<sup>1</sup> In *C. floribunda* the summit of the style is a long narrow hollow cone opening by a little terminal pore.

<sup>2</sup> They have two coats.

<sup>3</sup> H. B. K., *Nov. Gen. et Spec.*, vi. 337.—BENTH., *Fl. Austral.*, ii. 280.—HARV. & SONDR., *Fl. Cap.*, ii. 271.—WALP., *Rep.*, i. 812; ii. 904; v. 559; *Ann.*, i. 257; ii. 443; iv. 595.

<sup>4</sup> We have been able to follow the development of the flower, and the symmetry of its parts in *C. floribunda*, and have found that the flower has two planes of symmetry, intersecting at an angle of 36°. The one belongs only to the calyx, passing between sepals 1 and 3, and bisecting 2. The other is antero-posterior, dividing the corolla, androecium, and gynæceum into two symmetrical halves.

<sup>5</sup> *Senna* GERTN., *Frucl.*, ii. 312, t. 146.—ROXB., *Fl. Ind.*, ii. 339.—BATKA, in *Bot. Zeit.* (1854), 12; *Mon. der Cassien Gruppe Senna*, Prague (1866).—BENTH., *Gen.*, 572, 2. To this BENTHAM adds the section *Herpetica* (DC., *Prodr.*, ii. 492).

<sup>6</sup> DC., *loc. cit.*, 493, sect. v.—JACQ., *Icon.*, t. 74, 460; *Hort. Schænbr.*, t. 203, 270.—K., *Mimos.*, t. 41–43.—COLLAD., *op. cit.*, t. 3, 7, 11.—BISCH., in *Bot. Zeit.* (1850), t. 10.—*Bot. Mag.*, t. 810, 1829, 2638.—*Bot. Reg.*, t. 109, 1310.

<sup>7</sup> DC., *loc. cit.*, 490, sect. ii.—JACQ., *Icon.*, t. 70–73.—K., *Mimos.*, t. 38–40.—COLLAD., *op. cit.*, t. 5, 6, 8, 10, 12, 13.—SWEET., *Fl. Austral.*, t. 32.—*Bot. Mag.*, t. 633.—*Bot. Reg.*, t. 83, 856.



and *Prososperma*,<sup>1</sup> whose narrow cylindrical pod contains elongated compressed seeds.

*Cassia (Senna) obovata.*



FIG. 97.  
Habit ( $\frac{1}{3}$ ).

The fruits of *Cathartocarpus*<sup>2</sup> (Purging Cassia, or Pudding-pipe Tree, figs. 103–105), on the contrary, are nearly or quite cylindrical, with very thick woody indehiscent walls, and a cavity separated by tough transverse false dissepiments into low chambers, each enclosing a seed which is flattened from above downwards, and more or less coin-shaped or nummuliform. Here the stamens are all fertile, but the three anterior have better developed anthers and much more elongated filaments.<sup>3</sup>

In the section *Absus*,<sup>4</sup> all the ten stamens are fertile, and nearly

<sup>1</sup> VOG., *loc. cit.*,—JACQ., *Icon.*, iii. t. 459.

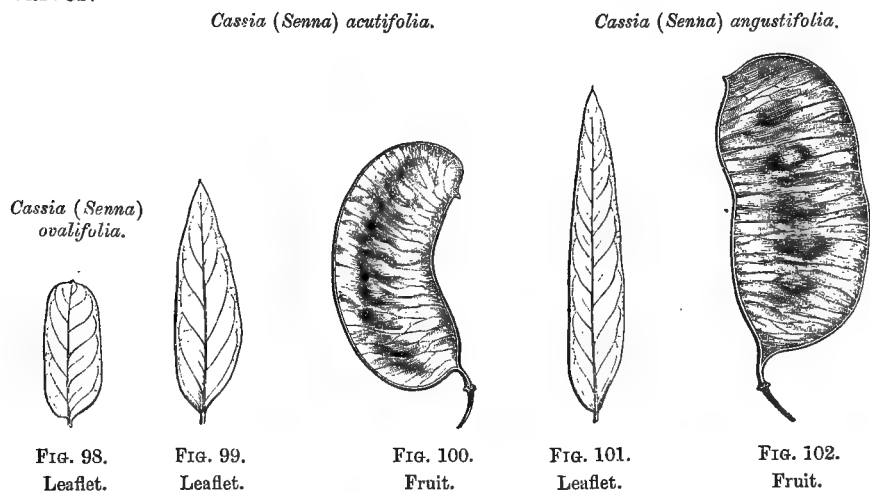
<sup>2</sup> PERS., *Syn.*, i. 459.—*Bactyrilobium* W., *Enum. Hort. Berol.*, 439.—*Fistula* DC., *loc. cit.*, 489, sect. i.—GÆRTN., *Fruct.*, ii. 313, t. 147.—WIGHT, *Illustr.*, t. 83, *Icon.*, t. 252, 269.—COLLAD., *op. cit.*, t. 1.—HANBURY, in *Trans. Linn. Soc.*, xxiv. t. 26.

<sup>3</sup> The anterior filaments are dilated about half way up, into a sort of globular appendage.

*C. Brewsteri* F. MUELL., *javanica* L., *Spec.*, 542 (part.)—DC., *Prodr.*, n. 7.—*C. nodosa* ROXB.—*C. Bacillus* GÆRTN., *Fruct.*, ii. 313.—WIGHT, *Icon.*, t. 410, *Arereh* DEL. (A. RICH., *Fl. Abyss. Tent.*, t. 47), etc.

<sup>4</sup> VOG., *loc. cit.*—JACQ., *Eclog.*, i. t. 53.—*Baseophyllum* DC., *op. cit.*, 500, sect. vi.—COLLAD., *op. cit.*, 115, t. 14.

equal, with short filaments bearing anthers that dehisce by two short clefts near the apex. The pod is flattened and bivalve; and the seeds, which are often oblique, are compressed parallel with the valves.



In *Psilorhagma*<sup>1</sup> the ten stamens are also fertile, and like those of *Absus*, and the pod is compressed and bivalve; but the seeds are transverse.

*Chamæcrista*<sup>2</sup> has nearly the flowers of *Psilorhagma*; but the sepals taper at the apex instead of being obtuse, and the flowers are axillary or lateral, solitary or few together. The compressed pod usually tapers towards either end, and dehisces in two valves.

Thus constituted, the genus *Cassia* comprises, it is said, upwards of four hundred species; but this number should, as we have seen, be reduced to less than half. They are shrubs, or more rarely trees or herbs, natives of all warm countries, especially tropical America. Their alternate leaves are paripinnate, or else have no blade, while the petiole expands into a phyllode. The stipules are very variable in

<sup>1</sup> VOG., *loc. cit.*—B. H., *Gen.*, 573, 3.—*Macleaya* MONTEOUZ., *Fl. Ins. Art.*, in *Mém. Ac. Lyon*, x, 199. All the species of this section are Asiatic or Australian (REICHB., *Icon. Exot.*, t. 206;—COLL., *Hort. Ripul.*, t. 10, 11;—GAUDICH., in *Freyein. Voy. Bot.*, t. 111;—*Bot. Mag.*, t. 2676;—*Bot. Reg.*, t. 1322), except *C. Apocouita* AUBL. (*Guian.*, 379, t. 146;—*C. Acuminata* W.;—*C. nitida* RICH.;—*C. ramiflora* VOG.), which is a native of tropical America.

<sup>2</sup> DC., *op. cit.*, 500, sect. viii.—E. MEY., *Comm. Pl. Afric. Austr.*, 158.—JACQ., *Hort. Schænbr.*, t. 480.—K., *Mimos.*, t. 36, 37.—COLLAD., *op. cit.*, t. 9, 16–20.—*Grimaldia* SCHRANCK, in *Münch. Denks.* (1808), 103 (part.).—In this section the sepals are almost constantly acute or acuminate—a character of but little importance, but convenient for systematic purposes, as it is very rare in the other sections, whose sepals are generally rounded at the apex.

size and form, and the petioles often bear cupuliform or peltate glands. The flowers are sometimes solitary, or few together, axillary, sometimes in axillary or terminal simple racemes. More rarely

*Cassia* (*Cathartocarpus*) *Fistula* (*Purging Cassia*).

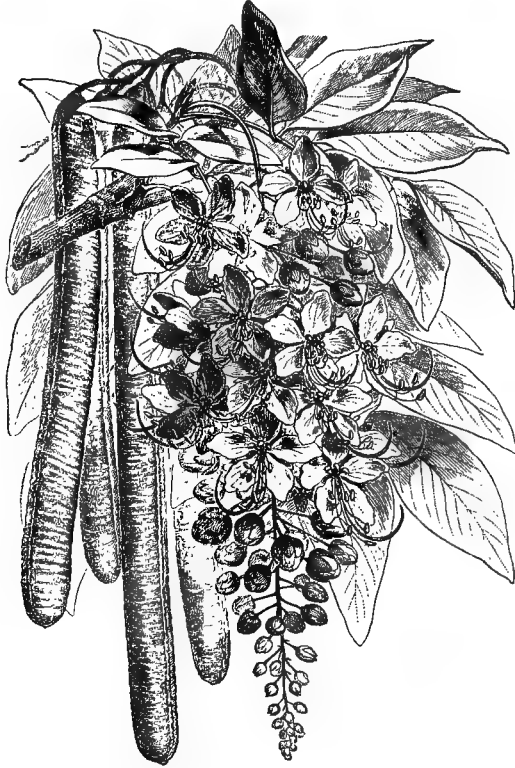


FIG. 103.

Habit ( $\frac{1}{4}$ ).

the leaves to which the racemes are axillary, are ill-developed or replaced by bracts towards the ends of the branches, the whole inflorescence becoming a terminal ramified raceme. Each flower is axillary to a bract, and is often accompanied by two lateral bractlets.

*Petalostyles labicheoides*,<sup>1</sup> an Australian shrub, has alternate imparipinnate leaves,<sup>2</sup> and solitary axillary pedunculate flowers, altogether like those of *Cassia*, with five sepals and five petals, both imbricated; and an androceum, whose three outer stamens are fertile, while the

<sup>1</sup> R. BR., in *Append. Sturt Exped.*, 17.—BENTH., *Fl. Austral.*, ii. 292.—B. H., *Gen.*, 573, n. 327.—WALP., *Ann.*, ii. 442.

<sup>2</sup> The leaflets are also alternate.

posterior pair have sterile acuminate anthers. But the pluriovulate ovary is surmounted by a petaloid style, which is dilated above it into a sort of irregular sac or hood,<sup>1</sup> whose median lobe, longer than

*Cassia* (*Cathartocarpus*) *Fistula*.



FIG. 104.  
Fruit ( $\frac{1}{6}$ ).



FIG. 105.  
Longitudinal section of fruit.

the lateral ones, ends in a little stigmatic surface. The flattened oblong-linear bivalve pod contains numerous seeds, whose long funicles are dilated into arils, and which are filled by horny albumen, surrounding an embryo with a straight radicle and flattened cotyledons.

<sup>1</sup> Like the hood formed by the posterior sepal in the Aconites. At first the ovary of *Petalostyles* is surmounted by a slender capitate style, whose apex then gradually bends down towards the placenta, while its two edges increase in breadth all the way up, the membranous

gutter now formed by the style having its concavity towards the centre of the flower, so that later on the back of the hood is anterior. As *Petalostyles* differs in no other respect from *Cassia*, it might, perhaps, be not amiss to make it a mere section of the genus.

The flowers of *Labichea*<sup>1</sup> (figs. 106, 107) also come very near those of *Cassia*, and may be pentamerous or tetramerous. The calyx and corolla are imbricated in the bud, and the posterior petal, internal in the bud, differs from the rest in size and colour. The number of stamens is reduced to two, placed close against the posterior sepal; each consists of a short free filament and an elongated basifixed two-celled anther, dehiscing by apical pores.<sup>2</sup> The gynæceum is formed of an ovary containing two or three descending ovules, and surmounted

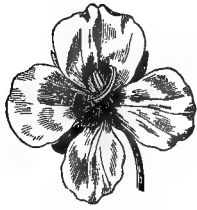
*Labichea cassioides.*

FIG. 106.  
Flower.



FIG. 107.  
Longitudinal section of flower.

by a style with a tapering stigmatiferous apex. The fruit is elongated, flattened, and bivalve, containing one or two seeds, whose funicle is dilated around the hilum, and whose embryo is surrounded by hard albumen. *Labichea* consists of unarmed shrubs or undershrubs, with imparipinnate or subdigitate leaves, which may even only possess one leaflet. The flowers form short racemes in the axils of the leaves; each flower is axillary to a caducous bract, and is accompanied by two sterile bractlets. The five known species are Australian.<sup>3</sup>

Very near to the flower of *Cassia* is that of *Dicorynia*,<sup>4</sup> with its five thick much-imbricated sepals, and only three (superior) petals. The androceum consists of only two stamens, nearly hypogynous, whose thick, elongated, unequally bowed, warty or rugose, extrorse two-celled anthers dehiscence by two short subapical clefts, and are supported by thick filaments, one of them being much the longer. The

<sup>1</sup> GAUDICH., in *Freyzin. Voy. Bot.*, 485, t. 112.—DC., *Prodr.*, ii. 507.—ENDL., *Gen.*, n. 6782.—B. H., *Gen.*, 573, n. 328.

<sup>2</sup> These stamens, though seemingly superposed to the two posterior sepals, are always unequal, and appear as if of different ages; the anther of one of them is acuter and narrower, and oftentimes contains no pollen.

<sup>3</sup> BENTH., *Enum. Pl. Hügel.*, 41; *Fl. Austral.*, ii. 292.—PAXT., *Mag. Bot.*, x. 149, icon.—LINDL. & PAXT., *Fl. Gard.*, t. 52.—MEISSN., in *Bot. Zeit.* (1855), 12.—WALP., *Rep.*, i. 841; v. 561; *Ann.*, ii. 442; iv. 600.

<sup>4</sup> BENTH., in *Hook. Journ.*, ii. 82.—ENDL., *Gen.*, n. 6772<sup>1</sup>.—B. H., *Gen.*, 571, n. 324.

pauciovulate ovary tapers into a style which is undilated at its stigmatiferous apex. The dorsal rib of the flattened obliquely oval coriaceous one- or two-seeded pod is edged by a narrow wing. The seeds are organized as in *Cassia*. Three or four species of *Dicorynia* have been described, handsome trees from North Brazil and Guiana,<sup>1</sup> whose alternate imparipinnate leaves have few coriaceous leaflets, and whose flowers are grouped into immense terminal compound ramified racemes.

*Martia*<sup>2</sup> (figs. 108-110) has flowers closely resembling those of the preceding genera, the receptacle and insertion being as in *Cassia*. The

*Martia excelsa.*



FIG. 108.  
Flower.

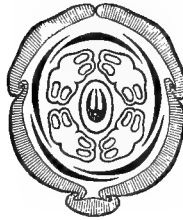


FIG. 109.  
Diagram.

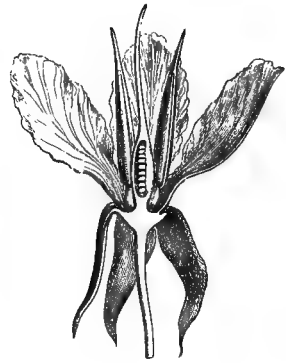


FIG. 110.  
Longitudinal section of flower.

calyx consists of five free sepals, all of nearly the same breadth,<sup>3</sup> and pretty thick, except towards the edges; these are slightly imbricated, and sometimes even valvate towards the base. The free petals are very decidedly imbricated, and are nearly equal in size, except the posterior one, which is internal in the bud, and a little broader than the rest. The androceum consists of four stamens, two posterior and two lateral,<sup>4</sup> each composed of a distinctly hypogynous filament, short stumpy and subpyramidal, and an elongated sub-basifixed introrse anther, two-celled, though below divided into four locelli, and dehiscing by two short pore-like clefts near its acuminate apex.

WALP., *Rep.*, v. 562. There are probably only two species.

<sup>2</sup> BENTH., in *Hook. Journ.*, ii. 146 (nec LEANDR., nec SPRENG., nec ZUCC.)—ENDL., *Gen.*, n. 6812<sup>2</sup>.—B. H., *Gen.*, 571, n. 323.—*Martiusa* BENTH., *loc. cit.*, 84.

<sup>3</sup> The anterior sepal is, however, a little narrower than the rest (fig. 109).

<sup>4</sup> The outer stamen may be sometimes developed; it is generally wanting in *M. excelsa* from Guiana.

The sessile or subsessile ovary ends in a subulate style, undilated at its stigmatiferous apex, and contains one or more descending anatropous ovules attached by funicles, and with their micropyles upwards and outwards. The fruit is a flattened oblong or oval thin coriaceous indehiscent pod, whose sutures are indicated by two prominent ribs, with their concavities facing, and their convexities produced into a continuous wing forming an uninterrupted frame all round the pericarp. Inside are one or more flattened reniform seeds, whose fleshy embryo has a short straight radicle, and is surrounded by a thin layer of albumen. Of the two known species of the genus one is from Brazil, the other from Guiana;<sup>1</sup> both are unarmed trees, whose imparipinnate leaves have very caducous stipules. The flowers are collected in numbers at the ends of the branches in large branching compound racemes; each flower is axillary to a very caducous elongated bract.

The flower of *Storckiella*,<sup>2</sup> though usually tetramerous, or more rarely di- or tri-merous, comes very near *Martia*; but its calyx and corolla, imbricated in the bud, are inserted on the rim of a cup-shaped receptacle, in the bottom of which is inserted the gynæceum. The stamens are usually ten in number<sup>3</sup> in the first known species, *S. vitiensis* SEEM. In a second species from New Caledonia, *S. Pancheri*,<sup>4</sup> there are usually only four alternipetalous stamens, as in *Martia*; it has accordingly been placed in a distinct section, under the name of *Doga*. In both species the stamens consist of a free filament and an introrse two-celled anther, each cell of which opens by a short cleft in the upper part of the longitudinal groove on its face. The shortly stipulate ovary contains an indefinite number of anatropous ovules, whose micropyles look upwards and outwards. It is surmounted by a style with an obtuse stigmatiferous apex. The fruit is an elongated compressed coriaceous valved pod, expanded along its placentary edge into a wing. It contains a variable number of seeds, with pretty long funicles, containing within the seed-coats, a greenish embryo surrounded by fleshy albumen. The genus *Storckiella* consists of Oceanian trees, whose

<sup>1</sup> WALP., *Rep.*, i. 841.—FIELD. & GARDN., *Sert. Plant.*, t. 11.

<sup>2</sup> SEEM., in *Bonplandia*, ix. 255; A. 363, t. 6; *Fl. Vitiens.*, 68, t. 13.—B. H., *Gen.*, 571, 1003, n. 325.—H. BN., in *Adansonia*, ix. 204.

<sup>3</sup> There are sometimes eleven, twelve, or even more.

<sup>4</sup> H. BN., *loc. cit.*—*Cassia Pancheri* VIELL. (ex B. H., *loc. cit.*).—*Doga macrogemma* PANCH., herb.

alternate imparipinnate leaves have coriaceous leaflets and little caducous stipules.<sup>1</sup> The flowers form compound ramified racemes at the ends of the branches; the accompanying bracts and articulated bractlets fall off early.

The flower of *Baudouinia*<sup>2</sup> has ten stamens<sup>3</sup> just as in *Storckiella vitiensis*; but they are hypogynous as in *Martia*, and somewhat unequal in length.<sup>4</sup> The gynæceum is shortly stipitate like that of *Storckiella*, and its ovary contains three or four descending ovules separated by oblique false dissepiments, and the fleshy stipitate fruit is divided into as many one-seeded chambers. The two known species, natives of the islands to the east of South Africa, have not altogether the general habit and foliage of *Leguminosæ*. They are small trees possessing shortly-petiolate simple entire leaves, and with two little lateral caducous stipules. The flowers are axillary, in few-flowered false racemes.

*Duparquetia*,<sup>5</sup> though with a convex receptacle and hypogynous perianth, comes equally near *Cassia* and *Storckiella*. But its corolla presents an anomaly which is rare in *Casalpinieæ*; its præfloration is vexillary. The five petals are very unequal and dissimilar;<sup>6</sup> around these are four sepals of which the two lateral, irregular and dissimilar,<sup>7</sup> are overlapped by the posterior, while this is again overlapped by the anterior which is largest of all. The androceum consists of a variable number of hypogynous triadelphous stamens; there are often four, two lateral isolated, and two posterior united into one bundle; or this bundle may consist of three stamens. All have flattened filaments, and introrse anthers dehiscing by two longitudinal clefts.<sup>8</sup> Each cleft corresponds to a deep groove, which appears to divide the cell completely into two locelli; and each cell ends above in a long point.<sup>9</sup> The superior shortly stipitate ovary contains two superposed

<sup>1</sup> The leaf-buds axillary to the leaves are often very big and globular.

<sup>2</sup> H. BN., in *Adansonia*, vi. 193, t. 5; viii. 301.—B. H., *Gen.*, 1003, n. 326 a.

<sup>3</sup> More rarely only eight or nine. Each has an obconical or obpyramidal filament, tapering slowly though considerably towards the base, with a basifixed introrse two-celled anther, tapering and penicillate at the apex, and dehiscing by two longitudinal clefts, which extend downwards by degrees.

<sup>4</sup> Becoming shorter as they are more posterior.

<sup>5</sup> H. BN., in *Adansonia*, vi. 189.—*Oligostemon* BENTH., *Gen.*, 570, 1002, n. 322; in *Trans. Linn. Soc.*, xxv. 305, t. 39 (post.).

<sup>6</sup> Especially the two anterior, which are very small, with glandular-ciliate edges. We formerly considered them staminodes.

<sup>7</sup> On the anterior edge is a sort of irregular wing or auricle. We formerly described them as external pieces of the corolla.

<sup>8</sup> These clefts only extend about half-way down the anther.

<sup>9</sup> For these reasons each cell may be taken for a distinct anther, as we formerly described it.



ovules whose micropyles look upwards and outwards; it is surmounted by a tapering style, obtuse at the stigmatiferous apex. On either side of the walls of the ovary is seen a pair of wings,<sup>1</sup> which become more marked in the fruit; this has not yet been studied at maturity. *D. orchidacea*,<sup>2</sup> the only known species, is a lofty tree from the west of tropical Africa. Its alternate imparipinnate leaves have two lateral stipules. The flowers, which in form and colour recall those of certain Orchids, are collected in terminal racemes.<sup>3</sup>

Next to this we shall place *Moldenhauera*,<sup>4</sup> referred by some to *Sclerolobieæ*, from which, however, it is distinguished chiefly by the convexity of its receptacle, and by the hypogynous insertion of the perianth and androceum resembling that of *Baudouinia*, *Martia*, and *Duparquetia*. The flowers are pentamerous or tetramerous (fig. 111), with valvate sepals, at first sticking together by their edges and then becoming quite free down to the receptacle, unguiculate petals whose limbs are fringed and lobed, auricled at the base, and much imbricated in the bud, and two whorls of four or five free stamens, superposed the one to the sepals, the other to the petals; the anterior stamen, corresponding with the back of the carpellary leaf, is enormously developed. Its filament is incurved and ends in a fertile or sterile anther with a thick connective often covered with hairs. The other seven or nine have short erect filaments, and flattened sub-basifixed anthers, which dehisce near the apex by a cleft prolonged downwards to an extent varying with the genus, but which may be very short, as in *Cassia*. The ovary is superior sessile and multiovulate, surmounted by a slender style, inflexed or involute in the bud, with a slightly dilated or capitate

*Moldenhauera emarginata.*

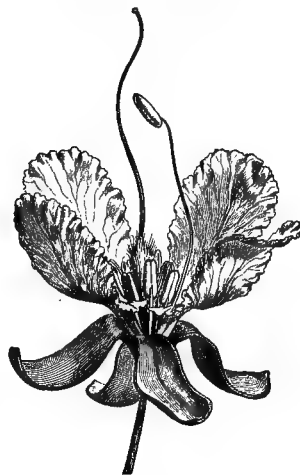


FIG. 111.  
Flower ( $\frac{1}{2}$ ).

<sup>1</sup> The placenta corresponds to the groove, separating the two posterior wings.

<sup>2</sup> H. BN., *loc. cit.*, t. iv. fig. 1-4.—*Oligostemon pictus* BENTH., *loc. cit.*—OLIV., *Fl. Trop. Afr.*, ii. 267.

<sup>3</sup> In the lower part of each pedicel is an arti-

culatum, below which it usually bears two caducous lateral bracts.

<sup>4</sup> SCHRAD., in *Götting. Anzeig.* (1821), 718, ex DC., *Prodr.*, ii. 488.—ENDL., *Gen.*, n. 6780.—B. H., *Gen.*, 569, n. 319.—*Dolichonema* NEES, in *Flora* (1821), 303.

stigmatiferous apex; the fruit is not well known.<sup>1</sup> This genus comprises two or three species<sup>2</sup> from tropical America, especially Brazil, unarmed trees whose pinnately compound or decomposed leaves have coriaceous leaflets and small caducous stipules. The flowers form branching and compound racemes or false corymbs.

*Apuleia*<sup>3</sup> has polygamous trimerous flowers. The receptacle forms a little obconical pocket whose edges bear three sepals of which the anterior overlaps the edges of the two others, and of these one overlaps the other posteriorly (fig. 112): the petals are also three in number, perigynous, alternating with the sepals, and slightly imbricated in the bud. The androceum consists of three (more rarely two) alternipetalous stamens, each of a free filament suddenly tapering towards its apex, by which it is inserted near the base of an erect introrse two-celled anther of longitudinal dehiscence. The central gynæceum consists of a shortly stipitate ovary containing a few descending ovules<sup>4</sup> and surmounted by a terminal style with a slightly dilated stigmatiferous head. The fruit is

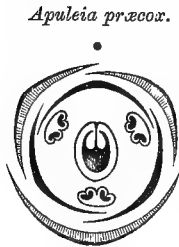


FIG. 112.  
Diagram.

a flattened oval or oblong, thin coriaceous indehiscent one- or two-seeded pod, whose dorsal edge is prolonged into a very narrow linear wing. The seed, attached by a pretty long funicle, contains a greenish embryo surrounded by a translucent albumen. *Apuleia* consists of two or three species of unarmed trees from tropical America.<sup>5</sup> Their flowers, often developed before the imparipinnate leaves, are collected into lateral false umbels on the sides of the branches or in the axils of the leaves.

*Distemonanthus*<sup>6</sup> is a tree from tropical Africa whose flowers come out before the alternate imparipinnate leaves, just as in *Apuleia præcox*, and possess an imbricated pentamerous calyx; but they have only the three posterior petals, the anterior being altogether absent

<sup>1</sup> "Legumen (si rite hic relatam) oblongum plano-compressum coriaceum, 2-valve. Semina transversa ovoidea" (B. H., *Gen.*, 570). This description of the pod and seeds is taken from Pl. 94 of the seventh volume of VELLOZO'S *Flora Fluminensis (Pterocarpus)*.

<sup>2</sup> POHL., *Pl. Bras. Icon.*, ii. 90, t. 160.—WALP., *Rep.*, v. 559.

<sup>3</sup> MART., *Herb. Fl. Bras.*, 123 (nec GÆRTN., nec LESS.).—ENDL., *Gen.*, n. 6759.—B. H.,

*Gen.*, 574, n. 330.—*Zenkeria* ARN., in *Mag. Zool. et Bot.*, ii. 548.

<sup>4</sup> Rarely more than two.

<sup>5</sup> VOG., in *Linnaea*, xi. 393 (*Leptolobium*).—WALP., *Rep.*, v. 571.

<sup>6</sup> BENTH., *Gen.*, 573, n. 329. The only known species is *D. Benthianus*, hitherto undescribed. [OLIV. (*Fl. Trop. Afr.*, ii. 252) describes a second species, *D. laxus* OLIV.]

(fig. 113). The androceum is in two whorls, both very imperfect, the posterior pieces being alone developed. Of the alternipetalous whorl there are only two stamens fertile, each consisting of a thick filament suddenly contracted at its apex almost as in *Apuleia*, and a sub-basifixed two-celled anther, divided below into four distinct locelli, tapering above where it opens by two very short introrse clefts. The gynæceum consists of a shortly stipitate ovary,<sup>1</sup> surmounted by a style with an oblique stigmatiferous surface at the end. The fruit is as yet unknown; the flowers form compound axillary cymes.



FIG. 113.  
Diagram.

*Dialium*<sup>2</sup> (figs. 114–119) must also be referred to *Cassieæ*, though its flower is yet more reduced than in *Distemonanthus* and *Apuleia*, as it may consist of only a calyx of five imbricated sepals, two lateral stamens<sup>3</sup> and a carpel. The receptacle is somewhat variable in form. In certain species it is regular or nearly so, forming a

*Dialium (Codarium) nitidum*.<sup>4</sup>

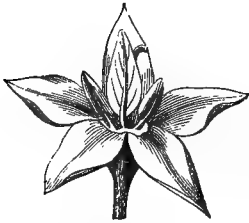


FIG. 114.  
Flower ( $\frac{5}{7}$ ).



FIG. 115.  
Diagram.



FIG. 117.  
Gynæceum  
opened.

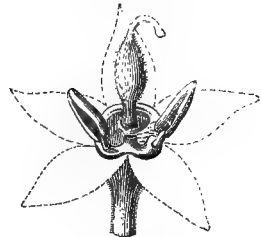


FIG. 116.  
Flower, anterior petal cut  
off through its base.

shallow cup, with the gynæceum almost in the centre. In others it becomes irregular; and the gynæceum is inserted excentrically on the side next the anterior sepal, while the receptacle forms a shallow

<sup>1</sup> The insertion of the ovary is slightly oblique and excentric. Its cicatrix is elliptical.

<sup>2</sup> L., *Mantiss.*, n. 1240.—AFZ., in *Schrad. n. Journ.*, ii. 238.—J., *Gen.*, 424.—LAMEK., *Dict.*, ii. 275; Suppl., ii. 467.—DC., *Prodr.*, ii. 520.—SPACH, *Suit. à Buffon*, i. 130.—ENDL., *Gen.*, n. 6805.—B. H., *Gen.*, 574, n. 331.—H. BN., in *Adansonia*, vi. 198.—*Codarium* SOLAND., ap.

VAHL, *Enum.*, i. 302; ii. 400.—AFZ., *loc. cit.* 233.—K., *Zwei Abhandl.*, 17, t. 2, fig. 6.—DC., *Prodr.*, ii. 520.—ENDL., *Gen.*, n. 6804.

<sup>3</sup> There are said to be sometimes three.

<sup>4</sup> Figs. 114, 116, and 117 are taken from Pl. 58 of *Flora Senegambicæ Tentamen*. The dotted lines in fig. 116 indicate the sepals.

pit on the opposite side. It is between this pit and the two posterior sepals that we find a little tongue-shaped petal in *Codarium*, which was formerly considered a distinct genus.<sup>1</sup> The gynæceum in this section is very excentric, shortly stipitate, and consists, as in *Dialium* generally, of an ovary surmounted by a subulate style, which is inflexed in the bud so that its scarcely dilated stigmatiferous apex is bent backwards and downwards towards the placenta. This bears two more or less oblique descending anatropous ovules with their micropyles superior and exterior. The fruit is a nearly globular berry, with a glabrous or velvety exocarp of variable thickness, and an endocarp forming a sort of pulp surrounding one or two seeds. Within the seed-coats is a copious horny albumen surrounding a green embryo with flattened cotyledons, which are more or less unsymmetrical at the base and sometimes a little folded, and a short obtuse swollen superior radicle.

*Dialium (Arouna) guianense.*

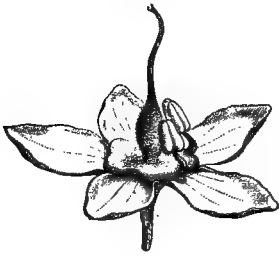


FIG. 118.  
Flower ( $\frac{2}{3}$ ).

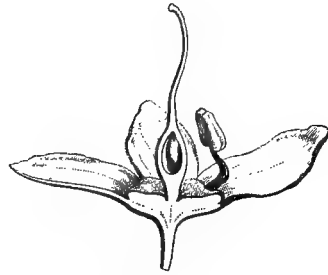


FIG. 119.  
Longitudinal section of flower.

*Arouna*<sup>2</sup> (figs. 118, 119) consists of American species of *Dialium* in which the floral receptacle is a little more flattened, and lined by a thicker, less concave disk.<sup>3</sup> There is no corolla, and the flowers are very small.

*Dialium*<sup>4</sup> consists of some seven or eight species of trees from the tropics in Africa,<sup>5</sup> Asia,<sup>6</sup> and America. Their unarmed branches bear alternate imparipinnate leaves with few leaflets. The stipules

<sup>1</sup> We are told that it may sometimes have two.

<sup>2</sup> AUBL., *Guian.*, i. 16, t. 5.—*Cleyeria* NECK., *Elem.*, n. 897.

<sup>3</sup> Which brings it, as we shall see, nearer to *Ceratonia*.

<sup>4</sup> *Dialium divaricatum* VAHL, *Enum.*, i. 303.—DC., *Prodr.*, n. 2.—*Arouna guianensis* AUBL., *loc. cit.*—*A. divaricata* W., *Spec.*, i. 49.

<sup>5</sup> GUILL. & PERR., *Fl. Seneg. Tent.*, i. 267.—HOOK., *Niger*, 329.—WEBB, in *Hook. Journ.*, ii. 347.—WALP., *Rep.*, i. 834; *Ann.*, ii. 449.—OLIV., *Fl. Trop. Afr.*, ii. 282.

<sup>6</sup> BURM., *Fl. Ind.*, 12.—SM., in *Rees Cyclop.*, v. and xi. n. 1.—BENN., *Pl. Jav. Rar.*, t. 30.—THW., *Enum. Pl. Zeyl.*, 97.

are ill-developed or absent. The flowers form large axillary or terminal branching compound racemes, and are accompanied by caducous bracts and bractlets.

The Carob,<sup>1</sup> St. John's Tree, or Locust Tree (Fr., *Caroubier*; figs. 120-122), has polygamo-dioecious flowers. In the hermaphrodite

*Ceratonia Siliqua* (Carob tree).



FIG. 120.  
Habit ( $\frac{1}{2}$ ).

the receptacle has a very peculiar form, like a large thick shallow porringer lined by a large fleshy quoit-shaped disk, filling the whole concavity of the receptacle.<sup>2</sup> On the rim of this are inserted five little thick sepals, at first imbricated in the bud, but early ceasing to overlap. The androceum is composed of five stamens superposed to the sepals, each consisting of a free subulate filament inserted under

<sup>1</sup> *Ceratonia* L., *Gen.*, n. 1167.—J., *Gen.*, 347.—LAMK., *Dict.*, i. 635; *Suppl.*, ii. 119; *Ill.*, t. 859.—GÆRTN., *Fruct.*, ii. t. 146.—DC., *Mém. Légum.*, ii. t. 23, fig. 114; *Prodr.*, ii. 486.—SPACH, *Suit. à Buffon*, i. 109.—ENDL., *Gen.*, n. 6809.—B. H., *Gen.*, 574, n. 332.—*Siliqua* T., *Instit.*, 578, t.

344.—*Ceratia* PLIN., ex ADANS., *Fam. des Pl.* ii. 319.

<sup>2</sup> We pointed out above that the disk of *Arouna* (figs. 118, 119) made it transitional between the other species of *Dialium* and *Ceratonia* (figs. 121, 122).

the edge of the disk (fig. 122), and a versatile introrse two-celled anther of longitudinal dehiscence.<sup>1</sup> The gynæceum, represented in the male flower by a little conical projection from the central depression of the disk, in the hermaphrodite and female flowers consists of a stipitate ovary, tapering into a style which dilates at the apex into a large stigmatiferous head notched on one side by the longitudinal groove traversing the whole length of the placentary edge of the gynæceum. The placenta, alternating with two sepals, bears an indefinite number of transverse or slightly descending

*Ceratonia Siliqua.*

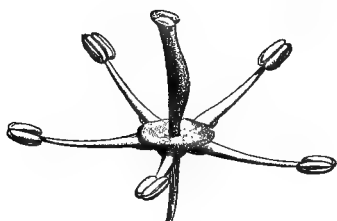


FIG. 121.  
Hermaphrodite flower ( $\frac{3}{4}$ ).

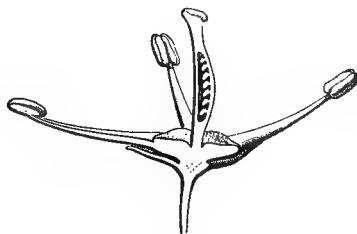


FIG. 122.  
Longitudinal section of hermaphrodite flower.

anatropous ovules, with their micropyles upwards and outwards.<sup>2</sup> The fruit is a sort of elongated pod, straight or bowed, compressed, with thickened sutures. The walls are drupaceous and indehiscent; the thin smooth epicarp covers a coriaceous mesocarp, more or less gorged with a sweet pulp; and the thin dry parchment-like endocarp projects to form oblique or transverse false dissepiments between the seeds. These are unequally obovate and compressed, attached by long funicles;<sup>3</sup> within the thick seed-coats is an abundant horny albumen, in the centre of which is a greenish embryo with flattened cotyledons and a straight exerted radicle.<sup>4</sup> *C. Siliqua*<sup>5</sup> is the only known species of the genus; it is a tree from the Mediterranean, whose persistent paripinnate leaves have few coriaceous leaflets and

<sup>1</sup> This anther, like that of the large anterior stamen of *Moldenhawera* (fig. 111), is in form exceptional among *Cassieæ*, but this character of itself can have no great value.

<sup>2</sup> They have two coats, and the rim of the exostome is slightly thickened, like the circumference of the hilum, which at a certain age forms a well-marked collar around the funicle.

<sup>3</sup> The funicle is dilated a little before joining the hilum.

<sup>4</sup> The cotyledons are more or less unsymmetrical and auriculate at the base. The radicle is often dilated towards the apex.

<sup>5</sup> L., *Spec.*, 1513.—DUHAM., *Arbr.*, ii. t. 70.—CAV., *Icon.*, t. 113.—BLACKW., *Herb.*, t. 209.—FASANO, in *Act. Neapol.* (1787), 248, t. 18, fig. 2.—NEES, *Plant. Off.*, iv. t. 19.—*Keronia* THEOPHR.—*Keraton* DIOSC.—*Siliqua* MATH.—*Ficus Ægyptia* THEOPH. (ex ADANS.).

ill-developed caducous stipules. The flowers form solitary or multiple short racemes on the wood of the old branches; they are accompanied by scaly caducous bracts and bractlets.

## VII. COPAIVA SERIES.

The Copaiva-trees<sup>1</sup> (Fr., *Copaiërs*; figs. 123-128), have regular

*Copaifera officinalis*.



FIG. 123.

Habit ( $\frac{1}{3}$ ).

hermaphrodite flowers. The little receptacle, convex or slightly

<sup>1</sup> *Copaifera* L., *Gen.*, n. 542.—J., *Gen.*, 365.—LAMK., *Dict.*, ii. 97; *Ill.*, t. 342.—DESF., in *Mém. Mus.*, vii. 375, t. 13, 14.—H. B. K., *Nov. Gen. et Spec.*, vi. 265, t. 659.—DC., *Prodr.*, ii. 508.—SPOCH, *Suit. à Buffon*, i. 116.—ENDL., *Gen.*, n. 6806.—H. BN., in *Adansonia*, vi. 202.—B. H., *Gen.*, 585, 1003, n. 362.—*Copaiba* MARCG., *Brasil.*, 130.—ADANS., *Fam. des Pl.*, ii. 341.—*Copiiba* PIS., *Brasil.*, 56 (incl. *Guibourtia* BENN., *Gorskia* BOLLE).

dilated at the apex,<sup>1</sup> bears a calycine perianth and an androceum below the unicarpellary gynæceum. The calyx consists of four sepals, two lateral, one anterior, and one posterior. This last is usually the broadest, really representing two calycine leaves, traces of which are sometimes to be found in its more or less deeply notched apex.<sup>2</sup> The præfloration is variably imbricate, the sepals overlapping

*Copaifera officinalis.*

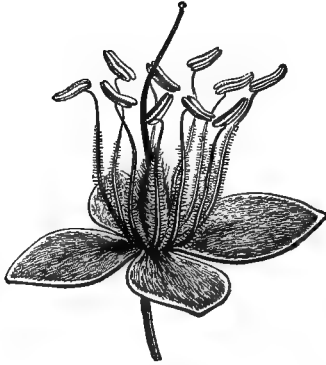


FIG. 124.  
Flower ( $\frac{2}{3}$ ).

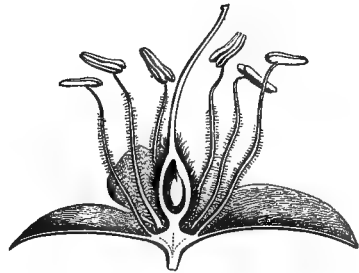


FIG. 125.  
Longitudinal section of flower.



FIG. 126.  
Fruit ( $\frac{3}{4}$ ).

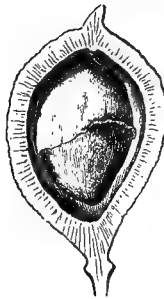


FIG. 127.  
Longitudinal section of fruit.

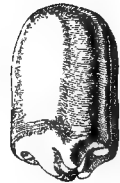


FIG. 128.  
Embryo ( $\frac{3}{4}$ ).

greatly when the edges thin off slowly, and scarcely imbricated when the edges are thick and only abruptly bevelled (fig. 124). The stamens are in two tetra- or pentamerous whorls; the longer are superposed to the sepals, and when there are five, it is through two being in front of the posterior sepal. The shorter ones alternate

<sup>1</sup> In *C. officinalis* we have been able to make out in the fresh flower that within the insertion of the perianth and androceum there is a very

short cupule of glandular tissue surrounding the foot of the gynæceum.

<sup>2</sup> Here and there we find a calyx with five leaves, or even, though very rarely, with only three.



with these; each consists of a free filament more or less inflexed at the bud, and an introrse<sup>1</sup> two-celled anther of longitudinal dehiscence. The free superior gynæceum is composed of a shortly stipitate one-celled ovary surmounted by a style which is at first reflexed,<sup>2</sup> and ends in a little stigmatiferous head. On the parietal placenta, which is posterior, are inserted two obliquely descending anatropous ovules, with the micropyles looking upwards and outwards.<sup>3</sup> The fruit is a shortly stipitate pod (fig. 126), with a pericarp of variable thickness, fleshy, but finally bivalve.<sup>4</sup> It contains a descending seed attached by a pretty long slender funicle. From the umbilicus and the adjacent part of the seed-coats grows a fleshy aril, forming a sort of hood (fig. 127) enveloping the seed more or less completely.<sup>5</sup> The exalbuminous embryo has very thick plano-convex cotyledons, whose auricled bases form a complete sheath around the superior radical.<sup>6</sup> This genus consists of unarmed trees, nearly all natives of tropical America,<sup>7</sup> only three species out of twelve being African. The alternate paripinnate leaves have one or more pairs of unsymmetrical leaflets,<sup>8</sup> and two caducous lateral stipules. The flowers form simple or ramified spikes, or racemes with very short pedicels, axillary to the leaves or terminating the young branches. Each flower is axillary to a scaly bract, usually caducous, but which may be persistent, and is then better developed.<sup>9</sup>

<sup>1</sup> The face of the anther often looks outwards in the bud owing to the inflexion of the filament, which is folded on itself near the apex. The anther is often versatile.

<sup>2</sup> Sometimes even revolute; in the very young bud its tip reaches to the back of the ovary.

<sup>3</sup> They have two coats. In several cultivated flowers of *C. officinalis* I have observed four ovules in two vertical rows.

<sup>4</sup> In several American species the lower part of the pod is flattened and indehiscent as in *Hardwickia*, the valves only separating near the apex. The fruit of most of the Copaivas is apiculate.

<sup>5</sup> This aril appears to be altogether absent in the African species, which have been made into the genus *Gorskia* (BOLLE, in *Pet. Mossamb. Bot.*, i. 15, fig. 3). In this group the leaves have two many-ribbed leaflets, and the fruit is thin and flattened. In *C. hymenæifolia* MORIC. (*Pl. Nouv. Amér.*, t. 1), the aril is obliquely turbinate under the seed. In *C. nitida* MART., and other Brazilian species, it forms a fleshy or submembranous sac, covering some two-thirds

of the seed, and is obliquely truncate. In one African species it covers the whole seed according to BENTHAM.

<sup>6</sup> In *C. Mopane* KIRK (ex BENTH., in *Trans. Linn. Soc.*, xxv. 317, t. 43 A), the cotyledons are well developed, and corrugated and filled with reservoirs of resinous juice. In this species the leaf consists of two leaflets.

<sup>7</sup> JACQ., *Amer.*, 133, t. 86.—H. B. K., *Nov. Gen. et Spec.*, vi. t. 659.—HAYNE, in *Linnaea*, i. 418; *Arzn.*, x. t. 12-23.—WALP., *Rep.*, i. 854. For the African species of *Copafjera* see OLIV., *Fl. Trop. Afr.*, ii. 313.

<sup>8</sup> There is one Brazilian species whose leaves possess numerous little leaflets, and resemble those of *Schotia*. In other species from the same country, with only two leaflets, the venation of these is pinnate, instead of being as in *Gorskia*.

<sup>9</sup> This is the case in *C. copallina* (*C. Guibourtiana* BENTH.—*Guibourtia copallina* BENN., in *Journ. Linn. Soc.*, i. 150), an African species, with bifoliate leaves, and rather large flowers whose persistent bractlets are one-quarter the length of the calyx.

*Detarium*<sup>1</sup> (figs. 129, 130) comes very near *Copaifera* in its flower : it has the same usually tetramerous perianth,<sup>2</sup> with scarcely imbricated sepals ;<sup>3</sup> ten hypogynous stamens,<sup>4</sup> of which the five larger are superposed to the sepals ; and the same central gynæceum with its sessile biovulate ovary,<sup>5</sup> surmounted by a style with a little stigmatiferous head, rolled in the bud towards the anterior side of the flower. But the fruit is a large sessile compressed orbicular drupe.

*Detarium senegalense.*

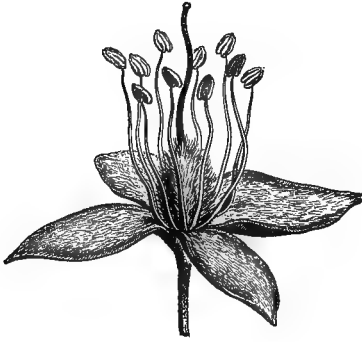


FIG. 129.  
Flower ( $\frac{1}{2}$ ).

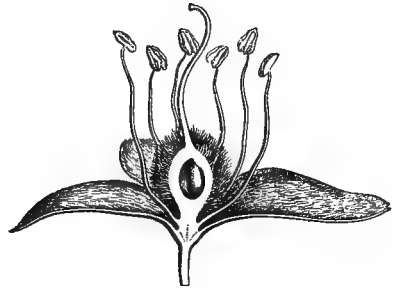


FIG. 130.  
Longitudinal section of flower.

Its one-seeded stone is rugose and bony, surrounded by sarcocarp whose flesh is traversed by a rich network of branching fibrovascular bundles. The two known species of this genus<sup>6</sup> are unarmed trees from the west of tropical Africa, with alternate paripinnate paucifoliolate leaves. The flowers form compound ramified racemes of spikes,<sup>7</sup> either axillary or lateral on the wood of last year's branches.

The flowers of *Hardwickia*<sup>8</sup> scarcely differ from those of certain species of *Copaifera*. The receptacle is the same ; the calyx consists of five sepals with thin edges imbricated in the bud. The stamens

<sup>1</sup> J., *Gen.*, 365.—DC., *Prodr.*, ii. 521.—SPACH, *Suit. à Buffon*, i. 131.—B. H., *Gen.*, 585, n. 361.—H. BN., in *Adansonia*, vi. 200.

<sup>2</sup> The two posterior sepals are usually united into a single piece, but may be occasionally found separate. Hence the flower is resupinate, as in *Copaifera*.

<sup>3</sup> Only the edge is bevelled, and this bevelled edge it is which alone overlaps or is overlapped in æstivation.

<sup>4</sup> The filaments are at first bent on themselves near the insertion of the anther.

<sup>5</sup> The ovules are descending, anatropous, with the micropyles superior and exterior. The exo-

stome is thickened so as to simulate a young caruncula at anthesis. The carpel is always superposed to the anterior sepal.

<sup>6</sup> GMEL., *Syst.*, iii. 700.—HOOK., *Niger*, 327.—GUILL. & PERR., *Fl. Seneg. Tent.*, i. 269, t. 59.—WALP., *Rep.*, i. 854.—OLIV., *Fl. Trop. Afr.*, ii. 312.

<sup>7</sup> The floral pedicel is either absent or very short, and articulated at the base ; axillary to a bract and accompanied by two lateral bractlets.

<sup>8</sup> ROXB., *Pl. Coromand.*, iii. 6, t. 209.—DC., *Prodr.*, ii. 487.—ENDL., *Gen.*, n. 6808.—B. H., *Gen.*, 586, n. 364.—H. BN., in *Adansonia*, vi. 203.

are ten in number, as in *Copaifera*; and all possess fertile two-celled anthers unless some of the posterior ones are reduced to their filaments. The gynæceum too resembles that of the *Copaivas*; the ovary contains two descending ovules, and the style ends in a point or a peltate stigmatiferous dilatation. The fruit is as yet unknown in the single African species possessing three pairs of leaflets referred to this genus, and in one of the two Asiatic species, which has usually several pairs of leaflets. But in the other Asiatic species, whose stigma is peltate and whose leaflets are reduced to a single pair, we observe a flattened pod, the lower part of which, flattened and elongated, resembles a phyllode, the upper part alone dehiscing to reveal a cavity containing a seed with fleshy embryo. *Hardwickia* consists of three species of unarmed trees from tropical Africa and Asia.<sup>1</sup> Their alternate paripinnate leaves possess from two to six leaflets apiece. The flowers form ramified racemes, and are accompanied by scaly bracts and lateral bractlets.

The flowers of *Prioria*<sup>2</sup> are very nearly those of *Hardwickia*. The floral receptacle, not very greatly developed,<sup>3</sup> bears on its edges a deeply five-lobed calyx, narrowly imbricated in the bud. Of the ten free stamens five are superposed to the sepals, and five alternate with them. The filaments are but slightly perigynous,<sup>4</sup> and the anthers are introrse two-celled, and of longitudinal dehiscence, with a thick apiculate connective. The gynæceum is inserted in the centre of the receptacle. Its shortly stipitate ovary contains one or two descending ovules like those of *Copaifera*. The style is short and subulate with an obtuse stigmatiferous tip.<sup>5</sup> The oblique orbicular-oval flattened woody pod contains one descending seed, whose exalbuminous embryo has thick fleshy coherent cotyledons, and a short thick radicle. *P. Copaifera* GRISEB., the only known species, is a large unarmed tree from Central America and the Antilles. It has alternate paripinnate leaves, with two or four leaflets and caducous scaly stipules. Its numerous small flowers are collected into ramified spikes, terminating the branches. Each flower, axillary to a little bract, is ac-

<sup>1</sup> ROXB., *Fl. Ind.*, ii. 425.—WIGHT & ARN., *Prodr.*, i. 284.—OLIV., *Fl. Trop. Afr.*, ii. 315.

<sup>2</sup> GRISEB., *Fl. Brit. W. Ind.*, 215.—BENTH., in *Trans. Linn. Soc.*, xxiii. 390, t. 40.—B. H., *Gen.*, 585, n. 363.

<sup>3</sup> It is, however, more concave than in the preceding genera, and is lined with glandular

tissue. Hence the perianth and androceum are truly perigynous.

<sup>4</sup> In the bud the filament is so inflexed that the anther is brought to the bottom of the receptacle, between the insertion of its filament and the short foot of the gynæceum.

<sup>5</sup> The style is reflexed in the bud; its apex touches the back of the ovary.

accompanied by two pretty large lateral bractlets, which are connate in form, a sort of two-lipped sac below the flower.

Most of the *Cynometras*,<sup>1</sup> too, are easy to define when we know *Copaifera*: they are Copaivas with five imbricate petals. However, all the species are not exactly alike. In some the floral receptacle is slightly concave, giving a perigynous insertion to the sepals. These are pretty often five in number, the two posterior remaining separate. The androceum has sometimes more than five pieces, owing to the deduplication of some of them;<sup>2</sup> and the filaments, instead of being wholly free, are sometimes slightly monadelphous at the base. The ovary contains one or two ovules, descending and anatropous, with the micropyles superior and exterior. The fruit is thick, short and straight, or bowed and reniform, often wrinkled or warty; it contains a large descending seed, whose coats inclose a fleshy exalbuminous embryo, with its superior radicle enveloped by the auricled bases of the cotyledons. *Cynometra* comprises some twenty specimens of unarmed trees from most tropical countries.<sup>3</sup> Their leaves are alternate paripinnate, with one or more pairs of unsymmetrical leaflets and with caducous stipules. The flowers are grouped in short racemes, often corymbose or subumbellate, inserted in the axils of the leaves or on the wood of the branches or trunk. Each flower, often accompanied by two coloured bractlets, is axillary to a bract, and at the bottom of the inflorescence these bracts are greatly developed, together forming a caducous involucre. There are often also two coloured bractlets.

The small flowers of *Pterogyne*<sup>4</sup> have also five petals and five sepals. They are inserted round the rim of a little circular disk, and are imbricated<sup>5</sup> in the bud. The ten stamens are free and similarly inserted; they have introrse two-celled anthers of longitudinal dehis-

<sup>1</sup> L., *Gen.*, n. 519.—J., *Gen.*, 350.—LAMK., *Dict.*, ii. 240, t. 331.—GÆRTN., *Fruct.*, ii. 350, t. 156.—DC., *Prodr.*, ii. 509.—SPACH, *Suit. à Buffon*, i. 117.—ENDL., *Gen.*, n. 6784.—B. H., *Gen.*, 586, n. 367.—*Metrocynia* DUP.-TH., *Gen. Nov. Madag.*, 22.—DC., *op. cit.*, ii. 507.—ENDL., *Gen.*, n. 6783.—*Cynomorium* RUMPH., *Herb. Amboin.*, i. 163, t. 62 (nec MICH.).

<sup>2</sup> Sometimes, too, there are ten stamens, which are not however all fertile, some of the posterior being reduced to filaments.

<sup>3</sup> ROXB., *Pl. Coromand.*, iii. 286.—HAYNE, *Arzn.*, xi. t. 17 (*Trachylobium Martianum*).—

BENTH., in *Hook. Journ.*, ii. 99; in *Trans. Linn. Soc.*, xxv. 318.—HOOK. F., *Niger*, 328.—A. RICH., *Fl. Cub.*, 232, t. 41.—TUL., in *Arch. Mus.*, iv. 178.—A. GRAY, *Bot. Unit. States Expl. Exp.*, t. 52.—WALP., *Rep.*, i. 853; v. 573; *Ann.*, ii. 449; iv. 601.—OLIV., *Fl. Trop. Afr.*, ii. 316.

<sup>4</sup> TUL., in *Ann. Sc. Nat.*, sér. 2, xx. 140; in *Arch. Mus.*, iv. 130.—B. H., *Gen.*, 586, n. 366.

<sup>5</sup> Usually the two lateral petals overlap, and the anterior and posterior are overlapped, on either edge.

cence. The gynæceum consists of a shortly stipitate ovary, surmounted by a curved style with a truncate stigmatiferous apex. The solitary suspended anatropous ovule has its micropyle superior and exterior. On the placentary edge of the ovary is a little longitudinal expansion, which becomes a thin rigid wing in the dry flattened indehiscent samaroid one-seeded fruit. The descending compressed seed contains a fleshy embryo, with a straight superior radicle. *P. nitens*,<sup>1</sup> the only known species of this genus, is an unarmed tree from Brazil and the countries to the south of it. It has alternate paripinnate leaves with little caducous stipules, and its flowers form little catkin-like axillary racemes, with scaly bracts.

*Sindora*<sup>2</sup> has hermaphrodite flowers, which are at first imbricated, but which fall early. The short convex receptacle supports a calyx of four sepals,<sup>3</sup> of which the posterior really represents two, imbricated only by their bevelled edges, as in *Detarium* and in most of the Copaivas. The corolla is represented by a single elongated petal superposed to the posterior sepal. There are ten hypogynous stamens, of which the posterior is free and sterile, its ill-developed anther containing no pollen. The nine others are monadelphous and declinate at the base at first, then free, bearing anthers, of which the seven anterior<sup>4</sup> are sterile, and the two alternipetalous fertile and well-developed. These two anthers are introrse, two-celled, and dehisce by two longitudinal clefts. The gynæceum consists of a shortly stipitate ovary, containing from two to four or five obliquely descending or transverse ovules, and surmounted by a style, which is at first rolled up, and which ends in a slight stigmatiferous dilatation. The fruit is a shortly stipitate irregular orbicular flattened coriaceous bivalve pod, covered with prickles, and containing an ovoidal exalbuminous seed, whose funicle is dilated into a cupuliform aril. The embryo is thick, with fleshy cotyledons and a short included radicle. *Sindora* consists of unarmed trees from tropical Asia and Malaysia, whose leaves are alternate paripinnate and paucijugate, and whose flowers form terminal ramified racemes.

<sup>1</sup> TUL., in *Arch. Mus., loc. cit.*, 131, t. 9.—WALP., *Rep.*, v. 577.

<sup>2</sup> MIQ., *Fl. Ind.-Bat.*, Suppl., i. 287; *Ann. Mus. Lugd.-Bat.*, iii. 86.—*Echinocalyx* B. H., *Gen.*, 584, 1003, n. 359.

<sup>3</sup> They are more or less covered with prickles

in certain species, whence the generic name *Echinocalyx*. In the Cochin China species the concave inner surface of the sepals is lined by closely appressed rigid hairs, filling nearly the whole of the concavity.

<sup>4</sup> It may, we are told, be completely absent.

The flower of *Cryptosepalum tetraphyllum*<sup>1</sup> has but one petal, and that posterior, as in *Sindora*; but the calyx is at the same time so much reduced that the lateral bractlets fulfil its part in protecting the bud, and by their close approximation form a sac which at first completely covers it. Thus *Cryptosepalum* is in this respect to *Copaifereæ* what *Didelotia* is to *Amherstieæ*. The sepals are represented by four little scales; there are three stamens with short free filaments and versatile introrse two-celled anthers; and the gynæceum resembles that of *Copaifera* or *Detarium*. As yet we do not know the fruit of this unarmed branching tree from the west of tropical Africa. Its leaves are paripinnate, with one or two pairs of coriaceous leaflets, and little lateral stipules. Its flowers form short axillary racemes, whose caducous bracts fall off and leave the bractlets persisting on either side of each flower. While *Cryptosepalum* links the most imperfect *Amherstieæ* to *Copaifereæ* by its affinities with *Didelotia*, *Zuccagnia*, formerly placed in this series, links it, as will be now seen, to those *Cæsalpinieæ* in which the structure of the flower is least intricate.

### VIII. DIMORPHANDRA SERIES.

*Dimorphandra*<sup>2</sup> (figs. 131, 132) has regular hermaphrodite flowers;

*Dimorphandra speciosa*.

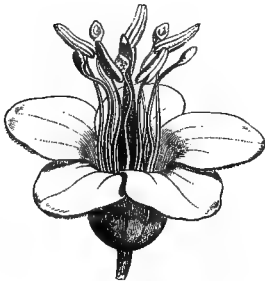


FIG. 131.  
Flower ( $\frac{1}{2}$ ).



FIG. 132.  
Longitudinal section of flower.

the very narrow receptacle bears a gamosepalous calyx, a poly-

<sup>1</sup> BENTH., *Gen.*, 584, 1003, n. 360; in *Trans. Linn. Soc.*, xxv. 315, t. 43 B.—*Cynometra?* *tetraphylla* HOOK. F., *Niger*, 329.—WALP., *Ann.*, ii. 449, n. 2.—OLIV., *Fl. Trop. Afr.*, ii. 303. [This author adds two new species, *C.*

*maraviense* OLIV., and *C.?* *mimosoides* WELW.]  
<sup>2</sup> SCHOTT, ap. SPRENG., *Syst. Cur. Post.*, 404.—ENDL., *Gen.*, n. 6824.—B. H., *Gen.*, 587, n. 370.—MORA SCHOMB., ex BENTH., in *Trans. Linn. Soc.*, xviii. 207, t. 16, 17.

petalous corolla, a diplostemonous androceum, and a free gynæceum. The calyx is divided to a variable depth into five lobes, valvate in the bud.<sup>1</sup> The corolla, regular, or nearly so, is so imbricated, that the vexillary petal is overlapped on either edge. The stamens are subhypogynous and of two kinds. Those superposed to the petals are fertile, each formed of a free filament and an introrse two-celled anther dehiscing by two longitudinal clefts.<sup>2</sup> Those alternating with the petals are on the contrary sterile, consisting of an obpyramidal body,<sup>3</sup> or else a long slender staminode with a club-shaped head. The central gynæceum consists of a sessile or shortly stipitate pluriovulate ovary,<sup>4</sup> tapering above, to form a very short or almost obsolete style, whose scarcely dilated apex is covered with stigmatic papillæ. The fruit is a flattened elongated pod with a thick woody endocarp, and divided by slightly projecting false dissepiments into as many chambers as there are seeds.<sup>5</sup> The endocarp separates into two flat elastic valves which then turn back, while the exocarp remains adherent in some species,<sup>6</sup> but separates altogether from them in others.<sup>7</sup> Within the membranous seed-coats is a greenish embryo surrounded by fleshy albumen.<sup>8</sup> *Dimorphandra* consists of some half-score species<sup>9</sup> of unarmed trees from tropical America. The leaves are alternate, pinnate<sup>10</sup> or more frequently bipinnate, with ill-developed lateral stipules at the base. The flowers, each axillary to a little caducous bract, are small and numerous, in simple or ramified racemes, or spikes terminating the branches.

In *Burkea*,<sup>11</sup> from tropical and southern Africa, the subperigynous

<sup>1</sup> The short thick lobes of the calyx often cease touching at a very early age, but in some species, like *D. mollis*, where they are longer, they are at first slightly imbricated.

<sup>2</sup> The filament is commonly attached by its very fine apex to an elongated, thick coriaceous connective, usually dark-coloured. The two linear cells occupy but a very narrow space on either side of the connective.

<sup>3</sup> In this case the tops of the five staminodes cohere into a sort of five-pillared vault. Only the filaments of the fertile anthers are to be seen in the interspaces between the pillars, the anthers being mainly lodged in the elongated pits on the inner faces of the staminodes. This is the case with the species of which TULASNE (*Arch. Mus.*, iv. 186) has made his section *Pocillum*. In the other sections of the genus (*Eudimorphandra* TUL., *loc. cit.*, 183; *Phaneropsia* TUL., *loc. cit.*, 188) the staminodes are more

slender above, and dilate at the summit into a little more or less oblique club-shaped head, often slightly concave or cupuliform above.

<sup>4</sup> The ovules are descending, with the micropyles superior and exterior.

<sup>5</sup> The fruit is one-seeded, it is said, in *D. guianensis* (*D. Mora* BENTH.;—*Mora guianensis* SCHOMB.).

<sup>6</sup> E.g., *D. (Pocillum) vernicosa* SPRUCE.

<sup>7</sup> Such as *D. mollis* BENTH., in *Hook. Journ.*, ii. 102.

<sup>8</sup> The albumen is perhaps wanting in certain species, as BENTHAM gives the absence of perisperms as a characteristic of the genus.

<sup>9</sup> WALP., *Rep.*, 574.

<sup>10</sup> In the species properly belonging to *Mora* SCHOMB., *loc. cit.*

<sup>11</sup> HOOK., *Icon.*, t. 593.—ENDL., *Gen.*, n. 6767<sup>1</sup>.—B. H., *Gen.*, 587, u. 369.

insertion and the perianth are nearly as in *Dimorphandra*. But the stamens are all ten fertile; their free filaments are surmounted by introrse two-celled anthers, whose connective is tipped by a terminal apiculus. The sessile or subsessile ovary ends in a short thick style, with a more or less oblique concave apex covered with stigmatic papillæ. The ovary contains either two transverse or descending ovules whose micropyles look upwards and outwards, or only one, often ascending when adult with its micropyle downwards and inwards. The oblong compressed coriaceous indehiscent (?) fruit contains one or two compressed suborbicular seeds, whose embryo is surrounded by a thin cartilaginous albumen. Two species of this genus are known.<sup>1</sup>

The floral receptacle of *Erythrophlæum*<sup>2</sup> (figs. 133, 134) is far more concave than in the two preceding genera; and hence the

*Erythrophlæum guineense*.

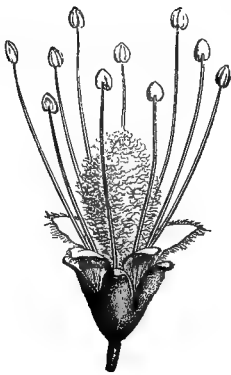


FIG. 133.  
Flower ( $\frac{5}{7}$ ).

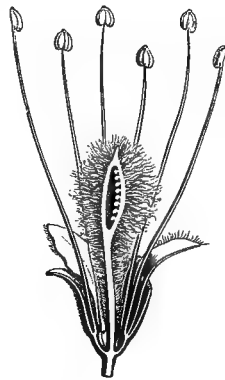


FIG. 134.  
Longitudinal section of flower.

insertion of the perianth and androceum is far more decidedly perigynous. The receptacle is lined with glandular tissue; on its rim are inserted a five-toothed gamosepalous calyx, five equal petals, at first slightly imbricate but later valvate, and ten free stamens, five superposed to the teeth of the calyx, and five shorter to the petals; the filament of each stamen bears an introrse two-celled anther of

<sup>1</sup> HARV. & SONDR., *Fl. Cap.*, ii. 271.—OLIV., *Fl. Trop. Afr.*, ii. 319.

<sup>2</sup> AFZEL., ex R. BR., in *Tuck. Congo*, 438; *Misc. Works*, ed. BENN., i. 153, 290.—G. DON, *Syst.*, ii. 424.—ENDL., *Gen.*, n. 6818.—B. H.,

*Gen.*, 588, n. 371.—FILLÆA GUILL. & PERR., *Fl. Seneg. Tent.*, i. 242, t. 55.—MAVIA BERTOL. F., *Ill. Plant. Mossamb.*, i. 10, t. 3.—LABOUCHERIA F. MUELL., in *Journ. Linn. Soc.*, iii. 158.



longitudinal dehiscence, whose connective is often surmounted by a mossy glandular point. The gynæceum is inserted by a long slender foot in the bottom of the receptacle. Its ovary<sup>1</sup> contains an indefinite number of ovules, and is surmounted by a short style, with an undilated stigmatiferous apex. The fruit is an oblong flattened coriaceous or woody bivalve pod. The seeds, surrounded by a variable thickness of pulp, contain within their coats<sup>2</sup> a fleshy

*Brandzeia filicifolia.*



FIG. 135.  
Habit ( $\frac{1}{2}$ ).

embryo surrounded by thick, fleshy or subcorneous albumen. This genus consists of unarmed trees from tropical Africa<sup>3</sup> and

<sup>1</sup> Often covered with very long woolly hairs (figs. 133, 134).

<sup>2</sup> The middle coat is very hard; it is surrounded by a soft layer, which swells up and

becomes much thicker in contact with water (see *Adansonia*, vi. 204).

<sup>3</sup> The old species, named *Willæa suaveolens* by the authors of the *Floræ Senegambiæ Tenta-*

Australia.<sup>1</sup> The leaves are alternate, bipinnate, with few, rather broad, coriaceous leaflets. The flowers are grouped in terminal ramified racemes; the pedicels, articulate at the base, are each axillary to a caducous bract.

At the end of this series we place *Brandzeia filicifolia*<sup>2</sup> (figs. 135–137), whose affinities with *Mimoseæ* and *Eucæsalpinicæ*<sup>3</sup> are incontestable, and which has, with the regular flowers of the preceding genera, a receptacle yet more concave<sup>4</sup> than in *Erythrophlæum*, and a

*Brandzeia filicifolia.*



FIG. 136.  
Flower ( $\frac{2}{3}$ ).



FIG. 137.  
Longitudinal section of flower.

more broadly imbricated calyx. The sepals are four<sup>5</sup> or five in number; and the petals<sup>6</sup> which are also imbricated, taper below into long claws. The ten stamens, all fertile, are superposed to the leaves of the perianth. Each consists of a free involute filament finally exserted, and an introrse two-celled anther with a glandular connective. The central gynæceum consists of a stipitate pluriovulate ovary,<sup>7</sup> surmounted by a style whose stigmatiferous apex is slightly dilated. The pod is of variable size, often oblong compressed, covered with rusty-coloured velvety down; bordered with somewhat prominent sutures, rarely flat, but more often irregularly knobbed on

men, is *E. guineense* DON. We find it undistinguishable from *Mavia judicialis* BERTOL. F., a plant from the east coast, of which we have only an imperfect specimen before us [see also OLIV., *Fl. Trop. Afr.*, ii. 320].

<sup>1</sup> *E. chlorostachys*.—*E. Labouchei* BENTH., *Fl. Austral.*, ii. 297. — *Laboucheria chlorostachys* F. MUELL., *loc. cit.*, 159.

<sup>2</sup> H. BN., in *Adansonia*, ix. 215, t. vi.

<sup>3</sup> It might strictly have been placed in this series, for it comes very near *Cæsalpinia*, differ-

ing mainly in the greater regularity of its corolla and in its non-declinate filaments, nude at the base.

<sup>4</sup> With a lining of glandular tissue, whose margin is divided into ten little crenulations.

<sup>5</sup> In this case there is one larger than the rest, and evidently representing two leaves.

<sup>6</sup> Whose number may also be reduced to four.

<sup>7</sup> There are usually from ten to twelve obliquely descending ovules in two vertical rows.

its two faces. It appears to be indehiscent, and contains in chambers formed by its endocarp a variable number of seeds borne on slender funicles; their coats, resembling those of *Erythrophloeum*,<sup>1</sup> enclose a thick albumen of peculiar texture,<sup>2</sup> which in turn envelopes a greenish embryo. *B. filicifolia* is a small unarmed tree from the islands off the east coast of tropical Africa. Its alternate bipinnate leaves consist of a very large number of little leaflets, and its flowers form ramified false racemes on the wood of the young branches.

To R. BROWN<sup>3</sup> is due the formation of the group *Cæsalpinieæ*,<sup>4</sup> by some authors considered a distinct order,<sup>5</sup> but by most regarded as a mere suborder of *Leguminosæ*.<sup>6</sup> It is most difficult to find a single character which will really distinguish *Cæsalpinieæ* absolutely from the rest of *Leguminosæ*. Still, generally speaking, the embryo is straight,<sup>7</sup> and the imbrication of the corolla is not vexillary. But there are several members of the series *Bauhinieæ* in which the radicle is curved, and on the other hand in many *Papilionaceæ* the radicle is quite straight. Again, we have found that in such genera as *Cadia*, *Tamarindus*, *Vouapa*, &c., the vexillary petal is sometimes overlapping, sometimes overlapped, on one or both sides,<sup>8</sup> and others like *Duparquetia*, in which the imbrication is always vexillary; while among *Papilionaceæ* we shall occasionally find plants where this same vexillary æstivation of the corolla is far from constant. Hence, making all proper reservations, we may say the *Cæsalpinieæ* are, very generally speaking, *Leguminosæ* with straight embryos and a non-vexillary æstivation.

All those other characters to which considerable importance is

<sup>1</sup> The middle coat is extremely hard, and outside it is a soft layer, which in water swells, and then gives way, and curls up irregularly.

<sup>2</sup> It has a farinaceous or subcrystalline appearance; in water it breaks up and becomes translucent, especially in certain parts, and dissolves like aleurone.

<sup>3</sup> *Gen. Rem.*, 19; *Congo*, 10? *Misc. Works*, ed. BENN., i. 23, 100, 240 (*Lomentaceæ* v. *Cæsalpinieæ*).

<sup>4</sup> It was really ADANSON who, in 1763, distinguished this group in the order *Leguminosæ* as "*Première section: les Casses.*" He included however the few *Mimoseæ* then known. (See *Fam. des Pl.*, ii. 317.)

<sup>5</sup> A. BRONGN., *Enum.* (1843), 132, *Fam.*

283.—J. G. AGARDH, *Theor. Syst. Plant.* (1858), 212.

<sup>6</sup> J., *Gen.*, 346, &c.—DC., *Prodr.*, ii. (1825), 473 (subord. iv.)—ENDL., *Gen.*, 1310 (trib. viii.).—LINDEL., *Veg. Kingd.*, 549.—B. H., *Gen.*, 436, 457 (subord. ii.)

<sup>7</sup> DC., *Prodr.*, ii. 94, tab. synopt., "*Leguminosæ rectembriæ, nempe embryonis radícula recta.*" He subdivides this group into *Mimoseæ*, in which the petals are valvate, and the stamens hypogynous; and *Cæsalpinieæ*, in which the petals are imbricated, and the stamens perigynous. We need scarcely dwell on the over precise and absolute characters of this grouping.

<sup>8</sup> See pp. 71, 99, 103.

assigned elsewhere, here become so variable that we may say they are nearly as often absent as present. The flowers are regular or irregular, with a valvate or imbricated calyx,<sup>1</sup> and with or without a hypogynous or perigynous corolla. The stamens are free or in one or more bundles; the gynæceum is central or excentric.<sup>2</sup> The fruit is dehiscent or indehiscent, containing one or many albuminous or exalbuminous seeds. The leaves are pinnate or bipinnate, stipulate or exstipulate. Some few characters are of altogether exceptional occurrence, such as simple or unifoliolate leaves,<sup>3</sup> indefinite stamens,<sup>4</sup> diclinous flowers,<sup>5</sup> and herbaceous stems. The last character is only found in several *Cassias* and in some *Cæsalpinias* of the section *Hoffmanseggia*.

In 1825, DE CANDOLLE knew but thirty-four of the genera now retained in the group *Cæsalpinieæ*. He inserted three other types, the genera *Aloexylum*,<sup>6</sup> *Anoma*,<sup>7</sup> and *Baryxylum*<sup>8</sup> of LOUREIRO, which are still ill-known and of most doubtful position; besides the *Dalbergieæ*, now referred to the sub-order *Papilionaceæ*. To the then-known genera R. BROWN added *Petalostyles* in 1817, and he pub-

<sup>1</sup> In our descriptions we always make it a point to distinguish as far as possible the calyx proper from the receptacular part of the flower. Thus, while BENTHAM & HOOKER, following their predecessors, almost always describe a tubular or cupuliform part of the calyx consisting of a single piece and lined by the disk, as well as a free part above, often divided down to its base, we consider the former part, usually lined by the disk, as belonging to the receptacular axis. Hence from our view the calyx is far oftener dialysepalous in *Cæsalpinieæ*.

<sup>2</sup> In this case we do not, like most authors, regard the gynæceum as adnate to the calyx-tube; but consider that owing to the irregular development of the different parts of the floral receptacle, its organic apex, which corresponds with the insertion of the gynæceum becomes more or less excentric, as in most *Chrysobalaneeæ*, being more or less closely approximated to the rim of the cup, sac, or tube represented by the receptacle. Moreover the study of the development confirms this interpretation. (See *Adansonia*, vi. 187.)

<sup>3</sup> In *Griffonia*, *Cercis*, and certain species of *Bauhinia*, *Palovea*, and *Barklya*.

<sup>4</sup> In *Campsandra*, and certain species of *Brownea*, *Storckia*, and *Cynometra*.

<sup>5</sup> In *Gleditschia*, *Gymnocladus*, *Ceratonia*, certain species of *Bauhinia*, *Cynometra*, and *Erythrophloeum*.

<sup>6</sup> LOUR., *Fl. Cochinch.*, 269.—DC., *Prodr.*, ii. 518.—ENDL., *Gen.*, n. 6786.—B. H., *Gen.*, 464.—H. BN., in *Dict. Encycl. des Sc. Médic.*, iii. 378. This tree is noted, for to it is attributed one of the kinds of eagle wood or *lign-aloes* (*bois d'aigle*) of commerce ("verum lignum Aloes largiens, ENDL."); it is described as having simple alternate leaves, and flowers with four sepals, five and ten stamens. Its fruit is thus described: "*Legumen lignosum laxe falcatum 1-spermum. Semen oblongum curvum arillatum.*" This plant it seems cannot be identified in Cochinchina. Its organization brings it at once near to *Copaifera*, *Cynometra*, and *Connaraceæ*.

<sup>7</sup> LOUR., *op. cit.*, 280.—ENDL., *Gen.*, n. 6779. "Ab auctore in uno genere cum *Moringa* inclusa, a DC. (*Prodr.*, ii. 480) pro genere proprio admittitur. E descriptione tamen nequaquam recognoscenda, nisi *Cæsalpinia* ipsæ species, foliis perperam oppositis dictis." (B. H., *Gen.*, 464.)

<sup>8</sup> LOUR., *op. cit.*, 268.—DC., *Prodr.*, ii. 87.—ENDL., *Gen.*, n. 6781a (*Cassia*). "Est genus valde dubium. Descriptio auctoris pluribus notis *Cassiam* refert. Icon Rumphii dubie citata est *Azelia* species. Specimen Loureirianum, errore quodam sub hoc nomine in herb. Mus. Brit. servatum, cum characteribus nequaquam convenit." (B. H., *Gen.*, 464.)

lished *Erythrophlœum* of AFZELIUS in 1818. *Labioclea* was described by GAUDICHAUD (1817); *Apuleia* by MARTIUS (1837); *Pœppigia* by PRESL (1832); *Amherstia* by WALLICH (1830). In 1827 SCHOTT made known *Melanoxyton* and *Dimorphandra* in the *Curæ posteriores* of SPRENGEL's great work. VOGEL, in 1834, established the genera *Schizolobium* and *Sclerolobium*. In his special investigations into the *Leguminosæ* of Brazil, from 1843 downwards, L. R. TULASNE described *Cercidium*, *Diptychandra*, *Phyllocarpus*, *Pterogyne*, and *Thylacanthus*. But it is in England and her colonies that the greatest number of new types have been determined and studied during the last forty years—viz., *Acrocarpus* by WIGHT, *Burkea* by W. HOOKER, *Colvillea* by BOJER, *Elizabetha* by SCHOMBURGK, *Daniella* by BENNETT, *Wagatea* by DALZELL, *Prioria* by GRISEBACH, and *Storckiella* by SEEMANN. In his endless researches on the *Leguminosæ* BENTHAM determined the six genera *Campsiandra*, *Dicorynia*, *Martia*, *Baikiaea*, *Cryptosepalum*, and *Distemonanthus*, besides publishing *Berlinia* of SOLANDER and *Batesia* of SPRUCE. MIQUEL, in 1859, made known the genus *Sindora* from Tropical Africa, and we ourselves have since 1865 determined the five genera *Didelotia*, *Griffonia*, *Duparquetia*, *Baudouinia*, and *Brandzeia*, besides demonstrating that AUBLET's *Vouacapoua* formed a genus, not identical with *Andira* as had been hitherto maintained, but belonging to the series *Sclerolobiæ*, and very near to *Batesia*.

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Thus the number of uncontested genera which we retain in the suborder *Cæsalpinieæ* is raised to seventy-two. Their geographical distribution is mainly restricted to a zone of 40° on either side of the equator. Hence *Cæsalpinieæ* belong almost exclusively to the very warmest countries, the only exceptions being *Cercis*, *Ceratonia*, and *Gymnocladus*, besides some representatives of *Gleditschia*, *Cassia*, and *Cæsalpinia*. There is hardly a single warm country which has not species of *Cassia*, *Bauhinia*, *Cæsalpinia*, *Parkinsonia*, *Tamarindus*, *Hymenæa*, and even *Dialium* and *Vouapa*. One genus, *Apalatoa*, is common to tropical America, Asia, and Africa, though by no means equally distributed, being very common in the New World and very rare in the Old. Another genus, *Copaifera*, unknown in Asia and Australia, is common to tropical America and Africa. There are twenty-four genera which have as yet been found spontaneous in

the New World only—namely, *Hæmatoxylon*, *Gymnocladus*, *Cercidium*, *Martia*, *Apuleia*, *Palovea*, *Elisabetha*, *Heterostemon*, *Brownea*, *Eperua*, *Tachigali*, *Prioria*, *Zuccagnia*, *Pterogyne*, *Dimorphandra*, and *Schizolobium* and the other eight genera of the series *Sclerolobiæ*. All the remaining genera of the suborder, thirty-seven in number, are natives of the Old World only. A large number of types are confined to very small areas. Thus, *Acrocarpus*, *Wagatea*, and *Amherstia* occupy a very limited region of tropical Asia; and *Pterogyne*, *Zuccagnia*, *Phyllocarpus*, *Dicorynia*, *Batesia*, *Apuleia*, *Palovea*, *Elizabetha*, *Eperua*, *Prioria*, &c., a relatively small part of tropical America. In Australia only are found *Labichea*, *Petalostyles*, and *Barklya*; while *Storckiella* is altogether Oceanian. *Detarium*, *Didelotia*, *Cryptosepalum*, *Baikia*, *Daniella*, *Berlinia*, *Griffonia*, *Distemonanthus*, and *Duparquetia* are confined to tropical Africa; and *Baudowinia*, *Colvillea*, *Brandzeia* to Madagascar and the neighbouring islands. The number of species in this suborder may be estimated at about eight hundred and fifty, of which some five hundred are peculiar to the Old World, and three hundred and fifty to the New.

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The subdivisions which it has been found necessary to make in this group for convenience of study, are not the most natural imaginable. The limits of the tribes or series are hardly more precise and absolute than those of the suborder itself. However, they are of real value in practice; and hence, without blinding ourselves to their artificial character, we have fully adopted the subdivisions proposed by BENTHAM, which are characterized as follows:

I. CADIEÆ. — Flowers regular. Receptacle concave. Perianth and androceum perigynous. Corolla contorted or imbricated; vexillary petal internal, external, or overlapped on one edge and overlapping on the other. Androceum regular diplostemonous. Stamens free. Seed exalbuminous; radicle straight. Leaves imparipinnate (1 genus).

II. EUCÆSALPINIÆ. — Flowers irregular or subregular. Calyx dialysepalous. Corolla imbricated, the vexillary petal internal. Androceum diplostemonous, rarely isostemonous. Stamens free; anthers versatile. Gynæceum free, inserted in the bottom of the receptacle. Leaves bipinnate, rarely pinnate or unifoliate (14 genera).

III. SCLEROLOBIÆ.—Flowers of *Eucæsalpinieæ*. Leaves imparipinnate, more rarely paripinnate, not decomposed (9 genera).

IV. AMHERSTIÆ.—Flowers possessing an excentric gynæceum inserted at a variable height on the posterior wall of the receptacular tube, the non-placentary suture of the carpel towards its cavity; sepals imbricate, very rarely valvate. Corolla irregular or absent. Leaves alternate, pari- or imparipinnate (20 genera).

V. BAUHINIÆ.—Gynæceum central, or if excentric inserted at a variable height on the anterior wall of the receptacular tube, the placentary suture of the carpel towards its cavity. Calyx gamosepalous, dehiscing variably by imbricate teeth or lobes; corolla regular or irregular. Leaves simple entire, bilobed, or more rarely bifoliolate (3 genera).

VI. CASSIÆ.—Flowers irregular or subregular; gynæceum central. Sepals free, imbricate, rarely subvalvate. Stamens very rarely ten or more, but if so with some nearly always sterile on the posterior side of the flower, free anthers basifixed or nearly so, dehiscing by often short clefts or pores. Leaves pari- or imparipinnate, not decomposed (13 genera).

VII. COPAIHEREÆ.—Flowers small; receptacle ill-developed convex or concave. Sepals free, imbricate or valvate. Petals absent, or more rarely 1–5 imbricate. Androceum nearly always diplostemonous, rarely pleiostemonous; anthers versatile. Leaves pari- or imparipinnate, pretty frequently bifoliolate (8 genera).

VIII. DIMORPHANDREÆ.—Flowers small, regular; receptacle convex or concave. Sepals usually imbricate, largely coherent. Corolla of five equal or subequal imbricated petals. Androceum diplostemonous; anthers versatile; filaments free. Gynæceum free; insertion central. Leaves bipinnate, very rarely pinnate (4 genera).

The uses of *Cæsalpinieæ* are very numerous,<sup>1</sup> and their detailed study would fill a volume. As most species come from hot climates they can hardly be cultivated here, except in the conservatory. But many species are to be found in all the gardens of tropical countries, for the sake of their beautiful flowers. *Amherstia nobilis*,

<sup>1</sup> GUIB., *Drog. Simpl.*, ed. 4, iii. 299.—ROSENTH., *Synops. Plant. Diaphor.*, 1031-1047.—DUCH., *Repert.*, 259.—ENDL., *Enchirid.*, 675.—

WALL.<sup>1</sup> is one of the most magnificent ornamental trees known, and the *Browneas*,<sup>2</sup> with their numerous coloured bracts, are not far behind it in beauty. It is to be hoped that the genera *Azelia* and *Berlinia* may be cultivated in our hothouses, for their splendid corollas are exquisitely scented.<sup>3</sup> *Schotia* blooms pretty often under our cultivation.<sup>4</sup> *Saraca* is grown in the gardens of India, owing to the beauty of its petaloid calyx. Many yellow-flowered perennial *Cassias* are bedded out in our summer parterres. The so-called *Flamboyan*s or Flame-trees of India and the islands east of tropical Africa, are all prized for their conspicuous red flowers. Of these some are true species of *Poinciana*,<sup>5</sup> and the remaining two are *Colvillea racemosa*,<sup>6</sup> of Madagascar, and *Cæsalpinia pulcherrima*,<sup>7</sup> now found in all hot countries. Indeed all the arborescent species of *Cæsalpinia* are ornamental; and *C. Gilliesii*<sup>8</sup> often flowers in our gardens. *Cadia varia* has pretty pinkish flowers, something like those of the Mallow.<sup>9</sup> Species of *Cercis* (Judas Tree; Fr., *Gâinier*, *Bois de Judée*), *Gymnocladus*, and *Gleditschia* are often planted in our parks and gardens, and are prized, the former for their precocious flowers, the latter for their foliage, and the peculiar look of their enormous branching spines.

LINDLEY showed that the chief property of *Cæsalpinia* is that of purging.<sup>10</sup> This is especially marked in the genus *Cassia*,<sup>11</sup> which in this respect may be distinguished into two groups, *Cathartocarpus* and *Senna*. The former supplies us with the drug Cassia (*Casse*), the latter with Senna (*Séné*). The pulp of the fruit is mainly used with the *Cassias*, especially the commonest, *C. Fistula*,<sup>12</sup> the Purging Cassia, or Pudding-pipe Tree, known in France under the

<sup>1</sup> See above, p. 92, figs. 65, 66; *Bot. Mag.*, t. 4453.—The flowers are offered to the gods in the Buddhist temples.

<sup>2</sup> See LINDL. & PAXT., *Fl. Gard.*, t. 59.—*Bot. Reg.* (1841), t. 30.—*Bot. Mag.*, t. 3964, 4839.

<sup>3</sup> See *Adansonia*, vi. 185, t. iii. fig. 10.

<sup>4</sup> *S. Speciosa* JACQ., vulgarly named *Belle Theodore* and highly prized by the colonists at the Cape, is the most remarkable of all the species for its handsome red flowers.—(See HOOK., *Exot. Fl.*, t. 159; *Bot. Mag.*, t. 1153.)

<sup>5</sup> See *Bot. Mag.*, t. 2884.

<sup>6</sup> BOJ., in *Bot. Mag.*, t. 3325, 3326.

<sup>7</sup> SW., *Obs.*, 166.—*Poinciana pulcherrima* L., *Spec.*, 554; DC., *Prodr.*, ii. 484, n. 1.

<sup>8</sup> *Poinciana Gilliesii* HOOK., *Bot. Misc.*, i.

t. 54; *Bot. Mag.*, t. 4006.—LINDL. & PAXT., *Mag.*, i. t. 28.

<sup>9</sup> See above, page 69, figs. 38, 39.

<sup>10</sup> *Veg. Kingd.*, 549; *Fl. Med.*, 258.

<sup>11</sup> COLLAD., *Monograph. des Casses*, 4to (1816.)

<sup>12</sup> *Cassia Fistula alexandrina* BAUH., *Pin.*, 403.—T., *Instit.*, 619, t. 392 E.—*C. nigra* DOD., *Pempt.*, 787.—*C. Fistula* L., *Spec.*, 540.—GERTN., *Fruct.*, ii., t. 147, fig. 1.—DC., *Prodr.*, ii. 490, n. 10.—GUIB., *Drog. Simpl.*, ed. 4, iii. 345, fig. 345.—ROSENTH., *op. cit.*, 1035.—*Bactrylobium Fistula* W., *Enum. Hort. Berol.*, 439.—*Cathartocarpus Fistula* PERS., *Syn.*, i. 459.—LINDL., *Fl. Med.*, 262.



name of *Canéficier*. This species, indigenous, it is said, in Æthiopia, but at present spread over all warm countries, has large cylindrical fruits, reaching the length of half a yard. They are smooth and dark brown, obtuse at both ends, indehiscent, and divided by woody transverse septa into as many compartments as there are seeds. Between the seed and the walls of its compartment is a sweet pulp, often dark in colour; this it is that is used as a mild purgative.<sup>1</sup> For the same purpose has been used the bark of the Smaller Cassia (*Petite Casse*) of America, whose dimensions are but half of those of the preceding kind. It is now known to come from *C. moschata*.<sup>2</sup> *C. brasiliensis* LAMK.<sup>3</sup> (*Canéficier du Brésil*), is also used in its native country for its laxative pulp. This species has much thicker, longer pods, recurved and sabre-shaped, slightly compressed, with very prominent sutures and projecting veins. Several other species have been cited as possessing similar properties, especially *C. javanica* L.,<sup>4</sup> *timorensis* DC., *bacillaris* L. f.,<sup>5</sup> and *marginato* ROXB.<sup>6</sup>

The section *Senna* furnishes the Sennas of commerce, purgative plants prized for their leaves and pods, especially the latter, misnamed follicles. This name no doubt arises from their flattened form and dry membranous consistency, and their general leaf-like aspect. They are straight and elliptical, ovate or obovate, or bowed and more or less reniform. These fruits always finally separate more or less easily into two valves, showing that each of the contained seeds, which may be seen to cause an external prominence on the pericarp is parted from either neighbour by a thin false dissepiment of centri-petal evolution. Though several points in the botanical history of the Sennas still remain doubtful,<sup>7</sup> we may regard these drugs as being chiefly supplied by the three species of the section *Senna* of *Cassia*,

<sup>1</sup> It formed part of the electuary *catholicon*, the *lévitatif*, and even the true *médecine noire* of the old French Pharmacopœia; and is used in the *confectio Sennæ* of the present English one.

<sup>2</sup> H. B. K., *Nov. Gen. et Spec.*, vi., 358.—DC., *Prodr.*, n. 3.—HABN., in *Trans. Linn. Soc.*, xxiv. 167.

<sup>3</sup> *Dict.*, i. 649.—DC., *Prodr.*, n. 1.—GUIB., *loc. cit.*, 347.—ROSENTH., *op. cit.*, 1036.—*C. Fistula brasiliensis* BAUH., *Pin.* 403.—T., *Instit.*, 619, t. 392 D.—*C. Siliqua brasiliensis purgatrix compressa* LOB., *Ph. Rond.*, 41.—*C. Fistula brasiliensis, flore incarnato* BREYN., *Cent.*, i. 58.—*C. grandis* L. FIL., *Suppl.*, 230.—*C. Mollis*

VAHL., *Symb.*, iii. 57.—JACQ., *Fragm.*, t. 85, fig. 3.

<sup>4</sup> *Spec.*, 542 (part.)—DC., *Prodr.*, n. 8.—*C. Fistula sylvestris* RUMPH., *Herb. Amb.*, ii. t. 22.—*C. Bacillus* GERTN., *Fruct.*, i. 318.

<sup>5</sup> *Suppl.*, 231.—DC., *Prodr.*, n. 13.—*Cathartocarpus Bacillus* LINDL., in *Bot. Reg.*, t. 881.

<sup>6</sup> *C. javanica* HASSK. (nec L.).

<sup>7</sup> GUIB., *loc. cit.*, 336.—MÉR. & DEL., *Dict. Mat. Méd.*, ii. 127; vi., 310, 320.—BISCH., in *Bot. Zeit.* (1850), t. 9.—PEREIRA, *Elem. Mat. Méd.*, ed. 5, ii. p. ii. 350.—LINDL., *Fl. Med.*, n. 535-539.—BATKA, in *Bot. Zeit.* (1854), 12; *Monogr. der Cassien Gruppe Senna*, Prague, 4to (1866), t. 1-5.

to which BATKA has given the names of *Senna obovata*,<sup>1</sup> *acutifolia*,<sup>2</sup> and *angustifolia*.<sup>3</sup> It appears certain that the first produces the Sennas called Aleppo, Alexandria, Thebais, Senegal, and Italian Senna; to the second belong the kinds known in commerce as Tribute (*S. de la palthe*), Nubian, and Æthiopian; from the third come Mocca, Mecca, Pike, Tinnevelly and Indian Sennas; the last kind is known in India as *Suna mutka*.

A large number of other *Cassias*<sup>4</sup> are also used in medicine in their native countries. Some are purgative like the Senna-producing species above; we may cite especially *C. Schimperi* STEUD.,<sup>5</sup> in Abyssinia; *C. Tora* L.,<sup>6</sup> in India; *C. medica* VELLOZ., *cathartica* MART., *falcata* L., *lævigata* W.,<sup>7</sup> *magnifica* MART., *rugosa* DON, and *splendida* VOG., in Brazil; *C. peruviana* VOG., in Peru; *C. Chamæcrista* L.,<sup>8</sup> *emarginata* L.,<sup>9</sup> *decipiens* VAHL, and *fabulosa* G. DON, in the Antilles and neighbouring parts of South America and *C. marylandica*,<sup>10</sup> which produces the American Senna, in the United States.

Many other *Cassias* serve for divers medical uses in their native countries. *C. Sophora*<sup>11</sup> from tropical Asia, is used in fevers, eruptions,

<sup>1</sup> *Cassia obovata* COLLAD., *op. cit.*, 92.—DC., *Prodr.*, ii. 492, n. 34.—*C. Senna* β L.—*C. Senna* LAMK., *Ill.*, t. 332, fig. 2, a, b, d; fig. 3, b, f, g.—*C. obtusifolia* DEL., *Fl. Ægypt.*, 75.—*C. arachoides* BURCH.—*C. porturegalis* BANGR. (ex WIGHT & ARN.).—*C. Burmanni* WALL., in *Madr. Journ.* (1837), 354.—*C. obtusa* WALL., herb. (*C. italica* offic.; *Faux-Séné*; *Séné de la Thébaïde* of NECTOUX (*Voy.*, t. 1); *Lena belledy* of the Egyptians and Nubians).

<sup>2</sup> *Cassia acutifolia* DEL., *Fl. Ægypt.*, 219, t. 27, fig. 1.—*C. lanceolata* FORSK.; *Eg.-Arab.*, 158, ex DC., *Prodr.*, n. 35 ?.—LAMK., *Ill.*, t. 332, fig. 2, c; fig. 3, a.—*C. ovata* MÉR. & DEL., *op. cit.*, vi. 311.—COLLAD., *loc. cit.*—NECTOUX, *loc. cit.*—*C. æthiopica* GUIB., *op. cit.*, 357, fig. 337.—*C. lenitiva* BISCH., *loc. cit.* (*Séné de Nubie* of NECTOUX, *loc. cit.*, t. 2).

<sup>3</sup> *Cassia elongata* LEM.-LIS., in *Journ. Pharm.*, vii. 345.—MÉR. & DEL., *op. cit.*, vi., 314.—PEREIR., *loc. cit.*, 350.—LINDL., *Fl. Med.*, 258.—*C. lanceolata* ROYLE, *Ill.*, 201, t. 37.—WIGHT & ARN., *Prodr.*, i. 288.—WALL., in *Madr. Journ.* (1837), 354.—*C. medicinalis* BISCH., *loc. cit.*—*C. Ehrenbergii* BISCH.—*C. Royleana* BISCH.—The nomenclature and synonymy of these three species need a complete revision.—Probably the epithet *lanceolata* which has been applied to so many different plants will have to disappear; but it appears to us impossible to

substitute *medicinalis* and *lenitiva*, which have not the least claim to priority.

<sup>4</sup> See ROSENTH., *op. cit.*, 1038-1041.

<sup>5</sup> *C. cana* WENDER., in *Linnæa*, xxii. 22 (nec NEES, nec SCHR.).—*C. obtusata* HOCHST.—*Senna tomentosa* BATKA (1849).—*S. ovalifolia* BATKA (1860).

<sup>6</sup> *Spec.*, 538 (part).—DC., *Prodr.*, n. 47.—LINDL., *Fl. Med.*, 260.—*C. gallinaria* COLLAD.—*C. fetida* SALISB., *Prodr.*, 326.—*Gallinaria rotundifolia* RUMPH.—This species is also considered an anthelmintic, and is used in India in the treatment of abdominal disorders in children. It is called *Gallinaria*, because it is supposed to cure several of the diseases of poultry, and especially their broken bones.

<sup>7</sup> *Enum.*, 441.—DC., *Prodr.*, ii. 23.—*C. tropica* VELLOZ.

<sup>8</sup> *Spec.*, 542 (part).—*C. pulchella* SALISB., *Prodr.*, 326.—The type of the section of the same name.

<sup>9</sup> *Cathartocarpus emarginata* PERS. (See DESCOURT., *Fl. Med. des Ant.*, ii. 231).

<sup>10</sup> L., *Spec.*, 541.—DC., *Prodr.*, n. 103.—*C. succedanea* BELL.—*Senna marylandica* MÉR. & DEL., *op. cit.*, vi. 321.—This species is constantly used in the United States as a mild purgative (See GUIB., *loc. cit.*, 342.—LINDL., *Fl. Med.*, 261).

<sup>11</sup> L., *Spec.*, 542.—DC., *Prodr.*, n. 31.—MÉR. & DEL., *op. cit.*, ii. 130.—ROSENTH., *op. cit.*

&c. *C. glauca*<sup>1</sup> is prescribed for gout, diabetes, &c., in the same regions. *C. auriculata*<sup>2</sup> is also used in the treatment of diabetes, ophthalmia, and chlorosis. The seeds of *C. Absus*,<sup>3</sup> a native of Africa, are employed under the name of *Chichim* or *Tchechum*, and are commonly used in cases of ophthalmia in Egypt. *C. occidentalis*<sup>4</sup> produces the *Fédégose* of Brazil, which bears the reputation of being an antidote to poisons and a good remedy in stranguria, erysipelas of the legs, &c. *C. alata*,<sup>5</sup> made by several authors the type of a section *Herpetica*,<sup>6</sup> and remarkable for the two large lateral longitudinal wings of its pod, is often called *Dartrier* [Tetter-tree], its antitherpetic properties being undoubted in India, Java, and the Antilles. Medicinal powers have also been attributed to upwards of twenty other species of the genus *Cassia*.<sup>7</sup>

Among the purgative or laxative *Leguminosæ*, we must not omit to cite the Tamarind, of which we shall have to treat later, on account of its edible fruits, and certain species of *Bauhinia* and *Brownea*. In the last genus the Venezuela Rose, *B. coccinea* JACQ.,<sup>8</sup> is noted for having emollient leaves and laxative refreshing flowers which are hence constantly used in ptisans in the Antilles and the north of the adjacent mainland or Tierra Firma. *Bauhinia acuminata* L. and *variegata* L. are used in India as laxatives and carminatives.<sup>9</sup>

*Cæsalpinieæ* possess many other medicinal properties. *Parkinsonia acuminata*<sup>10</sup> is cited as a febrifuge and anti-putrescent. Several species of *Cæsalpinia* also furnish drugs. Of course all the species

1038. Its seeds are used in the Mauritius for dyeing black, under the name of *graines de Cassier*.

<sup>1</sup> LAMK., *Dict.*, i. 647.—DC., *Prodr.*, ii. 67.—*C. surattensis* BURM., *Fl. Ind.*, 97 (see MÉR. & DEL., *op. cit.*, ii. 129).

<sup>2</sup> L., *Spec.*, 542.—DC., *Prodr.*, n. 79.—AINSL., *Mat. Med. Ind.*, i. 162; ii. 32.

<sup>3</sup> L., *Spec.*, 537.—DC., *Prodr.*, n. 126.—MÉR. & DEL., *op. cit.*, ii. 127.

<sup>4</sup> L., *Spec.*, 539.—DC., *Prodr.*, n. 92.—MÉR. & DEL., *op. cit.*, ii. 130.—LINDL., *Fl. Med.*, 261.

<sup>5</sup> L., *Spec.*, 541.—DC., *Prodr.*, n. 32.—MÉR. & DEL., *op. cit.*, ii. 128.—LINDL., *Fl. Med.*, 260.—*Senna alata* ROXB., *Fl. Ind.*, ii. 349.

<sup>6</sup> DC., in *Collad. Monogr.*, 91; *Prodr.*, ii. 492, sect. iii. (see above p. 116, note 2).

<sup>7</sup> Especially *C. Akakalis* ROYLE, supposed to produce the *Chichim* seeds; *C. mimosoides* L.; *C. sericea* Sw. (*Doença do bicho* of the Brazilians); *C. biflora*, used as an anti-syphilitic in

South America; *C. acuminata* W. (*C. Apocouita* AUBL.) of Guiana; *C. florida* VAHL (*C. sumatrana* ROXB.), or *Juwar* of the Indians; *C. mimosoides* L. (*C. rachiptera* HOCHST.); *C. venenifera* MEY., &c. (see ROSENTH., *op. cit.*, 1039, 1040).

<sup>8</sup> See above, p. 97, figs. 70-72.—ROSENTH., *op. cit.*, 1047.

<sup>9</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, viii. 585. Other species, such as *B. tomentosa* L., are antiphlogistic and antidyenteric. *B. forficata* LINK., is used for its mucilaginous properties in Brazil. *B. scandens* is the *Dawn lolab mubut* or "mouth-opening tree" of the Moluccas. (For the other *Bauhinias* (*Caulotretus*, *Phanera*, *Pileostigma*) employed in Asia or Africa see ROSENTH., *op. cit.*, 1043, 1044.)

<sup>10</sup> L., *Hort. Cliff.*, 157, t. 13.—JACQ., *Amer.*, 121, t. 180.—DESCOURT., *Fl. Méd. des Ant.*, i. 54.—ROSENTH., *op. cit.*, 1035.

rich in tannin, and, as we shall see, valued for dyeing and tanning, have marked astringent properties. The wood of the East Indian "Sappan Tree" (*C. Sappan*),<sup>1</sup> is used as a powerful emmenagogue in Malabar and Cochin China, while *C. Nuga*<sup>2</sup> serves the same purposes in India. *C. pulcherrima* Sw.<sup>3</sup> is also used as a tonic, excitant, and emmenagogue. The infusion of its leaves may even produce abortion, and they are said to be purgative and to be sometimes employed instead of Senna.<sup>4</sup> Severe fevers have been cured by its leaves and flowers. The root is acrid and even venomous.<sup>5</sup> The *Guilandinas* (Fr., *Uniquiers*, *Bonducs*)<sup>6</sup> also enjoy a pretty extended reputation as febrifuges and tonics. The seeds of *C. Bonduc*<sup>7</sup> *majus*<sup>8</sup> and *minus*<sup>9</sup> are used in India and Guiana, both locally and internally, especially for tumours and hydrocele; and the roots are supposed to cure snake-bites.<sup>10</sup>

The Kentucky Coffee-tree<sup>11</sup> (*Chicot de Canada*) and several species of *Gleditschia* are considered slightly astringent. From the seeds of the former is extracted an oil said to be purgative. It owes its name to the fact that in the United States its roasted seeds may really be used as real coffee-beans. The pulp of the *Gleditschia* fruits, and especially of the Honey Locust (*G. triacanthos* L.)<sup>12</sup> has at first a sweetish taste, which then becomes horribly astringent, bitter, and even acrid. From the mesocarp, however, containing as it does a certain amount of sweetish matter, is prepared an alcoholic drink used in North America. Several other species of this genus from Eastern Asia are said to have saponaceous fruits.

The so-called Copaiva- or Copaiba-balsam (*baume de Copahu*) is undoubtedly most in request of the drugs obtained from the sub-order *Cesalpinieæ*. This was at first supposed to be produced by a single species of Copaiva-tree, namely *C. officinalis* L.,<sup>13</sup> from the

<sup>1</sup> L., *Spec.*, 544.—RHEED., *Hort. Malab.*, vi. t. 2.—AINSL., *Mat. Med. Ind.*, ii. 450.—DC., *Prodr.*, ii. 482.—ROSENTH., *op. cit.*, 1033.

<sup>2</sup> AIT., *Hort. Kew.*, iii. 32.—DC., *Prodr.*, ii. 481.—*Guilandina Nuga* L., *Spec.*, 146 (nec BURM.). RUMPHIUS says, moreover, that the decoction of its root cures calculous and nephritic affections (see LINDL., *Fl. Med.*, 262.—ROSENTH., *op. cit.*, 1034).

<sup>3</sup> See above, p. 150, note 7.

<sup>4</sup> LINDL., *Fl. Med.*, 263.

<sup>5</sup> SCHOMB., in *Linnaea*, ix. 512.

<sup>6</sup> Sect. *Guilandina* (see p. 74).

<sup>7</sup> AIT., *Hort. Kew.*, iii. 32.—DC., *Prodr.*, ii. 480.

<sup>8</sup> *Guilandina Bonduc* L., *Spec.*, 545 (yellow seeds).

<sup>9</sup> *Guiland. Bonducella* L., *loc. cit.* (grey seeds).

<sup>10</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, x. 64. An emulsion of the seeds cures certain chronic discharges.

<sup>11</sup> *Gymnocladus dioica* (see above, p. 83, note 1, figs. 52, 53).—ROSENTH., *op. cit.*, 1032.

<sup>12</sup> L., *Spec.*, 1509.—DUHAM., *Arbr.*, ed. 2, iv. t. 25.—MICHX. F., *Arbr.*, ii. 164, t. 10.—DC., *Prodr.*, ii. 479, n. 1.

<sup>13</sup> L., *Spec.*, 557.—W., *Spec.*, ii. 630.—JACQ., *Amer.*, 133, t. 86.—LAMK., *Dict.*, ii. 97; *Ill.*,

southern Antilles and the neighbouring regions of South America. But it is now asserted that this substance is extracted from some score of species more or less autonomous, in Brazil, the Guianas, and the States of Venezuela, San Salvador, Nicaragua, Costa Rica, &c. These species are as follows:—*C. Beyrichii* HAYNE,<sup>1</sup> *bijuga* W., *Blancheti* BENTH., *bracteata* BENTH., *cordifolia* HAYNE, *coriacea* MART.,<sup>2</sup> *elliptica* MART., *glabra* VOG., *guianensis* DESF.,<sup>3</sup> *hymenæifolia* MORIC., *Jussiewi* HAYNE, *Langsdorffii* DESF.,<sup>4</sup> *lava* HAYNE,<sup>5</sup> *Martii* HAYNE, *multijuga* MART. & HAYNE, *nitida* MART. & HAYNE, *oblongifolia* MART., *pubiflora* LINDL., *Sellowii* HAYNE, and *trapezifolia* HAYNE. The balsam is extracted by incisions, which may be repeated twice or thrice a year on vigorous trees, and of which a single one may yield as much as six kilogrammes (upwards of thirteen pounds) of the oleo-resinous juice. The *Copaiferas* of tropical Africa afford a very different product, a true copal, if we admit that it is the *Guibourtia*<sup>6</sup> of Sierra Leone that produces the African copal known as African Red Gum and Yellow Gum. It is now certain that the true resins copal and anime,<sup>7</sup> due to *Leguminosæ*, are produced by species of *Hymenæa*. GUIBOURT,<sup>8</sup> who has made a special study of these substances, now so much used for making varnishes, distinguishes between the hard and soft animes, the one kind eastern, exuding from *Hymenæa verrucosa*<sup>9</sup> in Madagascar and on the east coast of Africa, the other western, produced in South America by *Hymenæa Courbaril*,<sup>10</sup> and a fair number of other species more or less distinctly

t. 342.—WOODV., *Med. Bot.*, 3, t. 137.—DC., *Prodr.*, ii. 508, n. 1.—H. B. K., *Nov. Gen. et Spec.*, vi. t. 659.—MÉR. & DEL., *Dict.*, ii. 414.—GUIB., *Drog. Simpl.*, ed. 4, iii. 432.—A. RICH., *Élém. d'Hist. Nat. Med.*, ed. 4, ii. 304.—PEREIRA, *Elem. Mat. Med.*, ed. 5, ii. p. ii. 364.—C. Jacquin DESF., in *Mém. Mus.*, vii. 376.—LINDL., *Fl. Med.*, 278.—ROSENTH., *Syn. Pl. Diaph.*, 1046 (New Spain Resin, Columbian Copaiva, and *aceite de Canime* of New Granada).

<sup>1</sup> In *Linnæa*, i. 426; in *Dunc. Suppl. to the Edinb. New Disp.*, 45 (ex PER., *loc. cit.*).

<sup>2</sup> In *Isis* (1824), 589.—DC., *Prodr.*, n. 4 (*Dialium?*).

<sup>3</sup> *Loc. cit.*, t. 13.

<sup>4</sup> *Loc. cit.*, 377, t. 14.

<sup>5</sup> *Copaiva do campo* of Minas-Geraës; Para Copaiva.

<sup>6</sup> *Copaifera copallina*.—*C. Guibourtiana* BENTH., in *Trans. Linn. Soc.*, xxv. 317.—*Guibourtia copallina* BENN., in *Journ. Linn. Soc.*, i. 150.

<sup>7</sup> DANIELL, in *Pharm. Journ.*, xvi. (1857),

367. This light-coloured copal, we are told, forms at most but a part of the resin exported from Sierra Leone (WELW., in *Journ. Linn. Soc.*, ix. 298).

<sup>8</sup> In *Rev. Scientif.*, xvi. (1844), 177; *Drog. Simpl.*, ed. 4, iii. 423.

<sup>9</sup> GERTN., *Fruct.*, iii. 306, t. 139, fig. 7.—*Trachylobium verrucosum* HAYNE (see p. 108, notes 4, 6, fig. 84).

<sup>10</sup> L., *Spec.*, 537.—VAHL, *Ecl. Amer.*, ii. 30.—LAMK., *Ill.*, t. 330, fig. 1.—DC., *Mém. Légum.*, xii. t. 26, fig. 120; *Prodr.*, ii. 511, n. 1.—MÉR. & DEL., *Dict.*, iii. 565.—GUIB., *Drog. Simpl.*, ed. 4, iii. 332, fig. 334.—LINDL., *Fl. Med.*, 266.—ROSENTH., *op. cit.*, 1042 (*Copalier d'Amérique* [American Copal-Tree], *Simiri* of the Galibis, *Locust-Tree* of the English. The resin is called *jatahy*, *jatchy*, *jatoba* in Brazil, and *Copal d'Algarrobo* in New Granada. It is used as a drug in Brazil in lung complaints, such as coughs and hæmoptysis. The decoction of the inner bark is used as a vermifuge, according to MACFADYEN (*Fl. Jamaica*, i. 349).

characterized, especially *H. Candolleana* H. B. K., *confertifolia* HAYNE,<sup>1</sup> *confertiflora* MART., *latifolia* HAYNE, *Olfersiana* HAYNE, *Sellowiana* HAYNE, *stigonocarpa* MART., *stilbocarpa* HAYNE, and *venosa* VAHL.<sup>2</sup> The origin of the copal so largely exported from the west of tropical Africa is even at the present day still very doubtful. Perhaps some of it exudes from the trunk of a living species of *Cynometra*.<sup>3</sup> Perhaps, again, it was formerly produced by trees whose species is now extinct in the country,<sup>4</sup> and in this case constitutes a sort of fossil resin like yellow amber.<sup>5</sup>

Besides these resinous matters and the astringent principles of which we have spoken, the wood of *Casalpinia* often contains colouring matters; so that several of these plants are prized by the dyer. We shall review the chief of them.

Logwood, or Campeachy-wood (*Bois de Campêche, d'Inde*), one of the best known dyestuffs, is produced by *Hæmatoxylon campechianum* L.,<sup>6</sup> which grows not only in and around Campeachy, but in the Antilles, Venezuela, and Guiana. This wood, of a rather pale brownish-red colour, becomes bright red in the air, and blackish when exposed to damp. Heavy, close-grained, and taking a fine polish, it is valued for cabinet-making. It is its colouring principle, called *hæmatine* or *hæmatoxylin*, that renders the wood chiefly available for dyeing black, blue, or violet. The wood, moreover, contains astringent principles, also found in the bark and gum. These products are used in certain intestinal affections, and especially the decoction of the wood in cases of chronic diarrhœa, in the Antilles and the United

<sup>1</sup> See *Arzneig.*, t. 7-16, 18, 19.—MART., *Mat. Med. Bras.*, 115.

<sup>2</sup> *Ecl. Amer.*, ii. 31 (see p. 108, notes 3, 5).

<sup>3</sup> *C. lasiflora* BENTH., in *Trans. Linn. Soc.*, xxv. 318. *Cynometra*, whose leaves often resemble those of *Hymenœa*, has more than once been confounded with it. Thus *H. (Trachylobium) Martiana* HAYNE (*loc. cit.*, t. 17) is a *Cynometra*. WELWITSCH (*loc. cit.*, 295) gives this plant as a synonym of *H. verrucosa* LAMK. The *Nam-nam* of India is *C. cauliflora* L., (*Spec.*, 547;—LAMK., *Ill.*, t. 331, fig. 1;—DC., *Prodr.*, ii. 509, n. 1). According to RUMPHIUS (*Herb. Amboin.*, i. t. 62) its roots are purgative, and the oil obtained from the seeds cures itch and other cutaneous diseases. *C. ramiflora* L. (*Spec.*, 547;—DC., *loc. cit.*, n. 2;—RHEED., *Hort. Malab.*, iv. t. 31) has similar properties.

<sup>4</sup> This is the opinion maintained by WELWITSCH in his *Obs. on the Orig. and the Geogr.*

*Distr. of the Gum Copal in Angola* (*loc. cit.*, 301). [See also KIECK, *On the Copal of Zanzibar* (*Journ. Linn. Soc.*, xi. 1) and *On Copal* (*loc. cit.*, 479).]

<sup>5</sup> Among the plants producing a resin more or less closely allied to anime may be cited *Daniellathurifera* BENN. (in *Pharmaceut. Journ.*, xiv. 251;—H. BN., in *Adansonia*, vi. 186), which affords the *bumbo* or *bungbo* of Sierra Leone, and which has been mentioned as producing some of the African copal.

<sup>6</sup> *Spec.*, 549.—SLOAN., *Hist.*, t. 10, fig. 1-4.—BLACKW., *Herb.*, t. 463.—LAMK., *Ill.*, t. 340.—DC., *Prodr.*, ii. 485.—MÉR. & DEL., *Dict.*, iii. 449.—GUIB., *Drog. Simpl.*, ed. 4, iii. 317.—A. RICH., *Elém.*, ed. 4, ii. 324.—FERREIRA, *Elem. Mat. Méd.*, ed. 5, ii. p. ii., 345.—LINDL., *Fl. Méd.*, 264.—ROSENTH., *Syn. Plant. Diaphor.*, 1035 (*Lignum nephriticum* HEEN.) (see p. 78, figs. 49-51).

States. It has also been recommended in cholera and dysentery, and has been considered as efficacious as kino or catechu. Many species of *Cæsalpinia* also furnish dyestuffs, usually red. The following species are mentioned among others:—*Cæsalpinia echinata*,<sup>1</sup> supposed to produce the Brazil-wood, Pernambuco, St. Martha, and Antilles-wood; *C. Sappan*,<sup>2</sup> the Sappan-wood or bukkum-wood of India; *C. crista*,<sup>3</sup> also sometimes called Brazil-wood or *Brésillot*; *C. brasiliensis*,<sup>4</sup> the *Brasiletto* or Red-wood of Jamaica; and *C. tinctoria*<sup>5</sup> of Peru and Colombia, used like the preceding species for dyeing red and black: *C. bahamensis*<sup>6</sup> and *Sepiaria*,<sup>7</sup> though less in request, possess the same properties. As tinctorial plants are also used *Cassia brasiliensis*<sup>8</sup> and *auriculata*, the *Hymenæas* which ALLEMAO has named *Peltogyne Guarabú* and *macrolobium*,<sup>9</sup> several *Bauhinias*,<sup>10</sup> *Eperua falcata* AUBL.,<sup>11</sup> *Vouapa Simiria* AUBL.,<sup>12</sup> *Melanoxydon Brauna* SCHOTT,<sup>13</sup> &c.

Nearly all the arborescent *Cæsalpinia* afford useful and often valuable woods, a mine of wealth for tropical countries. The structure of these woods should be studied by observers on the spot. The botanical origin of many of the commercial species or kinds is but little known. Thus, the true origin of the American Angelica and Vouacapou woods, so-called, was long unknown. The former belongs to *Dicorynia paraensis* BENTH.,<sup>14</sup> a fine tree from Guiana and South Brazil, very solid for building purposes, and resisting the action of damp; it is hence used for making bridges, balustrades, and railway sleepers.<sup>15</sup> The latter wood does not belong to an *Andira*, as was thought, but to a member of the series *Sclero-*

<sup>1</sup> LAMK., *Dict.*, i. 461.—DC., *Prodr.*, ii. 483, n. 19.—*Guilandina echinata* SPRENG., *Syst.*, ii. 327 (*Ibirapitanga* MARCGR.).

<sup>2</sup> L., *Spec.*, 544.—ROXB., *Pl. Coromand.*, i. t. 16.—DC., *Prodr.*, ii. 6.—GUIB., *op. cit.*, iii. 317.

<sup>3</sup> L., *Spec.*, 544.—DC., *Prodr.*, n. 11.

<sup>4</sup> L., *Spec.*, 544 (part.).—DC., *Prodr.*, n. 5.—*C. bahamensis* LAMK.?

<sup>5</sup> CAY., *Præl.*, ex DC., *Cat. Hort. Monsp.*, 84.—*Coullteria tinctoria* H. B. K., *Nov. Gen. et Spec.*, vi. 329, t. 569.—C. GAY., *Fl. Chil.*, ii. 222.—*Poinciana Tara* R. & PAV., ex DC., *Prodr.*, ii. 481, n. 3.—*Tara tinctoria* MOL., *Chil.*, 164.—*Poinciana spinosa* FEUILL. (*Tarataro* of the Chilians).

<sup>6</sup> LAMK., *Dict.*, i. 461.—DC., *Prodr.*, n. 10.

<sup>7</sup> ROXB., *Fl. Ind.*, ii. 360.

<sup>8</sup> See p. 151, note 3.

<sup>9</sup> Ex ROSENTH., *op. cit.*, 1041.

<sup>10</sup> Especially *B. variegata* (ROXB., ex LINDL., *Veg. Kingd.*, 550).

<sup>11</sup> *Guian.*, i. 369, t. 142.—*Dimorpha falcata* SM., in *Rees Cyclop.*, n. 3. Its bark is bitter, and is used as an emetic by the Arrawack Indians.

<sup>12</sup> *Guian.*, i. 26, t. 8.—*V. violacea* LAMK., *Ill.*, t. 420.—*Macrolobium Simira* GMEL., *Syst.*, i. 93.—*M. sphaerocarpum* W., *Spec.*, i. 186.

<sup>13</sup> Ap. SPRENG., *Syst.*, *Cur. Post.*, 406.—ROSENTH., *op. cit.*, 1032.—*Perittium ferrugineum* VOG., in *Linnaea*, xi. 408 (*Maria preta* of the Brazilians).

<sup>14</sup> In *Hook. Journ.*, ii. 82.

<sup>15</sup> A wood of the highest value for naval purposes, being proof against insects and ship-worms. It supplies pieces of timber of 15 or 20 metres long. Three varieties are known—black, red, and white (strength=215 kilos).

*lobiæ*, to *Vouacapoua americana* AUBL.<sup>1</sup> Its colour is a dark brown, varying in depth and variegated with whitish spots, whose form varies with the direction of the section; its great solidity renders it valuable for building and many domestic purposes in Guiana.<sup>2</sup> The Copaiva-trees have yet finer and handsomer woods, preferably employed by the cabinet-maker. That of *Copaifera officinalis* is used for marqueterie in the Antilles. The so-called Amaranth woods<sup>3</sup> of Guiana belong to *C. bracteata*, and, we are told, to *C. pubiflora* also. They are fine, hard, and elastic, even resisting artillery discharges, and are hence used for making fine furniture, and all kinds of constructions.<sup>4</sup> The Courbaril woods are also of good quality. That of *Hymenæa Courbaril* L.<sup>5</sup> (the West Indian Locust-tree) is red, hard, and full of specks, which look as though engraved; it is used in the manufacture of very strong furniture and utensils.<sup>6</sup> Several other species afford good timber. *Melanoxylon Brauna* SCHOTT, the *Guarauna* of Brazil, is a fine tree with an incorruptible, tough, black heart-wood, one of the best in the country for building.<sup>7</sup> The chief kinds of Iron-wood (*Bois de fer*) of the same country are *Apuleia ferrea* MART., and the *Juca* (*Cæsalpinia ferrea* MART.<sup>8</sup>), the woods of the *Vignatico* (*Echirospermum Balthasari* ALLEM.<sup>9</sup>), and the *Cana fistula* (*Cassia brasiliæna* LAMK.<sup>10</sup>), are also cited as excellent. The oily *Vouapa* or *Eperu*, the wood of *Eperua falcata*,<sup>11</sup> the Wallaba-tree, impregnated with a resinous oil that renders it very durable, is prized in Guiana; so, too, is that of *E. (Parivoa) grandiflora*,<sup>12</sup> used, among other purposes, in the fabrication of the *juruparis*<sup>13</sup> of the Amazon; and especially that of the magnificent *Dimorphandra excelsa*,<sup>14</sup> which attains a height of upwards of 160 feet. *Cæsalpinia insignis*,<sup>15</sup> from the Amazon, is, we are told, one of the Rosewoods of commerce. At the Cape of Good Hope

<sup>1</sup> See p. 88, note 4.

<sup>2</sup> GUIB., *Drog. Simpl.*, ed. 4, iii. 331.

<sup>3</sup> Distinguished as red and purple Amaranths (*Purple-wood*, *Purple-heart* of the English; *Simiridi* of the Galibis and Arrawacks).

<sup>4</sup> It is also used for gun-carriages, railway-sleepers, &c. (see GUIB., *loc. cit.*, 322.—LINDL., *Veg. Kingd.*, 550).

<sup>5</sup> *Spec.*, 537 (see above, p. 108, note 1).

<sup>6</sup> GUIB., *loc. cit.*, 323.—ROSENTH., *op. cit.*, 1042.

<sup>7</sup> J. DE SALDANHA, *Configur. das Pr. Madeir.*, 94, t. 2.

<sup>8</sup> Both are also termed *Pao ferro*, or False Brazil Iron-wood.

<sup>9</sup> Ex SALDANHA, *op. cit.*, 39, t. 3 (*Cassia*?).

<sup>10</sup> See p. 151, note 3.—SALDANHA, *op. cit.*, 43.

<sup>11</sup> See p. 105, note 1.

<sup>12</sup> See p. 105, note 2, figs. 81, 82.

<sup>13</sup> Musical instruments used by the Indians in certain religious ceremonies.

<sup>14</sup> *Mora excelsa* SCHOMB., in *Trans. Linn., Soc.*, xviii. 207.—The seeds of certain *Dimorphandras* are supposed to contain the largest dicotyledonous embryos known.

<sup>15</sup> *Poinciana insignis* K., *Mimos.*, t. 44.—H. B. K., *Nov. Gen. et Spec.*, vi., 333.



several *Schotias* are valued for their hard whitish wood, especially *S. latifolia*.<sup>1</sup> Among the remaining African *Cæsalpinieæ* valuable for their wood we may mention *Afzelia africana*,<sup>2</sup> common on the banks of the Casamance, whose wood is hard and close-grained, clouded with light violet; *Detarium microcarpum*<sup>3</sup> of Senegal, excellent for boat-building; and *Dialium nitidum*<sup>4</sup> or *Solomé*<sup>5</sup> of Senegambia, for fine carpenter's work and turning. The only woods from India and the Indian Archipelago which are cited as useful are those of *Afzelia bijuga*, *Dialium indicum*<sup>6</sup> (Tamarind Plum), *Saraca indica*,<sup>7</sup> the Sappan and Tamarind, and several *Bauhinias*.<sup>8</sup> These last have often a textile bark: coarse but strong ropes are made from that of *B. tomentosa* L., *purpurea* Sw., *Adansonia*,<sup>9</sup> and *reticulata*.<sup>10</sup> In this order, as a rule, the barks furnish but few useful products, except those rich in tannin and used in preparing skins. We may, however, refer to that of *Burkea*,<sup>11</sup> which passes for an astringent and tonic; that of *Cadia*, used in the treatment of intestinal complaints in Arabia;<sup>12</sup> that of several American *Cassias*, a febrifuge; that of *Brownea coccinea*,<sup>13</sup> much used in piles; and finally, that of the Abyssinian *Kantuffa*, on which BRUCE<sup>14</sup> wrote so interesting a chapter, and which belongs to *Pterolobium Kantuffa*.<sup>15</sup> The trunks of various species of *Gleditschia*, *Gymnocladus*, *Cercis*, and *Ceratonia* are used for timber in temperate Europe, Asia, and North America.

<sup>1</sup> JACQ., *Fragm.*, 23, t. 15, fig. 4.—DC., *Prodr.*, ii. 508, n. 6.—HÆRV. & SOND., *Fl. Cap.*, ii. 274.—ROSENTH., *op. cit.*, 1041.—*Omphalobium Schotia* JACQ. (*The Boor Baum* of the Dutch colonists).

<sup>2</sup> SMITH, in *Trans. Linn. Soc.*, iv. 221.—GUILL. & PERR., *Fl. Seneg. Tent.*, i. 263, t. 57.

<sup>3</sup> GUILL. & PERR., *op. cit.*, 271 (*Dank* of the Cayor natives).

<sup>4</sup> GUILL. & PERR., *op. cit.*, 267, t. 58.—*D. guineense* W., in *Rœm. Arch.*, 1, 31, t. 6.—H. BN., in *Adansonia*, vi. 198.—(See above, page 129, note 4, figs. 114–117).

<sup>5</sup> *Sorum* or *Solum* of the Cape Verde negroes, *Koccyto* of the Mandingos.

<sup>6</sup> *D. Indum* L., *Mantiss.*, 24.—DC., *Prodr.*, ii. 520, n. 1.—ROSENTH., *op. cit.*, 1046.

<sup>7</sup> L., *Mantiss.*, 98.—*Jonesia Asoca* ROXB., *Cat. Hort. Calc.*, 26.—DC., *Prodr.*, ii. 487, n. 1.—*J. pinnata*, W., *Spec.*, ii. 287.—This plant is cultivated in our conservatories for the sake of its beautiful orange-calyxed flowers. The inflorescences are offered to the gods in the temples of India, as are those of *Amherstia nobilis*.

<sup>8</sup> Especially *Bauhinia acuminata* L., which produces a kind of Ebony-wood, *purpurea* BENTH.,

*variegata* L., &c.—(See ROSENTH., *op. cit.*, 1043, 1044.—BRUCE, *Voyag.*, trad. CASTER, v. 73).

<sup>9</sup> GUILL. & PERR., *Fl. Seneg. Tent.*, i. 265 (*Raund* of the negroes).

<sup>10</sup> GUILL. & PERR., *op. cit.*, 266, t. 60.—*B. Thönningii* SCHUM., *Beskr.*, i. 223 (*Ghighis* of the negroes).—The bark is very astringent, and much used in chronic dysentery; gum sweats from the leaves.

<sup>11</sup> Especially that of *B. africana* HOOK., and that of another broad-leaved species from Angola, which we call *B. Caperangan*; its decoction is used by the women to give firmness to their organs.

<sup>12</sup> The infused leaves of *C. purpurea* serve the same purpose.

<sup>13</sup> JACQ., *Amer.*, 194, t. 121.—DC., *Prodr.*, ii. 477, n. 2 (*Rose de Montagne* of the Venezuelans.—See above, p. 97, figs. 70–72.—ROSENTH., *op. cit.*, 1047).

<sup>14</sup> *Voyag.*, loc. cit., 64.

<sup>15</sup> *P. lacerans* R. BR., in *App. Sal.*, 64 (part).—*Quartinia abyssinica* A. RICH., in *Ann. Sc. Nat. sér. 2*, xiv., 260, t. 14; xv. 180.—*Mimosa Kantuffa* DC., *Prodr.*, ii. 431.

There are but few edible seeds and fruits in *Leguminosæ*. The pericarp is rarely fleshy. That, however, of *Detarium senegalense*,<sup>1</sup> "about as big as an apricot, has a greenish floury flesh, traversed by numerous fibres spreading from an orbicular stone resembling that of the peach. It is extensively consumed by both negro and monkey, and is brought in considerable quantities to the markets of Goree, and even of St. Louis."<sup>2</sup> The *Dialiums* of the same country have also edible pericarps, especially *D. nitidum*, which has "subcompressed rounded fruits, black and velvety within, full of a moistish floury pulp, of a very agreeable subacid taste, and much prized by negroes, monkeys, and other animals."<sup>3</sup> In the Courbarils (*Hymenæa*), too, it is the pulp produced inside the pericarp that is the edible portion of the fruit. Formed, as we have seen, of hairs gorged with starchy and resinous matters, it finally dries up and is so usually eaten. The pericarp itself is impregnated with astringent resinous matters. Astringency is strongly developed, too, in the pericarp of the *Cæsalpinias*,<sup>4</sup> especially in those hence used for tanning. The chief are the *Divi-divi* or *Libidibi* pods,<sup>5</sup> the fruits of *C. coriaria*, and the *Algarobillas* or *Algarovillos* of South America, the fruits of *C. glabrata* (?). The pods of *C. crista*, *corymbosa* BENTH., *Cacalaco*,<sup>7</sup> &c., are also rich in tannin. Those of *C. brevifolia*<sup>8</sup> are also exported from Chili under the name of *Algarrobilos*, the pericarp being rich in resin and tannin. In the Carobs and Tamarinds it is the mesocarp which becomes thick and fleshy; but the chief principles in its parenchyma are sweet or acid. Thus the Carobs, or *Karouba*, contain a firm, soft, sweet, nutritious flesh, eaten in the Mediterranean and used as fodder in Spain under the name of *Algarobo* and in England under that of Locust-beans.<sup>9</sup> In the fruits of *Tamarindus indica*<sup>10</sup> the parenchyma of the mesocarp, when freed from the fibro-vascular

<sup>1</sup> GMEL., *Syst.*, iii. 700.—DC., *Prodr.*, ii. 521.—HOOK., *Niger*, 329.—H. BN., in *Adansonia*, vi. 200 (*Niey-datch* of the negroes).

<sup>2</sup> GUILL. & PERR., *Fl. Sen. Tent.*, i. 270.

<sup>3</sup> GUILL. & PERR., *loc. cit.*, 268.

<sup>4</sup> W., *Spec.*, ii. 532.—DC., *Prodr.*, ii. 483, n. 16.—K., *Mimos.*, t. 45.—*C. Thomæa* SPRENG.—*Poinciana coriaria* JACQ., *Amer.*, 123, t. 175, fig. 36.

<sup>5</sup> *Nacasol*, *Owatta-pana*, *Muata-pana* (GUIB., *Drog. Simpl.*, ed. 4, ii. 368, fig. 360;—ROSENTH., *op. cit.*, 1034).

<sup>6</sup> H. B. K., *Nov. Gen. et Spec.*, vi. 326.—DC., *Prodr.*, n. 13.—These are perhaps the

fruits represented by *Guibourt* (*loc. cit.*, fig. 361).

<sup>7</sup> H. B., *Pl. Æquin.*, ii. t. 137.—DC., *Prodr.*, n. 14.

<sup>8</sup> *Balsamocarpon brevifolium* CL., apud C. GAY, *Fl. Chil.*, ii. 228, t. 20.

<sup>9</sup> From it is prepared a tonic wine and a syrup used in Egypt for preserving tamarinds, myrobalans, &c. (GUIB., *op. cit.*, ii. 349, fig. 347.—MÉR. & DEL., *Dict.*, ii. 180;—A. RICH., *Élém.*, éd. 4, ii. 225;—ROSENTH., *op. cit.*, 1046). The fruits were the *siliquæ dulces* of the old physicians.

<sup>10</sup> See page 100, n. 1, figs. 73-76.—The wood is good for building, cart-making, &c. It is the

bundles which traverse it, is a yellow or brownish pulp, sweet, acid, and slightly astringent, long employed in medicine as a laxative and antiputrescent; it was formerly used in the old electuaries known as *lenitif*, *catholicon double*, &c.<sup>1</sup> From it is made a pleasant subacid preserve. Tamarind and Carob seeds were, we are told, the original carats used by jewellers to weigh against precious stones. The albumen contained in these seeds, as in those of *Afzelia bijuga*, may be roasted and eaten. So, too, with those of *Bauhinia Vahlia* BENTH., the Cape *Schotias*, and several Indian *Cæsalpinias*. The enormous seeds of *Prioria Copaifera* GRISEB. have edible embryos, and are sold at Panama under the name of *Cativa* or *Amanza muger*.<sup>2</sup> Oil is extracted from the seeds of *Cæsalpinia oleosperma* ROXB., *C. (Guilandina) Bonduc*, *Bauhinia tomentosa* L., *Dicorynia paraensis* BENTH., &c. The edible part of the seeds of *Afzelia africana* is the orange-coloured fleshy aril, which rises from the hilum to form a deep sac or cupule.<sup>3</sup>

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*Dakkar* of Senegal, the *Balam pulli* of India (GUIB., *op. cit.*, ii. 348, fig. 346;—MÉR. & DEL., *op. cit.*, vi. 633).

<sup>1</sup> Such as *diaprun*, *confection Hamech*, and *psyllium*.

<sup>2</sup> BENTH., in *Trans. Linn. Soc.*, xxiii. 390.

<sup>3</sup> GUILL. & PERR., *Fl. Sen., Tent.*, i. 264.—ROSENTH., *Syn. Plant. Diaph.*, 1044.

## GENERA.

### I. CADIEÆ.

1. **Cadia** FORSK.—Flowers hermaphrodite regular; receptacle broadly cupuliform or campanulate, lined by a disk with 10-crenulate margin. Calyx perigynous 5-partite; sepals valvate-subreduplicate in æstivation. Petals 5, equal alternisepalous free, oblong-obovate or suborbicular, shortly unguiculate, contorted or variably imbricated; highest petal sometimes innermost, sometimes outermost. Stamens 10, perigynous, 5 oppositipetalous shorter, 5 alternipetalous; filaments free; anthers introrse 2-celled, dehiscing longitudinally, finally versatile. Germen central free stipitate; ovules  $\infty$ , 2-seriate parietal descending: micropyle superior extrorse; style short curved; stigma small terminal. Legume linear acuminate plano-compressed coriaceous, continuous within,  $\infty$ -seeded, 2-valved. Seeds unequally-ovate compressed exarillate; embryo exalbuminous fleshy; radicle superior inflexed accumbent.—Unarmed shrubs; leaves alternate imparipinnate; leaflets  $\infty$ , small exstipellate; stipules 2, small lateral; flowers rather large, solitary or in few-flowered pendulous lateral racemes, axillary or terminal (*Eastern tropical Africa, and adjoining islands*). See p. 69.

### II. EUCÆSALPINIÆ.

2. **Cæsalpinia** PLUM.—Flowers hermaphrodite, more or less irregular; receptacle evenly or unevenly cupuliform, lined by a disk. Calyx 5-partite; sepals unequal; æstivation imbricate (lowest sepal enveloping 2 lateral and often larger cymbiform), or much more rarely subvalvate or valvate (*Melanosticta*). Petals 5, free, unequal, much imbricated; highest petal larger or smaller, innermost in æstivation. Stamens 10, perigynous free declinate; filaments glandular or villous at base; anthers uniform introrse 2-celled, dehiscing longitudinally. Germen sessile free at bottom of receptacle; style terete; apex stigmatiferous, truncate or clavate, or more rarely concave or broadly peltate (*Peltophorum*); ovules few

descending. Legume of variable form; in some cases straight tortuous or subfalcate, thick, spongy or coriaceous, subcarnose, indehiscent or tardily 2-valved (*Libidibia*, *Peltophorum*, *Coulteria*), resinous subtorulose (*Balsamocarpon*); sutures sometimes thickened (*Cinclidocarpus*); in other cases legume 2-valved, thin coriaceous, sprinkled with glands or short bristles (*Erythrostemon*, *Hoffmanseggia*, *Pomaria*), straight or falcate; or else eglandular (*Cæsalpinaria*), ovate or oblong, unarmed (*Nugaria*), more rarely somewhat turgid echinate (*Guilandina*), or broadly falcate or straight with truncate apex and coriaceous valves (*Sappania*). Seeds few or solitary, ovate obovate orbicular globose or ovoid; testa coriaceous; embryo exalbuminous; cotyledons flat or cordate; radicle short straight.—Trees or shrubs, more rarely undershrubs or herbs (*Hoffmanseggia*), either unarmed (*Coulteria*, *Cæsalpinaria*, *Libidibia*, *Erythrostemon*), or glandular (*Pomaria*, *Balsamocarpon*), or prickly, high climbing (*Cinclidocarpus*, *Guilandina*, *Nugaria*, *Sappania*); leaves alternate, 2- or more rarely simply-pinnate (*Pari-pinnaria*, *Cenostigma*); leaflets rather large, coriaceous or herbaceous, or small numerous; stipules of variable form; flowers in simple, axillary or terminal, and in branching racemes; bracts small or large, usually very caducous (*All hot regions*). See p. 71.

3. **Zuccagnia** CAV.—Flowers small (of *Cæsalpinia*); ovary shortly stipitate, 1-ovulate; style filiform, rather thick; stigma terminal concave, minutely ciliate. Legume short subovate, 2-valved; valves covered with long bristles; seed descending ovate flat; embryo exalbuminous; cotyledons broad flat, cordate at base; radicle straight short.—A glutinous shrub; leaves alternate pinnate; leaflets small coriaceous; stipules minute caducous; flowers in terminal racemes; bracts very caducous (*Andine Chili*). See p. 76.

4. **Parkinsonia** PLUM.—Flowers of *Cæsalpinia*; ovary  $\infty$ -ovulate; style slender; apex evenly or obliquely truncated. Legume linear torulose, indehiscent or sub-2-valved; valves rather thick, or thin coriaceous, convex over the seeds, often constricted between them, striated. Seeds oblong albuminous.—Trees; leaves alternate 2-pinnate; petiole short spiniform; pinnæ 2-4, flattened,  $\infty$ -foliolate; stipules small, often spinescent; flowers in axillary racemes; bracts

caducous (*Hot regions of America, Mexico, southern Africa*). See p. 77.

5. **Cercidium** TUL.—Flowers of *Cæsalpinia*; sepals subequal, valvate or subimbricate with obliquely-cut margins. Stamens 10; filaments pilose at base; anthers uniform ovate versatile. Germen shortly stipitate,  $\infty$ -ovulate; style involute, apex acute; stigma small terminal. Legume linear-oblong plano-compressed, membranous or subcoriaceous, 2-valved; sutures nerviform; valves venulose. Seeds ovate compressed albuminous.—Trees or shrubs; branches usually tortuous; axillary twigs spinescent; leaves small 2-pinnate; leaflets small paucijugate; flowers fascicled in short lax racemes at defoliated nodes of wood; bracts small membranous; bractlets small or 0 (*Central America, Mexico*). See p. 77.

6. **Mezoneurum** DESF.—Flowers of *Cæsalpinia*; receptacle cupuliform or obliquely cymbiform, glandular within, sometimes subrostrate posteriorly. Sepals 5, unequal (lowest sepal usually much the largest) free, finally spreading or coalescing into a rather long tube, much imbricated. Petals of *Cæsalpinia*; highest petal innermost, usually unlike the others, sometimes having within above the base a small unequally-corrugated lacinate appendix. Stamens 10; filaments glabrous or pilose at base. Germen 2- $\infty$ -ovulate; style usually clavate at apex; stigma terminal small, usually concave minutely ciliate. Legume plano-compressed, membranous or coriaceous, longitudinally winged at superior suture, indehiscent or sub-2-valved. Seeds transverse plano-compressed, orbicular or reniform; embryo exalbuminous; cotyledons flat; radicle short straight.—Trees or more frequently high climbing shrubs, often prickly; leaves 2-pinnate; stipules small or 0; flowers in axillary simple or terminal compound racemes; bracts usually caducous; bractlets 0 (*Tropical Asia, Africa, and Australia*). See p. 78.

7. **Hæmatoxylon** L.—Flowers subregular; receptacle cupuliform subhemispherical, glandular within. Sepals 5, subequal, much imbricated. Petals 5, oblong spreading subequal imbricated. Stamens 10, perigynous uniform; 5 oppositipetalous shorter. Germen inserted in bottom of receptacle, free, shortly stipitate, pauci-

(usually 2-) ovulate; style slender; stigma small capitate. Legume lanceolate plano-compressed membranous leaf-like, indehiscent at sutures but bursting longitudinally down middle of valves to form 2 unequal navicular pseudovalves. Seed 1 (more rarely 2), transversely oblong; hilum ventral depressed; embryo exalbuminous fleshy; cotyledons with 2 widely divaricating lobes, narrowed at base; radicle very short straight, retracted between lobes of cotyledons.—A glabrous tree; leaves pinnate or 2-pinnate; leaflets paucijugate, unevenly obovate; stipules sometimes minute deciduous, sometimes spinescent persistent; flowers in short axillary, solitary or fascicled racemes; bracts minute caducous (*Tropical and subtropical America*). See p. 78.

8. *Poinciana* L.—Flowers subregular (of *Cæsalpinia*); sepals 5, subequal thick valvate. Petals subequal (or highest innermost unlike the rest), much imbricated. Stamens 10 (of *Cæsalpinia*), exserted. Germen sessile or shortly stipitate, central or somewhat excentric,  $\infty$ -ovulate; style thin, short or elongated; apex sometimes clavate; stigma small terminal, truncate or minutely ciliate. Legume elongated plano-compressed, sometimes very long, hard veined, replete between seeds, 2-valved. Seeds oblong; testa hard; embryo albuminous; cotyledons rather thick; radicle straight short exserted.—Unarmed trees; leaves 2-pinnate; stipules minute or 0; flowers handsome, in racemes or corymbs on extremities of twigs; bracts small caducous; bractlets 0 (*East Indies, hot regions and islands of Eastern Africa*). See p. 80.

9. *Colvillea* BOJ.—Flowers of *Poinciana*; calyx ventricose; sepals coriaceous thick induplicate-valvate, connate at apex into a 5- or more rarely 4-toothed sac, highest tooth broader; calyx finally separating by circumscission from base. Corolla of *Poinciana*; highest petal innermost and broader. Stamens 10 (of *Cæsalpinia*). Germen subcentral free  $\infty$ -ovulate; style slender; apex obtuse stigmatiferous. “Legume elongated straight thick turgid 2-valved. Seeds transverse oblong; hilum small.”—An unarmed tree; leaves 2-pinnate  $\infty$ -foliolate; stipules minute caducous; flowers in thick branched racemes; rachis thickened; bracts membranous coloured caducous; bractlets 0 (*Madagascar*). See p. 80.

10. **Acrocarpus** WIGHT.—Flowers subregular; receptacle campanulate, lined by a disk; calyx and corolla subregular. Stamens 5, alternipetalous equal exerted. Germen central stipitate  $\infty$ -ovulate; style short inflexed; stigma small terminal. Legume elongated  $\infty$ -seeded, on very long stalk. Seeds . . . ?—An unarmed tree; leaves large 2-pinnate; leaflets ovate acuminate herbaceous; flowers expanding before leaves, rather large, racemose; racemes solitary axillary, or in twos or threes at extremities of branches; bracts and bractlets small caducous (*East Indies*). See p. 81.

11. **Wagatea** DALZ.—Flowers subregular (of *Cesalpinia*); receptacle long, campanulate or subtubular, lined by a disk; calyx and corolla subregular imbricated. Stamens 10, free, markedly perigynous. Germen inserted in bottom of receptacle, free  $\infty$ -ovulate; style subclavate at apex; stigma concave oblique sub-2-labiate. “Legume oblong-linear acute coriaceous, transversely depressed between seeds; sutures thickened. Seeds obovate-oblong; testa thick bony; radicle very short, straight.”—High climbing prickly shrubs; leaves 2-pinnate; leaflets numerous; flowers in long simple or branched spikes; rachis thick, pitted at insertion of each flower; bracts small caducous (*East Indies*). See p. 81.

12. **Pterolobium** R. BR.—Flowers subregular; receptacle slightly concave, lined by a disk. Sepals 5, imbricated. Petals 5, imbricated. Stamens 10, free; anthers introrse 2-rimose. Germen central sessile, 1-2-ovulate; style short or long; apex truncate or concave, stigmatiferous. Legume sessile compressed samaroid indehiscent 1-seeded; placentary margin oblique, produced into a membranous, oblong or falcate wing. Seed descending compressed; embryo exalbuminous; cotyledons flattened; radicle short straight.—Trees or high climbing shrubs, prickly; leaves 2-pinnate; stipules small or 0; flowers in loosely-branched terminal racemes; bracts very caducous; bractlets 0 (*Tropical Asia, Africa, and Australia*). See p. 82.

13. **Barklya** F. MUELL.—Flowers subregular (of *Pterolobium*); receptacle cupuliform, lined by a disk. Calyx gamosepalous, shortly toothed, imbricated. Petals subequal with rather long claws;



highest petal of variable æstivation, never outermost. Stamens 10, perigynous subequal; anthers uniform sagittate introrse 2-rimose. Germen stipitate pauciovulate; style short apiculate; apex undilated stigmatiferous. "Legume stipitate oblong-lanceolate flat thin, almost indehiscent. Seeds 1, 2, plano-compressed; albumen small; cotyledons compressed; radicle rather long, inflexed."—An unarmed tree; leaves 1-foliolate; stipules 2, small lateral; flowers in terminal branched racemes; bracts minute; bractlets 0. (*Tropical Australia*). See p. 82.

14. **Gymnocladus** LAMK.—Flowers polygamo-dioecious; receptacle long tubular, lined by a disk. Sepals 5, inserted at top of tube, valvate or unevenly imbricated. Petals 5, subsimilar to sepals, subequal imbricated. Stamens 10, free inserted with perianth; anthers uniform introrse rimose, in female flower sterile. Germen inserted in bottom of receptacle, in male flower rudimentary, in hermaphrodite and female  $\infty$ -ovulate; style terminal straight; apex obliquely dilated, sub-2-lobed stigmatiferous. Legume sessile oblong sub-falcate thick turgid, finally woody, 2-valved, pulpy within between seeds. Seeds thick, subglobose or obovoid; funicle rather long; integuments coriaceous; albumen copious horny; embryo fleshy; cotyledons flattened; radicle short straight. An unarmed tree; leaves alternate 2-pinnate; leaflets membranous; stipules 2, lateral minute pectinate; stipels linear; flowers in terminal simple or branched racemes (*North America*). See p. 83.

15. **Gleditschia** L.—Flowers polygamous; receptacle turbinate-campanulate or tubular, lined by a disk. Sepals 3–5, narrow sub-imbricated. Petals 3–5, sessile subequal, nearly similar to sepals, imbricated. Stamens 6–10, free, inserted with perianth, in female flower sterile. Germen central, in male flower rudimentary or 0, in female and hermaphrodite 2– $\infty$ -ovulate; style short; stigma terminal, more or less dilated. Legume ovate or elongated, straight compressed, coriaceous or subdrupaceous; indehiscent or tardily 2-valved; mesocarp pulpy; endocarp membranous protruded between seeds. Seeds 1– $\infty$ , transverse; funicle slender, rather long; albumen horny; embryo compressed; cotyledons subfoliaceous; radicle straight, slightly exserted.—Trees; abortive twigs often transformed into strong simple or branched spines; leaves 2-pinnate

and (on same tree) simply paripinnate; flowers in simple or fascicled or compound cymuliferous, axillary or lateral, racemes (*North America, temperate and subtropical Asia*). See p. 84.

### III. SCLEROLOBIEÆ.

16. **Sclerolobium** Vog.—Flowers hermaphrodite subregular; receptacle cupuliform or shortly obconical, lined by a disk; mouth evenly or obliquely truncate. Sepals 5, subequal imbricated. Petals 5, equal or slightly unequal, membranous imbricated, with highest petal innermost (*Cosymba*); or else thin linear unequal. Stamens 10, inserted with perianth; filaments free, pilose at base, inflexed or folded in æstivation; anthers uniform introrse, longitudinally 2-rimose. Germen central stipitate, inserted in bottom of receptacle, straight or oblique,  $\infty$ -ovulate; ovules descending 2-seriate; micropyle extorse superior; style terminal slender; apex stigmatiferous, truncate or scarcely dilated. Legume shortly stipitate plano-compressed 1- $\infty$ -seeded indehiscent; exocarp often separable from thin subligneous endocarp. Seeds large, orbicular or reniform; embryo exalbuminous; cotyledons leaf-like, cordate at base; radicle short straight.—Trees; leaves impari- or paripinnate; stipules minute or 0, more rarely leaf-like 1-3-foliolate; flowers small numerous in much-branched terminal racemes; bracts small caducous (*Tropical America*). See p. 85.

17. **Diptychandra** TUL.—Flowers of *Sclerolobium*; sepals and petals 5, imbricated. Stamens 10 (of *Sclerolobium*). Germen central stipitate pauciovulate; style slender inflexed; stigma terminal, truncated or slightly dilated. Legume shortly stipitate, short or elongated, plano-compressed, bare within, 2-valved; valves coriaceous; margins nerviform. Seeds 1-3, transverse, orbicular or reniform, much compressed; testa expanded into a marginal wing; embryo exalbuminous; cotyledons flat; radicle short straight.—Unarmed trees or shrubs; leaves pari- or sub-imparipinnate; leaflets with pellucid dots; stipules minute or 0; flowers in loose axillary and terminal racemes; bracts very caducous (*Brazil, Bolivia*). See p. 87.

18. **Pœppigia** PRESL.—Flowers of *Diptychandra*; receptacle sub-

campanulate, lined by a disk. Sepals usually connate to form a gamosepalous calyx; lobes 5, slightly imbricated. Petals 5, slightly unequal, imbricated. Stamens 10; filaments free straight; anthers introrse versatile. Germen stipitate, inserted in bottom of receptacle, free  $\infty$ -ovulate; style short; stigma small terminal. Legume elongated, much plano-compressed, membranous, bearing a narrow wing at superior suture, indehiscent (?). Seeds compressed; embryo exalbuminous; cotyledons leaf-like; radicle straight.—An unarmed tree; leaves imparipinnate; flowers in much-branched pyramidal compound cymuliferous terminal racemes; bracts and bractlets membranous, very caducous (*Tropical America*). See p. 87.

19. **Batesia** SPRUCE.—Receptacle campanulate, lined by a disk. Calyx regular; sepals 5, equal imbricated. Petals 5, markedly perigynous, subequal imbricated. Stamens 10, inserted with petals; filaments free, villous at base, inflexed in bud; anthers uniform 2-celled introrse, dehiscing longitudinally. Germen inserted on a central stalk with obliquely dilated apex, pauciovulate; style short thick; stigma terminal concave ciliated. “Legume short subfalcate turgid-compressed coriaceous-subligneous, covered by raised ribs, dehiscing as a follicle. Seeds few, exarillate thick-compressed albuminous; cotyledons flat, somewhat fleshy, cordate at base; radicle short straight.”—A lofty unarmed tree; leaves imparipinnate; flowers in composite much-branched terminal racemes; bracts and bractlets narrow very caducous (*Northern Brazil*). See p. 88.

20. **Vouacapoua** AUBL.—Flowers of *Batesia*; anthers subsagittate; ovary sessile 1-ovulate; ovule descending anatropous; style arched; apex concave ciliate stigmatiferous. Fruit coriaceous-subligneous, unequally obovate, obtusely apiculate, wrinkled externally, dehiscing as a follicle, 1-seeded; seed descending obovate glabrous exalbuminous; embryo thick fleshy.—An unarmed tree; leaves and inflorescence of *Batesia* (*Guiana, northern Brazil*). See p. 88.

21. **Melanoxyton** SCHOTT.—Flowers of *Pæppigia*; receptacle campanulate, lined by a disk; calyx and corolla subregular imbricated. Stamens 10, scarcely declinate; filaments villous at base; anthers

oblong introrse uniform. Germen sessile subcentral  $\infty$ -ovulate; style short thick curved; stigma truncate concave, minutely ciliate. "Legume broad oblong-falcate compressed coriaceous-subligneous, replete within between seeds, 2-valved. Seeds transverse oblong compressed; inner covering coriaceous shining close-fitting; outer samariform loose membranous, produced at apex into a truncated falcate wing reaching to margin of valves, base continuous with very short funicle;" albumen thin; cotyledons flat oblong, cordate at base; radicle short straight.—A lofty ferruginous-velvety tree; leaves imparipinnate; leaflets  $\infty$ -jugate; flowers rather large in a large much-branched terminal raceme (*Brazil*). See p. 89.

22. **Thylacanthus** TUL.—Flowers of *Batesia*; sepals 4, 5, membranous petaloid or rather thick, imbricated. Petals 5, somewhat unequal, imbricated. Stamens 10, free or connate to a very small height from base; filaments inflexed in bud; anthers uniform. Germen central, shortly stipitate,  $\infty$ -ovulate; style elongated, involute in æstivation; apex peltate stigmatiferous. Fruit . . . ?—Small trees, unarmed; leaves paripinnate; flowers in compound corymbose racemes at extremities of branches; bracts thick spiral very caducous; bractlets 2, either concave, rather thick, connate on anthesis into a 2-lobed involucre persistent below flower (*Euthylacanthus*), or coriaceous very thick ivory-like, forming a globe before anthesis, persistent opened by anthesis (*Dicymbe*), inclosing a younger flower-bud (*Northern Brazil, southern Venezuela*). See p. 90.

23. **Campsiandra** BENTH.—Receptacle campanulate, lined by a disk. Sepals 5, imbricated. Petals 5, subequal imbricated. Stamens  $\infty$  (usually 15–20), perigynous; filaments free glabrous exerted; anthers introrse. Germen subcentral free, shortly stipitate,  $\infty$ -ovulate; style terminal; stigma minute or dilated. Legume large compressed, straight or falcate, coriaceous or woody, 2-valved. "Seeds exarillate exalbuminous; radicle straight; cotyledons flat, obliquely or evenly cordate."—Unarmed trees; leaves alternate imparipinnate; stipules minute, very caducous; flowers in compound corymbose much-branched terminal racemes; bracts caducous (*Tropical America*). See p. 91.

24. ? **Phyllocarpus** RIED.—Receptacle concave, lined by a disk;

sepals 4, imbricated. Petals 3, posterior; highest petal innermost smallest. Stamens 10, diadelphous (9-1); highest filament free; remainder united to form a sheath, cleft above; anthers uniform introrse 2-rimose. Germen central stipitate pauciovulate; style thin twisted, clavate at apex; stigma minute terminal. Legume oblong subfalcate compressed thin indehiscent (?); placentary suture produced into a narrow wing.—An unarmed tree; leaves paripinnate  $\infty$ -foliolate; flowers in short racemes usually fascicled at nodes of last year's branches; bracts and bractlets very caducous (*Tropical Brazil*). See p. 92.

#### IV. AMHERSTIÆ.

25. **Amherstia** WALL.—Flowers hermaphrodite irregular resupinate; receptacle long tubular, lined by a disk. Sepals 4, inserted at top of tube, petaloid unequal, imbricated in æstivation. Petals 5, free; 3 posterior broad membranous, the highest innermost largest broadly cordate; 2 anterior minute rudimentary. Stamens 10, inserted with perianth, diadelphous (9-1); filament superposed to standard free; remainder coalescing into a sheath, cleft above; 5 oppositipetalous much the smallest; anthers introrse 2-celled 2-rimose. Germen stipitate, very excentric, inserted on posterior wall of receptacle near margin,  $\infty$ -ovulate; style slender, revolute in bud; apex capitellate stigmatiferous. Legume elongated falcate plano-compressed coriaceous woody 2-valved; placentary suture thick dilated. Seeds transverse ovate-orbiculate compressed exarillate; embryo exalbuminous; cotyledons flat; radicle short straight included.—An unarmed tree; leaves alternate paripinnate; leaflets large coriaceous; stipules leaf-like caducous; flowers large in ample loose terminal pendulous racemes; bracts caducous; bractlets large coloured persistent, free or slightly connate at base inclosing bud, finally spreading (*India*). See p. 92.

26. **Humboldtia** VAHL.—Flowers of *Amherstia*, but much smaller; stamens 10, free, all fertile or more usually 5 oppositipetalous reduced to small sterile filaments or absent. Germen pauciovulate. Legume oblong oblique or falcate compressed coriaceous 2-valved. Seeds few compressed exarillate.—Unarmed shrubs; leaves alternate paripinnate; stipules leaf-like, obliquely reniform or semi-

sagittate; racemes dense, terminal or sessile on nodes of old wood, solitary or geminate; bracts ovate or oblong; bractlets coloured, inclosing bud, finally spreading (*Tropical Asia and Africa*). See p. 94.

27. **Schotia** JACQ.—Flowers of *Humboldtia*; stamens 10, free or monadelphous close to base. Legume oblong or broadly linear, falcate or straight, plano-compressed coriaceous subindehiscent; placental suture sometimes marginate. Seeds orbiculate compressed, exarillate (*Theodora*) or with a cupuliform aril formed by expansion of funicle at hilum (*Euschotia*); embryo exalbuminous; cotyledons flat, radicle very short.—Unarmed trees or shrubs; leaves paripinnate; stipules small; flowers handsome, crowded in short branched racemes; bracts and bractlets membranous very caducous (*Southern and subtropical Africa*). See p. 94.

28. **Palovea** AUBL.—Flowers of *Amherstia*; sepals 4, imbricated; petals 3, posterior imbricated. Stamens 9 (stamen superposed to standard absent), free. Legume oblong, very oblique, plano-compressed coriaceous-ligneous; placental suture thickened. Seeds ovate compressed.—Small trees, unarmed; leaves 1-foliolate coriaceous; stipules small; flowers in short spikes at extremities of twigs; bracts short persistent, bractlets lateral coloured, connate to form a 2-lobed involucre shorter than the calyx (*Guiana*). See p. 95.

29. **Elisabetha** SCHOMB.—Flowers of *Palovea*; petals 5, subequal imbricated; stamens 9, free or connate close to base; 3 fertile large, superposed to anterior sepals; 6 posterior, minute or antherless. “Legume elongated falcate plano-compressed coriaceous-woody 2-valved; placental suture thickened. Seeds ovate compressed.”—Unarmed trees; leaves paripinnate; stipules caducous; flowers in short or capitate racemes at extremities of branches; bracts broad coloured; bractlets coriaceous coloured, longer than sepals, connate into a sheath inclosing bud (*Guiana*). See p. 95.

30. **Heterostemon** DESF.—Flowers of *Palovea*; petals 3 posterior broad, 2 anterior rudimentary; stamens 9 (of *Elizabetha*); filaments connate to form a sheath cleft above. Legume stipitate elongated,

straight or falciform, plano-compressed coriaceous 2-valved; sutures a little thickened. Seeds ovate or orbicular, compressed; embryo exalbuminous; cotyledons flat; radicle short included.—Low or weak trees, unarmed; leaves 1- $\infty$ -foliolate; stipules leaf-like caducous; flowers in short few-flowered racemes; racemes terminal or sessile at defoliated nodes; bracts small; bractlets persistent connate very short (*Tropical America*). See p. 96.

31. **Brownea** JACQ.—Flowers of *Palovea*; calyx 4-merous, valvate or imbricated; petals 5, slightly unequal, imbricated. Stamens 10–15, free or unequally monadelphous. Legume oblong or elongated, straight or falcate, coriaceous or subligneous, 2-valved; placental suture thickened or dilated; seeds ovate compressed; embryo of *Heterostemon*.—Trees; leaves paripinnate; stipules leaf-like, often coloured, caducous; flowers handsome, in short terminal few-flowered or very dense, subcapitate racemes; bracts small or large, coloured; bractlets coloured, enclosing calyx, connate to a variable height (*Tropical America*). See p. 97.

32. **Saraca** BURM.—Flowers of *Humboldtia*; calyx coloured; corolla 0; stamens 3–10, either all fertile or 1–6 sterile or antherless; filaments free or connate close to base. Legume oblong or elongated, plano-compressed or rather turgid, coriaceous-subligneous 2-valved. Seeds thick-compressed or subglobose, ovoid or cylindrical, exarillate; embryo exalbuminous; cotyledons thick, sometimes very thick; radicle straight included.—Trees or shrubs, rarely climbing; leaves paripinnate; leaflets coriaceous, usually paucijugate; stipules small caducous or 0; flowers in compound, usually short, much-branched lateral racemes; bracts small deciduous; bractlets lateral, much shorter than receptacular tube, tapering margins often imbricated before anthesis (*Tropical Asia*). See p. 97.

33. **Apaltoa** AUBL.—Flowers apetalous (of *Saraca*); stamens 10 or fewer, free fertile. Germen shortly stipitate, excentric or more rarely subcentral, 2–4- or more rarely  $\alpha$ -ovulate. Legume obliquely orbicular, ovate, or rather broad oblong compressed, coriaceous 2-valved; sutures often thickened. Seeds 1 or few, compressed; embryo exalbuminous compressed.—Unarmed trees; leaves imparipinnate; leaflets alternate; stipules minute or broad leaf-like, persistent;

flowers in simple, lateral or terminal racemes; bracts and bractlets rarely persistent (*Tropical America, Africa, and Asia, Indian Archipelago*). See p. 98.

34. *Baikiaea* BENTH.—Flowers subregular; receptacle turbinate, lined by a disk. Sepals 4, thick, velvety without; edges abruptly tapering or obliquely bevelled, imbricated; highest sepal broader (double). Petals 5, subequal unguiculate imbricated; highest petal innermost equilateral, remainder oblique. Stamens 10, free; filaments villous at base, thinner in 5 alternisepalous stamens; anthers introrse 2-rimose, versatile. Germen excentric stipitate  $\infty$ -ovulate; apex tapering into a glabrous, minutely capitate, style. Fruit . . . ? —Trees, glabrous except the flowers; leaves paripinnate, 1–2-jugate large coriaceous; stipules minute; flowers large, in short subterminal racemes; bracts and bractlets short caducous (*Western Tropical Africa*). See p. 98.

35. *Tamarindus* T.—Flowers irregular; receptacle narrow tubular, lined by a disk. Sepals 4, imbricated; highest sepal broader (double). Petals 3, posterior imbricated; highest petal innermost or more rarely outermost, often narrower. Stamens 9 (of *Heterostemon*); 3 fertile larger, superposed to inferior petals; filaments connate to form a sheath cleft above, becoming free at middle, anthers introrse 2-rimose; 6 sterile reduced to short subulate staminodes. Germen stipitate, very excentric, inserted posteriorly on margin of receptacle,  $\infty$ -ovulate; apex of style scarcely dilated, truncated stigmatiferous. Fruit oblong or linear, subcompressed curved drupaceous indehiscent; epicarp crustaceous fragile; mesocarp thick, very pulpy, traversed by woody branched veins; endocarp coriaceous, septate between seeds. Seed obovate-orbicular, compressed; testa very hard; embryo exalbuminous; cotyledons fleshy; radicle straight included.—An unarmed tree; leaves alternate paripinnate, leaflets small  $\infty$ -jugate; stipules lateral caducous; flowers in racemes at extremities of branches; bracts and bractlets coloured caducous (*Tropical Africa (and Asia ?)*). See p. 99.

36. *Vouapa* AUBL.—Flowers irregular; receptacle concave, of variable form, sometimes narrow tubular, oftener shortly turbinate, lined by a disk. Sepals 4; highest sepal broader; more rarely 5



subequal imbricated. Petals 5; highest petal largest unguiculate, very complex cucullate in æstivation, usually outermost; 4 anterior smaller, or very small scale-like, or more rarely 0. Germen stipitate, more or less excentric, 2- $\infty$ -ovulate; style slender; apex truncate or capitate stigmatiferous. Legume obliquely-orbiculate ovate oblong or falcate, plano-compressed 2-valved; placental suture sometimes thickened or dilated. Seeds 1 or few, orbiculate compressed; embryo exalbuminous; cotyledons thick; radicle straight included.—Unarmed trees; leaves pari- or more rarely imparipinnate; leaflets 1, or pauci-, more rarely multijugate; stipules leaf-like or small caducous, more rarely 0; flowers in simple or branched, terminal or axillary racemes; bracts caducous; bractlets 2, rather thick or coriaceous, inclosing bud as 2 valves, finally spreading (*Tropical America and Africa*). See p. 101.

37. *Berlinia* SOLAND.—Flowers large (of *Vouapa*); sepals 5, thin imbricated; highest petal largest; 4 anterior, a little smaller or oftener rudimentary or 0. Stamens 10, or more rarely 5 alternipetalous, fertile; filaments free or connate close to base; anthers uniform introrse. Germen very excentric, stipitate, inserted high below androceum,  $\infty$ -ovulate, style slender; apex truncate or capitate, stigmatiferous. Fruit . . .?—Unarmed trees; leaves paripinnate; leaflets coriaceous; stipules small caducous, or more rarely broad leaf-like; flowers in simple, or oftener compound, much-branched terminal racemes; bracts coriaceous caducous; bractlets broadly concave thick spathulate, inclosing bud as valves, finally spreading or deciduous (*Western Tropical Africa*). See p. 104.

38. *Daniella* BENN.—Flowers subregular; receptacle narrowly turbinate, lined by a disk. Sepals 4, slightly unequal, coloured imbricated. Petals 5; highest small or rather large; 4 anterior usually rudimentary or 0; 2 lateral rarely rather large, imbricated. Stamens 10, free (of *Berlinia*). Germen excentric stipitate  $\infty$ -ovulate; style terminal; apex capitate stigmatiferous. Legume stipitate obliquely ovate-oblong, subfalcate plano-compressed coriaceous 2-valved; endocarp separating elastically. Seed usually 1, compressed; embryo exalbuminous; radicle short straight.—Unarmed trees; leaves paripinnate; leaflets coriaceous; stipules lateral caducous; flowers in compound much-branched racemes at extre-

mities of branches; bracts and bractlets subsquamous, tapering at margin, coloured imbricated, very caducous (*Western tropical Africa*). See p. 104.

39. **Eperua** AUBL.—Flowers of *Berlinia*; sepals 4, connate to a variable height, imbricated; petal 1, sessile, very broad. Stamens 10, fertile, free or slightly connate at base (*Parivoa*). Germen stipitate, inserted posteriorly on margin of receptacle,  $\infty$ -ovulate; style slender, involute in æstivation; apex minute capitate stigmatiferous. Legume broadly oblong or elongated, usually oblique, plano-compressed, coriaceous or woody, 2-valved; seeds few, ovate or elongated, compressed; embryo exalbuminous fleshy; radicle short included.—Unarmed trees, lofty or weak, sarmentose; leaves paripinnate or subparipinnate; leaflets few, coriaceous; stipules minute or leaf-like, deciduous; flowers handsome, in terminal, simple pendulous or branched, sometimes very long racemes; bracts and bractlets caducous (*Tropical America*). See p. 105.

40. **Afzelia** SM.—Flowers of *Berlinia*; sepals 4, imbricated; petals, highest unguiculate, broadly orbiculate or reniform; 4 anterior rudimentary or 0. Stamens 9, anterior (none superposed to standard) free or monadelphous (*Pahudia*) to a variable height; 3–7 fertile, unequal; remainder antherless or with rudimentary anthers, more rarely entirely absent. Gynæceum of *Berlinia*. Legume stipitate, obliquely oblong, compressed, thick and coriaceous or woody; transversely septate or pulpy between seeds. Seeds transverse, oblong or orbiculate, either bare (*Intsia*) or furnished with a thick fleshy unevenly-cupuliform aril (*Euafzelia*); embryo exalbuminous fleshy.—Unarmed trees; leaves pari- or subimparipinnate; leaflets paucijugate coriaceous; flowers in compound branched terminal racemes; bracts small deciduous; bractlets 2, lateral ovate subpersistent, shorter than bud (*Tropical Africa, Asia, and Oceania*). See p. 106.

41. **Didelotia** H. BN.—Flowers small (of *Berlinia*); receptacle short, lined by a disk; sepals and petals very short, reduced to small unequal or rudimentary scales. Stamens 10, either all-fertile (*Brachystegia*), or 5 oppositipetalous antherless short, sometimes very short, more rarely entirely wanting. Germen stipitate, more or less

excentric,  $\infty$ -ovulate; style thin; apex slightly dilated or truncated, stigmatiferous. "Legume oblong or broadly-linear, often falcate, compressed subligneous 2-valved; placentary suture thick. Seeds transverse, ovate or orbiculate, compressed; embryo exalbuminous fleshy; cotyledons flat; radicle short straight included." — Unarmed trees; leaves alternate paripinnate; leaflets 1- or paucijugate unsymmetrical coriaceous; stipules very short caducous; flowers crowded in simple terminal and axillary, or in terminal much-branched racemes; bracts small or gland-like; bractlets 0 or rather large, obovate-concave, including bud as 2 valves (*Tropical Africa*). See p. 108.

42. *Hymenæa* L.—Flowers thick; receptacle thick, campanulate or turbinate, lined by a disk. Sepals 4, much imbricated, coriaceous; highest sepal broader. Petals 5, sessile, slightly unequal (*Courbaril*, *Peltogyne*), or more rarely 2 anterior very small scale-like or 0 (*Trachylobium*); much imbricated in æstivation. Stamens 10, free perigynous. Germen stipitate, more or less excentric; style long or short; apex stigmatiferous, more or less dilated, subpeltate (*Peltogyne*); ovules 2- $\infty$ . Legume indehiscent, sometimes obliquely orbiculate or scimitar-shaped, more or less winged above (*Peltogyne*), sometimes ovoid or oblong, more or less warty, coriaceous-subligneous, sometimes short few-seeded (*Trachylobium*), sometimes elongated (*Courbaril*); endocarp stuffed with thick floury hairs between seeds. Seeds of variable form, exalbuminous.—Unarmed trees; leaves 2-foliolate; leaflets unsymmetrical coriaceous; stipules small caducous; flowers in dense compound much-branched, often corymbiform, terminal or subterminal, racemes; bracts and bractlets short caducous, rarely shortly connate (*Peltogyne*) and persistent (*Tropical America, eastern tropical Africa and adjoining islands*). See p. 108.

43. *Tachigali* AUBL.—Flowers markedly curved-clavate in bud; receptacle obconical, lined by a disk; mouth oblique. Sepals 5, slightly unequal, much imbricated. Petals 5, slightly unequal, imbricated. Stamens 10, fertile. Germen stipitate, inserted posteriorly on receptacle below androceum,  $\infty$ -ovulate. Legume oblong or elongated, plano-compressed, indehiscent (?). Seeds compressed; albumen thin; embryo compressed.—Unarmed trees; leaves paripinnate;

stipules small caducous; flowers in axillary simple or terminal branched racemes; bracts caducous; bractlets 0 (*Tropical America*). See p. 109.

44. **Schizolobium** Vog.—Flowers of *Tachigali*; mouth of receptacle rather less oblique. Legume unequally obovate, compressed 1-seeded 2-valved; endocarp membranous subligneous, separating from membranous exocarp. Seed at apex of fruit, inclosed in winged separating endocarp, oblong compressed; albumen horny thick; embryo compressed; radicle straight exerted.—Lofty trees; leaves alternate 2-pinnate; leaflets small  $\infty$ ; flowers in axillary simple or terminal branched racemes; bracts small caducous; bractlets 0 (*Tropical America*). See p. 110.

## V. BAUHINIEÆ.

45. **Bauhinia** PLUM.—Flowers hermaphrodite or more rarely polygamous, irregular resupinate; receptacle lined by a disk, either shortly turbinate or tubular. Calyx, before anthesis entire and closed or contracted and shortly 5-toothed; on anthesis cleft in a variable manner or spathe-like; valvate or imbricated in æstivation. Petals 5, slightly or very unequal, imbricated; highest petal innermost. Stamens 10, perigynous; either all perfect and fertile; anthers introrse 2-celled 2-rimose versatile; filaments free or connate to a variable height; or else 1–9 reduced to sterile staminodes or altogether wanting. Germen subsessile or more frequently stipitate rarely furnished with a gland above base, central or excentric, inserted anteriorly on receptacle, 2– $\infty$ -ovulate; style terminal; apex variably dilated or peltate, stigmatiferous. Legume oblong or linear, straight oblique or falcate, membranous coriaceous or sub-carnose, continuous within or replete or septate between seeds, indehiscent or 2-valved. Seeds subglobose or ovoid, compressed; testa thin or hard; embryo albuminous; cotyledons flat; radicle short, straight, oblique, or subinflexed, usually exerted.—Trees or erect or climbing shrubs; stem terete or unequally compressed or flattened, fasciated; branches often furnished with simple tendrils at base of racemes; leaves simple, 1–3-veined, entire or 2-lobed, or often 2-foliolate; end of petiole rather prominent between leaflets, awned; stipules of variable form, often caducous; flowers in simple terminal

and axillary, or more rarely terminal much-branched corymbiform racemes (*All tropical regions*). See p. 110.

46. **Griffonia** H. BN.—Flowers of *Bauhinia*; receptacle tubular, much elongated; calyx loosely campanulate, 5-lobed, imbricated. Petals 5, subequal, imbricated. Stamens 10, perigynous free; anthers uniform introrse versatile. Germen stipitate, very excentric, inserted anteriorly on receptacle,  $\infty$ -ovulate; style short; stigma minute terminal. Legume raised on a long stalk, obliquely oblong, compressed or turgid, 2-valved; style persistent, apiculate or hooked. Seeds few . . . ?—Climbing shrubs; leaves alternate 3-foliolate, penniveined or 3-veined; stipules lateral small; flowers handsome in axillary supra-axillary or terminal, simple or branched, racemes; bracts small caducous (*Western tropical Africa*). See p. 114.

47. **Cercis** L.—Receptacle shortly turbinate, lined by a disk; mouth oblique. Calyx unequally campanulate, broadly 5-toothed, imbricated. Petals 5, very disparate, imbricated; highest petal innermost, stamens 10; filaments free declinate; anthers uniform introrse 2-rimose. Germen stipitate subcentral  $\infty$ -ovulate; style rather thick; apex obtuse stigmatiferous. Legume oblong or broadly linear, compressed thin veined, rather late becoming 1-2-valved; placental suture narrowly winged. Seeds obovate or ovate, compressed; albumen hard; embryo compressed; cotyledons flat; radicle either straight or oblique curved, somewhat exerted.—Unarmed trees or shrubs; leaves simple, entire or emarginate 2-lobed, 3- $\infty$ -veined; stipules small caducous; inflorescence racemose; racemes short, simple or compound, solitary or oftener fascicled, on wood of stem and last year's and older branches (*Temperate and eastern Asia, North America*). See p. 114.

## VI. CASSIÆ.

48. **Cassia** T.—Flowers hermaphrodite irregular resupinate; receptacle slightly dilated; apex a little convex or subplane, more rarely a little concave. Sepals 5, very unequal, at apex sometimes acute, sometimes obtuse, imbricated. Petals 5, alternisepalous, subequal or unequal (posterior petals smaller), imbricated; highest petal innermost. Stamens 10, subhypogynous free; either all fertile

(*Absus*, *Cathartocarpus*, *Psilorhegma*), subequal or higher stamens smaller; anthers subuniform, 2-celled introrse, dehiscing by 2 short oblique, confluent or poriform, slits at apex, or more rarely by a basilar aperture; or else 3–5 higher stamens smaller or sometimes very small, imperfect or abortive, sterile. Germen free, sessile or stipitate, central, straight or oftener arched,  $\infty$ -ovulate; style short or long; stigma terminal small, either truncate, or more rarely swollen, minutely ciliate, concave, or else urceolate containing papillæ. Legume either terete or crasso-compressed, woody, divided by transverse septa between seeds, indehiscent (*Cathartocarpus*) or 2-valved, plano-compressed (*Chamæsenna*); or thin membranous much compressed, thickened in middle over seeds, subindehiscent (*Senna*), at base and apex usually acute (*Chamæcrista*, *Absus*), more rarely winged, bare within or septate between seeds or full of pulp. Seeds transverse or more rarely longitudinal (*Prososperma*), horizontally or vertically compressed, more rarely quadrilateral subterete; embryo albuminous; cotyledons flat or more rarely arched or undulate; radicle short straight.—Trees, shrubs, or herbs; leaves alternate paripinnate, rarely reduced to phyllodes; stipules and petiolar glands variable or 0; flowers in axillary or terminal, simple or branched compound racemes, more rarely solitary or few in each axil; bracts and bractlets variable (*All tropical and subtropical and a few temperate regions*). See p. 116.

49? **Petalostyles** R. BR.—Flowers of *Cassia*; stamens 5, subhypogynous; 3 fertile anterior, anthers 2-rimose; 2 sterile acuminate. Germen sessile  $\infty$ -ovulate; style dilated into a petaloid cuculate much reflexed 3-lobed sac; middle lobe longer stigmatiferous at apex. Legume oblong-linear plano-compressed oblique, 2-valved. Seeds oblique compressed albuminous; funicle dilated into a small fleshy aril; cotyledons flat; radicle short straight.—An unarmed shrub; leaves imparipinnate; stipules small caducous; flowers axillary solitary pedunculate (*Australia*). See p. 121.

50. **Labichea** GAUDICH.—Flowers of *Cassia*, 4–5-merous. Stamens 2, free, usually unequal; 1 sometimes sterile; anthers basifixed, 2-porous at apex. Germen free, sessile or shortly stipitate, pauciovulate; style short; stigma small terminal. Legume oblong or lanceolate, compressed 2-valved. Seeds compressed albuminous

arillate.—Shrubs or undershrubs; leaves imparipinnate or subdigitate, more rarely 1-foliolate; stipules small caducous; flowers in axillary, often short, racemes; bracts caducous; bractlets 0 (*Australia*). See p. 123.

51. *Dicorynia* BENTH.—Flowers of *Cassia*; sepals 5, ovate, very unequal, imbricated; petals 3, posterior, much imbricated. Stamens 2, free; anthers dehiscing by short openings at apex. Germen sessile pauciovulate; style inflexed; stigma small terminal. Legume obliquely or evenly ovate, plano-compressed coriaceous, indehiscent (?); placentary suture narrowly winged. Seeds compressed albuminous.—Unarmed trees; leaves alternate imparipinnate; leaflets coriaceous; stipules very caducous; flowers in compound much-branched terminal racemes; bracts and bractlets very caducous (*Tropical America*). See p. 123.

52. *Martia* BENTH.—Receptacle shortly conical. Sepals 5, slightly unequal, subhypogynous, either imbricated or subvalvate with obliquely-cut margins in æstivation. Petals 5 (more rarely 4), slightly unequal, imbricated in æstivation; highest petal innermost. Stamens 4, 5, free subhypogynous; filaments short erect; anthers subbasifixed elongated acuminate 2-celled 4-locellate, dehiscing by 2 short poriform clefts below apex. Germen central free sessile pauci- or more rarely  $\infty$ -ovulate; style subulate; stigma minute terminal. Legume large oblong plano-compressed, thinly coriaceous, traversed by 2 longitudinal ribs; sutures broadly winged; 1- or few-seeded, indehiscent. Seed flat, reniform or subrhomboid; albumen thin; embryo compressed; cotyledons thin; radicle short straight.—Unarmed trees; leaves alternate imparipinnate; stipules very caducous; flowers in compound much-branched terminal racemes; buds acuminate curved; bracts and bractlets very caducous (*Tropical America*). See p. 124.

53. *Storckiella* SEEM.—Flowers of *Martia*; perianth hypogynous imbricated, usually 5- more rarely 3-6-merous. Stamens either 10 or rarely more (*Eustorckiella*), or else 4 (*Doga*); anthers shortly 2-rimose below apex. Germen shortly stipitate,  $\infty$ -ovulate; style subulate; apex thin stigmatiferous. Legume oblong plano-compressed coriaceous, longitudinally winged at placental suture,

2-valved. Seeds  $\infty$ , transverse; albumen fleshy; embryo greenish cotyledons cordate at base; radicle short straight.—Unarmed trees; leaves alternate imparipinnate; stipules short, very caducous; inflorescence of *Martia* (*Oceania*). See p. 125.

54. *Baudouinia* H. BN.—Flowers of *Storckiella*; sepals and petals 5, hypogynous imbricated, stamens 10, hypogynous free, all fertile; anthers basifixed, penicillate at apex, anther-cells 2, dehiscing longitudinally; posterior stamens slightly shorter. Germen central free, shortly stipitate, 3-4-ovulate; style subulate, apex minute stigmatiferous. Fruit fleshy, obliquely stipitate, cylindrical, obliquely or subtransversely septate between seed. Seeds . . . ? Small trees; leaves alternate simple; stipules very short and caducous; flowers in axillary pedunculate, few- or rarely 1-flowered, spurious racemes (*Tropical Africa and western adjoining islands*). See p. 126.

55. *Duparquetia* H. BN.—Perianth hypogynous. Sepals 4, large unequal; lowest sepal outermost coriaceous; highest sub-petaloid: 2 lateral innermost petaloid, unequally 2-lobed, very unsymmetrical. Petals 5, very disparate, imbricated vexillary in æstivation; 3 higher petals membranous ovate-lanceolate; highest outermost; 2 lower minute scale-like, furnished with unequal glandular cilia. Stamens 4, 5, hypogynous 3-adelphous; 2 lateral free; 2, 3, superior connate; filaments short flat; anthers basifixed elongated 2-celled introrse; locelli free acuminate at apex, furrowed longitudinally, rimose within and above. Germen shortly stipitate, central, longitudinally 4-winged, 2-ovulate; style subulate; apex minute stigmatiferous. Legume elongated 4-winged . . . ?—An unarmed shrub; leaves alternate imparipinnate; leaflets large petiolulate; stipules lateral ovate; flowers in dense terminal racemes; bracts and bractlets scale-like caducous (*Western tropical Africa*). See p. 126.

56. *Moldenhauera* SCHRAD.—Flowers 4, 5-merous; receptacle shortly conical. Sepals hypogynous valvate. Petals unguiculate subfimbriate, corrugated-imbricate. Stamens 8 or 10, hypogynous free; 7 or 9 posterior short straight; anthers erect subbasifixed 2-celled introrse, 2-rimose to a greater or less extent from apex to



base; anterior stamen much longer; filament curved ascending; anther fertile or sterile, glabrous or pilose. Germen sessile central free  $\infty$ -ovulate; style slender, slightly clavate at apex; stigma truncate, minutely ciliate. "Legume oblong plano-compressed coriaceous 2-valved. Seeds transverse ovoid."—Unarmed trees; leaves imparipinnate and 2-pinnate; leaflets coriaceous ferruginous below; stipules small caducous; flowers in elongated or dense, corymbiform compound branched terminal racemes; bracts small caducous (*Tropical America*). See p. 127.

57. *Apuleia* MART.—Flowers subregular; receptacle shortly obconical or turbinate, lined by a disk. Sepals 3, imbricated. Petals 3, a little dissimilar, slightly imbricated. Stamens 3, more rarely 2, posterior perigynous free; anthers linear-oblong basifixed, introrse 2-rimose. Germen subcentral stipitate, 2–3-ovulate; style rather thick; apex truncate or dilated, stigmatiferous. Legume obliquely ovate or oblong, plano-compressed coriaceous 1–2-seeded 2-valved; placentary suture narrowly winged. Seeds transverse orbicular or ovate, compressed albuminous; cotyledons leaf-like; radicle shortly exerted straight.—Unarmed trees; leaves imparipinnate; leaflets alternate coriaceous; stipule small or 0; flowers (sometimes polygamous) in composite axillary cymes, usually expanding before opening of leaves; bracts small caducous; bractlets 0 (*Tropical America*). See p. 128.

58. *Distemonanthus* BENTH.—Flowers (of *Apuleia*), 5-merous; sepals 5, imbricated; petals 3, posterior imbricated. Stamens 2, alternipetalous fertile posterior (of *Apuleia*); anthers 4-locellate at base, dehiscing at apex by 2 short poriform clefts. Staminodes 3, posterior oppositipetalous antherless. Germen (of *Apuleia*) pauciovulate; stigma terminal oblique. Fruit . . . ?—An unarmed tree; leaves alternate imparipinnate; stipules very caducous; flowers in composite axillary cymes; leaves opening after anthesis (*Western tropical Africa*). See p. 128.

59. *Dialium* L.—Flowers of *Apulia*; receptacle evenly or unevenly cupuliform, tapering or subrostrate posteriorly, lined by a disk. Sepals 5, rarely 4, perigynous imbricated. Petal 1 ("or 2") posterior vexillary minute (*Codarium*), usually absent. Stamens 2 or

more rarely 3, lateral free; anthers subbasifixed introrse 2-rimose. Germen subcentral or excentric, shortly stipitate, free 2-ovulate; style subulate; apex minute stigmatiferous. Fruit globose or ovoid, sometimes slightly compressed; subbaccate, glabrous or velvety outside, pulpy within. Seed 1 (more rarely 2), slightly compressed; embryo greenish albuminous; cotyledons fleshy or leaf-like, sometimes folded; radicle short straight.—Unarmed trees; leaves alternate imparipinnate; leaflets usually alternate coriaceous; stipules small or 0; flowers in compound cymiferous much-branched, terminal or axillary racemes; bracts and bractlets small scale-like caducous (*All tropical regions*). See p. 129.

60. *Ceratonia* L.—Flowers polygamo-dicœcious; receptacle short broadly depressed turbinate, lined by a thick glandular orbiculate, subpileiform disk. Sepals 5, very short imbricated in young bud, finally free or hardly visible. Petals 0. Stamens 5, oppositisepalous inserted below disk; filaments free thread-like; anthers 2-celled introrse versatile 2-rimose. Germen central; in male flower sterile, shortly conical abortive; in female and hermaphrodite, shortly stipitate  $\infty$ -ovulate: style short; apex peltate, stigmatiferous. Fruit elongated compressed, thick-coriaceous, indehiscent, both sutures thick; epicarp and endocarp glabrous; mesocarp subcarnose pulpy, produced into thick septa between seeds. Seeds  $\infty$ , transverse obovate compressed; testa hard glabrous; albumen copious horny; embryo greenish; cotyledons flat; radicle straight, shortly exerted.—An unarmed evergreen tree; leaves alternate paripinnate; leaflets paucijugate coriaceous; stipules small lateral; flowers in short, solitary or fascicled racemes along wood of last year's branches; bracts and bractlets minute scale-like caducous (*Inland regions*). See p. 131.

## VII. COPAIFEREÆ.

61. *Copaifera* L.—Flowers small subregular; receptacle minute, convex or slightly dilated. Sepals 4 (highest sepal broadest), more rarely 5; either much imbricated in æstivation, margins tapering; or slightly imbricated, margins obliquely cut; or more rarely valvate. Corolla 0. Stamens 8–10, free, subhypogynous or a little perigynous; 4–5-alternisepalous much shorter; filaments glabrous, inflexed in bud; anthers uniform introrse 2-celled 2-rimose versatile. Germen

central free, sessile or shortly stipitate, 2-ovulate; style slender; stigma terminal, truncate or small capitate. Legume stipitate or subsessile, either obliquely elliptical or else falcate ovate or obovate, compressed or rather turgid, sometimes subdrupaceous, finally coriaceous, 2-valved. Seed 1, descending; funicle dilated round hilum into a fleshy aril either entirely enveloping seed or oftener incompletely cupuliform or sacciform, or more rarely absent (*Gorskia*). Embryo exalbuminous; cotyledons thick fleshy, 2-auriculate at base round short straight included radicle, rarely notably corrugated.—An unarmed tree; leaves alternate paripinnate; leaflets 1- $\infty$ -jugate coriaceous oblique, penniveined or  $\infty$ -ribbed; stipules small; flowers in racemes or oftener in spikes: inflorescence simple or compound, much-branched terminal and axillary; bract and bractlets small scale-like caducous, or more rarely larger (*Guibourtia*) persistent round flowers (*Tropical America and Africa*). See p. 133.

62. **Detarium** J.—Flowers of *Copaifera*; sepals 4, subhypogynous, valvate or slightly imbricated. Stamens 10, hypogynous free. Germen central sessile 2-ovulate; style revolute; apex capitate stigmatiferous. Fruit sessile drupaceous orbicular crasso-compressed; sarcocarp interwoven with branching fibres; endocarp thick very hard, wrinkled outside. Seed compressed exalbuminous.—Unarmed trees; leaves paripinnate; leaflets few, usually alternate; stipules minute or 0; flowers in compound branched spikes; spikes axillary or lateral on last year's branches; bracts and bractlets small scale-like caducous (*Western tropical Africa*). See p. 136.

63. **Hardwickia** ROXB.—Flowers of *Copaifera*; sepals 5, much imbricated. Stamens 10, subhypogynous free, either all fertile or 1-3 superior sterile. Germen 2-ovulate; style slender; broadly peltate at stigmatiferous apex or subulate; stigma minute. Fruit plano-compressed, 2-valved at apex only. Seed 1, compressed; testa thin; embryo exalbuminous fleshy.—Unarmed trees; leaves paripinnate; leafless coriaceous 1-3-jugate; flowers small, in slender much-branched racemes; bracts and bractlets scale-like (*Tropical Asia and Africa*). See p. 136.

64. **Prioria** GRISEB.—Flowers of *Hardwickia*; sepals 5, closely imbricated, stamens 10, free perigynous; anthers introrse versatile; connective apiculate. Germen central, shortly stipitate, 2-ovulate; style subulate; apex minute stigmatiferous. Fruit obliquely obovate-orbicular, plano-compressed, coriaceous-woody, 2-valved. Seed 1, large flat; embryo exalbuminous; cotyledons cohering; radicle short thick.—An unarmed tree; leaves paripinnate; leaflets coriaceous 1, 2-jugate; stipules scale-like; flowers minute, in much-branched terminal spikes; bracts minute; bractlets lateral, connate into a 2-lobed cup a little shorter than calyx (*Central America and West Indies*). See p. 137.

65. **Cynometra** L.—Flowers (of *Hardwickia*), 4–5-merous; calyx imbricated. Petals 4, 5, alternate, nearly equal or 3 inferior smaller, imbricated. Stamens 10– $\infty$ , free. Germen central, 2-ovulate; apex of style truncate or dilated, stigmatiferous. Fruit thick, turgid or compressed, usually wrinkled or warty outside, straight or oftener arched, 2-valved. Seed exalbuminous; hilum ventral.—Trees or shrubs, unarmed; leaves paripinnate; leaflets oblique unsymmetrical coriaceous, 1, or paucijugate; flowers racemose; racemes often short or umbelliform, axillary or lateral on wood of stem or branches; superior bracts of raceme small, inferior often much larger, imbricated; bractlets 0 or membranous, coloured (*All tropical regions*). See p. 138.

66. **Pterogyne** TUL.—Flowers of *Cynometra*; perianth scarcely perigynous. Stamens 10, free. Germen shortly stipitate, winged at superior side, 1-ovulate; style short; apex truncate stigmatiferous. Fruit plano-compressed samaroid indehiscent; wing thin rigid oblong falcate veined. Seed descending; embryo exalbuminous; radicle straight exerted.—An unarmed tree; leaves paripinnate; stipules minute; flowers very small, in short axillary catkin-like racemes; bracts scale-like, in younger inflorescences much imbricated, finally deciduous (*Southern Brazil*). See p. 138.

67. **Sindora** MIG.—Flowers of *Copaifera*; sepals 4, with obliquely cut margins, narrowly imbricated or subvalvate; highest sepal broader. Petal 1, superior vexillary sessile, plaited. Stamens 10, sub-1-adelphous or 2-adelphous (9–1), anthers introrse 2-celled, longitu-

dinally rimose; in 2 stamens alternating with standard longer larger fertile; in 8 others smaller; sometimes sterile, more rarely "entirely absent." Germen shortly stipitate, 2-ovulate; style slender, stigma small terminal. Fruit shortly stipitate, suborbicular or ovate, compressed, prickly outside, 2-valved. Seed 1, descending; funicle dilated at hilum into an aril; embryo exalbuminous fleshy.—Unarmed trees; leaves paripinnate; leaflets few coriaceous; stipules minute or 0; bracts and bractlets scale-like caducous (*Tropical Asia*). See p. 139.

68. **Cryptosepalum** BENTH.—"Calyx tube very short, lined by a disk: segments 4, minute scale-like. Petal 1, sessile orbiculate. Stamens 3; filaments short; anthers oblong; cells dehiscing longitudinally. Germen shortly stipitate, free 2-ovulate; style filiform; stigma terminal truncate. Legume . . . ?"—A small unarmed tree; leaves paripinnate; leaves 1-2-jugate coriaceous oblique, lowest rather smaller; stipules minute; flowers in short axillary racemes; bracts at base of young raceme scale-like imbricated, afterwards deciduous, on raceme minute caducous, bractlets rather large, concave valvate including bud (*Tropical Africa*). See p. 140.

### VIII. DIMORPHANDRÆ.

69. **Dimorphandra** SCHOTT.—Flowers regular; receptacle very short, rather concave. Calyx campanulate, evenly 5-lobed or 5-toothed. Petals 5, subhypogynous; nearly equal, imbricated; highest petal innermost. Stamens 10, free subhypogynous; 5 oppositipetalous equal free, anthers introrse 2-celled 2-rimose; 5 alternipetalous sterile, either sterile, somewhat clubbed at apex (*Eudimorphandra, Mora*), or dilated thick fleshy unevenly obpyramidal cohering into a body, more or less projecting fertile stamens and deciduous on anthesis (*Pocillum*). Germen central, shortly stipitate,  $\infty$ -ovulate; style very short or nearly absent; stigma small terminal. Legume elongated compressed coriaceous—subligneous 2-valved; endocarp woody, sometimes separable from exocarp, transversely septate between seeds. Seeds orbicular or elongated, embryo exalbuminous; radicle short straight included.—Unarmed trees; leaves pinnate or 2-pinnate; stipules minute or 0; flowers small in

racemes or more usually spikes; inflorescences simple or much branched at extremities of branches; bracts small caducous; bractlets 0 (*Tropical America*). See p. 140.

70. **Burkea** Hook.—Receptacle shortly concave, lined by a disk. Calyx campanulate, evenly 5-lobed. Corolla subregular, imbricated. Stamens 10; filaments short; anthers uniform, introrse 2-rimose; connective inflexed glandular appendiculate at apex. Germen central, sessile or very shortly stipitate, 2-ovulate; style very short, thick; stigma terminal concave. Legume oblong plano-compressed subcoriaceous indehiscent (?). Seeds compressed, “funicle filiform; outer coat thin; inner cartilaginous-fleshy; albumen 0; cotyledons flat thin; radicle straight short included.”—Trees or shrubs, unarmed; leaves 2-pinnate; pinnæ paucijugate; leaflets coriaceous; stipules minute; flowers small (polygamous?) in interrupted elongated simple or branched spikes; bracts minute (*Tropical and southern Africa*). See p. 141.

71. **Erythrophloeum** Afz.—Receptacle shortly cupuliform, lined by a disk. Calyx campanulate regular, shortly 5-toothed. Petals 5, equal, subvalvate or slightly imbricated. Stamens 10, perigynous, free, equal or alternipetalous shorter; anthers uniform 2-rimose. Germen stipitate central  $\infty$ -ovulate; style short; stigma terminal obtuse. Legume oblong compressed, thickly coriaceous, pulpy within between seeds, 2-valved. Seeds compressed, embryo albuminous; cotyledons subfoliaceous; radicle straight, shortly exerted.—Unarmed trees; leaves 2-pinnate; leaflets coriaceous, often alternate; flowers small, in dense much-branched racemes at extremities of branches; bracts small; bractlets 0 (*Tropical Africa and Australia*). See p. 142.

72? **Brandzeia** H. Bn.—Flowers regular; receptacle obconical, lined by a disk. Sepals 4, 5, perigynous imbricated. Petals 5, nearly equal, furnished with long claws, imbricated. Stamens 10, perigynous: filaments free slender, inflexed in bud, finally long exerted; anthers introrse 2-rimose versatile; connective glandular. Germen central stipitate  $\infty$ -ovulate; style slender involute; apex scarcely dilated, stigmatiferous. Legume stipitate elongated plano-compressed, unevenly bent; gibbous on both sides, coriaceous woody,

indehiscent (?); sutures somewhat thickened. Seeds  $\infty$ ; coats thick; albumen copious; embryo rather fleshy, greenish; cotyledons elongated; radicle straight exerted.—An unarmed tree; leaves alternate 2-pinnate; leaflets small numerous; stipules minute caducous; flowers small in cymiferous much-branched racemes; inflorescence terminal or lateral on wood of last year's branches (*Islands of eastern tropical Africa*). See p. 144.

## SUB-ORDER PAPILIONACEÆ.

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### I. VICIA SERIES.

The study of the plants of this order and of the *Leguminosæ-Papilionaceæ* generally may be well commenced by a detailed study

*Vicia Faba* (Common Bean).



FIG. 138.—Habit ( $\frac{1}{3}$ ).



of the Common Bean (*Vicia<sup>1</sup> Faba<sup>2</sup>*; Fr., *Fève commune*). In this plant (figs. 138–142) the flowers are hermaphrodite irregular and resupinate. The receptacle forms a shallow cup lined with glandular tissue. In the bottom of this is inserted the gynæceum, while its oblique edges bear the calyx, corolla and androceum. The calyx is

*Vicia Faba.*

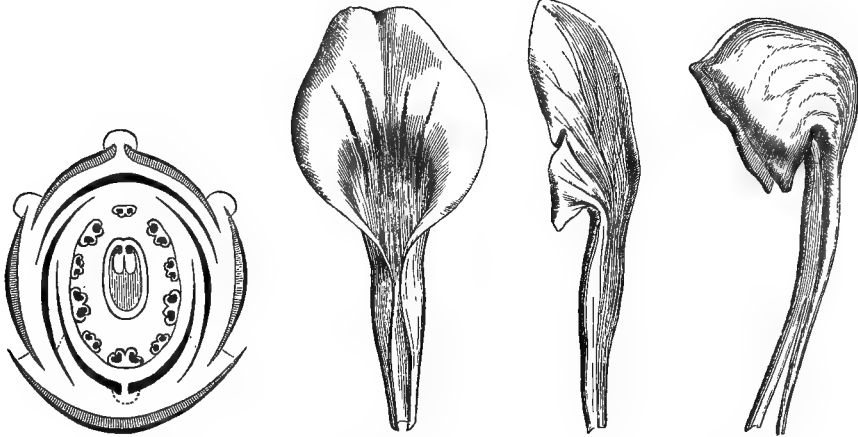


FIG. 139.  
Diagram.

FIG. 140.  
Standard.

FIG. 141.  
Wing.

FIG. 142.  
Keel ( $\frac{3}{4}$ ).

gamosepalous membranous, slightly gibbous below and posteriorly, and divided above into five narrow unequal lobes, becoming longer as they approach the back of the flower. In the bud the anterior lobe overlaps the two lateral, which in turn overlap the two posterior. These last are valvate by their posterior edges (fig. 139).<sup>3</sup> The petals, free and alternating with the calyx lobes, together form what is termed a “papilionaceous” corolla. The posterior petal, unlike the rest (fig. 140), and termed *vevillum* or “standard” (Fr., *étendard*); is

<sup>1</sup> T., *Inst.*, 396, t. 221.—L., *Gen.*, n. 873.—ADANS., *Fam. des Pl.*, ii. 331.—J., *Gen.*, 360.—LAMK., *Dict.*, viii. 551; Suppl., v. 469; *Ill.*, t. 634.—GÆRTN., *Fruct.*, ii. 325, t. 51.—DC., *Prodr.*, ii. 354.—SPACH, *Suit. à Buffon*, i. 300.—ENDL., *Gen.*, 6581.—ALEF., in *Östr. Bot. Zeitschr.* (1858); in *Bonplandia* (1861), 66, 69, 116.—B. H., *Gen.*, 525, 1002, n. 184 (incl.: *Abacosa* ALEF., *Atossa* ALEF., *Coppolteria* TODAR., *Craacca* RIV., *Cujunia* ALEF., *Endusia* ALEF., *Troilia* LINK., *Ervum* T. (part.), *Faba* T., *Hypechusa* ALEF., *Orobella* PRESL., *Oxygon* RAFIN., *Parallosa* ALEF., *Sellanina* ALEF., *Swantia* ALEF., *Tuamina* ALEF., *Vicilla*

SCHUR., *Vicioides* MENCH., *Wiggersia* ALEF.). ALEFELD makes or retains most of the preceding genera in the group *Vicia*, which he considers not a genus, but a separate tribe, and calls *Viciideæ*.

<sup>2</sup> L., *Spec.*, 1039.—*Faba vulgaris* MENCH., *Meth.*, 130.—DC., *Prodr.*, ii. 354.

<sup>3</sup> In *Ervum* (L., *Gen.*, 874;—DC., *op. cit.*, 366), which, omitting the species of the group *Lens*, is referred by many authors to the genus *Vicia*, the calyx lobes are simply longer and narrower than in *Vicia* proper, and the ovary often contains but two or three ovules.

obovate emarginate, and tapers below into a large claw with involute edges. The two lateral petals, called *alæ* or "wings" (Fr., *ailles*), symmetrical with respect to each other and far shorter and narrower than the standard, have an irregularly and obliquely oblong limb, with a lateral projection below and a long slender curved claw (fig. 141). The two anterior petals differ from both wings and standard in size and form, but resemble each other. The limb is irregular, and like the wing with the base of the inferior edge of its posterior border produced into an unsymmetrical auricle; it is unequally wrinkled and bears on its outer surface, not far from the top of this auricle, a depression by which it clings to a corresponding projection on the inner face of the wing. The claw is here also slender and curved, and coheres for a certain distance along its inferior border with that of the petal symmetrical. This close adhesion is prolonged all the way up the limb; so that the two anterior petals together form a single piece (fig. 142), which is termed the "keel" or *carina* (Fr., *carène*). In the bud the keel is overlapped by the wings, themselves again overlapped by the standard—an imbrication known as the *vexillary præfloration*. The androceum consists of ten stamens, subperigynous like the perianth; five superposed to the calyx-lobes, and five, shorter, to the petals. The filaments are diadelphous, the nine anterior being united below into a tube split along its superior edge, while the tenth, superposed to the standard, and hence termed the vexillary stamen, remains free on the superior side of the flower. The free summit of each filament bears an introrse two-celled anther of longitudinal dehiscence.<sup>1</sup> The gynæceum, formed by a single carpel superposed to the anterior sepal, consists of a subsessile one-celled ovary surmounted by an inflexed style whose apex is dilated into a little stigmatiferous head, below which the dorsal edge of the style bears a thick tuft of hairs.<sup>2</sup> Above the wall of the ovary next the standard is a longitudinal placenta on whose two lips are inserted a variable number<sup>3</sup> of de-

<sup>1</sup> The pollen is generally ovoidal or ellipsoidal in the group. Each group bears three longitudinal folds, which in the spherical moistened grain are represented by either smooth or papillose bands. H. MOHL. (in *Ann. Sc. Nat.*, sér. 2, iii. 341) has found the latter condition in the pollen of *Vicia Cracca* and *sylvatica*, *Orobis*

*vernus*, *Lathyrus odoratus* and *pratensis*, and *Pisum sativum*.

<sup>2</sup> In the section *Cracca* (Riv., t. 52, nec L.) the style is slightly compressed from side to side, and the fruit bears an oblique dilatation at the apex.

<sup>3</sup> Only two, or rarely three, as we have mentioned in certain of the species of *Ervum*, which are now united with the genus *Vicia*.

scending campylotropous ovules, whose micropyles look upwards and outwards.<sup>1</sup> The fruit is a pod, elongated and subcylindrical or slightly compressed, thick and at first fleshy, finally coriaceous,<sup>2</sup> and dehiscing by two longitudinal clefts into two valves, freeing from its single cavity a variable number of descending campylotropous seeds. Each of these, attached by a broad hilum, contains within its thick coats a fleshy exalbuminous embryo, with thick cotyledons and an inflexed accumbent radicle. The Bean is a herbaceous annual, with alternate pinnate leaves, whose leaflets, variable in number (from one to three pairs), are unsymmetrical and entire, while the extremity of the rachis aborts and is reduced to a narrow tongue. The two lateral stipules are membranous and unsymmetrical,<sup>3</sup> and the flowers are united, few together, in short axillary racemes.<sup>4</sup>

The other species of the genus *Vicia* often differ from this in habit, for their stem is rarely erect, more frequently creeping along the ground, and still oftener climbing and hooking on to neighbouring bodies by the *cirrho* or tendrils borne on the leaves. These tendrils represent the midrib of the terminal leaflet, with (if ramified) those of the last lateral leaflets. The flowers are often collected into racemes,<sup>5</sup> or more rarely one, two, or three together on a level with the axils of the leaves.<sup>6</sup> Each flower is accompanied by a very caducous bract, but has no lateral bractlets. Some two hundred species<sup>7</sup> of this genus have been described, natives of the temperate regions of the whole northern hemisphere and of South America.<sup>8</sup>

The Lentils<sup>9</sup> (Fr., *Lentilles*) come very near *Vicia*, from which perhaps they should not be generically separated; their style is

<sup>1</sup> They have two coats.

<sup>2</sup> The walls are not so thick or so fleshy, or coriaceous, in any of the remaining species of *Vicia*.

<sup>3</sup> In *V. Faba* they bear a dark-purple thick glandular spot.

<sup>4</sup> Or rather pseudo-racemes; the true arrangement of the flowers is not yet well known.

<sup>5</sup> In many of the species it will be seen that these so-called racemes have flowers on only one side of the chief axis of the inflorescence, the other side remaining bare.

<sup>6</sup> But not in the very axils of the leaves; for the study of the development shows that the inflorescence is not really axillary here any more than in the Bean.

<sup>7</sup> But this number should probably be reduced by half.

<sup>8</sup> JACQ., *Hort. Vindob.*, t. 146, 147; *Fl.*

*Austr.*, t. 34, 229, 364.—W., *Spec.*, iii. 1093.—H. B. K., *Nov. Gen. et Spec.*, t. 581-583.—LEDEB., *Fl. Ross. Icon.*, t. 50, 108, 366, 368, 481.—VENT., *Jard. Cels.*, t. 84.—DESF., *Fl. Atlant.*, t. 197, 198.—BROT., *Phyt. Lusit.*, t. 52.—SIBTH., *Fl. Græc.*, t. 699-702.—MORIS., *Fl. Sard.*, t. 69-71.—DC., *Ik. Pl. Gall. Rar.*, 33.—WEBB., *Phyt. Canar.*, t. 65, B, C.—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 41.—BOISS., *Voy.*, t. 57.—SWEET, *Brit. Fl. Gard.*, ser. 2, t. 274.—GREN. & GODB., *Fl. de Fr.*, i. 458-475.—BENTH., in *Mart. Fl. Bras., Papil.*, 107, t. 29.—*Bot. Reg.*, t. 871.—*Bot. Mag.*, t. 2098, 2141, 2206, 2946.—WALP., *Rep.*, i. 713; ii. 885; *Ann.*, i. 242; ii. 398; iv. 528.—BAKER, in *Olivo.*, *Fl. Trop. Afr.*, ii. 172.

<sup>9</sup> LENS T., *Inst.*, 390, t. 210.—MÆNCH, *Meth.*, 131.—GREN. & GODB., *Fl. de Fr.*, i. 476.—B. H., *Gen.*, 525, n. 185.

slightly compressed from within outwards, and on its hinder face is a longitudinal surface covered with fine hairs. The ovary generally contains only two ovules.

*Pisum sativum* (Common Pea).

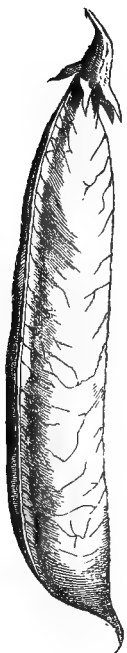


FIG. 147.  
Fruit.



FIG. 143.  
Floriferous branch ( $\frac{1}{2}$ ).

*Lathyrus*<sup>1</sup> is also scarcely distinct from *Vicia*. The sheath formed by the staminal filaments is horizontally, not obliquely, truncate at the apex, and the style becomes broadly flattened from before

<sup>1</sup> T., *Inst.*, 394, t. 216, 217.—L., *Gen.*, ii. 872.—DC., *Prodr.*, ii. 369.—ENDL., *Gen.*, n. 6582.—B. H., *Gen.*, 526, n. 186.—*Clymenum* T., *op. cit.*, t. 218.—*Ochrus* T., *op. cit.*, 396, t. 219, 220.—*Aphaca* T., *op. cit.*, 399, t. 223.—*Nissolia* T., *op. cit.*, Append., t. 656 (nec L.).—*Orobus* L., *Gen.*, 871.—DC., *Prodr.*, ii. 376.—ENDL., *Gen.*, n. 6583.—*Cicerella* MENCH, *Meth.*,

163.—*Astrophia* NUTT., in *Torr. and Gr. Fl. N. Amer.*, i. 278.—A. GRAY, in *Suckl. and Coop. Nat. Hist. Wash.*, 54, t. 6.—*Platystylis* SWEET, *Brit. Fl. Gard.*, t. 239.—*Anarus* E. MEY., *Preuss. Pfl. Gatt.*, 258.—ALEFELD (in *Bonplandia* [1861], 126, 139), making the genus *Lathyrus* also into a subtribe (*Lathyroseæ*) divides that into several genera;—*Lathy-*

backwards, and rigid and indurated. The whole length of its posterior face is bearded.

The Peas<sup>1</sup> (Fr., *Pois*) have nearly all the characters of *Vicia*, from which they only differ in the form of the style, which here also

*Pisum sativum.*



FIG. 145.  
Androceum and gynæceum.



FIG. 144.  
Flower.



FIG. 146.  
Gynæceum ( $\frac{2}{3}$ ).

is broad, but instead of remaining flat is bent longitudinally into a gutter, whose hollow looks towards the back of the flower.

To this series also belong the Chickpeas<sup>2</sup> (Fr., *Chiches*, *Ciches*; fig. 148), in which the wings of the corolla are free, while the style is slender and beardless; and the fruit is a turgid, bladder-like pod, containing but few seeds with straight radicles. There remains the abnormal genus *Abrus* (Fr., *Liane-Reglisse*<sup>3</sup>), which has a twining stem, woody at the base, and only nine monadelphous stamens to its flowers. The gynæceum has a glabrous style with capitate stigma. This genus has been made by several authors the type of a distinct series, *Abrineæ*, placed doubtfully by some next *Phaseoleæ*,

*rus*, *Cicerula*, *Navidura*, and *Lastila*. His *Orobosæ* includes the genera *Clymenum*, *Gra-phiosa*, *Lens*, *Aphaca*, and *Orobos*. I believe that no one else admits this incredible multiplication of genera.

<sup>1</sup> *Pisum* T., *Inst.*, 394, t. 215.—L., *Gen.*, ii. 870 (part.).—J., *Gen.*, 360.—LAMK., *Dict.*, v. 455; Suppl., iv. 452; *Ill.*, t. 633.—GÆRTN., *Fruct.*, ii. 331, t. 152.—DC., *Prodr.*, ii. 368.—ENDL., *Gen.* n. 6759.—B. H., *Gen.*, 527, n. 187. [*Vicia* is strictly Vetch (Fr., *Vesce*), *Lathyrus* "Vetchling," or "Everlasting-pea" (*Gesse*), and *Pisum* "Pea" (*Pois*); but all four terms are used for different species of *Lathyrus* in English. So "Tare" is applied to certain species of *Lathyrus*, *Ervum*, and *Vicia*.]

<sup>2</sup> *Cicer* T., *Inst.*, 389, t. 110.—L., *Gen.*, n.

875.—GÆRTN., *Fruct.*, ii. 326, t. 151.—DC., *Mém. Légum.*, t. 54; *Prodr.*, ii. 354.—ENDL., *Gen.*, n. 6578.—B. H., *Gen.*, 524, n. 183.

<sup>3</sup> L., *Gen. Mant.*, n. 1286.—GÆRTN., *Fruct.*, ii. 323, t. 151.—LAMK., *Dict.*, i. 3; *Ill.*, t. 608, fig. 1.—DC., *Prodr.*, ii. 381.—ENDL., *Gen.*, n. 6698.—B. H., *Gen.*, 527, n. 188.—H. BN., in *Dict. Encycl. des Sc. Médic.*, i. 245. The reader will see that we here follow what we believe to be the best course in treating the very natural orders, such as *Papilionaceæ*. After a detailed description of the chief type of the series, we run quickly over the other genera. All details of their organization and bibliography will be given in the *Genera* (pp. 229 & seq.), in order to avoid repetitions. This plan we shall follow in all the other series of this suborder.

by others next *Vicieæ*, though really differing from both. The calyx of *Abrus* is nearly truncate above, and its two posterior teeth are more or less coherent. The claw of the standard is slightly adherent to the base of the gutter formed by the staminal filaments. The fruit is an oblong or linear compressed bivalve pod, with rudiments of septa inside between the seeds. These are the pretty little red

*Cicer arietinum.*

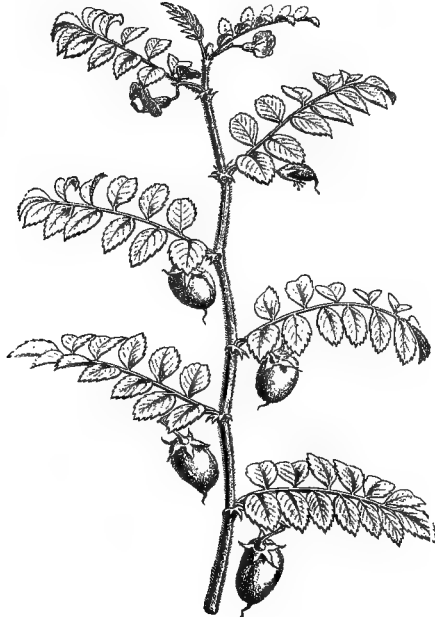


FIG. 148.  
Habit ( $\frac{2}{3}$ ).

“peas” with a black stain at one end, so well and universally known. By the characters of its fruit *Abrus* is sharply marked off from *Dalbergiæ*, to which series the organization of its flower would have else approximated it. Its leaves are paripinnate with indefinite leaflets. Excepting then this last genus, the series *Vicieæ* is most natural; so that it will be seen how slight are the characters used to distinguish the several genera, and how insufficient they would be deemed in many other orders.

II. KIDNEY-BEAN SERIES.

The Kidney-beans (Fr., *Haricots* ;<sup>1</sup> figs. 149–152) have resupinate hermaphrodite flowers. Their slightly concave receptacle is lined by a glandular disk which rises up in the centre into a sheath around the foot of the gynæceum. The calyx, inserted on the rim of the receptacular cup, is gamosepalous, five-lobed though two-lipped; the upper lip consists of two lobes, united for a good way by their superior edges; the lower, of three lobes, at first imbricated in the

*Phaseolus multiflorus.*

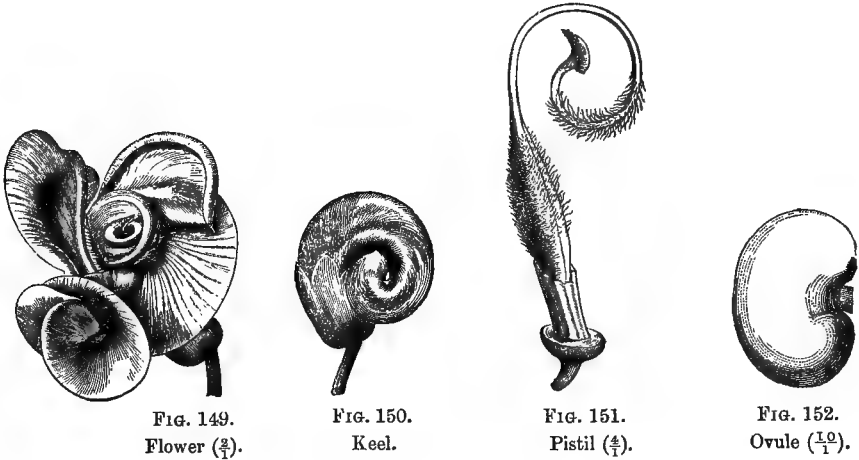


FIG. 149.  
Flower ( $\frac{2}{3}$ ).

FIG. 150.  
Keel.

FIG. 151.  
Pistil ( $\frac{1}{2}$ ).

FIG. 152.  
Ovule ( $\frac{1}{10}$ ).

bud. The corolla is papilionaceous. The standard is suborbicular, first spreading, finally reflexed or slightly twisted, and sessile with two more or less prominent auricles at the base. Its wings are oblong or obovate, as long as the standard or longer. The keel varies in form and ends in a spirally twisted beak. The ten stamens are superposed five to the sepals, five to the petals. They are diadelphous; and the vexillary filament (the only free one) is dilated a little above its insertion, where it often presents a little scale-like appendage. The ten anthers are uniform, introrse two-celled and of longitudinal dehiscence.<sup>2</sup> The gynæceum consists of a sessile

<sup>1</sup> *Phaseolus* L., *Gen.*, n. 866.—ADANS., *Fam. des Pl.*, ii. 325.—J., *Gen.*, 356.—GÆRTN., *Fruct.*, ii. 321, t. 150.—SAVI, *Diss. Phaseol.* (1824), 8.—DC., *Prodr.*, ii. 390.—SPACH, *Suit. à Buffon*, i. 322.—ENDL., *Gen.*, n. 667.—B. H., *Gen.*, 538,

n. 221.—*Strophostyles* ELL., *Carol.*, ii. 229.—*Phaseolus* MËNCH, *Meth.*, 240.

<sup>2</sup> The pollen resembles that of the *Vicia*, with smooth or papillose bands.

or subsessile pluriovulate ovary,<sup>1</sup> tapering above into a style which is lodged in the keel, and is similarly twisted. The surface of the style is often covered with hairs for a considerable distance, and its apex is dilated into a more or less oblique stigmatiferous head (fig. 151). The fruit is a straight or bowed pod, subcylindrical or compressed; the pericarp, projecting slightly between the seeds, finally opens longitudinally into two valves. The seeds, variable in number, are reniform or ovoidal, attached to the fruit by an elongated ill-developed hilum. Within their coats is a fleshy starchy embryo, whose thick cotyledons are applied together by their flat faces, and whose radicle lies near the middle of the inner border of the seed, next the hilum. The Kidney-beans are erect or twining herbs, rarely woody at the base. Their leaves are alternate, pinnately trifoliolate or rarely unifoliolate, with two lateral persistent stipules. Each leaflet has a pedicel, articulated at its base where it is accompanied by one or two stipules. The flowers are collected next the axils of the leaves into simple or multiple racemes. The lower part of the peduncles is bare below.<sup>2</sup> This genus contains some fifty species from all warm countries.<sup>3</sup>

The spiral keel is also found in the two neighbouring species, each forming a genus of itself, namely *Minkeliersia galactioides* MART. & Zucc., from Mexico, which only differs from *Phaseolus* in the form of the pieces of the perianth and in its inflorescence; and *Physostigma venenosum* BALF.,<sup>4</sup> a native of Africa, known by the name of Calabar- or Ordeal-bean (*Fève de Calabar*). It has the flowers of *Phaseolus*, but the style is broadly dilated into a triangular blade above the stigma (fig. 154); and its voluminous pod contains large seeds with tough coats down one side of which runs a long narrow umbilical cicatrix extending more than half round the seed (fig. 155).

The keel is obtuse or merely bowed or beaked in *Vignea*, which subseries comprises besides *Vigna* the four genera *Dolichos*, *Voandzeia*, *Pachyrhizus*, and *Psophocarpus*, all very closely allied. The character

<sup>1</sup> The ovules are descending, completely or incompletely campylotropous (fig. 152), with the micropyle upwards and outwards. They have two coats.

<sup>2</sup> BENTHAM (*loc. cit.*) divides this genus into six artificial sections: *Drepanospron*, *Eupha-seolus*, *Leptospron*, *Strophostyles*, *Macroptilium*, and (?) *Dysolobium*.

<sup>3</sup> JACQ., *Hort. Vindob.*, t. 66, 90, 100, 114;

*Ik. Rar.*, t. 558.—WIGHT, *Icon.*, t. 34, 249, 755.—WALL., *Pl. Asiat. Rar.*, t. 6, 63.—BENTH., in *Mart. Fl. Bras., Papil.*, 180, t. 49.—GREEN. & GODR., *Fl. de Fr.*, i. 457.—*Bot. Reg.*, t. 341, 743.—*Bot. Mag.*, t. 4076.—WALP., *Rep.*, i. 770; ii. 901; v. 537; *Ann.*, i. 251; ii. 426; iv. 560.—BAKER, in *Oliv., Fl. Trop. Afr.*, ii. 191.

<sup>4</sup> For the details of this genus and the succeeding ones see the *Genera*, p. 233.



of the beak distinguishes this little group from that of the *Euphaseoleæ*, where the keel is spirally twisted. Thus nothing can come

*Physostigma venenosum* (Calabar Bean).

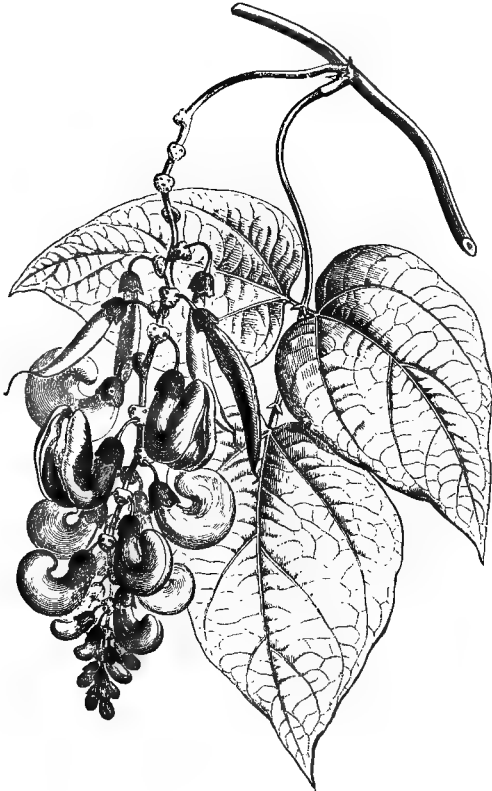


FIG. 153.  
Floriferous branch ( $\frac{1}{2}$ ).

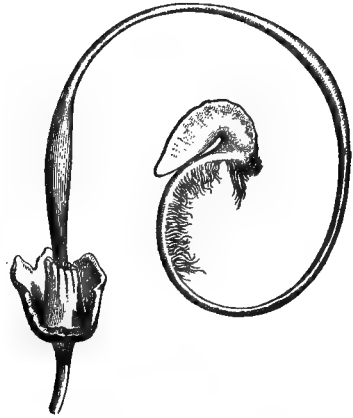


FIG. 154.—Pistil ( $\frac{2}{3}$ ).



FIG. 155.  
Seed.

nearer to a Kidney Bean than a *Dolichos*, and the two genera are often confounded in collections; but an examination of the keel is sufficient to remove all doubts.

In the *Galactiæ* the inflorescence remains the same as in the preceding types, the axis of the raceme bearing little thick very short knot-like secondary axes. The bracts are small and often caducous. The two upper lobes of the calyx are often united into one. The vexillary stamen remains free, and the style is glabrous. In this subseries or subtribe are placed the five genera *Galactia*, *Grona*, *Cymbosema*, *Calopogonium*, and *Mastersia*.

The sub-series *Erythrineæ* contains eight genera: *Erythrina*, *Strongylodon*, *Rudolphia*, *Mucuna*, *Apios*, *Cochlianthus*, *Butea*, and

*Spatholobus*. Excepting the last, which though rendered by its fruit and vegetative organs inseparable from *Butea*, presents the general organization of the *Galactiæ*, all these genera have the inflorescence of the *Galactiæ*, or of the *Euphaseoleæ* or *Vigneæ*, with flowers whose standard is shorter than the wings or keel; or else very large, with the wings very short, or in any case shorter than the keel. The style is beardless and the floral bracts are small or caducous.

The small group *Diocleæ* has the same inflorescence and bracts. The calyx is usually four-lobed, with the posterior lobe broadest, or else it is equally bilabiate. The vexillary stamen, free at the base, joins the rest above; the style is beardless. The five genera *Dioclea*, *Camptosema*, *Cleobulia*, *Pueraria*, and *Canavalia* constitute this sub-series.

In the group *Glycineæ* the secondary axis of the inflorescence loses the knot-like appearance of the preceding sub-series. The vexillary stamen may be either free or united with the rest. The standard is altogether without appendages, or else its edges are only slightly inflexed at the base. The style is glabrous except in *Clitoria*. This group contains the eleven genera: *Glycine*, *Shuteria*, *Teramnus*, *Kennedy* (figs. 156, 157), *Dumasia*, *Amphicarpa*, *Cologania*, *Periandra*, *Centrosema*, *Clitoria*, and *Platycyamus*.

*Kennedy prostrata*.



FIG. 156.



FIG. 157.  
Longitudinal  
section of fruit.

In *Cajaneæ*, too, the nodes of the inflorescence are wanting. The flowers have no lateral bractlets; the vexillary stamen is free; and the style is beardless with a terminal stigma. The leaves are covered, at least underneath, with resinous dots, and the stipules of the leaflets are small or absent. In this last subseries we have the eight genera: *Cajanus*, *Fagelia*, *Atylosia*, *Dunbaria*, *Cylista*, *Rhynchosia*, *Eriosema*, and *Flemingia*. In the four last the number of ovules and seeds is always very limited.<sup>1</sup>

<sup>1</sup> The characters separating these six sub-series are very far from being absolute, as, indeed, might be expected in a series which is itself quite

artificial and in no way absolutely distinguished from its neighbours.

## III. GALEGA SERIES.

*Galega*<sup>1</sup> (fig. 158) has irregular resupinate hermaphrodite flowers. The slightly dilated receptacle bears in due order a gamosepalous calyx, a papilionaceous corolla, a monadelphous diplostemonous androceum of subhypogynous insertion, and a unicarpellary gynæceum.

The calyx divides above into five shallow teeth or lobes, valvate or subimbricate in the bud. The standard is obovate or oblong with the midrib projecting along its back, and tapers into a short claw at the base; the shortly unguiculate wings are oblong, with the limb unsymmetrical, especially near the base, and are often slightly adherent to the somewhat incurved obtuse keel. The staminal filaments form a complete tube below. In the five stamens superposed to the calyx-lobes the free part of the filament is longer; but their anthers resemble those of the oppositipetalous stamens, though usually a little larger.<sup>2</sup> The gynæceum consists of a sessile or subsessile ovary, containing an indefinite number of descending campylotropous ovules, and tapering above into an incurved glabrous subulate style, ending in a little stigmatiferous head. The fruit is

*Galega officinalis.*FIG. 158.  
Habit ( $\frac{1}{2}$ ).

<sup>1</sup> T., *Inst.*, 398, t. 122.—MILL., *Icon.*, t. 137.—ADANS., *Fam. des Pl.*, ii. 322.—J., *Gen.*, 359.—LAMK., *Dict.*, ii. 595; *Ill.*, t. 625.—DC., *Prodr.*, ii. 248.—SPACH, *Suit. à Buffon*, i. 249.—ENDL., *Gen.*, n. 6533.—B. H., *Gen.*, 496, n. 97.—*Callotropis* DON (G.), *Gen. Syst.*, ii. 228.—ENDL., *Gen.*, n. 6535 (nec R. BR.).—*Accorombona* ENDL., *Gen.*, 1427.

<sup>2</sup> The pollen resembles that of *Vicia* in all *Galegæ* hitherto examined (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 341). This form seems to be that of *Papilionaceæ*, so that in treating of the other series we shall abstain from referring to this point.

a somewhat rounded linear pod, surmounted by a point formed by the persistent base of the style, and dehiscing into two thin obliquely-striate valves; it contains in its single cavity an indefinite

*Robinia Pseudacacia* (*Garden Acacia*).

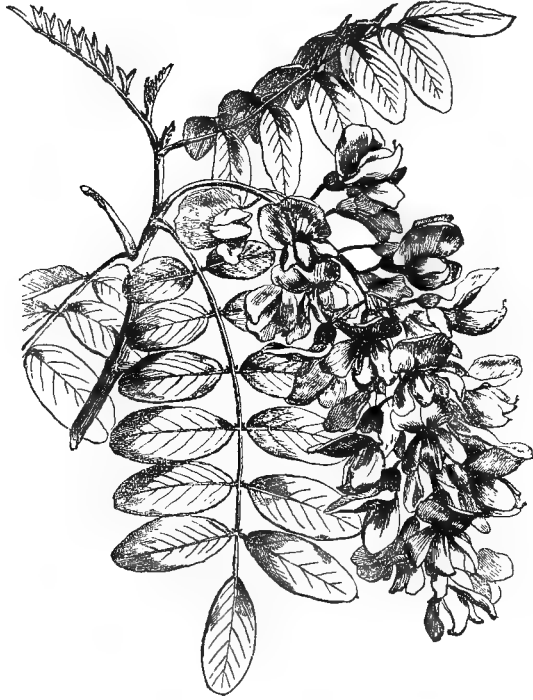


FIG. 159.  
Floriferous branch ( $\frac{1}{2}$ ).

number of transverse oblong seeds with fleshy exalbuminous embryos. *Galega* consists of perennial herbs, glabrous or nearly so. Their alternate imparipinnate leaves have entire leaflets and unsymmetrical lateral stipules, often greatly developed. The flowers form terminal and axillary racemes, each flower axillary to an often persistent bract. The three species of this genus belong to the South of Europe and to Eastern Asia.<sup>1</sup>

The *Galegeæ* proper (or *Tephrosiæ*) have the following points in common with the preceding genus. The flowers form racemes, terminal, leaf-opposed, or collected into terminal panicles. More rarely the inflorescences occupy the axils of the upper leaves, or else the floral pedicels are all, or only the lower ones, paired or

<sup>1</sup> SIBTH., *Fl. Græc.*, t. 726.—SWEET, *Brit. Fr.*, i. 455.—*Bot. Reg.*, t. 326.—*Bot. Mag.*, t. *Fl. Gard.*, t. 159, 244.—GREEN. & GODR., *Fl. de* 2192.

fascicled in the axils of the leaves. The flowers have mucicous anthers, usually indefinite ovules and an often rigid style. The

*Indigofera tinctoria* (Indigo-plant).



FIG. 160.

Habit ( $\frac{1}{2}$ ).

pod opens in two valves. The subseries consists of erect or climbing trees, or more rarely of trees; it includes eleven genera; *Galega*, *Ptychosema*, *Barbieria*, *Peteria*, *Sylitra*, *Tephrosia*, *Mundulea*, *Chadsia*, *Milletia*, *Sarcodum*, and *Wistaria*.

The *Robinias* (fig. 159), vulgarly termed False-Acacias (*Faux-Acacias*) have been made the types of a second subseries *Robinieæ*, which is quite artificial, presenting all the general characters of the preceding but with the inflorescences all axillary, or fascicled on the wood of the old branches. It contains fifteen genera: *Robinia*, *Gliricidia*, *Diphysa*, *Sabinea*, *Corynella*, *Poitæa*, *Vilmorinia*, *Lennea*, *Olneya*, *Coursetia*, *Poissonia*<sup>1</sup> (BN.), *Cracca*, *Sesbania*, *Microcharis*, *Carmichaelia*, and *Notospartium*.

<sup>1</sup> Given only in the addenda in the French edition.

*Coluteæ* forms a third group with the six genera; *Colutea*, *Sutherlandia*, *Swainsona*, *Lessertia*, *Cliantlus*, and *Eremosparton*. These are herbaceous or rarely suffrutescent plants, of axillary inflorescence. The flowers have a usually spreading or reflexed standard, diadelphous stamens (9-1), mucicous anthers, a multiovulate ovary, and a style

*Astragalus verus*.



FIG. 161.  
Habit ( $\frac{1}{2}$ ).

often rigid, always bearded along its superior edge. The fruit is often bladder-like.

The fourth subseries or subtribe, *Indigofereæ*, only includes *Indigofera* (Indigo-plant; Fr., *Indigotier*) and *Cyanopsis*. It consists of herbs or shrubs, with often dotted leaves covered with peculiar hairs.<sup>1</sup> The flowers form axillary racemes or spikes; their anthers

<sup>1</sup> Fixed by the middle ("Pili medifixi").

are usually tipped by a gland or a point (mucro). The pod is bivalve, usually many-seeded.

The embryo of *Brongniartia* presents a peculiar character very rare in *Papilionaceæ*; its radicle is straight as in *Cæsalpinieæ*. The seed has a little aril.<sup>1</sup> The genus consists of erect shrubs, with the

*Astragalus monspeliensis.*



FIG. 162.  
Flower ( $\frac{2}{3}$ ).



FIG. 163.  
Longitudinal section of flower.



FIG. 164.  
Androecium and gynæceum.

flowers in terminal racemes, or in pairs in the axils of the leaves. The anthers are mucicous; the ovary pluriovulate. The pod always opens by two valves. The three genera *Lamprolobium*, *Harpalyce*, and *Brongniartia* compose the subseries *Brongniartieæ*.

*Astragalus* (Fr., *Astragale*, figs. 161-164) is the type of *Astragaleæ*, which also includes *Oxytropis*, *Biserrula*, *Gueldenstædtia*, *Glycyrrhiza* (Liquorice, Fr., *Réglisse*—fig. 165) *Calophaca*, *Halimodendron*, and *Caragana*. These are herbs or shrubs, rarely trees. The flowers are solitary or in racemes or umbels, but always axillary. The flower has an erect standard, often narrow, with its sides reflexed, diadelphous stamens with mucicous anthers, and a pluriovulate ovary with a glabrous style. The fruit is compressed cylindrical, or oftener turgid or bladder-like, frequently divided into two false cells by a longitudinal partition springing from one of the carpellary sutures.

<sup>1</sup> Forming a fleshy excrescence from the hilum.

In the group *Psoraleæ* or *Amorpheæ* we find the greatest reduction

*Glycyrrhiza glabra.*



FIG. 165.—Habit ( $\frac{1}{3}$ ).

of the flower in this series.

*Amorpha fruticosa.*



FIG. 166.  
Flower ( $\frac{2}{3}$ ).



FIG. 167.  
Long. sect. of flower.

Sometimes the corolla is reduced to a single petal, the standard, as in *Amorpha* (figs. 166, 167), or is altogether absent as in *Paryella*; sometimes, as in *Psoralea*, the ovary contains but a single ovule. We may rarely find two or three ovules; and one genus, *Asagraea*, is so far exceptional as to possess half a dozen. The androceum alone remains as in most *Papilionaceæ*; it is decandrous and monadelphous. The *Psoraleæ* are herbs or shrubs whose leaves are covered with glandular dots. The flowers form racemes or spikes, and possess muticous an-



thers; the fruit is generally, if not always, one-seeded. The sub-series includes nine genera: *Psoralea*, *Dalea*, *Marina*, *Petalostemon*, *Eysenhardtia*, *Amorpha*, *Paryella*, *Apoplanesia*, and *Asagræa*.

#### IV. LOTUS SERIES.

*Lotus*<sup>1</sup> (Fr., *Lotier*) has irregular resupinate hermaphrodite flowers. On the edges of the concave receptacle, lined with glandular tissue, are inserted the perianth and androceum. The five equal or unequal lobes of the gamopetalous calyx are approximated into two lips.<sup>2</sup> The corolla is papilionaceous. Its standard, obovate ovate acuminate, or suborbicular, tapers slightly at the base to form a short claw. The wings are obovate, very unsymmetrical towards the base of the shortly unguiculate limb. The incurved or inflexed beaked keel is gibbous on both sides. There are ten diadelphous stamens, the nine inferior being united into a tube cleft above, while the tenth or vexillary stamen is free. The five alternipetalous stamens are longer than the rest, and their filaments are more dilated above, below the introrse or subbasifixed two-celled anthers, which dehisce longitudinally. The gynæceum, inserted in the bottom of the receptacle, consists of a sessile multiovulate ovary, surmounted by a glabrous style, naked or bearing an appendage of variable form, and with a

*Lotus corniculatus* (Bird's-foot Trefoil).



FIG. 168.  
Fruit ( $\frac{2}{3}$ ).

<sup>1</sup> L., *Gen.*, n. 897.—DC., *Prodr.*, ii. 209.—ENDL., *Gen.*, n. 6514.—B. H., *Gen.*, 490, n. 81.—*Tetragonolobus* SCOP., *Fl. Carniol.*, ii. 87.—SER., in DC., *Prodr.*, ii. 215.—ENDL., *Gen.*, n. 6515.—*Lotea* WEBB, *Phyt. Canar.*, ii. 80.—*Anisolotus* BERNH., *Ind. Sem. Hort. Erfurth.* (1837).—*Pedrosia* LOWE, in *Hook. Journ.*, viii. 292.—

*Heineckenia* WEBB, in *Exs. Canar. Bourg.*, ex B. H., *loc. cit.*

<sup>2</sup> Well marked in the section *Lotea*, but the calyx-lobes or teeth tend to become distinct and more nearly equal in the remaining sections of the genus, viz., *Krockeria* (SER.), *Pedrosia*, and *Anisolotus*.

terminal or lateral obtuse or swollen stigmatiferous surface.<sup>1</sup> The fruit (fig. 168) is an oblong or often linear bivalve<sup>2</sup> pod, straight or curved, cylindrical or with four longitudinal wings, turgid or plano-compressed, and usually divided by incomplete transverse false septa into chambers, each of which contains a lenticular or subglobular campylotrous seed without any arillar dilatation.

*Anthyllis Vulneraria*  
(Kidney Vetch, Lady's-fingers).



FIG. 169.  
Flower ( $\frac{3}{4}$ ).



FIG. 170.  
Longitudinal  
section of flower.

The plants of this genus are herbaceous or suffrutescent, glabrous or covered with silky or bristly down. The leaflets of the alternate trifoliolate leaves articulate with the apex of the petiole, and the stipules resemble the leaflets in form. The flowers form often few- or one-flowered false umbels terminating an axillary peduncle, and are frequently accompanied by a trifoliolate bract. Some fifty species are known from all temperate and mountainous regions.<sup>3</sup>

In the series *Loteæ* come first of all three other genera in which as in *Lotus* the pod is bivalve—*Cytisopsis*, *Dorycnium*, and *Hosackia*. The genus *Anthyllis* (figs. 169, 170) may be considered the type of a second subseries including four genera in which the fruit does not open at all, or else opens but slightly at a very advanced period. These genera are *Anthyllis*, *Securigera*, *Helminthocarpum*, and *Hymenocarpus*.

<sup>1</sup> In *Eulotus* SER., the style often has a little introrse lobe or accessory tooth. This is also the case in *Pedrosia*. The appendage becomes membranous in certain species of *Tetragonolobus*.

<sup>2</sup> The form of the fruit is the chief character by which this genus has been subdivided into sections. BENTHAM admits the five following:—

1. *Krockeria*.—Pod coriaceous, turgid bowed; inferior suture strongly marked.

2. *Lotea*.—Pod thin, linear bowed, compressed or torulose.

3. *Microlotus*.—Pod oblong or linear, usually straight (the calyx differs from that of *Lotea*).

4. *Eulotus*.—Pod of *Lotea* or *Microlotus*; calyx bilabiate or with five subequal lobes.

5. *Tetragonolobus*.—Each valve of pod with five longitudinal wings; seeds separated by false septa. Style of *Eulotus*.

<sup>3</sup> DESS., *Fl. Atlant.*, t. 210 (*Tetragonolobus*).—VENT., *Jard. Malm.*, t. 92; *Jard. Cels.*, t. 57.—CAY., *Icon.*, ii. 156, 157, 163.—SIBTH., *Fl. Græc.*, t. 755–758.—JACQ., *Fl. Austr.*, t. 361 (*Tetragonolobus*).—DELESS., *Icon. Sel.*, iii. t. 66.—BROT., *Phyt. Lusit.*, t. 53.—TORR. & GR., *Fl. N. Amer.*, i. 325.—WEBB., *Phyt. Canar.*, ii. 80, t. 60–65.—CAMBESS., *Enum. Pl. Balear.*, t. 15.—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 96 (*Ononis*).—HOOK. & ARN., *Beech. Voy. Bot.*, i. 8.—A. GRAY, in *Proceed. Acad. Philad.* (1863), 351.—HOOK., *Icon.*, t. 754, 757.—FENZL, in

V. CLOVER SERIES.

The Clovers<sup>1</sup> (Fr., *Trèfles*; figs. 171–173) have irregular hermaphrodite flowers. The receptacle varies in form, but is generally

*Trifolium pratense* (Purple Clover).



FIG. 172.  
Flower ( $\frac{2}{3}$ ).

FIG. 171.  
Habit ( $\frac{1}{2}$ ).

FIG. 173.  
Long. section of flower.

very slightly dilated and very shallow at the apex, which is lined by a thin layer of glandular tissue. The gamosepalous calyx divides

*Tchihatch. As. Min., Bot.*, t. 1.—HARV. & SONDR. *Fl. Cap.*, ii. 157.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 61.—GREN. & GODR., *Fl. de Fr.*, i. 429.—BENTH., *Fl. Austral.*, ii. 188.—*Bot. Reg.*, t. 1488.—*Bot. Mag.*, t. 79, 1233.—WALP., *Rep.*, i. 647; ii. 853; *Ann.*, i. 227; ii. 335; iv. 476.

<sup>1</sup> *Trifolium* T., *Inst.*, 404, t. 228.—L., *Gen.*, n. 896.—ADANS., *Fam. des Pl.*, ii. 322.—J., *Gen.*, 355.—GÆRTN., *Fruct.*, ii. t. 153.—LAMK.,

*Dict.*, viii. 1; Suppl., v. 329; *Ill.*, t. 613.—SER., in DC., *Prodr.*, ii. 189.—SPACH, *Suit. à Buffon*, i. 223.—ENDL., *Gen.*, n. 6511.—B. H., *Gen.*, 487, n. 74.—*Pentaphyllon* PERS., *Synops.*, ii. 352.—*Paramesus* PRESL., *Symb.*, i. 45.—*Amorinus* PRESL.—*Amoria* PRESL.—*Lupinaster* PRESL.—*Micrantheum* PRESL., *loc. cit.*, 46, 47.—*Myrtillus* PRESL.—*Galearia* PRESL. (nec ZOLL.).—*Calycomorpha* PRESL., *op. cit.*, 48–50.—*Lowospermum* HOCHST., in *Flora* (1846), 594.

above into five subequal or unequal lobes (the anterior being the longest), valvate or subimbricate in the bud. The unequal petals form an irregular papilionaceous corolla. All or most of them cohere by their claws for a variable extent into a tube completed by its being adnate to the staminal sheath. The standard is elongated and longer than the wings, which again are longer than the keel. The stamens are diadelphous, nine being united to one another and to the corolla, while the tenth is free, or only sticks for some way to both edges of the cleft of the tube formed by the nine others. The ovary is sessile or stipitate, usually almost superior owing to the form of the receptacle. It tapers above into an incurved or inflexed, slender or more or less swollen style, with a terminal capitate or oblique dorsal stigma. Within we find one or more descending campylotropous ovules whose micropyles look upwards and outwards.<sup>1</sup> The fruit is an oblong pod,<sup>2</sup> cylindrical, or more rarely obovate-compressed, surrounded by the marcescent calyx or corolla, and usually membranous, with one or few seeds. The campylotropous seeds have a bowed exalbuminous embryo with an inflexed radicle. This genus consists of herbs with compound digitate leaves, usually trifoliolate, but rarely with more leaflets; the leaflets, again, may be exceptionally pinnate. The two lateral stipules are adnate to the petiole. The flowers form a sort of capitula or shortly pedicellate false umbels; these inflorescences are sometimes unilateral,<sup>3</sup> or the flowers are more rarely solitary. The inflorescences are axillary leaf-opposed. The flowers are axillary to membranous bracts, persistent or caducous or narrow and ill-developed, and even sometimes quite rudimentary. There are probably not more than a hundred and fifty species of this genus, plants from all temperate climates.<sup>4</sup>

Next in order in the series *Trifolieæ* comes the genus *Medick*

<sup>1</sup> They have two coats.

<sup>2</sup> Usually indehiscent.

<sup>3</sup> See TRÉCUL, in *Bull. Soc. Bot. de Fr.*, i. 125.

<sup>4</sup> JACQ., *Fl. Austr.*, t. 40, 385, 386, 433; *Hort. Vindob.*, t. 60.—H. B. K., *Nov. Gen. et Spec.*, vi. t. 593.—K., *Mimos.*, t. 53.—SAVI, *Trifol.* (1810).—HOOK., *Fl. Bor.-Amer.*, t. 48-50; *Icon.*, t. 281, 286 (275).—PRESL., *Symbol.*, t. 30-34.—LEDEB., *Icon. Fl. Ross.*, t. 96.—VIS., *Fl. Dalmat.*, t. 44, 45.—DESF., *Fl. Atlant.*, t. 208, 209.—BROT., *Phyt. Lusit.*, t. 61-64.—

MORIS, *Fl. Sard.*, t. 60-64.—HOOK. & ARN., *Beech. Voy. Bot.*, t. 78, 79.—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 139, 140.—MORIC., *Pl. Nouv. Amér.*, t. 2.—GREN. & GODR., *Fl. de Fr.*, i. 403, 508.—HARV. & SOND., *Fl. Cap.*, ii. 158.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 53.—*Bot. Reg.*, t. 1070, 1883.—*Bot. Mag.*, t. 328, 557, 879, 1168, 2779, 2790, 3471, 3702.—WALP., *Rep.*, i. 639; ii. 850; v. 512; *Ann.*, i. 226; ii. 348; iv. 474.

(*Medicago*; Fr., *Luzerne*), whose flowers (figs. 174–179) resemble those of the Clovers; but it differs in that its fruit is elongated and sickle-shaped, or more or less spirally twisted (figs. 176–179),

*Medicago sativa* (*Lucerne*).



FIG. 174.  
Flower ( $\frac{2}{3}$ ).



FIG. 175.  
Longitudinal section of flower.

The edges of the spiral may be smooth and unarmed (figs. 176, 177), or spiny (figs. 178, 179), and the turns, at first pretty close together

*Medicago orbicularis* (*Snails*).

*Medicago ciliaris*.



FIG. 176.  
Side-view of Fruit.



FIG. 177.  
Front-view of fruit.



FIG. 178.  
Fruit.



FIG. 179.  
Fruit unrolled.

(figs. 176–178), may later become separated (fig. 179) under various influences.

Melilot (fig. 180) comes very near Medick, and has the same pinnately trifoliolate leaves; but the fruit is short and subglobular, straight or scarcely curved; it contains few seeds and opens later, if at all, into two valves. In this series are three other genera.

Trigonel (Fr., *Trigonelle*) has, like Medick and Clover, an obtuse keel

*Melilotus officinalis* (Common Melilot).



FIG. 180.  
Floriferous branch ( $\frac{1}{2}$ ).

and pinnate-trifoliolate leaflets; but the fruit is very variable in form, being straight bowed or sickle-shaped, sometimes thick and beaked, sometimes narrow or linear, or broad and flattened. It opens into two valves in certain species, into one in others; and may sometimes be quite indehiscent. *Parochetus* has an acute keel and a bivalve pod. Finally, Rest-harrow (*Ononis*; Fr., *Bugrane*) has numerous points of affinity with *Genisteæ*, in which series the genus has been placed by several authors. But in the form of the staminal filament, and in the leaves and inflorescence, it comes near *Trifolieæ*. The stamens are monadelphous and the pod opens into two valves.

## VI. SAINFOIN.

*Hedysarum*<sup>1</sup> (Fr., *Sainfoin*)<sup>2</sup>, has irregular resupinate hermaphrodite flowers.<sup>3</sup> On the edges of the little cup-shaped receptacle, lined with glandular tissue, are inserted the perianth and androecium, while the gynæceum springs from the bottom. The gamosepalous calyx divides above into five subequal lobes or teeth, valvate or slightly

<sup>1</sup> T., *Inst.*, 401, t. 225 (part.).—L., *Gen.*, n., 887 (part.).—J., *Gen.*, 362.—GÆRTN., *Fruct.*, ii. t. 155.—LAMK., *Dict.*, vi. 395; *Suppl.*, v. 14; *Ill.*, t. 628.—JAUME, in *Desvæ. Journ. Bot.*, i. 61 (part.).—DC., *Mém. Légum.*, 342; *Prodr.*, ii. 340.—SPACH, *Suit. à Buffon*, i. 286.—ENDL., *Gen.*, n. 6618.—BASINER, *Enum. Mon. Hedysar.*, in *Act. Petrop.* (1846).—B. H., *Gen.*, 510, n.

144.—*Echinolobium* DESVX., *Journ. Bot.*, i. 123, t. 5.

<sup>2</sup> [The English word Sainfoin is restricted to the English plant *Onobrychis sativa* (Fr., *Esparcette-Sainfoin*).]

<sup>3</sup> White, pink, purple, or violet; rarely yellowish.

imbricate in the bud. The petals form a papilionaceous corolla; the obovate or obcordate standard, reflexed on anthesis, tapers at the base, though seldom forming a distinct claw. The wings shorter than the standard, and sometimes very short, are obliquely elongated, each supported on a short narrow claw, above which the base of the limb is produced into an auricle. The petals of the keel have also short claws, and are usually longer than the wings; the keel, obtuse at the apex, is curved or abruptly bent, and as it were obliquely truncate along its inferior edge. The androceum consists of ten diadelphous stamens, the filaments of the nine anterior being united below, forming a cleft tube open behind; the anthers are introrse, all uniform. The sessile or shortly stipitate ovary contains a variable number of descending campyloptropous ovules, whose micropyles look upwards and outwards, is surmounted by a slender hollow style, abruptly inflexed, and ends in a little undilated stigma. The fruit (fig. 181) is a plano-compressed elongated pod, containing several seeds, and *lomentaceous*—i.e., dividing transversely at maturity into as many indehiscent joints as there are seeds. Each joint represents a sort of achene. It is smooth or muricated, and contains a reniform exarillate exalbuminous seed, with an inflexed radicle. *Hedysarum* consists of perennial herbs, undershrubs, or more rarely shrubs. Some fifty species<sup>1</sup> are known from the temperate regions of Europe, North Africa, Asia, and North America. The leaves are imparipinnate, with scarious stipules, but no stipels. The flowers form axillary racemes, and are themselves axillary each to a scarious or setaceous bract, and accompanied by two lateral bractlets placed some way up the pedicel, usually close against the flower.

Next to *Hedysarum* come on the one hand *Taverniera*, *Stracheya*, *Eversmannia*, *Alhagi*, and *Corethroedendron*, which have the same flower and several-jointed seed, but differ in the form of the fruit and in habit;

*Hedysarum  
coronarum.*

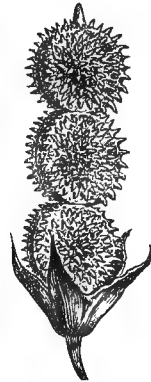


FIG. 181.  
Fruit ( $\frac{2}{3}$ ).

<sup>1</sup> JACQ., *Fl. Austr.*, t. 168.—LEDEB., *Icon.*, *Fl. Ross.*, t. 51, 52, 482.—DESF., *Fl. Atlant.*, t. 200.—SIBTH., *Fl. Græc.*, t. 721.—TORR. & GR., *Fl. N. Amer.*, i. 359.—REICHB., *Iconog. Pl. Crit.*, t. 411.—MORIS, *Fl. Sard.*, t. 68.—BOISS., *Voy. Bot.*, t. 56.—BGE. & MEX., *Enum.*

*Pl. Sais. Nor.*, t. 8.—FENZL., in *Tchihatch. As-Min. Bot.*, t. 4, 5.—GREEN. & GODR., *Fl. de Fr.*, i. 503-509.—*Bot. Reg.*, t. 808.—*Bot. Mag.*, t. 282, 1251, 2213.—WALP., *Rep.*, i. 744; ii. 892; v. 527; *Ann.*, ii. 415; iv. 544.

and on the other hand the true Sainfoins (*Onobrychis*; Fr., *Esparcette*), with the flower and vegetative organs (fig. 182) of *Hedysarum*, but

*Onobrychis sativa* (Sainfoin).



FIG. 182.  
Habit ( $\frac{1}{3}$ ).

whose fruit (fig. 183) is reduced to a single one-seeded joint, very variably winged or muricated. *Ebenus* has also an indehiscent fruit reduced to a single joint. All these genera constitute the sub-series *Euhedysareæ*.

To these *Æschynomeneæ* comes very near; the flowers are here in racemes (often few-flowered), cymes or fascicles always axillary to the leaves. These last are pinnate, with usually numerous leaflets, or rarely only from one to three. In these flowers the wings are often folded across, and the keel is incurved, obtuse or beaked. The stamens are either monadelphous, or equally diadelphous (five on either side of the flower). Unequal diadelphous (9-1) is very rare. The style is slender filiform, usually incurved. In this subseries are placed the following genera: *Æschy-*

*nomene*, *Herminiera*, *Sæmmeringia*, *Geissaspis*, *Smithia*, *Discolobium*, *Ormocarpum*, *Isodesmia*, *Brya*, *Pictetia*, *Amicia*, *Onobrychis crista-galli*, *Poiretia*, *Chætocalyx*, *Nissolia*, and (?) *Ctenodon*.

The single genus *Adesmia* constitutes the little group *Adesmieæ*, or *Hedysareæ* with free stamens.

*Bremontiera* forms another little group. Here the fruit finally separates into one-seeded joints as in most *Hedysareæ*, but the genus has the flowers of *Indigofereæ*; the leaves are simple.



FIG. 183.  
Fruit ( $\frac{2}{3}$ ).

*Coronilleæ* are herbaceous, or rarely frutescent, *Hedysareæ* with pinnate, or rarely simple leaves and axillary peduncles, supporting each a single flower, or a little umbel. The stamens are diadelphous, and five have the upper parts



of the filaments dilated. Here belong the five genera *Coronilla*, *Ornithopus*, *Hammatolobium*, *Scorpiurus*, and *Hippocrepis*.

The subseries *Stylosantheæ* comprises the three genera *Stylosanthes*, *Zornia*, and *Chapmannia*, formed of herbaceous or scarcely suffrutescent plants, with exstipellate paucifoliolate leaves and spicate or capitate, rarely racemose, flowers. The stamens are monadelphous, forming an unslit tube, and five of them are shorter than the rest, which have versatile anthers.

The Earthnuts (*Arachis*; Fr., *Ara-chide*), have the general characters of *Stylosantheæ*; but may be placed in a separate category because their indehiscent fruits ripen underground, and though contracted between the seeds, never separate into joints. The radicle is straight (figs. 184, 185).<sup>1</sup>

*Desmodiæ* forms the last group of this series, remarkable for its trifoliolate leaves, whose lateral leaflets (fig. 186) may be much reduced or even altogether absent. Here belong the genera *Desmodium*, *Pseudarthria*, *Pycnospora*, *Uraria*, *Lourea*, *Mecopus*, *Alysicarpus*, *Phylacium*, *Hallia*, *Eleiotis*, *Leptodesmia*, *Cranocarpus*, *Lespedeza*, and *Ougeinia*. In the last few of these genera the ovary usually contains only one ovule; so that the fruit is short, one-seeded and indehiscent as in *Onobrychis*; the genus *Ougeinia*, by its leaves and the form of its floral receptacle connects this series with *Phaseoleæ*. At the same time its fruit is articulated, composed of one or more flattened woody joints, each resembling the entire fruit of the *Dalbergiæ*.

*Arachis hypogæa* (Peanut).



FIG. 184.  
Seed.

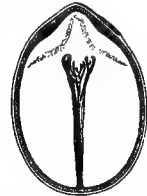


FIG. 185.  
Longitudinal  
section of seed.

*Desmodium gyrans*.



FIG. 186.  
Leafy branch ( $\frac{1}{2}$ ).

<sup>1</sup> After this genus comes *Arthrochianthus* H. Bn., given only in the Addenda in the French

edition, but which will be found in its place at n. 153a in the following *Genera*.

## VII. DALBERGIA SERIES.

*Dalbergia*<sup>1</sup> (fig. 187) has irregular resupinate flowers, whose cup-shaped receptacle is lined by a glandular disk. The gamosepalous calyx divides above into five unequal teeth, imbricated in the bud. The two superior are the largest, and the inferior, often longer than the two lateral ones, is also narrower and more acute. There are nine or ten stamens, monadelphous or diadelphous; for the vexillary stamen may be quite free, united to the rest in a sheath split open

*Dalbergia melanoxyylon.*



FIG. 187.  
Longitudinal  
section of flower ( $\frac{4}{5}$ ).

above, or even altogether absent. The anthers are short erect and didymous, with their two cells often placed back to back; they dehisce by longitudinal clefts extending all the way down, or only to a variable distance from the apex. The one-celled ovary, inserted by a short foot in the bottom of the receptacle, ends in an incurved style, with an obtuse truncate or slightly dilated stigmatiferous apex. Its cavity contains one or few descending incompletely anatropous ovules, whose micropyles look upwards and outwards. The fruit is dry, flattened, and samaroid, obliquely linear or seldom bowed, with a thin reticulate pericarp, one or few-seeded,

thinned off at the edges, and somewhat swollen and thickened over the seeds. These are reniform compressed; the radicle is inflexed and accumbent. *Dalbergia* contains some three-score species<sup>2</sup> of climbing trees or shrubs, from all the tropical countries of Asia, Africa, America, and Oceania. The leaves are alternate imparipinnate; with alternate leaflets (sometimes reduced to one). There are no stipels, but only two lateral ill-developed stipules, often caducous

<sup>1</sup> L. FIL., *Suppl.*, 52 (nec TUSS.).—J., *Gen.*, 362.—LAMK., *Dict.*, ii. 254; *Suppl.*, ii. 445; *Ill.*, t. 601.—DC., *Prodr.*, ii. 416 (part.).—SPACH, *Suit. à Buffon*, i. 359.—ENDL., *Gen.*, n. 5717.—BENTH., in *Ann. Wien. Mus.*, ii. 102.—B. H., *Gen.*, 544, n. 236.—*Solori* ADANS., *Fam. des Pl.*, ii. 327.—*Amerimum* P. BR., *Jam.*, 288, t. 32, fig. 3.—ADANS., *loc. cit.*, 320.—DC., *Prodr.*, ii. 421.—ENDL., *Gen.*, n. 6701.—*Trip-tolemæa* MART., ex BENTH., *loc. cit.*, 102.—ENDL., *Gen.*, n. 6718.—*Semeionotis* SCHOTT, in *Wien. Zeitschr.* (1830), 1206.—*Miscolobium* VOG., in *Linnaea*, xi. 200.—BENTH., *loc. cit.*,

101.—ENDL., *Gen.*, n. 6719.—*Endospermum* BL., in *Flora* (1825), 132 (nec BENTH.).—DC., *Prodr.*, ii. 415.—*Podiopedalum* HOCHST., in *Flora* (1841), 657.

<sup>2</sup> ROXB., *Pl. Coromand.*, t. 114, 191.—WIGHT, *Icon.*, t. 242, 243, 261, 262, 266, 1156.—GUILL. & PERR., *Fl. Seneg. Tent.*, i. 227, t. 53.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 232.—BENTH., in *Journ. Linn. Soc.*, iv. *Suppl.*, 28; in *Mart Fl. Bras., Papil.*, t. 53–62; *Fl. Austral.*, ii. 270.—THW., *Enum. Pl. Zeyl.*, 93 (part.).—WALP., *Rep.*, i. 799; ii. 903; v. 545; *Ann.*, i. 255; ii. 438; iv. 575.

or absent. The flowers are small and numerous,<sup>1</sup> in terminal or axillary racemes; these are ramified, consisting of a large number of regularly or irregularly branching cymes,<sup>2</sup> and covered with sometimes large bracts, and small bractlets, either caducous or fairly persistent.

All the plants which in common with *Dalbergia* have alternate leaves and a dry fruit, with the seeds attached by the middle of the inner edge, so that they

are neither ascending nor descending, have been united into a separate subseries, which has been named *Pterocarpeæ* from the included genus *Pterocarpus* (figs. 188–189), whose fruit is one-seeded, suborbicular or oblong, with the edge thinning off into a sort of membranous wing. The ten genera of this subseries, distinguished from one another by the form of their anthers and fruit, are *Dalbergia*, *Ecastaphyllum*, *Machærium*, *Cyclobium*, *Drepanocarpus*, *Platypodium*, *Tipuana*, *Centrolobium*, *Pterocarpus*, and *Pacilanthæ*.

The six genera *Andira*, *Geoffræa*, *Coumarouna* (fig. 190), *Pterodon*, *Euchresta*, and *Fissicalyx*, form the small subseries *Andirææ* or *Geoffræææ* in which both the wings and the pieces of the keel are free, or rarely united. The ovules are few or solitary; and the fruit, always one-seeded, is usually an indehiscent drupe, or has a thin, turgid indehiscent pericarp.

The single genus *Bocoa* forms a group apart, possessing the fruit of *Dalbergia* and the allied genera, with a dehiscent pericarp, a sub-regular corolla, an irregularly dentate, elongated gamosepalous calyx, and alternate leaves.

In *Lonchocarpeæ*, the leaves are compound with the leaflets almost constantly opposite. The fruit is not drupaceous but dry and

*Pterocarpus Draco.*

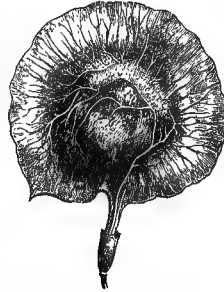


FIG. 188.  
Fruit.

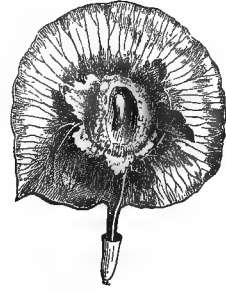


FIG. 189.  
Fruit opened.

<sup>1</sup> They are white or more frequently purple or violet.

<sup>2</sup> BENTHAM (*loc. cit.*) divides this genus by means of the inflorescence, androecium, and fruit,

into four sections, whose differentiating characters are far from being absolute: 1. *Triptolemææ*; 2. *Sissoa* (BENTH.); 3. *Dalbergaria* (BENTH.); 4. *Selenolobium* (BENTH.).

indehiscent. The seeds are usually transverse, or attached by a lateral hilum, not pendulous inside the pericarp. This subseries

*Coumarouna odorata* (Tonquin-Bean).



FIG. 190.

Flower and fruit-bearing branch ( $\frac{1}{3}$ ).

comprises *Lonchocarpus*, *Xanthocercis* H. Bn.,<sup>1</sup> *Piscidia*, *Coublandia*, *Platymiscium*, *Ostryocarpus*, *Hymenolobium*, *Pongamia*, and *Deguelia*. This last genus at once approaches *Milletia*, *Gliricidia*, and the *Genisteæ*.

### VIII. BROOM SERIES.

The Brooms<sup>2</sup> (Fr., *Genêts*—fig. 191) have hermaphrodite flowers, with a concave receptacle lined with glandular tissue, on whose

<sup>1</sup> Given only in the Addenda in the French edition, but will be found in its place at n. 185a, in the following *Genera*.]

<sup>2</sup> *Genista* T., *Inst.*, 643 (part.), t. 412.—L., *Gen.*, n. 859 (part.).—J., *Gen.*, 353.—LAMK., *Dict.*, ii. 616, t. 619.—DC., *Mém. Légum.*, 204, t. 36; *Prodr.*, ii. 154.—SPACH, *Suit. à Buffon*, i. 200.—ENDL., *Gen.*, n. 6500.—B. H., *Gen.*, 482, 1002, n. 62.—*Corniola* PRESL., *Bot. Bem.*, 136.—*Corothismus* PRESL., *op. cit.*, 137.—*Dry-*

*mospartum* PRESL., *op. cit.*, 138.—*Voglera* Fl. Wett. (ex KOCH, *Syn. Fl. Germ.*, 153).—*Salz-wedelina* Fl. Wett. (ex SCHUB., *Enum.*, 146).—*Asterocytisus* SCHUB., *loc. cit.*—*Spartium* SPACH, in *Ann. Sc. Nat.*, sér. 2, xix. 285, t. 16 (nec L.).—*Relama* BOISS., *Voy.*, 143.—*Dendrospartum* SPACH, in *Ann. Sc. Nat.*, sér. 3, iii. 152.—*Gonocytisus* SPACH, *loc. cit.*, 153.—*Syspone* GRISEB., *Spic. Fl. Rumel.*, i. 5.—*Balia* WEBB, *Otia Hisp.*, 20, t. 15, 16.

edges is inserted the calyx. This is gamosepalous, with five divisions of unequal size and depth. The three anterior are of nearly equal length, approximated to form a sort of lip, which is slightly notched at the apex in the very young bud. The two superior or posterior are separated behind by a cleft, so deep, that in certain species it extends to close upon the edge of the receptacle. The irregular papilionaceous corolla has an oval standard, oblong wings, and a straight or incurved oblong keel, whose pieces are united for a variable distance along the lower edge. The angles of these petals are often adnate for a short distance to the staminal filaments. They are monadelphous, united for a good distance into a closed tube and only free near the apex. The introrse two-celled anthers dehisce longitudinally. The five superposed to the petals are the shorter and versatile, while the alternating five are more elongated and basifixed. The sessile ovary is surmounted by an incurved style, inflexed or circinate above, and ending in a globular, or more rarely oblique oblong, stigmatiferous head. The ovules, two or three, or more frequently indefinite in number, form two vertical rows on the posterior wall of the ovary and are campylotropous and descending, with the micropyle looking upwards and outwards. The fruit is an oblong linear or subglobular, indehiscent or bivalve pod; the valves are convex or turgid, rarely almost flat, and enclose a variable number of exarillate seeds. The genus Broom or *Genista* comprises shrubs or undershrubs from the temperate regions of Europe, western Asia, and north Africa; some seventy species are

*Genista tinctoria* (Dyer's Greenweed).



FIG. 191.  
Habit ( $\frac{1}{3}$ ).

known.<sup>1</sup> The leaves are simple, trifoliolate, or more frequently unifoliolate; their stipules are ill-developed, or even altogether absent. The flowers are white or yellow, forming simple or compound racemes or spikes, sometimes short and capituliform; they are accompanied by bracts and bractlets, leafy and persistent or small and caducous.

This genus gives its name to the group *Eugenisteeæ* (or *Sparticeæ*), in which the seeds are exarillate, and the stamens united into a tube.

*Bossiaea scolopendra.*



FIG. 192.  
Flower-bearing branch.

It contains the nine genera, *Genista*, *Spartium*, *Laburnum*, *Calycotome*, *Adenocarpus*, *Petteria*, *Erinacea*, *Argyrolobium*, and *Lupinus*.

The Furze or Gorse (*Ulex*, Fr., *Ajonc*) is the type of the subseries *Ulicineæ*, which also includes the genera *Cytisus* and *Hypoclyptus*. These have the androceum of the *Eugenisteeæ*, the filaments being united into a cylindrical tube; but their seeds are exarillate.

The subseries *Crotalarieæ*, contains all the *Genisteeæ* which have no aril, and in which the tube formed by the filaments of the monadelphous stamens is short down the back. It contains eighteen genera, viz., *Crotalaria*, *Priotropis*, *Pentadynamis*, *Heylandia*, *Dichilus*, *Melolobium*, *Anarthrophyllum*, *Buchenrædera*, *Viborgia*, *Aspalathus*, *Lebeckia*, *Rothia*, *Lotononis*, *Listia*, *Pleiospora*, *Borbonia*, *Rafnia*, and *Euchlora*.

In the little group *Liparieæ*, the leaves are simple, the stamens diadelphous (9-1), rarely monadelphous, and the seeds arillate; it comprises the six African genera *Liparia*, *Priestleya*, *Amphithalea*, *Cœlidium*, *Lathriogyne*, and *Walpersia*.

*Bossiaeeæ* consists of Australian plants, in habit approaching many of the *Podalyrieæ*, and almost always possessing simple leaves, monadel-

<sup>1</sup> Spec. ad 70. JACQ., *Hort. Vindob.*, t. 190; *Fl. Austr.*, t. 208, 209;  *Ic. Rar.*, t. 557.—VENT., *Jard. Cels.*, t. 87.—DESE., *Fl. Atlant.*, t. 178, 180, 182, 183.—SIBTH., *Fl. Græc.*, t. 672, 674.—MORIS., *Fl. Sard.*, t. 28-32.—WEBB., in *Ann. Sc. Nat.*, sér. 2, xx. 276; *Phyt. Canar.*, t. 48.—BROT., *Phyt. Lusit.*, t. 54, 55.—SPACH,

in *Fl. Alger.*, t. 84-87.—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 142-152.—REICH., *Pl. Crit.*, t. 383.—GREN. & GODR., *Fl. de Fr.*, i. 349, 507.—*Bot. Reg.*, t. 368, 1150.—*Bot. Mag.*, t. 683, 1918, 2260, 2674.—WALP., *Rep.*, v. 461; *Ann.*, i. 218; ii. 340; iv. 469.

phous stamens whose tube is split above, and arillate seeds. It contains the genera *Bossiaea* (fig. 192), *Platylobium*, *Templetonia*, *Hovea*, and *Goodia*.

IX. PODALYRIA SERIES.

*Podalyria*<sup>1</sup> (193, 194) has resupinate irregular hermaphrodite flowers. The cup-shaped receptacle lined by a glandular disk is elongated from before backwards.<sup>2</sup> From its bottom springs the gynæceum, while the remaining organs of the flower are inserted round its margin. The gamosepalous calyx forms a thick sac dividing above into five teeth, equal or slightly unequal, or lobes usually valvate in the bud. The petals, which possess slender claws, form a papilionaceous corolla of vexillary æstivation. The limb of the standard is broad, sub-orbicular, often emarginate; the wings rather shorter, are irregularly and obliquely obovate; the keel is still shorter, incurved and obovate, obtuse at the apex. The gynæceum consists of a nearly central sessile or subsessile ovary, surmounted by a style whose apex is dilated into a little stigmatiferous head, forming two vertical rows. Within the ovary are an indefinite number of obliquely descending subanatropous ovules whose micropyles look upwards and outwards. The fruit is a subglobular ovoidal or oblong turgid coriaceous bivalved pod, containing a variable number of incompletely campylotropous seeds, often ascending, with their micropyles downwards and outwards. The funicle dilates at the hilum into a little fleshy aril. This genus consists of some fifteen species of shrubs from South Africa.<sup>3</sup> Nearly all their organs are covered with down. The leaves are alternate simple petiolate,

*Podalyria Burchellii.*



FIG. 193.  
Flower ( $\frac{2}{3}$ ).

*Podalyria Burchellii.*

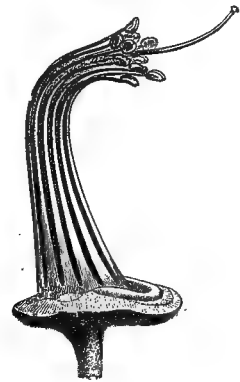


FIG. 194.  
Flower, perianth removed ( $\frac{2}{3}$ ).

<sup>1</sup> *Podalyria* LAMK., *Dict.*, v. 440 (part.); *Suppl.*, iv. 442; *Ill.*, t. 327, figs. 3, 4.—DC., *Prodr.*, ii. 101.—SPACH, *Suit. à Buffon*, i. 167.—ENDL., *Gen.*, n. 6423.—BENTH., in *Ann. Wien. Mus.*, ii. 67.—B. H., *Gen.*, 467, n. 7.—*Aphora* NECK., *Elem.*, n. 1370 (nec NUTT.).

<sup>2</sup> In many species the "calyx" (*i.e.*, the receptacle) well deserves its character of "*basi intrusus*."

<sup>3</sup> THUNB., *Prodr. Fl. Cap.*, 79; *Fl. Cap.*, 568 (*Hypocalyptus*).—SALISB., *Par. Lond.*, t. 7.—W., *Spec.*, 505.—VENT., *Jard. Cels.*, t. 99.—R.

accompanied by two subulate lateral stipules, often caducous. The flowers are pedunculate in the axils of the leaves, usually solitary or geminate; rarely more numerous.

This series contains twenty-six genera. Two are South African and only contain shrubs, viz., *Podalyria* and *Cyclopia*. Five are natives of the northern hemisphere and possess herbaceous leaves, viz., *Baptisia*, *Thermopsis*, *Anagyris*, *Piptanthus*, and *Pickeringia*.

The other nineteen genera are Australian, often comprising little shrubs, with coriaceous persistent leaves. They are as follows: *Brachysema*, *Jansonia*, *Oxylobium*, *Chorizema*, *Isotropis*, *Gompholobium*, *Mirbelia*, *Burtonia*, *Jacksonia*, *Sphærolobium*, *Viminaria*, *Daviesia*, *Aotus*, *Phyllota*, *Gastrolobium*, *Pultenæa*, *Eutaxia*, *Dillwynia*, and *Latrobea*.

*Sophora* (*Styphnolobium*) *japonica*.



FIG. 195.  
Fruit.

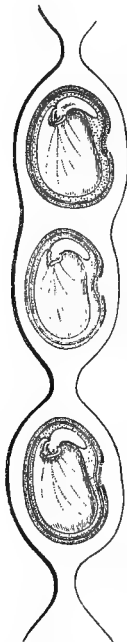


FIG. 196.  
Partial longitudinal  
section of fruit ( $\frac{3}{4}$ ).

## X. SOPHORA SERIES.

*Sophora*<sup>1</sup> (figs. 195, 196) has irregular repupinate hermaphrodite flowers. The concave receptacle is lined by a glandular disk, on whose rim is inserted a calyx divided into five equal or slightly unequal teeth, imbricated in the bud. The petals, alternate with these, have a similar perigynous insertion, and a vexillary æstivation. The standard is obovate or orbicular, erect or spreading, shorter or longer in the keel. The wings are oblique and elongated. The keel is oblong, nearly straight; its two petals are united edge to edge, or else one overlaps the other below. Of the ten free or nearly free stamens five are superposed to

the calyx lobes; their anthers are versatile introrse two-celled, de-

BR., in *Ait. Hort. Kew.*, ed. 2, iii. 6.—HARV. & SONN., *Fl. Cap.*, ii. 9.—*Bot. Reg.*, t. 869.—*Bot. Mag.*, t. 753, 1580.

<sup>1</sup> L., *Gen.*, n. 508.—J., *Gen.*, 352.—GÆRTN., *Fruct.*, ii. 320, t. 149.—LAME., *Dict.*, vii. 228,

Suppl., v. 163.—DC., *Prodr.*, ii. 95.—SPACH, *Suit. à Buffon*, i. 160.—ENDL., *Gen.*, n. 6738.—B. H., *Gen.*, 555, 1002, n. 273.—*Patrinia* RAFIN., in *Journ. Phys.*, lxxxix. 97 (ex ENDL.).—*Radiusia* REICHEB., *Consp.*, 148.



hiscing longitudinally. The gynæceum, inserted in the bottom of the receptacle, consists of a shortly stipitate ovary surmounted by an incurved style, truncate or slightly dilated at its stigmatiferous apex. Along the vexillary edge of the ovary is a vertical placenta whose two lips each support an indefinite number of descending

*Toluifera Balsamum* (*Balsam of Tolu Plant*).



FIG. 197.  
Habit ( $\frac{1}{3}$ ).



FIG. 198.  
Flower ( $\frac{1}{4}$ ).



FIG. 199.  
Longitudinal section of flower.

campylotropous ovules with their micropyles looking upwards and outwards. The fruit is a rounded or slightly compressed coriaceous woody or even fleshy moniliform pod, sometimes opening late into two valves. To each dilatation of the pericarp corresponds a descending exarillate campylotropous seed, containing within its coats an exalbuminous embryo with thick fleshy cotyledons and a superior radicle; this last may be short and nearly straight, or longer and inflexed. *Sophora* consists of trees, shrubs, and perennial herbs inhabiting all warm climates. Some

twenty-two species are known.<sup>1</sup> Their leaves are alternate imparipinnate, with indefinite or few leaflets sometimes possessing setaceous stipels. The stipules are very small and narrow, or absent. The flowers form simple or ramified terminal racemes; each flower, axillary to a bract, is accompanied by two lateral bractlets, usually ill-developed, inserted at the base of the pedicel or at a variable height on it.

*S. japonica*<sup>2</sup> has been made by some authors the type of a genus apart,<sup>3</sup> because of the pulpy or fleshy substance of its pericarp. The character may be held to distinguish a section of the genus *Sophora*. *S. secundiflora*<sup>4</sup> has also been classed in a distinct genus<sup>5</sup> because its

*Toluifera Balsamum.*



FIG. 200.  
Fruit ( $\frac{2}{3}$ ).

pod is hard, woody and somewhat compressed. *Edwardsia*<sup>6</sup> has also been usually made a distinct genus, because the pod here often possesses four longitudinal wings, and the standard is mostly, though not constantly, erect and shorter than the keel. The most recent authors only admit these groups as sections of the genus *Sophora*.

Next to *Sophora* come thirteen nearly allied genera, with a similar perianth and an ovary generally containing more than three ovules, and sometimes even a large number. They are as follows: *Gourliea*, *Ammodendron*, *Ammothamnus*, *Virgilia*, *Calpurnia*, *Cladrastis*, *Castanospermum*, *Alexa*, *Ormosia*, *Pericopsis*, *Bowdichia*, *Diplostropis*, and *Spirotropis*.

In *Monopteryx* the leaves are also pinnate, but the ovary is uniovulate, bringing the genus very near *Dalbergiæ*.

The five genera: *Baphia*, *Leucomphalus*, *Dalhousiea*, *Bowringia*, and *Panurea*, have unifoliolate leaves and indefinite ovules.

<sup>1</sup> PALL., *Astrag.*, t. 87, 88.—LEDEB., *Icon. Fl. Ross.*, t. 365.—JACQ., *Hort. Schænbr.*, t. 260 (*Edwardsia*), 363 (*Styphnolobium*); *Amer.*, 118, t. 173.—DESVX., *Journ. Bot.*, i. 75.—ROYLE, *Himal.*, t. 32.—WIGHT, *Icon.*, t. 979, 1054, 1155.—JAUB. & SPACH, *Ill. Plant. Or.*, t. 330.—THW., *Enum. Pl. Zeyl.*, 94.—BENTH., *Fl. Austral.*, ii. 274; in *Mart. Fl. Bras., Papil.*, 313, t. 124.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 253.—*Bot. Reg.*, t. 738, 1185, 1798.—*Bot. Mag.*, t. 1442, 3390, 3735.—WALP., *Rep.*, i. 806; ii. 903; *Ann.*, i. 439; iv. 586.

<sup>2</sup> *Mantiss.*, 66.—DC., *Prodr.*, ii. 1.—*S. sinica* ROS., *Journ. Phys.*, 14.

<sup>3</sup> *Styphnolobium* SCHOTT, in *Wien. Zeitsch.* (1830), 844.—ENDL., *Gen.*, n. 6743.

<sup>4</sup> LAG., in DC., *Cat. Hort. Monsp.*, 148.—*Virgilia secundiflora* CAV., *Icon.*, 5, t. 401.

<sup>5</sup> *Broussonnetia* ORTEG., *Dec.*, 61, t. 7 (nec VENT.).—*Dermatophyllum* SCHEELE (A.), in *Linnaea*, xxi. 458.

<sup>6</sup> SALISB., in *Trans. Linn. Soc.*, ix. 298, t. 26, fig. 1.—DC., *Prodr.*, ii. 97.—ENDL., *Gen.* n. 6737.

*Ateleia* and *Belairia* have pinnate leaves, but only one or two ovules; and the inferior sepals are distant from one another, or altogether absent.

*Sweetia*, and the allied genera *Myrocarpus*, *Myrospermum*, *Tolwifera* (figs. 197–200), and *Ferreirea*, have only one or few ovules and a samaroid fruit.

Finally, *Camoensia* has indefinite ovules, but its trifoliolate leaves bring it very near *Podalyriææ*.

## XI. TOUNATEA SERIES.

The flowers of *Tounatea*<sup>1</sup> (figs. 201–204) are hermaphrodite or rarely polygamous. The receptacle is of no great size, convex or

*Tounatea Panacocco.*



FIG. 201.  
Flower ( $\frac{2}{3}$ ).



FIG. 202.  
Longitudinal section of flower.

slightly concave; it bears a valvate gamosepalous calyx bursting irregularly at anthesis. The corolla is absent, or more frequently represented by a large vexillary petal, involute and corrugated in

<sup>1</sup> AUBL., *Guian.*, i. 549, t. 218 (1775).—J., *Gen.*, 440.—H. BN., in *Adansonia*, ix. 214.—*Possira* AUBL., *op. cit.*, ii. 934, t. 355 (1775).—*Ritteria* SCHREB., *Gen.*, 364 (1789–91).—*Swartzia* SCHREB., *op. cit.*, 518 (nec EHRH., nec HEDW.).—W., *Spec.*, ii. (1799), 1219.—DC., *Prodr.*, ii. 422.—SPACH, *Suit. à Buffon*, i. 145.—

ENDL., *Gen.*, n. 6814.—B. H., *Gen.*, 561, n. 294.—*Hætzelia* NECK., *Elem.*, n. 1383 (1791).—*Riveria* H. B. K., *Nov. Gen. et Spec.*, vii. (1825) 266, t. 659 *bis.*—ENDL., *Gen.*, n. 6807.—*Gynanthistrophe* POIT., ex DC., *loc. cit.*, 424 (1825).—*Trischidium* TUL., in *Ann. Sc. Nat.*, sér. 2, xx. (1843), 141, t. 4.

the bud, and sometimes accompanied by two very small lateral petals. The androceum consists of an indefinite number (often very large) of declinate hypogynous or nearly hypogynous stamens, composed of free or shortly coherent filaments, and introrse two-celled anthers of longitudinal dehiscence. Sometimes the stamens are all of nearly equal size, both in filament and anther; sometimes on the contrary, those next the standard are shorter than those on the opposite side of the flower, while some of these last may assume considerable dimensions, both anther and filament being at once longer and thicker. The free superior gynæceum consists of one, or more rarely of two, carpels (figs. 203, 204). The ovary

*Toumatea microstylis.*

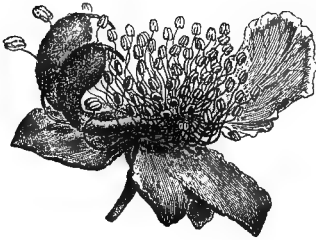


FIG. 203.  
Flower ( $\frac{2}{3}$ ).

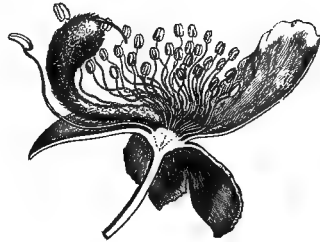


FIG. 204.  
Longitudinal section of flower.

is stipitate, often bowed; it contains an indefinite number of descending ovules whose micropyles look upwards and outwards, and it tapers above into an acute style whose undilated or slightly capitate apex is covered with stigmatic papillæ. The pod is ovoidal or elongated, cylindrical or turgid, indehiscent or bivalve. It contains an indefinite number of arillate or exarillate seeds whose coats unfold an embryo, sometimes accompanied by albumen, which has thick cotyledons and a short inflexed radicle. *Toumatea* comprises unarmed trees from tropical America; one species alone has been found in Africa. The leaves are alternate, imparipinnate or unifoliolate, and possess two small or leafy lateral stipules. The flowers are solitary or grouped into single or fascicled racemes, inserted on the nodes of the old wood, or rarely axillary to the living branches, but pretty frequently forming ramified racemes, the leaves of the branches being replaced by bracts. These last are usually small and very caducous, and the flower is accompanied by two

little lateral bractlets, themselves rarely persistent. Some sixty species of *Tounatea* are known,<sup>1</sup> grouped by the most recent authors into five sections<sup>2</sup> based on the form and dehiscence of the calyx, the form of the vexillary petal, and that of the stamens, especially as regards the anthers.

Near *Tounatea* have been placed four genera, distinguished from it chiefly by the following characters. *Aldina* (figs. 205, 206) has the flowers of *Tounatea*, but with a nearly regular corolla of five or six segments. Hence it might perhaps be better to take this genus rather than *Tounatea* as the type of the section; its receptacle is

*Aldina latifolia.*



FIG. 205.  
Flower.

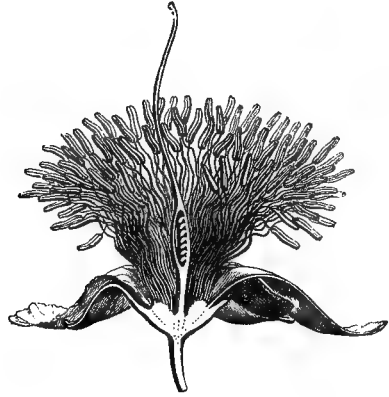


FIG. 206.  
Longitudinal section of flower.

also nearly regular, cup-shaped, and lined by a thick disk, external to which are inserted the pieces of the perianth and androceum. *Zollernia* has also nearly regular flowers (figs. 207, 208), with five equal or nearly equal petals, and from nine to fifteen stamens. The flower-buds are elongate and acuminate. The leaves are reduced to a single leaflet. The depth of the receptacle, too, is reduced, so that the insertion of the perianth and androceum becomes nearly hypogynous. *Exostyles* has nearly the flower of *Zollernia*, but with

<sup>1</sup> VELLOZ., *Fl. Flum.*, xi. t. 17, 18, 19 (?), 22, 23 (*Mimosa*).—VAHL.,  *Ic. Amer.*, t. 9; *Ecl. Amer.*, t. 20; *Symb.*, t. 34.—DESVX., in *Ann. Sc. Nat.*, sér. 1, ix. 424.—DC., *Mém. Légum.*, t. 58-60.—DELESS., *Icon. Sel.*, iii. 42, t. 74.—

BENTH., in *Hook. Journ.*, ii. 87.—WALP., *Rep.* i. 841; v. 563; *Ann.*, ii. 446.

<sup>2</sup> 1. *Cyathostegia* (BENTH.); 2. *Dithyria* (BENTH.); 3. *Eutounatea*; 4. *Possira*; 5. *Fistuloides* (see below, *Gen.*, n. 239).

a much deeper receptacle, and its leaves are imparipinnate. *Cordyla* has also a very deep receptacle and its stamens are markedly

*Zollernia Houletiana.*

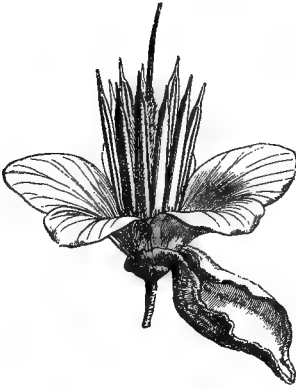


FIG. 207.  
Flower ( $\frac{3}{4}$ ).

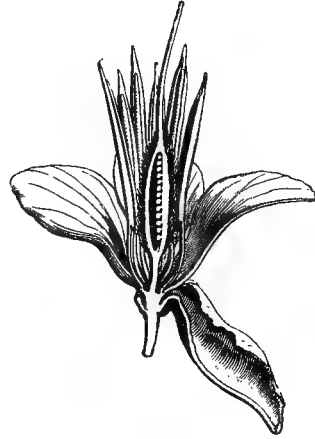


FIG. 208.  
Longitudinal section of flower.

perigynous as in many *Cesalpinieae*, but its flowers are apetalous, while its stamens are indefinite as in *Aldina* and *Toumatea*.<sup>1</sup>

<sup>1</sup> We cannot treat of the general classification, geographical distribution, and uses of this order until after the enumeration of the characters of

its several genera, which immediately follows. The above points will therefore be found after the ensuing *Genera*.

## GENERA.

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### I. VICIÆ.

1. **Vicia** T.—Flowers irregular resupinate; receptacle concave, usually oblique, lined by a disk. Calyx gamosepalous; lobes or teeth 5, nearly equal; 2 highest shorter, or 1 lowest longer; imbricated or subvalvate in æstivation. Corolla papilionaceous; standard obovate or oblong, emarginate; claw broad, short; wings oblique usually oblong, adhering at middle to keel; keel shorter than wings, falcate. Stamens 10, 2-adelphous (9-1); vexillary stamen free, or more or less connate with remainder; other 9 connate into a sheath cleft above with oblique mouth; anthers uniform, introrse 2-celled, longitudinally rimose. Germen sessile or stipitate; ovules 2 (*Ervum*) or oftener  $\infty$ , incompletely campylotropous, usually descending; micropyle extrorse superior; style inflexed, filiform or slightly compressed above laterally or dorsally, apex dorsally bearded by a bunch of hairs, or pilose or pubescent all round, or more rarely beardless (*Ervum*); stigma terminal. Legume of variable form compressed, continuous within; pericarp membranous, or more rarely thick subcarnose or coriaceous (*Faba*), 2-valved. Seeds globose or compressed; funicle dilated at hilum into an oblong or linear aril; embryo fleshy; cotyledons thick; radicle inflexed accumbent.—Low erect, or diffuse herbs, usually climbing by means of tendrils; leaves terminating in a small recurved bristle, or a simple or branched tendril; leaflets  $\infty$  or more rarely 1, 2-jugate, entire or dentate, exstipellate; stipules semisagittate; flowers solitary or in twos or threes at axils, or oftener in lateral (spurious?) racemes at axils of leaves; bracts usually small, very caducous; bractlets 0 (*Temperate regions of Northern hemisphere and of South America*). See p. 190.

2. **Lens** T.<sup>1</sup>—Receptacle shortly obconical, glandular within. Calyx gamosepalous; lobes 5, nearly equal, elongated valvate. Corolla and stamens of *Vicia*. Germen stipitate or subsessile, 2-

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<sup>1</sup> See p. 193.

ovulate; style inflexed, slightly flattened dorsally above, longitudinally bearded with minute hairs on inner face; apex minutely capitate, stigmatiferous. Legume compressed, continuous within, 1-2-seeded, 2-valved. Seeds lenticular compressed; funicle thin, soon dilated into a thin arched aril covering long, ovate or oblong hilum; embryo thick; cotyledons usually orbiculate; radicle inflexed accumbent. —Erect or subscandent herbs; leaves alternate imparipinnate; odd leaflet, or sometimes 2 or 3 highest, terminating in a bristle or tendril; stipels 0; stipules scarcely adnate to petiole, membranous acute, semisagittate at base; flowers small, solitary or in few-flowered racemes, pedunculate, spuriously axillary; bracts and bractlets 0 or rudimentary<sup>1</sup> (*Southern Europe, Western Asia, Northern Africa*<sup>2</sup>).

3. *Lathyrus* T.<sup>3</sup> —Receptacle widely cupuliform, slightly concave, glandular within. Calyx gamosepalous, more or less oblique; teeth 5, equal; or superior teeth shorter and more obtuse, imbricated. Petals very unequal; standard broadly obovate or orbicular, emarginate, narrowed at base into a broad claw; wings falcate-oblong or obovate, either adhering within at middle to keel or free, narrowly unguiculate; keel shorter than or nearly equal to wings, curved obtuse pointed. Stamens 10; vexillary stamen free or more rarely connate with remainder to a variable height; mouth of sheath usually nearly even; filaments at apex free inflexed filiform or dilated; anthers uniform. Germen sessile or stipitate; ovules  $\infty$  or more rarely few; style inflexed, flattened and often hardened at apex; posterior face (often finally more or less lateral or anterior by torsion) longitudinally bearded; apex minutely capitate or subglobose, terminal stigmatiferous. Legume compressed or subterete, continuous within, few or  $\infty$ -seeded, 2-valved. Seeds globose or angular, more rarely compressed; funicle (as in *Pisum*) dilated along hilum; embryo thick; radicle inflexed accumbent.—Herbs, low or climbing by means of tendrils; branches sometimes winged; leaves alternate pinnate 2- $\infty$ -jugate; petiole terete or angular or more

<sup>1</sup> This genus, formerly united by LINNÆUS with *Cicer*, by VISIANI (*Fl. Dalmat.*, 324) with *Lathyrus*, ought, we think, scarcely to be separated generically from section *Ervum* of *Vicia*.

<sup>2</sup> Species 8, according to ALEF. (*Bonplandia* [1861], 128), but to be reduced to 2 or 3 in the opinion of BENTH. (*Gen.*, 526).—L., *Spec.*, 1039.—DC., *Prodr.*, ii. 366, sect. 1.

<sup>3</sup> See p. 194.



rarely dilated phyllodineous; leaflets either all foliaceous (*Orobus*), or 1-5 or  $\infty$ , superior transformed into small bristles or simple or branched tendrils; stipules foliaceous, sagittate or semisagittate, rarely entire at base, sometimes (in absence of leaflets) large leaf-like; flowers<sup>1</sup> subracemose on spuriously axillary 1- $\infty$ -flowered peduncles; bracts minute caducous; bractlets 0 (*Northern Hemisphere, South America*<sup>2</sup>).

4. **Pisum** T.<sup>3</sup>—Flowers of *Lathyrus*; germen  $\infty$ -ovulate; style dilated from base upwards, more or less hardened, inflexed; margins much reflexed; posterior face longitudinally bearded along middle, angular through reflexion of margins, subcarinate, rather prominent posteriorly; apex oblique stigmatiferous. Legume (of *Lathyrus*) compressed 2-valved. Seeds  $\infty$ , globose or subglobose; funicle dilated into a thin arched aril covering oblong hilum; embryo fleshy; cotyledons thick; radicle inflexed.—Glabrous herbs, resembling *Lathyrus* in appearance; leaves pinnate; leaflets 1-3-jugate, superior ending in a small bristle, or simple or branched tendril; stipules broad foliaceous, semicordate or sagittate; flowers<sup>4</sup> solitary or few, subracemose on spuriously axillary peduncles; bracts minute caducous; bractlets 0 (*Mediterranean, Western Asia*<sup>5</sup>).

5. **Cicer** T.<sup>6</sup>—Receptacle cupuliform, lined by a crenulate disk slightly projecting beyond its margin. Calyx gamosepalous, more or less gibbous above; lobes 5, nearly equal, or 2 superior connivent a little shorter. Petals free; standard ovate or suborbicular, either narrowed into a broad claw or sessile; limb subspathulate at base; wings obliquely obovate; keel curved, obtuse or rather acute. Stamens 10, 2-adelphous (9-1); filaments more or less dilated above; anthers uniform. Germen sessile (in some flowers abortive) 2- $\infty$ -ovulate; style curved or inflexed, beardless; apex capitate stigmatiferous. Legume sessile, surrounded at base by calyx, ovoid or oblong, turgid, continuous within, 2-valved. Seeds 1- $\infty$ , globose or irregularly obovoid: funicle not dilated at minute

<sup>1</sup> White, yellow, pink, violet, or blue.

<sup>2</sup> Species about 90. DC., *Prodr.*, ii. 369, 376.—WALP., *Rep.*, i. 718, 723; ii. 886, 887; *Ann.*, i. 244, 245; ii. 403; iv. 530, 531.

<sup>3</sup> See p. 195.

<sup>4</sup> Handsome, white, pink, or purple.

<sup>5</sup> Species 2. DC., *Prodr.*, ii. 368 (excl. n. 4).—SIBTH., *Fl. Græc.*, t. 687, 688.—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 46.—GREEN. & GODR., *Fl. de Fr.*, i. 477.—WALP., *Rep.*, i. 712; ii. 885.

<sup>6</sup> See p. 195.

hilum; embryo fleshy; cotyledons thick; radicle short, nearly straight or curved, accumbent.—Annual or perennial herbs; leaves imparipinnate; terminal leaflet similar to remainder (*i.e.* membranous and dentate or cut) or ending in a spine or small tendril; stipules membranous, adnate to base of petiole; flowers' solitary or few, pedicellate on a subaxillary peduncle; bracts small; bractlets 0 (*Mediterranean, Western and Central Asia*<sup>2</sup>).

6? **Abrus** L.<sup>3</sup>—Calyx truncate; teeth 4, 5, very short or obsolete. Petals elongated, arched or falcate; keel a little longer than wings. Stamens 9; filaments scarcely perigynous, connate into a sheath cleft above; anthers uniform. Germen sessile  $\infty$ -ovulate; style short curved beardless; stigma minute capitate. Legume oblong or linear, plano-convex, more or less septate between seeds, 2-valved; seeds subglobose or ovoid, shining.—Shrubs or undershrubs, slender, often turning; leaves paripinnate; petiole terminating in an abortive bristle; leaflets  $\infty$ -jugate exstipellate; flowers<sup>4</sup> racemose articulated; racemes terminal or axillary, each terminating a short, almost leafless branch<sup>5</sup> (*All hot regions*<sup>6</sup>).

## II. PHASEOLEÆ.

7. **Phaseolus** L.—Flowers irregular resupinate; receptacle cupuliform, lined by a disk produced into a tube round base of gynæceum. Calyx gamosepalous; lobes or teeth 2, posterior nearly free or connate to a variable height, imbricated in æstivation. Corolla papilionaceous: standard suborbicular, recurved patent, or rather twisted, at base thickened fleshy, subappendiculate at inflexed margins; wings obovate or oblong, about equal to or longer than standard, adhering to keel in a variable manner and often twisted

<sup>1</sup> White, blue, or violet.

<sup>2</sup> DC., *Mém. Légum.*, t. 54; *Prodr.*, ii. 354.—WIGHT, *Icon.*, t. 20.—SIBTH., *Fl. Græc.*, t. 703.—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 42-45.—FENZL, in *Russ. Reise*, t. 9.—ALEF., in *Æstr. Bot. Zeit.* (1859); in *Bonplandia* (1861), 67.—*Bot. Mag.*, t. 2274.—GREEN & GODR., *Fl. de Fr.*, i. 477.—WALP., *Rep.*, ii. 833; *Ann.*, i. 242; ii. 397.

<sup>3</sup> See p. 195.

<sup>4</sup> Small, white, or pink.

<sup>5</sup> This genus, anomalous among *Viciæ*, and

having some affinity with *Dalbergiæ*, has by some authors been placed among *Phaseoleæ* (where it is similarly anomalous), while by others it is made the type of the sub-tribe *Abrineæ* (WIGHT & ARN., *Prodr.*, i. 236;—ENDL., *Gen.*, 1301).

<sup>6</sup> ROXB., *Fl. Ind.*, iii. 257.—WIGHT, *Icon.*, t. 33.—THW., *Enum. Pl. Zeyl.*, 91.—BENTH., in *Mart. Fl. Bras., Papil.*, 215.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 174.—WALP., *Rep.*, i. 791; v. 541; *Ann.*, iv. 569.

with it; keel obovate or linear, with obtuse elongated beak, much twisted spirally. Stamens 10, 2-adelphous (9-1); vexillary stamen usually geniculate and thickened or appendiculate above base; anthers uniform introrse rimose. Germen sessile or shortly stipitate,  $\infty$ -ovulate; ovules descending subcampylotropous; micropyle extrorse superior; style rather thickened, included by and twisted with beak of keel, usually bearded above at apex; summit unequally dilated, stigmatiferous, pulpy; head oblique, often compressed on both sides, or introrse lateral. Legume linear or falcate, compressed or subterete, thickly stuffed between seeds, 2-valved. Seeds oblong or reniform, attached by their middle; funicle very short; hilum minute, elliptical or shortly linear, exarillate; embryo thick; radicle inflexed accumbent.—Herbs, sometimes woody at base, prostrate, short erect, or twining; leaves alternate petiolate, pinnate 3-foliolate, very rarely 1-foliolate; leaflets articulated at base, stipellate; stipules persistent striated; racemes solitary or several together, axillary or subaxillary; flowers solitary or oftener fascicled, few in axil of each bract; rachis of fascicles node-like; racemes solitary or several together, axillary or subaxillary; bracts usually small caducous; bractlets often larger and persistent for a longer time (*All hotter regions*). See p. 197.

8. *Minkeliersia* MART. & GAL.<sup>1</sup>—Flowers almost those of *Phaseolus*, much elongated; calyx-lobes 5, oblong, nearly equal. Corolla narrow. Germen sessile  $\infty$ -ovulate; style elongated thickened, contained by and twisted with beak of keel, longitudinally bearded above and within; stigma large, oblique or introrse lateral. Legume elongated linear flat 2-valved. Seeds rounded.—A creeping herb; leaves of *Phaseolus*; flowers<sup>2</sup> axillary; peduncles 1-2-flowered, are reticulated and bearing 2 stipuliform, or 3, 4 persistent bracts below apex (*Mexico*<sup>3</sup>). See p. 198.

9. *Physostigma* BALF.<sup>4</sup>—Flowers of *Phaseolus*; teeth of calyx short obtuse imbricated; 2 superior connate to a considerable height. Corolla much arched in bud; standard ovate-orbicular recurved,

<sup>1</sup> In *Bull. Acad. Brux.*, x. p. ii. 200.—B. H., *Gen.*, 539, n. 222.

<sup>2</sup> Purple-violet.

<sup>3</sup> Species 1. *M. galactioides* MART. & GAL.,

*loc. cit.*—WALP., *Rep.*, v. 529.—“Almost to be considered a section of *Phaseolus*” (BENTH.).

<sup>4</sup> In *Trans. Roy. Soc. Edinb.*, xxii. 310, t.

16, 17.—B. H., *Gen.*, 538, n. 220.

much thickened and bearing inflexed auriculate appendages at base; wings long obovate free; keel obovate; apex beaked, subspirally twisted. Stamens 10, 2-adelphous (9-1); vexillary stamen geniculate and appendiculate a little above base; anthers uniform. Germen shortly stipitate, surrounded at base by a disk produced into a conical, unevenly furrowed, usually 10-crenate sheath; 2-3-ovulate; style very long, gradually thickened within and twisted with beak of keel, at apex tapering and longitudinally bearded along posterior margin; summit capitate subglobose, bearing stigmatic papillæ; back furnished with an uneven triangular and vexilliform compressed (not hollow) appendage below summit. Legume broadly linear, rather compressed, biconvex, thinly stuffed within between seeds, 2-valved. Seeds 1-3, oblong, half surrounded by long linear hilum, exarillate; outer coat coriaceous thick glabrous; embryo thick sub-ovoid.—A high twining herb, suffrutescent at base; leaves and axillary inflorescences of *Phaseolus*; bracts minute caducous (*Tropical Africa*). See p. 198.

10. *Dolichos* L.<sup>1</sup>—Flowers of *Phaseolus*; calyx subcampanulate; lobes obtuse; 2 superior connate into one, emarginate or entire. Standard thickened, and bearing inflexed auriculate appendages at base; wings adhering to keel; keel curved, usually beaked (not spirally twisted). Germen subsessile,  $\infty$ -ovulate; style slightly thickened above, often rather compressed, and longitudinally bearded below, terminal or subterminal (not capitate) stigma, or penicillate at summit. Legume falcate or linear, more rarely rather broad and much compressed (*Lablab*<sup>2</sup>); sutures often thickened; valves 2, flat or convex. Seeds thick or compressed; hilum short or elongated, dilated with a linear rather fleshy aril.—Herbs or undershrubs, twining erect or prostrate; leaves pinnate; 3-foliolate stipellate; stipules small or gland-like; flowers<sup>3</sup> solitary or fascicled, axillary, usually in axillary racemes; fascicles 1- $\infty$ -flowered each in axil of a bract;

<sup>1</sup> *Gen.*, n. 867.—ADANS., *Fam. des Pl.*, ii. 325.—DC., *Prodr.*, ii. 397.—ENDL., *Gen.*, n. 6676.—B. H., *Gen.*, 540, n. 227.—*Chloryllis* E. MEY., *Comm. Pl. Afr. Austr.*, 149 (keel a little longer than wings).—? *Dipogon* LIEBM., *Ind. Sem. Hort. Hafn.*, in *Ann. Sc. Nat.*, sér. 4, ii. 376.—*Macrotyloma* WIGHT & ARN., *Prodr.*, 249.

<sup>2</sup> ADANS., *Fam. des Pl.*, ii. 325.—MENCH,

*Meth.*, 153.—SAVI, *Mem. Phaseol.*, ii. 19.—DC., *Prodr.*, ii. 401.—ENDL., *Gen.*, n. 6677.—*Lablavia* DON (D.), in *Sweet Brit. Fl. Gard.*, ser. 2, t. 236 (style more thickened at apex; seeds descending or subtransverse; legume slightly stuffed within; hilum elongated, dilated into an aril).

<sup>3</sup> Whitish, flesh-coloured, violet, or yellowish

rachis of fascicle node-like, or nearly absent; bracts and bractlets small, striated, usually very caducous (*All warmer regions*<sup>1</sup>).

11. **Vigna** SAVI.<sup>2</sup>—Flowers of *Phaseolus*. Standard suborbicular, furnished at base with inflexed auriculate appendages; wings falcate; keel about equal to wings, curved, either without beak or produced into a curved beak (not twisted into a perfect spiral). Other characters of *Phaseolus*.—Herbs, twining or more rarely prostrate or short erect; leaves of *Phaseolus*; stipules sessile, or more rarely produced below insertion; flowers<sup>3</sup> arranged as in *Phaseolus* (*All hotter regions*<sup>4</sup>).

12? **Voandzeia** DUP.-TH.<sup>5</sup>—Flowers small, polygamous (of *Vigna*); fertile flowers, smaller apetalous; germen sessile pauciovulate; style curved, bearded above; stigma oblong introrse lateral. Legume irregularly subglobose, bare within, 1-seeded, 2-valved, ripening underground. Seed subglobose; hilum oblong; embryo fleshy, thick; radicle short, nearly or quite straight.—A creeping herb;<sup>6</sup> leaves on long petioles, pinnately 3-foliolate, stipellate; peduncles axillary short few-flowered, recurved after anthesis; flowers axillary to small striated bracts; bractlets conformable (*Tropical Africa*).

13. **Pachyrhizus** RICH.<sup>7</sup>—Flowers of *Vigna*; standard broad obovate, furnished at base with inflexed auriculate appendages;

<sup>1</sup> Species about 20. GÆRTN., *Fruct.*, ii. 322, t. 150.—SMITH, *Spicil.*, t. 21; *Exot. Fl.*, t. 74; *Bot. Reg.*, t. 830.—JACQ., *Fragm.*, t. 55; *Hort. Vindob.*, t. 124.—*Bot. Mag.*, t. 380, 896.—WIGHT, in *Hook. Bot. Misc.*, Suppl., t. 15.—BENTH., in *Ann. Wien. Mus.*, ii. 113; in *Mart. Fl. Bras., Papil.*, 196, t. 51.—HARV. & SOND., *Fl. Cap.*, ii. 243.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 209.—WALP., *Rep.*, i. 779; ii. 901; v. 539; *Ann.*, i. 252; ii. 429; iv. 563.

<sup>2</sup> *Mem. Phaseol.*, iii. 7.—DC., *Prodr.*, ii. 401.—ENDL., *Gen.*, n. 6675.—B. H., *Gen.*, 539, n. 223.—*Otioptera* DC., *Mém. Légum.*, 249, t. 42; *Prodr.*, ii. 240.—*Calicysthus* ENDL., *Prodr. Fl. Norfolk.*, 90; *Gen.*, n. 6675 b.—*Scytalis* E. MEY., *Comm. Pl. Afric. Austr.*, 144.—? *Strophostyles* E. MEY., *loc. cit.*, 147 (nec ELL.).—ENDL., *Gen.*, n. 6674 d (*Phaseolus*).—? *Plectrotropis* SCHUM., *Beskr.*, 338.—*Sphenostylis* E. MEY., *loc. cit.*, 148.—ENDL., *Gen.*, n. 6678.

<sup>3</sup> Yellowish, or more rarely purplish.  
<sup>4</sup> JACQ., *Hort. Vindob.*, t. 23, 67, 90, 102.—WIGHT, *Icon.*, t. 202.—HOOK., *Icon.*, t. 637; *Bot. Mag.*, t. 2233.—RICH. (A.), *Fl. Abyss.*

*Tent.*, t. 2.—HARV. & SOND., *Fl. Cap.*, ii. 239.—BENTH., in *Mart. Fl. Bras., Papil.*, 193, t. 50; *Fl. Austral.*, ii. 258.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 202.—WALP., *Rep.*, i. 778; v. 537; *Ann.*, ii. 427; iv. 562.

<sup>5</sup> *Gen. Nov. Madagasc.*, 23.—DC., *Mém. Légum.*, t. 20, fig. 106; *Prodr.*, ii. 474.—ENDL., *Gen.*, n. 6684.—B. H., *Gen.*, 539, n. 224.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 207.—*Cryptolobus* SPRENG., *Syst.*, iii. 152, 218 (part.).

<sup>6</sup> *V. subterranea* DUP.-TH.—*Arachis africana* BURM., *Fl. Ind.*, 22.—*Glycine subterranea* L. F., *Dec.*, 37, t. 17.—*Voandzou* FLAC., *Madag.*, 118. (*Voandzeia* should perhaps rather be considered a section of *Vigna* with short subterranean legumes).

<sup>7</sup> In DC., *Mém. Légum.*, 379; *Prodr.*, ii. 402.—ENDL., *Gen.*, n. 6679.—B. H., *Gen.*, 540, n. 225.—*Caraca* DUP.-TH., in *Dict. Sc. Nat.*, v. 35.—*Tæniocarpum* DESVX., in *Ann. Sc. Nat.*, sér. 1, ix. 420.—ENDL., *Gen.*, n. 6683.—*Robinia* MART. & GAL., in *Bull. Ac. Brux.*, x. ii. 193.—WALP., *Rep.*, v. 534.

style more or less flattened at apex; stigma subglobose at inner face, very shortly stipitate. Legume marked with transverse lines between seeds, 2-valved; cells full. Seeds transversely oblong or suborbiculate, compressed; hilum minute, oblong or elliptical.—Herbs, with habit and leaves of *Phaseolus*; bracts and bractlets small setaceous. Other characters of *Phaseolus* or *Vigna* (*Hotter regions of America and Asia*<sup>1</sup>).

14. *Psophocarpus* NECK.<sup>2</sup>—Flowers of *Pachyrhizus*; vexillary stamen free close to base, usually connate at middle with remainder into a tube; ovary shortly stipitate,  $\infty$ -ovulate; style thickened above ovary, subulate curved beardless; stigma terminal subglobose or introrse, with a dense villous tuft. Legume 4-gonous, longitudinally 4-winged (2 anterior, 2 posterior wings), 2-valved, stuffed within between seeds. Seeds transversely oblong, compressed in turn; hilum lateral, oblong or elliptical, exarillate. Embryo very fleshy; radicle inflexed; petioles of cotyledons forming a sheath round plumule and tigella.—Twining herbs; leaves pinnate 3-foliolate stipellate; stipules membranous, produced below insertion; flowers<sup>3</sup> in fasciated racemes; bracts deciduous; bractlets larger, persistent for a longer time (*Tropical Asia and Africa*<sup>4</sup>).

15. *Galactia* P. BR.<sup>5</sup>—Receptacle concave, lined by a disk; disk crenulate, a little projecting round gynæceum. Calyx gamosepalous; lobes 4 (2 highest connate into one quite entire), long acuminate; lowest lobes often longer. Petals a little unequal; standard ovate or orbicular, with slightly inflexed margins, wings long obovate or narrow, more or less adhering to keel; keel equal to or a little longer than wings, without beak. Stamens 10, either 2-adelphous (9-1), or 1-adelphous at base and vexillary stamen connate at middle with remainder; anthers uniform. Germen sessile or subsessile,  $\infty$ -ovulate; style slender beardless; apex stigmatiferous,

<sup>1</sup> Species 2. L., *Spec.*, 420.—LOUR., *Fl. Cochinch.*, ii. 535 (part.), 536.—MOQ. & SESS., in DC., *Prodr.*, ii. 399, n. 34.—BENTH., *Fl. Bras.*, *Papil.*, t. 53.—WALP., *Rep.*, ii. 902.

<sup>2</sup> *Elem.*, n. 1362.—DC., *Prodr.*, ii. 403.—ENDL., *Gen.*, n. 6680.—B. H., *Gen.*, 540, n. 226.—*Diesingia* ENDL., in *Flora* (1862), 117; *Atakta*, i. t. 1, 2; *Gen.*, n. 6681.—*Botor* ADANS., *Fam. des Pl.*, ii. 326.

<sup>3</sup> Lilac or violet, rather large or middle-sized.

<sup>4</sup> L., *Spec.*, 1021.—RUMPH., *Herb. Amboin.*,

v. t. 133.—DUP.-TH., in *Dict. des Sc. Nat.*, v. 241.—BENTH., in *Mart. Fl. Bras.*, *Papil.*, 197, t. 52.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 208.—WALP., *Rep.*, i. 781; ii. 902.

<sup>5</sup> *Jam.*, 298.—DC., *Prodr.*, ii. 237.—ENDL., *Gen.*, n. 6653.—B. H., *Gen.*, 535, n. 211.—*Betencourtia* A. S. H., *Voyag.*, i. 376.—*Sweetia* DC., *Prodr.*, ii. 381 (nec SPRENG.).—*Odonia* BERT., ex DC., *Prodr.*, ii. 239.—*Heterocarpæa* SCHEELE, in *Linnaea*, xxi. 467.—*Leucodictyon* DALZ., in *Hook. Journ.*, ii. 264.

scarcely or not dilated. Legume linear, straight or curved, compressed or rather convex, subseptate or stuffed between seeds, 2-valved.<sup>1</sup> Seeds exarillate.—Shrubs or herbs, twining or prostrate; leaves usually 3, more rarely 1–5–7-foliolate, stipellate; stipules small, often deciduous; flowers<sup>2</sup> in axillary racemes, solitary or in pairs or fascicled at axil of each bract; rachis of fascicle node-like small; bracts and bractlets below flowers small (*All hotter regions*<sup>3</sup>).

16. *Grona* LOUR.<sup>4</sup>—Flowers of *Galactia*; 2 superior calyx-lobes connate at base or slightly beyond middle. Keel obtuse. Stamens 10, 2-adelphous (9–1). Legume stuffed between seeds, 2-valved. Seeds orbiculate or ellipsoidal; funicle short, dilated at hilum into a small aril. Other characters of *Galactia*.—Prostrate or twining herbs; leaves 1-foliolate stipellate; stipules caducous; flowers in axillary or subterminal racemes, in twos or threes or fascicled in axil of each bract, pedicellate; rachis of fascicle short, node-like; bracts small deciduous; bractlets persistent rather late below flower (*Tropical Asia*<sup>5</sup>).

17. *Cymbosema* BENTH.<sup>6</sup>—Flowers almost those of *Galactia*, but larger; 2 superior calyx-lobes connate into one, 2-toothed. Vexillary stamen free. Germen subsessile ∞-ovulate; style curved beardless; stigma terminal truncate. Legume oblong-falcate compressed, terminated by curved style, 2-valved. Seeds oblong or reniform, half surrounded by linear hilum, exarillate.—Twining herbs; leaves pinnate, 3-foliolate stipellate; stipules small persistent; flowers<sup>7</sup> in a short raceme composed of a few 2-, 3-flowered fascicles; peduncle long; rachis of fascicle node-like; bracts and bractlets small (*Tropical America*<sup>8</sup>).

<sup>1</sup> Ripening underground in *G. (Heterocarpæa) canescens* BENTH.

<sup>2</sup> Red, violet, or white; usually small or middle sized; handsome; petals broader in *Collæa* DC., in *Ann. Sc. Nat.*, sér. 1, iv, 96; *Prodr.*, ii, 240.—ENDL., *Gen.*, n. 6657 (nec SPRENG., nec LINDL.), which ought by no means to be separated generically from *Galactia*.

<sup>3</sup> Species about 40. MICHX., in *Fl. Bor.-Amer.*, ii, 261.—K., *Mimos.*, t. 55, 56.—H. B. K., *Nov. Gen. et Spec.*, vi, 428.—JACQ., *Icon. Ear.*, t. 572, 573; *Hort. Vindob.*, t. 76.—BENTH., in *Ann. Wien. Mus.*, ii, 126; in *Mart.*

*Fl. Bras., Papil.*, 141, 144, t. 39, 40; *Fl. Austral.*, ii, 255.—TOBB. & GR., *Fl. N. Amer.*, i, 287.—WIGHT, *Icon.*, t. 482.—LINDL., in *Bot. Reg.*, t. 269.—GEISEB., *Fl. Brit. W. Ind.*, 194; *Pl. Wright. Cub.*, 376.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii, 188.—WALP., *Rep.*, i, 761; ii, 900; v, 531; *Ann.*, ii, 421; iv, 554.

<sup>4</sup> *Fl. Cochinch.*, ed. 1 (1790), 459.—BENTH., in *Pl. Jungh.*, 233.—B. H., *Gen.*, 535, n. 211.

<sup>5</sup> Species 2 or 3.

<sup>6</sup> In *Hook. Journ.*, ii, 61; *Gen.*, 534, n. 210.

<sup>7</sup> Handsome; pink or purplish.

<sup>8</sup> Species about 2. BENTH., in *Mart. Fl.*

18. **Calopogonium** DESVX.<sup>1</sup>—Flowers almost those of *Galactia*; 2 superior calyx-lobes distinct or connate with one 2-toothed. Standard obovate, 2-auriculate at base; wings narrow; keel shorter than, and adhering to wing, obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile  $\infty$ -ovulate; style slender beardless; apex capitate stigmatiferous. Legume linear plano-compressed or convex septate within between seeds, 2-valved. Seeds orbicular, rather compressed, exarillate.—Herbs or undershrubs, twining; leaves pinnate, 3-foliolate stipellate; flowers small,<sup>2</sup> in elongated or short racemes, fascicled in aril of each bract; rachis of fascicle node-like; pedicels very short; bracts and bractlets small caducous<sup>3</sup> (*South and Central America*<sup>4</sup>).

19. **Mastersia** BENTH.<sup>5</sup>—“2 superior calyx-lobes connate into one entire broad. Standard suborbicular, very shortly unguiculate, exauriculate; wings obliquely oblong; keel broad slightly curved obtuse, nearly equal to wings. Vexillary stamen free from base upwards, straight, remainder connate; anthers (5? or all?) linear versatile. Ovary sessile  $\infty$ -ovulate; style short, filiform curved, beardless; stigma terminal capitate.” Legume oblong-linear plano-compressed indehiscent; superior suture slightly winged. Seeds  $\infty$ , transversely oblong, exarillate; hilum small lateral.—An undershrub (?); stem twining; leaves pinnate 3-foliolate stipellate; stipules very caducous; flowers in elongated axillary racemes, fascicled in axil of each bract; rachis of fascicle node-like or very shortly developed; bracts in pairs, caducous, bractlets suborbicular, persistent for a long time<sup>6</sup> (*Assam*).

20. **Erythrina** L.<sup>7</sup>—Receptacle cupuliform, lined by a disk; disk

*Bras., Papil.*, 159, t. 42, fig. 2. This genus has much affinity, on the one hand, with *Grona* and *Calopogonium*, by the free vexillary stamen; on the other, with *Camptosema*, but differs from the latter by its stamens, by its compressed apiculate fruit, thinly stuffed between the seeds, and by the habit of its hilum.

<sup>1</sup> In *Ann. Sc. Nat.*, sér. 1, ix. 423.—ENDL., *Gen.*, n. 6699 (part.).—B. H., *Gen.*, 534, n. 209.—*Stenolobium* BENTH., in *Ann. Wien. Mus.*, ii. 125.—ENDL., *Gen.*, n. 6648 (nec DON).

<sup>2</sup> Blue or violet.

<sup>3</sup> This genus differs from *Galactia* by its calyx, from *Glycine* by its nodose-racemose inflorescence.

<sup>4</sup> H. B. K., *Nov. Gen. et Spec.*, t. 575.—BENTH., in *Mart. Fl. Bras., Papil.*, 139, t. 38.

<sup>5</sup> *Gen.*, 535, n. 213; in *Trans. Linn. Soc.*, xxv. 300, t. 34.

<sup>6</sup> “This genus is by its habit allied to some species of *Dioclea* and *Pueraria*, while by its stamens it is distinct from them, and by its legume anomalous among *Phaseoleæ*” (BENTH.).

<sup>7</sup> *Gen.*, n. 855.—J., *Gen.*, 356.—LAMK., *Dict.*, ii. 390; Suppl., ii. 382; *Ill.*, t. 608.—DC., *Prodr.*, ii. 410.—SPACH, *Suit. à Buffon*, i. 354.—ENDL., *Gen.*, n. 6667.—B. H., *Gen.*, 531, n. 201.—*Corallodendron* T., *Inst.*, 661, t. 446.—*Mouricou* RHEED.—*Gelala* RUMPH., ex ADANS., *Fam. des Pl.*, ii. 326.



glandular, often 12-lobed, 10-furrowed. Calyx companulate or sacciform; mouth oblique truncate, quite entire or sometimes cleft and 1-2-lobate, more rarely minutely toothed, very rarely more deeply, unequally or nearly equally, 5-toothed. Petals very unequal; standard large or elongated, erect or patent, sometimes falcate, raised on a short or long claw, without appendages at base; wings short or very short, more rarely 0; keel smaller than standard, longer or shorter than wings; all petals free or more or less connate dorsally. Stamens 10, 2-adelphous; 9-connate at middle; vexillary stamen free, or connate close to base with remainder; anthers uniform. Germen stipitate; ovules  $\infty$ ; style curved beardless; apex subulate, stigma minute terminal. Legume stipitate, nearly straight or falcate, linear, tapering at apex and base, compressed or subterete, more rarely flat at base, sinuous or constricted between seeds, sometimes 2-valved, sometimes dehiscent as a follicle along superior suture, more rarely hardly dehiscent, seeds oblong, exarillate, uniform in colour or particoloured; hilum lateral, oblong or linear.—Trees or erect shrubs, thick, more rarely subherbaceous; twigs often prickly; leaves alternate pinnate 2-foliolate; stipels gland-like; stipules small; inflorescence racemose; racemes axillary leafless, or terminal bearing leaves at base; flowers' solitary or in twos or threes in axil of each bract; bracts alternate<sup>3</sup> (*All hot regions*<sup>3</sup>).

21. *Strongylodon* Vog.<sup>4</sup>—Receptacle slightly concave, lined by a disk; disk somewhat projecting round stalk of germen, shortly toothed, calyx gamosepalous; teeth 5, nearly equal (2 superior

<sup>1</sup> Scarlet, purplish, or greenish yellow, usually handsome.

<sup>2</sup> In BENTHAM'S opinion (*Gen.*, 532) the following genera, proposed by various authors, scarcely form well-defined sections of this genus: (a) *Micropteryx* WALP. (in *Linnaea*, xxiii. 739; *Ann.*, ii. 425), keel gamopetalous, overlapping dwarf wings.—(b) *Duchassaingia* WALP. (*loc. cit.*, 741), keel gamopetalous, claw of standard long.—(c) *Stenotropis* HASSK. (*Retzia*, i. 183), petals of keel free, calyx sometimes cleft.—(d) *Chirocalyx* MEISSN. (in *Hook. Journ.*, ii. 97), teeth of calyx rather long, distinct.—(e) *Hypaphorus* HASSK. (*Hort. Bog.*, ed. nov., 197), legume flat, empty for a considerable distance from base, containing seeds at apex, turgid over seeds, 2-valved.—(f) *Macrocybium* WALP. (in *Flora* [1853], 149), standard (called *sphalma*) shorter than calyx.—(g) *Xyphantus* RAFIN. (*Fl.*

*Ludov.*, 103), including the species whose calyx is not spathe-like.

<sup>3</sup> Species about 25. JACQ., *Hort. Schœnbr.*, t. 216, 466; *Fragm.*, t. 119.—ROXB., *Pl. Coromand.*, t. 219, 220.—PRESL, *Symbol.*, t. 46, 47, 68.—WIGHT, *Icon.*, t. 58, 247.—BROT., in *Trans. Linn. Soc.*, xiv. t. 10-12.—SWEET, *Brit. Fl. Gard.*, t. 142, 214.—BENTH., in *Mart. Fl. Bras.*, *Papil.*, 172; *Fl. Austral.*, ii. 253.—HARV. & SOND., *Fl. Cap.*, ii. 236.—HARV., *Thes. Cap.*, t. 61, 62.—GAUDICH., in *Freyg. Voy. Bot.*, t. 114.—A. RICH., *Fl. Abyss. Tent.*, t. 41.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 181.—*Bot. Reg.*, t. 313, 389, 736, 750, 1246, 1327, 1617.—*Bot. Mag.*, t. 877, 2161, 2431, 3227, 3234.—WALP., *Rep.*, i. 768; ii. 901; v. 535; *Ann.*, ii. 423; iv. 557.

<sup>4</sup> In *Linnaea*, x. 585.—ENDL., *Gen.*, 6668.—B. H., *Gen.*, 532, n. 203.

sometimes a little connate), imbricated in æstivation. Petals unequal : standard elongated acute, recurved or reflexed, furnished with an appendage within above claw ; wings shorter, slightly adhering to keel ; keel curved beaked, petals connate. Stamens 10, 2-adelphous (9-1) ; anthers uniform. Germen stipitate, pauci-, usually 1-2-ovulate ; style slender beardless ; apex capitate stigmatiferous. Legume stipitate, obliquely ovate-oblong ; valves 2, convex coriaceous. Seed thick orbicular exarillate, half surrounded by linear hilum.—Shrubs or undershrubs, twining glabrous ; leaves pinnate 3-foliolate stipellate ; stipules 2, lateral small ; flowers<sup>1</sup> fascicled in simple or oftener branched elongated axillary racemes ; rachis of fascicle node-like ; bracts small or minute, bractlets minute orbiculate, very caducous (*Ceylon, South Sea Islands*<sup>2</sup>).

22. *Rudolphia* W.<sup>3</sup>—Flowers almost those of *Erythrina*. Calyx coriaceous, gamosepalous to a considerable height, tubular sub-2-labiate, 2 superior lobes connate into one, entire or shortly emarginate or cleft at apex ; lowest a little longer, long acuminate, somewhat arched ; 2 lateral much smaller or hardly visible. Corolla and stamens of *Erythrina*. Germen sessile or stipitate, ∞-ovulate ; style usually thickened at middle, hooked beardless at apex ; summit capitate stigmatiferous. Legume surrounded at base by persistent calyx, elongated plano-compressed, shortly acuminate or mucronate at apex, thinly stuffed within, 2-valved ; valves finally twisted. Seeds flat.—Twining herbs ; leaves 1-foliolate articulated stipellate ; stipules narrow deciduous ; flowers<sup>4</sup> subaxillary racemose ; fascicles alternate ; rachis of fascicle node-like ; bracts and bractlets narrow (*West Indies*<sup>5</sup>).

23. *Mucuna* ADAMS.<sup>6</sup>—Receptacle cupuliform, lined by a disk ; disk somewhat projecting round gynæceum, 10-lobed. Calyx thick, teeth very unequal ; 2 superior quite connate ; lowest longer than the others or about equal to superior. Corolla usually large ;

<sup>1</sup> "Red, handsome."

<sup>2</sup> A. GRAY, *Unit. States Expl. Exped., Bot.*, 445, t. 48, 49.—WALP., *Rep.*, i. 769 ; *Ann.*, iv. 559.

<sup>3</sup> In *Neue Schrift. Ges. Nat. Berl.*, iii. 41.—DC., *Prodr.*, ii. 414 (part.).—ENDL., *Gen.*, ii. 6669 (nec K.).—B. H., *Gen.*, 532, n. 202.

<sup>4</sup> Red.

<sup>5</sup> Species 2 or 3. W., *Spec.*, iii. 918.—VAHL, *Ecl. Amer.*, ii. 41, t. 30.—? PLUM., *Pl. Amer.*, ed. BURM., t. 102, fig. 1.

<sup>6</sup> *Fum. des Pl.*, ii. 325.—DC., *Prodr.*, ii. 404.—ENDL., *Gen.*, ii. 6665.—B. H., *Gen.*, 533, n. 205.—CITTA LOUR., *Fl. Coch.*, 456.—? *Macranthus* LOUR., *loc. cit.*, 460.—*Stizolobium* PERS., *Syn.*, ii. 298.—*Negretia* R. & PAV., *Prodr.*, 98, t. 21.—*Carpopogon* ROXB., *Fl. Ind.*, iii. 283.—*Macroceratides* RADD., ex ENDL.—*Pillera* ENDL., *Prodr. Fl. Norf.*, 91.—*Zoophthalmus* BR. (ex ADAMS.).

standard shorter than wings, plaited, thick and more or less tapering and bearing inflexed auriculate appendages at base; wings oblong or obovate, curved, usually adhering to keel, broadly 1-auriculate at base; keel about equal to or often larger than wings, 2-auriculate at base, curved acute or cartilaginous beaked at apex. Stamens 10, 2-adelphous (9-1); 5 alternipetalous anthers longer subbasifixed; oppositipetalous shorter, often bearded, versatile. Germen sessile villous; ovules few descending subanotropous; raphe short thick; micropyle extrorse superior; style slender often corrugated in bud, beardless; apex minutely capitate, stigmatiferous. Legume often large thick ovate, oblong, or linear, usually covered outside with stinging hairs and sometimes variably ribbed or laminated,<sup>1</sup> stuffed or spuriously septate within between seeds, 2-valved, seeds orbicular or transversely oblong, compressed; hilum sometimes short, sometimes linear and half or more than half surrounding seed, exarillate; embryo thick.—Herbs or shrubs, climbing or more rarely suberect; leaves of *Phaseolus*; stipules deciduous; flowers<sup>2</sup> racemose; racemes sometimes short subcymose, oftener elongated and composed of alternate fascicles; bracts small, often caducous (*All hotter regions*<sup>3</sup>).

24. **Apios** BOERH.<sup>4</sup>—Receptacle short, lined by a somewhat prominent disk. Calyx gamosepalous; teeth unequal, lowest tooth larger, 2 superior broad connate. Petals shortly unguiculate; standard orbicular or ovate, reflexed; wings shorter oblique, adhering to curved or spirally twisted keel. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen subsessile ∞-ovulate; style inflexed beardless; stigma terminal. Legume linear falcate 2-valved. Seeds exarillate.—Twining herbs; leaves pinnate 3-6-7-foliolate stipellate; stipules small; flowers<sup>5</sup> in axillary simple or terminal branched racemes; bracts and bractlets narrow, very caducous (*Temperate Asia and North America*<sup>6</sup>).

<sup>1</sup> From which character the genus is divided into three sections—viz.: 1. *Citta*. Legume laminated, with transverse foliaceous folds.—2. *Stizolobium*. Legume linear, longitudinally ribbed or bare.—3. *Carpopogon*. Legume longitudinally ribbed or winged at sutures, constricted between seeds.

<sup>2</sup> Handsome; yellowish, red, or purple.

<sup>3</sup> WIGHT, *Icon.*, t. 35, 280.—HOOK., in *Bot. Misc.*, ii. t. suppl., 12, 13.—WALL., *Pl. As. Rar.*, t. 47, 236.—*Bot. Mag.*, t. 4945.—*Bot.*

*Reg.* (1838), t. 18.—BENTH., in *Mart. Fl. Bras., Papil.*, 169, t. 46, 47.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 184.—WALP., *Rep.*, i. 767; ii. 900; *Ann.*, ii. 422; iv. 557.

<sup>4</sup> *Hort. Lugd.-Bat.*, ii. 53 (nec THEOPH., nec DIOSC., nec COEN.).—MENCH., *Meth.*, 165.—DC., *Prodr.*, ii. 390.—ENDL., *Gen.*, n. 6673.—B. H., *Gen.*, 532, n. 204.—*Cyrtotropis* WALL., *Pl. As. Rar.*, i. 49, t. 62.—ENDL., *Gen.*, n. 6672.

<sup>5</sup> Dark purple or scarlet.

<sup>6</sup> Species 3, of which 1 is North American

25. *Cochlianthus* BENTH.<sup>1</sup>—"Calyx; 2 superior teeth connate into 1, nearly entire; 3 lateral smaller; lowest longer. Standard broadly ovate, furnished with inflexed auriculate appendages; wings oblong, slightly overtopping standard; keel linear spirally twisted, not overtopping wings. Vexillary stamen free; remainder connate; anthers uniform. Germen very shortly stipitate,  $\alpha$ -ovulate; style filiform beardless; stigma peltate dilated. Legume linear curved, somewhat flattened, 2-valved, obscurely septate within. Seeds square; hilum short, estrophiolate.—A twining herb, blackening when dry. Leaves pinnate 3-foliolate stipellate. Flowers middle-sized, in fascicled racemes on slender axillary peduncles; rachis of fascicle node-like or shortly developed. Bracts or bractlets minute, very caducous, or 0" (*Nepaul*).

26. *Butea* KOEN.<sup>2</sup>—Receptacle short, lined by a more or less prominent disk. Calyx large, silky within; teeth or lobes very unequal; 2 superior connate into a broad, entire or emarginate lip; 3 inferior much smaller, imbricated when very young. Petals very dissimilar; standard recurved acute, without appendages; wings falcate, nearly equal to standard, adhering to standard and curved keel. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile or shortly stipitate; style curved beardless; stigma terminal, minute or truncate; ovules 2, descending; micropyle extrorse superior. Legume shortly stipitate, unequally oblong or broadly linear; at base flat for a considerable distance, wing-like, indehiscent, effete; close to apex thick, 1-seeded 2-valved. Seed plano-compressed, suborbicular or reniform exarillate; embryo fleshy exalbuminous.—Trees or sarmen-tose twining shrubs; leaves pinnate 3-foliolate exstipellate; lateral leaflets very unsymmetrical; stipules minute caducous; flowers<sup>3</sup> in short racemes or racemose or fascicled-panicled spikes; bracts and bractlets caducous (*Tropical Asia*<sup>4</sup>).

27. *Spatholobus* HASSK.<sup>5</sup>—Receptacle minute concave, lined by a

(*Glycine Apios* L., *Spec.*, 1067;—SCHKUHR, *Handb.*, 198).—TORRE. & GR., *Fl. N. Amer.*, i. 282.—NUTT., *Gen.*, ii. 113.—*Bot. Mag.*, t. 1198.—WALP., *Rep.*, i. 770.

<sup>1</sup> In *Plant. Jungh.*, i. 234.—B. H., *Gen.*, 533, n. 206.

<sup>2</sup> ROXB., *Pl. Coromand.*, i. 22, t. 21, 22.—DC., *Prodr.*, ii. 414 (part.).—ENDL., *Gen.*, n. 6670 (part.).—B. H., *Gen.*, 533, n. 207.—*Plaso*

RHEED., *Hort. Malab.*, vi. 29, t. 16, 17 (ex ADANS., *Fam. des Pl.*, ii. 325).

<sup>3</sup> "Orange or flame-coloured; handsome."

<sup>4</sup> ROXB., *Fl. Ind.*, iii. 244.—WIGHT & AEN., *Prodr.*, i. 216.—HOOK., *Bot. Misc.*, ii. t. suppl., 32.—BENTH., in *Pl. Jungh.*, i. 238.—WALP., *Rep.*, i. 769; *Ann.*, iv. 560.

<sup>5</sup> In *Flora* (1842), ii. *Beibl.*, 52.—BENTH., in *Plant. Jungh.*, i. 238; *Gen.*, 534, n. 208.—*Dreb-*

cupuliform unequally crenate disk. Calyx gamosepalous, pilose within; teeth or lobes 4, 2 superior connate into one, entire or emarginate; æstivation imbricated. Corolla papilionaceous; keel nearly straight, obtuse, shorter than wings. Stamens 10, 2-adelphous (9-1); anthers uniform; connective glandular coloured. Germen sessile or shortly stipitate; ovules 2, 1 descending, 1 often ascending; style subulate, beardless except at base, curved at apex; summit minutely capitate, stigmatiferous. Legume (of *Butea*), at base winged for a considerable distance and empty at apex; 1-2-seeded, and late becoming 2-valved. Seeds flat, unequally obovate, exarillate.—Climbing shrubs; leaves pinnate 3-foliolate stipellate; stipules minute persistent; flowers<sup>1</sup> in much-branched racemes, pedicels articulated at base; bracts and bractlets small, acute for same distance at apex (*Tropical Asia and Africa* (?)<sup>2</sup>).

28. **Glycine** L.<sup>3</sup>—Receptacle slightly concave; calyx gamosepalous; 2 superior lobes usually connate to a considerable height. Petals often very unequal; standard suborbicular or obovate, narrowed or subauriculate at base; margins inflexed; wings oblique narrow, more or less adhering to keel; keel shorter than wings or very short, obtuse. Stamens 10, 1- or more rarely 2-adelphous (9-1); filament free at apex, usually filiform; anthers often short. Germen subsessile, 2-∞-ovulate; style linear curved, usually short beardless; apex capitate. Legume linear or falcate, more rarely broad falcate (*Soja*<sup>4</sup>), compressed or terete, cellularly septate within, 2-valved. Seeds exarillate.—Herbs twining or prostrate, slender, more rarely erect; leaves pinnate, 3- or more rarely 5-7-foliolate stipellate; stipules lateral, usually small; flowers<sup>5</sup> in axillary racemes, either solitary or fascicled along the rachis, or else scattered (*Leptocytamus*<sup>6</sup>); lower flowers (often apetalous) sometimes solitary at axils; bracts and bractlets minute, setaceous or narrow (*Tropical and Subtropical Africa, Asia, and Australia*<sup>7</sup>).

*belia*, ZOLL., in *Nat. Gen. Arch.* (ex HASSK., in *Flora* [1847], 702).

<sup>1</sup> Small, crowded; white, pink, or purple.

<sup>2</sup> Species about 10. WIGHT, *Icon.*, t. 210 (*Butea*).—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 183.

<sup>3</sup> *Gen.*, n. 868 (nec NUTT.).—DC., *Prodr.*, ii. 240.—ENDL., *Gen.*, n. 6650.—B. H., *Gen.*, 530, n. 196.—*Johnia* WIGHT & ARN., *Prodr.*, 449.—ENDL., *Gen.*, n. 6646.—*Notonia* WIGHT & ARN.,

*loc. cit.*, 207 (nec DC.).—*Bujacia* E. MEY., *Comm. Pl. Afr. Austr.*, 127.

<sup>4</sup> MENCH, *Meth.*, 153.—SAVI, *Mem. Phaseol.*, ii. 16.—DC., *Prodr.*, ii. 396.—ENDL., *Gen.*, n. 6649.

<sup>5</sup> "Purplish or pale."

<sup>6</sup> BENTH., in *Trans. Linn. Soc.*, xviii. 209.—ENDL., *Gen.*, n. 6645.—*Leptolobium* BENTH., in *Ann. Wien. Mus.*, ii. 124 (nec VOG.).

<sup>7</sup> Species about 12. JACQ., *Icon. Rar.*, t. 145

29. **Shutteria** WIGHT & ARN.<sup>1</sup>—Flowers of *Glycine*; calyx 4-lobed or 4-toothed (2 superior lobes connate at apex). Vexillary stamen never coherent.—Herbs, twining slender; leaves pinnate, 3-foliolate stipellate; stipules striated; flowers<sup>2</sup> small, in axillary racemes, in pairs or cymose along the rachis; bracts persistent striated; bractlets rather rigid, persistent below flowers<sup>3</sup> (*Western India*<sup>4</sup>).

30. **Teramnus** P. BR.<sup>5</sup>—Flowers of *Glycine*; 2 superior calyx lobes distinct or connate. Stamens all connate, 1-adelphous; 5 alternate anthers very small, lopped. Legume terminated by hooked style.<sup>6</sup>—Herbs, twining slender; leaves pinnate 3-foliolate stipellate, stipules small, flowers small few, fascicled at axils or arranged in axillary racemes; bracts small; bractlets below flower, linear or lanceolate, striated (*Tropical America, Asia, and Africa*<sup>7</sup>).

31. **Kennedyia** VENT.<sup>8</sup>—Calyx gamosepalous; teeth or lobes 5, about equal in length to tube, rarely shorter (*Hardenbergia*<sup>9</sup>); 2 superior teeth or lobes connate into an entire or emarginate lip. Petals very dissimilar; standard obovate or orbicular, more or less narrowed at base, with or without auriculate appendages; wings oblong or obovate, oblique, adhering to keel; keel curved, either slightly acute or obtuse. Stamens 10; 9 connate; vexillary stamen free; anthers uniform. Germen sessile or shortly stipitate,  $\alpha$ -ovulate; style short or long, inflexed or curved, beardless or furnished with tooth at apex; stigma terminal capitate. Legume linear, compressed terete or turgid, spuriously septate within between seeds, stuffed or more rarely continuous. Seeds ovoid or oblong; hilum lateral arillate.—Undershrubs or perennial herbs, prostrate or

(*Dolichos*).—LABILL, *Sert. Austr.-Caled.*, t. 70 (*Kennedyia*)?—BENTH., in *Journ. Linn. Soc.*, viii. 266.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 178.

<sup>1</sup> *Prodr.*, 207.—ENDL., *Gen.*, n. 6652.—B. H., *Gen.*, 529, n. 195.

<sup>2</sup> White, pink, or violet.

<sup>3</sup> This genus is otherwise scarcely to be distinguished from *Glycine*.

<sup>4</sup> Species 4 or 5. BENTH., in *Ann. Wien. Mus.*, ii. 126; in *Plant. Jungh.*, 232.—HOOK., *Icon.*, t. 144.—WIGHT, *Icon.*, t. 165.—WALL., *Pl. Asiat. Bar.*, t. 241.—WALP., *Ann.*, 553.

<sup>5</sup> *Jam.*, 290.—SW., *Fl. Ind. Occ.*, iii. 1238, t. 25.—DC., *Prodr.*, ii. 382.—B. H., *Gen.*, 530, n. 197.

<sup>6</sup> This genus is otherwise scarcely to be distinguished from *Glycine*. (See WIGHT & ARN., *Prodr.*, 208.)

<sup>7</sup> BENTH., in *Ann. Wien. Mus.*, ii. 126; in *Mart. Fl. Bras., Papil.*, 137, t. 37; in *Journ. Linn. Soc.*, viii. 269.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 180.—WIGHT, *Icon.*, t. 168.

<sup>8</sup> *Jard. Malmais.*, t. 104–106.—DC., *Prodr.*, ii. 383.—ENDL., *Gen.*, n. 6641.—B. H., *Gen.*, 531, n. 199.—*Caulinia* MÖENCH, *Suppl.*, 47 (nec W., nec DC.).—*Amphodus* LINDL., in *Bot. Reg.*, t. 1101.—*Zichya* HUEG., *Bot. Arch.*, t. 1.—*Physolobium* HUEG., *loc. cit.*, t. 2.

<sup>9</sup> BENTH., in *Hueg. Enum.*, 40.—ENDL., *Gen.*, n. 6644.—B. H., *Gen.*, 530, n. 198.

twining; leaves pinnate, 3-5- or more rarely 1-foliolate, stipellate; stipules striated, free or connate; flowers<sup>1</sup> in simple or branched, rarely 1-flowered, terminal or axillary, racemes; bracts of variable form; bractlets 0<sup>2</sup> (*Australia*<sup>3</sup>).

32. *Dumasia* DC.<sup>4</sup>—Flowers almost those of *Kennedyia*; calyx slightly gibbous posteriorly at base, obliquely truncate at mouth; teeth scarcely projecting or inconspicuous. Standard obovate 2-auriculate.<sup>5</sup> Germen  $\infty$ -ovulate, surmounted at base by a disk produced into a tube; style dilated at middle, tapering at apex and base; stigma capitate terminal. Legume sessile compressed 2-valved.—Twining herbs; leaves pinnate 3-foliolate stipellate; stipules setaceous or striated; flowers<sup>6</sup> in axillary racemes, solitary or in pairs in axils of each of narrow bracts, bractlets 2 below flower, narrow (*Tropical Asia and Africa*<sup>7</sup>).

33. *Amphicarpa* ELL.<sup>8</sup>—Receptacle a little concave, lined by a disk produced into a tube round gynæceum. Calyx gamosepalous tubular; teeth 4, 5, subequal subvalvate. Standard obovate erect, dilated above claw with or without small inflexed auricular appendages, plaited and usually reflexed laterally; wings falcate-oblong more or less adhering to keel; keel about equal to or a little shorter than wings, more or less curved, obtuse.<sup>9</sup> Stamens 10, 2-adelphous (9-1); vexillary stamen free; anthers uniform. Germen shortly stipitate,  $\infty$ -ovulate; style inflexed slender beardless; apex capitate stigmatiferous. Legume linear or falcate, compressed, continuous within, 2-valved. Seeds subglobose or a little compressed, exarillate.

<sup>1</sup> Red, violet, or blackish.

<sup>2</sup> Sections 3: *Kennedyia*, *Physolobium*, *Zichya*, formerly considered as genera by BENTHAM (*Ann. Wien. Mus.*, ii. 122), but now, in his own opinion (*Gen.*, 531), scarcely to be separated from each other.

<sup>3</sup> Species about 14. GAUDICH., in *Freycin. Voy., Bot.*, 113.—BENTH., *Fl. Austral.*, ii. 246, 248.—SWEET, *Fl. Austral.*, t. 23.—*Bot. Reg.*, t. 298, 944, 1336, 1526, 1718, 1790, 1838, 1845, 1862; (1839), t. 52; (1840), t. 60; (1842), t. 68.—*Bot. Mag.*, t. 263, 268, 278, 2169.—WALP., *Ann.*, iv. 552.

<sup>4</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 96; *Mém. Légum.*, vi. t. 44, 45; *Prodr.*, ii. 241.—ENDL., *Gen.*, n. 6631.—B. H., *Gen.*, 529, n. 194.

<sup>5</sup> The standard is said to be exauriculate (B. H., *Gen.*, 451, n. 194), but in *D. villosa* DC. the

auriculate appendages are certainly longer than in *Amphicarpa*.

<sup>6</sup> Yellow (or violet?).

<sup>7</sup> Species 2 or 3. BENTH., in *Ann. Wien. Mus.*, ii. 112.—WIGHT, *Icon.*, t. 445.—*Bot. Reg.*, t. 961 (text. 962).—WALP., *Rep.*, i. 750; *Ann.*, iv. 551.

<sup>8</sup> In *Journ. Ac. Sc. Philad.* (1818), i. 372.—NUTT., *Gen. Amer.*, ii. 113.—*Amphicarpæa* DC., *Mém. Légum.*, ix.; *Prodr.*, ii. 383.—ENDL., *Gen.*, n. 6630.—B. H., *Gen.*, 529, n. 193.—*Savia* RAFIN., in *N. York Med. Repos.*, ii. hex. v. 350 (nec W.).—*Xypherus* RAFIN., in *Journ. Phys.*, lxxxix. 260.—*Falcata* GMEL., *Syst.*, ii. 1131.—*Cryptolobus* SPRENG., *Syst.*, iii. 218 (part.).

<sup>9</sup> Flowers sometimes apetalous.

—Twining herbs; leaves pinnate 3-foliolate stipellate; stipules membranous striated; flowers<sup>1</sup> in axillary racemes or solitary axillary; bractlets 0 or small setaceous (*North America, Northern India, Japan*<sup>2</sup>).

34. *Cologania* K.<sup>3</sup>—Flowers of *Amphicarpæ*; lobes or teeth of calyx 5; 2 superior considerably or almost entirely connate; lowest longer. Standard exauriculate.<sup>4</sup> Germen stipitate; stigma terminal capitate. Legume linear compressed or curved. Seeds of variable form, hilum oblong.—Twining herbs; leaves pinnate, 3 or rarely 1–5-foliolate, stipellate; stipules minute or striated; flowers<sup>5</sup> in a short raceme or solitary or fascicled at axils; bracts and bractlets usually linear or setaceous persistent (*Tropical and Andine America, Mexico*<sup>6</sup>).

35. *Periandra* MART.<sup>7</sup>—Flowers of *Kennedya* or *Clitoria*; receptacle and calyx subcampanulate shorter than in these; lobes of calyx unequal; lowest usually longer; 2 highest more or less connate. Petals dissimilar; standard broadly obovate or suborbicular, with short curved plaited claw; wings oblique; keel broad, slightly shorter than wings. Stamens 10 (of *Clitoria*); vexillary stamen sometimes more or less connate with the others. Germen subsessile ∞-ovulate; style subclavate at apex, beardless. Legume linear plano-compressed, with both sutures thickened, 2-valved. Seeds exarillate compressed.—Herbs or shrubs, erect or twining; leaves 3-foliolate (lower leaves more rarely 1-foliolate), stipellate; stipules striated; peduncles axillary 1–3-flowered or at extremities of branches racemose; bracts in pairs, stipuliform, free or connate; bractlets larger, appressed to flower,<sup>8</sup> striated persistent (*Tropical America*<sup>9</sup>).

<sup>1</sup> White, violet, or blue.

<sup>2</sup> Species about 7. WENDL., in *Rœm. Arch.*, iii. t. 2.—TORR. & GR., *Fl. N. Amer.*, i. 291.—BENTH., in *Ann. Wien. Mus.*, ii. 112; in *Pl. Jungh.*, i. 231.—WALP., *Rep.*, i. 750.

<sup>3</sup> *Mimos.*, 204, t. 57, 58.—DC., *Prodr.*, ii. 236.—ENDL., *Gen.*, n. 6633.—B. H., *Gen.*, 529, n. 192.

<sup>4</sup> Flowers apetalous in *Martia mexicana* ZUCC. (in *Abh. Münch. Akad.*, i. 339, t. 14, 15), which, according to BENTHAM (*loc. cit.*), is a species of *Cologania*. This genus is scarcely to be distinguished from *Amphicarpa* by its exauriculate standard. The calyx is identical in some species.

<sup>5</sup> Violet or red.

<sup>6</sup> Species about 4. H. B. K., *Nov. Gen. et Spec.*, vi. 411.—BENTH., in *Ann. Wien. Mus.*, ii. 112.—MAUND., *Botan.*, t. 110.—*Bot. Reg.*, t. 1418.—WALP., *Rep.*, i. 751 (part.); *Ann.*, iv. 551.

<sup>7</sup> Ex BENTH., in *Ann. Wien. Mus.*, ii. 120; *Gen.*, 528, n. 190.—ENDL., *Gen.*, n. 6639.

<sup>8</sup> Blue or scarlet; handsome.

<sup>9</sup> Species 5, Brazilian. BENTH., in *Mart. Fl. Bras., Papil.*, 135, t. 35, 36.—DC., *Prodr.*, ii. 235 (*Clitoria* sect. *Glycinopsis*).—WALP., *Rep.*, i. 756. Species 1 (doubtful) Dominican.



36. *Centrosema* DC.<sup>1</sup>—Flowers of *Periandra*; standard dorsally spurred, or more rarely more or less gibbous (*Vexillaria*<sup>2</sup>) near base. Germen subsessile,  $\infty$ -ovulate, style curved; apex more or less dilated, slightly bearded round terminal stigma. Legume subsessile; both sutures thickened; valves traversed on each side by a rather prominent vein not far from margin, or winged close to anterior suture.—Herbs or undershrubs, twining or prostrate; leaves pinnate, or more rarely subdigitate, 3- or more rarely, 1- or 5–7- foliolate, stipellate; stipules striated persistent; flowers<sup>3</sup> axillary; peduncles 1– $\infty$ -flowered, solitary or in pairs; bracts stipuliform in pairs; superior bracts connate striated; pedicels solitary or in pairs; bractlets appressed to flower, persistent, rather large (*South, Central<sup>4</sup> and North America, Java<sup>5</sup>*).

37. *Clitoria* L.<sup>6</sup>—Receptacle concave, lined by a disk. Calyx gamosepalous tubular; lobes 5, nearly equal, or 2 superior connate for a considerable distance, or lowest narrower. Petals usually very unequal; standard large, erect, emarginate; wings oblong subfalcate, spreading, more or less adhering to keel; keel curved acute, often much shorter than wings. Stamens 10, 2-adelphous (9–1); anthers uniform. Germen stipitate,  $\infty$ -ovulate; style curved, longitudinally bearded interiorly; apex stigmatiferous, more or less dilated. Legume stipitate linear-compressed; sutures 1 or 2 slightly thickened; faces bare or traversed by a rather prominent longitudinal rib (*Neurocarpum*<sup>7</sup>); continuous or membranous, stuffed within, 2-valved. Seeds somewhat compressed, exarillate.—Herbs or shrubs,<sup>8</sup> erect or twining; leaves pinnate, 1–3-foliolate (*Neurocarpum*) or 3-foliolate (*Clitorianthes*<sup>9</sup>), more rarely 5–9-foliolate (*Ternatea*<sup>10</sup>), almost always stipellate; stipules

<sup>1</sup> *Prodr.*, ii. 234 (*Clitoria* sect. iii.).—BENTH., in *Ann. Wien. Mus.*, ii. 117; *Gen.*, 527, n. 189.—ENDL., *Gen.*, n. 6638.—*Cruminium* DESVX., in *Ann. Sc. Nat.*, sér. I, ix. 423.—*Steganotropis* LEHM., *Ind. Sem. Hort. Hamburg.* (1826).

<sup>2</sup> BENTH., in *Ann. Wien. Mus.*, ii. 117.—*Pilanthus* POIT., ex ENDL., *Gen.*, n. 6637.—*Platysema* HOFFM., ex BENTH., *loc. cit.*, 122.

<sup>3</sup> Whitish, pink, violet, or bluish; handsome.

<sup>4</sup> Species about 25. H. B. K., *Nov. Gen. et Spec.*, t. 591.—BENTH., in *Mart. Fl. Bras. Papil.*, 125, t. 34.—*Bot. Reg.*, t. 268, 1047.

<sup>5</sup> Species 1, introduced.

<sup>6</sup> *Gen.*, n. 869.—GÆRTN., *Fruct.*, ii. 321, t. 149.—DC., *Prodr.*, ii. 233 (part.).—ENDL., *Gen.*,

n. 6635.—B. H., *Gen.*, 528, n. 191.—*Clitorius* PETIV., in *Ray Hist.*, iii.—*Nauchea* DESC., in *Mém. Soc. Linn. Par.*, iv. 3, t. 1.

<sup>7</sup> DESVX., in *Journ. Bot.*, i. (iii.) 75.—K., *Mimos.*, t. 59, 60.—PRESL., *Symbol.*, t. 9.—ENDL., *Gen.*, n. 6636.—*Martia* LEANDR., in *Denksr. Acad. Münch.*, vii. 233, t. 12 (nec BENTH.).—ZUCC., in *Abhand. Münch.*, i. 337 (part.).—*Martusia* SCHULT., *Mant.*, i. 69.—DC., *Prodr.*, ii. 236 (nec BENTH.).

<sup>8</sup> Species about 25.

<sup>9</sup> BENTH., in *Mart. Fl. Bras. Papil.*, t. 32, 33; *Gen.*, 529.

<sup>10</sup> T., in *Act. Acad. Par.* (1706), t. 1.—H. B. K., *Nov. Gen. et Spec.*, vi. 415.

persistent striated; flowers<sup>1</sup> 1, 2, or  $\infty$  at each axil, in crowded racemes; pedicels often geminate; bracts stipuliform persistent, free or variably connate; bractlets 2, lateral below flower, usually larger membranous striated, persistent (*All hot regions*<sup>2</sup>).

38? *Platygyamus* BENTH.<sup>3</sup>—"Lobes of calyx short, 2 superior connate into one, emarginate. Standard suborbicular, narrowed and without appendages at base; wings falcate oblong; keel about equal to wings; petals free. Stamens, vexillary free, remainder connate; anthers uniform. Germen sessile,  $\infty$ -ovulate; style filiform curved beardless; stigma small terminal. Legume<sup>4</sup> large, broadly linear plano-compressed, 2-valved; superior suture, winged. Seeds broad reniform plano-compressed estrophiolate.—Stem woody (arborescent? or high climbing?); leaves pinnate 3-foliolate stipellate; leaflets large; stipules deciduous or 0. Flowers<sup>5</sup> rather large, racemose along branches of a terminal panicle, one flower to each bract. Bracts small deciduous; bractlets minute, very caducous" (*Brazil*<sup>6</sup>).

39. *Dioclea* H.B.K.<sup>7</sup>—Receptacle obconical oblique lined by a glandular disk somewhat projecting round gynæceum. Calyx gamosepalous subgibbous; lobes 4 (2 superior connate into one broader entire), much imbricated. Standard orbicular or reflexed, furnished at base with inflexed auriculate appendages, and sometimes with 2 interior scales; wings obovate or oblong, equal to or a little shorter than keel, free; keel curved, obtuse or beaked. Stamens 10, 2-adelphous; vexillary stamen free at base, higher more or less connate with remainder; 9 filaments connate into a sheath, oblique at base, broadly cleft dorsally; anthers uniform, or 5 alternate smaller effete (*Pachylobium*, *Platylobium*). Germen shortly stipitate 2- $\infty$ -ovulate; style curved beardless, thickened or dilated at apex; stigma evenly or obliquely truncate, terminal often pulpy. Legume

<sup>1</sup> Blue, red, or white; handsome.

<sup>2</sup> VENT., *Ch. de Plant.*, t. 26.—*Bot. Mag.*, t. 1542, 2111, 3165.—BENTH., in *Ann. Wien. Mus.*, ii. 114; in *Journ. Linn. Soc.*, ii. 33; in *Mart. Fl. Bras., Papil.*, t. 31-33; *Fl. Austral.*, ii. 242.—BAKEB., in *Oliv. Fl. Trop. Afr.*, ii. 176.

<sup>3</sup> In *Mart. Fl. Bras., Papil.*, 323.—B. H., *Gen.*, 531, ii. 200.

<sup>4</sup> "Entirely that of *Phyllocarpus*" (BENTH.),

a genus, as before observed, anomalous among *Cesalpinieæ*. See pp. 92, 170.

<sup>5</sup> "Red (?)."

<sup>6</sup> Species 1. *P. Regnellii* BENTH., *loc. cit.*

<sup>7</sup> *Nov. Gen. et Spec.*, vi. 437 (nec SPRENG.).—DC., *Prodr.*, ii. 403.—ENDL., *Gen.*, n. 6662.—B. H., *Gen.*, 536, n. 216.—*Hymenospron* SPRENG., *Syst.*, *Cur. Post.*, 283.—*Crepidotropis* WALP., in *Linnaea*, xiv. 296.—*Trichodoum* P. BEAUV., ex H. BN., in *Adansonia*, vi. 228.

linear-oblong or semiorbicular or subreniform, plano-compressed or rather turgid, coriaceous; both sutures shortly winged or superior suture thickened, dilated; stuffed within between seeds, 2-valved. Seeds suborbicular or shortly reniform, compressed; hilum short or linear long, more or less thickened or fleshy subarillate.—Shrubs or undershrubs, twining; leaves pinnate 3-foliolate stipellate; stipules usually small, sometimes subglandular and rather prominent;<sup>1</sup> flowers<sup>2</sup> in usually elongated terminal racemes, fascicled in axil of each of very caducous bracts; rachis of fascicle node-like, sessile or shortly supported on an incurved partial peduncle; bractlets caducous (*Tropical America*,<sup>3</sup> *Asia*, and *Africa*<sup>4</sup>).

40. *Camptosema* HOOK. & ARN.<sup>5</sup>—Flowers almost those of *Dioclea*; calyx tubular or more rarely campanulate; lobes 4, imbricated. Standard ovate or oblong (*Bionia*), more rarely orbiculate (*Cratylia*). Stamens 10, 2-adelphous at base; vexillary stamen more or less connate with remainder at middle. Germen stipitate  $\alpha$ -ovulate; style subulate; stigma terminal minute (*Bionia*) or capitate (*Cratylia*). Legume stipitate plano-compressed 2-valved; sutures scarcely thickened.<sup>6</sup>—Shrubs or undershrubs, twining or more rarely suberect; leaves pinnate 3-foliolate, more rarely 1-5-7-foliolate, stipellate; flowers<sup>7</sup> arranged as in *Dioclea*; bracts and bractlets small, usually deciduous (*South America*<sup>8</sup>).

41. *Cleobulia* MART.<sup>9</sup>—Flowers of *Dioclea*, smaller; wings dwarfed apex of style dilated truncate beardless; stigma subdorsal. Legume broadly linear, compressed; superior suture scarcely thickened.<sup>10</sup>—A twining shrub; leaves pinnate, 3-foliolate, stipellate; stipules small, not produced at base; flowers in long racemes, densely fascicled in

<sup>1</sup> In section *Platylobium* small, entire at base; in section *Pachylobium* produced below insertion; in section *Eudioclea* (BENTH.), not produced.

<sup>2</sup> White, blue, or violet.

<sup>3</sup> New-World species about 18. BENTH., in *Mart. Fl. Bras., Papil.*, 161, t. 44.—WALP., *Rep.*, v. 533; *Ann.*, iv. 555.

<sup>4</sup> New-World species 2 or 3. THW., *Enum. Pl. Zeyl.*, 412.—HOOK., *Niger*, 306.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 189.

<sup>5</sup> *Bot. Misc.*, iii. 200.—ENDL., *Gen.*, n. 6659.—B. H., *Gen.*, 536, n. 214.—*Bionia* MART., ex BENTH., in *Ann. Wien. Mus.*, ii. 130.—ENDL., *Gen.*, n. 6658.—*Cratylia* MART., ex BENTH., in

*Ann. Wien. Mus.*, loc. cit., 131.—ENDL., *Gen.*, n. 6661.—B. H., *Gen.*, 536, n. 215.

<sup>6</sup> Handsome; white, scarlet, or pinkish-purple (almost like those of *Cymbosema*, p. 237).

<sup>7</sup> This genus, almost intermediate between *Dioclea* and section *Collaea* of *Galactia*, differs from both by its stipitate germen and legume.

<sup>8</sup> Species about 15. BENTH., in *Mart. Fl. Bras., Papil.*, 154, 158, 325, t. 41-43.—PAXT., *Mag.*, iii. 26, icon.—*Bot. Mag.*, t. 4608.

<sup>9</sup> Ex BENTH., in *Ann. Wien. Mus.*, ii. 131.—ENDL., *Gen.*, n. 6660.—B. H., *Gen.*, 537, n. 217.

<sup>10</sup> This genus is otherwise scarcely to be distinguished from section *Eudioclea* of *Dioclea*.

axil of each bract; rachis of fascicle node-like; bracts and bractlets small caducous (*Brazil*<sup>1</sup>).

42. *Pueraria* DC.<sup>2</sup>—Receptacle somewhat concave lined by a disk, slightly projecting gynæceum. Calyx gamosepalous to a considerable height; lobes or teeth 5, usually very unequal, imbricated; 2 superior connate into one 2-toothed or subentire. Petals very dissimilar; standard orbicular or obovate, 2-auriculate; wings narrowed for some distance from base, obliquely subfalcate; keel of variable form, about equal to wings. Stamens 10, 2-adelphous (9-1); vexillary stamen free or connate with remainder to a variable height; anthers uniform. Germen subsessile  $\infty$ -ovulate; style inflexed or curved, glabrous; apex capitate stigmatiferous. Legume elongated, more or less membranous or thick, compressed or subterete, continuous or stuffed within, 2-valved. Seeds variable.—Shrubs or undershrubs, high twining; leaves pinnate 3-foliolate stipellate; stipules herbaceous;<sup>3</sup> flowers<sup>4</sup> in few-flowered cymes, one in axil of each bract, arranged along axillary or terminal branched racemes; bracts small caducous; pedicels articulated; bractlets small elevated close to flower, caducous or persistent, closely applied to calyx (*Tropical Asia, Japan*<sup>5</sup>).

43. *Canavali* ADAMS.<sup>6</sup>—Receptacle more or less concave, lined by a disk produced round germen into a usually crenate ring. Calyx gamosepalous; lobes 5, very unequal, connate into 2 lips; superior lip large or very large, 2-lobed or truncated; lower lip usually very small, 3-lobed or subentire; aestivation imbricated. Corolla almost that of *Phaseolus*; standard large, suborbicular or broadly obovate, reflexed; wings free, falcate or a little twisted; keel broader than wings, obtuse or obtusely beaked, curved or inflexed or spirally twisted.<sup>7</sup> Stamens 10, 2-adelphous (9-1) at base; vexillary stamen

<sup>1</sup> BENTH, in *Mart. Fl. Bras., Papil.*, 167, t. 45.

<sup>2</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 97; *Prodr.*, ii. 240; *Mém. Légum.*, 252, t. 43.—ENDL., *Gen.* n. 6632.—B. H., *Gen.*, 537, n. 218.—*Neustanthus* BENTH., in *Plant. Jungh.*, i. 234.

<sup>3</sup> Sometimes produced below insertion.

<sup>4</sup> Blue, violet, or purplish.

<sup>5</sup> Species about 10. WIGHT, *Icon.*, t. 412 (part.).—MIQ., *Fl. Ind. Bat.*, i. p. 1, t. 4.—BENTH., in *Journ. Linn. Soc.*, ix. 121.

<sup>6</sup> *Fam. des Pl.*, ii. 325.—*Canavalia* DC., *Mém. Légum.*, 375; *Prodr.*, ii. 404.—ENDL., *Gen.*, n. 6663.—B. H., *Gen.*, 537, n. 219.—*Clementea* CAV., in *Ann. Scienc. Nat.*, vii. 68, t. 47.—SPRENG., *Syst.*, 584.—*Malocchia* SAVI, *Mem. Phaseol.*, iii. 1.—*Wenderothia* SCHLETT., in *Linnaea*, xii. 330.

<sup>7</sup> This genus is divided into two sections, according to the character of the perianth, as follows: "1. *Cochlitropis*. Superior lip of calyx truncate, and often acuminate. Standard with-

afterwards connate with remainder; anthers uniform. Germen sessile or very shortly stipitate,  $\infty$ -ovulate; style curved or involute beardless; apex minutely capitate, stigmatiferous. Legume oblong or broadly linear, neck slightly arched or nearly straight, compressed or rather turgid; superior suture produced at both ends into a wing or longitudinal rib; usually membranous stuffed within between seeds, finally (usually by elasticity) 2-valved. Seeds (often large) nearly round, ovate, or long-ellipsoidal, slightly compressed; hilum linear elongated; radicle inflexed, usually slightly compressed.—Herbs, twining or prostrate; leaves pinnate 3-foliolate stipellate; stipules small or minute, wart-like or gland-like; flowers<sup>1</sup> in axillary racemes, subsolitary or oftener fasciated in axil of each bract; rachis of fascicle node-like; bracts and bractlets caducous small (*All warm regions*<sup>2</sup>).

44. *Cajanus* DC.<sup>3</sup>—Receptacle concave, lined by a disk produced into a short unequally crenulate sheath round base of gynæceum. Standard suborbicular reflexed, furnished with inflexed auriculate appendages at base, wings oblique; keel curved at apex, obtuse. Stamens 10, 2-adelphous (9-1); vexillary stamen wholly free; anthers uniform. Germen subsessile  $\infty$ -ovulate; style thin, thickened above middle, glabrous; apex obliquely capitate, stigmatiferous. Legume linear compressed, obliquely acute at apex, depressed outside in oblique linear dents between seeds, spuriously celled within; cells  $\infty$ , 1-seeded. Seeds subspherical, slightly compressed; hilum lateral oblong, thickened into a small longitudinally furrowed aril.—An erect undershrub; leaves pinnate 3-foliolate exstipellate; leaflets usually tomentose and sprinkled with minute resinous dots; stipules long subulate caducous; flowers<sup>4</sup> in axillary pedunculate racemes, scattered along the rachis; rachis not node-like; bracts caducous; bractlets 0 (*All hot regions*<sup>5</sup>).

out appendages. Keel produced into an inflexed or spiral beak.—2. *Malocchia*. Superior lip of calyx 2-lobed. Standard with auriculate appendages. Keel curved, obtuse, without beak” (BENTH.).

<sup>1</sup> Large, handsome; whitish, pink, or purple-violet.

<sup>2</sup> JACQ., *Icon. Rar.*, t. 559, 550; *Hort. Schœnbr.*, t. 221.—WIGHT, *Icon.*, t. 753.—GAUDICH., *Voy. Freycin., Bot.*, t. 113, —

BENTH., in *Mart. Fl. Bras., Papil.*, 175, t. 48.—*Bot. Mag.*, t. 1199.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 189.—WALP., *Rep.*, i. 765.

<sup>3</sup> DC., *Cat. Hort. Monspel.*, 85; *Prodr.*, ii. 406.—ENDL., *Gen.*, n. 6686.—B. H., *Gen.*, 541, n. 228.—CAJAN ADANS., *Fam. des Pl.*, ii. 326.—DUP.-TH., in *Dict. Sc. Nat.*, vi. 166.

<sup>4</sup> Yellow or purple-striped.

<sup>5</sup> Species 1, widely cultivated (Asiatic ?), *C. indicus* SPRENG., *Syst.*, ii. 248.—BAKER, in

45. **Fagelia** NECK.<sup>1</sup>—Flowers almost those of *Cajanus*; calyx-lobes acuminate; 2 superior connate for a much shorter distance. Corolla and stamens of *Cajanus*. Germen sessile 2-∞-ovulate; style inflexed at middle, filiform or rather thick; stigma minute terminal. Legume oblong-falcate, rather turgid, acute, continuous within, a little depressed outside between seeds, 2-valved. Seeds ovoid; hilum short lateral, thickened into a rather fleshy aril.<sup>2</sup>—A twining herb, suffrutescent at base, glutinous fetid; leaves of *Cajanus*; stipules striated; flowers<sup>3</sup> in axillary racemes; bracts ovate caducous; bractlets 0 (*Southern Africa*).

46. **Atylosia** WIGHT & ARN.<sup>5</sup>—Flowers almost those of *Cajanus*; calyx-lobes elongated or acuminate 2 superior connate into one entire or more or less 2-toothed. Corolla and stamens of *Cajanus*. Germen sessile 2-∞-ovulate; style inflexed at middle, slender or slightly thickened at middle; apex small capitate stigmatiferous. Legume oblong or linear, obtuse or shortly acuminate, compressed transversely or obliquely septate and depressed outside in linear dents between seeds, 2-valved. Seeds orbicular or ovate; hilum dilated round minute funicle into a fleshy aril.—Herbs or shrubs, twining or erect; leaves pinnate or more rarely subdigitate, 3-foliate; leaflets with resinous dots on under surface; stipules minute persistent; flowers<sup>6</sup> either axillary fascicled, or in a simple or branched short pedunculate raceme composed of irregularly aggregated fascicles; bracts rather broad, deciduous; bractlets very small or 0 (*Tropical Asia and Australia*).

*Oliv. Fl. Trop. Afr.*, ii. 216.—*C. flavus* DC., *loc. cit.*—*C. bicolor* DC., *loc. cit.*—*Cytisus Cajan* L., *Spec.*, 1041.—LAMK., *Diet.*, ii. 249.—*C. Pseudo-Cajan* JACQ., *Hort. Vindob.*, ii. t. 119.

<sup>1</sup> *Elem.*, n. 1257.—GÆRTN., *Fruet.*, ii. t. 261.—DC., *Prodr.*, ii. 389.—ENDL., *Gen.*, n. 6685.—B. H., *Gen.*, 541, n. 229.

<sup>2</sup> Whence this genus seems scarcely to be distinct from *Cajanus*.

<sup>3</sup> Yellow, rather large.

<sup>4</sup> Species 1. *F. bituminosa* DC.—HÆRV. & SOND., *Fl. Cap.*, ii. 247.—*Bot. Reg.*, t. 261.—*Glycine bituminosa* L., *Spec.*, 1024.—LAMK., *Ill.*, t. 609, fig. 2.—*Glycine viscosa* MCENCH.—*Crotalaria glycinea* LAMK., *Diet.*, ii. 200.—*Dolichos hirtus* hort., ex DC.

<sup>5</sup> *Prodr.*, 257.—ENDL., *Gen.*, n. 6687.—B. H., *Gen.*, 542, n. 231.—*Collæa* DC., *Mém.*

*Légum.* (part.), t. 41.—*Cantharospermum* WIGHT & ARN., *op. cit.*, 255.

<sup>6</sup> Yellow.

<sup>7</sup> BENTH., in *Plant. Jungh.*, i. 243; *Fl. Austral.*, ii. 262. This eminent writer divides the genus into three sections, as follows:—“1. *Atylia*. Corolla marcescent, late persistent. Legume coriaceous, with red bristles, depressed, but scarcely dented between seeds. DC., *Mém. Légum.*, t. 41 (*Collæa*);—WIGHT, *Icom.*, t. 93, 754.)—2. *Cantharospermum*. Corolla usually deciduous. Legume coriaceous tomentose, and at the same time often pilose, deeply marked by transverse lines between seeds. (JACQ. F., *Écl.*, t. 152 (*Dolichos*);—*Cantharospermum* WIGHT & ARN., *Prodr.*, 255.)—3. *Rhynchosoides*. Corolla deciduous. Legume broad, flat, transversely reticulated, marked by slightly depressed transverse lines between seeds.”

47. *Dunbaria* WIGHT & ARN.<sup>1</sup>—Receptacle scarcely concave, lined by a glandular disk slightly projecting round ovary. Calyx membranous gamosepalous; lobes 5, unequal acute; 2 superior connate to a variable height; lowest usually longest. Corolla<sup>2</sup> and stamens of *Cajanus*. Germen sessile ∞-ovulate; style slender or slightly thickened, inflexed at middle, more or less pilose below small terminal capitate stigma. Legume linear, straight or falcate, plano-compressed continuous acuminate, subseptate within, 2-valved. Seeds suborbicular; funicle expanded near oblong or short hilum into a rather thick membranous aril.—Herbs, prostrate or twining, usually tomentose; leaves pinnate 2-foliolate exstipellate; flowers<sup>3</sup> in axillary pedunculate racemes, solitary or in pairs along the not node-like rachis, rarely solitary at axils; bracts membranous deciduous; bractlets 0 (*Tropical Asia, Australia*<sup>4</sup>).

48. *Cylista* AIT.<sup>5</sup>—Flowers of *Rhynchosia*; calyx membranous scarious veined, finally much enlarged; lobes 4; highest connate into one broad, subentire or emarginate; 2 lateral shorter, lowest very large, concave, usually obtuse. Germen subsessile 1, 2-ovulate, style slender; apex minute capitate stigmatiferous. Legume falcate-ovate, included by enlarged calyx, 1-seeded, 2-valved. Seed exarillate.—A twining undershrub; habit and other characters of *Rhynchosia*; racemes axillary (*East Indies*<sup>6</sup>).

49. *Rhynchosia* LOUR.<sup>7</sup>—Flowers almost those of *Cajanus* or *Atylosia*, usually smaller; calyx-lobes unchanged after anthesis; 2 posterior connate to a variable height. Petals and stamens of

<sup>1</sup> *Prodr.*, 258.—ENDL., *Gen.*, n. 6682.—B. H., *Gen.*, 541, n. 230.

<sup>2</sup> From which the genus is divided into two sections by BENTHAM, as follows:—"1. *Eudunbaria*. Corolla marcescent, persistent round fruit.—2. *Ryncholabium*. Corolla finally deciduous."

<sup>3</sup> "Usually yellow."

<sup>4</sup> Species about 12. BENTH., in *Pl. Jungh.*, i. 242; *Fl. Austral.*, ii.—MIQ., *Fl. Ind. Bat.*, i. p. i. 177.—WALP., *Ann.*, iv. 565.

<sup>5</sup> *Hort. Kew.*, ed. 1, iii. 512.—DC., *Prodr.*, ii. 410 (part.).—ENDL., *Gen.*, n. 6694 (part.).—B. H., *Gen.*, 542, n. 232.

<sup>6</sup> Species 1. *C. scariosa* AIT., *loc. cit.*—ROXB., *Pl. Coromand.*, i. t. 92.—DC., *loc. cit.*, n. 1.—WIGHT, *Icon.*, t. 1597.

<sup>7</sup> *Fl. Coch.*, 460.—DC., *Prodr.*, ii. 384 (part.).—ENDL., *Gen.*, n. 6692.—B. H., *Gen.*, 542, n. 233.—*Cyanospermum* WIGHT & ARN., *Prodr.*, 259.—WIGHT, *Ill.*, t. 81 (84).—ENDL., *Gen.*, n. 6695.—*Nomisma* WIGHT & ARN., *Prodr.*, 236.—WIGHT, *Icon.*, t. 283, 295.—*Arcyphyllum* ELL., in *Journ. Acad. Phil.*, i. 371.—DC., *Mém. Légum.*, t. 55.—*Pitcheria* NUTT., in *Journ. Acad. Phil.*, vii. 93.—*Polytropia* PRESL, *Symb.*, 21, t. 13.—*Hidrosia* E. MEX., *Comm. Pl. Afric.*, 89.—*Orthodanum* E. MEX., *op. cit.*, 131.—ENDL., *Gen.*, n. 6690.—*Copisma* E. MEX., *op. cit.*, 133.—*Chrysoscias* E. MEX., *op. cit.*, 139.—*Sigmodostyles* MEISSN., in *Hook. Journ.*, ii. 93.

*Cajanus*. Germen subsessile, 1-2-ovulate; ovules descending; micropyle extrorse superior; raphe somewhat thick; style slender or thickened,<sup>1</sup> curved above; apex minute capitate stigmatiferous. Legume compressed oblique suborbicular, oblong or slightly falcate, 1- or oftener 2-seeded, continuous or more rarely septate within, 2-valved. Seeds subglobose or compressed, more rarely subreniform; hilum lateral or subhorizontal and superior, short or oblong, dilated into a small or rudimentary aril; funicle subcentral or oblique.<sup>2</sup>—Herbs or undershrubs, prostrate, erect, or oftener twining; leaves pinnate or more rarely subdigitate, 3-foliolate; leaflets sprinkled with resinous dots on under surface; stipellæ minute or 0; stipules ovate or lanceolate; flowers<sup>3</sup> in axillary racemes, solitary or in pairs along rachis; bracts caducous; bractlets 0 (*All hotter regions*<sup>4</sup>).

50? *Eriosema* DESVX.<sup>5</sup>—Flowers almost those of *Rhynchosia*, calyx-lobes 5, all distinct or 2 superior shortly connate. Keel curved at apex, obtuse. Stamens 2-adelphous (of *Rhynchosia*). Germen sessile or subsessile; ovules 2, descending; style filiform or slightly thickened at apex; apex often curved, minutely capitate, stigmatiferous. Legume of *Rhynchosia*, continuous or nearly continuous within, 1-2-seeded, 2-valved. Seeds oblique or transverse; hilum linear superior, more or less thickened; funicle subhorizontal, attached at internal extremity of hilum.—Herbs or undershrubs, prostrate, erect, or rarely twining; leaves pinnate 3-foliolate, usually exstipellate; leaflets usually narrowed, sprinkled with resinous dots<sup>6</sup> on under surface; stipules narrow, free or connate into one superposed to leaf; flowers<sup>7</sup> in axillary racemes, solitary or in pairs along

<sup>1</sup> More thickened in *Sigmodostylis*.

<sup>2</sup> BENTHAM divides this genus, according to the characters of hilum, aril, and funicle, into 11 sections, as follows:—

a. Aril thick, fleshy (3 sections: *Nomismia*, *Phyllomatia* [WIGHT & ARN.], *Ptychocentron* WIGHT & ARN.).

b. Funicle expanded into a membrane covering the hilum, but not truly arillate (8 sections: *Orthodanum*, *Chrysoseias*, *Arcyphyllum*, *Cyanospermum*, *Pseudocajan* (BENTH.), *Copisma*, *Polytropia*).

<sup>3</sup> Yellow or purple, often with dark stripes.

<sup>4</sup> ROXB., *Pl. Coromand.*, t. 221.—JACQ.,  *Ic. Rar.*, t. 146.—JACQUEM., *Voy. Bot.*, t. 54.—A.

RICH., *Fl. Abyss. Tent.*, t. 43.—HOOK., *Icon.*, t. 189; *Exot. Fl.*, t. 201.—*Bot. Mag.*, t. 1859, 2234.—*Bot. Reg.*, t. 275.—BENTH., in *Mart. Fl. Bras., Papil.*, 200, t. 54; *Fl. Austral.*, ii. 265.—THW., *Enum. Pl. Zeyl.*, 412.—SIEM., *Herald*, t. 20.—HARV. & SOND., *Fl. Cap.*, ii. 247.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 216.—WALP., *Rep.*, i. 785; v. 540; *Ann.*, i. 252; ii. 434; iv. 567.

<sup>5</sup> In *Ann. Sc. Nat.*, sér. 1, ix. 421 (err. *Euriosma*).—DC., *Prodr.*, ii. 388 (*Rhynchosia* § 3).—ENDL., *Gen.*, n. 6691.—*Pyrrhotrichia* WIGHT & ARN., *Prodr.*, i. 238, not.

<sup>6</sup> Less conspicuous than in *Rhynchosia*.

<sup>7</sup> Yellow, usually small.



rachis, more rarely solitary or few in each axil<sup>1</sup> (*Tropical America, Asia, Australia, and Africa*<sup>2</sup>).

51. *Flemingia* ROXB.<sup>3</sup>—Flowers almost those of *Eriosema*, calyx-lobes nearly equal or lowest lobe longer, nearly free, often falcate. Corolla and stamens of *Rhynchosia*. Germen sessile or shortly stipitate, short; ovules 2, descending; style filiform or rather thickened above; apex minutely capitate, stigmatiferous. Legume short oblique turgid, continuous within, 1–2-seeded, 2-valved. Seeds somewhat thick, hilum short exarillate.—Herbs, undershrubs, or shrubs; erect, prostrate, or more rarely twining; leaves 1–3-foliate exstipellate; veins prominent on under surface; stipules striated usually caducous; flowers<sup>4</sup> racemose, racemes branched (*Ostryodium*,<sup>5</sup> *Chalaria*<sup>6</sup>), or dense spike-like or capitate, axillary or terminal (*Flemingiastrum*<sup>7</sup>); bracts sometimes small (*Chalaria*); oftener dry striated imbricated before anthesis, finally deciduous (*Flemingiastrum*); more rarely large, reniform or subcucullate, inflated plaited, including flowers (*Ostryodium*); bractlets 0 (*Tropical Asia, Africa, and Australia*<sup>8</sup>).

### III. GALEGEÆ.

52. *Galega* T.—Flowers irregular resupinate; receptacle scarcely dilated into a very short slightly glandular cup. Calyx gamosepalous, scarcely perigynous; teeth or lobes 5, short, nearly equal, valvate or scarcely imbricated in æstivation. Corolla papilionaceous; standard obovate-oblong, shortly unguiculate; wings oblong,

<sup>1</sup> This genus in most cases differs from *Rhynchosia* by the habit of the leaves and stem, but is scarcely to be properly distinguished by characters taken from the direction of the hilum and insertion of the funicle.

<sup>2</sup> Species about 40. AUBL., *Guian.*, t. 306 (*Cytisus*).—H. B. K., *Nov. Gen. et Spec.*, t. 572–574 (*Glycine*).—A. RICH., *Fl. Abyss. Tent.*, t. 44 (*Rhynchosia*).—BENTH., *Niger*, 312; in *Mart. Fl. Bras., Papil.*, 207, t. 55, 56.—KL., in *Pet. Moss., Bot.*, t. 6.—HARV. & SOND., *Fl. Cap.*, ii. 258.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 223.—H. BN., in *Adansonia*, vi. 226.—WALP., *Rep.*, i. 784; v. 540; *Ann.*, ii. 431; iv. 566.

<sup>3</sup> *Pl. Coromand.*, iii. 44, t. 248, 249.—DC., *Prodr.*, ii. 351.—ENDL., *Gen.*, n. 6697.—B. H.,

*Gen.*, 544, n. 235.—*Millingtonia* ROXB., *Mss.*, ex ENDL. (nec *Fl. Ind.*, i. 102).

<sup>4</sup> Red or purple, mixed with yellow.

<sup>5</sup> DESVX., in *Journ. Bot.*, i. 119, t. 4, fig. 2.—DC., *loc. cit.*, sect. ii.—*Lourea* JAUME, in *Bull. Phil.*, déc. 1812 (nec NECK.).—*Moghania* JAUME, in *Desv. Journ. Bot.*, i. 61.

<sup>6</sup> WIGHT & ARN., *Prodr.*, i. 241.—WIGHT, *Icon.*, t. 327.

<sup>7</sup> DC., *loc. cit.*, sect. i.—*Lepidocoma* JUNGH., *Reise*, ex *Flora* (1857), 508.

<sup>8</sup> AIT., *Hort. Kew.*, ed. 2, iv. 349.—WIGHT, *Icon.*, t. 267, 268, 326, 327, 329, 389, 390, 408, 987.—GUILL. & PERB., *Fl. Sen. Tent.*, i. 212, t. 52 (*Rhynchosia*).—BENTH., in *Pl. Jungh.*, i. 244; *Fl. Austral.*, ii. 268.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 230.—WALP., *Ann.*, iv. 568.

slightly adherent to keel; keel curved obtuse. Stamens 10, scarcely perigynous, 1-adelphous below; anthers uniform or 5 oppositipetalous a little shorter. Germen sessile  $\infty$ -ovulate; style subulate curved beardless; apex scarcely capitate, stigmatiferous. Legume linear, rather acute, terminated by style, continuous within, 2-valved; valves thin, obliquely striated, finally twisted. Seeds transversely oblong, attached by middle, exarillate; embryo exalbuminous oblong; radicle thick cylindrical, much inflexed.—Herbs, perennial glabrous, erect or bent, usually branched; leaves alternate imparipinnate; leaflets entire veined; stipules semi-sagittate or unsymmetrical, sometimes leaf-like; flowers in terminal and axillary racemes; bracts narrow, usually persistent; bractlets 0 (*Southern Europe, Western Asia*).

53? *Ptychosema* BENTH.<sup>1</sup>—"Calyx turbinate; lobes nearly equal in length; 2 superior connate into a truncate emarginate lip. Petals with rather long claws; standard suborbicular emarginate; wings falcate oblong free; keel shorter than wings, almost straight, obtuse. Stamens all connate into a sheath cleft above; anthers uniform. Germen sessile  $\infty$ -ovulate, style short inflexed; stigma extrorse oblique. Legume . . . ?—A herb, small, diffuse, nearly glabrous; leaves imparipinnate; leaflets quite entire, parallelly penniveined on under surface, exstipellate; stipules small; peduncles (always?) terminal, 1-flowered,<sup>2</sup> bracts 1, 2, at articulation on base of pedicel, bractlets 2 in middle of pedicel" (*South-Western Australia*<sup>3</sup>).

54. *Barbieria* DC.<sup>4</sup>—Calyx long tubular; lobes acute nearly equal. Petals very unequal; standard much elongated, subsessile, narrowed at base; wings and keel (rather longer than wings) furnished with long claws. Stamens 10, 2-adelphous (9-1); filaments finally free, very slender, anthers uniform; connective glandular. Germen sessile  $\infty$ -ovulate; style long slender, longitudinally bearded within, very shortly curved below apex; summit slightly dilated, stigmatiferous. Legume linear straight plano-compressed, trans-

<sup>1</sup> In *Lindl. Swan Riv. App.*, 16.—B. H., *Gen.*, 496, n. 98.

<sup>2</sup> "Flowers violet, judging from a dried specimen."

<sup>3</sup> Species 1. BENTH., *Fl. Austral.*, ii, 201.

<sup>4</sup> *Mém. Légum.*, 241, t. 39; *Prodr.*, ii, 239. —ENDL., *Gen.*, n. 6656.—B. H., *Gen.*, 495 n. 96.

versely impressed outside between seeds, septate within. Seeds  $\infty$ , transversely oblong; funicle short, dilated at lateral hilum.—Shrubs; leaves imparipinnate stipellate; stipules subulate persistent; flowers<sup>1</sup> racemose, 1–3 in axil of each of subulate bracts, bractlets lateral, similar to calyx-lobes, inserted below flower (*Tropical America and West Indies*<sup>2</sup>).

55. *Peteria* A. GRAY.<sup>3</sup>—Receptacle widely obconical, lined by a rather thick glandular disk. Calyx tubular, somewhat gibbous above base; lobes 5, nearly equal, imbricated; 2 superior connate for a considerable distance. Standard oblong, furnished with a long claw, patent at apex, reflexed laterally bare within; wings free, obliquely oblong; keel curved obtuse. Stamens 10; 9 connate into a sheath cleft above, vexillary stamen free at very base; anthers uniform. Germen stipitate  $\infty$ -ovulate; style inflexed, capitate stigmatiferous below apex, bearded all round. Legume linear straight plano-compressed, continuous within, 2-valved; valves coriaceous; sutures rather thick. Seeds oblong-ovate transverse exarillate.—An undershrub, glabrous rigid branched; leaves imparipinnate; leaflets  $\infty$ , minute exstipellate; stipules subulate, often finally spinescent; racemes slender, terminal or opposite to leaves; flowers<sup>4</sup> scattered; bracts minute; bractlets 0 (*New Mexico*<sup>5</sup>).

56. *Sylitra* E. MEY.<sup>6</sup>—Flowers small (of *Tephrosia*), calyx narrow, 3 anterior lobes nearly equal, acute; 2 superior connate for a considerable distance. Standard furnished with a rather long claw; wings falcate, adhering to rather shorter keel. Stamens 10, 2-adelphous (9–1) at base; vexillary stamen connate with remainder above into a closed tube; anthers small uniform. Germen sessile  $\infty$ -ovulate; style inflexed at apex, beardless; summit minutely capitate, stigmatiferous. Legume oblong plano-compressed submembranous inflated (indehiscent). Seeds suborbicular exarillate.—An undershrub, slender hoary; leaves alternate simple, shortly petiolate,

<sup>1</sup> Red.

<sup>2</sup> Species 1. *B. pinnata*.—*B. polyphylla* DC., *loc. cit.*—PÆFF. & ENDL., *Nov. Gen. et Spec.*, iii. t. 264.—BENTH., in *Mart. Fl. Bras., Papil.*, t. 9.—*Galactia pinnata* PERS., *Syn.*, ii. 302.—*Clitoria polyphylla* POIR., *Dict.*, Suppl., ii. 300.

<sup>3</sup> *Pl. Wright.*, i. 50.—B. H., *Gen.*, 495, n. 95.

<sup>4</sup> “Yellowish.”

<sup>5</sup> Species 1, *P. scoparia* A. GRAY, *loc. cit.*—WALP., *Ann.*, iv. 481.

<sup>6</sup> *Comm. Plant. Afric. Austr.*, 114 (nec MENCH).—ENDL., *Gen.*, n. 6565.—B. H., *Gen.*, 496, n. 99.

articulated at base; stipules minute persistent; flower shortly pedicellate, axillary in pairs; bracts minute (*Southern Africa*<sup>1</sup>).

57. *Tephrosia* PERS.<sup>2</sup>—Receptacle lined by a more or less prominent glandular disk. Calyx gamosepalous; teeth or lobes nearly equal, or more rarely inferior tooth or lobe longer; 2 superior connate for a considerable distance. Petals unguiculate; standard sub-orbicular, usually silky or villous outside; wings oblique, more or less adhering to keel; keel curved. Stamens 10, 2-adelphous; 9 lower connate into a tube cleft above; vexillary stamen more or less connate below with remainder, finally almost always free; each filament often a little gibbous outside above base; anthers uniform. Germen sessile 2-∞-ovulate; style often flattened or dilated, subtubular, rigid “or rather horny,” inflexed or curved; stigma terminal, truncate or oftener penicillate. Legume linear, more rarely ovate, compressed, continuous or imperfectly septate between seeds within, 2-valved. Seeds 1-∞, a little compressed, funicle dilated at base or towards apex into a small aril of variable form.—Shrubs or oftener undershrubs or herbs; leaves imparipinnate, more rarely 1-3-foliolate; leaflets usually marked by parallel veins oblique to midrib, often silky below; stipules setaceous or similar to leaves; inflorescence racemose; racemes terminal or leaf-opposed or in higher axils, often bearing leaves at base; flowers<sup>3</sup> solitary or often in fascicles of 2-6 in axils of each bract; bractlets 0<sup>4</sup> (*All Tropical and Sub-tropical regions*<sup>5</sup>).

<sup>1</sup> Species 1. *S. biflora* E. MEY, *loc. cit.*—HARV., *Theas. Cap.*, t. 78.—HARV. & SONN., *Fl. Cap.*, ii. 224.—[BAKER (in *Oliv.*, *Fl. Trop. Afr.*, ii. 103) gives another species, *S. angolensis*, which has “digitately trifoliolate leaves.”]

<sup>2</sup> *Syn.*, ii. 328.—DC., *Prodr.*, ii. 249 (part.).—ENDL., *Gen.*, n. 6589 (part.).—B. H., *Gen.*, 496, n. 100.—*Brissonia* NECK., *Elem.*, n. 1348.—*Reineria* MENCH., *Suppl.*, 44.—*Xyphocarpus* PRESL., *Symb.*, i. 13, t. 7.—*Ktesera* REINW., *Syll. Pl. Ratisb.*, ii. 11.—*Requienia* DC., in *Ann. Sc. Nat.*, sér. 1, iv. 91; *Mém. Légum.*, 224, t. 37, 38; *Prodr.*, ii. 168.—ENDL., *Gen.*, n. 6471.—*Apodynomene* E. MEY., *Comm. Pl. Afr. Austr.*, 111.—*Pogonostigma* BOISS., *Diagn. Pl. Or.*, ii. 39.—*Catacline* EDGEW., in *Journ. Asiat. Soc. Beng.*, xvi. 1214.—*Balboa* LIEBM., in *Vidensk. Medd.* (1856) 106.—*Macronyx* DALZ., in *Hook. Journ.* ii. 35.

<sup>3</sup> White, red, or purple.

<sup>4</sup> BENTHAM divides this genus, according to

the characters of inflorescence and gynæceum, into 3 sections:—“1. *Brissonia*. Racemes axillary and terminal; style usually longitudinally bearded above, subterete or narrowly flattened.—2. *Reineria*. Racemes terminal or opposite to leaves; style more or less dilated, bare or bearded; stigma usually penicillate.—3. *Requienia*. Flowers axillary fascicled; leaves 1-foliolate; ovules 1, 2.”  
<sup>5</sup> Species about 80. H. H. K., *Nov. Gen. et Spec.*, vi. t. 577.—VALL., *Pl. Asiat. Rav.*, t. 60.—WIGHT, *Icon.*, t. 370-372, 388.—BENTH., in *Mart. Fl. Bras.*, *Papil.*, 45; *Fl. Austral.*, ii. 203.—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 475-478 (*Pogonostigma*).—GUILL. & PERE., *Fl. Sen. Tent.*, i. 168 (*Requienia*), t. 49.—MIQ., *Stirp. Surin.*, t. 6; *Fl. Ind. Bat.*, i. p. i. 290.—HARV. & SONN., *Fl. Cap.*, ii. 203, 230 (*Requienia*).—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 104.—SEEM., *Herald*, t. 19.—WALP., *Rep.*, i. 673; ii. 857; v. 515; *Ann.*, ii. 364; iv. 459.

58. *Mundulea* DC.<sup>1</sup>—Flowers almost those of *Tephrosia*; 2 superior lobes or teeth of calyx subconnate. Standard usually transversely callous within above claw; keel curved obtuse. Stamens 10, 2-adelphous at base; vexillary stamen afterwards connate with remainder into a closed tube; 5 alternate filaments slightly dilated;<sup>2</sup> anthers uniform. Germen  $\infty$ -ovulate; style curved hard glabrous; apex capitate stigmatiferous. Legume linear plano-compressed; both sutures thickened; indehiscent or scarcely dehiscent. Seeds reniform exarillate.—Shrubs, silky-pubescent; leaves imparipinnate; leaflets quite entire, reticulate-penniveined; stipules minute; flowers<sup>3</sup> racemose; racemes terminal or springing from the wood and short; bracts small; bractlets very small or 0 (*Tropical Asia and Africa, Madagascar*<sup>4</sup>).

59. *Chadsia* BOJ.<sup>5</sup>—Flowers almost those of *Tephrosia*; calyx posteriorly rather gibbous; 2 superior lobes or teeth connate; lowest about equal to or longer than remainder. Corolla almost that of *Chianthus*; standard acuminate for a considerable length; wings acuminate, shorter than standard; keel falcate with a long beak, acuminate, longer than standard. Stamens 10, 2-adelphous at base; vexillary stamen afterwards connate with remainder into a tube; anthers uniform. Germen  $\infty$ -ovulate; style slender glabrous, apex stigmatiferous minute, scarcely or not thickened. Legume elongated acuminate 2-valved.—Shrubs; leaves imparipinnate; leaflets with close nearly parallel veins; flowers<sup>6</sup> (sometimes appearing before leaves) solitary or in few-flowered short racemes at nodes or on short, often leafless branches; pedicels long; bracts small narrow (*Madagascar*<sup>7</sup>).

60. *Milletia* WIGHT & ARN.<sup>8</sup>—Receptacle shortly campanulate, lined by a disk forming a short sheath round base of gynæceum.

<sup>1</sup> *Mém. Légum.*, vi. 266; *Prodr.*, ii. 249 (*Tephrosia* sect. i.).—ENDL., *Gen.*, n. 6539 d.—B. H., *Gen.*, 497, n. 102.

<sup>2</sup> Whence the stamens are almost those of the *Euloteæ*.

<sup>3</sup> Pink or violet.

<sup>4</sup> Species about 4. W., *Spec.*, iii. 1121 (*Cytisus*).—ROXB., *Fl. Ind.*, iii. 327, 328 (*Robinia*); *Cat. Hort. Calc.*, 56.—HOOK., *Exot. Fl.*, t. 188 (*Dalbergia*); *Icon. Plant.*, t. 120.—WIGHT, *Ill.*, 79 (85).—BAKER, in

*Oliv. Fl. Trop. Afr.*, ii. 126.—WALP., *Ann.*, iv. 491.

<sup>5</sup> In *Ann. Sc. Nat.*, sér. 2, xx. 104 (err. *Chaldia*).—B. H., *Gen.*, 497, n. 101.

<sup>6</sup> Scarlet or pink.

<sup>7</sup> Species 3. WALP., *Rep.*, v. 545.

<sup>8</sup> *Prodr.*, i. 263.—ENDL., *Gen.*, n. 6715.—B. H., *Gen.*, 498, n. 104.—*Berrebera* HOCHST., in *Flora* (1846), 597.—? *Fornasinia* BERTOL., *Misc. Bot.*, iii. 13, t. 1.—*Callerya* ENDL., *Gen.*, Suppl., iii. 104.—? *Marquartia* VOG., in *Pl. Meyen.*, 35, t. 1, 2.

Calyx gamosepalous, subentire truncate or shortly 5-toothed; 2 superior teeth absent or sometimes subconnate. Standard large, patent or reflexed, bare or callous within above claw, more rarely (*Otosema*<sup>1</sup>) furnished with inflexed auriculate appendages; wings free falcate-oblong, free or cohering at apex; keel curved obtuse. Stamens 10, 2-adelphous (9-1) at base; vexillary stamen always or afterwards free (*Padbruggea*<sup>2</sup>), or oftener more or less connate at middle with remainder; anthers uniform; connective often subglandular. Germen sessile or shortly stipitate; ovules  $\infty$ ; style terete glabrous inflexed; apex subtruncate or capitate. Legume linear oblong or lanceolate, plano-compressed rigid, coriaceous or woody, 2-valved or oftener late or scarcely dehiscent. Seeds exarillate.—Trees, or erect or climbing shrubs; leaves imparipinnate; leaflets<sup>3</sup> usually stipellate; stipules small; flowers scattered or fascicled along rachis of terminal, simple or branched racemes; bracts and bractlets deciduous<sup>4</sup> (*Tropical Asia, Africa, and Oceania*<sup>5</sup>).

61? *Sarcodum* LOUR.<sup>6</sup>—Flowers (apparently) of *Milletia*; calyx subtruncate; teeth very short. “Standard large patent; wings oblong; keel curved obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile, surrounded at base by an annular disk,  $\infty$ -ovulate. Legume linear straight terete fleshy (indehiscent?).—A high-climbing shrub; leaves imparipinnate; leaflets  $\infty$ , small oblong stipellate; racemes terminal subpanicled; younger bracts subulate-acuminate hairy”<sup>7</sup> (*Cochinchina*).

62. *Wistaria* NUTT.<sup>8</sup>—Calyx 4-toothed; superior tooth shortly 2-toothed or 2-crenate at apex; 3 inferior teeth usually a little longer

<sup>1</sup> BENTH., in *Pl. Jungh.*, i. 248.

<sup>2</sup> MIQ., *Fl. Ind.-Bat.*, i. p. i. 150.

<sup>3</sup> Rather large, often evergreen reticulate penniveined.

<sup>4</sup> This genus, closely allied to the large-leaved *Tephrosias*, to *Mundulea*, *Gliciridia*, and some species of *Lonchocarpus* and *Wistaria*, appears to be entirely artificial, and perhaps would be better considered a section of *Wistaria*.

<sup>5</sup> WIGBT, *Icon.*, t. 86, 207.—A. RICH., *Fl. Abyss. Tent.*, t. 35.—HOOK., *Icon.*, t. 788. BENTH., *Fl. Hongk.*, 78; *Fl. Austral.*, ii. 211.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 126.—H. BN., in *Adansonia*, vi. 222.—WALP., *Rep.*, i. 799; v. 544; *Ann.*, i. 254; iv. 572.

<sup>6</sup> *Fl. Cochinch.*, ed. Ulyssip. (1790), 462.—DC., *Prodr.*, ii. 522.—B. H., *Gen.*, 498, n. 103.

<sup>7</sup> A very uncertain genus, which, “judging from the characters given by LOUREIRO and an imperfect specimen, appears to be allied to *Milletia*; but the legume is different, and the leaves are rather those of *Tephrosia*.” (BENTH.)

<sup>8</sup> *Gen. N. Amer. Plant.*, ii. 115 (err. *Wistaria*).—DC., *Prodr.*, ii. 390.—SPACH, *Suit. à Buffon*, i. 256.—ENDL., *Gen.*, n. 6671.—B. H., *Gen.*, 499, n. 105.—*Thyrsanthus* ELL., in *Journ. Acad. Philad.*, i. 371.—*Diplonyx* RAFIN., *Fl. Ludov.*, 101.

and narrower. Standard large, with 2 appendages above claw; wings falcate with 1 appendage above claw; keel curved obtuse. Stamens 10, 2-adelphous (9-1); more rarely vexillary stamen connate with remainder; anthers uniform. Germen stipitate; disk produced round stalk of germen into a conical sheath, unequally cleft at apex; germen  $\infty$ -ovulate; style inflexed glabrous; stigma terminal subglobose. Legume elongated torulose, continuous within, 2-valved; valves somewhat coriaceous, convex. Seeds reniform exarillate.—Climbing shrubs; leaves imparipinnate; leaflets entire penniveined with reticulate venules; superior stipels linear, very caducous; stipules usually long narrow very caducous; racemes terminal nutant; flowers<sup>1</sup> on rather long pedicels; pedicels articulated at base; bracts very caducous (*China, Japan,<sup>2</sup> North America<sup>3</sup>*).

63. *Robinia* L.<sup>4</sup>—Receptacle depressed obconical, glandular within. Calyx gamosepalous to a considerable height; teeth short broad; 2 superior subconnate valvate. Petals shortly unguiculate; standard large reflexed, bare within; wings free falcate-oblong; petals of curved obtuse keel connate below, valvate. Stamens 10, 2-adelphous; 9 inferior connate into a tube often slightly inflated at base and cleft above; vexillary stamen either free or connate at middle with remainder; anthers uniform, oppositipetalous often smaller. Germen stipitate  $\infty$ -ovulate; style inflexed subulate, shaggy at apex; stigma capitate terminal. Legume scarcely stipitate, linear plano-compressed, continuous within, 2-valved; valves membranous thin; superior suture narrowly winged. Seeds  $\infty$ , oblique or transverse, exarillate amphitropous; funicle rather long, near hilum slightly thickened arilliform; albumen thin membranous; embryo fleshy; radicle much inflexed, accumbent.—Trees or shrubs, nearly glabrous, viscous, or bristly; leaves imparipinnate; leaflets  $\infty$ , usually stipellate; stipules minute, setaceous or spinescent; flowers<sup>5</sup> in usually axillary racemes; bracts minute or membranous, very caducous (*North America<sup>6</sup>*).

<sup>1</sup> Bluish, rarely whitish.

<sup>2</sup> SIEB. & ZUCC., *Fl. Jap.*, t. 43, 44 (45?).—*Bot. Mag.*, t. 20, 83.—*Bot. Reg.*, t. 650.

<sup>3</sup> SWEET, *Brit. Fl. Gard.*, ser. 2, t. 104.—*Bot. Mag.*, t. 2103.

<sup>4</sup> *Gen.*, n. 879 (part., nec AUBL., nec LHÉR.).—GÆRTN., *Fruct.*, ii. 307, t. 145.—DC., *Mém.*

*Légum.*, 273; *Prodr.*, ii. 261 (part.).—ENDL., *Gen.*, n. 6546.—B. H., *Gen.*, 499, n. 106.—*Pseudoacacia* T., *Inst.*, 649, t. 417.

<sup>5</sup> White, pink, or purplish.

<sup>6</sup> Species 5 or 6. VENT., *Jard. Cels.*, t. 4.—*Bot. Mag.*, t. 311, 560.—WALP., *Ann.*, iv. 491.

64. *Gliricidia* H. B. K.<sup>1</sup>—Receptacle cupuliform or shortly obconical, lined by a concave disk not produced round gynæceum. Calyx gamosepalous, either nearly entire and evenly truncate, or oftener very shortly 5-toothed; 2 superior teeth sometimes subconnate. Standard large reflexed, without callosities; claw articulated at base; limb bare or furnished with small inflexed auriculate appendages; wings<sup>2</sup> falcate-oblong free; keel curved obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform; connective long ovate, often coloured. Germen stipitate  $\infty$ -ovulate; style curved or inflexed, glabrous or furnished with small hairs below stigma; stigma terminal small or minutely capitate. Legume stipitate, broadly linear plano-compressed, sometimes unequally constricted between seeds, continuous within, 2-valved; valves coriaceous thick. Seeds exarillate.—Trees or shrubs; leaves imparipinnate; leaflets exstipellate, rather large, quite entire, reticulate penniveined, often spotted; stipules small; flowers<sup>3</sup> (sometimes appearing before the leaves) in racemes inserted in axils or at old defoliated nodes; bracts and bractlets small or 0 (*Tropical America*<sup>4</sup>).

65. *Diphysa* JACQ.<sup>5</sup>—Receptacle slightly concave, lined by a disk. Calyx gamosepalous; lobes 5, unequal; 2 superior broader obtuse; lowest longer and narrower than remainder, very acute, arched. Standard unguiculate suborbicular, with 2 callosities within; wings curved oblique; keel curved, more or less acute or beaked. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen stipitate  $\infty$ -ovulate arched, continuous with curved subulate glabrous style; stigma small or minutely capitate, terminal. Legume stipitate elongated; endocarp linear subplane, much narrower within, scarcely or not hollow between seeds; sutures linear bare, either scarcely prominent, or produced longitudinally into a subulate keel; exocarp separable from endocarp, inflated and dilated at each face into a reticulated, vesicular or compressed keel-like membrane. Seeds ovate or oblong, more rarely transversely elongated compressed.—Shrubs or trees, often glandular; leaves imparipinnate; leaflets entire exstipellate

<sup>1</sup> *Nov. Gen. et Spec.*, vi. 393.—B. H., *Gen.*, 499, n. 107.

<sup>2</sup> Sometimes transversely folded.

<sup>3</sup> Pink or lilac.

<sup>4</sup> JACQ., *Amer.*, 211, t. 119 (*Robinia*).—SW.,

*Prodr.*, 106?—DC., *Prodr.*, ii. 260, 216 (*Lonicocarpus*).—GRISEB., *Cat. Pl. Cub.*, 77.

<sup>5</sup> *Stirp. Amer.*, 208, t. 181, fig. 15L.—LAME., *Dict.*, ii, 289; *Ill.*, t. 605.—DC., *Prodr.*, ii. 269.—ENDL., *Gen.*, n. 6555.—B. H., *Gen.*, 500, n. 112.



articulated; stipules small; flowers<sup>1</sup> in short lax racemes inserted in axils or fascicled at old nodes; pedicels articulated at base and below flower, and furnished at same places with 2 caducous bracts (*Central America, Mexico*<sup>2</sup>).

66. *Sabinea* DC.<sup>3</sup>—Calyx broadly campanulate truncate, nearly entire or very shortly toothed. Standard broadly suborbiculate, patent or reflexed; wings free falcate-oblong; keel equal to or a little longer than wings, curved obtuse. Stamens 10, 2-adelphous (9-1), either all equal, or 5 lower longer and connate to a greater height; anthers uniform. Germen stipitate ∞-ovulate; style slender hollow, much curved, glabrous, long tapering at apex; summit minute, not thickened, stigmatiferous. Legume linear plano-compressed, continuous within, 2-valved; valves ultimately spirally twisted. Seeds ovate-compressed or reniform, exarillate.—Trees or shrubs; leaves paripinnate; midrib terminating at apex in a short point; leaflets deciduous, entire or apiculate, exstipellate; stipules small, usually setaceous caducous; flowers<sup>4</sup> solitary or fascicled at old nodes; bracts small; bractlets 0 (*West Indies*<sup>5</sup>).

67. *Corynella* DC.<sup>6</sup>—Calyx very short or elongated subulate; teeth either nearly equal or 2 superior connate to a considerable height. Standard suborbicular unguiculate reflexed; wings oblique free; keel curved, longer than wings and standard. Stamens 10, 2-adelphous (9-1); anthers uniform; connective glandular, usually coloured. Germen stipitate ∞-ovulate; apex of style usually thickened hooked curved; summit minutely capitate, stigmatiferous. Legume lanceolate or elongated, plano-compressed ∞-seeded, 2-valved.—Shrubs; leaves pari- or imparipinnate; stipels minute; stipules rigid, sometimes spinescent; flowers<sup>7</sup> solitary or fascicled at old nodes; bracts small, bractlets 0<sup>8</sup> (*West Indies*<sup>9</sup>).

<sup>1</sup> Yellow.

<sup>2</sup> BENTH. & ERST., *Legum. Centroamer.*, 10.—WALP., *Ann.*, ii. 493.

<sup>3</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 92; *Prodr.*, ii. 263.—ENDL., *Gen.*, n. 6548.—B. H., *Gen.*, 501, n. 114.

<sup>4</sup> Purplish.

<sup>5</sup> Species 2 or 3. VAHL., *Symb.*, iii. 89, t. 70.—POIB., *Dict.*, vi. 227.—PERS., *Syn.*, ii. 212 (*Robinia*).—GRISEB., *Fl. Brit. W. Ind.*, 183.

<sup>6</sup> In *Ann. Scienc. Nat.*, sér. 1, iv. 93; *Prodr.*, ii. 267.—ENDL., *Gen.*, n. 6556.—B. H., *Gen.*, 500, n. 112.—*Corynitis* SPRENG., *Syst.*, *Cur. Post.*, 263.—? *Toxotropis* TURCZ., in *Bull. Mosc.*, ii. p. ii. 506.—WALP., *Ann.*, i. 232.

<sup>7</sup> Purplish.

<sup>8</sup> A genus that needs to be attentively studied and compared with *Sabinia*, and perhaps with some species of *Pictetus*.

<sup>9</sup> "Species 2."

68. *Poitæa* VENT.<sup>1</sup>—Calyx gamosepalous subtruncate; teeth very short, standard obovate erect; wings oblong, longer than standard; keel longer than wings, acute subfalcate; petals free at apex. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen stipitate  $\infty$ -ovulate; style curved glabrous subulate; apex minute stigmatiferous. Legume linear plano-compressed 2-valved. Seeds orbiculate.—Shrubs; leaves imparipinnate; leaflets  $\infty$ , membranous entire exstipellate; stipules setaceous; flowers<sup>2</sup> in axillary racemes; bracts small; bractlets 0 (*West Indies*<sup>3</sup>).

69? *Vilmorinia* DC.<sup>4</sup>—“Calyx ebracteolate cylindrical, obtusely 4-toothed, sub-2-labiate. Corolla papilionaceous; petals oblong; wings shorter than keel. Stamens 2-adelphous. Style glabrous subulate acute. Legume pedicellate lanceolate, tapering at base, compressed, filiform at apex. Seeds 12-16.—A shrub; leaves imparipinnate; stipules rather broad at base, long subulate; flowers<sup>5</sup> in axillary racemes” (*Hispaniola*<sup>6</sup>).

70? *Lennæa* KL.<sup>7</sup>—Flowers small, almost those of *Robinia*; calyx teeth short; 2 superior connate. Standard suborbicular, naked on inner surface, shortly unguiculate; wings free; keel curved obtuse. Stamens 10; vexillary stamen free only close to base, afterwards connate with remainder into a closed tube; anthers uniform. Germen shortly stipitate; ovules  $\infty$ ; style slender, at apex much curved subinvolute, at back slightly bearded longitudinally; summit capitate stigmatiferous. Legume linear compressed torulose, septate within between seeds, 2-valved. Seeds lenticular compressed.<sup>8</sup>—Trees or shrubs, glabrous; leaves subimparipinnate; leaflets stipellate alternate, quite entire; stipules small; flowers<sup>9</sup> racemose; racemes axillary or fascicled at old nodes, sometimes nutant (*Central America*,<sup>10</sup> *Mexico*<sup>11</sup>).

<sup>1</sup> *Choix de Pl.*, t. 36.—TURP., in *Dict. Sc. Nat.*, Atl., t. 251.—DC., *Prodr.*, ii. 263.—ENDL., *Gen.*, n. 6547.—B. H., *Gen.*, 500, n. 109.

<sup>2</sup> Pink or purple.

<sup>3</sup> “Species 2.”

<sup>4</sup> *Prodr.*, ii. 239.—ENDL., *Gen.*, n. 6655.—B. H., *Gen.*, 499, n. 108.

<sup>5</sup> “Purple.”

<sup>6</sup> Species 1. *V. multiflora* DC., *loc. cit.*—

*Clitoria multiflora* Sw., *Fl. Ind. Occ.*, ii. 1253 (a very doubtful genus).

<sup>7</sup> Ap. LINK, KL. & OTTO, *Icon. Plant.*, ii. 65, t. 26.—B. H., *Gen.*, 500, n. 110.

<sup>8</sup> KUNZE, in *Linnaea*, xvi. 320.

<sup>9</sup> Pink or greenish (recalling the leaves and flowers of some species of *Indigofera*).

<sup>10</sup> WALP., *Rep.*, i. 680.

<sup>11</sup> SEEM., *Herald*, 107.

71. *Olneya* A. GRAY.<sup>1</sup>—Calyx subcampanulate membranous; lobes 5, nearly equal, or 2 superior connate to a considerable height, imbricated in æstivation. Standard broadly orbicular, unguiculate; limb reflexed, furnished with 2 inflexed auriculate appendages and with 2 callosities within; wings oblique free; keel broad curved obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile  $\alpha$ -ovulate; ovules subrhomboidal, compressed; style curved almost from base, bearded all round above middle; apex thick capitate stigmatiferous. Legume compressed, rather oblique, glandular, continuous within, 2-valved; valves thickly coriaceous, finally very convex over seeds. Seeds 1, 2, broadly ovate, exarillate.—A small tree, covered with hoary hairs, often armed with prickles below the stipules; leaves impari- or subparipinnate; midrib apiculate; leaflets alternate entire, rather rigid, exstipellate; stipules minute setaceous caducous; flowers<sup>2</sup> in axillary racemes; bracts caducous (?) (*California*<sup>3</sup>).

72. *Coursetia* DC.<sup>4</sup>—Calyx broad; teeth 5, elongated, nearly equal; 2 superior connate to a considerable height. Petals about equal in length; standard broadly orbicular or reniform; claw short; sides usually reflexed; wings free obovate-oblong; keel curved, shortly beaked or rather obtuse. Stamens 10, either 2-adelphous (9-1) or vexillary stamen connate at middle with remainder; anthers uniform. Germen sessile  $\alpha$ -ovulate; style rather rigid, at base slightly dilated and hollow, then inflexed, above longitudinally bearded within or for a greater distance without; apex minutely capitate, stigmatiferous. Legume linear compressed continuous within, 2-valved. Seeds suborbicular exarillate; funicle short.—Trees or shrubs, tomentose or villous; leaves pari- or imparipinnate; leaflets  $\infty$ , entire; stipels rudimentary or 0; stipules setaceous; flowers<sup>5</sup> in axillary racemes, each solitary in axil of a small narrow very caducous bract (*Hotter parts of America*<sup>6</sup>).

<sup>1</sup> *Plant. Thurber*, in *Mem. Amer. Acad.*, v. 313, 328.—B. H. *Gen.*, 500, n. 111.—*Tesota* C. MUELL., in *Walp. Ann.*, iv. 479.

<sup>2</sup> "White or purplish."

<sup>3</sup> Species 1. *O. Tesota* A. GRAY, *loc. cit.*—WALP., *Ann.*, iv. 587.

<sup>4</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 92; *Prodr.*, ii. 264.—ENDL., *Gen.*, n. 6549.—B. H., *Gen.*, 501, n. 115.

<sup>5</sup> Violet ?.

<sup>6</sup> Species about 10. CAV., *Icon.*, t. 84 (*Lathyrus*).—W., *Spec.*, iii. 1102.—DESF., *Cat. Hort. Par.*, ed. 1, 195 (*Orobus*).—H. B. K., *Nov. Gen. et Spec.*, vii. 268, t. 660 (*Sesbania*).—GRISEB., *Fl. Brit. W. Ind.*, 183.—BENTH., in *Mart. Fl. Bras., Papil.*, 44.—WALP., *Ann.*, iv. 491.

72*a*. **Poissonia** H. BN.<sup>1</sup>—Flowers irregular resupinate. Receptacle obconical turbinate, lined by a rather thick disk. Calyx gamosepalous subcampanulate, deeply 5-lobed; lobes long subulate subequal; 2 posterior connate to a considerable distance; aestivation imbricated. Petals unguiculate; standard suborbicular; wings obliquely obovate; keel curved, rather obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen very shortly stipitate; ovules  $\infty$ ; style curved, covered below stigma with thick hairs forming a short pyriform mass, glabrous elsewhere; apex capitate stigmatiferous. Legume shortly stipitate, surrounded at base by persistent calyx, linear, acute at both ends, compressed, depressed in oblique furrows between seeds outside, opposite surfaces almost meeting within,  $\infty$ -locellate. Seeds transversely obovate, compressed glabrous; funicle short; embryo exalbuminous; radicle elongated, much inflexed.—An undershrub (?), hoary tomentose in every part; leaves alternate petiolate 1-foliolate; leaflets obovate penniveined, articulated at base; stipules linear subulate, flowers axillary solitary; peduncle reflexed after anthesis (*Peru*<sup>2</sup>).

73. **Cracca** BENTH.<sup>3</sup>—Receptacle shortly obconical, lined by a disk, often coloured. Calyx gamosepalous membranous; lobes 5, nearly equal, setaceous acuminate at apex. Petals about equal in length; standard orbicular or reniform; sides reflexed; wings unequally obovate or oblong, free; keel broad curved, acute or subrostrate at apex. Stamens 10, 2-adelphous (9-1). Germen sessile  $\infty$ -ovulate; style rigid thin curved, above and within longitudinally (often thinly) bearded; apex minutely capitate, stigmatiferous. Legume linear compressed rigid, transversely septate within and transversely constricted by lines outside between seeds, 2-valved. Seeds unevenly orbicular or nearly square, exarillate; embryo fleshy; radicle elongated, much inflexed.—Herbs or undershrubs (?); leaves imparipinnate stipellate; stipules setaceous; flowers<sup>4</sup> in axillary racemes; bracts setaceous 1-flowered; bractlets 0 (*Tropical and Central America*<sup>5</sup>).

<sup>1</sup> *Adansonia*, ix. 295.

<sup>2</sup> Species 1: *P. solanacea*.

<sup>3</sup> In (*Erst. Legum. Centroamer.*, 8 (nec RIVIN., nec L., nec GREN. & GODR.)—B. H., *Gen.*, 501, n. 116.

<sup>4</sup> Whitish or pale ochraceous.

<sup>5</sup> JACQ., *Amer.*, 212, t. 125 (*Galega*); *Icon. Rar.*, t. 150.—H. B. K., *Nov. Gen. et Spec.*, v. 463 (*Tephrosia*).—DC., *Prodr.*, ii. 251, n. 18.—BENTH., *Sulph.*, 81 (*Tephrosia*).—WALP., *Rep.*, v. 514 (*Tephrosia*); *Ann.*, iv. 480.

74. **Sesbania** PERS.<sup>1</sup>—Receptacle depressed obconical, thickly glandular within. Calyx gamosepalous; tube broad truncate or equally 5-toothed or 5-lobed. Petals much imbricated; standard ovate or orbicular, patent or reflexed; wings falcate-oblong; keel furnished with a rather long claw, curved. Stamens 10, 2-adelphous (9-1), vexillary stamen a little thickened or geniculate above base; anthers uniform or 5-alternate a little longer. Germen usually stipitate  $\infty$ -ovulate; style curved glabrous, stigma small, evenly or unevenly capitate. Legume linear wingless; margins usually thick (*Eusesbania*); compressed or subterete, 4-gonous or 4-winged (*Daubentonia*<sup>2</sup>), more rarely short few-seeded; margins acute (*Glottidium*<sup>3</sup>); transversely septate within by intrusion of the often separable endocarp between the seeds; seeds transversely oblong or square, exarillate.—Herbs or shrubs; leaves paripinnate  $\infty$ -foliolate; stipels minute or 0; stipules membranous, usually caducous; flowers<sup>4</sup> handsome, sometimes very large (*Agati*<sup>5</sup>) in loose axillary racemes; bracts and bractlets setaceous, usually very caducous (*All hotter regions*<sup>6</sup>).

75. **Microcharis** BENTH.<sup>7</sup>—Flowers almost those of *Sesbania*, very small; calyx gamosepalous to a considerable height; lobes 5, somewhat unequal, long acute. Standard suborbicular, narrowed into a claw; wings oblique; keel a little shorter than wings, obtuse, stamens 10, 1-adelphous at base; vexillary stamen afterwards free; anthers uniform. Germen sessile,  $\infty$ -ovulate; style short, rather broad and compressed; apex thick capitate, rather compressed, stigmatiferous. Legume linear compressed slender submembranous, thinly stuffed within between seeds, 2-valved. Seeds oblong or square, exarillate.—Herbs, slender branched, rather shaggy all over;

<sup>1</sup> *Syn.*, ii. 316 (part).—DC., *Prodr.*, ii. 265.—ENDL., *Gen.*, n. 6551.—B. H., *Gen.*, 502, n. 118.—*Sesban* POIB., *Dict.*, vii. 127.—? *Darwinia* RAFIN., *Fl. Ludov.*, 106.—? *Monoplectrum* RAFIN., *loc. cit.*

<sup>2</sup> DC., *Mém. Légum.*, 285; *Prodr.*, ii. 267.—ENDL., *Gen.*, n. 6554.

<sup>3</sup> DESVX., *Journ. Bot.*, i. 119, t. 1.—DC., *Prodr.*, ii. 266.—ENDL., *Gen.*, n. 6550.

<sup>4</sup> White, yellow, purplish red, or variegated.

<sup>5</sup> RHEEDE, *Hort. Malab.*, i. 95, t. 51, ex DESVX., *loc. cit.*, t. 4, fig. 6.—DC., *Prodr.*, ii. 266.—ENDL., *Gen.*, n. 6553.

<sup>6</sup> Species about 15. RUMPH., *Herb. Amboin.*, i. t. 76 (*Agati*).—CAY., *Icon.*, t. 314 (*Æschynomene*), 316 (*Piscidia*).—JACQ., *Icon. Rar.*, t. 148 (*Robinia*), 564 (*Æschynomene*)—H. B. K., *Nov. Gen. et Spec.*, vi. 533.—GULLL. & PERR., *Fl. Seneg. Tent.*, i. 197, t. 50.—WIGHT, *Icon.*, t. 32.—BENTH., in *Mart. Fl. Bras., Papil.*, 42, p. 7; *Fl. Austral.*, ii. 212.—KL., in *Pet. Reis. Moss., Bot.*, t. 8.—A. GRAY, in *Amer. Expl. Exped., Bot.*, t. 46 (*Agati*).—*Bot. Reg.*, t. 873.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 133.—WALP., *Rep.*, i. 680; ii. 858; *Ann.*, iv. 492.

<sup>7</sup> *Gen.*, 501, n. 117.

leaves simple, very shortly petiolate, articulated at base; stipules subulate persistent; flowers<sup>1</sup> in simple slender axillary racemes, each solitary in axil of a narrow bract; bractlets 0 (*Western tropical Africa*<sup>2</sup>).

76. *Carmichælia* R. BR.<sup>3</sup>—Receptacle minute concave, sparingly glandular within. Calyx gamosepalous; teeth nearly equal or superior smaller, imbricated in æstivation, finally subvalvate. Standard orbicular unguiculate; wings oblong free, usually shorter than standard; keel curved or vaulted, obtuse, longer or shorter than standard. Stamens 10, 2-adelphous; 9 connate into a sheath cleft above; vexillary stamen free, usually smaller; anthers uniform. Germen shortly stipitate, ∞-ovulate, curved glabrous; stigma minute terminal. Legume usually short, compressed, ovate or oblong, elliptical, terminated by the style; sutures more or less thickened; valves separating from persistent margins. Seeds ∞ usually few, exarillate; embryo fleshy; radicle long, folded double.—Shrubs or small trees; branches rush- or cladode-like; leaves either perfect imparipinnate with 3–∞ small obcordate leaflets, or reduced to minute scales; stipules small membranous; flowers<sup>4</sup> shortly pedicellate, racemose; racemes short, solitary or fascicled at lateral nodes; bracts small; bractlets inserted at a variable height on pedicel or under flower (*New Zealand*<sup>5</sup>).

77. *Notospartium* HOOK. F.<sup>6</sup>—Flowers of *Carmichælia*; teeth of calyx short, nearly equal. Germen sessile, ∞-ovulate; style curved, longitudinally bearded within; apex hooked inflexed, stigmatiferous. Legume linear plano-compressed, membranous between vein-like sutures, septate within between seeds, indehiscent. Seeds compressed exarillate.—A small tree; twigs rush-like pendulous, leafless on anthesis; scales minute at nodes; flowers<sup>7</sup> in lateral racemes at nodes; bracts and bractlets minute (*New Zealand*).

78. *Colutea* T.<sup>8</sup>—Receptacle wide depressed, lined by a disk.

<sup>1</sup> "Red."

<sup>2</sup> Species 2 (or 1 with 2 varieties). BENTH., in *Trans. Linn. Soc.*, xxv. 297, t. 33 A, B. [BAKKEE (in *Oliv. Fl. Trop. Afr.*, ii. 132) gives a third species or variety].

<sup>3</sup> R. BR., in *Bot. Bey.*, t. 912.—ENDL., *Gen.*, n. 6568.—B. H., *Gen.*, 502, n. 119.

<sup>4</sup> Pink or white, spotted or striped with lilac.

<sup>5</sup> Species 9. RAOUL, *Ch. de Pl. de la N.-Zél.*, t. 28.—HOOK. F., *Handb. N. Zeal. Fl.*, 48.

<sup>6</sup> In *Hook. Journ.*, ix. 176, t. 3; *Handb. N. Zeal. Fl.*, 51.—B. H., *Gen.*, 502, n. 120.

<sup>7</sup> "Pink?"

<sup>8</sup> *Inst.*, 649, t. 418; *Cor.*, 44.—L., *Gen.*,

Calyx gamosepalous; teeth nearly equal or 2 superior shorter, valvate. Petals finally unequal; standard suborbicular patent, often unevenly gibbous within at base, rather long-unguiculate; wings falcate-oblong, finally shorter than standard; keel broad, much curved obtuse, longer than wings; claws more or less close or connate below. Stamens 10, 2-adelphous; 9 connate for a considerable height into a sheath cleft above, finally free subulate curved; vexillary stamen free; anthers uniform. Germen stipitate  $\infty$ -ovulate; ovules finally multiseriate<sup>1</sup> subhorizontal; style curved, rather prominent below; apex capitate stigmatiferous; margins thickened at apex, longitudinally bearded, produced into a helmet or cowl round stigmatiferous head. Legume stipitate surrounded at base by persistent calyx, vesicular membranous inflated veined, indehiscent or widely dehiscent by 2 valves at apex. Seeds  $\infty$ , reniform campylotropous; funicle straight, rather thick; albumen thin pulpy; embryo rather fleshy; radicle elongated arched accumbent.—Shrubs, glabrous or somewhat silky; leaves alternate imparipinnate; leaflets entire exstipellate articulated; stipules 2, lateral; flowers<sup>2</sup> axillary racemose few, rather large; bractlets 2, minute, inserted below flower (*Middle and southern Europe, temperate and subtropical Asia*<sup>3</sup>).

79. *Sutherlandia* R. BR.<sup>4</sup>—Flowers almost those of *Colutea*; corolla longer; standard erect, patent at apex, folded back at margins, shortly unguiculate; wings oblong; keel longer than standard, erect, curved acute. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen stipitate  $\infty$ -ovulate; style filiform, curved at apex, longitudinally bearded above and within; apex minutely capitate stigmatiferous. Legume membranous inflated (of *Colutea*), subindehiscent.—A shrub, hoary; leaves imparipinnate; leaflets  $\infty$ , quite entire, exstipellate; stipules small narrow; flowers<sup>5</sup> in axillary racemes; bracts and bractlets small (*Southern Africa*<sup>6</sup>).

n. 880.—J., *Gen.*, 359.—GÆRTN., *Fruct.*, ii. 320, t. 154.—LAMK., *Dict.* i. 352; Suppl. i. 560 (part.).—DC., *Prodr.*, ii. 270.—ENDL., *Gen.* n. 6561.—B. H., *Gen.*, 505, n. 128.

<sup>1</sup> Originally 2-seriate.

<sup>2</sup> White or reddish.

<sup>3</sup> Species 3 or 4. MILL., *Icon.*, t. 100.—SCHKURR., *Handb.*, t. 204.—DUHAM., *Arbr.*, ed. 2, i. t. 22, 23.—SIBTH., *Fl. Græc.*, t. 707.—GREEN. & GODR., *Fl. de Fr.*, i. 454.—*Bot. Reg.*,

t. 1727.—*Bot. Mag.*, t. 81, 2622.—WALP., *Rep.*, 682; *Ann.*, i. 232; ii. 367 [BAKER (in *Oliv. Fl. Trop. Afr.*, ii. 136) gives one species as extending to Nile Land.]

<sup>4</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 327 (nec GMEL.).—DC., *Prodr.*, ii. 273.—ENDL., *Gen.*, n. 6566.—B. H., *Gen.*, 503, n. 123.—*Colutia* MÖENCH, *Metk.*, 164.

<sup>5</sup> Scarlet, handsome.

<sup>6</sup> Species 1. *S. frutescens* R. BR., *loc. cit.*—

80. *Swainsona* SALISB.<sup>1</sup>—Flowers almost those of *Sutherlandia*; teeth of calyx 5, nearly equal or 2-superior connate to a greater height. Standard orbicular or reniform, patent or reflexed, bare or with 2 callosities within above claw; wings falcate-oblong or a little twisted. Stamens 10, 2-adelphous (9–1). Germen sessile or stipitate,  $\infty$ -ovulate; style curved or involute (*Cyclogyne*<sup>2</sup>), longitudinally bearded above and within or more rarely dorsally; stigma terminal small, minutely capitate or oblique (*Sphærophysa*<sup>3</sup>). Legume of *Sutherlandia* or *Colutea*, scarcely dehiscent or 2-valved; seminiferous suture slightly or much intruded (*Diplobium*<sup>4</sup>). Seeds subreniform exarillate.—Herbs or undershrubs, glabrous or pilose; leaves imparipinnate; leaflets 3– $\infty$ , exstipellate; stipules small or setaceous, or broad herbaceous at base; flowers<sup>5</sup> in axillary racemes; bracts small; bractlets sometimes appressed to flowers and persistent, sometimes minute caducous or 0 (*Australia, New Zealand, the East, Russian Asia, China*<sup>6</sup>).

81? *Lessertia* DC.<sup>8</sup>—Flowers of *Sutherlandia* or *Swainsona*; standard suborbicular, patent or reflexed, bare within; keel straight or curved; wings and keel usually shorter than standard, stamens 10, 2-adelphous (9–1); anthers uniform. Germen sessile or stipitate,  $\infty$ -ovulate; style curved subulate, bearded at back or all round at apex below stigma; bare or shortly bearded within. Legume of variable form, usually oblong, sometimes thin membranous compressed, sometimes inflated,<sup>9</sup> widely dehiscent or 2-valvate at apex. Seeds funiculate reniform exarillate.—Herbs or undershrubs; leaves imparipinnate exstipellate; stipules small; flowers<sup>10</sup> in axillary pedun-

HABV. & SEND., *Fl. Cap.*, ii. 212.—*S. microphylla* BURCH., ex DC., in *Icon. Deless.*, iii. 41, t. 71.—*Colutea frutescens* L., *Spec.*, 1045.—BURM., *Fl. Cap. Prodr.*, 22.—MILL., *Icon.*, t. 99.—DC., *Astrag.*, 43.—*Bot. Mag.*, t. 181.

<sup>1</sup> *Parad. Lond.*, t. 28.—DC., *Prodr.*, ii. 271.—ENDL., *Gen.*, n. 6562.—B. H., *Gen.*, 504, n. 126.—*Loxidium* VENT., *Dec. Gen. Nov.*, ex DC. (incl.: *Cyclogyne* BENTH., *Diplobium* F. MUELL., *Sphærophysa* DC. [*? Phyllolobium* FISCH., in DC., *Prodr.*, ii. 521]).

<sup>2</sup> BENTH., in *Lindl. Swan Riv. App.*, 16.

<sup>3</sup> DC., *Mém. Légum.*, 288; *Prodr.*, ii. 271.—ENDL., *Gen.*, n. 6569.—B. H., *Gen.*, 504, n. 127. (Though *Sphærophysa* and *Swainsona* are separated by all authors, we can see no generic distinction between them.)

<sup>4</sup> F. MUELL., in *Trans. Bot. Soc. Edinb.*, vii. 489.

<sup>5</sup> Red, yellowish, or white.

<sup>6</sup> BENTH., *Fl. Austral.*, ii. 215.—ANDB., *Bot. Rep.*, t. 319.—HOOK. F., *Handb. N. Zeal. Fl.*, 51.—*Bot. Reg.*, t. 994; (1846), t. 26.—*Bot. Mag.*, t. 792 (*Swainsona*).

<sup>7</sup> TRAUTV., *Fl. Russ.*, t. 33.—JAUB. & SPACH, *Ill. Pl. Orient.*, i. 126, t. 64.—WALP., *Rep.*, ii. 860 (*Sphærophysa*).

<sup>8</sup> *Astragal.*, 37; *Mém. Légum.*, t. 46; *Prodr.*, ii. 271.—ENDL., *Gen.*, n. 6563.—B. H., *Gen.*, 503, n. 125.

<sup>9</sup> Whence this genus ought hardly to be distinguished from *Swainsona*.

<sup>10</sup> White, pink, or oftener red.



culate racemes; bracts small; bractlets minute or 0 (*Southern Africa*).

82. **Clianthus** SOLAND.<sup>2</sup>—Calyx gamosepalous; lobes elongated, nearly equal or 2 superior broader. Corolla (of *Chadsia*) elongated; standard acuminate, closely reflexed, wings shorter than standard, falcate-lanceolate; keel erect curved, acute or long narrow, about equal to or longer than standard. Stamens 10, 2-adelphous (9–1); anthers uniform. Germen stipitate; ovules ∞; style subulate curved, longitudinally bearded above and within; apex minutely capitate or not thickened, stigmatiferous. Legume oblong curved acuminate, much stuffed within between seeds, 2-valved. Seeds reniform exarillate.—Herbs or undershrubs, erect or subscaudent; leaves imparipinnate; stipules herbaceous; flowers<sup>3</sup> in axillary, sometimes umbelliform racemes; bracts and bractlets subpersistent (*Australia, New Zealand*<sup>4</sup>).

83. **Eremosparton** FISCH. & MEY.<sup>5</sup>—Calyx gamosepalous; teeth 5, nearly equal. Standard broadly orbicular, emarginate reflexed; wings falcate-oblong; keel curved obtuse. Stamens 10; 9 connate; vexillary stamen free; anthers uniform. Germen sessile ∞-ovulate; style curved, slightly bearded dorsally below terminal stigma (like *Vicia*). Legume broad short falcate membranous plano-compressed, rather turgid, 2-valved. Seeds 1 or few, reniform exarillate.—A shrub or undershrub, branches leafless (rush-like) slender; scales distant alternate, representing leaves; flowers<sup>6</sup> racemose, bracteate, articulated at base, 2-bracteolate below calyx; racemes loose elongated slender; peduncles at axils of scales (*Caspian*<sup>7</sup>).

84. **Indigofera** L.<sup>8</sup>—Receptacle very short or scarcely concave.

<sup>1</sup> Species about 30. JACQ., *Hort. Schœnbr.*, t. 222 (*Vicia*); *Icon. Rar.*, t. 576 (*Galega*); *Hort. Vindob.*, iii. t. 3 (*Colutea*).—R. BR., in *Ait. Hort. Kew.*, ed. 2, ix. 327.—HOOK., *Exot. Fl.*, t. 84.—DELESS., *Icon. Select.*, iii. 39, t. 69, 70.—*Bot. Reg.*, t. 970.—*Bot. Mag.*, t. 2064.—HARV. & SOND., *Fl. Cap.* ii. 213.

<sup>2</sup> EX LINDL., in *Trans. Hort. Soc. Lond.*, ser. 2, i. 519, t. 22.—ENDL., *Gen.*, n. 6567 (part).—B. H., *Gen.*, 503, n. 122.—*Donia* DON (G.), *Gen. Syst.*, ii. 467.—*Eremocharis* R. BR., in *App. Sturt Voy.*, 10.

<sup>3</sup> Red, or with the standard blackish-purple spotted; pendulous, large.

<sup>4</sup> Species 2. LINDL. & PAXT., *Fl. Gard.*, t. 10.—WOODW., in *Damp. Voy.*, iii. 111, fig. 4.—BENTH., *Fl. Austral.*, ii. 214.—HOOK. F., *Handb. N. Zeal. Fl.*, 52.—*Bot. Reg.*, t. 1775.—*Bot. Mag.*, t. 3584, 5051.

<sup>5</sup> *Enum. Pl. Schrenck*, 75.—B. H., *Gen.*, 504, n. 125.

<sup>6</sup> "Small, violet, distant."

<sup>7</sup> WALP., *Rep.*, ii. 860.

<sup>8</sup> *Gen.*, n. 889.—J., *Gen.*, 359.—GÆRTN.,

Calyx sometimes subhypogynous, gamosepalous oblique; teeth or lobes nearly equal, or oftener posterior shorter. Petals sessile or shortly unguiculate; standard ovate or orbicular; wings oblong, slightly adhering to keel or androceum; keel erect, obtuse or acuminate, gibbous (*Indigostrum*<sup>1</sup>) or furnished with a more or less projecting spur on both sides. Stamens 10, 2-adelphous; 9 connate into a thin sheath cleft above and long persisting; vexillary stamen free; anthers uniform, glabrous or pilose, surmounted by gland-like prominent connective. Germen sessile or very shortly stipitate, 1, 2 or oftener  $\infty$ -ovulate; style glabrous; stigma capitate, often penicillate. Legume either terete, 4-gamous, or sub-compressed, septate between seeds, 2- $\infty$ -seeded (*Euindigofera*<sup>2</sup>); or plano-compressed, straight, arched, or circinate with thin margins, 2- $\infty$ -seeded (*Brissonia*<sup>3</sup>) are more rarely 1-seeded; or short globose unarmed (*Sphæridiophora*<sup>4</sup>); or short falcate subtriquetrous, with dilated echinate dorsal suture (*Acanthonotus*<sup>5</sup>). Seeds globose, square, or cylindrical, truncate at both ends, exarillate; embryo exalbuminous; radicle cylindrical or clubbed.—Shrubs, undershrubs, or herbs, more or less covered with hairs; hairs sometimes simple, sometimes attached by middle (*pili medifixi*), forked appressed; leaves imparipinnate, or more rarely digitate 3-foliolate or simple; leaflets entire, stipellate or exstipellate; flowers<sup>6</sup> in axillary racemes or spikes, sessile or oftener pedicellate, each solitary at axil of a bract; bracts caducous<sup>7</sup> (*All hotter regions*<sup>8</sup>).

*Fruct.*, ii, 317, t. 148.—LAMK., *Dict.*, iii, 244; *Suppl.*, iii, 145; *Ill.*, t. 626.—DC., *Prodr.*, ii, 221.—ENDL., *Gen.*, n. 6530.—B. H., *Gen.*, 494, n. 91 (including: *Acanthonotus* BENTH., *Ameocarpus* BENTH., *Brissonia* DESVX., *Eilemanthus* HOCHST., *Hemispadon* ENDL., *Indigostrum* JAUB. & SPACH, *Oustropis* DON (G.), *Sphæridiophora* DESVX.).

<sup>1</sup> JAUB. & SPACH, *Ill. Pl. Orient.*, v, 101, t. 492, 493.

<sup>2</sup> BENTH., *Gen.*, *loc. cit.*, sect. 3.—*Oustropis* DON (G.), *Gen. Syst.*, ii, 214 (*Indigofera gracilis* SPRENG.;—*Lotus Bot. Mag.*, t. 2808;—*Eilemanthus* HOCHST., in *Flora* [1846], 593).

<sup>3</sup> DESVX., in *Ann. Sc. Nat.*, sér. 1, ix, 409.—*Ameocarpus* BENTH., in *Lindl. Veg. Kingd.*, 554.

<sup>4</sup> DESVX., *Journ. Bot.*, i, 125, t. 6.—JAUB. & SPACH, *op. cit.*, t. 494.

<sup>5</sup> BENTH., *Niger*, 293.

<sup>6</sup> Pink, purple, yellowish, or white.

<sup>7</sup> This genus is divided by BENTHAM (*loc. cit.*) into 4 sections: *u.* germen 1-ovulate: 1. *Acanthonotus*, legume falcate, echinate dorsally; 2.

*Sphæridiophora*, legume globose unarmed: *b.* germen 2- $\infty$ -ovulate; 3. *Euindigofera*, legume terete 4-gonous or subcompressed; 4. *Ameocarpus*, legume compressed, straight arched or circinate; sutures tapering.

<sup>8</sup> JACQ., *Hort. Schœnb.*, 230-236, 365; *Icon. Rar.*, t. 569-571.—H. B. K., *Nov. Gen. et Spec.*, vi, 455, t. 580.—VENT., *Ch. de Plant.*, t. 30, 44; *Jard. Malm.*, t. 44, 55.—WALL., *Pl. Asiat. Rar.*, t. 279.—ENDL., *Atakta*, i, t. 3 (*Hemispadon*).—WIGHT, *Icon.*, t. 314, 315, 330-333, 365-369, 385-387, 403, 404, 983.—HOOK., *Icon.*, t. 188.—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 481-494.—GUILL. & PERR., *Fl. Seneg. Tent.*, i, 172, t. 46-48.—BENTH., in *Mart. Fl. Bras.*, *Papil.*, 35, t. 5, 6; *Fl. Austral.*, ii, 194.—THW., *Enum. Pl. Zeyl.*, 83.—HARV. & SONN., *Fl. Cap.*, ii, 163.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii, 65.—*Bot. Reg.*, t. 300, 386, 789, 957, 991, 1744; (1842) t. 57; (1843) t. 14; (1846) t. 22.—*Bot. Mag.*, t. 198, 465, 476, 742, 3000, 3065, 3348, 5063.—WALP., *Rep.*, i, 660; ii, 856; v, 514; *Ann.*, i, 230; ii, 362; iv, 486.

85. **Cyamopsis** DC.<sup>1</sup>—Flowers almost those of *Indigofera*; stamens 10, 1-adelphous; filaments connate into a closed tube; anthers uniform apiculate. Germen sessile  $\infty$ -ovulate; style curved at apex; apex capitate stigmatiferous. Legume linear sub-4-gonous compressed, rather thick, acuminate, septate within between seeds, 2-valved. Seeds square compressed exarillate; embryo fleshy; radicle inflexed clubbed.—Erect herbs, covered with hairs attached by middle; leaves imparipinnate; leaflets 3- $\infty$ , opposite exstipellate; stipules setaceous small; flowers<sup>2</sup> in axillary racemes, shortly pedicellate, each solitary at axil of a bract; bractlets 0 (*Tropical Africa, East Indies*<sup>3</sup>).

86. **Brongniartia** H. B. K.<sup>4</sup>—Receptacle shortly obconical or turbinate, lined by a disk produced round stalk of gynæceum into a ring or short, usually unequally crenate, tube; mouth of receptacle slightly oblique. Calyx gamosepalous to a considerable height; lobes disparate, nearly equal in length; 2 superior usually more obtuse, connate to a greater height; æstivation slightly imbricated. Petals nearly equal in length, very dissimilar; standard ovate or broadly orbicular, bare within, finally reflexed; claw short, somewhat articulated at base; wings unevenly oblong, falcate free; keel curved or cymbiform, obtuse. Stamens 10, 2-adelphous (9-1); sheath a little dilated at base; anthers uniform or 5 alternate a little shorter, versatile. Germen subsessile or stipitate; ovules  $\infty$ ; style curved subulate glabrous; apex minute or capitellate, stigmatiferous. Legume oblong or broadly linear, plano-compressed, continuous or slightly stuffed within; placentary suture furnished with a very narrow or somewhat broader (*Peralteæ*<sup>5</sup>) longitudinal wing; valves 2, coriaceous, finally rather twisted. Seeds ovate compressed; hilum dilated round insertion of funicle into a fleshy aril; embryo fleshy; radicle short, nearly or quite straight; cotyledons almost ensheathing radicle.—Shrubs, silky-villous or glabrous; leaves imparipinnate exstipellate;

<sup>1</sup> *Mém. Légum.*, 230; *Prodr.*, ii. 216.—ENDL., *Gen.*, n. 6647.—B. H., *Gen.*, 493, n. 90.—*Cordæa* SERENG., *Syst.*, n. 2847 (ex ENDL.).

<sup>2</sup> Small, "purplish."

<sup>3</sup> Species 2. CAV., *Icon.*, t. 59 (*Lupinus*).—LHÉRIT., *Stirp.*, t. 78 (*Dolichos*).—WIGHT & ARN., *Prodr.*, i. 196.—GUILL. & PERB., *Fl. Seneg. Tent.*, i. 171, t. 45.—BAKER, in

*Oliv. Fl. Trop. Afr.*, ii. 65.—WALP., *Rep.*, i. 759.

<sup>4</sup> *Nov. Gen. et Spec.*, vi. 465, t. 587, 588.—DC., *Prodr.*, ii. 475.—ENDL., *Gen.*, n. 6541.—B. H., *Gen.*, 495, n. 93.

<sup>5</sup> H. B. K., *loc. cit.*, 469, t. 589.—DC., *Prodr.*, ii. 474.—ENDL., *Gen.*, n. 6542.—*Megastegia* DON (G.), *Gen. Syst.*, ii. 468.

stipules either setaceous or broad herbaceous leaf-like, suborbicular or subreniform; flowers<sup>1</sup> sometimes axillary in twos or threes, sometimes in a terminal raceme, rarely appearing before leaves and arranged in an elongated raceme springing from wood and bearing thin few-flowered fascicles; bracts and bractlets of variable form, often caducous (*Central America, Mexico*<sup>2</sup>).

87. **Harpalyce**.—MOG. & SESSE.<sup>3</sup>—Calyx gamosepalous, much elongated, usually arched in bud: lobes 5, very unequal, sometimes free almost at base, either all connate into 2 nearly entire lips, or 2 lateral lobes smaller innermost; æstivation imbricated, standard large, shortly unguiculate, bare within; wings falcate-oblong, usually shorter; keel elongated, recurved or a little twisted, obtuse. Stamens 10, 1-adelphous, connate into a sheath cleft above; anthers, 5 linear, 5 alternate much shorter. Germen sessile ∞-ovulate, style glabrous, usually suddenly inflexed or subgeniculate below apex; summit scarcely capitate, stigmatiferous. Legume oblong or broadly linear septate<sup>4</sup> between seeds or 1-seeded short. Seeds oblong or ovate; funicle much dilated at hilum into an aril; radicle straight, very short. Erect shrubs; branches often herbaceous and tomentose; leaves imparipinnate; stipels rudimentary; stipules small caducous; flowers<sup>5</sup> in short terminal, simple or branched, racemes; bracts and bractlets linear deciduous (*Brazil, Mexico, Cuba*<sup>6</sup>).

88. **Lamprolobium** BENTH.<sup>7</sup>—“Calyx deeply cleft; 2 superior lobes connate for a considerable height. Standard orbicular, without appendages; wings obliquely oblong free; keel curved obtuse. Stamens all connate into a cleft sheath; anthers uniform. Germen shortly stipitate, ∞-ovulate; style curved beardless filiform; stigma terminal. Legume stipitate oblong, linear plano-compressed. Septate within between seeds, 2-valved; valves coriaceous. Seeds oblong compressed strophiolate; radicle short straight.—A shrub; leaves imparipinnate exstipellate; stipules minute; flowers<sup>8</sup> small

<sup>1</sup> Carnation, purplish, or violet.

<sup>2</sup> PRESL, *Symb.*, t. 67.—MORIC., *Pl. N. Amér.*, t. 10.—WALP., *Rep.*, i. 678; ii. 858; *Ann.*, i. 231.—H. BN., in *Adansonia*, ix. 240.

<sup>3</sup> EX DC., *Mém. Légum.*, 496; *Prodr.*, ii. 523.—ENDL., *Gen.*, n. 6577.—B. H., *Gen.* 494, n. 92 (nec DON).

<sup>4</sup> Septa finally easily separable from endocarp.

<sup>5</sup> Scarlet or purple.

<sup>6</sup> BENTH., in *Hook. Journ.*, iii. t. 5, 6; in *Mart. Fl. Bras., Papil.*, 50, t. 10.—GRISEB., *Cat. Pl. Cub.* 71.

<sup>7</sup> *Fl. Austral.*, ii. 202.—B. H. *Gen.*, 495, n. 94.

<sup>8</sup> “Yellow.”

solitary on terminal, axillary (always?) peduncle; bracts and bractlets minute, very caducous" (*Australia*).

89. *Astragalus* T.<sup>1</sup>—Receptacle cupuliform, glandular within; mouth horizontal or slightly oblique. Calyx tubular or more or less inflated, gamosepalous to a considerable height; teeth or lobes short, nearly equal. Petals usually rather long unguiculate; standard erect long, ovate obovate or panduriform; wings unevenly oblong; limb often with auriculate appendages above at base; keel equal to or a little shorter than wings and more or less adherent to them by its outer edges, of variable form, obtuse. Stamens 10, 2-adelphous; 9 connate into a sheath cleft above; vexillary stamen free; anthers uniform. Germen sessile or stipitate; ovules  $\infty$ , 2-seriate, more or less descending; style slender, straight or curved, beardless; stigma minute terminal. Legume sessile or stipitate, finally 2-valved, very variable in form; sometimes longitudinally divided by intrusion of dorsal suture into 2 spurious cells; sometimes turgid or membranous inflated, imperfectly or more rarely perfectly (*Phaca*,<sup>2</sup> *Erophaca*<sup>3</sup>) divided within. Seeds campylotropous exarillate funiculate.—Small shrubs, densely branched,<sup>4</sup> unarmed or bristling with spinescent hardened petioles; or oftener undershrubs or herbs; leaves either imparipinnate, or almost abruptly pinnate with persistent petiole, sometimes digitate 3-foliolate,<sup>5</sup> sometimes 1-foliolate; leaflets entire exstipellate; stipules free or adnate to petiole, more rarely connate into one oppositifolious; flowers<sup>6</sup> solitary or more rarely umbellate<sup>7</sup> or oftener racemose or spicate; inflorescences often pedunculate, axillary or springing laterally from stem; bracts usually minute; bractlets small or minute (*Europe, northern and subtropical Asia, Africa, and America*<sup>8</sup>).

<sup>1</sup> *Inst.*, 415, t. 233.—L., *Gen.*, n. 892.—J., *Gen.*, 358.—GÆRTN., *Fruct.*, i. 339, t. 154.—DC., *Astragalog.* (1802); *Prodr.*, ii. 281.—SPACH., *Suit. à Buffon*, i. 275.—ENDL., *Gen.*, n. 6573.—B. H. *Gen.*, 506, ll. 133.—*Tragacantha* T., *Inst.*, 417, t. 234 (incl.: *Aulosema* WALP., *Diplothecca* HOCHST., *Homalobus* NUTT., *Kentrophyta* NUTT., *Phaca* L., *Podolotus* ROYLE).

<sup>2</sup> L., *Gen.*, n. 891.—DC., *Prodr.*, ii. 273.—ENDL., *Gen.*, n. 6571.—A. GRAY, in *Proceed. Amer. Acad.*, vi. 188.

<sup>3</sup> BOISS., *Voy.*, 176. The sutures are not intruded in the narrow legume of *Homalobus* NUTT. (ap. TORR. & GR., *Fl. N. Amer.*, i. 353).

The legume is almost 1-seeded in *Kentrophyta* NUTT. (*op. cit.*, 353).

<sup>4</sup> In appearance like *Galgea*, in section *Galegiformis*, to which we must refer *Diplothecca* HOCHST. (in *Flora* [1846], 595).

<sup>5</sup> Section *Orophaca* TORR. & GR. (*op. cit.*, 342;—HOOK., *Fl. Bor.-Amer.*, t. 55).

<sup>6</sup> White, yellowish, pink, or purplish.

<sup>7</sup> *Podolotus* ROYLE (*Fl. Himal.*, 198.—*Bot. Mag.*, t. 1350).

<sup>8</sup> Species about 500. CAV., *Icon.*, t. 133, 188.—H. B. K., *Nov. Gen. et Spec.*, vi. 492, 495, 584–586 (*Phaca*).—PALLAS, *Astragal.*, t. 1–26, 28–36, 38–41, 54, 55, 58–65, 66B–70, 79, 82–84.—

90. *Oxytropis* DC.<sup>1</sup>—Flowers of *Astragalus*. Germen sessile or stipitate,  $\infty$ -ovulate; style straight or curved, beardless; stigma minute or capitate, terminal. Legume sessile or stipitate, rather turgid, undivided, 2-valved; placenta more or less intruded and projecting within. Seeds funiculate reniform exarillate.—Small or large shrubs, or herbs; unarmed or with hardened spinescent petioles; leaves imparipinnate; stipules free or adnate to petiole; flowers<sup>2</sup> in racemes or spikes; inflorescences axillary or springing from wood of stem; bracts small, bractlets minute or 0<sup>3</sup> (*Europe, cold and mountainous regions of Asia, and America*<sup>4</sup>).

91. *Biserrula* L.<sup>5</sup>—Flowers of *Astragalus*. Germen sessile  $\infty$ -ovulate; style curved, rather thick, tapering at apex; stigma capitate terminal. Legume linear, much flattened dorsally, longitudinally divided within by a very narrow septum connecting dorsal and ventral sutures into 2 lateral  $\infty$ -seeded cells; valves 2, lateral compressed; keels simulating margins of legume, nearly equally toothed or serrated; teeth entire or minutely toothed. Seeds reniform exarillate; radicle long inflexed.—A diffuse herb; leaves imparipinnate; leaflets  $\infty$ , emarginate exstipellate; stipules 2, lateral, adnate to base of petiole; flowers<sup>6</sup> few, in axillary long-pedunculate spikes; bracts minute (*Mediterranean*<sup>7</sup>).

FISCH., *Syn. Astrag. Tragac.*, t. A.—M.—DESF., *Fl. Atlant.*, t. 194 (*Anthyllis*), 202–207.—BROT., *Phyt. Lusit.*, t. 59, 60.—JACQ., *Icon. Rar.*, t. 151, 152–155, 561; *Hort. Vindob.*, t. 174; *Fl. Austr.*, t. 38, 251.—DELESS.,  *Ic. Sel.*, iii. 41, t. 72.—LEDEB., *Icon. Fl. Ross.*, t. 88, 95, 103, 284, 286, 287, 289–291, 293–300, 307, 315, 316, 318, 330.—TRAUTTV., *Im. Fl. Russ.*, t. 17, 34.—HOOK., *Fl. Bor.-Amer.*, t. 54–56 (*Phaca*), 57.—HOOK. & AEN., *Beech. Voy. Bot.*, t. 81.—SIBTH., *Fl. Græc.*, t. 727–736.—VIS., *Fl. Dalmat.*, t. 46.—ROYLE, *Illustr.*, t. 33.—MOR., *Fl. Sard.*, t. 65.—FENZL, *Ill. Pl. Syr.*, t. 5–8; in *Tehikatch. As. Min.*, t. 2, 3.—BGE. & MEY., *En. Pl. Sais. Nor.*, t. 2–7.—BGE., *Rel. Lehman.*, t. 10, 13–15.—KL., in *Wald. Reis., Bot.*, t. 2 (*Phaca*), 3–5.—HARV., *Thes. Cap.*, t. 82.—HARV. & SOND., *Fl. Cap.*, ii. 224.—TORR. & GE., in *Beckw. et Gunn. Exped.*, t. 3.—A. GRAY, in *Proc. Amer. Acad.*, vi. 188.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 137.—*Bot. Reg.*, t. 176, 1324.—*Bot. Mag.*, t. 375, 843, 2335, 2380, 2665, 3193, 3263, 3268.—WALP., *Rep.*, i. 684 (*Phaca*), 695; ii. 860 (*Phaca*), 863; v. 517; *Ann.*, i. 233 (*Phaca*), 235; ii. 368 (*Phaca*), 370; iv. 495 (*Phaca*), 496.

<sup>1</sup> *Astragal.*, 24, 66, t. 2–6, 8; *Prodr.*, ii. 275.—ENDL., *Gen.*, n. 6572.—B. H., *Gen.*, 507, n. 134.—*Spiesia* NECK., *Elem.*, n. 1311.

<sup>2</sup> Whitish, pale yellow, purple, or violet.

<sup>3</sup> This genus, which scarcely differs from *Astragalus* by the septum formed by the intrusion of the placental suture, ought perhaps rather to be reduced to a section thereof.

<sup>4</sup> “Species about 100.”—PALL., *Astragal.* t. 27, 37, 42–53, 56, 57, 66 A., 71–78, 80, 81.—JACQ., *Fl. Austr.*, t. 51, 167.—LEDEB., *Icon. Fl. Ross.*, t. 54, 55, 279, 281, 282, 285, 288, 292, 315, 381, 451, 457.—TRAUTTV., *Im. Fl. Russ.*, t. 12, 13; in *Midd. Reis.*, t. 7.—JACQUEM., *Voy.*, t. 44, 45.—A. GRAY, in *Proceed. Amer. Acad.*, vi. 234.—*Bot. Reg.*, t. 1054.—*Bot. Mag.*, t. 2147, 2483.—WALP., *Rep.*, i. 690, ii. 861; v. 517; *Ann.*, i. 234; ii. 370; iv. 496.

<sup>5</sup> *Gen.*, n. 893.—J., *Gen.*, 358.—GERTN., *Fruct.*, ii. 340, t. 154.—LAME., *Dict.*, vi. 77; *Suppl.*, iv. 655; *Ill.*, t. 622.—DC., *Prodr.*, ii. 307.—ENDL., *Gen.*, n. 6574.—B. H., *Gen.*, 507, n. 135.—*Pelecinus* T., *Inst.*, 417, t. 234.

<sup>6</sup> Bluish, small.

<sup>7</sup> Species 1. *B. Pelecinus* L., *Spec.*, 1073.—GIESECK, *Icon.*, fasc. i. t. 17.—SIBTH., *Fl.*

92. *Gueldenstædtia* FISCH.<sup>1</sup>—Calyx unequally 5-toothed; 2 superior teeth broader. Standard suborbicular or obovate, erect patent; wings obovate oblong; keel short obtuse. Stamens 10, 9-connate; axillary stamen free; anthers uniform. Germen sessile  $\infty$ -ovulate; style short inflexed beardless; stigma broad lateral. Legume linear or ovoid, terete turgid; placentary suture depressed intruded; 2-valved. Seeds reniform, smooth or scrobiculate.—Perennial herbs, almost stemless or decumbent; leaves imparipinnate or 1-foliolate; stipules free or adnate to petiole; flowers<sup>2</sup> solitary or oftener on axillary, shortly racemose, subumbellate scapes (*Russian Asia, Himalayas*<sup>3</sup>).

93. *Glycyrrhiza* T.<sup>4</sup>—Receptacle shortly obconical, glandular within; calyx gamosepalous; lobes 5, nearly equal or 2 superior shorter and connate to a variable height. Petals all free; standard ovate or oblong, usually narrow, contracted at base, erect; wings obliquely oblong, acute or obtuse; keel shorter than wings. Stamens 10, 2-adelphous; 9 connate into an often short sheath cleft above; 1 free or adnate on one side to sheath; 5 alternate anthers smaller; cells opening rather deeply on dehiscence. Germen sessile 1- $\infty$ -ovulate; style filiform or rather thick, curved at apex; apex capitate stigmatiferous. Legume of variable form, sometimes short linear, sometimes ovate or oblong; straight or more or less arched, turgid or compressed, smooth or oftener glandular or muricated, continuous within, indehiscent or rather late becoming 2-valved. Seeds ovate globose, or reniform, exarillate.—Perennial herbs, glabrous or oftener glandular; root often sweet; leaves alternate imparipinnate; leaflets  $\alpha$  or more rarely few (3, 5<sup>5</sup>), entire or with small glandular teeth; stipels 0 or minute setaceous; stipules narrowed at apex, membranous caducous; flowers<sup>6</sup> in axillary sessile or pedunculate spikes or ra-

*Græc.*, t. 737.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 138.—WALP., *Ann.*, ii. 397.

<sup>1</sup> FISCH., ex DC., *Prodr.*, ii. 307.—ENDL., *Gen.*, n. 6570.—B. H. *Gen.*, 506, n. 132.

<sup>2</sup> "Violet (or lemon-coloured?)"

<sup>3</sup> Species about 7. FISCH., in *Mém. Soc. Hist. Nat. Mosc.*, vi. 179, t. 19.—PALLAS, *Astrag.*, t. 66 (*Astragalus*).—DC., *Astrag.*, t. 49 (*Astragalus*).—DELESS., *Icon. Sel.*, iii. 41, t. 73.—WALP., *Rep.*, i. 684.

<sup>4</sup> *Inst.*, 389, t. 210.—L., *Gen.*, n. 882.—

GÆRTN., *Fruct.*, ii. 319, t. 148.—LAMK., *Diet.*, vi. 88; *Suppl.*, iv. 656; *Ill.*, t. 625.—DC., *Prodr.*, ii. 247.—ENDL., *Gen.*, n. 6532.—B. H., *Gen.*, 508, n. 136.—*Liquiritia* MENCH., *Meth.*, 152.—PERS., *Syn.*, ii. 313.—*Clidantha* R. BR., in *App. Sturt. Exp.*, 10.—*Meristotrophis* FISCH. & MEY., *Ind. Sem. Hort. Petrop.*, ix. 95.—*Glycyrrhizopsis* BOISS., *Diagn. Pl. Or.*, sér. 2, v. 82.

<sup>5</sup> In section *Meristotrophis*, wherein the germen is 2-ovulate and the fruit 1-seeded.

<sup>6</sup> White, yellowish, or oftener blue or violet.

cemes; bracts caducous; bractlets 0 (*Southern Europe, temperate and subtropical Asia, northern Africa, western North, and tropical South America, Australia*<sup>1</sup>).

94. *Calophaca* FISCH.<sup>2</sup>—Calyx tubular, usually glandular; lobes nearly equal or 2 superior connate to a greater height, imbricated in æstivation. Petals unequally unguiculate; standard ovate or suborbicular, erect patent; lateral margins folded back, often bearing appendages within a little above base; wings oval-oblong subfalcate free, rather long-unguiculate; keel curved, about equal to wings, obtuse or emarginate at apex. Stamens 10, 9 connate; vexillary stamen free; anthers uniform, often fixed by middle of back. Germen sessile  $\infty$ -ovulate; style slender beardless arched; stigma minute terminal. Legume linear, finally terete or turgid, often acute, villous, stuffed, or bare within, 2-valved. Seeds subreniform exarillate.—Herbs or shrubs, often glandular pubescent; leaves imparipinnate; leaflets entire exstipellate; stipules membranous or herbaceous, more or less adnate to petiole; flowers<sup>3</sup> few, rather large, shortly racemose or subumbellate; bract 1-flowered; bractlets, 2, lateral, usually inserted below calyx; inflorescences axillary; peduncles long (*Russian and western Asia*<sup>4</sup>).

95. *Halimodendron* FISCH.<sup>5</sup>—Calyx posteriorly gibbous; teeth 5, short; 2 superior subconnate. Corolla of *Calophaca*; keel curved. Stamens 10, 2-adelphous (9–1); anthers uniform. Germen stipitate  $\infty$ -ovulate; style inflexed beardless; apex minute stigmatiferous. Legume obovate or oblong, thick coriaceous, turgid, dehiscing rather late; placentary suture slightly impressed. Seeds subreniform, shining exarillate.—A shrub; leaves paripinnate; some of leaflets at apex of petiole often spinescent; stipules subulate; flowers<sup>6</sup>

<sup>1</sup> "Species about 12." PALL., *Voy.*, t. 80, 81.—JACQ., *Hort. Vindob.*, t. 95.—JACQ. F., *Eclog.*, t. 56.—WALDST. & KIT., *Pl. Rar. Hungar.*, t. 21.—DESF., *Fl. Atlant.*, t. 199.—SIBTH., *Fl. Græc.*, t. 708, 709.—BENTH., *Fl. Austral.*, ii. 225.—*Bot. Mag.*, t. 2150, 2154.—WALP., *Rep.*, i. 672; ii. 857; *Ann.*, i. 231.

<sup>2</sup> Ex DC., *Prodr.*, ii. 270.—ENDL., *Gen.*, n. 6560.—B. H., *Gen.*, 505, n. 131.—*Chesneya* LINDL., in *Chesn. It. ad Euphr.*, ex ENDL., *Gen.*, n. 6558.

<sup>3</sup> Yellow or violet, rather large.

<sup>4</sup> Species 6 or 7. PALL., *Fl. Ross.*, t. 47 (*Cytisus*).—I. UHAM., *Arbr.*, ed. 2, t. 48 (*Cytisus*).—JAUB. et SPACH., *Ill. Plant. Or.*, i. 93, t. 47, 48 (*Chesneya*).—BOISS., *Diagn. Plant. Or.*, vi. 34.—WALP., *Rep.*, ii. 859; *Ann.*, i. 232 (*Chesneya*).

<sup>5</sup> Ex DC., *Mém. Légum.*, 283; *Prodr.*, ii. 269.—ENDL., *Gen.*, n. 6559.—B. H., *Gen.*, 505, n. 129.—*Halodendron* DC., in *Mém. Soc. Gen.* (Mart. 1824).

<sup>6</sup> Rather large, violet.



subumbellate, in twos or threes; peduncles axillary or fascicled at old nodes; bracts and bractlets small (*Russian Asia*<sup>1</sup>).

96. *Caragana* LAMK.<sup>2</sup>—Receptacle somewhat concave, glandular within, narrowed and rather gibbous posteriorly. Calyx gamosepalous to a considerable height, tubular; 2 posterior teeth smaller or deeply separated. Standard ovate or suborbicular, erect patent, narrowed into a long claw;<sup>3</sup> lateral margins folded back; wings oblique unguiculate free; keel nearly straight, obtuse. Stamens 10, 2-adelphous, 9 connate into a long tube cleft above; vexillary stamen free; anthers uniform. Germen subsessile  $\infty$ -ovulate; style straight or curved, beardless; stigma terminal minute obtuse. Legume sessile linear, finally terete or turgid, usually acute, bare or villous within. Seeds  $\infty$ , transverse exarillate.—Trees or shrubs; leaves paripinnate, often fascicled; petiole sometimes hardened spinescent or terminated by a slender bristle; stipules either minute herbaceous, or subulate or spinescent; flowers<sup>4</sup> solitary or subumbellate, few; peduncles long, axillary at base of young shoots or fascicled at old nodes (*Himalayas, Russian Asia*<sup>5</sup>).

97. *Psoralea* L.<sup>6</sup>—Receptacle cupuliform, lined by a glandular disk; centre raised into a short column supporting ovary at apex. Calyx gamosepalous; lobes 5, nearly equal or lowest larger than others; higher lobes often connate to a variable height; æstivation slightly imbricated. Petals nearly equal in length or keel shorter than others; standard orbicular ovate or obovate, contracted at base or 2-auriculate above claw; wings oblong falcate, 1-auriculate above claw; keel curved obtuse, with shortly unguiculate petals slightly cohering at middle. Stamens 10, 2-adelphous (9-1) or

<sup>1</sup> Species 1. *H. argenteum* DC., *loc. cit.*—*Robinia Halodendron* L. F., Suppl., 330.—PALL., *Fl. Ross.*, t. 36; *Voy.* (ed. gall.), App., n. 360, t. 83, fig. 1.—*Bot. Mag.*, t. 1016.—*Caragana argentea* LAMK., *Ill.*, t. 607, fig. 3.

<sup>2</sup> *Dict.*, i. 615; *Ill.*, t. 607, fig. 1, 2.—DC., *Prodr.*, ii. 269.—ENDL., *Gen.*, n. 6557.—B. H., *Gen.*, 505, n. 130.

<sup>3</sup> Margins much involute in bud.

<sup>4</sup> Yellow or more rarely reddish-white.

<sup>5</sup> Species about 15. PALL., *Fl. Ross.*, t. 42-45; *Astragal.*, t. 85, 86.—LEDEB., *Icon. Fl. Ross.*, t. 464.—ROYLE, *Ill. Himal.*, t. 34.—JACQUEM., *Voy.*, t. 43.—SWEET, *Brit. Fl.*

*Gard.*, t. 227.—*Bot. Reg.*, t. 1021.—*Bot. Mag.*, t. 1886.—WALP., *Rep.*, i. 681; ii. 858; *Ann.*, iv. 494.

<sup>6</sup> *Gen.*, n. 894.—J., *Gen.*, 355.—GÆRTN., *Fruct.*, ii. 308, t. 145.—LAMK., *Dict.*, v. 680; *Ill.*, t. 614.—DC., *Prodr.*, ii. 216.—ENDL., *Gen.*, n. 6526.—B. H., *Gen.*, 491, n. 83.—*Dorychnium* MÖENCH, *Meth.*, 253 (nec T.)—*Rutaria* MÖENCH, *loc. cit.* (ex ENDL.)—*Poikadenia* ELL., *Carol.*, ii. 198.—*Rhynchodium* PRESL, *Bot. Bem.*, 54.—*Meladenia* TURCZ., in *Bull. Mosc.* (1848), i. 576.—*Bipontinia* ALEP., in *Jahresb. d. Pollichia* (1866).

vexillary stamen more or less connate with remainder; tube usually closed at commencement of anthesis, often abruptly constricted a little above base; anthers small, uniform or 5 alternate affixed higher than remainder. Germen articulated at base; ovule 1, campylotropous descending; style filiform or dilated at base, curved above; apex capitate stigmatiferous. Fruit ovate dry indehiscent, surrounded by persistent calyx. Seed exarillate; embryo fleshy; radicle superior inflexed accumbent.—Shrubs, undershrubs, or herbs, sprinkled with black or pellucid glands; leaves pinnate or digitate 3- $\infty$ -foliolate, more rarely 1-foliolate; stipules broad, embracing stem at base; flowers<sup>2</sup> capitate spicate or subracemose; inflorescences pedunculate axillary or (the floral leaves being reduced to bracts) crowded in compound terminal spikes; bracts membranous, 1-3-flowered; bractlets 0 (*Temperate regions of Europe, Asia, North and South America, and northern Africa; southern Africa, Australia*<sup>3</sup>).

98. *Dalea* L.<sup>4</sup>—Teeth or lobes of calyx 5, usually nearly equal, and persistent accrescent round fruit, often plumose. Petals often adnate to base of staminal tube; standard often altogether free, subcordate; claw tapering; wings and keel about equal to or longer than standard. Stamens 10, or 9 (vexillary stamen absent), 1-adelphous, connate close to base into a dilated cup; sheath a little higher longitudinally cleft above; anthers uniform, often surmounted by a gland. Germen sessile or shortly stipitate; ovules 2, or more rarely 3, 4, descending; style subulate, often hollow tubular; apex evenly truncate or scarcely dilated, stigmatiferous. Legume included by calyx and receptacle, membranous, usually 1-seeded, indehiscent. Seed oblong or reniform, exarillate.—Herbs or undershrubs, often sprinkled with glandular dots; leaves imparipinnate, sometimes minutely stipellate; leaflets  $\infty$  or more rarely 3, very rarely 1; stipules small, usually subulate; flowers<sup>5</sup> in terminal or oppositi-

<sup>1</sup> "Often adhering to pericarp."

<sup>2</sup> White, blue, or purple.

<sup>3</sup> Species about 100. JACQ.,  *Ic. Rar.*, t. 562; *Hort. Vindob.*, t. 184; *Hort. Schænbr.*, t. 223-230.—K., *Mimos.*, t. 54.—VENT., *Jard. Malin.*, t. 94.—SIBTH., *Fl. Græc.*, t. 738.—HOOK., *Fl. Bor.-Amer.*, t. 51-53.—HOOK. & ARN., *Beech. Voy., Bot.*, t. 80.—HARV. & SONDR., *Fl. Cap.*, ii. 143.—HARV., *Thes. Cap.*, t. 80.—BENTH., *Fl. Austral.*, ii. 189.—H. BN., *Adansonica*, ix. 233, 291.—BAKER, in *Oliv. Fl. Trop.*

*Afr.*, ii. 64.—*Bot. Reg.*, t. 223, 453, 454, 968, 1769, 1971.—*Bot. Mag.*, t. 446, 665, 990, 1727, 2063, 2090, 2158.—WALP., *Rep.*, i. 655; ii. 856; v. 513; *Ann.*, i. 230; ii. 361; iv. 486.

<sup>4</sup> *Hort. Cliffort.*, 363, t. 22 (nec GÆRTN., nec P. BR.).—DC., *Prodr.*, ii. 244.—ENDL., *Gen.*, n. 6523.—B. H., *Gen.*, 493, n. 88.—PAROSSELLA CAV., *Elench. Hort. Matrit.*—*Cylipogon* RAFIN. (part.), ex ENDL.—*Trichopodium* PRESL, *Bot. Bem.*, 52 (nec LINDL.).

<sup>5</sup> Whitish, blue, purplish, or more rarely yellow.

folious spikes or racemes; pedicels short; bracts membranous, rather broad, concave above, appressed to legume, sprinkled with glandular dots, subscarios or setaceous; bractlets 0 (*North, Central, and Andine America, Chili*<sup>1</sup>).

99. *Marina*? LIEBM.<sup>2</sup>—"Lobes of calyx nearly equal, dentate ciliate. Standard long-unguiculate, obovate rotundate; wings falcate obovate; keel cucullate, shorter than standard or wings. Stamens 10, all connate into a sheath cleft above; anthers uniform. Germen sessile 1-ovulate; style filiform glabrous; stigma simple. Legume included by calyx, membranous indehiscent. Seed subreniform.—A herb, tender annual diffuse, sprinkled with violet dots; leaves imparipinnate; leaflets  $\infty$ , very small, quite entire, minutely stipellate; stipules broad scarios dentate; racemes<sup>3</sup> extra-axillary or leaf-opposed; peduncle filiform; bracts minute scarios"<sup>4</sup> (*Mexico*<sup>5</sup>).

100. *Petalostemon* MICHX.<sup>6</sup>—Calyx gamosepalous and rather inflated at base; teeth or lobes nearly equal, more rarely posterior one larger than others. Petals very dissimilar; standard broadly cordate or reniform, concave or cupulate; claw thin slender; wings somewhat similar to and often shorter than petals of keel, very oblique, oblong; claw thin, nearly free or adnate to base of androceum. Stamens 5, oppositipetalous; filaments scarcely perigynous, connate at base into a sheath cleft above; anthers uniform, often surmounted by a dorsal gland. Germen sessile or scarcely stipitate; style subulate, much inflexed in æstivation; stigma terminal, usually minute and not thickened. Ovules 2, amphitropous, collaterally descending; micropyle extrorse superior. Fruit small, included by calyx, membranous, usually indehiscent, 1-seeded. Seed reniform

<sup>1</sup> Species about 80.—CAV., *Icon.*, t. 86, 87, 201, 240, 271, 325, 394.—JACQ.,  *Ic. Rar.*, t. 563.—VENT., *Jard. Cels.*, t. 40.—W., *Hort. Berol.*, t. 89.—MICHX., *Fl. Bor.-Amer.*, ii. 56, t. 38.—K., *Mimos.*, t. 47-49.—H. B. K., *Nov. Gen. et Spec.*, vi. 480.—HOOK., *Exot. Fl.*, t. 43.—TOBR. & GR., *Fl. N. Amer.*, ii. 307.—BENTH., *Sulph.*, t. 10.—CL., in *C. Gay Fl. Chil.*, ii. 8.—MORIC., *Pl. Nouv. Amér.*, t. 3-8, 45.—A. GRAY, in *Proc. Amer. Acad.*, vii. 335, 397.—WALP., *Rep.*, i. 652; ii. 855; v. 513: *Ann.*, i. 228; ii. 359; iv. 482.

<sup>2</sup> In *Vidensk. Meddel.* (1853), 103.—B. H., *Gen.*, 492, n. 85.

<sup>3</sup> "Flowers few, small, violet."

<sup>4</sup> Species 1. *M. gracilis* LIEBM., *loc. cit.*—WALP., *Ann.*, iv. 478.

<sup>5</sup> *Fl. Bor.-Amer.*, ii. 48, t. 37.—DC., *Prodr.*, ii. 243.—ENDL., *Gen.*, n. 6522.—B. H., *Gen.*, 493, n. 89.—*Kuhnistera* LAMK., *Dict.*, iii. 370.—*Cylipogon* RAFIN., in *Journ. Phys.*, lxxxix. 97 (part. excl. *Dalea* spec. plur., v. supra, p. 280, not. 4).—*Gatesia* BERTOL., *Misc. Bot.*, vii. 30, t. 1.

exarillate.—Annual or often perennial herbs, sprinkled with glandular dots; leaves imparipinnate exstipellate; stipules setaceous; flowers in heads or oftener in spikes; inflorescences terminal or leaf-opposed; peduncles usually long; bracts narrow setaceous or broad membranous, imbricated; bractlets 0 (*Hot regions of North America*<sup>1</sup>).

101. **Eysenhardtia** H. B. K.<sup>2</sup>—Flowers almost those of *Dalea*; calyx nearly equally 5-toothed. Petals nearly equal in length, long-unguiculate; standard subobovate; wings and petals of keel narrower, nearly similar to each other. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile (of *Dalea*); style hooked at apex with introrse oblique stigmatiferous summit, or minutely capitate and geniculate below apex, the joint furnished with an anterior gland at base. Legume small oblong-falcate, not included, rather compressed, indehiscent (?). Seeds 1, 2, oblong-reniform.—Shrubs, sometimes spinous, sprinkled with glandular dots; leaves imparipinnate; leaflets  $\infty$ , minutely stipellate; stipules small subulate; flowers<sup>3</sup> racemose; racemes terminal, simple or branched bearing leaves at base; pedicels very short; bracts and bractlets narrow caducous (*South-western North America*<sup>4</sup>).

102. **Amorpha** L.<sup>5</sup>—Calyx gamosepalous to a considerable height; teeth or lobes very nearly equal or lower ones longer; æstivation imbricated, often finally subvalvate. Petal 1, vexillary, obovate erect unguiculate; limb protecting reproductive organs. Stamens 10, connate at base into a sheath cleft above, higher free; alternipetalous stamens longer; anthers uniform. Germen sessile; ovules 2, descending; style curved, glabrous or villous; stigma small terminal. Legume short oblong, lunulate or falcate, indehiscent. Seeds 1, 2.—Shrubs or undershrubs, glabrous or pubescent and sprinkled with minute glandular dots; leaves alternate imparipinnate; leaflets numerous; stipels usually setaceous, very caducous; stipules

<sup>1</sup> Species about 15. TORR. & GR., *Fl. N. Amer.*, i. 309.—*Bot. Mag.*, t. 1707.—MORIC., *Pl. Nouv. Amér.*, t. 44 (*Dalea*).—WALP., *Rep.*, i. 651; *Ann.*, ii. 359; iv. 481.

<sup>2</sup> *Nov. Gen. et Spec.*, vi. 489, t. 592.—DC., *Prodr.*, ii. 257.—ENDL., *Gen.*, n. 6525.—B. H., *Gen.*, 492, n. 86.

<sup>3</sup> White.

<sup>4</sup> Species 3. TORR. & GR., *Fl. N. Amer.*, i.

699.—A. GRAY, in *Bost. Journ. of Nat. Hist.*, vi. 173.—A. SCHEEL, in *Linnaea*, xxi. 462.—H. BN., in *Adansonia*, ix. 239.—WALP., *Ann.*, ii. 360.

<sup>5</sup> *Gen.*, n. 861.—LAME., *Dict.*, i. 137; *Suppl.*, i. 330; *Ill.*, t. 621.—GERTN., *Fruct.*, ii. 304, t. 144.—DC., *Prodr.*, ii. 256.—ENDL., *Gen.*, n. 6524.—B. H., *Gen.*, 492, n. 87.—*Bonafidia* NECK., *Elem.*, n. 1364.

subulate; very caducous; flowers<sup>1</sup> in dense spicate racemes; racemes terminal, simple or branched; pedicels articulated at apex; bracts and bractlets narrow, very caducous (*North America*<sup>2</sup>).

103. *Paryella* A. GRAY.<sup>3</sup>—"Calyx obconical 5-toothed; teeth short equal. Petals 0. Stamens 10; filaments inserted in bottom of calyx, free; anthers uniform. Germen 2-ovulate; style rather thick, slightly exerted from calyx, hooked at apex; stigma gland-like lateral (of *Eysenhardtia*). Legume indehiscent, obliquely obovate coarsely glandular, tapering at base stipitate, surrounded by persistent calyx, filled by solitary oval seed; cotyledons oblong foliaceous; radicle inflexed.—A small shrub, much branched, almost glabrous; branches broom-like; branches and leaves sparingly sprinkled with glandular dots; leaflets plurijugate with an odd one, filiform channelled petiolulate; stipules and stipels 0 or reduced to small glands; flowers small, in terminal spikes" (*New Mexico*<sup>4</sup>).

104. *Apoplanesia* PRESL.<sup>5</sup>—"Calyx membranous; lobes obtuse, nearly equal, growing much after anthesis; venation reticulated 3-ribbed. Petals nearly equal in length, unguiculate; standard obovate-oblong reflexed; wings oblique linear undulate; keel-petals free spatulate obtuse undulate. Stamens 10, all connate at base into a short sheath cleft above; anthers uniform. Ovary sessile 1-ovulate; style filiform glabrous; stigma oblique capitate. Legume semi-orbicular compressed half-included coriaceous glandular wrinkled cymbiform apiculate.—An erect shrub, sprinkled with glandular dots; leaves imparipinnate; leaflets  $\infty$ , quite entire, petiolulate exstipellate; stipules 0; flowers<sup>6</sup> diffuse, in axillary and terminal  $\infty$ -flowered panicles; bracts minute" (*Mexico*<sup>7</sup>).

105. *Asagræa* H. BN.<sup>8</sup>—Receptacle shortly turbinate, 10-ribbed, lined by a thin disk. Calyx tubular-campanulate, shortly 5-lobed;

<sup>1</sup> Small, whitish, or violet.

<sup>2</sup> Species 8 or 9. MICHX., *Fl. Bor.-Amer.*, ii. 64.—NUTT., *Gen. Amer.*, ii. 91.—TORE & GR., *Fl. N. Amer.*, i. 305.—A. GRAY, in *Proceed. Amer. Acad.*, vii. *loc. cit.*—SWEET, *Brit. Fl. Gard.*, t. 241.—*Bot. Reg.*, t. 427.—*Bot. Mag.*, t. 2112.—WALP., *Rep.*, i. 654; *Ann.*, ii. 360; iv. 485.

<sup>3</sup> In *Proceed. Amer. Acad.*, vii. 397.

<sup>4</sup> Species 1. *P. filifolia* A. GRAY, *loc. cit.*

<sup>5</sup> *Symbol.*, i. 63, t. 41.—ENDL., *Gen.*, n. 6731.—B. H., *Gen.*, 492, n. 84.—*Microlabium* LIEBM., in *Vidensk. Medd.* (1853), 104.

<sup>6</sup> "Small, white."

<sup>7</sup> WALP., *Rep.*, v. 547; *Ann.*, iv. 479.

<sup>8</sup> In *Adansonia* ix. 232 (nec LINDL.).

tube furnished outside with elliptical rather prominent coloured glands (usually  $\infty$ ); lobes nearly equal, obtuse imbricated. Corolla perigynously inserted at top of receptacle; standard broadly cordate, shorter than keel, emarginate or cut at apex, callous within at base above short claw; wings with longer claws; limb unevenly ovate; keel-petals resembling and longer than wings. Stamens 10, inserted with corolla, 1-adelphous; filaments connate into a sheath cleft above; anthers ovate-elliptical, furnished with an oblong gland at back below apex. Germen shortly stipitate; stalk slender excentric; unevenly ovate, compressed, sparingly glandular at base; ovules 6, 2-seriate, obliquely descending; style slender, curved at apex, tubular; summit truncate stigmatiferous. Legume exserted, unevenly ovate, apiculate turgid 1-seeded (?).—A rigid branched hoary shrub; twigs ending in sharp spines; leaves simple scattered sessile, rather thick; stipules minute narrow; flowers' subspicate along ends of spinescent twigs; pedicels very short; bracts flowered caducous; bractlets 2, inserted at middle of pedicel (*California*<sup>2</sup>).

#### IV. LOTEÆ.

106. **Lotus** L.—Flowers irregular resupinate; receptacle scarcely concave. Calyx gamosepalous; teeth or lobes 5, nearly equal (*Krockeria*, *Microlotus*), or dissimilar and connate into two lips; lowest tooth or lobe sometimes longer than others. Corolla papilionaceous; standard suborbicular, obovate or ovate-acuminate, contracted at base into an often short claw; wings unevenly obovate; keel curved or inflexed, often 2-gibbous, beaked. Stamens 10, 2-adelphous (9–1); alternate filaments dilated at apex; anthers uniform. Germen sessile; ovules  $\infty$ ; style soon inflexed, glabrous, either continuous or furnished on inner side with a tooth or twig (*Eulotus*) or a membrane (*Tetragonolobus*); stigma terminal or lateral. Legume oblong or linear, subterete, straight curved or arched (*Krockeria*, *Microlotus*), rarely turgid (*Krockeria*), bare or longitudinally 4-winged (*Tetragonolobus*) outside, bare or slightly stuffed or more rarely septate within between seeds. Seeds globose, suborbicular, or lenticular, exarillate.—Herbs or undershrubs, glabrous silky or hirsute; leaves 3–5-foliolate; 3 leaflets close together at apex of petiole; 1, 2 near base

<sup>1</sup> Indigo.

<sup>2</sup> Species 1. *A. spinosa* H. BN., *loc. cit.*—

*Dalea spinosa* A. GRAY, *Plant. Thurber.*, 315.—  
TORELL, in *Parke's Rep.*, *Bot.*, t. 3.

of leaf, lateral stipuliform; stipules minute or 0; flowers on axillary peduncles, solitary or oftener spuriously umbellate; bract 1 below flower, usually 3-foliolate; other bracts small or 0; bractlets 0 (*All temperate and mountainous regions*).

107. **Cytisopsis** JAUB. & SPACH.<sup>1</sup>—Calyx long tubular, sub-2-labiate; 2 superior lobes longer, more obtuse, and connate to a greater height. Petals on very long linear claws, more or less adnate to staminal tube; standard ovate; wings and keel-petals nearly similar, slightly incurved, obtuse. Stamens 10, 2-adelphous (9-1); filaments finally free slender, dilated below apex; anthers small uniform. Germen shortly stipitate, subexcentric; ovules  $\infty$ ; style slender, very long, curved and dilated above; summit minutely dilated, stigmatiferous. Legume linear straight subterete, longer than persistent calyx, thinly septate within between seeds, 2-valved; valves coriaceous, rather thick. Seeds subglobose; funicle short exarillate.—A low diffuse shrub, silky pubescent; leaves sessile digitate 5-7-foliolate exstipulate; flowers<sup>2</sup> 1-2 in each axil; pedicel furnished at middle with 2 ovate rigid concave opposite bractlets (*Syria*<sup>3</sup>).

108. **Dorycnium** T.<sup>4</sup>—Flowers of *Lotus*; calyx-lobes longer than tube, nearly equal or lower lobes longer. Petals variable; standard oval-oblong or subspathulate, contracted into a short claw or subsessile; wings oblong; keel shorter than wings, rather obtuse. Stamens 10, 2-adelphous (9-1; alternipetalous or all filaments rather dilated at apex; anthers uniform. Germen subsessile, 2- $\infty$ , ovulate; style curved; apex capitate stigmatiferous. Legume oblong, shortly linear (*Bonjeania*<sup>5</sup>) or terete or turgid, 1- $\infty$ -seeded subseptate or pulpy within between seeds, 2-valved. Seeds exarillate, globose or compressed; embryo curved (green); radicle inflexed accumbent; albumen 0 or thin membranous.—Herbs or undershrubs, glabrous or villous; leaves alternate digitate, usually 5-foliolate; 2 inferior leaflets more or less remote from remainder;

<sup>1</sup> *Ill. Plant. Orient.*, i. 154, t. 84.—B. H., *Gen.*, 489, n. 79.

<sup>2</sup> Yellow.

<sup>3</sup> WALP., *Rep.*, v. 511.

<sup>4</sup> *Inst.*, 391, t. 211.—VILL., *Dauph.*, iii.

416.—SER., in DC., *Prodr.*, ii. 208.—ENDL., *Gen.*, n. 6512.—B. H., *Gen.*, 490, n. 80.

<sup>5</sup> REICHB., *Fl. Germ. Excurs.*, 507; *Pl. Crit.*, t. 1000 (part.)—KOCH, *Synops.*, 177.—ENDL., *Gen.*, n. 6513. (Other characters of *Dorycnium*. Germen pluriovulate.)

stipules 2, lateral minute, subulate or dot-like; flowers<sup>1</sup> spuriously capitate or umbellate (inflorescences axillary pedunculate), or solitary or few terminal; bract 1 below inflorescence, leaf-like 1-3-foliolate; bractlets 0 (*Europe, western Asia, northern Africa*<sup>2</sup>).

109. *Hosackia* DOUGL.<sup>3</sup>—Receptacle obconical thin. Calyx gamosepalous to a considerable height; teeth 5, nearly equal. Petals long-unguiculate; claws free from staminal tube; standard obovate, suborbicular, or ovate; claw thin straight, remote from others; wings oblong-obovate, auriculate above at base; keel curved, a little shorter than wings, rather obtuse at apex. Stamens 10, 2-adelphous (9-1); all or alternate filaments slightly dilated below uniform anthers. Germen sessile 2-∞-ovulate, tapering at apex into a style; style slender, curved or inflexed, more or less dilated below apex; stigma small capitate terminal. Legume linear compressed (*Euhosackia*), or subterete and straight or arched (*Drepanolobus*), septate within between seeds, 2-valved. Seeds exarillate.—Herbs or undershrubs; leaves 3-foliolate or oftener pinnate 2-∞-foliolate; stipules membranous or gland-like; flowers<sup>4</sup> in axillary spurious umbels or umbellules, more rarely solitary; bract minute, or 1-∞-foliolate at base; bractlets caducous (*North and Central America*<sup>5</sup>).

110. *Anthyllis* L.<sup>6</sup>—Receptacles slightly concave, glandular within. Calyx gamosepalous to a considerable height, tubular or inflated;<sup>7</sup> teeth or lobes nearly equal or 2 superior longer and more or less connate. Petals on long claws often adnate at base to staminal tube; standard ovate or elliptical, abrupt or 2-auriculate at base; wings obtuse; keel of variable form, shorter than wings, curved, gibbous on both sides. Stamens 10; either all connate into

<sup>1</sup> Whitish, pink, yellowish, or variegated.

<sup>2</sup> Species 5 or 6. SIBTH., *Fl. Græc.*, t. 759, 760 (*Lotus*).—WEBB, *Phyt. Canar.*, t. 57-59.—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 473.—*Bot. Mag.*, t. 336.—WALP., *Rep.*, i. 647; *Ann.*, ii. 335; iv. 476.

<sup>3</sup> Ex BENTH., in *Bot. Reg.*, t. 1257.—ENDL., *Gen.*, n. 6517.—B. H., *Gen.*, 491, n. 82.—*Syrmatium* VOG., in *Linnaea*, x. 590.

<sup>4</sup> Yellow or reddish, middle-sized.

<sup>5</sup> Species about 25. H. B. K., *Nov. Gen. et Spec.*, vi. t. 578, 579 (*Tephrosia*).—BENTH., in *Trans. Linn. Soc.*, xvii. 364 (part.).—TORE., & GR., *Fl. N. Amer.*, i. 323.—*Bot. Mag.*, t.

2913.—*Bot. Reg.*, t. 1257, 1977.—A. GRAY, in *Proceed. Ac. Philad.* (1863), 346 (part.).—TORE., in *Whipl. Exp., Bot.*, t. 4.

<sup>6</sup> *Gen.*, n. 864.—J., *Gen.*, 355.—GÆRTN., *Fruct.*, 307, t. 145.—DC., *Prodr.*, ii. 168.—SPACH, *Suit. à Buffon*, i. 214.—ENDL., *Gen.*, n. 6506.—B. H., *Gen.*, 488, n. 75.—*Vulneraria* MËNCH, *Meth.*, 146.—*Physanthyllis* BOISS., *Voy.*, 162.—*Cornicina* BOISS., *loc. cit.*—*Dorycnopsis* BOISS., *op. cit.*, 163.

<sup>7</sup> Persistent calyx little or scarcely inflated in 3 sections: *Aspalathoides* (DC.), *Cornicina* (DC.), and *Dorycnopsis*; much inflated in 2 sections, *Vulneraria* and *Physanthyllis*.



a closed tube, or 9 connate; vexillary stamen often shorter and thinner, partly, and ultimately after anthesis entirely, free; all or 5 filaments dilated at apex; anthers uniform. Germen subsessile or oftener stipitate, 2-∞-ovulate; style glabrous; stigma terminal. Legume ovoid or shortly linear, straight, arched, or falcate, included by or scarcely projecting beyond persistent more or less inflated calyx, turgid, indehiscent or late becoming 2-valved, 1-∞-seeded, continuous or transversely septate within.<sup>1</sup> Seeds exarillate.—Shrubs, undershrubs, or herbs; leaves pinnate or 1-foliolate; stipules minute or 0; flowers<sup>2</sup> unevenly capitate or shortly racemose, more rarely solitary; peduncles axillary or 2, 3 crowded pseudo-terminal at extremities of twigs; bracts and bractlets setaceous small or 0 (*Europe, northern Africa, western Asia*<sup>3</sup>).

111. *Securigera* DC.<sup>4</sup>—Receptacle very short, glandular within. Calyx short; lobes nearly equal; 2 superior often shorter, lateral thicker connate to a greater height. Petals free from androceum; standard suborbicular, usually subsessile; wings obliquely oblong; keel curved, shortly beaked. Stamens 10, 2-adelphous (9-1); filaments more or less dilated above; anthers uniform or oppositipetalous a little shorter. Germen sessile ∞-ovulate; style curved glabrous; apex capitate stigmatiferous. Legume linear falcate plano-compressed acuminate, indehiscent or late becoming 2-valved; endocarp finally separable; margins broadly thickened, furrowed at suture. Seeds flattened square.—Diffuse herbs, glabrous; leaves alternate imparipinnate; leaflets quite entire, exstipellate; stipules membranous small; flowers<sup>5</sup> umbellate at extremities of long axillary peduncles, nutant; bracts small reflexed; bractlets 0 (*Southern Europe, northern Africa, western Asia*<sup>6</sup>).

<sup>1</sup> The character of the legume varies in the 5 sections as follows: 1. *Dorycnopsis*. Legume straight ovoid 1-2-seeded indehiscent.—2. *Physanthyllis*. Straight membranous, 1-seeded or constricted between the 2 seeds.—3. *Vulmeraria*. Straight or slightly falcate, continuous within, 1-3-seeded.—4. *Aspalathoides*. Straight or subfalcate, hard, scarcely dehiscent, 1-seeded or subseptate between the 2 seeds.—5. *Cornicina*. Much curved or arched, more rarely moniliform, hard.

<sup>2</sup> Whitish, yellow, or reddish-purple.

<sup>3</sup> Species about 20. JACQ., *Fl. Austr.*, t. 334.—CAV., *Icon.*, t. 39, 40, 150.—SIBTH., *Fl.*

*Græc.*, t. 682, 683.—VIS., *Fl. Dalmat.*, t. 42.—BOISS., *Voy.*, t. 48-50, 162, 163.—DEFF., *Fl. Atlant.*, t. 195.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 60.—*Bot. Mag.*, t. 1927, 2576, 3284.—WALP., *Rep.*, i. 634; ii. 846; *Ann.*, i. 224; iv. 473.

<sup>4</sup> *Fl. de Fr.*, iv. 609; *Prodr.*, ii. 313.—B. H., *Gen.*, 489, n. 78.—*Securidaca* T., *Inst.*, 399, t. 224.—GÆRTN., *Fruct.*, ii. 337, t. 153.—LAMK., *Ill.*, t. 629 (nec *Dict.*, vii. 51, nec L.).—*Bona-veria* SCOP., *Introd.*, 1420.—NECK., *Elem.*, n. 1320.—ENDL., *Gen.*, n. 6589.

<sup>5</sup> White or yellow.

<sup>6</sup> Species 2. DESVX., *Journ. Bot.*, i. 60, t. 4, fig. 7.—SIBTH., *Fl. Græc.*, t. 712.

112. **Helminthocarpum** A. RICH.<sup>1</sup>—Flowers very small (of *Lotus*); 2 superior teeth of calyx broader. Petals long-unguiculate, variably but slightly adherent to staminal tube. Keel rather obtuse. Stamens of *Lotus*; vexillary stamen free or more or less connate with remainder. Germen sessile 2-ovulate; style inflexed; apex minutely capitate, stigmatiferous. Legume small linear sub-4-gonous, circinate curved, coriaceous, transversely wrinkled by veins, subseptate within between seeds, indehiscent.—A slender prostrate herb, with minute silky down; leaves imparipinnate; stipules minute; flowers<sup>2</sup> subumbellate on peduncles in higher axils; bracts very small; bractlets 0 (*Abyssinia*<sup>3</sup>).

113. **Hymenocarpus** SAVI.<sup>4</sup>—Flowers almost those of *Lotus*; calyx-lobes deep, nearly equal. Standard suborbicular; keel beaked. Stamens of *Lotus*. Germen sessile 2-ovulate; style abruptly inflexed; stigma terminal. Legume broad compressed circinate; exterior margin broad membranous, nearly entire or unequally toothed; indehiscent. Seeds reniform exarillate.—An annual prostrate herb; leaves imparipinnate or lowest leaves 2-foliolate; leaflets entire; stipules of higher leaves 0, of lower adnate to petiole (?); flowers 2-4 at extremity of each axillary peduncle; lowest bracts foliaceous; remainder small, setaceous or obtuse; bractlets 0 (*Mediterranean*<sup>5</sup>).

#### V. TRIFOLIEÆ.

114. **Trifolium** T.—Receptacle very short, lined by a disk. Calyx gamosepalous; teeth or lobes 5, nearly equal or unequal; 2 superior more or less connate; 1 or 3 inferior longer. Corolla usually marcescent; petals often connate at base, sometimes into a short tube; standard subobovate or oblong; wings narrow; keel shorter than wings, obtuse. Stamens 10, either 2-adelphous (9-1), or more rarely 1-adelphous at middle; all or 5 filaments often more or less dilated at apex; anthers uniform. Germen sessile or stipitate; ovules few; style slender, curved above, hooked-inflexed at apex; stigma ter-

<sup>1</sup> *Fl. Abyss. Tent.*, i. 200, t. 36.—B. H., *Gen.*, 489, n. 76.

<sup>2</sup> Yellow.

<sup>3</sup> Species 1, *H. abyssinicum* A. RICH., *loc. cit.*—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 60.—WALP., *Ann.*, ii. 406.

<sup>4</sup> *Fl. Pis.*, ii. 205.—B. H., *Gen.*, 489, n. 77.

<sup>5</sup> Species 1. *H. circinata* SAVI, *loc. cit.*—SIBTH., *Fl. Græc.*, t. 768.—MORIS, *Fl. Sard.*, t. 34.—DUB., *Bot. Gall.*, 123.—GREEN & GODR., *Fl. de Fr.*, i. 382.—*Medicago circinata* L., *Spec.*, 1096.—SER., in DC., *Prodr.*, ii. 171.—*Auricula muris Camerarii* BAUH., *Hist.*, ii. 387.

minal, capitate or oblique, or more rarely dorsal. Legume (usually included by marcescent perianth) oblong subterete or obovate compressed, usually membranous, indehiscent. Seeds 1 or few, exarillate.—Herbs; leaves digitate, 3- or more rarely 5-7-foliolate, more rarely pinnate; leaflets marked by lines at margin, usually denticulate; stipules adnate to petiole; flowers capitate or spicate, more rarely subumbellate or solitary; inflorescences sometimes 1-lateral, either axillary or leaf-opposed or (the terminal bud being undeveloped) spuriously terminal; bracts variable or 0, persistent or deciduous, lower ones sometimes connate into an involucre (*Temperate and sub-tropical regions of Northern Hemisphere, tropical South America, tropical Africa*). See p. 209.

115. **Medicago** L.<sup>1</sup>—Receptacle somewhat concave; calyx gamosepalous, nearly equally 5-toothed or 5-lobed. Petals free; standard oblong or obovate, narrowed and contracted at base; wings obliquely oblong; keel longer or oftener shorter than wings, obtuse. Stamen 10, 2-adelphous (9-1); filaments not dilated, lower ones connate into a broad sheath cleft above; anthers uniform. Germen sessile or shortly stipitate, 1- or oftener  $\infty$ -ovulate; style more or less dilated; apex subulate glabrous; stigma subcapitate oblique. Legume more or less spirally falcate, or oftener spirally arched and reticulated, unarmed or spinous, often prickly at back, scarcely or not dehiscent, 1- $\infty$ -seeded. Seeds exarillate.—Shrubs or oftener herbs; leaves pinnate 3-foliolate; leaflets often denticulate; stipules adnate to petiole; flowers<sup>2</sup> solitary or few, or oftener numerous in cylindrical or short capitate, axillary or subaxillary racemes; bracts small or 0; bractlets 0 (*Northern and temperate regions of Europe, Asia, Africa, and America*<sup>3</sup>).

116. **Melilotus** T.<sup>4</sup>—Calyx 5-toothed; teeth nearly equal to each

<sup>1</sup> *Gen.*, n. 1214.—J., *Gen.*, 356.—GÆRTN., *Fruct.*, ii. 348, t. 155.—SEB., in DC., *Prodr.*, ii. 171.—ENDL., *Gen.*, n. 6507.—B. H., *Gen.*, 487, n. 72.—*Medica* T., *Inst.*, 410, t. 231.—? *Diplopriion* VIS., *Fl. Lib.*, 48, t. 19, fig. 2.

<sup>2</sup> Small; violet or yellowish.

<sup>3</sup> Species about 40. JACQ., *Hort. Vindob.*, i. t. 89; *Icon. Rar.*, t. 156.—CAV., *Icon.*, ii. t. 130.—SIBTH., *Fl. Græc.*, t. 767, 769, 770.—VIS., *Fl. Dalmat.*, t. 43.—MORIS., *Fl. Sard.*, t. 35-53.—DC., *Icon. Pl. Gall. Rar.*, t. 27, 28.—

WEBB, *Phyt. Canar.*, t. 56.—COSS., *Fl. Alger.*, t. 88, 89.—GREN. & GODR., *Fl. de Fr.*, i. 382.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 50.—*Bot. Mag.*, t. 909.—WALP., *Rep.*, i. 635; ii. 487; *Ann.*, i. 224; ii. 343; iv. 473.

<sup>4</sup> *Inst.*, 406, t. 229.—J., *Gen.*, 356.—GÆRTN., *Fruct.*, ii. 333 (part.), t. 153 (part.).—LAMK., *Dict.*, iv. 61; *Suppl.*, iii. 646; *Ill.*, t. 613.—SER., in DC., *Prodr.*, ii. 186.—ENDL., *Gen.*, n. 6510.—B. H., *Gen.*, 487, n. 73.

other and to the tube. Petals free from androceum, deciduous; standard obovate or oblong, subsessile; wings oblong; keel about equal to or shorter than wings, obtuse. Stamens 10, 9 connate, vexillary stamen free or connate at middle with remainder; filaments not dilated; anthers uniform. Germen sessile or stipitate, pauci- or  $\infty$ -ovulate; style filiform, curved above; stigma terminal, capitate or oblique. Legume unevenly globose or ovoid, surrounded by long-persistent calyx, straight thick striated, indehiscent or rather late becoming 2-valved. Seeds solitary or few, exarillate, often sparingly albuminous.—Annual or biennial herbs; leaves pinnate 3-foliolate; leaflets articulated, often denticulate; stipules lateral, adnate to petiole; flowers<sup>1</sup> bracteate, in axillary or subaxillary racemes; bractlets 0 (*Northern temperate regions of Old World*<sup>2</sup>).

117. *Trigonella* L.<sup>3</sup>—Receptacle obconical to a variable height, glandular within. Calyx gamosepalous tubular; teeth or lobes nearly equal. Petals free from androceum; standard sessile or shortly and broadly unguiculate; wings unevenly oblong, shorter than standard; keel shorter than wings or very short, obtuse. Stamens 10, 2-adelphous (9–1), or vexillary stamen connate at middle with remainder; filaments free at apex, more or less dilated below uniform anthers. Germen sessile or shortly stipitate; ovules  $\alpha$ , 2-seriate; style rather thick or filiform; stigma dilated, terminal or subterminal. Legume either thick, long-beaked or else linear, compressed or terete or flat and broad; straight, arched, or falcate, indehiscent or 1–2-valved, continuous within. Seeds exarillate.—Herbs; leaves pinnate 3-foliolate; leaflets often denticulate, articulated at base; stipules adnate to petiole; flowers<sup>4</sup> solitary, capitate, subumbellate, or shortly and densely racemose, sessile or pedunculate; bracts small or inconspicuous; bractlets 0 (*Europe, Asia, northern Africa, Australia*<sup>5</sup>).

<sup>1</sup> White, yellow, or bluish; small.

<sup>2</sup> Species about 10. SIBTH., *Fl. Græc.*, t. 741–743.—MORIS, *Fl. Sard.*, t. 56–59.—COSS., *Fl. Alger.*, t. 90.—GREN. & GODR., *Fl. de Fr.*, i. 399.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 52.—WALP., *Rep.*, i. 638; *Ann.*, i. 225; ii. 348.

<sup>3</sup> *Gen.*, n. 898.—J., *Gen.*, 356.—GÆRTN., *Fruct.*, ii. 332, t. 152.—SER., in DC., *Prodr.*, ii. 181.—ENDL., *Gen.*, n. 6508.—B. H., *Gen.*, 486, n. 71.—*Pocockia* SER., in DC., *Prodr.*, ii. 185.—

ENDL., *Gen.*, n. 6509.—*Botryolotus* JAUB. & SPACH, *Ill. Plant. Orient.*, i. 124, t. 63.—*Falcatula* BROU., *Phyt. Lusit.*, 160, t. 65.—*Aporanthus* BROMF., *Fl. Vect.*, 117.

<sup>4</sup> Often fetid.

<sup>5</sup> White, yellow, or blue.

<sup>6</sup> Species about 50. SIBTH., *Fl. Græc.*, t. 761–766.—MORIS, *Fl. Sard.*, t. 54, 55.—TRAUTTV., *Im. Fl. Russ.*, t. 20.—JACQUEM., *Voy., Bot.*, t. 41, 42.—DC., *Pl. Gall. Rar.*, t.

118. **Parochetus** HAM.<sup>1</sup>—Calyx-lobes 4, 5, imbricated; 2 superior connate to a considerable height or entirely. Petals free from staminal tube; standard obovate, shortly unguiculate; wings falcate-oblong; keel shorter than wings, inflexed. Stamens 10, 2-adelphous (9-1). Germen sessile, surrounded at base by a rather prominent disk arched below,  $\infty$ -ovulate; style glabrous, inflexed above; apex minute stigmatiferous. Legume linear, finally rather turgid, obliquely acute, continuous within, 2-valved. Seeds funiculate exarillate.—A prostrate herb, rooting at nodes; leaves digitate 3-foliolate; stipules a little adnate to petiole or free; flowers<sup>2</sup> axillary pedunculate, solitary or in twos or threes; bracts stipuliform; bractlets 0 (*Tropical Asia and Africa*<sup>3</sup>).

119. **Ononis** L.<sup>4</sup>—Receptacle somewhat concave and oblique, glandular within. Calyx subovoid gamosepalous; lobes 5, equal or a little unequal, originally slightly imbricated in æstivation, finally remote. Petals shortly unguiculate: standard suborbicular or obovate; claw nearly absent; wings obovate-oblong; keel curved, beaked or more rarely obtuse. Stamens 10, all connate into a closed tube, or more rarely vexillary stamen free; filaments finally free, all or 5 alternate dilated above; alternipetalous anthers versatile; oppositipetalous subbasifixed, a little longer; more rarely all uniform. Germen sessile or stipitate, pilose or bearded on both sides or ventrally above; style curved glabrous; stigma terminal, capitate or oblique; ovules 2- $\infty$ , descending. Legume oblong or linear; turgid or terete, 2-valved, continuous within; or more rarely compressed torulose, spuriously septate between seeds. Seeds exarillate.—Herbs or undershrubs, more rarely shrubs; glabrous or villous, sometimes spinous, often viscous glandular; leaves alternate, usually pinnate 3-foliolate; leaflets denticulate; stipules lateral, adnate to petiole; flowers<sup>5</sup> on axillary peduncles, solitary or 2-3 racemose;

29; *Pl. Rar. Hort. Gen.*, t. 16.—REICHB., *Pl. Crit.*, t. 343, 344, 577, 578.—BOISS., *Diagn. Pl. Or.*, ix. 11.—GREN. & GODR., *Fl. de Fr.*, i. 396.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 49.—WALP., *Rep.*, i. 636; ii. 847; *Ann.*, i. 225; ii. 344.

<sup>1</sup> Ex DON, *Prodr. Fl. Nepal.*, 240.—DC., *Prodr.*, ii. 402.—ENDL., *Gen.*, n. 6519.—B. H., *Gen.*, 485, n. 70.—*Cosmiosa* ALEF., in *Bot. Zeit.* (1866), 146.

<sup>2</sup> Blue or purplish. Lower flowers small or apetalous, ripening their fruits on or under the ground.

<sup>3</sup> Species 1. WIGHT & ARN., *Prodr.*, i. 251.—WIGHT, *Icon.*, t. 483.—ROYLE, *Illustr. Pl. Himal.*, t. 35.—BENN., *Pl. Jav. Rar.*, t. 34.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 48.

<sup>4</sup> *Gen.*, n. 863.—J., *Gen.*, 354.—GÆRTN., *Fruct.*, ii. 343, t. 154.—DC., *Prodr.*, ii. 159 (part.).—ENDL., *Gen.*, n. 6493.—B. H., *Gen.*, 485, n. 69.—*Natria* MCENCH, *Meth.*, 158.—*Anonis* MCENCH, *loc. cit.*, 157.

<sup>5</sup> Pink or yellow.

peduncle often aristate above pedicel; racemes small, more rarely (the floral leaves being reduced to bracts) crowded into a spiciform terminal raceme (*Europe, western Asia, northern Africa*<sup>1</sup>).

## VI. HEDYSARÆ.

120. **Hedysarum** T.—Receptacle small concave, glandular within. Calyx gamosepalous, inserted in receptacle, nearly equally 5-toothed or 5-lobed. Petals free; standard obovate or obcordate, scarcely unguiculate; wings obliquely oblong, 1-auriculate, shorter than standard or very short; claws short slender; keel usually longer than wings, obtuse, arched or obliquely truncate dorsally at apex. Stamens 10, 2-adelphous (9-1); filaments free at apex, inflexed with style; anthers uniform. Germen sessile pauci- or  $\infty$ -ovulate; style thin; apex stigmatiferous, not thickened. Legume plano-compressed, divided into  $\infty$  closed indehiscent 1-seeded, suborbicular or square, smooth or muricated, separating segments. Seeds reniform compressed exarillate.—Perennial herbs or more rarely shrubs or undershrubs; leaves imparipinnate; leaflets entire, often sprinkled with pellucid dots; stipules 2, lateral; flowers<sup>2</sup> in axillary pedunculate racemes; bracts variable; bractlets 2, laterally inserted below calyx, setaceous (*Temperate regions of Asia, Europe, Africa, and North America*). See p. 212.

121 ? **Taverniera** DC.<sup>3</sup>—Flowers of *Hedysarum*; vexillary stamen connate at middle with remainder or finally free. Germen stipitate; ovules 1-3; style slender inflexed; apex minutely stigmatiferous. Legume plano-compressed (of *Hedysarum*); segments 1-3, 1-seeded, separating.—Undershrubs, glabrous or oftener hoary; branches rigid; leaves few, pinnate 1-3-foliolate; stipules scarious; flowers<sup>4</sup> few, in axillary pedunculate racemes; bracts minute or caducous; bractlets 2, small, persistent below flower<sup>5</sup> (*The East, India*<sup>6</sup>).

<sup>1</sup> Species about 60.—CAV., *Icon.*, t. 152-154, 159, 192.—JACQ., *Hort. Vindob.*, t. 93; *Fl. Austr.*, t. 240.—VENT., *Jard. Cels.*, t. 32.—BROT., *Phyt. Lusit.*, t. 56-58.—DESF., *Fl. Atlant.*, t. 184-193.—K., *Fl. Berol.*, ii. 219.—SIBTH., *Fl. Græc.*, t. 675-680.—MORIS., *Fl. Sard.*, t. 33, 33 bis.—WEBB., *Phyt. Canar.*, t. 51-55.—BOISS., *Voy.*, t. 43-47.—JAUB. & SPACH, *Ill. Plant. Or.*, i. t. 96, 154, 155.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 48.—*Bot. Reg.*, t. 1447.—*Bot. Mag.*, t. 317, 329, 335,

2450.—WALP., *Rep.*, i. 624; ii. 839; v. 460; *Ann.*, i. 217; iv. 462.

<sup>2</sup> Purple, white, or yellow.

<sup>3</sup> *Mém. Légum.*, 339, t. 52; *Prodr.*, ii. 339.—ENDL., *Gen.*, n. 6617.—B. H., *Gen.*, 511, n. 145.

<sup>4</sup> Pink or white; petals persistent, becoming scarious.

<sup>5</sup> This genus, differs from *Hedysarum* in habit alone, and ought hardly to be retained.

<sup>6</sup> Species 4 or 5. BURM., *Fl. Ind.*, t. 51, fig. 2 (*Hedysarum*).—WIGHT, *Icon.*, t. 1055.—

122. **Stracheya** BENTH.<sup>1</sup>—Flowers nearly of *Hedysarum*; 2 superior lobes of calyx longer and connate to a greater height. Stamens of *Taverniera*. Pistil  $\infty$ -ovulate (of *Hedysarum*). Legume linear straight plano-compressed rigid echinate indehiscent; sutures continuous with echinate teeth; segments more profusely muricated at middle, veined in other parts, scarcely or not separating.<sup>2</sup>—A cæspitose undershrub, subligneous at base; stem very short; leaves imparipinnate; stipules scarious villous; flowers<sup>3</sup> 1–4 on each of axillary peduncles; bracts and bractlets narrow persistent (*Himalayas*<sup>4</sup>).

123. **Eversmannia** BGE.<sup>5</sup>—Flowers of *Taverniera* or *Stracheya*. Legume linear plano-compressed, variably sinuate or gibbous, smooth indehiscent; sutures nerve-like continuous persistent; joints sometimes unevenly convex or concave, finally separating and laying bare the replum. Seeds of *Hedysarum*.—A small shrub, diffuse rigid hoary, armed with 1–2 axillary spinescent twigs; leaves imparipinnate; leaflets small, rather rigid; stipules scarious; flowers<sup>6</sup> in axillary pedunculate racemes; bracts and bractlets small persistent<sup>7</sup> (*Caspian and Dzungaria*<sup>8</sup>).

124. **Alhagi** T.<sup>9</sup>—Flowers nearly of *Hedysarum*; calyx-teeth 5, short, nearly equal. Stamens 10, 2-adelphous (9–1). Legume linear subterete glabrous smooth, more or less contracted and divided within by incomplete subduplicate septa between seeds, indehiscent; segments not separating. Seeds of *Hedysarum*; albumen thin.—A rigid branched shrub bristling with spinescent axillary branches; leaves small simple entire; stipules small; flowers<sup>10</sup> few, in axillary racemes; rachis spinescent branch-like rigid; bracts small (*Levant, India*<sup>11</sup>).

JACQUEM., *Voy., Bot.*, t. 49.—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 61, 62, 474.—WALP., *Rep.*, ii. 892; *Ann.*, ii. 414.

<sup>1</sup> In *Hook. Journ.*, v. 306.—B. H., *Gen.*, 510, n. 142.

<sup>2</sup> The segments easily separate when the ovary or young fruit is macerated (BENTH., *loc. cit.*).

<sup>3</sup> "Purple?"

<sup>4</sup> Species 1. *S. tibetica* BENTH., *loc. cit.*—WALP., *Ann.*, iv. 545.

<sup>5</sup> In *Gabel Reise*, ii. 267, t. 6, ex BGE. & MEY., *Enum. Plant. Sais. Nor.*, 30, t. 9.—B. H., *Gen.*, 510, n. 143.

<sup>6</sup> Purple.

<sup>7</sup> This genus ought scarcely to be distinguished from *Hedysarum*, from which it differs by the less evident articulation of its legume.

<sup>8</sup> Species 1. *E. hedysaroides* BGE., *loc. cit.*—WALP., *Rep.*, ii. 894.

<sup>9</sup> *Coroll.*, 54, t. 480.—DESFX., in *Journ. Bot.*, i. 120, t. 4, fig. 4.—DC., *Prodr.*, ii. 352.—ENDL., *Gen.*, n. 1287.—B. H., *Gen.*, 512, n. 149.—Manna DON., *Prodr.*, 246.

<sup>10</sup> Red.

<sup>11</sup> Species 1. *A. Maurorum* T., *loc. cit.*—DC., *loc. cit.*, n. 1.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 142.—WALP., *Rep.*, i. 749; *Ann.*, ii. 418.—*A. mannifera* DESFX., *loc. cit.*—JAUB. & SPACH.

125? **Corethroedendron** BASIN.<sup>1</sup>—"Calyx-teeth nearly equal, 2 superior connivent. Standard broadly obovate, narrowed into a short claw; wings short; keel curved obtuse, a little shorter than standard. Vexillary stamen free; remainder connate; anthers uniform. Germen stipitate  $\infty$ -ovulate; style filiform curved; stigma small terminal. Legume linear subterete; segments subovoid separating, indehiscent. Seeds reniform estrophiolate.—A broom-like shrub, thinly hoary; lower leaves imparipinnate; leaflets quite entire, exstipellate; petioles of upper leaves spinescent, without leaflets; stipules connate into one oppositifolious, deciduous; flowers (purple?) in long-pedunculate axillary racemes; bracts small caducous; bractlets very small (*Dzungaria*)."

126. **Onobrychis** GÆRTN.<sup>2</sup>—Receptacle somewhat concave, or nearly flat at apex. Calyx gamosepalous; lobes subulate, equal or lowest lobe smaller; 2 superior often separating widely one after the other; rather imbricated in æstivation, finally quite free. Petals often very dissimilar; standard obovate or obcordate, narrowed at base, sessile; wings short or very short; keel obtuse or truncate, about equal to or longer than standard. Stamens 10, 9 lower ones connate into a tube; vexillary stamen free close to base, a little higher usually connate with remainder; anthers uniform, usually fixed by middle of back; connective often ellipsoidal, glandular at back. Germen sessile or supported on a short cylindrical stalk; ovules 1, 2; style filiform, suberect or inflexed; stigma minute terminal. Legume semi-orbicular or unevenly orbicular-circinate, compressed, not jointed, coriaceous, echinate or crested, or more rarely smooth, deeply wrinkled or reticulated, indehiscent, or more rarely 2-seeded. Seeds broadly reniform or oblong, exarillate. Herbs, unarmed undershrubs, or more rarely small spinous shrubs; leaves imparipinnate, rarely 1-foliolate; leaflets entire exstipellate; petioles rarely spinescent; stipules scarious; flowers<sup>3</sup> in long-pedunculate axillary

*Ill. Plant. Orient.*, v. t. 401.—*A. Camelorum* FISCH., *Cat. Hort. Gor.* (1812), 72.—*A. Napaulensium* DC., *l.c. cit.*, n. 3.—*A. Turcorum* BOISS., *Diagn. Pl. Orient.*, ix. 113.—*A. Græcorum* BOISS., *loc. cit.*, 114.—*Hedysarum Alhagi* L., *Spec.*, 1051 (part.).—*H. Pseudo-Alhagi* BOB. & CHAUB.—*Manna hebraica* DON., *loc. cit.*—*M. caspica* DON.—*M. nepaulensis* DON.—*Ononis spinosa* HASSELQ. (nec L.).—*Genista Juasi* HAM.—*Agul* RAUW., *It.*, 94, icon.

<sup>1</sup> *Monog. Hedysar.*, 46, t. 2, ex B. H., *Gen.*, 512, n. 48.

<sup>2</sup> *Inst.*, 390, t. 211.—GÆRTN., *Fruct.*, ii. 318, t. 148.—DC., *Prodr.*, ii. 344 (part.).—ENDL., *Gen.*, n. 6619.—B. H., *Gen.*, 511, n. 146.—*Eriocarpæa* BERTOL., *Misc. Bot.*, ii. 20.—*Santoria* BOISS., *Diagn. Plant. Orient.*, ix. 109.

<sup>3</sup> Whitish, pink, or purplish.



racemes or spikes; bracts herbaceous or scarious; bractlets below calyx, often minute setaceous, more rarely nearly or quite absent (*Europe, temperate Asia, northern Africa*<sup>1</sup>).

127. *Ebenus* L.<sup>2</sup>—Calyx gamosepalous; lobes 5, elongated subulate, nearly equal, plumose. Petals very unequal; standard obovate or obcordate, very shortly unguiculate; wings short; keel about equal to standard, obliquely truncate at apex. Stamens 10, 2-adelphous (9-1) at base; vexillary stamen afterwards connate with remainder; anthers uniform. Germen sessile short, 1- or more rarely 2-6-ovulate; style slender inflexed; apex minute stigmatiferous. Legume compressed, ovate or oblong, 1- or more rarely few-seeded (*Ebenidium*<sup>3</sup>).—Herbs, or unarmed undershrubs, or small spinescent shrubs (sterile petioles rigid sharp); leaves imparipinnate, or subdigitate 3-foliolate; stipules connate into one oppositifolious; flowers<sup>4</sup> crowded, in dense long-pedunculate axillary spikes; bracts linear or lanceolate; bractlets minute or 0 (*Mediterranean, western Asia*<sup>5</sup>).

128. *Æschynomene* L.<sup>6</sup>—Calyx gamosepalous; lobes 5, nearly equal or connate into 2 lips; upper lip 2-fid, 2-toothed, or entire; lower nearly entire or 3-fid; æstivation imbricated. Petals shortly unguiculate; standard orbicular; wings about equal to standard, oblique; keel obovate, slightly curved or oftener much curved or beaked.<sup>7</sup> Stamens 10; either 1-adelphous, sheath cleft above, or evenly 2-adelphous, sheath cleft on both sides; vexillary stamen rarely separate from remainder, anthers uniform. Germen stipitate; ovules 2-∞, style curved beardless; apex scarcely dilated or minutely capitate, stigmatiferous. Legume stipitate; segments 2-∞, flat, or thicker at middle and so convex, smooth or muricated-

<sup>1</sup> Species about 50. JACQ., *Fl. Austr.*, t. 352 (*Hedysarum*).—DESF., *Fl. Atlant.*, t. 201 (*Hedysarum*).—DESVX., *Journ. Bot.*, i. 125, t. 6.—SIBTH., *Fl. Græc.*, t. 722-726.—GREEN. & GODR., *Fl. de Fr.*, i. 505.—FENZL., in *Tchihatch. As. Min., Bot.*, t. 6.—*Bot. Reg.* (1847), t. 37.—WALP., *Rep.*, i. 746; ii. 894; *Ann.*, i. 250; ii. 414 (*Sartoria*), 416; iv. 545.

<sup>2</sup> *Gen.*, n. 895.—DESVX., in *Act. Soc. Hist. Nat. Par.*, i. 21, t. 3.—DC., *Mém. Légum.*, t. 53; *Prodr.*, ii. 350.—ENDL., *Gen.*, n. 6624.—B. H., *Gen.*, 512, n. 147.

<sup>3</sup> JAUB. & SPACH, in *Ann. Sc. Nat.*, sér. 2, xix. 162; *Ill. Plant. Orient.*, iii. 249.

<sup>4</sup> "Reddish."

<sup>5</sup> Species about 8. VAHL, *Symb.*, ii. t. 41 (*Hedysarum*).—SIBTH., *Fl. Græc.*, t. 739, 740.—SWEET, *Brit. Fl. Gard.* sér. 2, t. 260.—JAUB. & SPACH, *op. cit.*, iii. t. 250-255.—*Bot. Mag.*, t. 1092.—WALP., *Rep.*, ii. 897.

<sup>6</sup> *Gen.*, n. 888.—J., *Gen.*, 362.—GÆRTN., *Fruct.*, ii. t. 155.—DC., *Prodr.*, ii. 320.—DESVX., *Journ. Bot.*, i. 124, t. 6.—ENDL., *Gen.*, n. 6605.—B. H., *Gen.*, 515, n. 159.

<sup>7</sup> Shorter in *Rueppelia* RICH. (A.), *Fl. Abyss. Tent.*, i. 203, t. 37, which is a species of *Æschynomene*.

corrugated, indehiscent or dehiscent at inferior suture.—Herbs, undershrubs, or shrubs, not twining; leaves pari- or imparipinnate; leaflets  $\infty$ , exstipellate; stipules setaceous or lanceolate; either produced below insertion and peltately affixed below middle (*Euaeschynomene*<sup>1</sup>) or not produced at base, striated, usually persistent (*Ochopodium*<sup>2</sup>); flowers<sup>3</sup> in axillary or more rarely terminal, simple or branched racemes; bracts usually stipuliform; bractlets inserted below flower, appressed to receptacle (*All hotter regions*<sup>4</sup>).

129. *Herminiera* GUILL. & PERR.<sup>5</sup>—Receptacle cupuliform, lined by a disk. Calyx 2-labiate almost to base; upper lip nearly entire, rather obtuse; lower nearly entire or rather acute and minutely unequally 3-toothed at apex. Standard subsessile, broadly orbicular; wings shortly unguiculate, obliquely obovate; keel about equal to wings, obtuse, petals free. Stamens 10, 1-adelphous; sheath longitudinally cleft below, either not or only finally cleft above; anthers uniform. Germen subsessile,  $\infty$ -ovulate; style slender; apex minute stigmatiferous. Legume broadly linear, plano-compressed, afterwards revolutely twisted into a ring or spiral; segments  $\infty$ , 1-seeded square, finally separating. Seeds reniform exarillate.—A tall shrub, shaggy with bristles; leaves imparipinnate; leaflets  $\infty$  exstipellate; stipules membranous; flowers<sup>6</sup> few, in short axillary racemes; bracts and bractlets membranous, very caducous (*Tropical Africa*<sup>7</sup>).

130. *Scemmeringia* MART.<sup>8</sup>—Flowers of *Æschynomene*; calyx 2-labiate. Petals after anthesis persistent scarious net-veined. Staminal sheath cleft above or on both sides. Legume stipitate, shorter than standard. Other characters of *Æschynomene*.—An annual diffuse herb; leaves subimparipinnate, leaflets  $\infty$ , often denticulate, exstipellate; stipules striated, produced below insertion;

<sup>1</sup> VOG., in *Linnaea*, xii. 81.—*Macromiscus* TURCZ., in *Bull. Mosc.* (1846), ii. 507.

<sup>2</sup> VOG., *loc. cit.*—*Patagonium* MEY. (E.), *Comm. Pl. Afric. Austr.*, 122 (nec SCHRANCK).

<sup>3</sup> Yellow, often purple-striped.

<sup>4</sup> Species about 30. WIGHT, *Icon.*, t. 299, 405.—WIGHT & ARN., *Prodr.*, i. 216.—TORR. & GR., *Fl. N. Amer.*, i. 355.—JACQUEM., *Voy., Bot.*, t. 48.—BENTH., in *Mart. Fl. Bras., Papil.*, 57, t. 12; *Fl. Austral.*, ii. 226.—HARV. & SOND., *Fl. Cap.*, ii. 225.—BAKER, in *Oliv. Fl. Trop.*

*Afr.*, ii. 145.—WALP., *Rep.*, i. 732; ii. 889; v. 521; *Ann.*, ii. 412; iv. 535.

<sup>5</sup> *Fl. Seneg. Tent.*, i. 201, t. 51.—ENDL., *Gen.*, n. 6552.—B., H., *Gen.*, 515, n. 158.—*Ædemone* KOTSCH., in *Estet. Mon.* (1858), t. 1.

<sup>6</sup> Orange-coloured, large.

<sup>7</sup> Species 1. *H. elaphroxylon* GUILL. & PERR., *loc. cit.*—WALP., *Rep.*, v. 516.—*Ædemone mirabilis* KOTSCH., *loc. cit.*

<sup>8</sup> *Dissert. de Scemmeringia* (1828), icon.—ENDL., *Gen.*, n. 6606.—BENTH., in *Mart. Fl. Bras., Papil.*, 70; *Gen.*, 516, n. 160.

flowers<sup>1</sup> axillary pedunculate, solitary or in pairs; bracts small stipuliform; bractlets persistent striated<sup>2</sup> (*Brazil*).

131. *Geissaspis* WIGHT & ARN.<sup>3</sup>—Calyx membranous imbricated, afterwards deeply cleft into 2 lips; upper lip entire or very shortly 2-toothed; lower unequally 3-toothed. Petals unguiculate; standard broadly suborbicular; wings oblique; keel curved obtuse, about equal to wings, a little shorter than standard. Stamens 10, finally 2-adelphous; sheath longitudinally cleft on both sides; anthers uniform. Germen stipitate; ovules 2, descending; style curved; apex minutely capitate, stigmatiferous. Legume membranous, 2- or oftener 1-seeded (lower ovule abortive and segment scarcely thickened); superior suture straight or arched; inferior sinuate; segments reticulated. Seeds orbicular or subreniform, exarillate.—Herbs, slender, diffuse; leaves paripinnate; leaflets few exstipellate, usually small; stipules broad membranous, produced below insertion; flowers<sup>4</sup> in crowded long-pedunculate axillary racemes; bracts large, obliquely orbicular or reniform, membranous or subscarious, veined, much imbricated, distichous (?), usually covering flowers and fruits, entire or ciliate; pedicels oblique, appressed to bracts; bractlets 0 (*East Indies, western tropical Africa*<sup>5</sup>).

132. *Smithia* AIT.<sup>6</sup>—Calyx gamosepalous, deeply cleft into 2 lips; upper lip entire or emarginate; lower nearly entire, 3-toothed or 3-fid. Corolla almost that of *Geissaspis*. Stamens 10, 1-adelphous; filamental sheath finally cleft on both sides; anthers uniform. Germen stipitate or sessile; ovules  $\infty$ ; style slender curved; apex minutely capitate or truncate, stigmatiferous. Legume contained by sacciform persistent or accrescent, scarious unevenly folded and retracted calyx, apiculated by usually weak style; segments 2- $\infty$ , much compressed, oblique or nearly horizontal, connected by much narrowed exocarp; endocarp hardened or scarious round each seed.

<sup>1</sup> "Yellow."

<sup>2</sup> This genus ought perhaps to be considered a section of *Æschynomene* with persistent petals.

<sup>3</sup> *Prodr.*, 217.—ENDL., *Gen.*, ii, 6597.—B. H., *Gen.*, 516, 1002, n. 162.

<sup>4</sup> Yellow or purplish.

<sup>5</sup> Species 4. WEBB, *Spicil. Gorgon.*, in Hook. *Niger*, 123 (*Sæmmeringia*).—BAKER, in Oliv.

*Fl. Trop. Afr.*, ii, 154.—WALP., *Rep.*, i, 726; *Ann.*, ii, 407, 412.

<sup>6</sup> *Hort. Kew.*, ed. 1, iii, 496, t. 13.—LAMK., *Dict.*, vii, 222; *Suppl.*, v, 162; *Ill.*, t. 627.—DESVX., *Journ. Bot.*, i, 121, t. 4.—DC., *Prodr.*, ii, 323.—ENDL., *Gen.*, n. 6608.—B. H., *Gen.*, 516, n. 161.—Kotschy, *Stirp. Nov. Mus. Vindob.*, Dec., 6; *Icon.*, t. 125; *Gen.*, n. 6607.—*Patagnana* GMEL. (ex POIR., *Dict.*, *Suppl.*, *loc. cit.*).

Seeds reniform or suborbicular, much compressed, exarillate.—Herbs, undershrubs, or more rarely shrubs, glabrous or shaggy; leaves pari- or imparipinnate; leaflets small, usually falcate exstipellate: stipules persistent, membranous or scarious; flowers<sup>1</sup> in short, often 1-lateral, racemes; bracts and bractlets scarious or striated, persistent; bractlets appressed to flowers (*Tropical Asia, South-eastern Africa*<sup>2</sup>).

133. *Discolobium* BENTH.<sup>3</sup>—Calyx gamosepalous; lobes 5, nearly equal or 2 superior connate. Petals shortly unguiculate; standard suborbicular; wings obovate, about equal to standard; keel shorter than wings, nearly straight, obtuse. Stamens 10, 1-adelphous, finally evenly 2-adelphous; the sheath becoming longitudinally cleft on both sides; “vexillary and lowest stamens almost free from base;” anthers uniform. Germen shortly stipitate pauciovulate; style curved glabrous; stigma minute oblique terminal. Legume short, at superior suture nearly straight, at inferior expanded into 3 horizontal segments or disks; middle segment largest reniform reticulated fertile 1-seeded indehiscent; lowest and highest sterile, much smaller. Seed lunulate-reniform exarillate.—Undershrubs; leaves imparipinnate; leaflets  $\infty$  or more rarely 1, 3, exstipellate; stipules small; flowers<sup>4</sup> in axillary racemes; peduncle elongated rigid; pedicels solitary; bracts and bractlets small persistent (*Brazil*<sup>5</sup>).

134. *Ormocarpum* PAL. BEAUV.<sup>6</sup>—Calyx gamosepalous; lobes 5, unequal; 2 superior broader, close or connate to a variable extent; lowest often longer than others. Standard suborbicular unguiculate; wings obliquely obovate; keel about equal to wings, broad curved, obtuse or rather acute at apex. Stamens 10, connate into a sheath often finally longitudinally cleft above and below; anthers uniform. Germen sessile; ovules  $\infty$ ; style slender, much inflexed; apex not thickened or minutely capitate, stigmatiferous. Legume

<sup>1</sup> Yellow.

<sup>2</sup> Species about 20. SALISB., *Par. Lond.*, t. 92.—WIGHT, *Icon.*, 986.—ROYLE, *Ill. Pl. Himal.*, t. 35.—BENTH., in *Plant. Jungh.*, i. 211.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 151.—*Bot. Mag.*, t. 4283.—WALP., *Rep.*, i. 735; v. 523; *Ann.*, i. 248; iv. 536.

<sup>3</sup> In *Ann. Wien. Mus.*, ii. 105; *Gen.*, 516, u. 163.—ENDL., *Gen.*, u. 6722.

<sup>4</sup> “Yellow.”

<sup>5</sup> Species 3 or 4. BENTH., in *Mart. Fl. Bras. Papil.*, 72, t. 17.

<sup>6</sup> *Fl. Owar. et Ben.*, i. 95, t. 58.—DESVX., *Journ. Bot.*, i. 122, t. 5.—DC., *Prodr.*, ii. 315.—ENDL., *Gen.*, n. 6593.—B. H., *Gen.*, 515, n. 157.—*Acrotaphros* HOCHST., ex A. RICH., *Fl. Abyss. Tent.*, i. 207, t. 38.

linear compressed, rather thick, longitudinally striated in furrows, somewhat warty or glandular-muricated; segments oblong, unevenly narrowed on both sides, hard or coriaceous. Seeds oblong compressed descending subanotropous; radicle scarcely or very shortly inflexed.—Shrubs often tall, glutinous; leaflets either  $\infty$ , small, or 1, large articulated; stipules striated; flowers' few, in short axillary racemes; bracts and bractlets persistent striated (*Tropical Asia and Africa*,<sup>2</sup> *Mexico*<sup>3</sup>).

135. *Isodesmia* GARDN.<sup>4</sup>—Flowers of *Æschynomene*; keel obtuse, about equal to wings. Stamens connate into a sheath cleft above or on both sides; lowest stamen sometimes free. Pistil (of *Æschynomene*)  $\infty$ -ovulate. Legume sessile linear straight flattened; segments coriaceous square, longitudinally net-veined.—Undershrubs, climbing or twining; leaves imparipinnate; leaflets  $\infty$ , exstipellate; stipules persistent, not produced at base; flowers<sup>5</sup> few, in axillary racemes; bracts stipuliform persistent; bractlets persistent<sup>6</sup> (*Brazil*<sup>7</sup>).

136. *Brya* P. BR.<sup>8</sup>—Calyx gamosepalous; lobes 5, narrowed, nearly equal or lowest shorter than others. Petals unguiculate; standard oblong-obovate or suborbicular; wings falcate oblong; keel curved obtuse. Stamens 10, 1-adelphous; filamental sheath longitudinally cleft above; anthers uniform. Germen sessile or stipitate; ovules 2; style slender curved; apex minutely capitate stigmatiferous. Legume sessile or stipitate; segments 1, 2, broad flat membranous indehiscent; one often small sterile; superior suture nearly straight; inferior arched. Seeds reniform compressed exarillate.—Small trees or shrubs; leaves imparipinnate or 3-foliolate; petiole usually nearly absent; 2 lateral leaflets of 3-foliolate leaf small minute or 0; stipules either spinescent persistent or small narrowed deciduous; flowers<sup>9</sup> in axillary or subterminal, few-

<sup>1</sup> Yellow, white, red, or purple-striped.

<sup>2</sup> Species about 4. WIGHT & ARN., *Prodr.*, i. 217.—WIGHT, *Icon.*, t. 297.—A. RICH., *Voy. Astrol.*, t. 32.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 142.—WALP., *Ann.*, i. 246.

<sup>3</sup> G. DON, *Gen. Syst.*, ii. 279.—? A. GRAY, *Pl. Thurber.*, 313 (*Daubentonia*?).—WALP., *Ann.*, iv. 493.

<sup>4</sup> In *Hook. Journ.*, ii. 339.—B. H., *Gen.*, 514, n. 156.

<sup>5</sup> Yellow, rather large.

<sup>6</sup> A genus closely allied to *Æschynomene*, but

differing by the legume, which is analogous at once to that of *Ormocarpum* and to that of *Chatocalyx* (the latter having almost the same habit).

<sup>7</sup> Species 2. BENTH., in *Mart. Fl. Bras., Papil.*, 71, t. 16.—WALP., *Rep.*, v. 523.

<sup>8</sup> *Jam.*, 299, t. 31, fig. 2.—DC., *Prodr.*, ii. 421.—ENDL., *Gen.*, n. 6592.—B. H., *Gen.*, 514, n. 155.—*Aldina* ADANS., *Fam. des Pl.*, ii. 328 (nec ENDL.).

<sup>9</sup> "Yellow?"

flowered, sometimes 1-lateral, cymes (?); bracts and bractlets small persistent (*West Indies, Nicaragua*<sup>1</sup>).

137. *Pictetia* DC.<sup>2</sup>—Calyx gamosepalous; lobes 5, unequal, 2 superior short obtuse; 3 inferior longer acute. Petals shortly unguiculate; standard suborbicular; wings oblique; keel a little shorter than wings, obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen stipitate; ovules  $\infty$ ; style slender glabrous; apex minutely capitate, stigmatiferous. Legume stipitate, oblong or broadly linear, compressed, scarcely jointed or separating into 2- $\infty$  oblong coriaceous striated segments. Seeds oblong compressed exarillate.—Shrubs, glabrous; leaves imparipinnate; leaflets  $\infty$ , mucronate or sharp at apex, exstipellate; petiole sometimes short; stipules usually spinescent; flowers<sup>3</sup> axillary, solitary or oftener in few-flowered slender racemes; bracts and bractlets caducous<sup>4</sup> (*Tropical America, West Indies*<sup>5</sup>).

138. *Amicia* H. B. K.<sup>6</sup>—Calyx gamosepalous; lobes 5, very unequal; 2 superior very large obtuse, 2 lateral minute, lowest minute or longer than lateral lobes. Petals unguiculate; standard broadly suborbicular or obovate-oblong, emarginate erect patent; wings oblique, usually shortened; keel curved obtuse, much longer than wings, usually about equal to standard. Stamens 10; either 1-adelphous, filaments connate into a sheath cleft above; or 2-adelphous (9-1); anthers uniform.<sup>7</sup> Germen subsessile; ovules  $\infty$ , usually few; style slender arched; apex minutely stigmatiferous. Legume linear arched compressed; segments nearly square. Seeds reniform exarillate.—Shrubs or undershrubs, glabrous or glandular; branches flexuous; leaves paripinnate pauci- (usually 2-) jugate; obovate or obcordate; stipules large foliaceous, often connate at

<sup>1</sup> PLUM., ed. BURM., t. 249, fig. 1 (*Pterocarpus*).—SLOANE, *Jam.*, ii. 3 (*Aspalathus*).—SPRENG., *N. Entd.*, ii. 159 (*Amerimum*).—BENTH., in *Erst. Leg. Centroamer.*, 13.—*Bot. Mag.*, t. 4670.—WALP., *Rep.*, i. 725; *Ann.*, iv. 533.

<sup>2</sup> In *Ann. Sc. Nat.*, sér. 1, ix. 93; *Mém. Légum.*, t. 47; *Prodr.*, ii. 314.—ENDL., *Gen.*, u. 6591.—B. H., *Gen.*, 514, u. 154.

<sup>3</sup> Yellow.

<sup>4</sup> A genus on the one hand closely allied to *Ormocarpum*, while, on the other, it ought to be

compared with *Corynella* and *Sabinea* (whose legumes are not jointed) and carefully studied.

<sup>5</sup> Species about 6. JACQ., *Hort. Schænbr.*, t. 237 (*Æschynomene*).—VAHL, *Symb.*, t. 69 (*Robinia*).—GRISEB., *Cat. Plant. Cub.*, 73.

<sup>6</sup> *Nov. Gen. et Spec.*, vi. 511, t. 600.—DC., *Prodr.*, ii. 315.—ENDL., *Gen.*, n. 6594.—B. H., *Gen.*, 514, u. 153.

<sup>7</sup> In *A. zygomeris* (DC., *loc. cit.*) the 5 posterior stamens are much smaller than the others, and the 2 anterior are very large.

base, deciduous; flowers<sup>1</sup> in few-flowered axillary racemes sometimes bearing leaves at base; bracts and bractlets broad foliaceous. (*Andine America from Mexico to Bolivia*<sup>2</sup>).

139. **Poiretia** VENT.<sup>3</sup>—Calyx subcampanulate; teeth 5, short unequal. Petals shortly unguiculate; standard broadly orbicular; wings falcate-oblong; keel much curved, oblong, beaked or more rarely obtuse. Stamens 10, 1-adelphous; filaments connate into a closed sheath; anthers uniform. Germen sessile; ovules  $\infty$ ; style slender curved; apex minutely capitate, stigmatiferous. Legume linear; segments flat rectangular, membranous or coriaceous, reticulated or sprinkled with warty glands.—Herbs or undershrubs, nearly erect or twining, covered with balsamic glands; leaves pinnate, 4- or more rarely 3-foliolate; stipules sessile or decurrent at base; flowers<sup>4</sup> in axillary or terminal branched racemes; bracts lanceolate or subulate; bractlets small, inserted on pedicel. (*South America, Mexico*<sup>5</sup>).

140. **Chæto calyx** DC.<sup>6</sup>—Calyx gamosepalous to a considerable height, capitate glandular outside; lobes 5, nearly equal or 2 superior approximated, often linear subulate. Standard suborbicular or obovate, emarginate; wings about equal to standard, oblong; keel obtuse, scarcely shorter than standard. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen shortly stipitate,  $\infty$ -ovulate; style filiform curved; apex stigmatiferous. Legume linear, subterete or plano-compressed, scarcely constricted between seeds; segments 1-seeded, linear-oblong or more rarely square (*Planarium*<sup>7</sup>), longitudinally ribbed or striated. Seeds oblong or reniform, exarillate.—Twining herbs; leaves alternate imparipinnate; stipules linear or lanceolate; flowers<sup>8</sup> racemose few, either axillary or terminal on a slender elongated twig<sup>9</sup> (*Tropical and sub-tropical America*<sup>10</sup>).

<sup>1</sup> Rather large, yellow.

<sup>2</sup> *Bot. Mag.*, t. 4008.

<sup>3</sup> *Choix de Plant.*, t. 42 (nec GMEL., nec SMITH, nec CAV.).—DESUX., *Journ. Bot.*, i. 122, t. 5.—DC., *Prodr.*, ii. 315.—ENDL., *Gen.*, n. 6595.—B. H., *Gen.*, 513, n. 152.—*Turpinia* PEES., *Syn.*, ii. 314.

<sup>4</sup> Yellow.

<sup>5</sup> Species 5. H. B. K., *Nov. Gen. et Spec.*, vi. 510.—VOG., in *Linnaea*, xii. 51.—BENTH., in *Mart. Fl. Bras., Papil.*, 78, t. 20.—WALP., *Rep.*, i. 725; v. 520.

<sup>6</sup> *Mém. Légum.*, 262; *Prodr.*, ii. 243.—ENDL., *Gen.*, n. 6537.—B. H., *Gen.*, 513, n. 150.—*Bœninghausenia* SPRENG., *Syst.*, iii. 245 (nec REICHB.).—*Rhadinocarpus* VOG., in *Linnaea*, xii. 108.—ENDL., *Gen.*, n. 6628.

<sup>7</sup> DESUX., in *Ann. Sc. Nat.*, sér. 1, ix. 416.

<sup>8</sup> Yellow.

<sup>9</sup> A genus entirely similar in habit to *Iso-desmia*, but differing by the fruit and androecium.

<sup>10</sup> Species 8 or 9. LINDL., in *Bot. Reg.*, t. 799 (*Glycine*).—BENTH., in *Mart. Fl. Bras., Papil.*, 74, t. 18; *Sulph.*, 81, t. 30 (*Planarium*).—

141. *Nissolia* JACQ.<sup>1</sup>—Flowers nearly of *Chaetocalyx*, smaller; calyx truncate; teeth 3, setaceous, nearly equal. Stamens 10, 2-adelphous (9–1) close to base; vexillary stamen connate at middle with remainder into a tube. Germen subsessile; ovules few; style slender, curved or sinuate; apex minutely capitate or obtuse, stigmatiferous. Legume linear, indehiscent; segments flat or convex, square or oblong, striated; last segment dilated into a much compressed, obliquely obovate, samaroid wing;<sup>2</sup> seeds few reniform exarillate.—Herbs or undershrubs, twining; leaves imparipinnate; leaflets few, exstipellate, setaceous; flowers<sup>3</sup> racemose; racemes short, either axillary or branched crowded at extremities of branches; bracts narrow; bractlets 0 (*Tropical and subtropical America*<sup>4</sup>).

142? *Ctenodon* H. BN.<sup>5</sup>—Receptacle minute concave, lined by a thin disk. Calyx gamosepalous subcampanulate; lobes 5, longer than tube; 2 superior broader than others; lowest longer than lateral ones, with a long point. Petals unguiculate; standard obovate, finally reflexed; wings very oblique, 1-auriculate at base; keel falcate beaked. Stamens 10, 1-adelphous; filaments connate into a tube rather oblique at apex and longitudinally cleft below; anthers uniform. Germen shortly stipitate; ovules  $\infty$ ; style filiform, slightly curved; apex scarcely dilated, stigmatiferous. Legume stipitate; segments  $\infty$ ; superior suture nearly straight or arched; inferior deeply sinuate. Seeds...?—A small undershrub, branched from base; leaves subimparipinnate; leaflets sessile oblong, very uneven at base, acuminate at apex; midrib produced into a rather sharp bristle; rachis thickened into a subglobose rather pubescent gland at insertion of each leaflet; stipules long subulate; flowers in loose long-pedunculate axillary racemes; pedicels slender; bracts

A. GRAY & TORR., in *Emor. Rep.*, t. 18.—WALP., *Ann.*, iv. 489.

<sup>1</sup> *Stirp. Amer.*, 199, t. 179, fig. 44; *Hort. Vindob.*, t. 167.—GÆRTN., *Fruct.*, ii. 309, t. 145.—DC., *Prodr.*, ii. 257 (sect. 1).—ENDL., *Gen.*, n. 6629.—B. H., *Gen.*, 513, n. 151 (nec T., *Inst.*, 656).

<sup>2</sup> In *Chaetocalyx Schottii* and *C. Wislizeni* TORR., figured in *Unit. St. Mex. Bound., Bot.*, t. 18, the last segment is more or less dilated; whence either these species ought to be referred

to *Nissolia*, or the two genera should be united into one, the sections of which are scarcely well-defined. The species of both ought therefore to be carefully examined.

<sup>3</sup> Yellow.

<sup>4</sup> Species 2. H. B. K., *Nov. Gen. et Spec.*, vi. 504.—DELESS., *Icon. Sel.*, iii. t. 68.—HOOK., *Icon. Plant.*, t. 599.—BENTH., in *Mart. Fl. Bras., Papil.*, 76, t. 19.—A. GRAY, in *Journ. Linn. Soc.*, v. 25.

<sup>5</sup> In *Adansonia*, ix. fasc. 7.



subulate; bractlets 2, narrowed, inserted at top of pedicel below flower (*Brazil*<sup>1</sup>).

143. *Adesmia* DC.<sup>2</sup>—Receptacle concave short, lined by a rather prominent disk. Calyx gamosepalous; lobes 5, nearly equal or lowest and 2 superior a little longer. Petals unguiculate, usually shortly: standard orbicular or obovate; wings obliquely oblong or obovate, sometimes short; keel obtuse, acute, or beaked, shorter than standard. Stamens 10, free; 2 superior filaments sometimes adnate to claw of standard, dilated at base; anthers uniform. Germen sessile; ovules 2-∞; style slender; apex truncate or minutely capitate, stigmatiferous. Legume ∞-jointed;<sup>3</sup> superior suture usually straight; inferior deeply sinuate; segment flat or convex, glandular or pilose, or oftener covered with long bristles or glandular hairs, separating from each other altogether or on side of superior margin, indehiscent or 2-valved. Seeds subglobose or orbicular.—Herbs or undershrubs, unarmed; or oftener small shrubs, sometimes armed with spinescent petioles, often glandular dotted balsamic; leaves pari- or imparipinnate; leaflets 3-∞, entire or dentate, exstipellate; stipules of variable form; flowers<sup>4</sup> in terminal racemes; bracts small 1-flowered (*Subtropical South America*<sup>5</sup>).

144? *Bremontiera* DC.<sup>6</sup>—Calyx short subcampanulate; 2 posterior teeth a little shorter and broader than anterior. Petals much exerted, unguiculate; standard obovate; wings obliquely oblong; keel about equal in length to wings, slightly curved, rather obtuse at apex. Stamens 10, 2-adelphous (9-1); anthers uniform; connective subglandular at back, coloured, apiculate. Germen subsessile; ovules ∞; style slender glabrous inflexed; apex capitate stigmatiferous. Legume long cylindrical arched moniliform, septate within and contracted outside between seeds; segments ∞, truncate a

<sup>1</sup> Species 1. *C. Weddellianum* H. BN., *loc. cit.*

<sup>2</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 94; *Mém. Légum.*, t. 48-50; *Prodr.*, ii. 318.—ENDL., *Gen.*, n. 6603.—B. H., *Gen.*, 517, n. 164.

<sup>3</sup> Finally folded, included in *Streptodesmia* A. GRAY (*Bot. Amer. Exped.*, i. 427, t. 47), which is a species of *Adesmia*.

<sup>4</sup> Yellow or red-striped.

<sup>5</sup> Species about 70. JACQ.,  *Ic. Rar.*, t. 568 (*Hedysarum*).—PRESL., *Symbol.*, t. 61-63.—

HOOK., *Bot. Misc.*, t. 104, 105.—HOOK. & ARN., *Beech. Voy., Bot.*, t. 9.—BENTH., in *Mart. Fl. Bras., Papil.*, 53, t. 11.—CL., in *C. Gay Fl. Chil.*, ii. 151, t. 18.—SWEET, *Brit. Fl. Gard.*, ser. 2, t. 222, 230, 322.—PHILIPP., *Fl. Atacam.*, 15.—*Bot. Reg.*, t. 1720.—WALP., *Rep.*, i. 728; ii. 889; *Ann.*, i. 246; ii. 407; iv. 534.

<sup>6</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 93; *Mém. Légum.*, 353; *Prodr.*, ii. 353.—ENDL., *Gen.*, n. 6627.—B. H., *Gen.*, 464.—H. BN., in *Adansonia*, ix. 234.

both ends, finally separating. Seeds ovate; hilum lateral.—A shrub; leaves alternate simple;<sup>1</sup> petiole short, articulated at base; stipules short triangular persistent; flowers in axillary racemes, each flower solitary in axil of a short bract, shortly pedicellate; bractlets 0<sup>2</sup> (*Mascarene Islands*<sup>3</sup>).

145. *Coronilla* L.<sup>4</sup>—Receptacle cupuliform, glandular within. Calyx gamosepalous; teeth 5, nearly equal or 2 superior shorter or connate to a greater height. Petals rather long unguiculate; standard suborbiculate reflexed; claw furnished with a simple or double rather projecting appendage within and slightly above base; wings obliquely obovate or oblong, claws thin; keel curved, beaked. Stamens 10, 2-adelphous, 9 connate into a sheath cleft above; vexillary stamen free; filaments free at apex, all or 5 alternate dilated above; anthers nearly or quite uniform. Germen sessile  $\alpha$ -ovulate; style inflexed subulate glabrous; stigma minute capitate. Legume terete, 4-gonous, or slightly compressed, straight or arched; segments oblong or elongated, almost without veins. Seeds transverse oblong exarillate.—Shrubs or herbs, glabrous or silky; leaves imparipinnate; leaflets  $\infty$ , or more rarely 3, quite entire; stipules of variable form, more or less adnate to petiole; flowers<sup>5</sup> in  $\infty$ - or few-flowered long-pedunculate axillary umbels; bracts small. (*Europe, western Asia, northern regions and western Islands of Africa*<sup>6</sup>).

146. *Ornithopus* L.<sup>7</sup>—Calyx broadly tubular or subcampanulate; lobes 5, long, nearly equal or 2 superior connate to a greater height. Petals almost those of *Coronilla*, shorter; keel nearly straight obtuse, shorter than wings or very short. Stamens 10, 2-adelphous (9–1);

<sup>1</sup> On some sterile twigs the leaves become very elongated linear or subacicular.

<sup>2</sup> This genus is indeed much more nearly allied to *Indigofera* than to the *Hedysarea*, but differs by its leaves, which are really simple (not compound 1-foliate; petiole not articulate at apex), and by its legume, with “finally separating segments.” It differs from *Indigofera* in the same way as *Æschynomene* differs from *Sesbania*.

<sup>3</sup> Species 1. *B. ammoxyton* DC., *loc. cit.*—*Mullera verrucosa* Herb. Par. (ex DC., nec PERS.).

<sup>4</sup> *Gen.*, n. 883 (part.).—J., *Gen.*, 361.—GÆRTN., *Fruct.*, t. 155.—DC., *Prodr.*, ii. 309.—ENDL., *Gen.*, n. 6585.—B. H., *Gen.* 509, n. 140.—EMERUS T., *Inst.*, 650, t. 418.—DESVX.,

*Journ. Bot.*, i. 121, t. 4.—*Ornithopodium* CAV., *Icon. Rar.*, t. 37, t. 41.—*Astrolobium* DC., *Prodr.*, ii. 311 (part.).

<sup>5</sup> Yellow, purplish, or variegated or spotted with white.

<sup>6</sup> Species about 20. JACQ., *Hort. Vindob.*, t. 25; *Fl. Austr.*, t. 95, 271.—REICHB., *Pl. Crit.*, t. 31–33.—SIBTH., *Fl. Græc.*, t. 710, 711, 713, 715.—BOISS., *Voy.*, t. 54.—*Bot. Reg.*, t. 820 (822).—*Bot. Mag.*, t. 13, 185, 258, 445, 907, 2179, 2646.—WALP., *Rep.*, i. 724; ii. 887; v. 519; *Ann.*, ii. 406.

<sup>7</sup> *Gen.*, 884.—DESVX., *Journ. Bot.*, i. 121, t. 5.—DC., *Prodr.*, ii. 311.—ENDL., *Gen.*, n. 6587.—B. H., *Gen.*, 509, n. 139.—*Ornithopodium* T., *Inst.*, 400, t. 224.—MËNCH, *Meth.*, 121.

5 alternate filaments dilated above; anthers uniform. Germen sessile; ovules  $\infty$ ; style inflexed; apex capitate stigmatiferous. Legume linear, compressed or subterete, sometimes slender (*Arthrolobium*<sup>1</sup>), arched or more rarely straight; segments oblong ovate or globose, separated by very narrow joints (*Antopetitia*<sup>2</sup>). Seeds ovate subglobose or transversely oblong.—Herbs, villous or more rarely glabrous; leaves imparipinnate; leaflets  $\infty$ , exstipellate; stipules narrow or membranous; flowers small, in axillary long-pedunculate pseudo-capitula or umbels; floral leaves pinnate, or inflorescence more rarely leafless (*Arthrolobium*); bracts and bractlets minute or 0 (*Europe, western Asia, northern regions and western islands of Africa, South America*<sup>3</sup>).

147. *Hammatolobium* FENZL.<sup>4</sup>—Flowers nearly of *Ornithopus*, larger; keel rather acute. Legume linear; segments plano-compressed or convex.—Perennial herbs, silky villous; stem<sup>5</sup> short woody; leaves usually 5-foliolate; either 2 inferior leaflets close to stem (petiole short) and stipuliform; or all leaflets subdigitate, and (petiole nearly evanescent) almost sessile; stipules minute, flowers<sup>5</sup> few, usually 2, on axillary peduncles; floral bract 2-foliolate (*Western Asia, northern Africa*<sup>6</sup>).

148. *Scorpiurus* L.<sup>7</sup>—Receptacle shortly concave, thick glandular within. Calyx gamosepalous; 2 superior lobes or teeth connate to a greater height than others. Petals rather long-unguiculate; standard suborbicular; wings obliquely oblong; keel curved, acute or acuminate. Stamens 10, 2-adelphous (9–1); anthers uniform. Germen subsessile  $\infty$ -ovulate, longitudinally furrowed; style inflexed, more or less dilated at middle, tapering at apex; stigma capitate terminal. Legume unevenly terete, circinate-revolute, unevenly furrowed and ribbed; ribs originally ventral, often tuber-

<sup>1</sup> DESVX., *Journ. Bot.*, i. 121, t. 4.—ENDL., *Gen.*, n. 5586.—*Astrolobium* DC., *Prodr.*, ii. 311 (part.).

<sup>2</sup> A. RICH., in *Ann. Sc. Nat.*, sér. 2, xiv. 261, t. 15, fig. 2; *Fl. Abyss. Tent.*, t. 39.

<sup>3</sup> Species about 7. BROT., *Phyt. Lusit.*, t. 67, 68.—SIBTH., *Fl. Græc.*, t. 714.—HOCHST., in *Field. et Gardn. Sert. Pl.*, t. 49.—BENTH., in *Mart. Fl. Bras., Papil.*, 51, t. 11.—GREEN. & GODB., *Fl. de Fr.*, i. 498.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 139.—WALP., *Ann.*, ii. 406 (*Antopetitia*); iii. 849; iv. 532.

<sup>4</sup> *Ill. Plant. Syr.*, i. t. 1.—B. H., *Gen.*, 509, n. 138.—*Ludoviccia* COSS., in *Bull. Soc. Bot. de Fr.*, iii. 674. (Legume more compressed than in *H. lotoides* FENZL.)

<sup>5</sup> Yellow, finally dusky.

<sup>6</sup> Species 2. WALP., *Rep.*, i. 724.

<sup>7</sup> *Gen.*, n. 886.—J., *Gen.*, 361.—GERTN., *Fruct.*, ii. 345, t. 155.—DC., *Prodr.*, ii. 308.—ENDL., *Gen.*, n. 6584.—B. H., *Gen.*, 508, n. 137.—*Scorpioides* T., *Inst.*, 402, t. 226.—*Scorpius* LOIS., *Fl. Gall.*, 468.

culate or muricated; either indehiscent jointed, or nearly continuous (joints scarcely marked). Seeds ovate or transversely oblong, exarillate; hilum lateral; embryo fleshy; cotyledons contorted folded.—Herbs, almost stemless or decumbent; leaves alternate simple, tapering for a considerable distance at base into petiole; stipules 2, lateral, adnate to petiole; flowers<sup>1</sup> nutant, solitary or few subumbellate; peduncles subaxillary, each with a bud; bracts minute; bractlets 0 (*Southern Europe, western Asia, northern Africa*<sup>2</sup>).

149. *Hippocrepis* L.<sup>3</sup>—Receptacle shortly obconical, lined by a disk. Calyx gamosepalous, usually membranous; teeth 5, nearly equal or 2 superior connate to a variable height. Petals long-unguiculate; standard suborbicular; claw at base rather thick and terete or subappendiculate within; wings falcate-obovate or oblong; keel curved beaked. Stamens 10, 9 connate into a sheath cleft above; vexillary stamen free; filaments at apex free and more or less dilated; anthers uniform. Germen sessile  $\infty$ -ovulate; style inflexed, rather compressed; stigma more or less globose, subterminal. Legume much plano-compressed or more rarely subterete, often arched or subterminal; dorsal margin deeply excavated at each seed, straight or scarcely depressed between seeds and there transversely separating into 1-seeded horseshoe-shaped segments. Seeds arched exarillate; hilum median ventral; albumen thin; cotyledons arched; radicle closely inflexed, accumbent.—Herbs or undershrubs, usually glabrous; leaves imparipinnate; leaflets  $\infty$ , entire exstipellate, stipules leaf-like or membranous, more rarely scarcely visible; flowers<sup>4</sup> nutant, in spurious axillary pedunculate umbels; more rarely pedicels 1, 2 at each axil, common peduncle nearly absent; bracts small or inconspicuous; bractlets 0 (*Europe, western Asia, northern Africa*<sup>5</sup>).

150. *Stylosanthes* Sw.<sup>6</sup>—Receptacle long cylindrical tubular,

<sup>1</sup> Yellow, often small.

<sup>2</sup> Species about 6. VIV., *Fl. Libyc.*, t. 19, fig. 4.—SIBTH., *Fl. Græc.*, t. 718, 719.—GREEN. & GODE., *Fl. de Fr.*, i. 492, 509.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 139.

<sup>3</sup> *Gen.*, n. 885.—J., *Gen.*, 361.—LAMK., *Diet.*, iii. 131; *Suppl.*, iii. 51; *Ill.*, t. 630.—DC., *Prodr.*, ii. 312.—ENDEL., *Gen.*, n. 6538.—B. H., *Gen.*, 510, n. 141.—*Ferrum equinum* T., *Inst.*, 400, t. 225.

<sup>4</sup> Yellow.

<sup>5</sup> Species about 12. JACQ., *Fl. Austr.*, t. 431;  *Ic. Rar.*, t. 149.—TEN., *Fl. Neap.*, t. 69.—MORIS, *Fl. Sard.*, t. 66, 67.—SIBTH., *Fl. Græc.*, t. 716, 717.—BOISS., *Voy.*, t. 55.—GREEN. & GODE., *Fl. de Fr.*, i. 500, 509.—*Bot. Mag.*, t. 427.—WALP., *Rep.*, i. 724; ii. 888; v. 519; *Ann.*, i. 245; ii. 406; iii. 850; iv. 532.

<sup>6</sup> In *Act. Holm.* (1789), 296, t. 9, 11; *Prodr.*, 108; *Fl. Ind. Occ.*, 1280, t. 25.—LAMK., *Diet.*,

dilated at apex into a short cup. Calyx inserted with corolla and stamens at top of tube; lobes 5, deep membranous unequal; superior lobes connate to a greater height, broader; lowest narrower; æstivation much imbricated. Petals unequal or nearly equal; standard orbicular; wings obliquely oblong; keel curved subrostrate. Stamens 10; filaments 1-adelphous; tube closed below; anthers 5 longer subbasifixed; 5 short, often subglobose, versatile, either all fertile or 2, 3 sometimes minute or entirely abortive. Germen inserted in bottom of tube, subsessile; ovules few; style slender elongated, minutely stigmatiferous at apex, finally breaking off a little above base or at middle; lower part persistent, often dilated recurved. Legume sessile; segments 1, 2, reticulated or muricated, 1-seeded. Seeds compressed lenticular exarillate.—Herbs, often rigid or viscous; leaves pinnate 3-foliolate; stipules adnate to dilated base of petiole; flowers<sup>1</sup> 1, 2 in axil of each bract, in dense, cylindrical or capituliform, terminal or more rarely axillary, spikes; bracts similar to leaves, and furnished with 2 adnate stipules, usually 1-foliolate by abortion of lateral leaflets<sup>2</sup> (*Tropical Asia and Africa, northern and tropical America*<sup>3</sup>).

151. *Zornia* GMEL.<sup>4</sup>—Calyx membranous; lobes 5, usually very unequal; 2 superior longer, connate to a greater height, 2 lateral usually smaller; lowest oblong or lanceolar, nearly equal to superior. Petals unguiculate; standard suborbicular; wings oblique; keel curved, rather obtuse or subrostrate. Stamens 10, 1-adelphous; anthers of 2 forms; 5 subbasifixed longer, 5 alternate versatile. Germen sessile; ovules  $\infty$ ; style slender; apex minute stigmatiferous. Legume compressed; sutures 2, generally dissimilar; inferior usually sinuate; segments  $\infty$ , glabrous or echinate, indehiscent. Seeds orbicular or subreniform, exarillate.—Herbs; leaves digitate,

vii. 479; *Ill.*, t. 627.—DC., *Prodr.*, ii. 317.—ENDL., *Gen.*, n. 6600.—B. H., *Gen.*, 518, n. 166.

<sup>1</sup> Yellow (or white?).

<sup>2</sup> A genus analogous at once to *Zornia* and to *Geissaspis*.

<sup>3</sup> Species about 15. L., *Spec.*, 1088 (*Trifolium*).—WALT., *Carol.*, 182 (*Arachis*).—AUBL., *Guian.*, 776, t. 309 (*Trifolium*).—H. B. K., *Nov. Gen. et Spec.*, t. 594–596.—PAL. BEAUV., *Fl. Ow. et Ben.*, t. 77.—WIGHT & ARN., *Prodr.*, i. 218.—BENTH., in *Mart. Fl.*

*Bras., Papil.*, 89, t. 24, 25.—HAEV. & SOND., *Fl. Cap.*, ii. 227.—BAKER, in *Olivo. Fl. Trop. Afr.*, ii. 139.—WALP., *Rep.*, i. 727; ii. 889; v. 521.

<sup>4</sup> *Syst. Nat.*, 1076.—DESVX., *Journ. Bot.*, i. 124, t. 5.—DC., *Prodr.*, ii. 316.—ENDL., *Gen.*, n. 6599.—B. H., *Gen.*, 518, n. 168.—*Anonyma* WALT., *Carol.*, 181 (ex DC.).—*Myriadenus* DESVX., *loc. cit.*, 121, t. 4.—DC., *Prodr.*, ii. 316.

2-4-foliolate; leaflets exstipellate, usually sprinkled with pellucid dots; stipules subfoliaceous; flowers solitary or oftener in interrupted spikes; peduncles terminal and axillary; bracts minute or inconspicuous; stipules 2, lateral large foliaceous striated, including sessile flower; bractlets 0 (*Northern and tropical America, southern Africa*<sup>1</sup>).

152. *Chapmannia* TORR. & GR.<sup>2</sup>—Calyx membranous, broadly tubular; tube tapering at base; apex shortly 5-lobed; lobes unequal imbricated; lowest narrower; superior more or less connate. Petals thin; standard suborbicular; wings obliquely obovate; keel nearly equal to standard, curved obtuse. Stamens 10, 1-adelphous; filaments connate into a closed tube; anthers nearly uniform; 5 inserted higher, versatile; 5 alternate subbasifixed suberect. Germen sessile; ovules  $\infty$ ; style slender elongated; apex minute stigmatiferous. Legume subterete rigid; superior suture nearly straight; inferior sinuate; segments long ovoid, longitudinally striated, glandular-muricated, truncate at both ends, 1-seeded. Seeds oblong exarillate; embryo subovoid; radicle superior conical straight.—An erect herb, branched at base; leaves imparipinnate; leaflets few entire exstipellate; stipules subulate; flowers<sup>3</sup> in short, simple or somewhat branched, long-pedunculate racemes; bracts and bractlets (stipules?) small (*Florida*).

✓ 153. *Arachis* L.<sup>4</sup>—Receptacle more or less concave, lined by a disk. Calyx gamosepalous; either tubular or sacciform at base; or else 2-partite, anterior sepal free to base, 4 superior connate to a considerable height and membranous; teeth imbricated. Petals very unequal; standard suborbicular, scarcely tapering at base,

<sup>1</sup> Species about 10. MICHX., *Fl. Bor.-Amer.*, ii. 76, t. 41.—H. B. K., *Nov. Gen. et Spec.*, vi. 514.—TORR. & GR., *Fl. N. Amer.*, i. 353.—WIGHT & ARN., *Prodr.*, i. 217.—MORIC., *Pl. Nov. Amer.*, t. 75-79.—BENTH., in *Mart. Fl. Bras., Papil.*, 80, t. 21, 22.—HARV. & SONDR., *Fl. Cap.*, ii. 225.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 159.

<sup>2</sup> *Fl. N. Amer.*, i. 355.—BENTH., in *Trans. Linn. Soc.*, xviii. 161.—ENDL., *Gen.*, n. 6602.—B. H., *Gen.*, 517, n. 165.

<sup>3</sup> Yellow in the 1 known species (*C. floridana* TORR. & GR.).

<sup>4</sup> *Gen.*, n. 876.—J., *Gen.*, 354.—GÆRTN., *Fruct.*, ii. t. 144.—LAMEK., *Dict.*, i. 222; *Suppl.*, i. 415; *Ill.*, t. 615.—DC., *Mém. Légum.*, t. 20, fig. 105; *Prodr.*, ii. 474.—TURP., in *Dict. d'Hist. Nat.*, Atl., t. 254, 255.—ENDL., *Gen.*, n. 6601.—B. H., *Gen.*, 518, n. 167.—JAC. DE CORDEB., in *Adansonia*, vi. 249.—*Arachnida* PLUM., *Gen.*, t. 37.—*Arachnoides* NISSOL, in *Act. Acad. Par.* (1723), 387, t. 19.—*Chamæbalanus* RUMPH., *Herb. Amboin.*, iv. 426, t. 536.—*Mundubi* MARCGR., *Brasil.*, 37.

thickened gibbous at back; wings oblong free; keel curved, beaked and tapering for a considerable distance at apex. Stamens 9, 10, 1-adelphous; tube more or less thickened and fleshy at base; anthers of 2 forms; 5 oppositipetalous shorter subglobose versatile, 5 alternipetalous elongated basifixed. Germen subsessile pauciovulate, afterwards (receptacle becoming elongated rigid reflexed) stipitate, and wreathed by a stigma-like neck after fall of style; style long filiform before anthesis; apex stigmatiferous, not dilated. Legume (ripening underground) oblong thick reticulated subtorulose, somewhat constricted between seeds, not reticulated, continuous within, indehiscent. Seeds few, unevenly ovoid; embryo exalbuminous, very fleshy oily; cotyledons plano-convex, very thick, subauriculate at base; radicle short.—Low or often prostrate herbs; leaves either paripinnate, leaflets 2- or pauci-jugate, or more rarely 3-foliolate; stipules 2, lateral adnate to base of petiole; flowers<sup>1</sup> either in dense axillary spikes, or solitary or few axillary, sessile or pedicellate; bract often 2-auriculate; bractlets 2, linear, inserted at a variable height on floral receptacle (*Tropical America*<sup>2</sup>).

153a. *Arthroclianthus* H. BN.<sup>3</sup>—Flowers papilionaceous; receptacle short concave, lined by a cupuliform disk. Calyx gamosepalous subcampanulate, obtusely 4- or 5-toothed. Corolla nearly of *Chianthus* (or *Chadica*); standard shorter than wings, subovate, usually acute at apex, shortly unguiculate, reflexed; wings with longer claws, falcate, acute or acuminate, adhering to keel; keel longer, arched, acutely beaked at apex; petals with very long claws, cohering valvately below. Stamens 10, 2-adelphous (9-1); anthers oblong, inserted dorsally above base, subversatile. Germen stipitate; ovules  $\infty$ ; style slender curved subulate; apex stigmatiferous, not thickened. Legume long-stipitate, surrounded at base by persistent calyx, linear, much elongated, compressed  $\infty$ -jointed; segments glabrous submembranous, narrowed at both ends, 1-seeded; last segment apiculated by style. Seeds (when unripe) subreniform descending, narrowed for a considerable distance below.—A shrub; leaves alternate pinnate 3-foliolate; leaflets petiolulate; stipules

<sup>1</sup> Yellow or whitish.

<sup>2</sup> Species 6 or 7. HOOK., *Icon.*, t. 500.—BENTH., in *Trans. Linn. Soc.*, xviii. 158; *Pl.*

*Jungk.*, 210; in *Mart. Fl. Bras., Papil.*, 86, t. 23.—WALP., *Rep.*, i. 727; *Ann.*, iv. 534.

<sup>3</sup> *Adansonia*, ix. 296.

short acute ; flowers in axillary racemes ; rachis rather rigid, straight ; bracts short distichous ; pedicels long ; bractlets 2, short, inserted at top of pedicel below flower (*New Caledonia*<sup>1</sup>).

154. *Desmodium* DESVX.<sup>2</sup>—Calyx gamosepalous ; tube short, at base either obtuse (*Catenaria*,<sup>3</sup> *Dendrolobium*,<sup>4</sup> *Dicerma*,<sup>5</sup> *Phyllodium*,<sup>6</sup> *Pteroloma*<sup>7</sup>), or tapering (*Nicolsonia*,<sup>8</sup> *Codariocalyx*,<sup>9</sup> *Pleurolobus*,<sup>10</sup> *Cyclomorium*,<sup>11</sup> *Sagotia*,<sup>12</sup> *Dollinera*<sup>13</sup>); lobes or teeth 5, unequal ; 2 superior connate to a less height ; 3 inferior narrower, acute or subulate. Petals sessile or unguiculate ; standard obovate, oblong, or suborbicular, narrowed at base, sessile or more rarely with an obtuse or subcordate claw ; wings oblique, either slightly adhering to inappendiculate keel (*Catenaria*, *Dendrolobium*, &c.), or adhering to keel laterally appendiculate with a small membrane or hump (*Nicolsonia*, *Codariocalyx*, &c.) ; keel curved or subrostrate, obtuse. Stamens 10, 2-adelphous (9-1) ; vexillary stamen free at base, connate to a variable height with remainder into a closed tube. Germen sessile or stipitate ; ovules 2-∞ ; style curved or inflexed, beardless ; apex obtuse or capitate, stigmatiferous. Legume jointed exserted : segments 1-∞ ; of variable form, coriaceous or membranous, rather turgid or flat, glabrous or villous, either separating in succession on maturity and usually indehiscent, or more rarely scarcely separable and dehiscing at inferior suture. Seeds orbicular ovate or reniform, compressed exarillate.—Herbs, undershrubs or shrubs ; leaves usually pinnate 3-foliolate (*Dendrolobium*, *Dicerma*, *Phyllodium*, *Dollinera*, &c.), more rarely 5- or 1-foliolate (*Pteroloma*, &c.) ; leaflets stipellate ; stipules free or connate into one, oppositifolious, usually dry striated ; flowers<sup>14</sup> either in terminal or axillary, compound branched, or more rarely simple or subumbellate racemes, or else sometimes axillary, solitary or few ; bracts often 2-flowered, mem-

<sup>1</sup> Species 1 : *A. sanguineus*.

<sup>2</sup> *Journ. Bot.*, i. 122, t. 5, fig. 15.—DC., *Prodr.*, ii. 325.—SPACH, *Suit. à Buffon*, i. 133.—ENDL., *Gen.*, n. 6615.—B. H., *Gen.*, 519, 1002, n. 170.

<sup>3</sup> BENTH., in *Plant. Jungh.*, i. 220.

<sup>4</sup> BENTH., *loc. cit.*, 215.

<sup>5</sup> DC., *Mém. Légum.*, 326 ; *Prodr.*, ii. 339 (sect. *Desmodii*).—ENDL., *Gen.*, n. 6616.

<sup>6</sup> DESVX., *loc. cit.*, 123, t. 5, fig. 24.

<sup>7</sup> BENTH., in *Plant. Jungh.*, i. 219.

<sup>8</sup> DC., *Mém. Légum.*, 311, t. 51 ; *Prodr.*, ii.

325.—ENDL., *Gen.*, n. 6612.—*Perrottetia* DC., in *Ann. Sc. Nat.*, sér. 1, iv. 95.

<sup>9</sup> HASSK., in *Flora* (1842), *Beibl.*, ii. 48.

<sup>10</sup> JAUME, in *Desv. Journ. Bot.*, i. 61.

<sup>11</sup> WALP., *Rep.*, ii. 890.

<sup>12</sup> WALP., in *Linnaea*, xxiii. 737 ; *Ann.*, ii. 412 (nec H. BN.).—*Oxydium* BENN., *Pl. Javan. Rar.*, 156.

<sup>13</sup> ENDL., *Gen.*, n. 6614.—*Ototropis* SCHAU., *Ind. Hort. Wratisl.* (1838).

<sup>14</sup> Usually small ; white, or oftener pink purple or blue.



branous or small, deciduous or persistent; bractlets variable, sometimes membranous, sometimes minute or 0<sup>1</sup> (*All tropical and sub-tropical regions*<sup>2</sup>).

155? *Pseudarthria* WIGHT & ARN.<sup>3</sup>—Flowers of *Desmodium*. Legume planó-compressed; sutures straight or slightly and unevenly sinuate between seeds, continuous within, 2-valved; valves thin, transversely veined, not jointed.<sup>4</sup>—Herbs, villous or viscid; leaves pinnate 3-foliolate; inflorescence and other characters of *Desmodium* (*Tropical Asia, south-eastern regions and islands of Africa*<sup>5</sup>).

156? *Pycnospora* R. BR.<sup>6</sup>—Flowers of *Desmodium*. Legume<sup>7</sup> oblong turgid, continuous within, ∞-seeded, 2-valved; valves thin, marked by transverse veins, not jointed. Seeds reniform funiculate, thinly arillate.—A slender undershrub;<sup>8</sup> leaves pinnate 3-foliolate; stipules 2, membranous striated; inflorescence terminal, ∞-flowered (of *Desmodium*); bracts membranous caducous (*Tropical Asia and Australia*<sup>9</sup>).

157. *Uraria* DESVX.<sup>10</sup>—Flowers of *Desmodium*; germen 2-∞-ovulate. Legume 2-∞-seeded, constricted between seeds; segments rather turgid, compressed, folded back one upon the other, inclosed

<sup>1</sup> BENTHAM divides this genus into 12 sections, as follows:—1. *Dendrolobium*; 2. *Phylodidium*; 3. *Dicerna*; 4. *Pteroloma*; 5. *Cate-naria*; 6. *Scorpiurus* (BENTH.); 7. *Dollinera*; 8. *Heteroloma* (BENTH.); 9. *Cralarium*; 10. *Nicolsonia*; 11. *Sagotia*; 12. *Pleurolobium* (DC.).

<sup>2</sup> Species about 120. JACQ., *Hort. Schœnbr.*, t. 297, 298; *ic. Rar.*, t. 565.—WALL., *Pl. As. Rar.*, t. 94, 157.—WIGHT, *Icon.*, t. 209, 270-272, 291-294, 298, 373, 374, 406, 407, 409, 418, 419, 984, 985.—H. B. K., *Nov. Gen. et Spec.*, vi. t. 597-599.—LABILL., *Sert. Austr.-Caled.*, t. 71, 72.—BENTH., in *Mart. Fl. Bras., Papil.*, 94, t. 26, 27; in *Pl. Jungk.*, i. 221; *Fl. Austral.*, ii. 229.—HOOK. & ARN., *Beech. Voy., Bot.*, t. 87, 96.—MIQ., *Fl. Ind.-Bat.*, Suppl., 305.—THW., *Enum. Pl. Zeyl.*, 411.—HARV. & SOND., *Fl. Cap.*, ii. 228.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 159.—*Bot. Reg.*, t. 355, 815, 967.—*Bot. Mag.*, t. 2867, 2960, 3553, 5452.—WALP., *Rep.*, i. 736; ii. 890; v. 525; *Ann.*, i. 249; ii. 413; iv. 537.

<sup>3</sup> *Prodr.*, i. 209.—ENDL., *Gen.*, n. 6689.—B. H., *Gen.*, 521, n. 172.—*Anarthrosyne* E. MEY., *Comm. Pl. Afric. Austr.*, 124.—ENDL., *Gen.*, n. 6613.

<sup>4</sup> This genus is not otherwise distinguished from *Desmodium*, of which it ought, perhaps, rather to be considered a section.

<sup>5</sup> Species 3 or 4. WIGHT, *Icon.*, t. 286.—KL., in *Pet. Mossamb., Bot.*, t. 7 (*Anarthrosyne*).—HARV. & SOND., *Fl. Cap.*, ii. 299.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 167.

<sup>6</sup> Ap. WIGHT & ARN., *Prodr.*, i. 197.—ENDL., *Gen.*, n. 6529.—B. H., *Gen.*, 521, n. 173.

<sup>7</sup> Small, almost as in the small-fruited *Crotalaria*; only the transverse veins indicate an affinity with *Desmodium*, whence the place of this genus remains very doubtful and artificial.

<sup>8</sup> Habit entirely that of the 3-foliolate species of *Desmodium*.

<sup>9</sup> Species 1. *P. hedysaroides* R. BR., *loc. cit.*—BENTH., *Fl. Austral.*, ii. 236.—*P. nervosa* WIGHT & ARN.—*Crotalaria? nervosa* GRAH., in *Cat. Wall.*, n. 5428 B.—*Indigofera desmodioides* BERNH., *Pl. Ind. Hohen.*, n. 303.

<sup>10</sup> *Journ. Bot.*, i. 122, t. 5.—DC., *Prodr.*, ii. 324.—ENDL., *Gen.*, n. 6610.—B. H., *Gen.*, 521, n. 174.—*Doodia* ROXB., *Hort. Calc.*, 99; *Fl. Ind.*, iii. 365 (nec R. BR.).

by persistent calyx.—Herbs or undershrubs; leaves pinnate 3- or more rarely 5-7-foliolate; lower leaves more rarely 1-foliolate; leaflets stipellate; stipules 2, acuminate, striated at base; flowers<sup>1</sup> in terminal, dense or much elongated and spiciform, racemes; pedicels in pairs, hooked-inflexed at apex; bracts variable, persistent or deciduous (*Tropical Asia, Africa, and Australia*<sup>2</sup>).

158? **Lourea** NECK.<sup>3</sup>—Flowers of *Uraria*; calyx broadly campanulate, nearly equally 5-lobed, after anthesis accrescent membranous and longer than fruit. Legume 2-∞-seeded; segments ovate compressed, rather turgid, bent back and nestling in bottom of calyx.—Erect or prostrate herbs; habit of *Desmodium*; leaves 1-3-foliolate; leaflets stipellate, usually broader than long; stipules 2, subulate or striated; flowers<sup>4</sup> in slender loose racemes; pedicels usually in pairs; bracts acuminate caducous (*Tropical Asia and Australia*<sup>5</sup>).

159. **Mecopus** BENN.<sup>6</sup>—Flowers of *Desmodium*; keel much curved, obtuse. Stamens 10, 2-adelphous (9-1). Germen shortly stipitate; ovules 2; style inflexed; apex minute stigmatiferous. Legume supported on a very long stalk, much exerted from inverted calyx, lodged within bracts close to axis of spike; segments 1, 2, compressed convex reticulated indehiscent. Seeds reniform exarillate.—A slender branched herb; leaves 1-foliolate; leaflets 2-stipellate reniform; stipules 2, lanceolate setaceous; flowers<sup>7</sup> crowded, in dense oblong terminal racemes; bracts elongated subulate, hooked at apex; pedicels in pairs, hooked at apex and coiled round flower (*Tropical Asia*<sup>8</sup>).

160. **Alysicarpus** NECK.<sup>9</sup>—Calyx glumaceous; lobes 5, deep,

<sup>1</sup> Purplish or yellowish.

<sup>2</sup> Species about 8. JACQ., *Icon. Rar.*, t. 567 (*Hedysarum*).—WIGHT & ARN., *Prodr.*, i. 221.—WIGHT, *Icon.*, t. 284, 289, 290, 411.—WALL., *Pl. Asiat. Rar.*, t. 37, 110.—BENTH., *Fl. Austral.*, ii. 236.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 168.—WALP., *Rep.*, i. 735; ii. 889; v. 523.

<sup>3</sup> *Elem.*, n. 1318.—DESVX., *Journ. Bot.*, i. 122, t. 5, fig. 18.—DC., *Prodr.*, ii. 323.—ENDL., *Gen.*, n. 6609.—B. H., *Gen.*, 522, n. 175.—*Christia* MENCH, *Suppl.*, 39.

<sup>4</sup> Whitish or purplish, small.

<sup>5</sup> Species 3 or 4. JACQ., *Icon. Rar.*, t. 566 (*Hedysarum*).—WIGHT & ARN., *Prodr.*, i. 221.—WIGHT, *Icon.*, t. 285.—BENTH., in *Pl. Jungh.*, i. 215.

<sup>6</sup> *Plant. Jav. Rar.*, 154, t. 32.—ENDL., *Gen.*, n. 6611.—B. H., *Gen.*, 521, n. 171.

<sup>7</sup> Very small.

<sup>8</sup> Species 1. *M. nidulans* BENN., *loc. cit.*—WALP., *Rep.*, v. 524.

<sup>9</sup> *Elem.*, n. 1315.—DC., *Prodr.*, ii. 352.—ENDL., *Gen.*, n. 6626.—B. H., *Gen.*, 522, n. 176.—*Hegetschweilera* REG., in *Bot. Zeit.*, i. 47.

nearly equal or 2 superior connate to a greater height, sometimes nearly to apex. Petals elongated; standard long obovate; wings obliquely oblong; keel adhering to and often about equal to wings, slightly curved, often bearing a small membranous appendage on each side, obtuse at apex. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile or shortly stipitate; ovules  $\infty$ ; style slender, more or less curved at apex; stigma terminal or oblique, usually broadly capitate. Legume subterete, subtubular, or rather compressed, transversely constricted or nearly even between seeds; segments ovate or cylindrical, truncate at both ends; septa between seeds finally vanishing. Seeds suborbicular or ovate, exarillate.—Erect or diffuse herbs, glabrous or silky; leaves 1-foliolate 2-stipellate or more rarely 3-foliolate; stipules scarious narrowed, free or connate; flowers in terminal or more rarely axillary racemes; pedicels articulated at base and apex, usually 2 at axil of each bract; bracts and bractlets usually scarious deciduous (*All tropical regions*<sup>1</sup>).

161. *Phylacium* BENN.<sup>2</sup>—Calyx gamosepalous sub-2-labiate; 2 superior lobes entirely or almost entirely connate. Petals rather long-unguiculate; standard obovate or suborbicular, callous and bearing 2 inflexed auriculate appendages within above base; wings subfalcate, sometimes auriculate subcalcarate at base; keel shorter than wings, curved obtuse. Stamens 10, 2-adelphous (9-1); vexillary stamen afterwards connate with remainder; anthers uniform. Germen subsessile, surrounded at base by a disk prolonged into a ring; ovule 1; style curved, slightly thickened above middle, subulate at apex; summit capitate stigmatiferous. Legume ovate plano-compressed, acuminate by style, reticulated indehiscent. Seed suborbicular compressed exarillate.—Twining herbs; leaves pinnate 3-foliolate; leaflets stipellate, rather large; stipules narrow caducous; flowers in a short, irregularly cymiferous axillary raceme; bracts mostly small; 1 or few much increasing in size after anthesis, plaited cucullate membranous-foliaceous veined; bractlets 2, inserted at apex of pedicel (*Indian Archipelago*<sup>3</sup>).

<sup>1</sup> Species 15. WIGHT, *Icon.*, t. 92, 250, 251.—HARV. & SONN., *Fl. Cap.*, ii. 230.—BAKER, in *Olin. Fl. Trop. Afr.*, ii. 169.—WALP., *Rep.*, i. 749; ii. 899; v. 528; *Ann.*, ii. 419; iv. 548.

<sup>2</sup> *Plant. Jav. Rar.*, 159, t. 33.—ENDL., *Gen.*, n. 6598.—B. H., *Gen.*, 523, n. 179.

<sup>3</sup> Species 1. *P. bracteosum* BENN., *loc. cit.*—WALP., *Rep.*, i. 726; v. 520; *Ann.*, iv. 533.—*P. scandens* HASSEK., *Cart. Hort. Bog.*, 227.

162? *Hallia* THUNB.<sup>1</sup>—Calyx subcampanulate; lobes 5, long acute, nearly equal. Petals shortly unguiculate; standard orbicular or obovate; wings obliquely oblong; keel equal to or shorter than wings, curved obtuse. Stamens 10, 1-adelphous or 2-adelphous (9-1); anthers uniform. Germen sessile; ovule 1, descending; style slender inflexed, often dilated at point of inflexion, subulate at apex; summit capitate stigmatiferous. Legume small ovoid, included in persistent slightly accrescent calyx, membranous thin reticulated. Seed filling pericarp; hilum lateral exarillate.—Undershrubs or low herbs, usually slender, diffuse or prostrate, leaves 1-foliolate; stipules 2, adnate to petiole, striated; flowers axillary, solitary or more rarely in twos or threes; pedicels slender, articulated above middle, and bearing at articulation 1-3 more or less connate involucriform bracts (*Southern Africa*<sup>2</sup>).

163. *Eleiotis* DC.<sup>3</sup>—Calyx gamosepalous membranous; teeth 5, very short unequal. Petals shortly unguiculate; standard sub-orbicular emarginate; wings oblong, adhering to keel; keel obtuse, shorter than wings. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile; ovule 1, descending; style inflexed above middle and slightly thickened at point of inflexion; summit capitate stigmatiferous. Legume compressed, unevenly ovate, acute membranous reticulated indehiscent. Seed reniform exarillate.—A tender diffuse herb; leaves 1- or more rarely 3-foliolate; stipules small striated; flowers very small in slender terminal and axillary racemes; pedicels usually 2 in axil of each of rather large striated caducous bracts<sup>4</sup> (*East Indies*<sup>5</sup>).

164. *Leptodesmia* BENTH.<sup>6</sup>—“Calyx deeply cleft; lobes narrow, nearly equal. Standard suborbicular unguiculate; wings obliquely oblong, free; keel narrower obtuse. Vexillary stamen free or scarcely cohering with remainder close to base; remainder connate;

<sup>1</sup> *Fl. Cap., Pref. & 593.*—DC., *Prodr.*, ii. 122.—ENDL., *Gen.*, ii. 6469.—B. H., *Gen.*, 523, n. 180.

<sup>2</sup> Species 6. HARV. & SOND., *Fl. Cap.*, ii. 231.

<sup>3</sup> *Mém. Légum.*, 348; *Prodr.*, ii. 348.—ENDL., *Gen.*, n. 6620.—B. H., *Gen.*, 523, n. 178.

<sup>4</sup> This genus ought hardly to be separated from section *Heteroloma* of *Desmodium*, from

which it differs only by its 1-ovulate ovary and 1-segmented legume.

<sup>5</sup> Species 1. *E. sororia* DC., *loc. cit.*—*E. monophylla* DC., *loc. cit.*, n. 1.—*Glycine sororia* BURM., *Fl. Ind.*, t. 50, fig. 2.—*Hedysarum sororium* L., *Mant.*, 270.—*Hallia sororia* W., *Spec.*, iii. 1170.—*Onobrychis sororia* DESVX., *Journ. Bot.*, i. t. 6.

<sup>6</sup> *Gen.*, 522, n. 177.

anthers uniform. Germen sessile 1-ovulate; style filiform; stigma terminal capitate. Legume ovoid 1-seeded 2-valved, included by calyx. Seed estrophiolate.—Perennial herbs or undershrubs, diffuse; leaves pinnate 3-foliolate; leaflets small stipellate; stipules free; flowers small, crowded in short dense subcapitate terminal racemes; bracts broad, imbricated, deciduous before anthesis" (*East Indies, Madagascar*<sup>1</sup>).

165. *Cranocarpus* BENTH.<sup>2</sup>—Flowers almost those of *Desmodium*; calyx oblique; 2 superior teeth broader. Petals narrowed for some distance at base. Stamens 10, 1-adelphous; sheath not cleft; anthers uniform. Germen subsessile; ovule 1; style slender curved; apex minute stigmatiferous. Legume stipitate, much compressed, subgaleate; superior margin impressed at middle, much intruded at position of seed; inferior much arched; faces convex; seed reniform exarillate.—A shrub; leaves 1-3-foliolate; terminal leaflet large penniveined 2-stipellate; 3 lateral small or 0; stipules free setaceous acuminate; flowers<sup>3</sup> in axillary racemes; pedicels solitary 2-bracteolate; bracts small (*Brazil*).

166. *Lespedeza* MICHX.<sup>4</sup>—Receptacle very shortly cupuliform. Calyx lobes or teeth 5, nearly equal or 2 superior connate to a rather greater height. Petals unguiculate; standard oblong or obovate; wings oblong falcate, free or adhering to keel; keel curved, obtuse or beaked. Stamens 10, 2-adelphous (9-1); more rarely vexillary stamen connate with remainder; anthers uniform. Germen sessile or stipitate; ovule 1; style slender curved; apex minute stigmatiferous. Legume subspherical or ovate, rather compressed, reticulated indehiscent. Seed of same form as pericarp, exarillate.—Herbs, undershrubs, or shrubs, rarely glabrous; leaves pinnate 3-foliolate or 1-foliolate, exstipellate; stipules 2, small, often very caducous; flowers<sup>5</sup> in racemes or fascicles; inflorescences axillary or more rarely branched terminal; bracts small 1-flowered; bract-

<sup>1</sup> Species 1 or 2. WIGHT, *Icon.*, t. 1056 (*Nicolsonia*).—BENTH., in *Plant. Jungh.*, i. 221 (*Desmodium*).

<sup>2</sup> In *Mart. Fl. Bras., Papil.*, 106, t. 28.—B. H., *Gen.*, 523, n. 181.

<sup>3</sup> "Yellow or whitish."

<sup>4</sup> *Fl. Bor.-Amer.*, ii. 70, t. 39, 40.—DC.,

*Prodr.*, ii. 348.—ENDL., *Gen.*, n. 6623.—B. H., *Gen.*, 524, n. 182.—*Oxyramphis* WALL., *Cat.*, n. 5348-5350.—*Campylotropis* BGE., in *Ann. Sc. Nat.*, sér. 2, vi. 57.—ENDL., *Gen.*, n. 6622.—*Phlebosporium* JUNGH., *Reise*, 346, ex *Flora* (1847), 508.

<sup>5</sup> White, pink, or purplish.

lets 2, inserted at apex of pedicel (*Temperate Asia, Australia, North America*<sup>1</sup>).

167? *Ougeinia* BENTH.<sup>2</sup>—Receptacle small cupshaped, lined by a very thick glandular disk. Calyx markedly perigynous; lobes 5, obtuse unequal; 2 superior connate into a broad, emarginate or 2-toothed lip; lowest lobe larger than lateral. Petals shortly unguiculate; standard suborbicular or broadly obovate; wings obliquely oblong, slightly adhering to keel; keel about equal to wings, slightly curved, obtuse. Stamens 10, 2-adelphous (9-1); anthers uniform. Germen sessile elongated; ovules  $\infty$ ; style curved; apex capitate globose stigmatiferous. Legume elongated flat; segments 1- $\infty$ , long oblong, rather thick, reticulated, scarcely dehiscent.<sup>3</sup> Seeds compressed reniform exarillate.—A tree; leaves pinnate 3-foliolate; leaflets large stipellate; stipules deciduous; flowers very crowded in short racemes densely fascicled at old nodes; pedicels filiform; bracts small scale-like; bractlets inserted at top of pedicel below flower, subpersistent (*East Indies*<sup>4</sup>).

## VII. DALBERGIEÆ.

168. *Dalbergia* L. f.—Receptacle cupuliform, lined by a disk. Calyx gamosepalous; teeth 5, unequal imbricated; lowest often longer than others; 3 superior broader. Corolla papilionaceous; petals unguiculate; standard ovate or obovate, more rarely orbicular; wings obliquely oblong; keel obtuse, petals dorsally connate at apex. Stamens 10; either 1-adelphous, sheath longitudinally cleft above; or 2-adelphous (9-1); more rarely 9, vexillary stamen absent; anthers small erect didymous; cells usually dorsally apposed, more or less longitudinally rimose from apex. Germen stipitate; ovules few or 1; style curved; apex minute or slightly dilated, stigmatiferous. Legume oblong or linear or more rarely falcate, flat samaroid thin reticulated, slightly hardened at middle, 1-seeded or

<sup>1</sup> Species about 25. JACQUEM., *Poy. Bot.*, t. 50-52.—MIQ., *Fl. Ind.-Bat.*, i. t. 4 (*Campylo-tropis*).—KL., in *Waldem. Reis., Bot.*, t. 1, fig. 2 (*Oxyramphis*).—BENTH., *Fl. Hongk.*, 85; *Fl. Austral.*, ii. 240.—RUPB., *Dec. Pl. Am.*, t. 5.—*Bot. Reg.* (1846), t. 28.—WALP., *Rep.*, i. 748; v. 527; *Ann.*, iii. 850; iv. 547.

<sup>2</sup> In *Plant. Jungh.*, i. 216.—B. H., *Gen.*, 518, n. 169.

<sup>3</sup> "Resembling the legume of *Dalbergia*" (BENTH.).

<sup>4</sup> Species 1. *O. dalbergioides* BENTH.—*Dalbergia oogeinensis* ROXB., ex WIGHT, *Icon.*, t. 391.

few-seeded (seeds remote), either not thickened or winged at margins, indehiscent. Seeds reniform plano-compressed, laterally affixed; embryo exalbuminous; radicle superior inflexed.—Trees or climbing shrubs; leaves alternate imparipinnate; leaflets  $\infty$ , exstipellate, alternate, or more rarely 1 terminal; stipules usually small, caducous, or scarcely visible; flowers small, usually crowded in axillary or terminal racemes composed of numerous, regular or irregular, much branched cymes; bracts and bractlets usually small, caducous or persistent (*Tropical Asia, Africa, Oceania, and America*).

169. *Ecastaphyllum* P. BR.<sup>1</sup>—Flowers of *Dalbergia*. Legume suborbicular, flat and rather thick or finally corky and thickened, submarginate at superior suture, 1-seeded indehiscent.—Shrubs, loosely branched or sarmentose, climbing; leaves alternate imparipinnate; leaflets 1- $\infty$ , usually alternate, exstipellate; flowers<sup>2</sup> in short, simple or compound, axillary racemes; bracts and bractlets small (*Tropical America and Africa*<sup>3</sup>).

170. *Machærium* PERS.<sup>4</sup>—Flowers nearly of *Dalbergia*; receptacle minutely cupuliform, obtuse at base; anthers versatile; cells parallel, dehiscing longitudinally. Germen 1-2-ovulate. Legume compressed samaroid, thickened at base, 1-seeded, tapering above into an oblong net-veined wing, terminated by style, indehiscent. Seed ovate orbicular or reniform; embryo rather fleshy; radicle inflexed.—Trees or shrubs, erect or climbing; leaves imparipinnate; leaflets  $\infty$ , usually alternate; stipules usually small, sometimes hardened spinescent; inflorescences<sup>5</sup> of *Dalbergia* (*Tropical America*<sup>6</sup>).

171. *Cyclolobium* BENTH.<sup>7</sup>—Flowers nearly of *Machærium*;

<sup>1</sup> *Jam.*, 229, t. 32, fig. 1.—L. C. RICH., in *Pers. Syn.*, ii. 277.—DC., *Prodr.*, ii. 420.—B. H., *Gen.*, 545, n. 237.—*Acouroa* AUBL., *Guian.*, 753, t. 301.—*Drakensteinia* NECK., *Elem.*, n. 1344.—*Hecastophyllum* H. B. K., *Nov. Gen. et Spec.*, vi. 387.—ENDL., *Gen.*, n. 6708 (Some authors write "*Ecastophyllum*").

<sup>2</sup> Whitish, small.

<sup>3</sup> Species 4 or 5. MIQ., *Stirp. Surin.*, t. 5.—BENTH., in *Ann. Wien. Mus.*, ii. 93; in *Journ. Linn. Soc.*, iv. Suppl., 50; in *Mart. Fl. Bras., Papil.*, 227, t. 63-65.—BAKER, in *Oliv. Fl.*

*Trop. Afr.*, ii. 236.—H. BN., in *Adansonia*, vi. 217.

<sup>4</sup> *Syn.*, ii. 276.—ENDL., *Gen.*, n. 6710.—B. H., *Gen.*, 545, n. 39.

<sup>5</sup> Flowers small or middle-sized; purple, violet, or white.

<sup>6</sup> Species about 60. PRESL, *Symb.*, t. 72, 73.—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 52; in *Mart. Fl. Bras., Papil.*, 231, t. 67-80.—WALP., *Rep.*, i. 794; *Ann.*, ii. 437; iv. 571.

<sup>7</sup> In *Ann. Wien. Mus.*, ii. 92.—ENDL., *Gen.*, n. 6700.—B. H., *Gen.*, 545, n. 238.

receptacle scarcely concave, obtuse at base; disk minute. Legume stipitate orbicular membranous, scarcely thickened over seeds; superior suture narrowly winged; style terminal; indehiscent. Seeds 2, 3, oblong transverse; embryo straight.—Shrubs; leaves alternate 1-foliolate, usually 2-stipellate; flowers<sup>1</sup> in axillary or lateral, simple or fascicled, racemes. Other characters of *Dalbergia* (*Tropical America*<sup>2</sup>).

172. *Drepanocarpus* G. A. F. MEY.<sup>3</sup>—Flowers of *Machæria*; stamens 1–2-adelphous. Legume reniform or circinate, plano-compressed, thickly coriaceous, 1-seeded indehiscent.—Erect trees or climbing shrubs; leaves imparipinnate exstipellate; leaflets usually alternate; stipules small or hardened spinescent; flowers<sup>4</sup> in short secundifloral racemes fascicled at axils or branched terminal; bracts small caducous; bractlets usually orbiculate persistent (*Tropical America and Africa*<sup>5</sup>).

173. *Platypodium* Vog.<sup>6</sup>—Flowers almost those of *Machærium*; receptacle shortly turbinate. Stamens 10, 8 connate into 2 lateral, 4-androus phalanges; vexillary and lowest nearly or quite free. Legume stipitate samaroid, woody at apex, 1, 2-seeded, indehiscent, dilated at base into an oblong obliquely-veined wing-like stalk.—Unarmed tree; leaves pari- or imparipinnate; leaflets alternate or irregularly opposite; stipules narrowed subulate or minute; flowers<sup>7</sup> in loose racemes at higher axils; bracts and bractlets small caducous. (*Brazil*<sup>8</sup>).

174. *Tipuana* BENTH.<sup>9</sup>—Flowers almost those of *Platypodium*; calyx more elongated or tubular, shortly toothed; stamens 10, 1, or

<sup>1</sup> Middle-sized.

<sup>2</sup> Species 4. BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 51; in *Mart. Fl. Bras., Papil.*, 229, t. 66.

<sup>3</sup> *Primit. Fl. Essequéb.*, 236. — GÆRTN., *Fruct.*, ii. 351 (part.), t. 156 (*Pterocarpus*).—DC., *Prodr.*, ii. 420 (part.).—ENDL., *Gen.*, n. 6709.—B. H., *Gen.*, 546, n. 240.—*Orucaria* CLUS., *Exot.*, 47, 48 (ex ENDL.).—*Sommerfeldtia* SCHUM. & THÖNN., *Beskr.*, 331.—*Nephrosis* L. C. RICH., *ms.* (ex ENDL.).

<sup>4</sup> Purple, violet, or white.

<sup>5</sup> Species 8. H. B. K., *Nov. Gen. et Spec.*, vi. 390.—BENTH., in *Ann. Wien. Mus.*, ii. 95;

in *Mart. Fl. Bras., Papil.*, 257, t. 81–85; in *Journ. Linn. Soc.*, iv. Suppl., 69.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 237.—H. BN., in *Adansonia*, vi. 218.

<sup>6</sup> In *Linnaea*, xi. 420.—B. H., *Gen.*, 546, n. 242.—*Callisemæa* BENTH., in *Ann. Wien. Mus.*, ii. 105.—ENDL., *Gen.*, n. 6721.

<sup>7</sup> Handsome, rather large, yellow.

<sup>8</sup> Species 2. BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 72; in *Mart. Fl. Bras., Papil.*, 261, t. 87, 88.

<sup>9</sup> In *Journ. Linn. Soc.*, iv. Suppl., 72.—B. H., *Gen.*, 546, n. 241.



2-adelphous. Legume stipitate, ovate and thickly coriaceous at base, few seeded indehiscent, produced above into a coulter-shaped transversely veined wing,<sup>1</sup> sometimes with a thickened margin formed by base of persistent style. Seeds 1-3, obliquely oblong, transverse, rather curved, separated by a hard isthmus of pericarp; embryo exalbuminous; radicle short curved.—Trees, handsome unarmed; leaves imparipinnate; leaflets  $\infty$ , exstipellate, mostly alternate; stipules small caducous; flowers<sup>2</sup> in loose branched terminal racemes; bracts small caducous; bractlets 0 (*South America*<sup>3</sup>).

175. *Centrolobium* MART.<sup>4</sup>—Flowers almost those of *Tipuana*, rather large; calyx unequally toothed, imbricated. Wings and petals of keel nearly similar, obliquely unguiculate. Stamens 10, 1-adelphous; filaments connate into a sheath cleft above and more deeply divided below than laterally; anthers versatile. Germen 2, 3-ovulate, much compressed and sterile at apex; style slender curved; apex not thickened, stigmatiferous. Legume large samaroid indehiscent, at base thickly coriaceous, inflated subligneous 1-3-seeded; higher produced into a falcate-oblong veined wing; style persistent hardened; laterally spurred at base of wing. Seeds separated by transverse or oblique septa, subreniform; radicle curved.—Trees, unarmed; leaves imparipinnate; leaflets opposite and alternate, exstipellate; stipules unevenly ovate, foliaceous caducous; flowers<sup>5</sup> in large branched terminal racemes; bracts almost resembling stipules, caducous; bractlets narrow caducous (*Tropical America*<sup>6</sup>).

176. *Pterocarpus* L.<sup>7</sup>—Receptacle shortly turbinate, lined by a disk; mouth usually slightly oblique. Calyx gamosepalous; 2 su-

<sup>1</sup> "The wing," says BENTHAM, "ought to be considered an appendage rather of the style than of the legume itself;" but on examination of the young fruit, the wing appears to us to arise from the same part as in *Machærium*, though not quite similar in shape. Hence the genus is a somewhat doubtful one, and to be distinguished from *Machærium* rather by the habit of the seeds and by the appearance of the plant, which is almost that of *Bowdichia*.

<sup>2</sup> "Yellow, handsome."

<sup>3</sup> Species 3. BENTH., in *Mart. Fl. Bras., Papil.*, 259, t. 86.

<sup>4</sup> Ex BENTH., in *Ann. Wien. Mus.*, ii. 95.—ENDL., *Gen.*, n. 6707.—B. H., *Gen.*, 546, n. 243.

<sup>5</sup> "White tinged with violet," middle-sized or rather large.

<sup>6</sup> Species 2 or 3. VELLOZ., *Fl. Flum.*, vii. t. 85 (*Nissolia*).—PRESL, *Symb.*, ii. 26, t. 74.—BENTH., in *Hook. Journ.*, ii. 66; in *Journ. Linn. Soc.*, iv. Suppl., 73; in *Mart. Fl. Bras., Papil.*, 263, t. 89-91.—TUL., in *Arch. Mus.*, iv. 87.

<sup>7</sup> *Gen.*, n. 854.—J., *Gen.*, 364.—GÆRTN., *Fruct.*, ii. 351 (part.), t. 156, fig. 2 (part.).—LAMK., *Dict.*, v. 725; Suppl., iv. 610 (part.); *Ill.*, t. 602 (part.).—DC., *Prodr.*, ii. 418 (part.).—

perior teeth or lobes connate to a variable height. Corolla almost that of *Dalbergia*; standard broadly ovate or suborbiculate. Stamens 10, 1- or 2-adelphous; sheath longitudinally cleft above or on both sides; more rarely vexillary stamen free; anthers versatile. Germen sessile or stipitate; ovules 2-6, descending; style slender curved; apex minute stigmatiferous. Legume compressed, ovate or oftener orbicular, more rarely oval-oblong and more or less oblique, seminiferous and more or less thickened or hardened at middle; sometimes unevenly corky (*Moutouchi*<sup>1</sup>); sometimes tapering all round into a wing, echinate at middle (*Echinodiscus*<sup>2</sup>), or almost entirely membranous thin (*Amphymenium*<sup>3</sup>); more rarely longer than broad, coriaceous, rather thick (*Ancylocalyx*<sup>4</sup>). Seeds 1 or more rarely 2, separated by a septum; radicle short curved.—Trees, unarmed; leaves alternate imparipinnate; leaflets alternate or nearly opposite, exstipellate; stipules usually minute or inconspicuous; flowers<sup>5</sup> in simple or branched, axillary and terminal racemes; bracts and bractlets small caducous<sup>6</sup> (*Tropical Asia, Africa, and America*<sup>7</sup>).

177? *Pœcilanthe* BENTH.<sup>8</sup>—"Calyx turbinate at base; 2 superior lobes connate into 1 sub-2-dentate. Standard orbicular inappendingulate; wings falcate-oblong or obovate; keel curved subrostrate, petals dorsally connate. Stamens all connate into a sheath cleft above;  $\sigma$  anthers longer, affixed close to base;  $\delta$  alternate shorter versatile. Germen subsessile or shortly stipitate,  $\infty$ -ovulate; style filiform curved; stigma small terminal. Legume . . . (when

SPACH, *Suit. à Buffon*, i. 362.—ENDL., *Gen.*, n. 6705.—B. H., *Gen.*, 547, n. 244 (incl.: *Amphymenium* H. B. K., ? *Ancylocalyx* TUL., *Echinodiscus* DC., *Moutouchi* AUBL., *Phellocarpus* BENTH., ? *Vatairea* AUBL. [according to BENTH., not SAG., as will be seen below]).

<sup>1</sup> AUBL., *Guian.*, ii. 748, t. 299.—*Griselinia* NECK., *Elem.*, n. 1358 (nec FORST.).—*Moutouchia* DC. (sect. *Pterocarpi*).—BENTH., in *Ann. Wien. Mus.*, ii. 94.—ENDL., *Gen.*, n. 6704.

<sup>2</sup> DC., *loc. cit.* (sect. *Pterocarpi*).—BENTH., *loc. cit.*, 94.—ENDL., *Gen.*, n. 6706.—*Weinreichia* REICHB., *Consp.*, 152.

<sup>3</sup> H. B. K., *Nov. Gen. et Spec.*, vi. 380.—BENTH., *loc. cit.*, 95.—*Phellocarpus* BENTH. (*loc. cit.*), 106, is, according to the same author (*Gen.*, 547), an *Amphymenium* "whose fruit is deformed (by the bite of some insect?)."

<sup>4</sup> TUL., in *Ann. Sc. Nat.*, sér. 2, xx. 136, t. 2; in *Arch. Mus.*, iv. 73.

<sup>5</sup> Yellow, more rarely whitish mixed with violet, often handsome.

<sup>6</sup> *Vatairea* AUBL. (*Guian.*, 755, t. 302.—DC., *Prodr.*, ii. 521.—ENDL., *Gen.*, n. 6731) is hesitatingly referred by BENTHAM to *Pterocarpus* (see above, p. 319, note 7).

<sup>7</sup> Species about 15. JACQ., *Amer.*, 283, t. 182, fig. 92.—VAHL, *Symb.*, ii. 79.—ROXB., *Pl. Coromand.*, ii. 9, t. 116.—PERS., *Syn.*, ii. 277.—WIGHT, *Ill.*, t. 78; *Icon.*, t. 246.—GUILLET & PERR., *Fl. Seneg. Tent.*, i. 228, t. 54.—A. RICH., *Fl. Abyss. Tent.*, t. 45.—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 74; in *Mart. Fl. Bras., Papil.*, 266, t. 92.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 237.—H. BN., in *Adansonia*, vi. 217.—WALP., *Ann.*, ii. 436; iv. 570.

<sup>8</sup> BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 80.—B. H., *Gen.*, 547, n. 245.

young linear or oblong, compressed, terminated by style). Seeds distant.—Trees; leaves alternate imparipinnate; leaflets alternate; stipels minute or 0; stipules very caducous or inconspicuous; flowers,<sup>1</sup> in short, axillary or lateral, racemes, scattered along rachis; bracts and bractlets small” (*South America*<sup>2</sup>).

178. *Andira* LAMK.<sup>3</sup>—Calyx gamosepalous; teeth 5, short or nearly absent. Standard suborbicular or obovate, tapering at base into a claw; wings and keel-petals (the latter dorsally imbricated); nearly similar, oblong. Stamens 10, 1-adelphous or oftener 2-adelphous (9–1); anthers versatile. Germen subsessile or oftener stipitate; ovules 1 or oftener 2–4; style short curved; apex minute stigmatiferous. Fruit drupaceous,<sup>4</sup> ovoid or obovoid, often rather compressed; mesocarp more or less fleshy; endocarp thick woody indehiscent, 1-seeded. Seed descending; embryo very fleshy, thick exalbuminous; cotyledons plano-convex; radicle short straight superior.—Trees; leaves imparipinnate; leaflets opposite or alternate; stipels small setaceous or 0; stipules narrow or minute; flowers<sup>5</sup> scattered or cymose, usually crowded, on much branched terminal racemes; pedicels very short; bracts and bractlets short caducous (*Tropical America*<sup>6</sup> and *Africa*<sup>7</sup>).

179? *Geoffræa* L.<sup>8</sup>—Flowers nearly of *Andira*; teeth or lobes of calyx nearly equal or 2 superior connate to a greater height. Stamens 10, 2-adelphous (9–1). Germen sessile or shortly stipitate; ovules few descending. Fruit drupaceous (nearly of *Andira*), ovoid obovoid or globose. Seed 1 (of *Andira*).—Large or small trees; leaves imparipinnate; leaflets alternate or subopposite; stipels rarely conspicuous; stipules acute or acuminate; flowers<sup>9</sup>

<sup>1</sup> “Yellow or whitish, mixed with red or violet; petals glabrous.”

<sup>2</sup> Species 3. BENTH., in *Mart. Fl. Bras., Papil.*, 270, t. 95.

<sup>3</sup> *Dict.*, i. 171 (part.); *Suppl.*, i. 348; *Ill.*, t. 604.—DC., *Prodr.*, ii. 475.—SPACH, *Suit. à Buffon*, i. 135.—ENDL., *Gen.*, n. 6726.—B. H., *Gen.*, 550, n. 255.—*Lumbricidia* VELLOZ., *Fl. Flum.*, vii. t. 104, 105.—? *Poltolobium* PRESL, *Bot. Bem.*, 63 (ex BENTH., *loc. cit.*).

<sup>4</sup> Like those of the *Prunææ*.

<sup>5</sup> Pink or violet, sweet-scented.

<sup>6</sup> Species about 15. H. B. K., *Nov. Gen. et*

*Spec.*, vi. 385.—BENTH., in *Ann. Wien. Mus.*, ii. 107; in *Journ. Linn. Soc.*, iv. *Suppl.*, 118; in *Mart. Fl. Bras., Papil.*, 291, t. 109–116.—GRISEB., *Pl. Cub. Wright.*, i. 179.

<sup>7</sup> Species 1 or 2. H. BN., in *Adansonia*, vi. 219, note 1.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 246.

<sup>8</sup> *Gen.*, n. 878.—B. H., *Gen.*, 551, n. 256.—*Geoffroya* DC., *Prodr.*, ii. 476.—ENDL., *Gen.*, n. 6725.—? *Acowroa* AUBL., *Guian.*, iii. 753 (part.).—*Drakensteinia* NECK., *Elem.*, n. 1344.—*Umari* MARCG., *Bras.*, 121 (ex ENDL.).

<sup>9</sup> Yellow, usually fetid.

racemose; racemes axillary simple or subfascicled at extremities of twigs; bracts caducous; bractlets minute or 0<sup>1</sup> (*Tropical America*<sup>2</sup>).

180. *Coumarouna* AUBL.<sup>3</sup>—Receptacle cupuliform, lined by a disk. Calyx gamosepalous; lobes 5, very unequal; 2 superior equal to each other, valvate large wing-like subcoriaceous; 3 inferior very small, rather thick, connate into a 3-toothed or subentire lip. Petals very dissimilar; standard broadly obovate, orbicular, or ovate, emarginate 2-fid; wings oblong or falcate, oblique, often 2-fid or emarginate; petals of keel nearly similar to wings, free or dorsally cohering. Stamens 10, 1-adelphous; filaments connate into a sheath longitudinally cleft above; anthers versatile; 5 alternate often shorter or abortive. Germen supported on a compressed stalk; ovule 1, descending; style slender, inflexed or curved; apex minutely capitate stigmatiferous. Fruit drupaceous ovoid, rather compressed; endocarp woody, very thick, indehiscent (or subdehiscent?), 1-seeded. Seed descending; radicle short, nearly straight.—Trees; leaves opposite or alternate, subparipinnate; leaflets opposite or alternate; rachis often narrowly winged; stipules minute or 0; flowers<sup>4</sup> in compound much branched terminal racemes; bracts small caducous; bractlets larger, nearly similar to large sepals, often valvate inclosing younger buds, caducous (*Tropical America*<sup>5</sup>).

181. *Pterodon* Vog.<sup>6</sup>—Flowers of *Coumarouna*; 2 sepals large wing-like membranous petaloid, closely valvate. Corolla and 1-adelphous stamens of *Coumarouna*; anthers uniform. Germen stipitate or more rarely sessile (of *Coumarouna*). Fruit drupaceous, ovate or oblong, flattened, more or less oblique; sarcocarp thin oily; endocarp woody, separating from exocarp on maturity, tapering all

<sup>1</sup> This genus ought rather to be considered a section of *Andira*.

<sup>2</sup> Species 4 or 5. JACQ., *Amer.*, 207.—H. B. K., *Nov. Gen. et Spec.*, vi. 379.—H. B., *Plant. Equin.*, ii. 69, t. 100.—BENTH., in *Hook. Journ.*, ii. 69; in *Journ. Linn. Soc.*, iv. Suppl., 123; in *Mart. Fl. Bras., Papil.*, 299, t. 117.

<sup>3</sup> *Guian.*, 740, t. 296 (1775).—J., *Gen.*, 364.—H. BN., in *Adansonia*, ix. 214.—*Coumarouna* LAMK., *Ill.*, t. 601.—*Baryosma* GÆRTN., *Fruct.*, ii. 73, t. 93.—PERS., *Syn.*, ii. 278.—*Henizia* SCOP., *Introd.*, n. 1270 (1777).—*Taralea* AUBL., *op. cit.*, 745, t. 298.—*Bolducia* NECK., *Elem.*, n. 1342.—*Dipteryx* SCHREB., *Gen.*, 845 (1789-

91).—DC., *Prodr.*, ii. 477.—SPACH, *Suit. à Buffon*, i. 141.—ENDL., *Gen.*, n. 6728.—B. H., *Gen.*, 551, n. 257.

<sup>4</sup> Violet or pink, often handsome.

<sup>5</sup> Species 8. BENTH., in *Ann. Wien. Mus.*, ii. 110; in *Hook. Journ.*, ii. 235; in *Journ. Linn. Soc.*, iv. Suppl., 124; in *Mart. Fl. Bras., Papil.*, 300, t. 118, 119.—TUL., in *Arch. Mus.*, iv. 100.

<sup>6</sup> In *Linnaea*, xi. 384.—ENDL., *Gen.*, n. 6730.—B. H., *Gen.*, 551, n. 258.—*Commilobium* BENTH., in *Ann. Wien. Mus.*, ii. 110.—ENDL., *Gen.*, n. 6729.

round margin into a woody or submembranous wing, 1-seeded. Embryo fleshy; radicle straight or slightly inflexed.—Trees; leaves paripinnate; leaflets opposite or alternate, exstipellate; last leaflet subterminal; stipules small or 0; flowers<sup>1</sup> in a much branched terminal raceme bearing leaves at base; bracts and bractlets membranous, similar to larger lobes of calyx, deciduous<sup>2</sup> (*South America*<sup>3</sup>).

182. **Euchresta** BENN.<sup>4</sup>—Receptacle unevenly cupuliform, posteriorly gibbous, lined by a thin disk. Calyx gamosepalous; teeth 5, nearly equal. Corolla almost that of *Coublandia*; petals long-unguiculate. Stamens 10, 2-adelphous (9–1); anthers versatile. Germen long-stalked; ovules 1, 2, descending; style slender curved; apex minute stigmatiferous. Legume ovoid stipitate shining, papery and fragile when dry, indehiscent. Seed 1; embryo exalbuminous; radicle short straight superior.—Shrubs, glabrous; leaves alternate imparipinnate; leaflets 3–7, rather thick; stipules minute caducous; flowers<sup>5</sup> in axillary and terminal racemes; bracts narrow; pedicel usually geniculate below flower (*Further India, Indian Archipelago, Japan*<sup>6</sup>).

183. **Fissicalyx** BENTH.<sup>7</sup>—“Calyx-tube turbinate; limb acuminate, entire or very shortly 2-toothed, sometimes cleft spathe-like on anthesis. Petals inserted with stamens at top of tube; standard ovate; wings obliquely oblong, free; petals of keel nearly similar to and a little smaller than wings, free. Stamens all connate into a sheath cleft above; anthers versatile, 2-porous at apex. Germen shortly stipitate, 2-ovulate; style filiform; stigma minute terminal. Legume flat, narrow itself, but oval-elliptical with its wings indehiscent; sutures slightly projecting; edges longitudinally and broadly winged at middle. Seed pendulous; hilum small; radicle short straight superior.—A tree; leaves alternate imparipinnate;

<sup>1</sup> Whitish, pink, or pale lilac, often handsome.

<sup>2</sup> This genus ought, perhaps, rather to be considered a section of *Coumarouna*, with membranous calyx and fruit tapering at margin.

<sup>3</sup> Species about 4. MOBIC., *Pl. Nouv. Amér.*, t. 62 (*Commilobium*).—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 127; in *Mart. Fl. Bras., Papil.*, 304, t. 120, 121.

<sup>4</sup> *Plant. Jav. Rar.*, 148, t. 31.—ENDL., *Gen.*, n. 6727.—B. H., *Gen.*, 551, n. 254.

<sup>5</sup> White.

<sup>6</sup> Species 2. LUSCHEN., in *Ann. Mus.*, xvi. 481, t. 12 (*Andira*).—DC., *Prodr.*, ii. 476, n. 6 (*Andira*?).—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 117.

<sup>7</sup> In *Journ. Linn. Soc.*, v. 78; in *Trans. Linn. Soc.*, xxiii. 389, t. 39.—B. H., *Gen.*, 552, n. 259.

leaflets opposite exstipellate; flowers<sup>1</sup> crowded along twigs of a terminal panicle; bracts minute; bractlets small persistent" (*Venezuela*<sup>2</sup>).

184. **Bocoa** AUBL.<sup>3</sup>—Flowers polygamous. Receptacle minute concave, lined by a thin disk. Calyx tubular or subcampanulate; teeth 2–5, irregular unequal. Petals 5, either nearly free or connate at base into a tube with base of stamens, nearly equal, linear, exerted, corrugated above, imbricated in æstivation; highest outermost. Stamens 10; 5 alternate longer; filaments connate into a tube with or without petals; anthers short didymous introrse 2-rimose. Germen (rudimentary in male flower) sessile or shortly stipitate; ovules 2 or few, descending; style short; apex obliquely dilated, stigmatiferous. Fruit subdrupaceous or coriaceous, obliquely obovate or curved, 1-seeded, finally 2-valved. Seed exalbuminous; embryo thick; cotyledons fleshy; radicle short curved.—Trees, unarmed; leaves simple coriaceous; petiole short; stipules small; flowers<sup>4</sup> in axillary spikes; bracts small deciduous 1-flowered; bractlets persistent for a longer time (*Guiana, Pacific Ocean*<sup>5</sup>).

185. **Lonchocarpus** H. B. K.<sup>6</sup>—Flowers almost those of *Coublandia* or *Milletia*; calyx evenly truncate or very shortly 5-toothed. Standard often silky, bare or 2-appendiculate at base above claw; wings oblique, slightly adherent to keel above claw. Stamens 10, 2-adelphous at base, afterwards connate into a closed tube. Germen subsessile or stipitate; ovules 2–∞; style curved slender; apex minute stigmatiferous. Legume indehiscent, oblong or elongated, flat, membranous or coriaceous (*Sphinctolobium*<sup>7</sup>); style terminal; sutures not winged; superior suture traversed by a nerve on each

<sup>1</sup> "Orange-coloured."

<sup>2</sup> Species 1. *F. Fendleri* BENTH., *loc. cit.*

<sup>3</sup> *Guian.*, Suppl., 38, t. 391 (1775).—BENTH., in *Journ. Linn. Soc.*, vi. 146.—H. BN., in *Adansonia*, ix. fasc. 7.—*Inocarpus* FORST., *Char. Gen.*, 65, t. 33 (1776).—GÆRTN., *Fruct.*, iii. 114, t. 199, 200, fig. 1.—ENDL., *Gen.*, n. 2017.—B. H., *Gen.*, 552, n. 260.—*Aniotum* SOLAND., mss. (ex ENDL., *loc. cit.*).—*Etaballia* BENTH., in *Hook. Journ.*, ii. 99.—HOOK., *Icon.*, t. 453.—? *Inodaphnis* MIQ., *Fl. Ind. Bat.*, Suppl., i. 357 (ex BENTH.; *Chrysobalanea*, ex MIQ., in *Ann. Mus. Lugd.-Bat.*, iii. 89).

<sup>4</sup> Small, yellow.

<sup>5</sup> Species 3 or 4, of which 1 belongs to the Old World. ROXB., *Pl. Coromand.*, iii. t. 263.—BL., *Bijdrag.*, 551.—GUILLEM., *Zeph. Tait.*, in *Ann. Sc. Nat.*, sér. 2, vii. 246.

<sup>6</sup> *Nov. Gen. et Spec.*, vi. 383 (part.).—DC., *Prodr.*, ii. 259 (part.).—ENDL., *Gen.*, n. 6544.—B. H., *Gen.*, 548, n. 249.—? *Clompanus* AUBL., *Guian.*, 773.—*Philenoptera* FENZL., in *Flora* (1844), 312.—*Capassa* KL., in *Pet. Mossamb.*, *Bot.*, 27, t. 5.

<sup>7</sup> VOG., in *Linnæa*, xi. 417.

side, more rarely thickened dilated (*Neuroscapha*<sup>1</sup>). Seeds 1-∞, suborbicular or reniform, compressed.—Trees or climbing shrubs; leaves imparipinnate; leaflets opposite, rarely stipellate; stipules small or linear; flowers<sup>2</sup> in simple or branched racemes; pedicels in pairs or fascicled along rachis, more rarely scattered; bracts and bractlets caducous or persistent<sup>3</sup> (*Tropical America, Africa, and Australia*<sup>4</sup>).

185a. *Xanthocercis* H. BN.<sup>5</sup>—Receptacle shortly cupuliform, lined by a thin disk. Calyx gamosepalous subcampanulate, entire and evenly truncate or more rarely obscurely 5-toothed. Corolla papilionaceous; 4 inferior petals nearly similar, free, oblong, subspathulate, tapering for a considerable distance at base, slightly unsymmetrical; standard nearly equal in length to wings; claw broader rather fleshy; limb subobovate, shortly 2-auriculate at base, outermost in bud; stamens 10, slightly 2-adelphous; vexillary stamen entirely free, tapering at base; 9 others connate close to base, deciduous; 5 alternipetalous filaments larger, furnished outside at base with a scale; scales connate to a variable height and unequally crenate or torn at apex (as in the *Simarubeæ*); anthers uniform, ovate, introrse, 2-rimose versatile. Germen shortly stipulate; style short subulate; apex not thickened, stigmatiferous; ovules ∞, obliquely descending. Fruit (when unripe) surrounded at base by persistent calyx, apiculated by style, elongated subcylindrical ∞-seeded indehiscent.—A tree; leaves alternate paripinnate; 2 last leaflets opposite; remainder alternate; all petiolate entire; stipules minute, scarcely visible; flowers in branched terminal and axillary racemes; bracts alternate 1-flowered; bractlets 2, small caducous, inserted at middle of pedicel (*Madagascar*<sup>6</sup>).

186. *Piscidia* L.<sup>7</sup>—Flowers of *Lonchocarpus*. Legume linear

<sup>1</sup> TUL., in *Ann. Sc. Nat.*, sér. 2, xx, 137; in *Arch. Mus.*, iv, 75, t. 6.

<sup>2</sup> Whitish, violet, or purple; standard often silky; calyx often cyathiform after anthesis.

<sup>3</sup> This genus, but for its indehiscent legume, has all the characters of *Milletia* (p. 259). Closely allied, too, are *Gliricidia* (p. 262), *Pongamia* and *Deguelia* (p. 328).

<sup>4</sup> Species about 50. BENTH., in *Journ. Linn. Soc.*, iv, Suppl., 85; in *Mart. Fl. Bras., Papil.*,

t. 99-106; *Fl. Austral.*, ii, 271.—H. BN., in *Adansonia*, vi, 220.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii, 241.

<sup>5</sup> *Adansonia*, ix, 293.

<sup>6</sup> Species 1. *X. madagascariensis*.

<sup>7</sup> *Gen.*, n. 856.—LAMK., *Dict.*, i, 433; Suppl., i, 663; *Ill.*, t. 605; DC., *Prodr.*, ii, 267.—ENDL., *Gen.*, n. 6723.—B. H., *Gen.*, 550, n. 252.—*Ichthyomethia* P. BR., *Jam.*, 276.

plano-compressed,  $\infty$ -seeded, longitudinally 4-winged, each suture transversely produced at each side into a broad membranous veined wing, seeds oval compressed.—A tree; leaves and inflorescences<sup>1</sup> of *Lonchocarpus*; bracts caducous; bractlets 2, lateral, inserted on pedicel, opposite subelliptical subcoriaceous<sup>2</sup> (*Mexico, Florida, West Indies*<sup>3</sup>).

187. *Coublandia* AUBL.<sup>4</sup>—Receptacle depressed obconical, slightly oblique, lined by a disk. Calyx gamosepalous, broadly tubular, either evenly truncate or very shortly 5-toothed. Petals unguiculate; standard suborbicular or broadly ovate, exappendiculate; wings unevenly oblong, slightly adhering to keel; keel curved obtuse. Stamens 10, 2-adelphous (9-1) at base; vexillary stamen afterwards closely connate with remainder into a closed tube; anthers versatile, minutely apiculate. Germen shortly stipitate; ovules  $\infty$ ; style slender curved; apex minute stigmatiferous. Legume either moniliform thick fleshy-corky subterete, constricted between seeds, or by abortion subglobose 1-seeded, indehiscent. Seeds subovoid, scarcely compressed, laterally affixed; embryo fleshy; radicle inflexed.—Trees; leaves alternate imparipinnate; leaflets opposite; stipules very small; flowers<sup>5</sup> in axillary or lateral racemes, scattered or in pairs along rachis; bracts and bractlets very small, caducous (*Mexico, South America*<sup>6</sup>).

188. *Platymiscium* Vog.<sup>7</sup>—Receptacle obtuse or turbinate at base, lined by a disk. Calyx gamosepalous, shortly and nearly equally 5-toothed. Corolla almost that of *Pterocarpus*; wings free; keel straight or slightly curved, petals dorsally connate at apex. Stamens 10, either 1-adelphous, sheath cleft above, or more rarely 2-adelphous; anthers versatile; cells often confluent at apex. Germen long-stalked, inserted in bottom of receptacle; ovule 1, descending;

<sup>1</sup> Flowers whitish mixed with blood-red; calyx coloured.

<sup>2</sup> This genus ought perhaps rather to be considered a section of *Lonchocarpus*.

<sup>3</sup> Species 1 *P. Erythrina* L., *Spec.*, 993.—H. B. K., *Nov. Gen. et Spec.*, vi. 382.—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 116.—*Erythrina piscipula* L., *Spec.*, ed. 1, 107.

<sup>4</sup> *Guian.*, 937, t. 300 (fruct.), 356 (1775).—J., *Gen.*, 352.—H. BN., in *Adansonia*, ix. fasc. 7.—*Muellera* L. F., *Suppl.*, 53 (1781).—J., *loc.*

*cit.*—DC., *Prodr.*, ii. 259.—ENDL., *Gen.*, n. 6735.—B. H., *Gen.*, 550, n. 253.—*Cyanobotrys* ZUCC., *Pl. Nov.*, fasc. v. 30, t. 5 (ex BENTH.).

<sup>5</sup> Violet or whitish.

<sup>6</sup> Species 2. MIQ., *Stirp. Surin.*, t. 4.—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 117; in *Mart. Fl. Bras., Papil.*, 290, t. 108.

<sup>7</sup> In *Linnaea*, xi. 198.—ENDL., *Gen.*, n. 6720.—B. H., *Gen.*, 548, n. 246.

<sup>8</sup> Petals glabrous.



style curved subulate; apex not thickened, stigmatiferous. Legume stipitate oblong flat, membranous or subcoriaceous, smooth indehiscent; margins thin or nerviform. Seed large plano-compressed subreniform.—Trees or shrubs; leaves opposite or in verticils of 3–4, imparipinnate; leaflets opposite; stipules rather thick, caducous; flowers<sup>1</sup> racemose; racemes in threes or single 3-fid at nodes of last year's branches; bracts and bractlets small, or rather large and inserted at top of pedicel (*Tropical America*<sup>2</sup>).

189? *Behaimia* GRISEB.<sup>3</sup>—Calyx gamosepalous sub-2-labiate; lobes 5, short; 2 superior connate to a greater height. Petals long-unguiculate; standard orbicular reflexed; wings spathulate-oblong; keel-petals free oblique, nearly similar to wings. Stamens 10, 2-adelphous (9–1); 9 inferior connate into a sheath cleft above; 2 posterior of these connate to a less height than others or scarcely at all; anthers versatile. Germen sessile; ovules few (usually 6); style slender subulate; apex minute stigmatiferous. Legume sessile oblong-elliptical flat submembranous, acute at both ends. Seeds usually 1, funiculate reniform, much compressed.—A lofty tree or a shrub; leaves alternate imparipinnate; leaflets opposite exstipellate; stipules minute scale-like obtuse; flowers racemose; racemes simple or branched, terminal and springing from axils of higher leaves of twigs; bracts narrow 1-flowered; bractlets minute, inserted at top of pedicel below flower<sup>4</sup> (*Cuba*<sup>5</sup>).

190. *Ostryocarpus* Hook. f.<sup>6</sup>—Flowers almost those of *Dalbergia*; calyx subtruncate; teeth small. Standard broadly rhomboidal; wings free; keel curved obtuse, petals dorsally connate. Stamens 10, 2-adelphous (9–1). Germen pauciovulate. Legume suborbicular plano-compressed coriaceous wingless, apiculate by terminal style, indehiscent. Seed broadly oblong, transverse plano-compressed.—A sarmentose shrub; leaves alternate imparipinnate; leaflets opposite; flowers<sup>7</sup> in compound much branched axillary

<sup>1</sup> Yellow.

<sup>2</sup> Species 12 or 13. BENTH., in *Ann. Wien. Mus.*, ii. 104; in *Seem. Herald.*, 121, t. 21; in *Journ. Linn. Soc.*, iv. Suppl., 80; in *Mart. Fl. Bras., Papil.*, 271, t. 96, 97.

<sup>3</sup> *Cat. Plant. Cub.*, 77.—B. H., *Gen.*, 1002, n. 246 a.

<sup>4</sup> This genus ("in habit somewhat resembling *Ateleia*," BENTH.) is allied to *Platymiscium* and *Hymenolobium*, while by its fruit and flowers it comes very near to *Dalbergia*.

<sup>5</sup> Species 1. *B. cubensis* GRISEB., *loc. cit.*, 78

<sup>6</sup> *Niger*, 316.—B. H., *Gen.*, 548, n. 248.

<sup>7</sup> Yellowish white.

racemes; bracts and bractlets small deciduous (*Western tropical Africa*<sup>1</sup>).

191. *Hymenolobium* BENTH.<sup>2</sup>—Flowers almost those of *Platymiscium*. Calyx truncate at apex, obscurely and sinuately toothed. Germen pluriovulate. Legume oblong or linear-oblong, flat membranous indehiscent, traversed by branched veins of which 2, larger than remainder, are almost parallel to margins near base. Seed 1, plano-compressed, transversely oblong; embryo exalbuminous; radicle short inflexed.—A tree; leaves alternate imparipinnate; leaflets opposite; stipules linear or lanceolate, caducous; flowers<sup>3</sup> loosely paniced on leafless branches; bracts and bractlets small caducous (*Tropical America*<sup>4</sup>).

192. *Pongamia* VENT.<sup>5</sup>—Receptacle short cupuliform. Calyx sacciform; teeth 5; very obtuse or evanescent. Corolla nearly of *Dalbergia* or *Ostryocarpus*; wings adhering at middle to obtuse keel. Stamens 10, 2-adelphous (9-1) at base; vexillary stamen sometimes connate at middle with remainder into a closed tube; anthers versatile. Germen sessile; ovules 2; style slender curved; apex more or less capitate, stigmatiferous. Legume more or less obliquely oblong, plano-compressed, thickly coriaceous or subcarnose, 1-seeded indehiscent; sutures obtuse bare.—A tree; leaves imparipinnate; leaflets opposite; stipules minute caducous; flowers<sup>6</sup> in axillary racemes, in groups of 2-4 along rachis; bracts very caducous; bractlets 2, inserted at middle of pedicel<sup>7</sup> (*Tropical Asia and Australia*<sup>8</sup>).

193. *Deguelia* AUBL.<sup>9</sup>—Flowers almost those of *Pongamia*;

<sup>1</sup> Species 1. *O. riparius* HOOK., *loc. cit.*—BENTH., in *Journ. Linn. Soc.*, iv. Suppl., 85, [and also *O. ? Welwitschii* BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 240].

<sup>2</sup> In *Journ. Linn. Soc.*, iv. Suppl., 84.—B. H., *Gen.*, 548, n. 247.

<sup>3</sup> Pink, rather large.

<sup>4</sup> Species 1. *H. nitidum* BENTH., in *Mart. Fl. Bras., Papil.*, 274, t. 98.

<sup>5</sup> *Jard. Malm.*, t. 28.—LAMK., *Ill.*, t. 600.—DC., *Prodr.*, ii. 416, n. 1.—ENDL., *Gen.*, n. 6713.—B. H., *Gen.*, 549, n. 251.—*Guadelupa* LAMK., *Dict.*, ii. 595.

<sup>6</sup> Whitish; standard very thinly silky outside.

<sup>7</sup> "This genus is scarcely distinct from *Lonchocarpus*" (BENTH.), and at the same time is

closely allied to section *Amphymenium* of *Pterocarpus*.

<sup>8</sup> Species 1. *P. glabra* VENT., *loc. cit.*—*P. grandifolia* ZOLL. & MOR., *Verz.*, 3.—L., *Spec.*, 1044 (*Robinia*).—W., *Spec.*, iii. 901 (*Dalbergia*).

<sup>9</sup> *Guian.*, 750 (1775), t. 300 (excl. fruct.).—LAMK., *Dict.*, ii. 266; *Ill.*, t. 603.—DC., *Prodr.*, ii. 422.—ENDL., *Gen.*, n. 6733.—H. BN., in *Adansonia*, ix. fasc. 7.—*Cylizoma* NECK., *Elem.*, n. 1343.—*Derris* LOUB., *Fl. Coch.*, ed. Ulyssip. (1790), 432.—DC., *Prodr.*, ii. 415.—ENDL., *Gen.*, n. 6732.—B. H., *Gen.*, 549, n. 250.—*Brachypterum* BENTH., in *Ann. Wien. Mus.*, ii. 101.—ENDL., *Gen.*, n. 6712.—*Aganope* MIQ., *Fl. Ind. Bat.*, i. p. 1, 151.

wings sometimes adherent to slightly curved keel above claw. Germen sessile or shortly stipitate; ovules 2-∞. Legume obliquely orbicular, oblong or elongated, flat, membranous or coriaceous, indehiscent; style terminal; superior or both sutures narrowly winged. Seeds 1 or several, reniform, ovate, or orbiculate, compressed.—Trees or oftener climbing shrubs; leaves imparipinnate; leaflets opposite; flowers<sup>1</sup> in simple or branched racemes, solitary or in pairs or oftener fascicled along rachis; bracts and bractlets small, usually caducous (*Tropical Asia, eastern Africa and adjoining islands, Australia, tropical America*<sup>2</sup>).

## VIII. GENISTEÆ.

194. *Genista* T.—Receptacle small, slightly glandular. Calyx gamosepalous; 2 superior lobes free or more or less connate; 3 inferior connate into a 3-toothed lip. Corolla papilionaceous; standard subovate; wings oblong; keel curved or nearly straight, obtuse, laterally 2-gibbous; claws free or adnate to staminal tube. Stamens 10, 1-adelphous; tube closed; 5 alternate anthers shorter versatile; 5 others longer subbasifixed. Germen sessile; ovules 2-∞; style curved, inflexed, or more rarely circinate; apex capitate or oblique, stigmatiferous. Legume either subglobose or ovate, horny fleshy, indehiscent (*Baelia*); or slightly compressed, scarcely dehiscent (*Retama*); or subrhomboidal oblique or falcate oblong, 2-valved, valves hard (*Drymospartum, Voglera*); or linear or elongated, nearly straight, compressed, 2-valved, valves thin (*Corniola*); or more rarely obliquely oblong, turgid, straight or falcate (*Camptolobium*). Seeds 1-∞; embryo fleshy, sparingly or not albuminous; radicle inflexed.<sup>3</sup>—Shrubs or undershrubs; branches virgate rush-like (*Drymospartum*), or spinescent (*Voglera, Camptolobium*), sometimes leafless or with few 1-foliolate leaves (*Baelia, Retama*), sometimes virgate; leaves 1-3-foliolate, usually small; stipules minute or 0; flowers racemose, capitate, or fascicled at extremities of branches, solitary, few, or fascicled on lateral branches; bracts and bractlets small deci-

<sup>1</sup> White, pink, purple, or violet.

<sup>2</sup> Species about 40. ROXB., *Pl. Coromand.*, t. 192.—WALL., *Pl. As. Bar.*, t. 237.—WIGHT, *Icon.*, t. 87, 240, 244, 275.—DC., *Prodr.*, ii. 260, n. 13 (*Lonchocarpus*).—BENTH., in *Pl. Jungh.*, i. 252; in *Journ. Linn. Soc.*, iv. Suppl.,

101; in MART., *Fl. Bras., Papil.*, 287, t. 107.—THW., *Enum. Pl. Zeyl.*, 413.

<sup>3</sup> "The character of having estrophiolate seeds seems to us to accord pretty well with its habit, although there is a doubt about the matter in some species" (BENTH.).

duous or larger foliaceous and rather long-persistent (*Western Asia, northern Africa*). See p. 218.

195. **Spartium** L.<sup>1</sup>—Flowers of *Genista*; calyx spathe-like, shortly and unequally 5-toothed, sub-2-labiate, finally cleft posteriorly; standard large, rather thickened and glandular within a little above base; claws of wings and keel slender, adnate to staminal tube; petals of keel often pilose at inferior margin, free on anthesis; stigma oblong, decurrent inwards. Legume elongated linear glabrous flat, subseptate within between seeds, 2-valved. Seeds exarillate.—A shrub; branches rush-like, almost leafless; leaves alternate or sub-opposite, 1-3-foliolate; lateral leaflets very small, stipuliform; petiole short concave somewhat sheathing; flowers<sup>2</sup> in terminal racemes; bractlets 2, laterally inserted on receptacle below calyx; bracts and bractlets subulate, very caducous (*Mediterranean, Canary Islands*<sup>3</sup>).

196. **Laburnum** GRISEB.<sup>4</sup>—Flowers almost those of *Genista* or *Spartium*; calyx-teeth connate into 2 very short lips; claws of petals free. Legume sessile or distinctly stipitate (*Podocytisus*)<sup>5</sup> linear plano-compressed, continuous within, indehiscent or finally 2-valved. Seeds exarillate.—Trees or shrubs, glabrous or rather pubescent; leaves digitate 3-foliolate; stipules small narrow; flowers<sup>6</sup> in terminal racemes; bracts and bractlets very small (*Europe, Asia Minor*<sup>7</sup>).

197. **Calycotome** LINK.<sup>8</sup>—Flowers nearly of *Genista*; calyx short membranous, truncate or obsoletely denticulate. Legume linear-oblong plano-compressed, continuous within 2-valved; placenary suture much thickened, somewhat winged.—Shrubs, spinescent-branching leaves digitate 3-foliolate; stipules very small or

<sup>1</sup> *Gen.*, n. 858.—*J.*, *Gen.*, 353.—*DC.*, *Prodr.*, ii. 145.—*ENDL.*, *Gen.*, n. 6497.—*B. H.*, *Gen.*, 483, n. 63.—*Spartianthus* LINK, *Enum. Hort. Berol.*, ii. 223.—*SPACH*, *Suit. à Buffon*, i. 199.

<sup>2</sup> Yellow, handsome, very sweet-scented.

<sup>3</sup> Species 1. *S. junceum* L., *Spec.*, 955.—*SIBTH.*, *Fl. Græc.*, t. 671.—*SWEET*, *Brit. Fl. Gard.*, ser. 2, t. 390.—*BENTH.*, in *Mart. Fl. Bras.*, *Papil.*, 10.—*GRÉN. & GODR.*, *Fl. de Fr.*, i. 347.—*Bot. Reg.*, t. 1974.—*Bot. Mag.*, t. 85.—*Genista juncea* LAMK., *Dict.*, ii. 617, n. 6.—*G. odorata* MËNCH.—*Spartianthus junceus* LINK, *loc. cit.*

<sup>4</sup> *Spicil. Fl. Rum.*, i. 7.—*B. H.*, *Gen.*, 481, n. 59.

<sup>5</sup> *BOISS.*, *Diagn. Pl. Orient.*, ix. 7. (In *L. caramanicum* *BENTH.*, the legume is longer stalked, and quite indehiscent [ex *BOISS.*], while the superior suture has a rather broad wing.)

<sup>6</sup> Yellow.

<sup>7</sup> Species 3. *DC.*, *Prodr.*, ii. 153.—*JACQ. Fl. Austr.*, t. 306.—*VIS.*, *Fl. Dalmat.*, t. 54.—*GRÉN. & GODR.*, *Fl. de Fr.*, i. 359 (*Cytisus*).—*Bot. Mag.*, t. 176 (*Cytisus*).

<sup>8</sup> In *Schrad. Neue Journ. Bot.*, ii. p. 2, 50.—*ENDL.*, *Gen.*, n. 6505 b.—*B. H.*, *Gen.*, 481, n. 60.—*Calicotomon* *HOFFMANG.*, *Verz.*, 166.

inconspicuous; flowers<sup>1</sup> very shortly racemose subfascicled on short twigs among fascicles of leaves; bract 3-fid or 3-crenate, inserted at top of pedicel, embracing flower<sup>2</sup> (*Mediterranean*<sup>3</sup>).

198. *Adenocarpus* DC.<sup>4</sup>—Flowers almost those of *Genista*; 2 superior lobes of calyx nearly or quite free; 3 inferior more or less connate. Keel much curved or shortly beaked. Legume sessile linear compressed, glandular-tubercular or muricated outside, 2-valved.—Shrubs, villous or silky; branches often divaricated; leaves digitate 3-foliolate; stipules small setaceous or minute; flowers<sup>5</sup> in terminal racemes; bracts and bractlets small caducous or larger foliaceous and longer persistent (*Southern Europe, northern and tropical Africa, Canary Islands*<sup>6</sup>).

199. *Petteria* PRESL.<sup>7</sup>—Flowers nearly of *Genista* or *Laburnum*; calyx tubular; 2 superior lobes free, broadly falcate; 3 inferior connate into a 3-toothed lip. Petals adnate at base to staminal tube. Legume broadly linear, compressed subfalcate, continuous within, 2-valved; sutures scarcely thickened, wingless.—A shrub, almost glabrous; leaves digitate 3-foliolate; stipules small; flowers<sup>8</sup> in dense terminal racemes; bract inserted on pedicel, membranous caducous (*Dalmatia*<sup>9</sup>).

200. *Argyrolobium* ECKH. & ZEYH.<sup>10</sup>—Flowers almost those of *Cytisus*; calyx deeply cleft; 2 superior lobes connate or nearly free; 3 inferior connate into a 3-fid or 3-toothed lip. Keel obtuse Stamens 10, 1-adelphous; tube closed or more or less deeply longitudinally cleft above. Legume linear compressed, often narrowed at

<sup>1</sup> Yellow.

<sup>2</sup> "Bracts connate with bractlets?" (BENTH.).

<sup>3</sup> Species 3 or 4. T., *Inst.*, 648 (*Cytisus*).—L., *Spec.*, 997 (*Spartium*).—LAMK., *Dict.*, ii. 247 (*Cytisus*).—DC., *Prodr.*, ii. 154, n. 13, 14 (*Cytisus*).—SIBTH., *Fl. Græc.*, t. 673.—GREN. & GODR., *Fl. de Fr.*, i. 346.—*Bot. Reg.* (1846), t. 55.

<sup>4</sup> *Fl. Fr.*, Suppl., 549; *Prodr.*, ii. 158.—ENDL., *Gen.*, n. 6492.—B. H., *Gen.*, 481, n. 58.

<sup>5</sup> Yellow.

<sup>6</sup> Species 8. W., *Spec.*, iii. 837 (*Genista*).—SIBTH., *Fl. Græc.*, t. 704.—BOISS., *Voy.*, t. 41, 42.—WEBB, *Otia Hisp.*, t. 4; *Phyt. Canar.*, t. 50, 50 B.—GREN. & GODR., *Fl. de Fr.*, i. 363.—

BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 47.—*Bot. Mag.*, t. 426, 1387 (*Cytisus*).—WALP., *Rep.*, i. 624; ii. 838.

<sup>7</sup> *Bot. Bem.*, 139.—B. H., *Gen.*, 482, n. 61.

<sup>8</sup> Yellow.

<sup>9</sup> Species 1. *P. ramentacea* PRESL, *loc. cit.*—*Cytisus ramentaceus* SIEB., in *Flora*, v. 242.—*C. Weldenii* VIS., in *Flora*, xiii. 52; *Fl. Dalmat.*, t. 39.—*Bot. Reg.* (1843), t. 40.—WALP., *Ann.*, i. 223.

<sup>10</sup> *Enum.*, 184.—ENDL., *Gen.*, n. 6504.—B. H., *Gen.*, 480, n. 57.—*Gamochilum* WALP., in *Linnaea*, xiii. 509.—*Trichasma* WALP., *loc. cit.*, 510.—? *Chamaecytisus* VIS., *Fl. Dalmat.*, 272, t. 55 (ex BENTH.).

both ends, silky or villous (not glandular), either continuous and not torulose within (*Chasmona*<sup>1</sup>) or more or less septate between seeds,<sup>2</sup> sometimes marked with oblique lines or finally cleft, 2-valved.—Herbs, undershrubs, or more rarely shrubs, silky or villous; leaves digitate 3-foliolate; stipules rather large, free or connate close to base; flowers<sup>3</sup> terminal or leaf-opposed, solitary, geminate, subumbellate, or shortly racemose; bracts and bractlets usually small narrow (*Southern Europe, northern and southern Africa, western Asia, India*<sup>4</sup>).

201. *Lupinus*.<sup>5</sup>—Receptacle somewhat concave or nearly flat at apex, lined by a disk. Calyx gamosepalous 2-labiate; lobes unequal; 3 superior connate into a 2-toothed or 2-fid lip; 3 inferior connate into an entire, 3-toothed, or 3-fid lip, usually imbricated. Petals very dissimilar; standard orbicular or broadly ovate; wings falcate oblong or obovate, dorsally connate at apex, including curved beaked keel. Stamens 10; filaments all connate into a usually long tube; oppositipetalous anthers longer basifixed; alternipetalous short versatile. Germen subsessile 2-∞-ovulate, tapering at apex into curved glabrous style; stigma subterminal capitellate, apex slightly bearded on one side. Legume more or less compressed, usually silky or villous, completely or incompletely septate between seeds, 2-valved. Seeds shortly funiculate; hilum oblong or linear, often subarillate; embryo fleshy exalbuminous; radicle considerably inflexed.—Herbs, undershrubs, or rarely shrubs; leaves simple or digitate 3-∞-foliolate; stipules adnate to petiole at base; flowers<sup>6</sup> scattered or subverticillate in terminal racemes; bracts usually caducous; bractlets usually persistent, inserted at a variable height on receptacle and sometimes below calyx (*Northern, subtropical, and temperate America, Mediterranean*<sup>7</sup>).

<sup>1</sup> E. MEY., *Comm. Pl. Afr. Aust.*, 71 (part.).

<sup>2</sup> Section *Eremotobium* (BENTH., *loc. cit.*).

<sup>3</sup> Yellow.

<sup>4</sup> Species about 40, of which about 30 are South African. REICHB., *Pl. Crit.*, t. 259.—JACQUEM., *Voy.*, *Bot.*, t. 40.—BROT., *Phyt. Lusit.*, t. 69.—JACQ., *Hort. Schœnbr.*, ii. t. 220 (*Crotalaria*).—ANDR., *Bot. Bepos.*, t. 237 (*Cytisus*).—JAUB. & SPACH, *Ill. Pl. Orient.*, t. 59, 60.—HARV. & SOND., *Fl. Cap.*, ii. 67, 76.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 44.—GREN. & GODR., *Fl. de Fr.*, i. 363.—WALP., *Rep.*, ii. 840; v. 509; *Ann.*, i. 222; ii. 341; iv. 470.

<sup>5</sup> *Inst.*, 392, t. 213.—L., *Gen.*, n. 865.—J., *Gen.*, 354.—GÆRTN., *Fruct.*, ii. 324, t. 150.—LAMK., *Dict.*, iii. 620; Suppl., iii. 519; *Ill.*, t. 616.—DC., *Prodr.*, ii. 406.—SPACH, *Suit. à Buffon*, i. 341.—ENDL., *Gen.*, n. 6473.—B. H., *Gen.*, 480, n. 56.

<sup>6</sup> White, yellow, pink, blue, or variegated; often sweet-scented.

<sup>7</sup> Species about 50. K., *Mimos.*, t. 50-52.—SIBTH., *Fl. Græc.*, t. 684-686.—MORIS, *Fl. Sard.*, t. 72.—HOOK., *Icon.*, t. 511, 521.—J. E. AGARDH., *Syn. Gen. Lupin.*, Lundiae (1835).—

202. *Cytisus* L.<sup>1</sup>—Receptacle cupuliform or shortly turbinate, lined by a glandular disk. Calyx gamosepalous, sub-2-labiate; teeth or lobes short or very short, 2 superior often connate entirely or to a considerable height. Petals free or slightly connate at base with staminal tube; keel straight or curved, obtuse or subacuminate. Stamens all connate into a closed tube; 5 oppositipetalous anthers shorter versatile; 5 alternipetalous longer subbasifixed. Germen sessile or shortly stipitate, ∞-ovulate; style curved glabrous; stigma terminal, capitate or oblique. Legume oblong or linear, plano-compressed glabrous or villous, continuous or more rarely subseptate within, 2-valved. Seeds ∞, arillate.—Shrubs or small trees; branches rarely spinescent; leaves digitate 3-foliolate, more rarely 1-foliolate or minute bract-like; stipules minute setaceous or 0; flowers<sup>2</sup> racemose; racemes sometimes terminal elongated, sometimes short few-flowered and terminal or else lateral or subaxillary by abortion of wing; bracts small caducous or more rarely foliaceous and longer persistent, inserted either below pedicel or at a variable height on pedicel and sometimes with bractlets just below calyx<sup>3</sup> (*Europe, northern Africa, Canary Islands, western Asia*’).

203. *Ulex* L.<sup>5</sup>—Calyx 2-partite; upper lip shortly 2-toothed;

SEEM., *Herald*, t. 53.—WEDD., *Chlor. Andin.*, ii. 249, t. 79.—BENTH., in *Mart. Fl. Bras. Papil.*, 9, t. 1; in *Erst. Legum. Centroom.*, 1.—A. GRAY, in *Unit.-States Expl. Exp., Bot.*, 392.—GREEN. & GODR., *Fl. de Fr.*, i. 365.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 44.—WALP., *Rep.*, i. 595; ii. 836; v. 452;—*Ann.*, i. 205; ii. 308; iv. 462.

<sup>1</sup> *Gen.*, n. 877.—DC., *Prodr.*, ii. 153 (part.).—ENDL., *Gen.*, n. 6505.—B. H., *Gen.*, 484, n. 66 (incl. : *Lembotropis* GRISEB., *Sarothamnus* WIMM., *Spartocytisus* WEBB, *Sparothamnus* WEBB, *Telinaria* PRESL, *Teline* WEBB).

<sup>2</sup> White, yellow, or purple.

<sup>3</sup> BENTHAM divides this genus into 8 sections, according to the habit of calyx, style, and legume : 1. *Sarothamnus* (WIMM., *Fl. Schles.*, ed. 2, 148). Lips of calyx short divaricated denticulate, style curved or circinate. Branches virgate. Leaves 1-3-foliolate.—2. *Spartocytisus* (WEBB, *Phyt. Canar.*, 49, t. 46, 47). Calyx as in *Sarothamnus*. Style curved. Branches virgate. Leaves 0 or small 1-3-foliolate.—3. *Lembotropis* (GRISEB., *Spicil. Fl. Rumel.*, i. 10). Calyx as in *Sarothamnus*. Keel subrostrate, much curved. Aril small. Leaves all 3-foliolate.—4. *Eucytisus* (BENTH.). Calyx as in *Sarothamnus*. Keel

curved obtuse. Leaves all 3-foliolate.—5. *Tubocytisus* (DC.). Calyx tubular 2-labiate; upper lip 2-toothed or 2-fid; lower 3-toothed. Leaves all 3-foliolate.—6. *Teline* (WEBB, *Phyt. Canar.*, ii. 34, t. 43-45.—*Telinaria* PRESL, *Bot. Bem.*, 49, 135). Calyx short or tubular; 2 superior lobes connate or free; lower lip 3-toothed or 3-lobed. Leaves 1-3-foliolate.—7. *Pterospartum* (SPACH). Flowers as in *Teline*. Leaves phyllodineous, winged and decurrent along branches.—8. *Chronanthus* (DC.). Calyx teeth nearly free or connate into 2 lips. Legume included by marcescent petals, ovate or oblong, glabrous.

<sup>4</sup> Species about 35. JACQ., *Fl. Austr.*, t. 20, 21, 33, 387.—VENT., *Jard. Cels.*, t. 13.—DESF., *Fl. Atlant.*, t. 177, 181.—SIBTH., *Fl. Græc.*, t. 706.—ANDR., *Bot. Repos.*, t. 632.—WEBB, *Otia Hispan.*, t. 3, 39, 40; *Phyt. Canar.*, 45, 49, t. 46, 47, 49; ii. 34, t. 43-45.—BOISS., *Voy.*, i. 40, 40 A (*Sarothamnus*).—JAUB. & SPACH, *Ill. Plant. Orient.*, t. 153.—GREEN. & GODR., *Fl. de Fr.*, i. 348.—*Bot. Reg.*, t. 121, 308, 1191, 1502.—*Bot. Mag.*, t. 255, 1176, 1438, 1908, 2265.—WALP., *Rep.*, i. 632; ii. 845; *Ann.*, i. 222; ii. 342; iv. 470 (part.).

<sup>5</sup> *Gen.*, n. 881.—J., *Gen.*, 352.—GREEN., *Fruct.*, ii. 330, t. 151.—LAMK., *Dict.*, i. 71;

lower 3-toothed. Corolla of *Cytisus*. Stamens 10, 1-adelphous; 5 alternate anthers shorter versatile; 5 others longer subbasifixed. Germen  $\infty$ -ovulate; apex of style minutely capitate, stigmatiferous. Legume ovate, oblong, or more rarely elongated exerted (*Stauracanthus*<sup>1</sup>) or shortly linear, compressed or turgid, continuous within, 2-valved. Seeds arillate.—Shrubs, bristling with spinous branches; leaves reduced to scales or spinescent petioles, exstipulate; flowers<sup>2</sup> solitary or few racemose, in axils of scales or spines at extremities of twigs; bracts small, bractlets 2, short, inserted at top of pedicel below flower, or 0 (*Western Europe, north-western Africa*<sup>3</sup>).

204. **Erinacea** BOISS.<sup>4</sup>—Receptacle scarcely concave, minute glandular. Calyx membranous inflated;<sup>5</sup> teeth very nearly equal or 2 superior a little longer. Petals long-unguiculate, standard ovate, sub-2-auriculate at base; wings narrow; keel curved; claw of standard to a small height, claws of wings and keel to a much greater height adnate to staminal tube. Stamens 10, all connate to a considerable height into a closed tube; oppositipetalous anthers shorter versatile; alternipetalous longer subbasifixed. Germen sessile  $\infty$ -ovulate; style curved; apex minutely capitate stigmatiferous. Legume oblong glandular villous 2-valved. Seeds exarillate.—A low shrub; branches rigid spinescent bristling often almost leafless; leaves scattered minute silky, 1-foliolate or digitate 3-foliolate; flowers<sup>6</sup> solitary or in twos or threes, axillary towards extremities of branches; bracts and 2 small bractlets inserted below flower, foliaceous (*Spain*<sup>7</sup>).

205. **Hypocalpytus** THUNB.<sup>8</sup>—Calyx intruded at base; teeth short, nearly equal. Corolla almost that of *Cytisus*; standard callous within at very short claw, longer than or about equal to curved keel, more rarely shorter (*Loddigesia*<sup>9</sup>). Stamens 10, 1-adelphous; filaments

Suppl., i. 273; *Ill.*, t. 621.—DC., *Prodr.*, ii. 144.—SPACH, *Suit. à Buffon*, i. 197.—ENDL., *Gen.*, n. 6495.—B. H., *Gen.*, 483, n. 65.

<sup>1</sup> LINE, in *Schrad. Neue Journ.*, ii. p. 2, 52.—DC., *Prodr.*, ii. 144.—ENDL., *Gen.*, n. 6496.

<sup>2</sup> Yellow.

<sup>3</sup> Species about 10. WEBB, *Otia Hispan.*, 26, t. 18-38.—PL., in *Ann. Sc. Nat.*, sér. 3, xi. t. 9.—GREEN. & GODR., *Fl. de Fr.*, i. 344.—WALP., *Ann.*, ii. 339; iii. 846; iv. 466.

<sup>4</sup> *Voy.*, 145.—ENDL., *Gen.*, n. 6494.—B. H., *Gen.*, 483, n. 64.

<sup>5</sup> Which is the chief difference between *Erinacea* and section *Spartocarpus* of *Genista*.

<sup>6</sup> Pale violet.

<sup>7</sup> Species 1. *E. pungens* BOISS.—*Anthyllis erinacea* L., *Spec.*, 1014.—DC., *Prodr.*, ii. 169, n. 7.—SIMS, in *Bot. Mag.*, t. 676.—ANDR., *Bot. Repos.*, i. t. 15.—GREEN. & GODR., *Fl. de Fr.*, i. 345.

<sup>8</sup> *Prodr. Fl. Cap.*, 126; *Fl. Cap.*, 568 (part.).—DC., *Prodr.*, ii. 135.—ENDL., *Gen.*, n. 6477.—B. H., *Gen.*, 484, n. 67.

<sup>9</sup> SIMS, in *Bot. Mag.*, t. 965.—DC., *Prodr.*,



connate into a closed tube; five alternate anthers shorter versatile; 5 longer subbasifixed. Germen substipitate; ovules  $\infty$ ; style curved glabrous; stigma terminal. Legume linear flat, continuous within, 2-valved; sutures slightly thickened. Seeds  $\infty$ , shortly funiculate, arillate.—Shrubs, glabrous or scarcely pubescent; leaves digitate 3-foliolate; stipules free; flowers<sup>1</sup> in simple or branched terminal racemes; bracts and bractlets narrow (*Southern Africa*<sup>2</sup>).

206. *Crotalaria* L.<sup>3</sup>—Receptacle cupuliform, lined by a disk. Calyx gamosepalous; lobes 5, free or more or less cohering to two lips; præfloration valvate. Petals very dissimilar; standard orbicular or ovate, apex usually acute or shortly apiculate, at base (above short claw) glandular, callous or velvety within; wings obovate or oblong, shorter than standard, keel usually longer than wings, incurved or angulate down the back, apex rostrate. Stamens 10, connate into a sheath cleft above; vexillary stamen very rarely free or nearly so; 2 oppositipetalous anthers short versatile; 5 alternipetalous usually much longer, subbasifixed. Germen sessile or shortly stipitate, 2- $\infty$ -ovulate; style incurved or abruptly inflexed, apex truncate or more or less capitate, stigmatiferous more or less longitudinally bearded above. Legume oblong or globose, turgid or inflated, continuous within, 1- $\infty$ -seeded, 2-valved. Seeds very campylotropous; funicle slender, often elongated, hilum thickened into a short aril or exarillate.—Herbs or shrubs, leaves simple or digitately 3-, more rarely 5-7-foliolate; stipules lateral, of variable form, more rarely minute; flowers<sup>4</sup> in terminal or leaf-opposed, rarely few or 1-flowered, racemes; bracts small or 0, rarely foliaceous; bractlets 2 lateral; inserted at a variable height on pedicel, or on floral receptacle below calyx, rarely 0 (*All warm regions*<sup>5</sup>).

ii. 135.—ENDL., *Gen.*, n. 6476.—B. H., *Gen.*, 485, n. 68.

<sup>1</sup> Purple in *H. sophoroides*, which is *H. obovatus* of TRUNB., *Prodr.* (1794).—*Spartium sophoroides* BERG., *Descr. Pl. Cap.*, 198 (1767); pale in *H. (Loddigesia) ovalidifolia*.

<sup>2</sup> Species 2. L., *Mantiss.*, 266 (*Crotalaria*).—DELESS., *Icon. Sel.*, iii. 37, t. 63.—MAUND., *Bot.*, t. 198.—HARV. & SOND., *Fl. Cap.*, ii. 81, 82.—*Bot. Reg.*, t. 128.—*Bot. Mag.*, t. 1913 (*Crotalaria*).

<sup>3</sup> *Gen.*, n. 862 (part.).—J., *Gen.*, 354.—GERTN., *Fruct.*, ii. t. 148.—LAMK., *Dict.*, ii. 194; Suppl., ii. 400; *Ill.*, t. 617.—DC., *Prodr.*, ii. 124.—

ENDL., *Gen.*, n. 6472 (part.).—B. H., *Gen.*, 479, n. 53.—*Clavulum* DESVX., in *Ann. Sc. Nat.*, sér. 1, ix. 407.—*Maria-Antonia* PARL., *Nov. Gen.* (1844), ic.—*Chrysocalyx* GULL. & PERR., *Fl. Seneg. Tent.*, i. 157, t. 43.—*Phyllocalyx* HOCHST., ex A. RICH., *Fl. Abyss. Tent.*, i. 160, t. 34.

<sup>4</sup> Yellow, more rarely blue or purplish.

<sup>5</sup> Species about 100. H. B. K., *Nov. Gen. et Spec.*, vi. t. 590.—VENT., *Jard. Cels.*, t. 17.—ROXB., *Pl. Coromand.*, ii. t. 193.—WIGHT, *Icon.*, t. 29-31, 200, 208, 273, 383, 421, 480, 481, 752, 885, 980-982.—HOOK., *Icon.*, t. 372, 829, 830.—HARV. & SOND., *Fl. Cap.*, ii. 89.—

207. **Priotropis** WIGHT & ARN.<sup>1</sup>—Flowers of *Crotalaria*. Legume stipitate oblong plano-compressed, continuous within,  $\infty$ -seeded, 2-valved.—A shrub; leaves alternate, 3-foliolate; flowers<sup>2</sup> racemose. Other parts of *Crotalaria* (*Mountains of India*<sup>3</sup>).

208 ? **Pentadynamis** R. BR.<sup>4</sup>—Flowers almost of *Crotalaria*; “keel obtuse, gibbous towards base, equal to wings. Stamens 10, 2-adelphous (9-1); anthers, 5 larger linear, 5 ovate. Style straight from bowed base, bearded behind, stigma terminal obtuse. Legume. . . . ?—A herb (or undershrub), hoary-silky; stem erect angular; leaves 3-foliolate; flowers<sup>5</sup> racemose.” (*S. Australia*<sup>6</sup>).

209. **Heylandia** DC.<sup>7</sup>—Flowers of *Crotalaria*; 2 superior calyx-lobes shortly connate. Germen  $\infty$ -ovulate. Legume ovate compressed, continuous within, 2-valved. Seeds 1, 2, exarillate; funicles filiform.—A prostrate herb; leaves simple entire; flowers small solitary axillary (*India*<sup>8</sup>).

210. **Dichilus** DC.<sup>9</sup>—Calyx 2-lipped; upper lip 2-, lower 3-toothed. Standard ovate or suborbicular; wings obliquely oblong; keel longer than standard and wings, obtuse. Stamens of *Crotalaria*. Germen  $\infty$ -ovulate; style incurved glabrous; stigma terminal. Legume linear compressed subtorulose eglandular, with thin septa inside separating seeds, 2-valved. Seeds shortly funiculate, exarillate.—Erect slender undershrubs (not viscid); leaves digitately 3-foliolate; stipules inconspicuous; flowers<sup>10</sup> solitary at ends or in forkings of twigs; bractlets small (*S. Africa*<sup>11</sup>).

BENTH., in *Mart. Fl. Bras., Papil.*, 18, t. 1-4; *Fl. Austral.*, ii. 78.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 7.—*Bot. Reg.*, t. 253, 377, 447, 982, 1137.—*Bot. Mag.*, t. 490, 1933, 2027, 2561, 2714, 3006, 3034, 3200.—WALP., *Rep.*, i. 583; ii. 835; v. 435; *Ann.*, i. 204; ii. 314; iv. 459.  
<sup>1</sup> *Prodr.*, 180.—ENDL., *Gen.*, n. 6472? f.—B. H., *Gen.*, 480, n. 54.

<sup>2</sup> Yellow.

<sup>3</sup> Species 1. *P. cytisoides* WIGHT & ARN., *loc. cit.*—MIQ., *Fl. Ind. Bat.*, i. p. 1, 348.—BENTH., in *Hook. Journ.*, ii. 594.—WALP., *Ann.*, iv. 461.—*Crotalaria cytisoides* ROXB., *Cat. Hort. Calc.*, 54.—DC., *Prodr.*, ii. 131, n. 78.—*C. psoraloides* DON, *Prodr. Fl. Nepal.*, 242.

<sup>4</sup> In *App. Sturt Exped.*, 76.—B. H., *Gen.*, 480, n. 55.

<sup>5</sup> “Yellow.”

<sup>6</sup> Species 1 (probably a variety of *Crotalaria dissitiflora* BENTH., according to F. MUELL.).

<sup>7</sup> *Mém. Légum.*, 198, t. 34; *Prodr.*, ii. 123.—ENDL., *Gen.*, n. 6470.—B. H., *Gen.*, 479, n. 52.—*Goniogyne* DC., in *Ann. Sc. Nat.*, sér. 1, iv. 91.

<sup>8</sup> Species 1. PETIV., *Gaz.*, t. 30, fig. 11 (*Lens*).—W., *Spec.*, iii. 1169 (*Hallia*).—PERS., *Syn.*, ii. 318, n. 12 (*Lespedeza*).—WIGHT & ARN., *Prodr.*, i. 180.

<sup>9</sup> *Mém. Légum.*, 201, t. 35; *Prodr.*, ii. 136.—ENDL., *Gen.*, n. 6480.—B. H., *Gen.*, 479, n. 51.—*Calycotome* E. MEX., *Comm. Pl. Afr. Austr.*, 113 (nec LINK).—*Melinospermum* WALP., in *Linnaea*, xiii. 527.

<sup>10</sup> Yellow, with nodding pedicels.

<sup>11</sup> Species 3. HARV. & SOND., *Fl. Cap.*, ii. 51.

211. *Melolobium* ECKL. & ZEYH.<sup>1</sup>—Flowers almost of *Dichilus*; 2 superior lobes of short calyx free or connate. Corolla and sexual organs of *Dichilus*. Legume linear compressed, often torulose, villous or glandular, continuous inside or with thin septa separating seeds, 2-valved.—Branching shrubs or undershrubs, often spinescent, glandular-villous or viscid; leaves digitately 3-foliolate; flowers<sup>2</sup> in short terminal spikes or racemes; bracts and bractlets often foliaceous (*South Africa*<sup>3</sup>).

212. *Anarthrophyllum* BENTH.<sup>4</sup>—Calyx tubular; 2 superior lobes nearly free; lower more or less connate into a lip. Corolla of *Genista*. Stamens 10, 1-adelphous; filaments connate into a sheath cleft longitudinally above; anthers nearly uniform, or 5 shorter versatile, 5 longer subbasifixed. Germen sessile; ovules few; style incurved, apex capitate stigmatiferous. Legume oblique oblong or rhomboidal, compressed cuspidate, continuous within, 2-valved. Seeds funiculate exarillate.—Very bushy shrubs, often rigid heath-like; leaves small, subentire or 3-fid, often spinescent; stipules like leaf-lobes, adnate to dilated subamplexicaul base of petiole; flowers<sup>5</sup> solitary terminal, usually 2-bracteate (*Extra-tropical South America*<sup>6</sup>).

213. *Aspalathus* L.<sup>7</sup>—Calyx gamosepalous; lobes usually elongated, subequal or unequal. Corolla almost of *Genista*; keel incurved, obtuse or subrostrate. Stamens 10, 1-adelphous; filaments connate into a sheath split longitudinally above; anthers 2-form; 5 shorter versatile, 5 longer subbasifixed. Germen sessile or stipitate; 2-∞-ovulate; style incurved glabrous; stigma terminal minutely capitate or oblique. Legume of variable form, oblique at base, obliquely acute, compressed or somewhat turgid. Seeds 1-∞, funiculate exarillate.—Shrubs or undershrubs, heath-like or spinescent, more

<sup>1</sup> *Enum. Pl. Afr. Austr.*, 188.—ENDL., *Gen.*, n. 6485.—B. H., *Gen.*, 478, n. 50.—*Sphingium* E. MEY., *Comm. Pl. Afr. Austr.*, 65.

<sup>2</sup> Small, yellow.

<sup>3</sup> Species 11. HARV. & SONDR., *Fl. Cap.*, ii. 78.

<sup>4</sup> *Gen.*, 478, n. 49.

<sup>5</sup> "Yellow?"

<sup>6</sup> Species 4 or 5. DC., *Prodr.*, ii. 152, n. 75 (*Genista*).—HOOK., *Bot. Misc.*, iii. t. 103.—CLOS, in *C. Gay Fl. Chil.*, ii. 54.—WALP., *Rep.*, i. 629 (*Genista*).

<sup>7</sup> *Gen.*, n. 860.—J., *Gen.*, 353.—GÆRTN., *Fruct.*, ii. 304, t. 144.—LAMK., *Dict.*, i. 286; *Suppl.*, i. 482; *Ill.*, t. 620.—DC., *Prodr.*, ii. 138.—ENDL., *Gen.*, n. 6482.—B. H., *Gen.*, 478, n. 47.—*Sarcophyllum* THUNB., *Fl. Cap.*, 573.—*Sarcocalyx* WALP., in *Linnaea*, xiii. 479.—*Scaligeria* ADANS., *Fam. des Pl.*, ii. 323.—*Eriocalyx* NECK., *Elem.*, n. 1331 (incl.: *Cyphocalyx*, *Heterolathus*, *Pachyraphea*, *Paraspalathus*, *Plagiostigma*, *Psilolepus*, *Trineuria* PRESL., *Bot. Bem.*, 126, 131).

rarely somewhat fleshy; leaves simple or digitately 3-foliolate; leaflets sessile exstipellate on short or much reduced thick pulvinate or tuberculate petiole; flowers<sup>1</sup> in short or elongated terminal spikes, or more rarely solitary axillary or lateral; bracts and bractlets usually leaf-like (*South Africa*<sup>2</sup>).

214. *Buchenroedera* ECKL. & ZEYH.<sup>3</sup>—Flowers almost of *Aspalathus*; calyx gibbous behind; teeth short subequal. Legume a little longer than calyx, ovate obliquely acute, somewhat turgid. Seeds 1–3, exarillate.—Silky or villous herbs; leaves digitately 3-foliolate, petiolate; stipules foliaceous; flowers<sup>4</sup> in elongated or capituliform terminal spikes; bracts foliaceous (*South Africa*<sup>5</sup>).

215. *Lebeckia* THUNB.<sup>6</sup>—Flowers almost of *Aspalathus*; calyx oblique, with subequal teeth or short lobes. Keel acute or subrostrate and nearly equal to standard (*Eulebeckia*<sup>7</sup>) or longer (*Stiza*<sup>8</sup>), sometimes acute or subrostrate (*Sarcophyllum*<sup>9</sup>) often scarcely longer than wings (*Viborgioides*<sup>10</sup>), sometimes obtuse, longer than wings, and equal to or longer than standard (*Calobota*<sup>11</sup>). Stamens and pistil of *Aspalathus*. Legume linear flat (*Stiza*, *Sarcophyllum*), narrow terete (*Eulebeckia*), or terete or turgid (*Viborgioides*, *Calobota*),  $\infty$ -seeded, 2-valved.—Shrubs or undershrubs; branches virgate or spinescent; glabrous or silky; leaves simple or digitately 1–3-foliolate; stipules small or 0; flowers<sup>12</sup> in terminal, often unilateral racemes; bracts and bractlets small or 0<sup>13</sup> (*South Africa*<sup>14</sup>).

216. *Viborgia* THUNB.<sup>15</sup>—Flowers of *Lebeckia*; keel longer than

<sup>1</sup> White, yellow, red, or blue.

<sup>2</sup> Species about 150. BENTH., in *Hook. Journ.*, vii. 583.—HARV. & SONDR., *Fl. Cap.*, ii. 94.—*Bot. Mag.*, t. 344, 829, 1289, 2225, 2233, 2329.—WALP., *Rep.*, i. 609; ii. 837; *Ann.*, i. 207; ii. 320.

<sup>3</sup> *Enum. Pl. Afr. Austr.*, 194.—B. H., *Gen.*, 478, n. 48.—*Colobotus* E. MEX., *Comm. Pl. Afr. Austr.*, 156.—ENDL., *Gen.*, n. 6481.

<sup>4</sup> White or purplish.

<sup>5</sup> Species about 8. HARV. & SONDR., *Fl. Cap.*, ii. 92.

<sup>6</sup> *Prodr. Fl. Cap.*, 2; *Fl. Cap.*, 561.—DC., *Prodr.*, ii. 136.—ENDL., *Gen.*, n. 6478.—B. H., *Gen.*, 477, n. 45.—*Acanthobotrya* ECKL. & ZEYH., *Enum.*, 192.

<sup>7</sup> BENTH., *loc. cit.*, sect. 3.

<sup>8</sup> E. MEX., *Comm. Pl. Afr. Austr.*, 31.—WALP., in *Linnaea*, xiii. 476.

<sup>9</sup> E. MEX., *Comm. Pl. Afr. Austr.*, 32 (nec THUNB.).—Sect. *Phyllodiastrum* BENTH.

<sup>10</sup> BENTH., *loc. cit.*, sect. 5.

<sup>11</sup> ECKL. & ZEYH., *op. cit.*, 191.

<sup>12</sup> Yellow.

<sup>13</sup> BENTHAM divides this genus into 5 sections: viz. 1. *Stiza*, 2. *Phyllodiastrum*, 3. *Eulebeckia*, 4. *Calobota*, 5. *Viborgioides*.

<sup>14</sup> Species about 24. JACQ., *Hort. Schoenbr.*, t. 919 (*Crotalaria*).—ANDE., *Bot. Repos.*, t. 417.—*Bot. Mag.*, t. 1699.—HARV. & SONDR., *Fl. Cap.*, ii. 83.

<sup>15</sup> *Fl. Cap.*, 560 (*Wiborgia*).—DC., *Prodr.*, ii. 135.—ENDL., *Gen.*, n. 6479.—B. H., *Gen.*, 477, n. 46.

standard or subequal. Stamens of *Lebeckia*. Germen stipitate; ovules 2 or few; style incurved glabrous; stigma terminal. Legume stipitate, unequally ovate or oblong; placentary suture (or both) unequally winged; faces rugose, striate, or with wing-like crests.—Shrubs, with aspect and 3-foliolate leaves of *Lebeckia*; flowers<sup>1</sup> in terminal, often 1-lateral racemes; bracts and bractlets small or 0 (*South Africa*<sup>2</sup>).

217. *Rothia* PERS.<sup>3</sup>—Calyx gamosepalous narrow; lobes 5 subequal, or 2 superior a little broader. Corolla short; standard ovate oblong; wings narrow; petals of keel nearly free, resembling wings. Stamens 10, 1-adelphous; filaments connate into a sheath split above; anthers uniform. Germen sessile; ovules  $\infty$ ; style incurved finally straight, apex capitate stigmatiferous. Legume linear or linear-lanceolate, thin acute, continuous within, dehiscent as a follicle at vexillary suture. Seeds reniform; aril rudimentary.—Diffuse annual herbs; leaves digitately 3-foliolate, stipules 2, lateral free; flowers small, leaf-opposed, solitary or 2–4 on a pedicel; bracts and bractlets setaceous (*India, tropical Africa*<sup>4</sup>).

218. *Lotononis* DC.<sup>5</sup>—Calyx gamosepalous high up; lobes unequal; 4 superior rarely free, usually connate or coherent in pairs, lowest free often narrower. Standard suborbicular, ovate or oblong; wings oblique; keel incurved obtuse or more rarely acute. Stamens 10, 1-adelphous; filaments connate into a sheath split above; anthers 5 shorter versatile, 5 longer subbasifixed. Germen sessile or subsessile; ovules  $\infty$ ; style incurved; stigma subterminal, usually oblique. Legume more or less elongated, subcompressed or terete turgid, continuous within, 2-valved. Seeds exarillate.—Shrubs,

<sup>1</sup> Yellow.

<sup>2</sup> Species 7. DC., *Mém. Légum.*, t. 57, fig. 2.—E. MEY., *Comm. Pl. Afr. Austr.*, 28.—DELESS., *Icon. Sel.*, iii. 38, t. 64.—WALP., in *Linnaea*, xiii. 476.—HARV. & SONDR., *Fl. Cap.*, ii. 90.

<sup>3</sup> *Syn.*, ii. 638 (nec SCHREB.).—DC., *Prodr.*, ii. 382.—ENDL., *Gen.*, n. 6475.—B. H., *Gen.*, 477, n. 44.—*Westonia* SPRENG., *Syst.*, iii. 230.—*Dillwynia* ROTH., *Catalect.*, iii. 71 (nec SM.).—*Harpelema* JACQ. F., *Eclog.*, ii. t. 129 ined. (ex ENDL.).—*Gatzea* REICHB., *Consp.*, n. 3928.—*Xerocharpus* GUILL. & PERR., *Flor. Seneg. Tent.*, i. 169, t. 44.

<sup>4</sup> Species 2. WIGHT & ARN., *Prodr.*, 195.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 7.

<sup>5</sup> *Mém. Légum.*, 223; *Prodr.*, ii. 166 (*Ononidis* sect.).—ENDL., *Gen.*, n. 6487.—ECKL. & ZEYH., *Enum.*, 176.—B. H., *Gen.*, 476, n. 42.—*Leobordea* DEL., *Fragm. Fl. Arab.*, 23, fig. 1.—ENDL., *Gen.*, n. 6489.—*Leptis* ECKL. & ZEYH., *op. cit.*, 174.—ENDL., *Gen.*, n. 6486.—*Krebsia* ECKL. & ZEYH., *op. cit.*, 179.—ENDL., *Gen.*, n. 6490.—*Polylobium* ECKL. & ZEYH., *op. cit.*, 180.—ENDL., *Gen.*, n. 6488.—*Lipozygis* E. MEY., *Comm. Pl. Afr. Austr.*, 76.—*Capnitis* E. MEY., *loc. cit.*, 81.—*Aulacanthus* E. MEY., *loc. cit.*, 155.—? *Amphinomia* DC., *Prodr.*, ii. 522.

undershrubs or herbs; leaves 3-foliolate, more rarely 1- or 5-foliolate; stipules 2, or much oftener 1, 1-lateral, more rarely 0; flower terminal, leaf opposed, or more rarely beside the leaves, solitary racemose, or subumbellate (*South and North Africa, Mediterranean, Europe and Asia*<sup>1</sup>).

219. *Pleiospora* HARV.<sup>2</sup>—Flowers almost of *Lotononis*; keel oblong straight obtuse. Legume ovate-lanceolate compressed, continuous within, 2-valved.—A lofty shrub;<sup>3</sup> leaves digitately 3-foliolate; stipules 2, free; flowers in short capituliform spikes, terminal or (on short almost leafless floriferous twigs) axillary; bracts and bractlets narrow subulate (*South Africa*<sup>4</sup>).

220. *Listia* E. MEY.<sup>5</sup>—Flowers of *Lotononis*; keel incurved obtuse, longer than standard. Legume linear compressed, with transverse folds or bends, retracted within marcescent keel and calyx,  $\infty$ -seeded.—A prostrate herb; leaves digitately 3-foliolate; flowers<sup>6</sup> in terminal racemes; bracts small, bractlets minute or 0. Other parts of *Lotononis* (*South Africa*<sup>7</sup>).

221. *Rafnia* THUNB.<sup>8</sup>—Receptacle unequally cupuliform lined by a disk rather thick above. Calyx often sub-2-labiate, lobes unequal, lowest usually smaller, standard suborbicular glabrous thick-unguiculate; wings falcate; keel incurved beaked (*Vascoa*<sup>9</sup>) or obliquely beaked (*Edmannia*<sup>10</sup>), more rarely subfornicate broadly and obliquely truncate or emarginate (*Pelecynthis*<sup>11</sup>), or fornicate (*Caminotropis*). Stamens 10, 1-adelphous; filaments connate into sheath split longitudinally above; anther of 2 kinds (of *Lebeckia* or *Lotononis*). Germen sessile or stipitate; ovules 2- $\infty$ ; style incurved, at apex minutely capitate stigmatiferous. Legume linear or lanceolate, obliquely

<sup>1</sup> Species as many as 60. JAUB. & SPACH, *Ill. Plant. Orient.*, iii. t. 256 (*Leobordea*).—FENZL, in *Russ. Reis.*, t. 4.—E. MEY, *loc. cit.*, 67 (*Telina*), 69, 76, 155.—BOISS., *Voy.*, t. 52.—HARV. & SOND., *Fl. Cap.*, ii. 47.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 5.—WALP., *Rep.*, v. 455.

<sup>2</sup> *Thes. Cap.*, t. 81.—B. H., *Gen.*, 475, n. 41.

<sup>3</sup> With thick foliage and tawny silk, and the habit of many *Psoralea*.

<sup>4</sup> Species 1. *P. cajaniiflora* HARV., *loc. cit.*—HARV. & SOND., *Fl. Cap.*, ii. 47.

<sup>5</sup> *Comm. Pl. Afr. Austr.*, 80.—ENDL., *Gen.* n. 6491.—B. H., *Gen.*, 476, n. 43.

<sup>6</sup> Yellow.

<sup>7</sup> Species 1. *L. heterophylla* E. MEY., *loc. cit.*—HARV. & SOND., *Fl. Cap.*, ii. 66.

<sup>8</sup> *Fl. Cap.*, 563.—DC., *Prodr.*, ii. 118.—ENDL., *Gen.*, n. 6459.—B. H., *Gen.*, 475, n. 39 (incl.: *Edmannia* THUNB., *Pelecynthis* E. MEY., *Vascoa* DC.).

<sup>9</sup> DC., *Mém. Légum.*, 186; *Prodr.*, ii. 119.

<sup>10</sup> THUNB., in *Act. Holm.* (1800), 281, t. 4.

<sup>11</sup> E. MEY., *Comm. Pl. Afr. Austr.*, 13.—ENDL., *Gen.*, n. 6460.

acute compressed, continuous within, 2-valved; placentary suture marginate or narrowly winged. Seeds 1-∞ exarillate.—Shrubs or undershrubs, glabrous (often glaucescent); leaves simple entire exstipulate;<sup>1</sup> flowers<sup>2</sup> racemose or solitary terminal, or solitary in axils of leaf-like bracts; bractlets leafy or 0 (*South Africa*<sup>3</sup>).

222. *Euchlora* ECKL. & ZEYH.<sup>4</sup>—Flowers nearly of *Rafnia*, smaller; receptacle gibbous behind; 2 superior calyx-lobes a little the larger. Legume ovoid subturgid few-seeded 2-valved.—A perennial<sup>5</sup> prostrate villose herb; leaves simple exstipulate; flowers<sup>6</sup> in a short dense terminal raceme. Other parts of *Rafnia* (*South Africa*<sup>7</sup>).

223. *Borbonia* L.<sup>8</sup>—Calyx-lobes 5, subequal, acute or pungent. Petals more or less villous externally; standard suborbicular or obovate, keel incurved obtuse, usually with a rather prominent fold on both sides. Stamens and pistil of *Rafnia*. Legume linear or lanceolate, obliquely acute, compressed, continuous within, 2-valved; placentary suture bare marginate; valves coriaceous convex. Seeds 1-∞ exarillate.—Shrubs or undershrubs, glabrous or somewhat villous; leaves simple entire rigid coriaceous, ∞-ribbed exstipulate; flowers<sup>9</sup> solitary, racemose or capitate, terminal or leaf-opposed; bracts and bractlets coriaceous or setaceous (*South Africa*<sup>10</sup>).

224. *Boissæa* VENT.<sup>11</sup>—Receptacle slightly concave; calyx membranous 5-lobed; 2 superior lobes, much larger than rest, connate to a variable height into a lip. Petals unequal; standard broadly orbicular or reniform reflexed; wings unequally oblong, keel obtuse. Stamens, connate into a sheath cleft above; anthers uniform. Germen sessile or stipitate, few or ∞-ovulate; style uncurved; stigma

<sup>1</sup> Either 1-ribbed or net-veined, in *Vascoa* broadly amplexicaul.

<sup>2</sup> Yellow.

<sup>3</sup> Species about 22. VENT., *Jard. Malmais*, t. 48.—DELESS., *Icon. Sel.*, iii. 37, t. 62.—HARV., *Thes. Cap.*, t. 71, 72.—HARV. & SONDR., *Fl. Cap.*, ii. 31.—*Bot. Mag.*, t. 482.

<sup>4</sup> 1. *Enum.*, 171.—ENDL., *Gen.*, n. 6484.—B. H., *Gen.*, 475, n. 40.—*Microtropis* E. MEX., *Comm. Pl. Afr. Austr.*, 65.

<sup>5</sup> With habit of *Lotonosis*. <sup>6</sup> Purplish.

<sup>7</sup> Species 1. *E. serpens* ECKL. & ZEYH., *loc. cit.*—HARV. & SONDR., *Fl. Cap.*, ii. 39.—*Microtropis hirsuta* E. MEX., *loc. cit.*

<sup>8</sup> *Gen.*, n. 857.—LAMK., *Dict.*, i. 435; *Ill.*, t. 619.—DC., *Prodr.*, ii. 120.—ENDL., *Gen.*, n. 6461.—B. H., *Gen.*, 475, n. 38.

<sup>9</sup> Yellow.

<sup>10</sup> Species 13. JACQ., *Hort. Schœnbr.*, ii. t. 217, 218.—E. MEX., *Comm. Pl. Afr. Austr.*, 15.—*Bot. Mag.*, t. 274, 2128.—HARV. & SONDR., *Fl. Cap.*, ii. 563.

<sup>11</sup> *Jard. Cels.*, t. 7.—DC., *Prodr.*, ii. 116.—ENDL., *Gen.*, n. 6455.—B. H., *Gen.*, 473, n. 34.—*Scottee* R. BR., in *Art. Hort. Kew.*, ed. 2, iv. 269.—*Lalage* LINDL., in *Bot. Reg.*, t. 1722.—ENDL., *Gen.*, n. 6453.

minute capitate. Legume sessile or stipitate, plano-compressed, with slender or thickened sutures, continuous or callous between seeds, 2-valved. Seeds unequally oblong, glabrous; funicle dilated at apex into a fleshy aril of variable form.—Shrubs or undershrubs, sometimes leafless; branches terete compressed or 2-winged cladodiform,<sup>1</sup> rarely subangular; leaves alternate or opposite, simple, or reduced to scales; stipules minute (dark-coloured) or 0; flowers<sup>2</sup> solitary axillary; bracts at base of pedicels minute, often dry, imbricate; bractlets 2, almost like bracts, inserted on pedicel (*Australia*<sup>3</sup>).

225. *Platylobium* SM.<sup>4</sup>—Calyx-lobes very unequal; 2 superior very large, free or connate; 3 inferior small or very small, connate into a 3-dentate or 3-fid lip. Corolla almost of *Bossiaea*; keel shorter than wings, obtuse. Stamens 10, 1-adelphous; filaments connate into a sheath cleft above; anthers uniform versatile. Germen sessile, ovules ∞; style incurved subulate; apex minute stigmatiferous. Legume sessile or stipitate, plano-compressed, continuous within; 2-valved, valves flat, on dehiscence bending elastically back to longitudinally winged superior suture. Seeds arillate.—Shrubs; branches opposite thin, leaves opposite simple; stipules small; flowers<sup>5</sup> solitary or more rarely few; axillary bract rigid dry imbricated at base of flower; bractlets 2, resembling bracts, lateral under flower (*Australia*<sup>6</sup>).

226. *Templetonia* R. BR.<sup>7</sup>—Receptacle shortly concave oblique. Calyx gamosepalous; lobes or teeth 4, unequal (2 posterior connate, more rarely distinct); æstivation imbricate. Petals much exerted; standard ovate or orbicular, often reflexed; wings narrow, often shorter, keel equal to or shorter than wings, obtuse. Stamens 10, 1-adelphous; filaments connate into a sheath cleft above; anthers 5

<sup>1</sup> See p. 220, fig. 192.

<sup>2</sup> Yellow, red, or purple-variegated.

<sup>3</sup> Species 34. SM., in *Trans. Linn. Soc.*, ix. 302.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iv. 266.—BONPL., *Jard. Malmais.*, t. 52.—SWEET, *Fl. Austral.*, t. 9, 20, 51.—HOOK. F., *Fl. Tasm.*, t. 16.—ANDR., *Bot. Repos.*, t. 191, 205, 276.—BENTH., *Fl. Austral.*, ii. 154.—*Bot. Reg.*, t. 306; (1841), t. 55; (1843), t. 63.—*Bot. Mag.*, t. 1144, 1233, 1235, 1266, 1493, 1652, 2491, 3895, 3986.

<sup>4</sup> In *Trans. Linn. Soc.*, ii. 350.—DC., *Prodr.*, ii. 116.—ENDL., *Gen.*, n. 6454.—B. H., *Gen.*,

473, n. 33.—? *Cheilococca* SALISB., *Prodr.*, 412 (ex SM.).

<sup>5</sup> Yellow.

<sup>6</sup> Species 3. SM., *Bot. Nov.-Holl.*, t. 6.—VENT., *Jard. Malmais.*, t. 31.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iv. 166.—BENTH., *Fl. Austral.*, ii. 152.—*Bot. Mag.*, t. 469, 1508, 1520, 3258, 3259.

<sup>7</sup> In *Ait. Hort. Kew.*, ed. 2, iv. 269.—DC., *Prodr.*, ii. 118.—ENDL., *Gen.*, n. 6457.—B. H., *Gen.*, 474, n. 35.—*Nematophyllum* F. MUELL., in *Hook. Journ.*, ix. 20.



alternate shorter versatile; 5 others longer basifixed. Germen sessile or stipitate, 2-∞-ovulate; style subulate incurved; stigma terminal. Legume oblong or linear, compressed 2-valved, within continuous coriaceous. Seeds arillate; funicle short.—Shrubs or undershrubs, sometimes leafless; leaves usually simple, articulated at base; stipules 2 lateral minute; flowers' racemose, often few; bracts imbricated at base of pedicel; bractlets inserted on pedicel, almost like bracts (*Australia*<sup>2</sup>).

227. *Hovea* R. BR.<sup>3</sup>—Receptacle shortly cupuliform glandular within. Calyx gamosepalous; lobes or teeth valvate in bud, very unequal; 3 inferior short narrow, usually subequal; 2 superior much larger connate into a truncate or emarginate broad lip. Petals unequal; standard broadly suborbicular; wings obliquely obovate; keel obtuse much longer than standard. Stamens 10, all connate into a sheath cleft above or above and below; 1 vexillary sometimes free or nearly so (*Plagiolobium*<sup>4</sup>), usually connate with rest; 1 superior (alternipetalous) sometimes also nearly free; 5 oppositipetalous anthers shorter versatile, 5 others longer basifixed. Germen sessile or substipitate; apex tapering into an incurved style; stigma terminal. Ovules ∞ or more frequently 2, descending, micropyle superior extrorse. Legume sessile or stipitate, turgid short, globular ovoid, or ovoid-rhomboidal often oblique at base, continuous within, 2-valved. Seeds 1 or more, arillate funiculate.—Shrubs, unarmed or spiny; leaves alternate simple; stipules small or 0; flowers<sup>5</sup> axillary or fascicled, more rarely irregularly racemose on a developed branch; bracts and bractlets small or 0 (*Australia*<sup>6</sup>).

228. *Goodia* SALISB.<sup>7</sup>—Calyx 2-labiate; upper lip shortly 2-dentate; lower partite into 3 narrow subequal lobes.<sup>8</sup> Standard suborbicular; wings very unsymmetrical; keel incurved obtuse.

<sup>1</sup> Yellow, red, or purple-variegated.

<sup>2</sup> Species 7. VENT., *Jard. Malmais*, t. 53.—*Bot. Reg.*, t. 383, 859.—*Bot. Mag.*, t. 2088, 2334.—BENTH., *Fl. Austral.*, ii. 168.

<sup>3</sup> In *Ait. Hort. Kew.*, ed. 2, iv. 275.—DC., *Prodr.*, ii. 115.—ENDL., *Gen.*, n. 6451.—B. H., *Gen.*, 474, n. 36.—*Poirertia* SM., in *Trans. Linn. Soc.*, ix. 304 (nec VENT.).—*Platychilum* DELAUN., *Herb. Amat.*, t. 87.—*Phusicarpus* POIR., *Dict.*, Suppl., iv. 399.

<sup>4</sup> SWEET, *Fl. Austral.*, t. 2.

<sup>5</sup> Blue or purplish.

<sup>6</sup> Species 11. BONPL., *Jard. Malmais*, t. 81.—SWEET, *Fl. Austral.*, t. 13.—HUEG., *Arch. Bot.*, t. 7.—HOOK. F., *Fl. Tasm.*, t. 15.—*Bot. Reg.*, t. 280, 463, 614, 1423, 1427, 1512, 1524; (1838), t. 62; (1843), t. 4; (1844), t. 58.—*Bot. Mag.*, t. 1624, 2005, 3053.

<sup>7</sup> *Parad. Lond.*, t. 41.—ENDL., *Gen.*, n. 6456.—DC., *Prodr.*, ii. 117.—B. H., *Gen.*, 474, n. 37.

<sup>8</sup> Fairly imbricate when young.

Stamens 10, 1-adelphous; 5 oppositipetalous shorter; sheath split above; anthers versatile uniform. Disk produced above receptacle into a short sheath cleft above. Ovary stipitate pauciovulate;<sup>1</sup> funicle descending;<sup>2</sup> style inflexed or incurved; stigma terminal, minutely capitate. Legume stipitate oblong-falcate plano-compressed; continuous within, 2-valved; sutures nerviform. Seeds arillate; funicle short.—Shrubs, glabrous or pubescent; leaves pinnately 3-foliolate; leaflets quite entire, articulated at base; stipules lateral, transversely cut a little above base, very caducous; flowers<sup>3</sup> in terminal or leaf-opposed racemes; bracts and bractlets caducous (*Australia*<sup>4</sup>).

229. *Liparia* L.<sup>5</sup>—Flowers nearly of *Templetonia*; calyx-lobes 5, very unequal; 4 superior lanceolate; lowest much larger, often petaloid; præfloration imbricate. Keel with lateral appendage. Stamens 10, 2-adelphous (9-1); anthers all uniform subbasifixed, or alternate 5 a little shorter. Germen sessile; ovules few; style slender; apex minutely stigmatiferous. Legume oblong or obovate compressed, continuous within, 2-valved. Seeds few arillate.—Shrubs<sup>6</sup> usually villous or silky; leaves alternate simple entire coriaceous; flowers<sup>7</sup> capitate terminal; bracts broad imbricate forming an involucre (*South Africa*<sup>8</sup>).

230. *Priestleya* DC.<sup>9</sup>—Flowers of *Liparia*; calyx-lobes subequal, lowest a little longer. Germen sessile; ovules 2-∞; style subulate; apex entire or 2-dentate, stigmatiferous. Legume oblong or broadly linear-oblong, compressed, continuous within, 2-valved; valves coriaceous flat or convex. Seeds 1-∞ arillate.—Shrubs, usually silky or villous; leaves simple exstipulate; flowers<sup>10</sup> crowded in terminal heads or racemes, more rarely axillary; bracts ovate

<sup>1</sup> Ovules usually 2 or 3.

<sup>2</sup> Ovule suspended by this, finally inflexed; micropyle introrse superior.

<sup>3</sup> Yellow, variegated with purple.

<sup>4</sup> Species 2. BENTH., *Fl. Austral.*, ii. 117.—*Bot. Mag.*, t. 958, 1310.—An anomalous genus (according to BENTHAM), related by its (yellow) flowers and legume to *Bossicea*, by its inflorescence to *Crotalaria*; but differing in its pinnately (non-digitately) trifoliolate leaves from all the *Genisteæ*.

<sup>5</sup> *Mantiss.*, n. 1319 (part.).—LAMK., *Dict.*, ii. 437.—DC., *Prodr.*, ii. 121.—ENDL., *Gen.*, n. 6463.—B. H., *Gen.*, 472, n. 27.

<sup>6</sup> Turning black when dry.

<sup>7</sup> Yellow.

<sup>8</sup> Species 4. BUEM., *Fl. Cap. Prodr.*, 4 (*Leucadendron*).—LODD., *Bot. Cab.*, t. 642.—ANDR., *Bot. Repos.*, t. 568.—*Bot. Mag.*, t. 1241, 4034.—HARV. & SOND., *Fl. Cap.*, ii. 14.

<sup>9</sup> In *Ann. Sc. Nat.*, sér. 1, iv. 90; *Mém. Légum.*, 190, t. 29, 30, 32, 33; *Prodr.*, ii. 121.—ENDL., *Gen.*, n. 6464.—B. H., *Gen.*, 172, n. 27.—*Achyronia* WENDL., *Obs. Bot.*, 39; *Hort. Herrenhaus.*, i. t. 12.—DC., *Prodr.*, ii. 121.

<sup>10</sup> Yellow.

concave, lanceolate, or (the innermost) setaceous ; bractlets setaceous caducous<sup>1</sup> (*South Africa*<sup>2</sup>).

231. **Amphithalea** ECKL. & ZEYH.<sup>3</sup>—Calyx narrow ; lobes or teeth all 5 subequal, or 2 superior connate rather high and broader. Petals often narrowed at base ; standard obovate ovate or orbicular ; wings oblong ; keel pretty straight, spurred or gibbous on both sides, obtuse at apex. Stamens 10, 2-adelphous (9-1) ; anthers 5 alternate smaller versatile ; 5 others subbasifixed longer. Germen sessile, ovules 1 or few ; style incurved ; apex minute stigmatiferous. Legume ovate or oblong, compressed, continuous within, 1- or few-seeded, 2-valved. Seeds arillate.—Shrubs, glabrous or more frequently silky-villous, usually heath-like ; leaves alternate simple entire exstipulate ; flowers<sup>4</sup> in crowded leafy spikes, or axillary often paired ; pedicels 0, or very short, 1-bracteate (*South Africa*<sup>5</sup>).

232. **Lathriogyne** ECKL. & ZEYH.<sup>6</sup>—Flowers nearly of *Amphithalea* ; corolla shorter than calyx ; keel beaked, gibbous on both sides. Germen sessile ; ovule 1. Legume. . . . . ? Other parts of *Amphithalea*.—A silky-villous heath-like shrub ; leaves alternate simple entire ; flowers crowded in terminal leafy capitula (*South Africa*<sup>7</sup>).

233. **Coelidium** VOG.<sup>8</sup>—Flowers nearly of *Amphithalea* ; keel pretty straight obtuse. Stamens 10, 1-adelphous ; filaments connate into a sheath cleft above ; anthers of 2 kinds. Germen sessile ; ovule 1. Legume ovate rather acute 2-valved ; seed arillate.—Silky-villous heath-like shrubs ; leaves simple (of *Amphithalea*) ; flowers<sup>9</sup> crowded in a terminal head, or axillary, often paired ; pedicels very short, 1-bracteolate (*South Africa*<sup>10</sup>).

<sup>1</sup> DECANDOLLE divides this genus into the following 2 sections : 1. *Isothea* : base of calyx pushed up ; keel beaked ; 2. *Anisothea* : base of calyx not pushed up, or tapering obconical ; keel not beaked (*Xyphotea* ECKL. & ZEYH., *Enum.*, 166).

<sup>2</sup> Species 15. THUNB., *Fl. Cap.*, 565 (*Liparia*).—KEE, in *Bot. Reg.*, t. 8.—ANDR., *Bot. Repos.*, t. 382.—HARV. & SONDR., *Fl. Cap.*, ii. 16.—*Bot. Mag.*, t. 382, 3216.

<sup>3</sup> *Enum.*, 167.—ENDL., *Gen.*, n. 6465.—*Ingenhousia* E. MEY., *Comm. Pl. Afric. Austr.*, 20.—*Cryphiantha* ECKL. & ZEYH., *op. cit.*, 171.—*Epistenum* WALP., in *Linnaea*, xiii. 473.

<sup>4</sup> Pink or purple, usually small.

<sup>5</sup> Species 9. DC., *Mém. Légum.*, t. 31 (*Priestleya*).—HARV. & SONDR., *Fl. Cap.*, ii. 21.

<sup>6</sup> *Enum.*, 170.—ENDL., *Gen.*, n. 6466.—*Heudusa* E. MEY., *Comm. Pl. Afric. Austr.*, 153.

<sup>7</sup> Species 1. *L. parvifolia* ECKL. & ZEYH., *loc. cit.*—HARV. & SONDR., *Fl. Cap.*, ii. 593.—*Heudusa decipiens* E. MEY., *loc. cit.*

<sup>8</sup> Ex WALP., in *Linnaea*, xiii. 472.—ENDL., *Gen.*, n. 6467.—B. H., *Gen.*, 473, n. 31.

<sup>9</sup> Pink, purple, or yellow, usually small.

<sup>10</sup> Species 8. HARV. & SONDR., *Fl. Cap.*, ii. 24.

234. ? *Walpersia* HARV. & SOND.<sup>1</sup>—Flowers nearly of *Cælidium*; “calyx-lobes of nearly same length, 2 superior broader, claws of petals adnate at base to staminal tube. Stamens 1-adelphous. Germen 2-ovulate.—A much-branched villous shrub; leaves simple quite entire, edges revolute; flowers<sup>2</sup> pedicellate in axils of upper leaves; bractlets<sup>3</sup> foliaceous below calyx” (*South Africa*).

## IX. PODALYRIEÆ.

235. *Podalyria* LAMK.—Receptacle subcampanulate, pushed in at base, lined by a glandular disk. Calyx gamosepalous; teeth or lobes 5, subequal. Corolla papilionaceous; standard orbicular, or broadly cordate emarginate, a little longer than wings, rather thick or glandular inside above short subrecurved claw; wings obliquely obovate; keel broadly obovate incurved obtuse, shorter than wings. Stamens 10, perigynous; filaments free or unequally connate at very base; anthers uniform. Germen sessile; ovules  $\infty$ ; style slender; apex minute stigmatiferous. Legume oblong or turgid 2-valved; valves coriaceous; seeds 1- $\infty$ , arillate.—Silky or villous shrubs; leaves alternate simple, shortly petiolate or sessile; stipules subulate, often caducous; flowers axillary pedunculate, solitary or in twos or fours (*South Africa*).

236. *Cyclopia* VENT.<sup>3</sup>—Flowers of *Podalyria*; keel incurved obtusely beaked. Legume oblong plano-compressed. Seeds  $\infty$ , arillate.—Shrubs, glabrous or rather villous when young; leaves shortly petiolate or sessile, digitately 3-foliolate, rarely 1-foliolate; peduncles axillary, 1-flowered,<sup>4</sup> 2-bracteolate at base (*South Africa*<sup>5</sup>).

237. *Thermopsis* R. BR.<sup>6</sup>—Receptacle shortly turbinate disciferous within; calyx-lobes 5 subequal or 2 posterior united for a variable height. Standard suborbicular, subequal to wings, with

<sup>1</sup> *Fl. Cap.*, ii. 26.—B. H., *Gen.*, 473, n. 32.

<sup>2</sup> “Yellow.”

<sup>3</sup> *Dec. Gen. Nov.*, 8.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 5.—DC., *Prodr.*, ii. 101.—ENDL., *Gen.*, n. 6422.—B. H., *Gen.*, 466, n. 6.—*Ibbetsonia* SIMS, in *Bot. Mag.*, t. 1259.

<sup>4</sup> Flowers yellow.

<sup>5</sup> Species 9. ECKL. & ZEYH., *Enum.*, 153.—

E. MEY., *Comm. Pl. Afric. Austr.*, 3.—ANDE., *Bot. Repos.*, t. 427.—HARV. & SOND., *Fl. Cap.*, ii. 6.

<sup>6</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 3.—DC., *Prodr.*, ii. 99.—ENDL., *Gen.*, n. 6420.—B. H., *Gen.*, 465, n. 3.—*Thermia* NUTT., *Gen. Amer.* i. 282.—*Scolobus* RAFIN., in *Journ. Phys.* lxxxix. 89.

reflexed edges; keel equal to wings or slightly longer; petals imbricate below. Stamens 10, free. Germen sessile or shortly stipitate  $\infty$ -ovulate; style incurved; stigma minute terminal. Legume sessile or shortly stipitate, oblong linear or inflated, straight or incurved scarcely coriaceous. Seeds arillate or exarillate.—Perennial herbs; rhizome usually creeping; annual branches erect, simple or branched, sheathing at base; lower leaves reduced to broad scarious-membranous sheath passing from entire below to 3-toothed or 3-dentate; upper leaves perfect, alternate digitately 3-foliolate, stipules leafy lateral free; flowers<sup>1</sup> ebracteolate in terminal or leaf-opposed racemes (*North America and Eastern Asia*<sup>2</sup>).

238. **Baptisia** VENT.<sup>3</sup>—Flowers nearly of *Thermopsis*; receptacle obtuse at base or very shortly turbinate. Germen stipitate; ovules  $\infty$ . Other parts of *Thermopsis*. Legume stipitate subglobose or ovoid, inflated often coriaceous. Seeds arillate or exarillate.—Herbs, with habit of *Thermopsis*; leaves 3-foliolate, more rarely simple or perfoliate; stipules 0, or small, or large foliaceous free; flowers<sup>4</sup> in terminal or leaf-opposed racemes, bracts simple or 0; bractlets 2 or 0 (*North America*<sup>5</sup>).

239. **Anagyris** T.<sup>6</sup>—Flowers nearly of *Thermopsis*; standard shorter than wings; sides not reflexed. Germen shortly stipitate; ovules  $\infty$ . Other parts of *Thermopsis*. Legume stipitate broadly linear compressed, more or less torulose, with thin incomplete septa inside parting seeds. Seeds  $\infty$ , exarillate.—Shrubs; leaves alternate digitately 3-foliolate; stipules 2, connate into 1 oppositifolious; flowers<sup>7</sup> in short racemes at ends of branches; pedicels 2, 3 in axil of

<sup>1</sup> Yellow or purple, rather large and handsome.

<sup>2</sup> Species about 12. PALL., *Astrag.*, t. 89, 90.—TORE. & GE., *Fl. N. Amer.*, i. 387.—DELESS., *Icon. Sel.*, iii. 36, t. 60.—JACQUEM., *Voy. Bot.*, t. 39.—ROYLE, *Ill. Himal.*, t. 32.—HOOK., *Fl. Bor.-Amer.*, i. t. 47.—A. GRAY, *Chlor. Bor.-Amer.*, t. 7-9.—*Bot. Reg.*, t. 1272.—*Bot. Mag.*, t. 1389 (*Podalyria*), 3611, 4868.—WALP., *Rep.*, i. 562.

<sup>3</sup> *Dec. Gen. Nov.*, 9.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 5.—DC., *Mém. Légum.*, t. 4; *Prodr.*, ii. 100.—ENDL., *Gen.*, n. 6421.—B. H., *Gen.*, 466, n. 4.—*Crotalopsis* MICHX., mss. (ex DC., *loc. cit.*).

<sup>4</sup> White, blue, or yellow.

<sup>5</sup> Species about 14. GÆRTN., *Fruct.*, ii. 321, t. 149 (*Sophora*).—MICHX., *Fl. Bor.-Amer.*, i. 263.—VENT., *Jard. Cels.*, t. 56.—SWEET, *Brit. Fl. Gard.*, t. 97.—TORE. & GE., *Fl. N. Amer.*, i. 263.—*Bot. Reg.*, t. 3121.—*Bot. Mag.*, t. 1099, 1177.—WALP., *Rep.*, i. 563; *Ann.*, ii. 307.

<sup>6</sup> *Instit.*, 647, t. 415.—L., *Gen.*, n. 509.—J., *Gen.*, 352.—LAMK., *Dict.*, i. 141; *Suppl.*, i. 332; *Ill.*, t. 328.—DC., *Mém. Légum.*, t. 4, fig. 3; *Prodr.*, ii. 99.—ENDL., *Gen.*, n. 6418 (part.).—B. H., *Gen.*, 465, n. 1.

<sup>7</sup> Yellow, rather large.

each stipulaceous sheathing or small deciduous bract; bractlets 0 (*Mediterranean, Arabia, Canary Islands*<sup>1</sup>).

240. *Piptanthus* D. DON.<sup>2</sup>—Flowers of *Thermopsis*; standard subequal to wings; sides reflexed. Legume stipitate broadly linear plano-compressed, continuous within. Seeds minutely arillate.—A shrub; leaves petiolate, digitately 3-foliolate; stipules 2, connate into 1, leaf-opposed; flowers<sup>3</sup> in short racemes at ends of branches; pedicels 2, 3, in axil of each sheathing deciduous bract<sup>4</sup> (*Himalaya*<sup>5</sup>).

241? *Pickeringia* NUTT.<sup>6</sup>—Flowers nearly of *Baptisia*; receptacle shortly obconical glandular within, calyx campanulate, with subequal imbricated teeth. Germen shortly stipitate ∞-ovulate; style incurved; stigma minute terminal. Legume. . . ?—A bushy shrub; twigs often spinescent; leaves alternate 1–3 foliolate; petiole very short concave; stipules 0 or very small; flowers<sup>7</sup> in short terminal racemes or solitary pedunculate in axils of highest leaves of twigs; bractlets 2, lateral small (*California*<sup>8</sup>).

242. *Brachysema* R. BR.<sup>9</sup>—Receptacle concave, glandular within. Calyx-lobes 5, of nearly equal length; 2 superior more or less connate; præfloration imbricate. Petals usually very unequal; standard shorter and narrower than wings, often minute, more or less recurved; wings narrow oblong; keel usually longer and broader than wings, incurved; 2 dorsal petals connate. Stamens 10, free; 5 alternipetalous longer. Germen sessile or stipitate,<sup>10</sup> ∞-ovulate; style thin long; apex minute stigmatiferous. Legume ovate or elongated; valves coriaceous.—Shrubs or undershrubs; leaves either

<sup>1</sup> Species 2. SIETH., *Fl. Græc.*, t. 366.—DRESF., *Fl. Atlant.*, i. 385.—WEBB, *Phyt. Canar.*, t. 40.—LODD., *Bot. Cab.*, t. 740.—GREEN. & GODR., *Fl. de Fr.*, i. 343.

<sup>2</sup> In *Sweet Brit. Fl. Gard.*, t. 264.—B. H., *Gen.*, 465, n. 2.

<sup>3</sup> Yellow, rather large.

<sup>4</sup> This genus, with the flowers and fruit of *Thermopsis*, and the stipules and inflorescence of *Anagyris*, is, as it were, intermediate between them, and should perhaps be rather reduced to a section of the former; for the generic separation of *Thermopsis*, *Baptisia*, *Anagyris*, and *Piptanthus* seems hardly correct.

<sup>5</sup> Species 1. *P. nepaulensis* DON, *loc. cit.*—

*Thermopsis nepaulensis* DC., *Prodr.*, ii. 99, n. 3.—*T. laburnifolia* DON, *Prodr. Fl. Nepal.*, 241.—HOOK., *Exot. Fl.*, t. 131 (*Baptisia*).

<sup>6</sup> Ex TORR. & GR., *Fl. N. Amer.*, i. 389.—B. H., *Gen.*, 466, n. 5.

<sup>7</sup> “Red.”

<sup>8</sup> Species 1. *P. montana* NUTT.—TORR., in *Emor. Rep.*, t. 14.—*Prickothamnus montanus* NUTT.

<sup>9</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 10.—ENDL., *Gen.*, n. 6425.—B. H., *Gen.*, 467, n. 9.

<sup>10</sup> The section *Embrachysema* (stem leafy) has a stipitate germen, surrounded by an inner sheathing disk within stamens.

reduced to minute scales (*Leptosema*<sup>1</sup>), or simple, alternate or opposite, often silky; stipules narrow; flowers<sup>2</sup> solitary or few at ends of twigs in axils of leaves, more rarely crowded on short radicle scapes (*Western and tropical Australia*<sup>3</sup>).

243? *Jansonia* KIPP.<sup>4</sup>—Calyx oblique gamosepalous, cleft behind; lobes 5, very unequal; posterior 2 very small; anterior 1 longer than laterals. Petals unequal, at base adnate to staminal tube; standard minute, long-tapering at base; limb folded back; wings oblong, longer than standard; keel still longer, with its petals free. Stamens 10 at base 1 or 2-adelphous (9-1), finally free; anthers uniform. Germen sessile; ovules ∞; style filiform elongated stigma minute terminal. Legume . . . ?—A shrub; leaves simple opposite; stipules subulate; flowers<sup>5</sup> included before anthesis in a 2-seriately decussate 4-leaved involucre; capitula terminal sessile nutant (*South Australia*<sup>6</sup>).

244. *Oxylobium* ANDR.<sup>7</sup>—Calyx-lobes 5, united to a variable height, imbricate; 2 superior often broader, joined higher, valvate by superior margins. Petals unguiculate; standard orbicular or reniform, with usually short claw; wings nearly equal to keel. Stamens 10, free; anthers uniform. Germen inserted in bottom of disk, sessile or stipitate, 2-∞-ovulate; style thin subulate, apex scarcely- or undilated, stigmatiferous. Legume oblong or ovoid turgid, sessile or shortly (more rarely, in *Podolobium*<sup>8</sup> long-) stipitate, within either continuous, or thin-stuffed or more rarely subseptate<sup>9</sup> between seeds. Seeds long-funiculate, arillate or exarillate.—Shrubs or undershrubs; leaves simple petiolate 2-stipulate, alternate, or oftener opposite or verticillate. Flowers<sup>10</sup> in terminal or axillary racemes, or more

<sup>1</sup> BENTH., in *Ann. Wien. Mus.*, ii. 84; *Fl. Austral.*, ii. 12.—*Bot. Mag.*, t. 4481.—*Kaleniczienkia* TURCZ., in *Bull. Mosc.* (1853), i. 252.—*Burgesia* F. MUELL., *Fragm. Phyt. Austral.*, i. 222 (nec SIEB. & ZUCC.).—H.B.N., in *Adansonia*, ix. 297, t. vii.

<sup>2</sup> Red, rarely nearly black or greenish yellow.

<sup>3</sup> Species about 14. BENTH., *Fl. Austral.*, ii. 10.—*Bot. Reg.*, t. 118, 642.—*Bot. Mag.*, t. 2008, 4652.—WALP., *Ann.*, ii. 308; v. 452.

<sup>4</sup> In *Trans. Linn. Soc.*, xx. 384, t. 16.—B. H., *Gen.*, 467, n. 8.—*Cryptosema* MEISSN., in *Pl. Preiss.*, ii. 207.

<sup>5</sup> "Red."

<sup>6</sup> Species 1. *J. formosa* KIPP., *loc. cit.*—BENTH., *Fl. Austral.*, ii. 8.—WALP., *Ann.*, ii. 308.

<sup>7</sup> *Bot. Repos.*, t. 492.—DC., *Prodr.*, ii. 104.—ENDL., *Gen.*, n. 6427.—B. H., *Gen.*, 467, n. 10.

<sup>8</sup> R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 9.—DC., *Prodr.*, ii. 103.—ENDL., *Gen.*, n. 6428.

<sup>9</sup> VENT., *Jard. Malmais.*, t. 115.—DC., *Prodr.*, ii. 104.—ENDL., *Gen.*, n. 6426.—*Callistachya* SM., in *Trans. Linn. Soc.*, ix. 266.

<sup>10</sup> Yellow or purple-variegated.

rarely in dense false-corymbs; bracts and 2 lateral bractlets inserted at a variable height under calyx, very caducous (*Australia*<sup>1</sup>).

245. *Chorizema* LABILL.<sup>2</sup>—Receptacle slightly concave, glandular within. Calyx gamosepalous; lobes 5 unequal or subequal; 2 superior often joined higher than rest; præfloration valvate or imbricate. Petals unguiculate; standard orbicular or reniform; wings oblong; keel much shorter than wings, straight or incurved. Stamens 10 free, all equal, or vexillary more slender, distant from rest. Germen sessile or stipitate  $\infty$ -ovulate; style incurved; stigma more or less oblique. Legume ovoid, turgid or compressed continuous within. Seeds  $\infty$ , reniform exarillate; hilum rather distant from micropyle; funicle slender, rather long.—Shrubs or undershrubs; leaves simple, alternate or rarely opposite; stipules minute or setaceous; flowers<sup>3</sup> in terminal or axillary racemes; bracts deciduous; bractlets lateral at a variable height on pedicel, deciduous (*Australia*<sup>4</sup>).

246. *Isotropis* BENTH.<sup>5</sup>—Receptacle obconical short; calyx-lobes 5 much longer than tube; 2 superior high-connate. Petals unguiculate; standard broadly orbicular; wings obliquely subfalcate; keel incurved. Stamens 10 free. Germen sessile ovules  $\infty$ ; style slender; apex minute stigmatiferous. Legume oblong linear or lanceolate, more or less turgid, acute. Seeds exarillate.—Herbs or undershrubs; stems diffuse or ascending; leaves alternate 1-foliolate; stipules small or linear falcate; flowers long-pedunculate solitary axillary, or in racemes at ends of branches (*Australia*<sup>6</sup>).

247. *Gompholobium* SM.<sup>7</sup>—Receptacle cupuliform; edge of disk

<sup>1</sup> Species about 27. LABILL., *Nouv.-Holl.*, t. 135 (*Gompholobium*).—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 9.—ANDR., *Bot. Repos.*, t. 320 (*Pultenæa*).—SWEET, *Fl. Austral.*, t. 5.—BENTH., *Fl. Austral.*, ii. 14.—*Bot. Reg.*, t. 216 (*Callistachys*), 392, 913; (1843), t. 16 (*Oxylobium*), 959, 1338 (*Podolobium*), 1434 (*Mirbelia*).—*Bot. Mag.*, t. 1544, 1925, 2442, 3249, 3882.—WALP., *Rep.*, v. 423, 424; *Ann.*, iv. 452, 453.

<sup>2</sup> *Voy.*, i. 405, t. 21.—DC., *Prodr.*, ii. 102.—ENDL., *Gen.*, n. 6431.—B. H., *Gen.*, 467, n. 11.—*Orthotropis* BENTH., in *Lindl. Swan Riv. App.*, 16.

<sup>3</sup> Orange or red, often 2-coloured.

<sup>4</sup> Species about 15. BONPL., *Jard. Malmais.*, t. 35.—R. BR. in *Ait. Hort. Kew.*, ed. 2, iii.

8.—BENTH., in *Ann. Wien. Mus.*, ii. 271; *Fl. Austral.*, ii. 26.—MAUND., *Bot.*, t. 106.—*Bot. Reg.*, t. 986, 1513, 1514, 1528; (1838), t. 10; (1839), t. 49; (1841), t. 45.—*Bot. Mag.*, t. 1032, 3607, 3903.—WALP., *Ann.*, ii. 309; iv. 453.

<sup>5</sup> In *Hueg. Enum.*, 28; in *Ann. Wien. Mus.*, ii. 70.—ENDL., *Gen.*, n. 6429.—B. H., *Gen.*, 468, n. 13.—? *Callistachya* SM., in *Trans. Linn. Soc.*, ix. 267 (ex ENDL.).

<sup>6</sup> LODD., *Bot. Cab.*, t. 1953 (*Chorizema*).—PAXT., *Mag.*, x. 127, ic. (*Chorizema*).—BENTH., *Fl. Austral.*, ii. 38.

<sup>7</sup> In *Trans. Linn. Soc.*, iv. 220.—DC., *Prodr.*, ii. 105.—ENDL., *Gen.*, n. 6432.—B. H., *Gen.*, 468, n. 14.



slightly prominent. Calyx deeply 5-lobed; lobes subequal rather thick valvate persistent. Petals very unequal; standard broadly orbicular or reniform, apex often emarginate; wings oblong, often falcate; keel oblong, broader than wings. Stamens 10, free perigynous; anthers uniform. Germen inserted by short slender stalk in bottom of receptacle closely surrounded by a disk at base; style incurved; apex truncate or capitate, stigmatiferous; ovules 4- $\infty$ , 2-seriate, long-funiculate campylotropous. Legume inflated sub-gibbous, ovoid or shortly cylindrical, obtuse often oblique inflated. Seeds few or  $\infty$ , small exarillate long-funiculate.—Shrubs or undershrubs; leaves alternate simple, or more rarely pinnate or digitate; terminal leaflet sessile; stipules minute or 0; flowers<sup>1</sup> axillary or terminal, solitary or in small racemes; bracts and bractlets minute or 0 (*Australia*<sup>2</sup>).

248. *Mirbelia* Sm.<sup>3</sup>—Calyx gamosepalous imbricated; 2 superior lobes broader, higher connate. Petals unguiculate; standard reniform or broadly orbicular; wings obliquely oblong; keel equal to wings or shorter. Stamens 10, free. Germen sessile or stipitate; ovules 2- $\infty$ ; style usually short incurved; apex capitate stigmatiferous. Legume oblong or ovoid, turgid, within longitudinally 2-locellate by 2 longitudinal false-septa, springing one from pushed-in placenta, one from anterior suture (as in *Astragalus*); endocarp often separating from exocarp at maturity; seeds 1, 2, or  $\infty$ , exarillate.—Shrubs; leaves simple, alternate and opposite or verticillate, more rarely 0; stipules small setaceous or 0; flowers<sup>4</sup> axillary or terminal, solitary fascicled or racemose; bracts and bractlets small or 0 (*Australia*<sup>5</sup>).

249. *Burtonia* R. Br.<sup>6</sup>—Receptacle very short. Calyx hence

<sup>1</sup> Yellow or red.

<sup>2</sup> Species about 24. LABILL., *Nouv.-Holl.*, t. 133, 134.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 11.—ANDR., *Bot. Repos.*, t. 642.—REICHB., *Icon. Exot.*, t. 76, 97, 243.—BENTH., in *Ann. Wien. Mus.*, ii. 72; *Fl. Austral.*, ii. 40.—*Bot. Reg.*, t. 1468, 1474, 1490, 1563, 1574, 1615; (1839), t. 43.—*Bot. Mag.*, t. 1533, 4171, 4179, 4258.—WALP., *Ann.*, ii. 309; iv. 453.

<sup>3</sup> In *Ann. of Bot.*, i. 511; in *Trans. Linn. Soc.*, ix. 265.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 21.—DC., *Prodr.*, ii. 114.—SPACH, *Suit. à Buffon*, i. 183.—ENDL., *Gen.*, n. 6448.—B. H., *Gen.*, 468, n. 12.—*Dichosema* BENTH., in *Hueg.*

*Enum.*, 35; in *Ann. Wien. Mus.*, ii. 84.—ENDL., *Gen.*, n. 6449.—*Oxycladium* F. MUELL., in *Hook. Journ.*, ix. 20; *Fragm. Phyt. Austral.*, i. 167.

<sup>4</sup> Yellow, red, or purple.

<sup>5</sup> Species about 16. VENT., *Jard. Malmaï.*, t. 119.—SWEET, *Fl. Austral.*, t. 34.—REICHB., *Icon. Exot.*, t. 191.—BENTH., *Fl. Austral.*, ii. 32.—*Bot. Reg.*, t. 1041; (1841), t. 58.—*Bot. Mag.*, t. 1121, 2771, 4419.—WALP., *Rep.*, i. 576; v. 433; *Ann.*, i. 204; ii. 313.

<sup>6</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 12 (nec SALISB.).—DC., *Prodr.*, ii. 106.—ENDL., *Gen.*, n. 6433.—B. H., *Gen.*, 468, n. 15.

hypogynous; lobes nearly free, or only connate at very base, valvate; 2 superior a little broader. Petals shortly unguiculate; standard orbicular or reniform; wings obliquely obovate or oblong; keel shorter than wings, obtuse. Stamens 10, free, scarcely perigynous. Germen sessile or stipitate; ovules 2; funicles elongated, thickened at apex, dilated into obturators above micropyle, curved or folded one upwards, one downwards; style incurved more or less dilated at base; apex minutely stigmatiferous. Legume ovoid or subglobose inflated, oblique at base. Seeds 1, 2, exarillate.—Shrubs or under shrubs; leaves alternate, simple digitate, or pinnate; terminal leaflet sessile; stipules small or 0; flowers<sup>1</sup> racemose in superior axils, or racemose or subumbellate at ends of branches; bracts small bractlets inserted at bottom of pedicel or half-way up (*Australia*<sup>2</sup>).

250. *Jacksonia* R. BR.<sup>3</sup>—Receptacle obconical very short. Calyx gamosepalous at very base; lobes elongated equal or 2 superior broader; præfloration valvate. Corolla and stamens of *Burtonia*. Germen sessile or stipitate; ovules 2, very rarely 3–6 (*Piptomeris*<sup>4</sup>), reniform, shortly funiculate; style subulate incurved, apex minutely stigmatiferous. Legume ovate or oblong, compressed or subturgid. Seeds 1, 2, exarillate.—Shrubs or undershrubs, rigid leafless, twigs sometimes angular rush-like, or spinescent, sometimes phyllodineous simulating leaves; leaves minute scale-like; flowers<sup>5</sup> scattered along branches or in terminal racemes or spikes; bracts and bractlets small scale-like (*Australia*<sup>6</sup>).

251. *Sphærolobium* SM.<sup>7</sup>—Receptacle obconical, often elongated. Calyx gamosepalous; tube longer (*Roea*<sup>8</sup>) or shorter than lobes; lobes imbricate; 2 superior larger or very large, connate. Corolla and stamens of *Burtonia*, very perigynous. Germen stipitate; ovules 2 (of *Jacksonia*); style incurved subulate or dilated at base, above

<sup>1</sup> Yellow, orange, or purple-blue.

<sup>2</sup> Species 7. DELESS., *Icon. Sel.*, iii. 37, t. 61.—BENTH., *Fl. Austral.*, ii. 50.—*Bot. Reg.*, t. 1600.—*Bot. Mag.*, t. 4392, 4410, 5000.—WALP., *Rep.*, i. 569; v. 426; *Ann.*, i. 203; ii. 310.

<sup>3</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 12.—DC., *Prodr.*, ii. 107.—ENDL., *Gen.*, n. 6434.—B. H., *Gen.*, 469, n. 16.

<sup>4</sup> TURCZ., in *Bull. Mosc.* (1853), i. 258.

<sup>5</sup> Yellow or purple-variegated.

<sup>6</sup> Species 28. LABILL., *Nov.-Holl.*, i. 107, t. 136 (*Gompholobium*).—BONPL., *Jard. Malmais.*, 30, t. 11 (*Gompholobium*).—SM., in *Trans. Linn. Soc.*, ix. 256 (*Daviesia*).—HUEG., *Bot. Arch.*, t. 3.—BENTH., *Fl. Austral.*, ii. 52.—WALP., *Ann.*, ii. 310; iv. 454.

<sup>7</sup> In *Ann. of Bot.*, i. 509; in *Trans. Linn. Soc.*, ix. 261.—DC., *Prodr.*, ii. 107.—ENDL., *Gen.*, n. 6437.—B. H., *Gen.*, 469, n. 17.

<sup>8</sup> HUEG., *Enum.*, 34.—BENTH., in *Ann. Wien. Mus.*, ii. 77.

with a longitudinal wing-like membrane, or with an unequal ring below stigma. Legume stipitate short, globose or compressed—1, 2-seeded.—Glabrous shrubs or undershrubs; branches often rush-like; leaves narrow or filiform, small, alternate opposite or verticillate, more rarely 0; flowers<sup>1</sup> solitary, axillary or lateral, more frequently in terminal or lateral racemes; bracts small (*Australia*<sup>2</sup>).

252. *Viminaria* SM.<sup>3</sup>—Calyx gamosepalous; teeth much shorter than tube, subequal. Corolla and stamens nearly of *Burtonia*. Germen subsessile; ovules 2 (of *Jacksonia*); style slender, apex minute stigmatiferous. Legume sessile ovoid-oblong; pericarp thin subindehiscent; seed usually filling pericarp, minutely arillate.—A shrub, branches rush-like; leaves alternate, 1–3-foliolate or more frequently reduced to slender elongated petiole; flowers<sup>4</sup> in terminal slender racemes; bracts minute caducous; bractlets 2 small, inserted at top of pedicel under flower (*Australia*<sup>5</sup>).

253. *Daviesia* SM.<sup>6</sup>—Receptacle minutely obconical, truncate horizontally at apex, glandular within. Calyx gamosepalous; teeth 5, subequal, or 2 superior connate broader. Petals with slender claws; standard broadly reniform or orbicular; wings falcate-oblong or obovate; keel a little smaller than wings, incurved. Stamens 10, free or only coherent at base; 5 filaments often broader. Germen stipitate, 2-ovulate; style subulate; apex not thickened, stigmatiferous. Legume stipitate much compressed, unequally 1–3-angular acute; placentary suture straight; dorsal curved at nearly a right-angle. Seeds 1, 2; funicle dilated into an aril.—Shrubs or undershrubs; leaves alternate simple, horizontal or vertical, sometimes terete spinescent, sometimes prickle-like, more rarely very small or 0; flowers<sup>7</sup> usually small, in short, lax or umbelliform corymbiform, axillary or terminal racemes; bracts minute, rarely enlarged and protecting fruit; bractlets 0 (*Australia*<sup>8</sup>).

<sup>1</sup> Yellow or red.

<sup>2</sup> Species 13. LABILL., *Nouv.-Holl.*, t. 138.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 14.—BENTH., *Fl. Austral.*, ii. 63.—*Bot. Mag.*, t. 969.—WALP., *Ann.*, ii. 311; iv. 455.

<sup>3</sup> In *Ann. of Bot.*, i. 507; *Exot. Bot.*, 51, t. 27; in *Trans. Linn. Soc.*, ix. 261.—DC., *Prodr.*, ii. 107.—ENDL., *Gen.*, n. 6436.—B. H., *Gen.*, 469, n. 18.

<sup>4</sup> Orange-yellow, small.

<sup>5</sup> Species 1. *V. denudata* SM., *loc. cit.*—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 13.—*Bot. Mag.*, t. 1190.—*Daviesia denudata* VENT., *Ch. de Plant.*, t. 6.—*Sophora juncea* SCHRAD., *Sert. Hannov.*, t. 3.

<sup>6</sup> In *Trans. Linn. Soc.*, iv. 220.—DC., *Prodr.*, ii. 113.—ENDL., *Gen.*, n. 6435.—B. H., *Gen.*, 469, n. 19.

<sup>7</sup> Yellow, orange, or red, usually small.

<sup>8</sup> Species about 55. LABILL., *Nouv.-Holl.*, t.

254 *Aotus* Sm.<sup>1</sup>—Calyx-lobes 5, unequal; 2 superior broader higher connate; præfloration imbricate. Corolla and stamens nearly of *Burtonia*. Germen sessile or stipitate; ovules 2, shortly funiculate; style slender inflexed; apex minute stigmatiferous. Legume ovate, compressed or rather turgid, 1-2-seeded, 2-valved.—Shrubs; branches often virgate; leaves alternate or 3-nately verticillate, simple; stipules minute or 0; flowers<sup>2</sup> axillary, often in 2's or 3's, pedicellate; bracts small caducous; bractlets 0 (*Australia*<sup>3</sup>).

255. *Phyllota* DC.<sup>4</sup>—Calyx-lobes 2, superior often broader or higher connate; præfloration imbricate. Corolla and stamens of *Aotus*; filaments all or outer 5 adnate to petals at base; anthers usually elongated. Germen 2-ovulate; style usually dilated at base, subulate at apex, minutely stigmatiferous at very point. Legume ovate, rather turgid, 1-2-seeded, 2-valved.—Shrubs, usually heath-like; leaves alternate simple linear; stipules minute or 0; flowers axillary or terminal, pedunculate; bractlets 2, 3, often inserted under flower, sometimes foliaceous<sup>5</sup> (*Australia*<sup>6</sup>).

256. *Gastrolobium* R. BR.<sup>7</sup>—Calyx gamosepalous; 2 superior lobes broader, often truncate, connate higher. Corolla and free stamens of *Aotus*. Germen subsessile or stipitate; ovules 2 reniform; style slender incurved, at apex minute or capitate stigmatiferous. Legume ovoid or subglobular turgid, 2-valved. Seeds, 1, 2, arillate.—Shrubs; leaves opposite or 3- or 4-nately verticillate, more rarely alternate, simple rigid, with edges revolute or folded and connate; stipules small narrow; flowers<sup>8</sup> in terminal or axillary racemes or

137.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 20.—ANDR., *Bot. Repos.*, t. 304.—LODD., *Bot. Cab.*, t. 43.—BENTH., *Fl. Austral.*, ii. 69.—*Bot. Reg.*, t. 728, 1005.—*Bot. Mag.*, t. 1757, 1957, 2679, 3196, 4244.—WALP., *Rep.*, i. 569; ii. 832; v. 427; *Ann.*, i. 203; ii. 310; iv. 455.

<sup>1</sup> In *Ann. of Bot.*, i. 504, in *Trans. Linn. Soc.*, ix. 249.—DC., *Prodr.*, ii. 108.—ENDL., *Gen.*, n. 6440.—B. H., *Gen.*, 470, n. 20.

<sup>2</sup> Yellow or purple-variegated.

<sup>3</sup> Species about 19. LABILL., *Nouv.-Holl.*, t. 132.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 14.—VENT., *Jard. Malmais.*, t. 35 (*Pultenæa*).—BENTH., in *Ann. Wien. Mus.*, ii. 78; *Fl.*

*Austral.*, ii. 94.—WALP., *Rep.*, i. 572; v. 429; *Ann.*, ii. 311; iv. 456.

<sup>4</sup> *Prodr.*, ii. 113 (*Pultenæa* sect. ii).—ENDL., *Gen.*, n. 6439.—B. H., *Gen.*, 470, n. 21.

<sup>5</sup> This genus differs from *Pultenæa* (of which it was formerly made a section) by its exarillate seeds, and its stamens adnate at the base to the corolla; from *Dillwynia* and *Aotus* by its bractlets.

<sup>6</sup> Species 6. BENTH., in *Hueg. Enum.*, 34; in *Ann. Wien. Mus.*, ii. 77; *Fl. Austral.*, ii. 94.

<sup>7</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 16.—DC., *Prodr.*, ii. 110.—ENDL., *Gen.*, n. 6443.—B. H., *Gen.*, 470, n. 22.

<sup>8</sup> Yellow or variegated red and purple.

dense fascicles; bracts small caducous; bractlets minute very caducous, or 0<sup>1</sup> (*Australia*<sup>2</sup>).

257. *Pultenæa* SM.<sup>3</sup>—Flowers of *Gastrolobium*; 2 superior calyx-lobes sometimes very large (*Euchilus*<sup>4</sup>); style often conspicuously dilated at base (*Spadostyles*<sup>5</sup>). Legume ovate, compressed or turgid, 2-valved. Seeds 1, 2, reniform arillate.—Shrubs; leaves alternate or more rarely 3-nately verticillate simple; margins revolute or involute; stipules lanceolate or subulate dusky scarious, usually interfoliar connate; flowers<sup>6</sup> axillary solitary, or crowded in stipules of short capituliform terminal spikes or racemes; bracts or upper leaves often enlarged involucrant; bractlets narrow persistent, inserted on floral receptacle, closely appressed to calyx (*Australia*<sup>7</sup>).

258. *Eutaxia* R. BR.<sup>8</sup>—Calyx sub-2-labiate; 2 superior lobes connate into 1 horizontally truncate or more or less incised. Corolla and stamens of *Burtonia* or *Gastrolobium*. Germen stipitate or sessile; ovules 2; style slender incurved or uncinata; apex minute stigmatiferous. Legume ovate compressed or turgid 2-valved. Seeds 1, 2, reniform arillate.—Shrubs, usually glabrous; leaves opposite simple, convex or concave; stipules small; flowers axillary, solitary, or 3 or 4 together pedicellate on an axillary twig bearing a leaf-bud at apex; bracts small; bractlets 2 inserted at a variable height on pedicel<sup>9</sup> (*Australia*<sup>10</sup>).

<sup>1</sup> This genus is in habit very near *Oxylobium*, from which it differs in its 2-ovulate germen; by this character it approaches *Pultenæa* very closely, being separated by its habit and the absence of bractlets just before anthesis.

<sup>2</sup> Species about 30. HOOK., *Icon.*, t. 612 (*Oxylobium*).—LODD., *Bot. Cab.*, t. 70.—TURP., in *Dict. Sc. Nat.*, Atl., t. 176.—LINDL., *Swan Riv.*, t. 5 B.—BENTH., in *Ann. Wien. Mus.*, ii. 80; *Fl. Austral.*, ii. 96.—LINDL. & PAXT., *Fl. Gard.*, ii. t. 85.—*Bot. Reg.*, t. 411; (1847), t. 45.—*Bot. Mag.*, t. 2212.—WALP., *Ann.*, ii. 312; iv. 456.

<sup>3</sup> In *Ann. of Bot.*, i. 502; in *Trans. Linn. Soc.*, ix. 245.—DC., *Prodr.*, ii. 110.—ENDL., *Gen.*, n. 6446.—B. H., *Gen.*, 470, n. 24.—*Bartlingia* AD. BR., in *Ann. Sc. Nat.*, sér. 1, x. 373.—SCHAUER, *Myrt. Xeroc.*, 22, t. 1 A.—*Urodon TURCZ.*, in *Bull. Mosc.* (1849), ii. 16.

<sup>4</sup> R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 17.—DC., *Prodr.*, ii. 110.—ENDL., *Gen.*, n. 6444.

<sup>5</sup> BENTH., in *Ann. Wien. Mus.*, ii. 80.—ENDL., *Gen.*, n. 6445.

<sup>6</sup> Yellow or reddish-purple variegated.

<sup>7</sup> Species about 75. LABILL., *Nouv.-Holl.*, t. 130, 131.—SM., in *Trans. Linn. Soc.*, ix. 245.—RUDGE, in *Trans. Linn. Soc.*, xi. t. 23–25.—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 17.—HOOK. F., *Fl. Tasm.*, t. 13, 14.—REICHB., *Icon. Exot.*, t. 192–196.—BENTH., *Fl. Austral.*, ii. 108.—*Bot. Reg.*, t. 378, 403, 1632, 1694.—*Bot. Mag.*, t. 475, 967, 1394, 1588, 2081, 2086, 2091, 2859, 3254, 3443.—WALP., *Rep.*, i. 574; ii. 832; v. 432; *Ann.*, ii. 311 (*Urodon*), 313; iv. 457.

<sup>8</sup> In *Ait. Hort. Kew.*, ed. 2, iii. 16.—DC., *Prodr.*, ii. 109.—ENDL., *Gen.*, n. 6442.—B. H., *Gen.*, 471, n. 25.—*Sclerothamnus* R. BR., *loc. cit.*—DC., *Prodr.*, ii. 109.—ENDL., *Gen.*, n. 6447.

<sup>9</sup> This genus is perhaps to be reduced to a section of *Pultenæa*, from which it differs in habit and its bractlets removed from the flower.

<sup>10</sup> Species about 8. LABILL., *Nouv.-Holl.*, t. 140 (*Dillwynia*).—BENTH., in *Ann. Wien. Mus.*, ii. 79; *Fl. Austral.*, ii. 143.—*Bot. Mag.*, t. 1274.—WALP., *Rep.*, i. 573; ii. 832; v. 430; *Ann.*, i. 203; ii. 312.

259. *Dillwynia* SM.<sup>1</sup>—Receptacle very concave, usually obconical lined by a glandular disk. Calyx gamosepalous sub-2-labiate; 2 superior lobes connate to a variable height, more rarely scarcely distinct; lower 3 of nearly same length, imbricate. Petals unguiculate. Standard broader than long, keel shorter than narrow wing, straight or slightly incurved. Stamens 10, uniform or vexillary, shorter and more slender. Germen shortly stipitate at bottom of receptacle 2-ovulate; ovules descending; micropyle superior extrorse; style erect, uncinata recurved under capitate stigmatiferous apex. Legume turgid or orbicular, 2-valved. Seeds 1, 2, arillate.—Heath-like shrubs; leaves alternate simple, linear or terete, articulated at base, channelled above; stipules 2, minute filiform caducous; flowers<sup>2</sup> in terminal and axillary racemes or corymbs, 1-bracteate; bractlets 2, lateral at a variable height on pedicel (*Australia*<sup>3</sup>).

260 ? *Latrobea* MEISSN.<sup>4</sup>—Flowers nearly of *Gastrolobium* or *Pultenæa*; calyx subregular ebracteolate ribbed, subequally toothed or lobed. Legume plano-compressed, ovate or lanceolate, 2-valved. Seeds 1, 2, reniform arillate.—Heath-like shrubs; branches usually virgate. Leaves alternate simple linear, convex or channelled above; stipules minute or 0; flowers<sup>5</sup> terminal, or in short spikes or racemes on shortened floriferous twigs, axillary, solitary or subcapitate or subcorymbose; bracts and bractlets small, distant from flower, caducous or 0<sup>6</sup> (*Australia*<sup>7</sup>).

## X. SOPHOREÆ.

261. *Sophora* L.—Receptacle concave, lined by a glandular disk. Calyx gamosepalous, often unequally cleft just before anthesis; teeth 5, short before anthesis. Corolla papilionaceous resupinate; standard suborbicular or broadly obovate, longer or shorter than

<sup>1</sup> In *Ann. of Bot.*, i. 510; *Exot. Bot.*, t. 25, 26 (nec ROTH).—R. BR., in *Ait. Hort. Kew.*, ed. 2, iii. 15.—DC., *Prodr.*, ii. 108.—ENDL., *Gen.*, n. 6441.—B. H., *Gen.*, 471, n. 26.

<sup>2</sup> Yellow or orange red.

<sup>3</sup> Species 10. SWEET, *Fl. Austral.*, t. 28.—LABILL., *Nov.-Holl.*, t. 139.—BENTH., in *Ann. Wien. Mus.*, ii. 78; *Fl. Austral.*, ii. 146.—*Bot. Mag.*, t. 944, 1527, 1545, 2247.

<sup>4</sup> In *Pl. Preiss.*, ii. 219.—B. H., *Gen.*, 471, n.

24.—*Leptocytisus* MEISSN., in *Plant. Preiss.*, ii. 211.

<sup>5</sup> "Yellow (or purplish?)."

<sup>6</sup> This genus is perhaps better reduced to a section of *Pultenæa*, distinguished by the structure of its ebracteolate calyx. The calyx is shortly dentate in *Leptocytisus*.

<sup>7</sup> Species 6. BENTH., *Fl. Austral.*, ii. 140.—WALP., *Ann.*, ii. 313.

keel; wings obliquely oblong; keel nearly straight oblong near its petals, imbricated at back or valvately connate. Stamens 10, perigynous, free or more rarely connate at very base; anthers introrse, 2-rimose versatile. Germen stipitate in bottom of receptacle; ovules  $\infty$ , descending; micropyle superior extrorse; style incurved; apex minute stigmatiferous. Legume moniliform, terete or slightly compressed, outside naked or longitudinally 4-winged (*Edwardisia*), woody coriaceous or fleshy (*Styphnolobium*), indehiscent or rather late sub-2-valved. Seeds  $\infty$ , exarillate, albumen hard; embryo fleshy; cotyledons thick; radicle superior short, nearly straight, or more frequently incurved or inflexed.—Trees, shrubs, or rather perennial herbs; leaves alternate imparipinnate, leaflets few or  $\infty$ ; stipels setaceous or more frequently 0; stipules small deciduous or 0; flowers in terminal simple or branched racemes; bracts and bractlets small or more rarely 0 (*Warmer regions all over the world*). See p. 222.

262. **Gourliea** GILL.<sup>1</sup>—Receptacle concave, glandular within. Calyx gamosepalous; lower teeth shorter; two upper connate rather high. Petals rather long-unguiculate; standard orbicular spreading; wings obliquely obovate; keel incurved obtuse, shorter than wings. Stamens 10, free or more frequently unequally connate at base; anthers small uniform. Germen sessile pluriovulate; style incurved subulate, at apex capitate stigmatiferous. Legume ovoid-globular subdrupaceous, indehiscent; endocarp woody. Seeds few (1–3) reniform thick exarillate; embryo exalbuminous thick; radicle incurved.—A shrub; twigs alternate spinescent; leaves imparipinnate; leaflets  $\infty$ , small; flowers<sup>2</sup> small in short few-flowered racemes, often fasciated at nodes on wood of branches; bracts small caducous (*Extratropical South America*<sup>3</sup>).

263. **Ammodendron** FISCH.<sup>4</sup>—Calyx high-gamosepalous, lobes 5 subequal, 2 superior shortly connate. Petals stamens of *Sophora*; anthers versatile. Germen sessile 2- or pauci-ovulate; style incurved subulate; apex minutely capitate stigmatiferous. Legume linear-

<sup>1</sup> In *Hook. Bot. Misc.*, iii. 207, t. 106.—*ENDL.*, *Gen.*, n. 6746.—*B. H.*, *Gen.*, 555, n. 272.

<sup>2</sup> Gold-coloured, striate.

<sup>3</sup> *CLOS*, in *C. Gay Fl. Chil.*, ii. 218.—*WALP.*, *Rep.*, i. 807; *Ann.*, ii. 440.

<sup>4</sup> In *DC.*, *Prodr.*, ii. 523.—*ENDL.*, *Gen.*, n. 6739.—*B. H.*, *Gen.*, 554, n. 270.

lanceolate plano-compressed; apex more or less obtuse; each suture produced into a narrow longitudinal wing; mesocarp thin suberous; endocarp membranous, 1-seeded (more rarely 2-seeded). Seed oblong exarillate; albumen very scanty; embryo fleshy; cotyledons thick, unequal at base, subauriculate inside, tapering outside; radicle rather long cylindrical inflexed accumbent.—Shrubs, silvery-silky all over; leaves paripinnate; leaflets 1-, 2-jugate exstipellate; midrib prolonged to a variable distance beyond leaflets into a slender spine; stipules lateral small; flowers<sup>1</sup> small in terminal racemes; bracts small caducous, bractlets 0 (*Russian Asia*<sup>2</sup>).

264. *Ammothamnus* BGE.<sup>3</sup>—Flowers nearly of *Sophora*; stamens free or some unequally connate at base; anthers versatile. Legume linear contorted, continuous within, 2-valved. Seeds ovate exarillate; cotyledons thick; radicle short incurved.—A small thinly silky shrub; leaves imparipinnate; leaflets  $\infty$ , small exstipellate; stipules subulate; flowers<sup>4</sup> in simple terminal racemes; bracts setaceous (*Russian Asia*<sup>5</sup>).

265. *Virgilia* LAMK.<sup>6</sup>—Flowers of *Sophora*; base of calyx finally intruded; lobes 5, short unequal connate into 2 unequal lips. Petals long-unguiculate; keel incurved beaked. Stamens 10 free; anthers linear versatile. Germen sessile pauciovulate; style incurved; stigma minute terminal. Legume plano-compressed coriaceous, densely velvety outside, 2-valved; margins thickened. Seeds unequally ovate; apex of funicle dilated into a rudimentary aril; embryo (green) albuminous; radicle incurved.—A tree; leaves alternate imparipinnate; leaflets small exstipellate; stipules narrow caducous; flowers<sup>7</sup> in short terminal racemes; bracts broad very caducous; bractlets 0 (*South Africa*<sup>8</sup>).

266. *Calpurnia* E. MEY.<sup>9</sup>—Flowers of *Sophora*; calyx with 5

<sup>1</sup> "Violet."

<sup>2</sup> Species probably 1 (3 described). PALL., *Astragal.*, t. 91 (*Sophora*).—LEDEB., *Icon.*, t. 107.—EICHW., *Pl. Casp. Cauc.*, t. 33.—WALP., *Rep.*, i. 806.

<sup>3</sup> *Enum. Plant. Lehman.*, 67, t. 12.—B. H., *Gen.*, 555, n. 271.

<sup>4</sup> White.

<sup>5</sup> Species 1. *A. Lehmanni* BGE., *loc. cit.*—WALP., *Ann.*, i. 256.

<sup>6</sup> LAMK., *Ill.*, t. 326, fig. 2.—DC., *Prodr.*, ii.

98 (part.).—ENDL., *Gen.*, n. 6741.—B. H., *Gen.*, 554, n. 267.

<sup>7</sup> Pink-purple.

<sup>8</sup> Species 1. *V. capensis* LAMK., *loc. cit.*—SIMS, in *Bot. Mag.*, t. 1590.—DC., *loc. cit.*, n. 1.—HAEV. & SONN., *Fl. Cap.*, ii. 266.—*Sophora capensis* BURM., *Fl. Cap. Prodr.*, 12.—*S. oroboides* BERG.—*Hypocalyptus capensis* THUNB., *Fl. Cap.*, 570.—*Galega sericea*  $\beta$  LAMK.—*Podalyria capensis* ANDR., *Bot. Repos.*, t. 347.

<sup>9</sup> *Comm. Pl. Afric. Austr.*, 2.—ENDL., *Gen.*, n. 6740.—B. H., *Gen.*, 554, n. 268.



teeth or short broad lobes; 2 superior more or less subconnate. Standard suborbicular erect or subrecurved; wings falcate oblong; keel incurved obtuse. Stamens 10, free; anthers versatile. Germen stipitate  $\infty$ -ovulate; style incurved; stigma minute terminal capitate. Legume linear plano-compressed membranous indehiscent; ventral suture narrowly winged. Seeds compressed, unequally ovate or oblong, funiculate; embryo coloured albuminous.—Trees or shrubs; leaves imparipinnate; leaflets  $\infty$ , exstipellate; stipules small subulate, or minute; flowers<sup>1</sup> in racemes axillary or branched at ends of branches; bracts small; bractlets 0<sup>2</sup> (*South Africa*<sup>3</sup>).

267. *Cladrastis* RAFIN.<sup>4</sup>—Receptacle obliquely obconical, glandular within; mouth oblique, higher behind. Calyx gamosepalous; teeth unequal imbricate; 2 posterior connate higher valvate behind. Corolla elongated; standard obovate-orbicular reflexed above middle; wings obliquely oblong; petals of slightly incurved keel; free dorsally or united. Stamens 10, very shortly connate at base, otherwise free; anthers uniform versatile. Germen shortly stipitate, pauci- or  $\infty$ -ovulate; style tubular; apex subulate; stigma minute terminal. Legume linear plano-compressed thin wingless; scarcely dehiscent; superior margin considerably thickened. Seeds oblong compressed exarillate; embryo thick; radicle inflexed.—Trees; leaves alternate imparipinnate; leaflets few rather large exstipellate; petiole exstipulate, dilated at base into a conical sheath completely covering several superposed axillary buds; flowers<sup>5</sup> in slender branching terminal, usually nutant, racemes; bracts and bractlets 0 (*North America*,<sup>6</sup> *Mantchooria*<sup>7</sup>).

268. *Castanospermum* A. CUNN.<sup>8</sup>—Flowers nearly of *Sophora*; calyx large coloured; teeth very short broad obtuse, or nearly absent. Petals 4, inferior nearly equal to standard. Stamens 10 free;

<sup>1</sup> Yellow.

<sup>2</sup> This genus should hardly be separated from *Virgilia*.

<sup>3</sup> Species about 6. LAMK., *Ill.*, t. 326, fig. 1.—DELESS., *Icon. Sel.*, iii. 36, t. 59.—WIGHT, *Ill.*, t. 78 (81).—SM., *Exot. Bot.*, t. 37.—HARV. & SOND., *Fl. Cap.*, ii. 267.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 253.—*Bot. Mag.*, t. 2617.

<sup>4</sup> *Nov. Gen.* (1825); *Neog.*, ex TOBB. & GR., *Fl. N. Amer.*, i. t. 390.—ENDL., *Gen.*, n. 6742.—B. H., *Gen.*, 554, n. 269.

<sup>5</sup> White.

<sup>6</sup> Species 1. *C. lutea*.—*C. tinctoria* RAFIN., *loc. cit.*—*Virgilia lutea* MICHX., *Fl. Arb. Am.*, iii. 266, t. 3 (78).—DELAUN., *Herb. Amat.*, t. 197.—DC., *Prodr.*, ii. 98, n. 5.

<sup>7</sup> Species 1. *C. amurensis*.—*Maackia amurensis* RUPR. & MAXIM., in *Bull. Acad. Petersb.*, ex MAXIM., *Prim. Fl. Amur.*, 87, t. 5.

<sup>8</sup> In *Hook. Bot. Misc.*, i. 244, t. 51, 52.—ENDL., *Gen.*, n. 6745.—B. H., *Gen.*, 556, n. 274.—? *Viellardia* MONTROUZ., in *Mém. Acad. Lyon*, x. 196 (ex B. H.).

anthers linear versatile. Germen long stipitate; ovules  $\infty$ ; style incurved tapering towards apex; rather obtuse stigmatiferous at very point. Legume elongated subfalcate turgid thick-woody, within spongy between seeds, 2-valved. Seeds large subglobose or ovoid; hilum linear; embryo fleshy; cotyledons thick plano-convex; radicle very short nearly straight or incurved.—A lofty tree; leaves imparipinnate; leaflets large coriaceous; stipules (apparently) 0; flowers<sup>1</sup> in short racemes on last year's branches; bracts small; bractlets 0 (*Subtropical Australia*<sup>2</sup>).

269. *Alexa* Moç.<sup>3</sup>—Receptacle cupuliform, disciferous within. Calyx large coriaceous shortly sinuate-dentate, valvate (?). Corolla subregular; standard obovate emarginate or 2-lobed; wing- and keel-petals subsimilar free imbricate. Stamens 10, very perigynous free; anthers linear. Germen excentric stipitate; ovules  $\infty$ ; style incurved pointed; apex minute stigmatiferous. Legume large<sup>4</sup> elongated compressed woody, within continuous, 2-valved. Seeds suborbicular compressed; embryo fleshy; radicle short straight.—A lofty tree; leaves imparipinnate; leaflets large coriaceous; flowers<sup>5</sup> in lateral pendulous racemes at defoliated nodes; bracts . . . ? (*Guiana*<sup>6</sup>).

270. *Ormosia* JACKS.<sup>7</sup>—Receptacle cupulate, disciferous within. Calyx gamosepalous; 2 superior lobes longer and broader, usually incurved; præfloration subvalvate or slightly imbricate. Petals free unguiculate; standard broadly suborbicular or cordate; wings obliquely obovate; keel-petals subsimilar to wings, incurved, usually imbricated behind. Stamens 10, free; filaments articulated at base, unequal; anthers versatile or (in 1–3 stamens) wanting. Germen subsessile, ovules 2– $\infty$ ; style slender; apex involute; stigma introrse lateral. Legume oblong or elongated, more frequently short and unequally obovate or subrhomboidal, compressed, or rather turgid over seeds, thick-coriaceous continuous within, or spongy or septate

<sup>1</sup> Yellow or orange.

<sup>2</sup> Species 2. One is doubtful, from the islands of New Caledonia; the other is *C. australe* A. CUNN., *loc. cit.*—BENTH., *Fl. Austral.*, ii. 275.

<sup>3</sup> In DC., *Prodr.*, xiii. p. 2, 168.—B. H., *Gen.*, 556, n. 275.—*Alexandra* SCHOMB., *Dissert.* (1845), 18, icon. (nec BGE.).

<sup>4</sup> A foot and a half in length.

<sup>5</sup> Orange, 1 large.

<sup>6</sup> Species 1. *A. Imperatricis*.—*Alexandra Imperatricis* SCHOMB.—WALP., *Rep.*, v. 564.

<sup>7</sup> In *Trans. Linn. Soc.*, x. 360, t. 25–27.—DC., *Prodr.*, ii. 97.—ENDL., *Gen.*, n. 6747.—B. H., *Gen.*, 556, n. 276.—? *Macrotropis* DC., *Prodr.*, ii. 98.—ENDL., *Gen.*, n. 6744.—? *Tullichiba* ADANS., *Fam. des Pl.*, ii. 326.—*Layia* HOOK. & ARN., *Beech. Voy. Bot.*, 183, t. 38.

between seeds, 2-valved. Seeds 1-∞, suborbicular obovate or oblong rather thick shining (of one colour or two) cotyledons; radicle short, straight.—Trees; leaves impari- or subparipinnate; leaflets coriaceous, stipellate or more frequently exstipellate; stipules small or 0; flowers<sup>2</sup> in usually branched axillary or terminal racemes; bracts and bractlets small inserted on pedicel, or minute (*America, tropical Asia*<sup>3</sup>).

271. *Pericopsis* THW.<sup>4</sup>—Flowers of *Ormosia*; ovary stipitate. “Legume stipitate broadly linear plano-compressed coriaceous indehiscent (?); both sutures marginate. Seeds much compressed, broadly ovate or orbicular; cotyledons obliquely cordate at base; radicle somewhat incurved towards larger auricle.”—A tree;<sup>5</sup> leaves imparipinnate; flowers<sup>6</sup> racemose in upper axils or in branched terminal racemes; bracts and bractlets minute, very caducous (*Ceylon*<sup>7</sup>).

272. *Bowdichia* H. B. K.<sup>8</sup>—Receptacle turbinate, disciferous within. Calyx-teeth valvate or subimbricate. Corolla nearly of *Ormosia* or *Diploptropis*. Stamens 10 very perigynous; filaments articulated at base free; anthers versatile uniform, 1 or 2 often wanting. Germen stipitate excentric; ovules ∞; style slender inflexed at apex, stigma capitate. Legume (nearly of *Deguelia*) oblong linear plano-compressed membranous indehiscent; placentary suture narrowly winged. Seeds ∞, oblong transverse; cotyledons thick plano-convex; radicle short incurved.—Lofty trees; leaves imparipinnate; leaflets ∞, exstipellate; stipules narrow caducous; flowers<sup>9</sup> in lax much branched terminal racemes; bracts and bractlets small (*Tropical America*<sup>10</sup>).

273. *Diploptropis* BENTH<sup>11</sup>.—Receptacle turbinate, disciferous

<sup>1</sup> Testa smooth, scarlet or variably spotted with black.

<sup>2</sup> White, lilac, or dark purple.

<sup>3</sup> Species about 18. WIGHT, *Icon.*, t. 245 (*Sophora*).—WALL., *Pl. As. Rar.*, t. 125.—BENTH., *Fl. Hongkong*, 96; in *Mart. Fl. Bras., Papil.*, 315, t. 125, 126.—WALP., *Rep.*, i. 807; ii. 903 (*Macroptropis*); v. 549; *Ann.*, iv. 587.

<sup>4</sup> *Enum. Plant. Zeyl.*, 413.—B. H., *Gen.*, 556, n. 277.

<sup>5</sup> With habit of *Ormosia*.

<sup>6</sup> Dark purple.

<sup>7</sup> Species 1. *P. Mooniana* THW., *loc. cit.* The genus only differs from *Ormosia* in its legume and curved radicle.

<sup>8</sup> *Nov. Gen. et Spec.*, vi. 376.—DC., *Prodr.*, ii. 519.—ENDL., *Gen.*, n. 6749.—B. H., *Gen.*, 557, n. 279.—*Sebipira* MART., *Reis.*, 787.—*Cebipira* PRS., *Brasil.*, 78.

<sup>9</sup> White or blue; petals rather crisp at edges.

<sup>10</sup> Species 1 or 2. BENTH., in *Ann. Wien. Mus.*, ii. 89; in *Mart. Fl. Bras., Papil.*, 311, t. 123.

<sup>11</sup> In *Ann. Wien. Mus.*, ii. 88.—ENDL., *Gen.*, n. 6748.—B. H., *Gen.*, 557, n. 278.

within; mouth oblique. Calyx-teeth or lobes unequal in length, sub-valvate; 2 superior higher connate longer recurved. Corolla nearly of *Ormosia*; petals flat rather thick or crisp corrugated (*Dibrachion*<sup>1</sup>); standard naked or appendicular on both sides above claw; wings oblique; keel-petals valvate behind and slightly coherent, or free subimbricate (*Dibrachion*). Stamens very perigynous unequal free. Germen sessile or shortly stipitate in bottom of receptacle; ovules 2-∞; style incurved; stigma small terminal or oblique. Legume ovate or oblong, compressed, coriaceous or woody, rather late 2-valved. Seeds 1 or few, unequally ovate or suborbicular, compressed; embryo thick; radicle straight short.—Trees; leaves imparipinnate; leaflets coriaceous exstipellate; stipules small, flowers<sup>2</sup> racemose; simple axillary to upper leaves or branched terminal; bracts and bractlets minute, below flower (*Tropical America*<sup>3</sup>).

274. **Spirotropis** TUL.<sup>4</sup>—Calyx tubular, finally splitting unevenly; teeth 5, connate into two unequal lips; superior lip 2-, inferior 3-toothed. Petals shortly unguiculate; standard obovate elliptical; wings oblong shorter than standard; keel-petals subsimilar to wings, finally convolute; stamens 10, free unequal; anthers linear-elongated subbasifixed. Germen subsessile; ovules ∞; obliquely descending; style slender; apex minutely stigmatiferous. “Legume oblong, acute at both ends, flat wingless. Seeds . . . ?”—A tree; leaves imparipinnate; leaflets paucijugate coriaceous; stipules foliaceous; flowers<sup>5</sup> in much branched terminal racemes; bracts small caducous; bractlets minute, inserted on pedicel (*Guiana*<sup>6</sup>).

275. **Monopteryx** SPRUCE.<sup>7</sup>—Receptacle short concave. Calyx deeply 5-lobed; 3 inferior lobes minute connate (as in *Coumarouna*) into a short 3-toothed lip; 2 superior connate into a very large lip plicate and including corolla. Petals subsessile; standard obovate; wings oblong; keel-petals like wings, connate behind from base to

<sup>1</sup> TUL., in *Ann. Sc. Nat.*, sér. 2, xx, 139; in *Arch. Mus.*, iv, 102, t. 7.

<sup>2</sup> Whitish or pink.

<sup>3</sup> Species about 7. BENTH., in *Mart. Fl. Bras.*, *Papil.*, 319, t. 127.—WALP., *Rep.*, v, 550 (*Dibrachion*).

<sup>4</sup> In *Arch. Mus.*, iv, 113.—B. H., *Gen.*, 557, 11, 280.—*Vatairea* SAG., *ms.*, in herb. Mus.

Par. (an AUBL. ?, p. 322, not. 1; 323, not. 6).

<sup>5</sup> Purple.

<sup>6</sup> Species 1. *S. longifolia*.—*S. Candollei* TUL., *loc. cit.*—*Swartzia longifolia* DC., *Mém. Légum.*, 406; *Prodr.*, ii, 423, n. 10.

<sup>7</sup> Ex BENTH., in *Mart. Fl. Bras.*, *Papil.*, 307, t. 122.—B. H., *Gen.*, 552, n. 261.

apex. Stamens 10, free; anthers oblong uniform. Germen stipitate; ovule 1, descending; style short incurved; stigma introrse lateral. Legume . . . ?—Tall trees; leaves alternate imparipinnate; leaflets coriaceous exstipellate; stipules . . . ?; flowers in much branched terminal racemes; bracts and bractlets small caducous<sup>1</sup> (*North Brazil*<sup>2</sup>).

276. *Baphia* AFZEL.<sup>3</sup>—Receptacle very short; disk thin nearly absent, or produced into a short ring round gynæceum. Calyx gamosepalous subglobose or ovoid, valvate, very shortly 5-toothed at apex; finally splitting into 5 subequal strips, more frequently unequally 2-cleft on anthesis (*Bracteolaria*<sup>4</sup>) or spathaceous (*Delairia*<sup>5</sup>). Petals subsessile; standard orbicular or broadly elliptical; wings oblique; keel slightly incurved obtuse. Stamens 10, subhypogynous or slightly perigynous; filaments free; anthers uniform. Germen subsessile; ovules  $\infty$ , more frequently few; style incurved subulate; apex minute stigmatiferous; legume linear, lanceolate or falcate, acute at both ends, plano-compressed coriaceous, continuous within or slightly stuffed, 2-valved. Seeds few, suborbicular or ovate; embryo fleshy; radicle incurved.—Trees or shrubs; leaves alternate 1-foliolate; stipules small; flowers<sup>6</sup> solitary or fascicled axillary, or in short terminal, rarely branched, racemes; bracts small caducous; bractlets large deciduous, or short inserted on top of pedicel and persisting below flower (*Tropical Africa*<sup>7</sup>).

277. *Leucomphalus* BENTH.<sup>8</sup>—Flowers nearly of *Baphia*; calyx subglobose, cleft on anthesis. Stamens 10, free; anthers linear longer than filaments. Germen long stipitate; ovules few. Legume long-stipitate, falcate-ovate coriaceous rather turgid, continuous within, 2-valved. Seeds 1, 2, oblong; hilum lateral, enlarged into a thick fungoid aril.—A shrub; leaves 1-foliolate; flowers<sup>9</sup> in terminal

<sup>1</sup> The habit is of *Dipteryx*, to which this genus comes really very near, differing in its free stamens and its united 2 superior calyx-lobes.

<sup>2</sup> Species 2. BENTH., *loc. cit.*

<sup>3</sup> In *Lodd. Bot. Cab.*, iv. t. 367.—DC., *Prodr.*, ii. 424.—ENDL., *Gen.*, n. 6812.—B. H., *Gen.*, 553, n. 263.—H. BN., in *Adansonia*, vi. 212.

<sup>4</sup> HOCHST., in *Flora* (1841), ii. 638.

<sup>5</sup> DESVX., in *Ann. Sc. Nat.*, sér. 1, ix. 406.—

*Carpolobia* DON (G.), *Gen. Syst.*, i. 370 (part.).—ENDL., *Gen.*, n. 5655.

<sup>6</sup> White or yellow.

<sup>7</sup> Species about 8. HOOK., *Niger*, 320.—HÆRV., *Thes. Cap.*, t. 20.—H. BN., in *Adansonia*, *loc. cit.*, 213, 214.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 247.—WALP., *Rep.*, v. 565; *Ann.*, ii. 308.

<sup>8</sup> *Niger*, 322, t. 31.—B. H., *Gen.*, 553, n. 264.

<sup>9</sup> White.

branching racemes; bracts and bractlets small (*Western tropical Africa*<sup>1</sup>).

278. *Dalhousiea* WALL.<sup>2</sup>—Receptacle concave short. Calyx campanulate; teeth very short. Petals unequally-unguiculate; standard sessile orbicular; wings oblique; keel erect oblique broader than wings. Stamens 10, free; anthers uniform oblong. Germen sessile; ovules few; style incurved; apex minute stigmatiferous. Legume obliquely oblong, acute at both ends, compressed coriaceous-woody, continuous within, 2-valved. Seeds 1-3, orbicular compressed; radicle short straight.—A shrub; leaves 1-foliolate; flowers<sup>3</sup> in axillary and terminal simple or branched racemes; bracts minute or altogether abortive; stipules of bracts rather large, ovate or orbicular, cordate at base, subpersistent, including flower (*East Indies, tropical Africa*<sup>4</sup>).

279. *Bowringia* CHAMP.<sup>5</sup>—Calyx broadly bowl-shaped subcampanulate membranous; teeth 5, short subequal. Corolla nearly of *Dalhousiea*; petals shortly unguiculate; keel-petals subsimilar to wings, a little longer, slightly connate behind. Stamens 10, free; anthers oblong uniform. Germen stipitate; ovules  $\infty$ ; style subulate; apex minute stigmatiferous. Legume stipitate, ovoid or subglobose, turgid submembranous, 2-valved. Seeds possessing a large bowl-shaped aril; embryo fleshy radicle short straight.—A climbing shrub; leaves alternate simple petiolate; stipules small; flowers<sup>6</sup> in short lax axillary racemes; bracts and bractlets small (*South of China*<sup>7</sup>).

280. *Panurea* SPRUCE.<sup>8</sup>—Receptacle obconical, disciferous within. Calyx oblique; lobes short, subvalvate or slightly imbricate; 2 superior valvate above, connate into a 9-toothed lip. Corolla and stamens of *Dalbergia*; anthers small subglobose, dehiscing by short oblique clefts; filaments quite free. Germen sessile; ovules few;

<sup>1</sup> Species 1. *L. capparideus* BENTH., *loc. cit.*—HOOK., *Icon.*, t. 784.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 252.—WALP., *Ann.*, i. 257.

<sup>2</sup> *Cat. Herb. Ind.*, n. 5339.—ENDL., *Gen.*, n. 6424.—B. H., *Gen.*, 552, n. 262.

<sup>3</sup> White.

<sup>4</sup> ROXB., *Pl. Coromand.*, iii. t. 259 (*Pod-*

*lyria*).—WIGHT, *Icon.*, t. 265.—BENTH., in *Ann. Wien. Mus.*, ii. 69.

<sup>5</sup> In *Hook. Journ.*, iv. 75.—B. H., *Gen.*, 553, n. 265.

<sup>6</sup> White.  
<sup>7</sup> Species 1. *B. callicarpa* CHAMP., *loc. cit.*—BENTH., *Fl. Hongkong.*, 95.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 247.—WALP., *Ann.*, iv. 585.

<sup>8</sup> Ex B. H., *Gen.*, 554, 1002, n. 266.

style short thick bowed, inflexed; apex obtuse capitate stigmatiferous. Legume stipitate oblong-lanceolate acuminate, slightly compressed 2-valved.—A branching tree; leaves alternate simple large coriaceous penniveined, shortly petiolate; stipules small subulate; flowers<sup>1</sup> in short axillary simple or branched racemes; bracts and bractlets under flower minute caducous (*North Brazil*<sup>2</sup>).

281. *Ateleia* Moç. & Sesse.<sup>3</sup>—Calyx gamosepalous obconical, horizontally truncate entire, or very shortly 5-toothed. Petal 1, vexillary, long-unguiculate; limb broader subcucullate, finally inflexed. Stamens 10, subhypogynous, free or 1-adelphous at very base; anthers uniform subovate compressed. Germen stipitate; ovules 2 descending; stigma sessile ovate bowed inflexed, on top of germen. Legume stipitate, usually accompanied with unthickened persistent calyx, much compressed subsamaroid membranous, narrowly and shortly winged at straight superior suture, indehiscent. Seed reniform compressed attached laterally; embryo exalbuminous; radicle inflexed accumbent.—Unarmed trees or shrubs; leaves imparipinnate stipules minute or 0; flowers<sup>4</sup> in axillary, simple or slightly branched racemes; bracts narrow, 1-flowered (*Central America and Antilles*<sup>5</sup>).

282. *Belairia* A. Rich.<sup>6</sup>—Receptacle obliquely-turbinate; calyx shortly 5-toothed. Petals acute erect; standard trapeziform; wings and keel-petals subequal linear-lanceolate free. Stamens 10, free exerted; anthers uniform ovate. Germen stipitate; ovules 2, 3; style subulate incurved; apex minute stigmatiferous. Legume stipitate small oblong plano-compressed; placentary suture marginate. Seeds reniform compressed; albumen membranous; embryo fleshy; radicle incurved accumbent.—Shrubs; leaves alternate paripinnate; leaflets small paucijugate; stipules long-spinescent subulate; flowers pedicellate solitary or subfasciated at old nodes; bracts caducous; bractlets small, persisting long (*Cuba*<sup>7</sup>).

<sup>1</sup> Small, ochrey-white.

<sup>2</sup> Species 1. *P. longifolia* SPRUCE, ex BENTH., in *Trans. Linn. Soc.*, xxv. 301, t. 35.

<sup>3</sup> Ex DC., *Mém. Légum.*, 395, t. 57; *Prodr.*, ii. 419 (*Pterocarpus* sect. v.).—BENTH., in *Ann. Wien. Mus.*, ii. 101.—ENDL., *Gen.*, n. 6711.—B. H., *Gen.*, 558, n. 283.

<sup>4</sup> Whitish, small.

<sup>5</sup> Species 2 or 3. DC., *Mém. Légum.*, 10, t.

57, fig. 1 (*Pterocarpus*).—A. RICH., *Fl. Cub.*, t. 42 (*Swartzia*).—GRISEB., *Pl. Wright.*, in *Mem. Amer. Acad.*, viii. 180; *Cat. Pl. Cub.*, 80.

<sup>6</sup> *Fl. Cub.*, i. 511, t. 40.—B. H., *Gen.*, 558, n. 282.

<sup>7</sup> Species 1. *B. spinosa* A. RICH., *loc. cit.*—GRISEB., *Pl. Cub. Wright.*, in *Mem. Amer. Acad.*, viii. 179; *Cat. Pl. Cub.*, 81, 284.

283. *Sweetia* SPRENG.<sup>1</sup>—Receptacle obconical minute. Calyx subcampanulate; lobes or teeth 5, subequal, valvate or slightly imbricate. Corolla subregular; petals erect-spreading, long-tapering at base, imbricate in æstivation; uppermost (vexillary) often<sup>2</sup> exterior; occasionally a little broader than rest. Stamens 10, slightly perigynous, longer than petals; filaments free inflexed in bud; anthers uniform. Germen stipitate in bottom of receptacle; ovules few descending; style slender; apex minute or truncate. Legume ellipsoid oval lanceolate or broadly linear, plano-compressed, coriaceous or submembranous, sometimes obscurely subulate at apex, indehiscent. Seeds 1 or few, compressed; embryo exalbuminous; cotyledons foliaceous or rather thick; radicle short straight, or longer incurved.—Trees; leaves pari- or imparipinnate; leaflets pauci- or  $\infty$ -jugate; stipules small or minute; flowers<sup>3</sup> in compound racemes at ends of branches; pedicels short; bracts and bractlets narrow, very caducous<sup>4</sup> (*Tropical South America*<sup>5</sup>).

284. *Myrocarpus* ALLEM.<sup>6</sup>—Receptacle obconical turbinate, disciferous within. Calyx membranous; teeth 4, 5, short subequal or slightly unequal; or else superior connate. Petals 5, unguiculate linear, long-narrowed at base subequal, variably imbricated.<sup>7</sup> Stamens 10, inserted perigynously with petals, exerted filaments free; anthers small uniform versatile. Germen central stipitate; ovules few reniform; style short, straight or incurved; apex minute stigmatiferous. Legume elongated much compressed, attenuated subulate at sutures, indehiscent; pericarp somewhat turgid over seeds stuffed, with resiniferous cavities. Seeds 1 or few, elongated subfusiform descending;<sup>8</sup> embryo long cylindrical exalbuminous; radicle superior short straight.—Trees; leaves imparipinnate, leaflets alternate or opposite, with transparent dots, stipules small, flowers racemose; racemes slender, axillary or at ends of defoliated branches;

<sup>1</sup> *Syst.*, ii. 171 (nec DC.).—B. H., *Gen.*, 559, n. 288.—*Acosmium* SCHOTT, in *Spreng. Syst.*, *Cur. Post.*, 406.—ENDL., *Gen.*, n. 6753.—*Leptolobium* VOG., in *Linnaea*, xi. 388.—ENDL., *Gen.*, n. 6751.—*Thalesia* MART., mss. (ex ENDL.).

<sup>2</sup> But not always; hence this genus is as it were, through *Barklya*, intermediate between *Sophorea* and *Casalpinia*.

<sup>3</sup> Yellowish, sometimes small and recalls those of many *Mimosea* and of *Leptolobium*.

<sup>4</sup> The genus is divided into 3 sections, viz. :—

1. *Acosmium*: calyx lobes shorter than tube; radicle incurved.—2. *Leptolobium*: calyx longer, radicle short straight.—3. *Mesitis* (VOG.): calyx of *Leptolobium*; radicle of *Acosmium*.

<sup>5</sup> Species about 10. BENTH., in *Journ. Linn. Soc.*, viii. 261.—WALP., *Rep.*, i. 808; v. 550; *Ann.*, ii. 440 (*Leptolobium*).

<sup>6</sup> ALLEM., *Diss.* (1847, 48), icon.—B. H., *Gen.*, 559, n. 287.

<sup>7</sup> Small, white.

<sup>8</sup> Closely appressed to pericarp, and not easily separable from it, though not altogether adherent.



bracts small; bractlets 0 or minute inserted at superior articulation of pedicel (*Brazil*<sup>1</sup>).

285. *Myrospermum* JACQ.<sup>2</sup>—Receptacle long obconical incurved, disciferous within; mouth oblique. Calyx gamosepalous subcampanulate; teeth 5 very short broad obtuse, with resinous ribs; præfloration . . . ? Corolla papilionaceous; standard broadly obovate, much involute completely surrounding other petals, finally expanded; wings and keel-petals subsimilar to one another, shorter, narrower sublanceolate acuminate. Stamens 10, free; filaments much elongated exerted persistent; anthers small ovate; connective bearing an oblong gland behind below apex. Germen stipitate compressed; ovules 2-∞, obliquely descending anatropous; style suberect subulate; apex not thickened, stigmatiferous. Legume surrounded at base by persistent receptacle calyx and filaments, long-stipitate, much compressed phyllode-like veined, below acuminate apex indurated inflated and excavated, 1-seeded, indehiscent, tapering for a long way to base, unequally 2-winged; superior wing a little broader than inferior. Seeds descending oblong compressed; cotyledons rather fleshy, laterally unequally auriculate at base; radicle superior short incurved.—A tree or shrub;<sup>3</sup> leaves alternate imparipinnate, leaflets exstipellate, sprinkled with pellucid round and shortly linear dots; stipules minute 3-angular caducous; flowers in simple axillary racemes (*Tropical and Central America and Antilles*).

286. *Toluifera* L.<sup>4</sup>—Receptacle obliquely turbinate, lined by a glandular disk. Calyx gamosepalous, entire, in bud valvate; unequally dentate just at expansion. Petals very perigynous, unequal; standard broadly orbicular; wings and keel-petals subsimilar to one another, much smaller, narrowly lanceolate. Stamens 10, inserted with petals, filaments free or shortly connate at very base; anthers exerted uniform apiculate introrse 2-rimose, longer than very slender

<sup>1</sup> Species 2 or 3. ALLEM., *loc. cit.*—BENTH., in *Linnaea*, xxii, 526 (*Leptolobium*).—WALP., *Ann.*, iii, 932.

<sup>2</sup> *Stirp. Amer.*, 120, t. 174, fig. 34.—DC., *Prodr.*, ii, 94 (sect. i., *Calusia* BERT., excl. sect. ii.).—ENDL., *Gen.*, n. 6736 a.—B. H., *Gen.*, 558, n. 285.

<sup>3</sup> Species 1. *M. frutescens* JACQ., *loc. cit.*—

H. B. K., *Nov. Gen. et Spec.*, vi, 572, t. 570, 571.

<sup>4</sup> *Gen.*, n. 524 (1737).—J., *Gen.*, 372.—*Myroxylon* L. F., *Suppl.* (1781), 34 (nec FORST.).—DC., *Prodr.*, ii, 95 (*Myrospermi* sect. ii.).—A. RICH., in *Ann. Sc. Nat.*, sér. I, ii, 168.—ENDL., *Gen.*, n. 6736 (part.).—B. H., *Gen.*, 558, n. 286.

filament. Germen excentric, long-stipitate on posterior wall of receptacle; ovules 1, 2, descending; style short incurved; apex minute stigmatiferous. Legume stipitate thickened and indurated at apex, tapering below on either side into a long wing; posterior wing broader than anterior; pericarp indehiscent, containing balsamic cavities round seed. Seed 1, descending subreniform; testa thin; embryo thick; cotyledons plano-convex or more or less subruminate; radicle short incurved.—Balsamiferous trees; leaves alternate imparipinnate; leaflets exstipellate, sprinkled with round and shortly linear pellucid dots; flowers<sup>1</sup> racemose; racemes simple axillary, or simple compound, or fascicled at ends of branches; bracts minute rigid; pedicels articulated at base; bractlets inserted at a variable height on pedicels, minute or 0 (*South America*<sup>2</sup>).

287? **Ferreirea** ALLEM.<sup>3</sup>—Calyx membranous subpetaloid truncate; teeth obsolete. Standard broadly suborbicular reflexed; 4 inferior petals subsimilar free narrowly oblong. Stamens free, slightly shorter than petals; anthers uniform ovate. Germen shortly stipitate 1-ovulate; apex produced into a membranous transversely veined wing thickened behind, indehiscent. Seeds oblong subreniform compressed; testa membranous; cotyledons not thick; radicle incurved.—A tall tree; leaves imparipinnate; leaflets  $\infty$ , small exstipellate; flowers<sup>4</sup> racemose; racemes slender paniced at end of branches; bracts and bractlets small very caducous<sup>5</sup> (*Brazil*).

288? **Camoensia** WELW.<sup>6</sup>—Calyx (receptacle?) campanulate or very long; lobes 5, imbricate. Corolla papilionaceous; petals unguiculate corrugated; standard broadly orbicular; wings and keel-petals ovate or cuneate, free. Stamens 10, free; anthers uniform versatile. Germen stipitate; ovules  $\infty$ ; style filiform, involute in bud; stigma terminal small or capitate. Legume broadly linear plano-compressed thick-coriaceous 2-valved. Seeds obovate trans-

<sup>1</sup> Whitish.

<sup>2</sup> As many as 6 species have been described, but there are probably only 2 or 3 variable. LAMK., *Dict.*, iv. 191; Suppl., iii. 708; *Ill.*, t. 341, fig. 2 (*Myrospermum*).—H. B. K., *Nov. Gen. et Spec.*, vi. 374.—KL., in *Hayne Arzen.*, xiv. t. 11, 12.—A. RICH., *Fl. Cub.*, i. 166, t. 38.—BENTH., in *Mart. Fl. Bras., Papil.*, 310.—WALP., *Rep.*, i. 805.

<sup>3</sup> In *Trab. Soc. Velloz.*, 26, icon.—B. H., *Gen.*, 558, n. 284.

<sup>4</sup> "Small, yellow."

<sup>5</sup> "A genus nearly resembling *Tipuana* in leaves and legume, but in flowers nearly akin to *Bowdichia* and *Myrospermum* (or *Toluifera*) (BENTH.)."

<sup>6</sup> Ex B. H., *Gen.*, 557, 1002, n. 281.

verse compressed; embryo exalbuminous, radicle short straight.—Climbing shrubs; leaves digitately 3-foliolate; leaflets petiolulate; flowers<sup>1</sup> large coriaceous in simple racemes at superior axils; bracts and bractlets short caducous (*West of tropical Africa*<sup>2</sup>).

## XI. TOUNATEÆ.

289. **Tounatea** AUBL.—Flowers hermaphrodite or rarely polygamous; receptacle minute, convex or slightly concave, disciferous. Calyx before anthesis entire, globose or obovoidal, at anthesis bursting variably sometimes open cup-shaped unequally toothed, circumscissile from base (*Cyathostegia*), sometimes reflexed, unequally 2-, 3-valved (*Trischidium*), often coriaceous or submembranous, irregularly 4-valved (*Eutounatea*, *Possira*), occasionally herbaceous subreflexed, unequally lobed (*Fistuloides*). Petals 0, or more frequently 1 vexillary, broad corrugated, more rarely accompanied by two lateral minute. Stamens subhypogynous or hypogynous, free or shortly connate at base; anthers uniform linear (*Trischidium*, *Cyathostegia*), or ovate or subglobular (*Eutounatea*), or anterior few or more, longer and thicker (*Fistuloides*, *Possira*); filaments longer equal. Carpels 1, more rarely 2. Germen stipitate usually incurved; ovules  $\infty$ ; style tapering; stigma terminal minute or capitate. Legume ovoid or elongated, subterete long (*Fistuloides*) or turgid, coriaceous or fleshy, rarely full of gummy lacunæ, indehiscent or 2-valved. Seeds arillate or exarillate, albuminous or exalbuminous; embryo fleshy; radicle short inflexed.—Unarmed trees; leaves alternate imparipinnate or 1-foliolate; stipule minute or more rarely foliaceous; flowers solitary pedunculate axillary or lateral, or usually racemose; racemes solitary or fascicled at old nodes, rarely branching axillary or on leafless twigs. Bracts and bractlets small, usually caducous (*Tropical America and Africa*). See p. 225.

290. **Aldina** ENDL.<sup>3</sup>—Flowers subregular; receptacle obconical turbinate, lined by a thick disk. Calyx gamosepalous, entire in bud, on anthesis valvate, unequally-partite. Petals 5, 6, subequal erect

<sup>1</sup> Handsome, in one species (*C. maxima* BENTH.) gigantic.

<sup>2</sup> Species 2. BENTH., in *Trans. Linn. Soc.*, xxv. 301, t. 36.—BAKER, in *Oliv. Fl. Trop. Afr.*, ii. 251.

<sup>3</sup> *Gen.*, n. 6315.—B. H., *Gen.*, 560, n. 293.—*Allania* BENTH., in *Hook. Journ.*, ii. 91 (nec ENDL.).

variably imbricated; highest usually outside, often a little broader than rest. Stamens 10, very perigynous; filaments free; anthers uniform linear-acuminate versatile 2-rimose. Germen central stipitate; ovules  $\infty$ , more frequently few; style short subulate incurved; apex minute stigmatiferous. Legume subdrupaceous thick, 1-seeded.—Lofty unarmed trees; leaves imparipinnate or 1-foliolate; stipules minute or 0; flowers<sup>1</sup> in simple axillary or terminal branching racemes; bracts small caducous (*East of Tropical America*<sup>2</sup>).

291. **Zollernia** MART.<sup>3</sup>—Flowers subregular; receptacle minute convex. Calyx gamosepalous, entire acuminate in bud, valvate, by anthesis sometimes unequally cleft, finally reflexed or deciduous. Petals 5, hypogynous imbricate; vexillary a little broader external. Stamens 10 (or 9–15); filaments hypogynous free short; anthers uniform linear-acuminate, subbasifixed; cells introrse 2-rimose. Germen shortly stipitate; ovules  $\infty$ ; style short subulate; apex minutely and subobliquely stigmatiferous. Legume very shortly stipitate, ovoid or subglobose, apiculate rather thick, 2-valved. Seeds 1 or few, orbicular subulate or ovate; embryo exalbuminous; cotyledons broad compressed; radicle short inflexed.—Unarmed trees or shrubs; leaves simple shortly petiolate; stipules rigid; flowers<sup>4</sup> in terminal simple or more frequently branched racemes; bracts small caducous; bractlets minute inserted on pedicel (*Brazil*<sup>5</sup>).

292? **Exostylis** SCHOTT.<sup>6</sup>—Flowers regular hermaphrodite or polygamous; receptacle elongated obconical turbinate, disciferous within. Calyx perigynous gamosepalous, before anthesis subentire at apex minutely 5-dentate valvate, by anthesis valvate 3–5-partite and finally reflexed. Petals 5, perigynous subequal free; aestivation variable, sometimes contorted, sometimes variably imbricated; highest often inside. Stamens 10; free subequal, inserted within petals, to which 5 are opposite, the rest alternate; filaments subulate; anthers introrse affixed a little above base, apiculate 2-celled

<sup>1</sup> Handsome, white.

<sup>2</sup> Species 4. WALP., *Rep.*, v. 565.

<sup>3</sup> In *Nov. Acta Nat. Cur.*, xiii. p. 13, t. C, D.—ENDL., *Gen.*, n. 6813.—B. H., *Gen.*, 560, n. 291.—*Acidandra* MART., mss. (ex ENDL.).—*Coquebertia* AD. BR., in *Ann. Sc. Nat.*, sér. 1, xxx. 180; in *Duperr. Voy., Bot.*, t. 75.

<sup>4</sup> "Yellow."

<sup>5</sup> Species 4. TUL., in *Arch. Mus.*, iv. 190.—WALP., *Rep.*, i. 841; v. 562.

<sup>6</sup> In *Spreng. Syst., Cur. Post.*, 406.—B. H., *Gen.*, 560, n. 292.—*Exostyles* ENDL., *Atakt.*, 26, t. 25; *Gen.*, n. 6758.

dehiscing longitudinally. Germen subcentral, free stipitate in bottom of receptacle; ovules  $\infty$ , anatropous, 2-seriate; style straight elongated, at apex unthickened ostiolate stigmatiferous. Legume obliquely ovate, compressed thick-coriaceous, 2-valved; sutures thickened. "Seeds 1-3, ovate transverse compressed exarillate exalbuminous; cotyledons flat orbicular; radicle short inflexed."—Small unarmed shrubs; leaves alternate imparipinnate; leaflets stipellate; stipules small subulate; caducous; flowers<sup>1</sup> in loose axillary racemes; bracts and bractlets small subpersistent<sup>2</sup> (*Brazil*<sup>3</sup>).

293. *Cordyla* LOUR.<sup>4</sup>—Flowers almost those of *Aldina*, apetalous; receptacle subcampanulate, lined by a disk;<sup>5</sup> calyx entire valvate before anthesis, finally unequally 3-5-lobed. Stamens  $\infty$ ; filaments free or connate close to base, much inflexed in bud, finally exerted; anthers short, inserted by upper part of back, glandular above insertion, rimose introrse. Germen central raised on a long stalk; ovules  $\infty$ ; style short subulate arched; apex minute stigmatiferous. Legume stipitate ovoid acuminate, pulpy within. Seeds  $\infty$ ; albumen thin; embryo fleshy; radicle inflexed.—Trees, unarmed; leaves imparipinnate; leaflets  $\infty$ , alternate; stipules lanceolate caducous; flowers<sup>6</sup> in racemes fascicled at old nodes or more rarely axillary; bracts and bractlets small caducous<sup>7</sup> (*Tropical Africa*<sup>8</sup>).

The genera we have just enumerated are classed according to the rules laid down by BENTHAM. The order *Papilionaceæ* is thus divided into eleven secondary groups or series, whose general characters we can now repeat:—

I. VICIÆ.—Flowers papilionaceous. Herbs with paripinnate leaves; midrib ending in a short bristle or more frequently transformed into a tendril; leaflets often denticulate at the apex. Stamens 2-adelphous (9-1) or subadelphous. Pod bivalved (6 genera).

<sup>1</sup> Pink or purple.

<sup>2</sup> A genus intermediate between *Papilionaceæ* and *Cæsalpinieæ*, which, perhaps, will be referred to *Sclerolobieæ* by preference when the seed is better known.

<sup>3</sup> Species 2. WALP., *Rep.*, i. 845.

<sup>4</sup> *Fl. Cochinch.*, ed. Ulyssip. (1790), 411 (nec BL.).—DC., *Prodr.*, ii. 521.—ENDL., *Gen.*, n. 6817.—B. H., *Gen.*, 562, n. 295.—*Cordylia*

PERS., *Syn.*, ii. 260.—*Calyandra* LEPÉ., ex A. RICH., *Fl. Seneg. Tent.*, i. 30, 232, t. 9.

<sup>5</sup> Disk marked by thin longitudinal striæ.

<sup>6</sup> White, scented.

<sup>7</sup> This genus is, no doubt, closely related to *Aldina*.

<sup>8</sup> Species 1 or 2. KL., in *Pet. Moss., Bot.*, t. 4.

II. PHASEOLEÆ.—Flowers papilionaceous, in racemes or fascicles, usually axillary or lateral. Stamens and fruit as in *Vicieæ*. Erect or twining herbs; rarely arborescent plants. Leaves pinnate, rarely digitate, 3-foliolate, rarely 1-, 5-, or 7-foliolate, stipellate (45 genera).

III. GALEGEÆ.—Herbs (not twining), trees, or shrubs (rarely climbing). Leaves pinnate, rarely 1–3-foliolate; leaflets usually entire; petiole not transformed into a tendril. Flowers in simple or compound racemes or solitary. Stamens 2-adelphous (9–1), all along, or only at the base, and 1-adelphous above. Pod bivalved, or indehiscent and membranous or 1–2-seeded (55 genera).

IV. LOTEÆ.—Herbaceous or suffrutescent plants. Leaves pinnate, with 3–∞ entire leaflets. Flowers solitary, or more frequently forming a sort of capitulum or umbel; peduncles axillary, or approximated at the ends of the branches. Stamens 1- or 2-adelphous; 5 usually having their filaments dilated above (8 genera).

V. TRIFOLIEÆ.—Herbaceous or rarely frutescent plants. Leaves pinnate, rarely digitate, 3-foliolate; leaflets often denticulate. Flowers solitary racemose or spicate; peduncles usually axillary. Stamens 1- or 2-adelphous (6 genera).

VI. HEDYSAREÆ.—Characters of last four series; fruit possessing more or less distinct transverse articulations (49 genera).

VII. DALBERGIEÆ.—Trees or shrubs. Leaves pinnate, rarely 1–3-foliolate. Inflorescence variable. Stamens 1- or 2-adelphous. Fruit indehiscent, dry or partly fleshy, often few- or one-seeded (26 genera).

VIII. GENISTEÆ.—Herbs or shrubs, with simple or digitate leaves. Flowers in terminal or leaf-opposed racemes; rarely solitary or fascicled in the axils of the leaves. Stamens usually 1-adelphous (41 genera).

IX. PODALYRIEÆ.—Shrubs or rarely herbaceous plants. Leaves as in *Genisteæ*. Stamens free (26 genera).

X. SOPHOREÆ.—Trees or shrubs, rarely subherbaceous plants. Flowers and free stamens of *Podalyrieæ*. Leaves usually pinnate (28 genera).

XI. TOUNATEÆ.—Trees or shrubs. Leaves pinnate; leaflets ∞, rarely 1–3. Calyx closed valvate entire before anthesis. Stamens ∞, rarely subdefinite, free or nearly so (5 genera).

In this group, taken as a whole, there is no character absolutely

constant, or which can distinguish it absolutely from the two other suborders of *Leguminosæ*. It may, however, be said, speaking generally, that *Papilionaceæ* are curvembryate *Leguminosæ* with an inflexed accumbent radicle, compound stipulate leaves, resupinate flowers, a concave floral receptacle, a gamosepalous calyx, and an irregular corolla, so arranged in æstivation that the vexillary petal envelopes the lateral ones, which themselves overlap the pieces of the keel. These peculiar characters of the corolla long ago led to the name *Papilionaceæ* [butterfly-like] being given to this group; a name found in most authors for a century before TOURNEFORT, by which this author distinguished two of his classes (10-22), and which Linnæus adopted for the title of an order.<sup>1</sup> But R. BROWN<sup>2</sup> was the first to point out clear limits to the group *Papilionaceæ* in the year 1814, and his limits have been, with slight modifications, adopted by his successors.<sup>3</sup>

The 293 genera that we admit in this group, omitting for the moment all reference to a few doubtful or very ill-known generic types,<sup>4</sup> comprise about 5300 species.<sup>5</sup> Twenty years ago only 4800<sup>6</sup> were admitted, though the number of species doing double duty was then multiplied indefinitely. Hence we may not unfairly assume that in some years, about 5500 distinct species of *Papilionaceæ* will have been described. It is impossible to lay down their exact geographical distribution, with the very insufficient figures we have at present.<sup>7</sup> But it may be stated generally that they occur in all countries, from the equator to those bordering on either pole.

<sup>1</sup> *Class. Plant.* (1738), Ord. 55. — *Papilionaceæ* and *Lomentaceæ* (*Præl.*, ed. GIES., 415).

<sup>2</sup> In *Flind. Voy.*, ii. 551.

<sup>3</sup> DC., *Prodr.*, ii. (1825), 93-524. — ENDL., *Gen.*, 1253, Ord. cclxxv. — LINDL., *Veg. Kingd.* (1846), 544 (*Fabaceæ*). — B. H., *Gen.*, 435, 437, 465, 1001.

<sup>4</sup> *Viz.*—1. *Bradburya* RAFIN., *Fl. Lud.*, 104 (*Galactia*, ex ENDL., *Gen.*, n. 6653);—2. *Crafordia* RAFIN., ex DC., *Prodr.*, ii. 522 (*Tephrosia* ?);—3. *Malaparius* MIQ., *Fl. Ind.-Bat.*, i. p. 1, 1082 (*Pterocarpus flavus* LOUR., *Fl. Coch.*, ed. 1790, 431);—4. *Placolobium* MIQ., *op. cit.*, 1082;—5. *Chanolobium* MIQ., *op. cit.*, Suppl., i. 302 (a genus formed from fruit);—6. *Nothocnestis* MIQ., *op. cit.*, Suppl., i. 530; *Mus. Lugd.-Bat.*, iii. 88 (*Leguminosa* dub., ex BENTH.; *Conuraceæ*, ex MIQ.);—7. *Singana* AUBL., *Guian.*,

574, t. 230 (*Townatea* ??);—8. *Radackia* ENDL., in *Ann. Wien. Mus.*, i. 186 (nom.).

<sup>5</sup> Thus divided according to the present state of knowledge: *Vicieæ*, 207; *Phaseoleæ*, 561; *Galegeæ*, 1377; *Loteæ*, 105; *Trifolieæ*, 311; *Hedysareæ*, 618; *Dalbergiææ*, 303; *Genisteæ*, 835; *Podalyriææ*, 415; *Sophoreæ*, 104; *Townateæ*, 72.

<sup>6</sup> This is the number given by LINDLEY (*Veg. Kingd.*, 556) in 1846, as the result of BENTHAM'S valuation, and is made up as follows: *Podalyriææ*, 350; *Loteæ*, 3000; *Hedysareæ*, 500; *Phaseoleæ*, 650; *Dalbergiææ*, 250; *Sophoreæ*, 50.

<sup>7</sup> See LINDL., *Veg. Kingd.*, 546.—A. DC. *Géogr. Bot. Rais.*, 433, 437, 503-512, 530-538, 837, 854, 1193-1233.

*Loteæ*, *Trifolieæ*, *Genisteæ*, and *Vicieæ* are the groups which extend furthest north and south, at least by some of their representatives. *Dalbergiææ*, *Podalyriææ*, and *Tounatæææ* are almost exclusively plants from hot climates. *Sophoreæ*, *Hedysareæ*, *Galegeæ*, and *Phaseoleæ* spread far and wide through warm and temperate regions.

The various properties of *Papilionaceæ* are so numerous, and the number of useful species so large, that we shall often have to refer the reader to special treatises<sup>1</sup> in the case of those that are of minor importance and practical interest. The list of species used as food by man and beast would alone fill several pages. There are many plants used as fodder, whose nutritive properties are easily explained by their richness in the nitrogenized principle, legumin, or vegetable casein. We may mention the species and varieties of Lupin,<sup>2</sup> Lucerne<sup>3</sup> (figs. 174–179), Clover or Trefoil,<sup>4</sup> *Lotus* (fig. 168),<sup>5</sup> Vetchling,<sup>6</sup> Vetch,<sup>7</sup> Birdsfoot,<sup>8</sup> and Sainfoin<sup>9</sup> (figs. 181–183). The nitrogenized principle is found accompanied by a quantity of starchy or fatty matter, chiefly in the seeds of the divers kinds of Pea,<sup>10</sup> Chick-pea,<sup>11</sup> Pigeon-pea,<sup>12</sup> Bean, Tare, and Vetch,<sup>13</sup> Kidney-bean,<sup>14</sup> Lentil,<sup>15</sup> Lupin,<sup>16</sup> *Dolichos*,<sup>17</sup> &c., in which the embryo is the essential

<sup>1</sup> ENDL., *Enchirid.*, 675.—DUCH., *Rép.*, 256.—LINDL., *Veg. Kingd.*, 547.—GUIB., *Drog. Simpl.*, ed. 6, iii. 319.—ROSENTH., *Syn. Plant. Diaphor.*, 980.

<sup>2</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, sér. 2, iii. 191.

<sup>3</sup> See H. BN., *loc. cit.*, 358.

<sup>4</sup> *Trifolium arvense* L., *repens* L., *incarnatum* L., *sativum* L., and a score more species are especially used as artificial grasses. (See ROSENTH., *op. cit.*, 992, 993.)

<sup>5</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, sér. 2, iii. 114.

<sup>6</sup> Especially *Lathyrus sativus* L., *pratensis* L., *Clymenum* L., &c. (See ROSENTH., *op. cit.*, 1007, 1008.)

<sup>7</sup> Our field species are *Vicia sativa* L., *leucosperma* MËNCH., *hybrida* L., *lutea* L., *sylvatica* L., *Cracca* L., *sepium* L., *angustifolia* ROTH., *narbonensis* L., &c.

<sup>8</sup> Among others *Ornithopus sativus*. Besides this we may cite as fodder plants *Coronilla varia* L., and *Emerus* L., *Biserrula* (Fr., *Rataeu*), *Hippocrepis* (Horseshoe-vetch; Fr., *Fer-à-cheval*), *Scorpiurus* (*Chenillon*) and *Securigera* (*Hachette*), all so remarkable for the form of

the fruit. (See pp. 276, 287, 304, 305, and ROSENTH., *op. cit.*, 1009, 1010.)

<sup>9</sup> By the French word *Sainfoin* have been designated the various species of *Hedysarum*, of which *H. coronarium* L. is most cultivated in France, as well as *Onobrychis* (Fr., *Esparcette*), especially *O. sativa* L. (the English *Sainfoin*).

<sup>10</sup> *Pisum sativum* L. (figs. 143–147), *biflorum* RAFIN., *abyssinicum* BRAUN., *thebaicum* W., *arvense* L., *P. maritimum* L., is a *Lathyrus*.

<sup>11</sup> Especially *Cicer sativum* and *arietinum* L. (Fr., *Pois-chiche*, *Tête-de-bélier*, *Garbance*, &c.). (See above, fig. 148.)

<sup>12</sup> *Cajanus indicus* SPRENG.—*C. flavus* DC.—*C. bicolor* DC.—*Cytisus Cajan* L.

<sup>13</sup> Including the genera *Vicia*, *Faba*, and most species of *Ervum* of authors. (ROSENTH., *op. cit.*, 1005–1007.)

<sup>14</sup> Especially *P. vulgaris* L. and *P. Mungo* L., *lunatus* L., *nanus* L., and a dozen more edible species (ROSENTH., *op. cit.*, 1018).

<sup>15</sup> *Lens esculenta* MËNCH.—*Ervum Lens* L.—*Cicer Lens* W.

<sup>16</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, sér. 2, iii. 191.

<sup>17</sup> Including the *Lablab* (*D. Lablab* L.;—*Lablab vulgaris* SAVI).



edible part.<sup>1</sup> With these nutritive principles is often found associated a deleterious acrid substance, sometimes narcotic, whose powers are usually destroyed by heat. This is to a slight extent the case with the fresh and raw ripe seeds of most Peas, Beans, Kidney-beans, &c. Thus it is that those of *Lathyrus Aphaca*<sup>2</sup> will produce headache and drowsiness. Those of the "Liquorice-vine" (Fr., *Liane-Réglisse*<sup>3</sup>) and *Anagyris fœtida*<sup>4</sup> are said to have this property to a yet higher degree. Cases are known where grave accidents have occurred through eating the seeds of several European kinds of Broom and Laburnum. It is probably for a similar reason that the flour of *Ervum Ervilia*,<sup>5</sup> when mixed with that of cereals, gives bread a deleterious property. The seeds of several *Leguminosæ* are used in fishing to poison the game, and the leaves and bark are often preferred, as we shall see below; while the seeds of the Indigo plants are reputed as poisonous in warm countries. But this dangerous quality is nowhere so strongly marked as in the famous Calabar-bean,<sup>6</sup> better known perhaps as Ordeal-bean (Fr., *poison d'épreuve*), the seed of *Physostigma venenosum*,<sup>7</sup> from tropical Africa. The extract or the contained alkaloids<sup>8</sup> are well known as possessing the peculiar power of contracting the pupil of the eye. In many species the vegetative organs share these irritant or narcotic properties with the seeds. The leaves of many species of *Cytisus*, *Genista*, *Colutea*, *Coronilla*, *Robinia*, *Clitoria*, *Indigofera*, *Tephrosia*, *Ononis*, *Anthyllis*, *Abrus*, *Lonchocarpus*, &c., are irritant, purgative, emetic,<sup>9</sup> sometimes even vesicant, as in *Arthrolobium scorpioides*. The shoots of *Sabinea florida* are poisonous.<sup>10</sup> In Australia cattle have suffered from browsing on several species of *Gompholobium* or

<sup>1</sup> The edible starchy matter accumulates pretty often in the roots, as in our *Orobis tuberosus* L. or Tuberous Bitter-vetch, *Apios tuberosa* and *Psoralea esculenta* PURSH, *Fl. Bor.-Amer.*, ii. 275, t. 22;—DC., *Prodr.*, ii. 219, n. 39, which has been suggested as a succedaneum to the potato, as also *Pueraria tuberosa*, &c.

<sup>2</sup> L., *Spec.*, 1029. A species remarkable for the almost constant abortion of the leaflets and the corresponding great development of its leafy stipules.

<sup>3</sup> *Abrus precatorius* L., *Syst.*, 533.—*Glycine Abrus* L., *Spec.*, 1025. (See H. BN., in *Dict. Encycl. des Sc. Méd.*, i. 205.)

<sup>4</sup> This plant is also purgative. (See H. BN., in *Dict. Encycl. des Sc. Méd.*, iv. 59.)

<sup>5</sup> L., *Spec.*, 1040.—*Vicia Ervilia* W. (See LINDL., *Veg. Kingd.*, 548.)

<sup>6</sup> Or *Chop Bean*; *Eséré* of the natives.

<sup>7</sup> BALF., in *Trans. Soc. Edinb.*, xxii. 305.—HANBURY, in *Pharm. Journ.*, sér. 2, iv. 559; v. 25.—FRASER, *On the Char., Act., &c., of the ordeal Bean of Calabar* (thes. Edinb., 1862).—J. C. LOPEZ, *Étude sur la Fève de Calabar* (thèse de Paris, 1864).—BUCHEN, in *Bot. Zeit.* (1863), ii. 47.—RÉV., in *Bull. Soc. Bot. de Fr.*, x. 538.—G. PL., in GUIB., *Drog. Simpl.*, ed. 6, iii. 330.

<sup>8</sup> *Physostigmine* and *eserine* (see VÉLE, *Rech., Chim. et Phys.*, &c., thèse de Paris, 1865).

<sup>9</sup> Among others *Genista purgans* L. (*Spec.*, 999.—*Spartium purgans* L., *Syst.*, 474); the False Senna of Egypt (*Tephrosia Apollinea* DC., *Prodr.*, ii. 254, n. 51); the False Senna of Popayan (*T. Senna* H. B. K., *Nov. Gen. et Spec.*, vi. 458).

<sup>10</sup> SCHOMB., ex LINDL., *Veg. Kingd.*, 548.

*Burtonia*. If the branches or foliage of certain *Tephrosias* (*T. toxicaria*, *piscatoria*, *Vogelii*,<sup>1</sup> &c.) are thrown into water-courses, they poison the fish, acting on them, it is said, like Foxglove.<sup>2</sup> The application of the leaves of several *Leguminosæ*<sup>3</sup> will cure sluggish ulcers and chronic phlegmasiæ, owing probably to their counter-irritant effect. The same is the case with many roots, such as the Brooms, Beans, Kidney-vetch (Fr., *Vulnéraire*), Rest-harrow, and certain species of *Tephrosia*. The root of *Clitoria Ternatea* is used as an evacuant in India. That of *Phaseolus radiatus*, *P. multiflorus*, &c., has in several cases proved poisonous. The decoction of the roots of several *Indigoferas* is a good vermifuge, and cures aphthæ and obstinate ulcers. The root-bark of *Piscidia Erythrina*<sup>4</sup> is used in fishing in the Antilles, like *Tephrosia* elsewhere. In *Andira*<sup>5</sup> and *Geoffræa*<sup>6</sup> are drastic purgatives, emetics, and vermifuges, useful in medicine, but in large doses poisons of unmistakable strength.

Another leading property in *Papilionaceæ* is astringency, which is nothing remarkable, considering that most of the species are rich in tannin.<sup>7</sup> Several of the kinos and catechus of commerce are furnished by *Dalbergiæ*, notably *Hecastaphyllum monetarium*, and above all by the various species *Pterocarpus*. *P. Draco*, *Marsupium*, *santalinus*, *erinaceus*, &c., produce kinos and gum-dragon or dragon's-blood.<sup>8</sup> Gum-Butea, a reddish substance of astringent tonic virtues, and mainly used in preparing hides, is yielded by *Butea frondosa* and *superba* in India.<sup>9</sup> Gum lac is also found on these *Buteas*, where its formation is determined by the presence of certain insects of the group *Coccidæ*. It is perhaps the astringency of *Euchresta Horsfieldii*<sup>10</sup>

<sup>1</sup> See H. BN., in *Adansonia*, vi. 225.

<sup>2</sup> LINDL., *op. cit.*, 549.

<sup>3</sup> Especially the genus *Indigofera*.

<sup>4</sup> See p. 326, note 3.

<sup>5</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, iv. 310, 688.

<sup>6</sup> See GUIB., *Drog. Simpl.*, ed. 6, iii. 331.

<sup>7</sup> TRÉCUL., *Du tannin dans les Légumineuses* (in *Compt. Rend. Acad. Sc.*, lx. 225; in *Adansonia*, vii. 113; in *Ann. Sc. Nat.*, sér. 5, iv. 378). In these memoirs it is shown that certain *Leguminosæ* possess tannin-cells, while others lack them. In the former the cells exist only in the bark or the circumference of the pith, or in both bark and pith. In certain species tannin occurs even in the cells of the epidermis and the collenchyma.

<sup>8</sup> According to GUIBOURT (*Drog. Simpl.*, ed.

6, ii. 137; iii. 345), it is *Pterocarpus indicus* which yields dragon's blood in Asia, and *P. Draco* or *P. gummifer* in America, chiefly in the Antilles, but this dragon's blood is rare in commerce. The same author (*op. cit.*, iii. 425) mentions among the kinos the astringent juice of the African species *P. erinaceus*. MURRAY appears to have been the first author to refer the origin of the astringent gum of *Gambia* to this same species of *Pterocarpus*. According to ROXBURGH and ROYLE *P. Marsupium* furnishes great part of the kino of India.

<sup>9</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, xi. 334.

<sup>10</sup> BENN., *Pl. Javan. Rar.*, 148, t. 31.—*Andira? Horsfieldii* LËSCH., in *Ann. Mus.*, xvi. 481, t. 12. (See p. 323, note 6.)

which makes it prized in Java as a remedy for stings and venomous bites; and similarly several species of *Tephrosia*, *Indigofera*, *Phaseolus*, *Baptisia*, *Clitoria*, &c., are prescribed as tonics in dyspepsia and dysentery. The infusions of *Butea* and Cowhage (*Mucuna pruriens*) are used for cholera in India. Other *Papilionaceæ* are simply emollient, *e. g.* Fenugreek (Fr., *Fenugrec*<sup>1</sup>), whose flour is used for poultices, like that of most seeds of *Viciæ* and *Phaseoleæ*, and that of the roots of *Pueraria tuberosa*;<sup>2</sup> this last is used in India in the topical treatment of dislocations and inflammations of the joints, in the same way as decoctions of Medick and Melilot.

There are moreover very many *Papilionaceæ*, employed for most variable reasons, whose properties do not appear to fall under any of the above categories. *Anthyllis Vulneraria*,<sup>3</sup> *Hermannia*<sup>4</sup> and *montana*<sup>5</sup> are vulnerary; the Rest-harrows are aperient; *Geoffræa* furnishes febrifuges; and others furnish antisyphilitics like the *Alcornoques*, the barks of several American *Bowdichias*.<sup>6</sup> Several *Genisteæ* and *Indigoferæ* have been recommended in hydropathies, epilepsy, and other neuroses. *Sesbania grandiflora*<sup>7</sup> and *Ormocarpus sennoides* are tonics. Several *Psoraleas* are prized in India as stomachics and deobstruents. The powder of *Indigofera Anil* is used in France, in the treatment of hepatics. The *Baptisias* are considered antiseptics.<sup>8</sup> The roots of *Anthyllis Hermannia*, and certain Brooms, Beans, and Rest-harrows have been prescribed in Dropsy.<sup>9</sup> We are ignorant of the reasons why several species of *Astragalus*, *Sophora*, and *Erythrina* are supposed to be efficacious in rheumatism; why *Lonchocarpus* is used in Africa in the treatment of abdominal complaints in children;<sup>10</sup> and why most multifarious medical virtues have been ascribed to *Borbonia*, *Priestleya*, *Crotalaria*, *Spartium*, *Viborgia*, *Hymenocarpus*, *Dorycnium*, *Lotus*, *Dalea*, *Amorpha*, *Caragana*, *Coronilla*,

<sup>1</sup> *Trigonella Fœnum græcum* L., *Spec.*, 1402.—GÆRTN., *Fruct.*, t. 152, fig. 3.—DC., *Prodr.*, ii. 182, n. 9.—GUIB., *Drog. Simpl.*, ed. 6, iii. 378.

<sup>2</sup> DC., *Prodr.*, ii. 240, n. 1.—*Hedysarum tuberosum* ROXB.

<sup>3</sup> L., *Spec.*, 1012.—*Vulneraria rustica* LAMK., *Fl. Fr.*, ii. 649.—*V. heterophylla* MËNCH, *Meth.*, 146. (See H. BN., in *Dict. Encycl. des Sc. Méd.*, v. 305.)

<sup>4</sup> L., *Spec.*, 1004.—*Aspalathus cretica* L., *Spec.*, 1002.—*Cytisus græcus* L., *Spec.*, 1043.

<sup>5</sup> L., *Spec.*, 1012.—LAMK., *Ill.*, t. 615, fig. 5.

<sup>6</sup> The *alcornoque* bark of Equinoctial America is that of *Bowdichia virgilioides* H. B. K., *Nov.*

*Gen. et Spec.*, vi. 376 (see H. BN., in *Dict. Encycl. des Sc. Méd.*, x. 420). The Brazilian *alcornoque* or *sebipiraguaçu* of PISON is produced by *B. major* MART., which probably belongs to the same species (see BENTH. in *Mart. Fl. Bras.*, *Papil.*, 31).

<sup>7</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, ii. 133 (AGATI).

<sup>8</sup> See BENTLEY, in *Pharm. Journ.*, ser. 2, v. 210.

<sup>9</sup> [An infusion of broom-tops in gin is a favourite "old woman's cure" for dropsy in many parts of England.]

<sup>10</sup> *Osani* (see *Adansonia*, vi. 320).

*Ornithopus*, *Desmodium*, *Centrosema*, *Canavalia*, *Rynchosia*, *Milletia*, *Deguelia*, *Virgilia*, &c.; and why *Galega officinalis* (*Rue des chèvres*, Goat's-rue<sup>1</sup>) has so long been used as a sudorific, vermifuge, and alexipharmic.

Many *Papilionaceæ* afford saccharine, gummy, and fatty matters; without mentioning the sugar developed under certain conditions in the seeds of several *Vicieæ* and *Phaseoleæ* which makes them so agreeable as food, we may call attention to the sweet taste of the various Liquorice-roots (*racines de Réglisse*<sup>2</sup>) used in medicine, and especially those of *Glycyrrhiza glabra* (fig. 165), *echinata*, and *glandulifera*,<sup>3</sup> and of the *Lianes à Réglisse* (Liquorice-vines) which are species of *Abrus*,<sup>4</sup> of *Trifolium alpinum*, *Astragalus glycyphyllus*, &c. A kind of manna is secreted by the species of *Alhagi*, and notably by the Camel's Thorn (*A. Maurorum*), at least in certain countries.<sup>5</sup> The Arabs call this manna *Terem-jabim*, and obtain it by merely shaking the branches; it is used for the food of man and still more of cattle, of which it is in certain cantons the only fodder during one season in the year. The gum exuded from certain *Papilionaceæ* is gum-tragacanth; it issues in plates, twisted sheets, or worm-like masses from clefts in the stems of several eastern Astragals, especially *Astragalus verus*<sup>6</sup> (fig. 161), long supposed to be the only kind, and *A. gummifer* LABILL., *creticus* LAMK., *aristatus* W., and *stroboliferus* LINDL.<sup>7</sup> It is the seed that usually contains oil in *Papilionaceæ*. Those of *Phaseoleæ*, *Vicieæ*, *Galegeæ*, and *Hedysareæ* contain it in variable proportions. But those more used are the Earth-nuts or Ground-nuts (*Pistaches de terre*), the seeds of *Arachis hypogea*,<sup>8</sup> which ripen underground, like those of the *Munduli* (*Voandzeia subterranea*<sup>9</sup>); both these plants are cultivated on this account in most hot countries.

Many members of this order furnish colouring matters. First

<sup>1</sup> L., *Spec.*, 1063.—DC., *Prodr.*, ii. 248.—*G. vulgaris* BLACKW.

<sup>2</sup> GUIB., *op. cit.*, ed. 6, iii. 325. The true officinal Liquorice is *Glycyrrhiza glabra* L. (*Spec.*, 1046;—*G. lavis* PALL.;—*Liquiritia officinalis* MÆNGH.). Russian Liquorice is *G. echinata* L. (*Spec.*, 1046;—DC., *Prodr.*, ii. 248, n. 5).

<sup>3</sup> WALDST. & KIT., *Pl. Hung.*, i. 20, t. 21.—DC., *Prodr.*, *loc. cit.*, n. 2.—*G. hirsuta* PALL.

<sup>4</sup> See p. 375, note 3.—H. BN., in *Dict. Encycl. des Sc. Méd.*, i. 206.

<sup>5</sup> Persia and Bokhara. It is said that the secretion does not take place in Egypt and India.

<sup>6</sup> OLIV., *Voy.*, iii. t. 44.—DC., *Prodr.*, ii. 296, n. 144.

<sup>7</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, vii. 1.

<sup>8</sup> L., *Spec.*, 1040.—DC., *Prodr.*, ii. 474. (See p. 215, figs. 184, 185).—GUIB., *op. cit.*, iii. 383.—ROSENTH., *Syn. Pl. Diaph.*, 1011.—H. BN., in *Dict. Encycl. des Sc. Méd.*, v. 773.

<sup>9</sup> DUP.-TH., *Nov. Gen. Madag.*, 23. (See above, p. 235, note 6.)

come the Indigo plants,<sup>1</sup> of which a large number of species are used in the preparation of Indigo blue, notably *Indigofera tinctoria* L., *Anil* L., *cærulæa* ROXB., *argentea* L., *hirsuta* L. FIL., *glandulosa* W., &c.; and from several *Tephrosias*, such as *T. toxicaria* PERS., *Apollinea* DC., *cinerea* PERS., *tinctoria* PERS.,<sup>2</sup> is extracted a similar dye. In England and France several *Genisteæ* are sometimes used for dyeing, especially the Dyers' Green-weed (Fr., *Genestrolle*; fig. 191). The *Butea* flowers are rich in an orange colouring matter; and the fruit-pulp of *Sophora japonica*<sup>3</sup> is also used for dyeing yellow. In the United States the wood of *Cladrastis lutea*<sup>4</sup> serves the same purpose, and the False or Wild Indigo (*Baptista tinctoria*<sup>5</sup>) is employed as a succedaneum of true Indigo.

The wood of several Papilionaceous trees has its industrial value. That of the False-Acacias<sup>6</sup> and the Laburnums<sup>7</sup> is pretty frequently used in Europe. But lofty trees are rare except in the series *Sophoreæ* and *Dalbergiæ*. These furnish a large number of woods used for building and ornament, being often remarkable for their grain and colour, and hence prized by the cabinet-maker. The origin of many is still very uncertain.<sup>8</sup> The so-called "Angelin" woods<sup>9</sup> are probably all produced by *Andiras*; but some are so, most certainly. The wood of *A. inermis* is hard, dark-red outside, and is found nearly all over equinoctial America. The *Angelin pedra* of Brazil, no doubt an *Andira*,<sup>10</sup> affords a highly prized wood. Several woods called *moutouchi* wood in Guiana are produced by species of *Pterocarpus*, such as *Moutouchia suberosa* AUBL.<sup>11</sup> *P. santalinus* is said to yield Red Sandal wood. The *Sang-vené* or blood-veined woods of Senegal are those of *P. erinaceus* and *Adansonia*. That of *P. dalbergioides* of India is also much esteemed.<sup>12</sup> Those of the genus *Dalbergia* itself

<sup>1</sup> ROSENTH., *op. cit.*, 995.—GUIB., *op. cit.*, ed. 6, iii. 480.

<sup>2</sup> DC., *Prodr.*, ii. 248-256.—ROSENTH., *op. cit.*, 999.

<sup>3</sup> See p. 218, note 2, figs. 195, 196.

<sup>4</sup> See p. 359, note 7.

<sup>5</sup> See H. BN., in *Dict. Encycl. des Sc. Méd.*, viii. 338.

<sup>6</sup> *Robinia Pseudacacia* L., *Spec.*, 1043 (see above, p. 203, fig. 159), *R. viscosa* VENT., *R. hispida* L. (see DC., *Prodr.*, ii. 261). All these plants are perhaps only varieties of a single species.

<sup>7</sup> *Cytisus alpinus* MILL., *Laburnum* L., &c. (p. 330, note 7).

<sup>8</sup> SAGOT, in *Revue Mar. et Comm.* (1869).

The anatomical structure of the wood in the arborescent *Papilionaceæ* is so variable and often so ill known that it is impossible to give any general account thereof; it would need a special study, one of the most interesting possible.

<sup>9</sup> See GUIB., *op. cit.*, ed. 6, iii. 355. We have seen (p. 157) that the racemose Angelin (*Angelin à grappes*) or so-called *Andira racemosa* is a *Vouacapoua*.

<sup>10</sup> *A. spectabilis*? SALDANHA, *Config. . . d. Princ. Mad.*, t. 3.

<sup>11</sup> *Pterocarpus suberosus* PERS., *Syn.*, ii. 277. Its wood is not tough.

<sup>12</sup> GUIB., *op. cit.*, ed. 6, iii. 342-345. *Calia-tour* wood is also attributed to *P. santalinus*; Bar wood or Red Sandal wood of Africa to *P.*

are often similarly useful. *Sissoo* wood is that of the Indian species of this genus, of the same specific name. Senegal ebony is *D. melanoxylon*.<sup>1</sup> A large number of hard coloured woods, very incorruptible, from tropical America are produced by *Dalbergia* or the neighbouring genera *Vatairea*, *Centrolobium*, *Cyclobium*, *Tipuana*, *Machærium*, &c., though it is impossible to refer each kind to its producing genus. This is the case with the true *Palissandre* wood, or violet-ebony, and probably the so-called *Saint-Martin* and *Prefontaine* woods of Guiana. In India the *Dalbergias*<sup>2</sup> yield good woods, especially *D. latifolia*, *heterophylla*, and *ferruginea*; but it is hardly possible to refer each commercial kind to its proper species. *Centrolobium tomentosum* BENTH., of Guiana, is also mentioned for the value of its wood. The *Gaiac* of Guiana is not *Guaiaacum sanctum* (of the order *Zygophyllaceæ*) but *Coumarouna odorata*,<sup>3</sup> the Tonquin-bean Tree; its hardness makes it difficult to work. The members of *Lonchocarpus* often attain a great height. The wood of *L. sericeus* from tropical America and Asia, resembles that of the Lemon-tree. The "*Cœur-dehors*" (heart outside) of Guiana, in which interlacing fibres form a heartwood and alburnum of equal strength, is *Diplostropis guianensis* BENTH.; the *Boco* is *Bocoa provacensis*.<sup>4</sup> The Cam-woods are produced by several African *Baphias*.<sup>5</sup> The *Panacocco*<sup>6</sup> are due some to American species of *Ormosia* or *Baracaras*, with a hard blackish heartwood; others to *Tounatea* or *Swartzia* (figs. 201, 202), of which several are used in building, while some furnish *arcabas*; these are the thin projecting ribs removed from the trunk and termed *bois-pagaye*, on account of certain of their uses. The *Immortelle* or *Erythrina* wood is of a weak spongy consistency, as also in certain *Sesbanias* and notably in the species of *Æschynomene*, such as *Æ. aspera*.<sup>7</sup> In this aquatic species the stem becomes cellular and spongy, and very light; it is hence used to make light head-dresses, children's toys,

*angolensis*; the Tender Red Sandal or Tender Coral wood of the Antilles to *P. Draco* and *gummifer*.

<sup>1</sup> *Brya Ebenus* P. BR. is said to give the Ebony or Grenadilla wood of the Antilles.

<sup>2</sup> See GUIB., *loc. cit.*, 347.—ROSENTH., *op. cit.*, 1025.

<sup>3</sup> AUBL., *Guian.*, iii. 740, t. 296.—*Dipteryx odorata* W., *Spec.*, iii. 910.—*Baryosma Tongo* GÆRTN., *Fruct.*, ii. t. 93. (See above, p. 218, fig. 190; 322, note 5.)

<sup>4</sup> AUBL., *Guian.*, Suppl., 33, t. 391. (See above, p. 324, note 5, and GUIB., *loc. cit.*, 353.)

<sup>5</sup> Especially *B. africana* AFZEL., *B. laurifolia* H. BN., or *M'pano* of the Gaboon. (See GUIB., *loc. cit.*, 342.—H. BN., in *Adansonia*, vi. 213.)

<sup>6</sup> GUIB., *loc. cit.*, 354.

<sup>7</sup> L., *Spec.*, 1060.—DC., *Prodr.*, ii. 320.—*Æ. lagenaria* LOUR. (See LÉPINE, in *Ann. Sc. Nat.*, sér. 4, xviii. 254.)

copies of monuments and works of art, &c. In these soft stemmed plants the bark may become hard and covered with prickles like those of the rose, which injure mechanically both man and beast. The *Erythrinæ* are used in hot countries to make impenetrable hedges, owing to their terrible prickles. The prickles of the heathy Furzes (*Ajoncs*<sup>1</sup>) are well known here as in France, like those of many species of *Robinia*, *Genista*, *Erinacea*, &c., due to the metamorphosis of leaves, branches, or some other organs. In Cowhage (= Cow-itch? Fr., *Pois pouilleux*, *Pois à gratter*), *i.e.*, *Mucuna urens*,<sup>2</sup> *pruriens*,<sup>3</sup> &c., the action is also mechanical, and due to the peculiar hairs covering the pericarp.

Many of the fine woods due to *Dalbergiæ* that are used in cabinet-making are perfumed; such as Violet-ebony, *Coumarouna*, &c. In this last plant the scent is especially marked in the seed, used under the name of Tonka- or Tonquin-bean (*Fève de Tonka*) and containing coumarin. The same principle has been found in the Melilots.<sup>5</sup> The smell of Balsam of Tolu is very characteristic, it is found in all the balsams used in medicine (especially for chest complaints) extracted from the various species of *Tolwifera*; *i.e.*, the dry, soft, or liquid balsams of Peru and Tolu, the brown balsam of Peru, white balsam of San Salvador, and black of Peru and San Salvador. All are obtained by incisions from *T. Balsamum*<sup>6</sup> and other species to be named:—*T. pubescens*, *punctata*, *pedicellata*, *peruifera*, *Pereiræ*,<sup>7</sup> &c.

<sup>1</sup> *Ulex europæus* L., *nanus* Sm., *Gallii* Pl., &c. (See DC., *Prodr.*, ii. 144.—Pl., in *Ann. Sc. Nat.*, sér. 3, xi. 202.)

<sup>2</sup> DC., *Prodr.*, ii. 405, n. 1.—*Dolichos urens* L., *Spec.*, 1020.

<sup>3</sup> DC., *loc. cit.*, n. 4.—*Stizolobium pruriens* PERS. The larger *Pois à gratter* (lit., Scratch-pea) or Cowhage is *M. urens*; the smaller is *M. pruriens* (GUIB., *op. cit.*, 381, 383).

<sup>4</sup> See p. 380, note 3.

<sup>5</sup> *Melilotus officinalis* W., *Enum.*, 790.—DC., *Prodr.*, ii. 186. *M. arvensis* W. serves the same purposes (GUIB., *op. cit.*, 358, fig. 661).

<sup>6</sup> MILL., *Dict.*, n. 1 (part.).—L., *Mat. Med.*, 201.—*Myroxylon Tolwifera* H. B. K., *Nov. Gen. et Spec.*, vi. 375.—*Myrospermum tolwiferum* RICH. (A.), in *Ann. Sc. Nat.*, sér. 1, ii. 172.—DC., *Prodr.*, ii. 95, n. 4. (See above, p. 225, figs. 197–200; 368, note 2.)

<sup>7</sup> The large number of species admitted into this genus appears to us to require reduction, and the same species may here, as in other groups of

balsamic plants, yield different products according to its place of growth. Following the researches of many authors, especially GUIBOURT (*op. cit.*, 470–480) and HANBURY (in *Pharm. Journ.*, sér. 2, v. 241), we may ascribe the different balsams to their species as follows:—White balsam of Peru to *Myroxylon peruiferum* (MUT. & L. FIL., *Suppl.*, 233;—*Myrospermum peruiferum* DC., *loc. cit.*, n. 3); black balsam of Peru to *M. Pereiræ* ROYLE, which should be the same species as *M. Sonsonate* KL., and according to HANBURY, *M. pubescens* K.; dry or soft balsam of Tolu to *M. tolwiferum* K. (*Tolwiferum balsamum* L.); dry balsam of Peru to *M. peruiferum* RUIZ.; balsam of San Salvador (wrongly called black or liquid balsam of Peru, since it does not come from Peru) to *M. Pereiræ* ROYLE, which really grows in San Salvador. There is, moreover, a white balsam of Sonsonate, which is obtained not by making incisions in the trunk, but by expressing the fruit, probably of *M. Pereiræ*.

Everyone knows the sweet scent of Fenugreek, of the flowers of the Peas, Beans, Brooms, and a host of other *Papilionaceæ* which are the ornament of our gardens. Besides the beautiful species of *Lupinus*, *Lathyrus*, *Phaseolus*, *Colutea*, *Robinia*, *Cytisus*, *Genista*, *Caragana*, *Wistaria*, *Astragalus*, *Desmodium*, *Swainsona*, *Baptisia*, *Thermopsis*, *Clanthus*, *Indigofera*, &c., which can be cultivated in the open air, our temperate conservatories and winter gardens owe some of their finest ornaments to the numerous shrubby Australian and Cape *Genisteæ* and *Podalyrieæ*, cultivated here since the beginning of the century and belonging chiefly to the genera *Pultenæa*, *Chorizema*, *Oxylobium*, *Viminaria*, *Gastrolobium*, *Daviesia*, *Bossiaea*, *Goodia*, *Templetonia*, and *Mirbelia*.



## IX. PROTEACEÆ.

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### I. EMBOTHRIUM SERIES.

*Embothrium*<sup>1</sup> (figs. 209–215) has hermaphrodite, slightly irregular flowers (figs. 210, 211). On the receptacle or slightly dilated end

*Embothrium (Oreocallis) grandiflorum.*



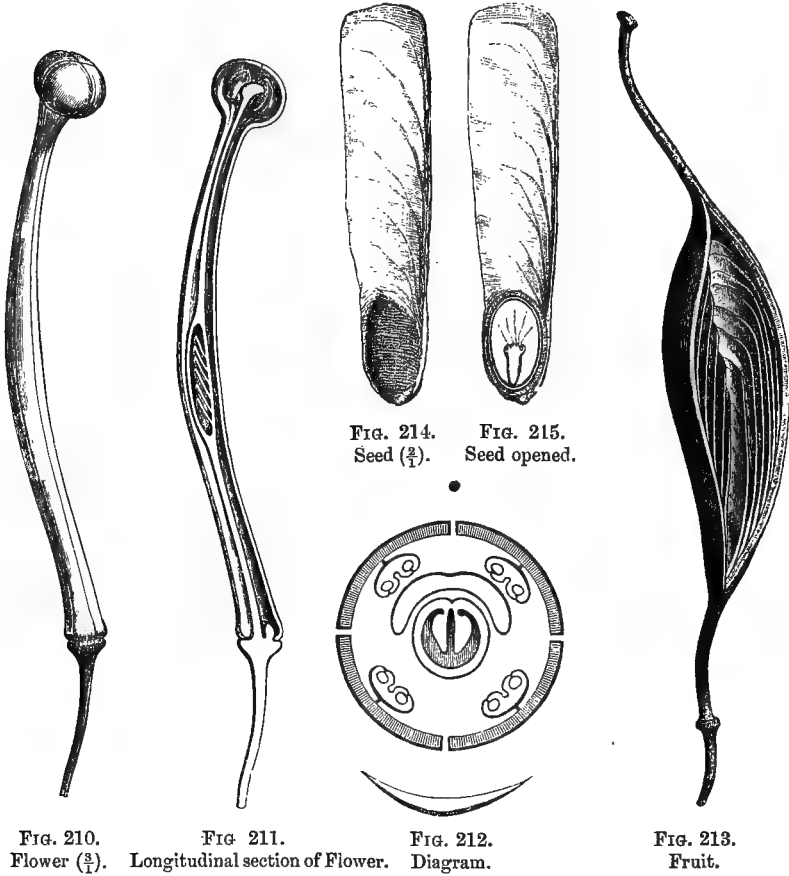
FIG. 209.—Floriferous branch ( $\frac{1}{2}$ ).

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<sup>1</sup> FORST., *Gen.*, 15, t. 8, figs. g-m.—LAMK., t. 55, fig. 2.—R. & PAV., *Prod. Fl. Per. Dict.*, ii. 354; Suppl., ii. 548 (part.); *Ill.*, i. 62, t. 95, 96.—R. BR., in *Trans. Linn.*

of the peduncle is obliquely inserted a simple coloured perianth<sup>1</sup> of 5 somewhat dissimilar<sup>2</sup> leaves, whose edges touch below<sup>3</sup> to form a long

*Embothrium (Oreocallis) grandiflorum.*



*Soc.*, x. 195.—ENDL., *Gen.*, n. 2152; *Suppl.*, iv. p. ii. 88.—MEISSN., in DC., *Prodr.*, xiv. 443.—*Oreocallis* R. BR., in *Trans. Linn. Soc.*, x. 48, 196.—ENDL., *Gen.*, n. 2153.—MEISSN., *Prodr.*, 445.—CATALP. J., ex RÆM. & SOH., *Syst.*, iii. 431.

<sup>1</sup> All authors are not agreed as to the morphological signification of this perianth. Those who compare it with that of *Loranthaceæ*, *Santalaceæ*, *Oleaceæ*, &c., consider it a corolla, contrary to those who side with JUSSEU in taking it as a calyx. Without denying the analogies of *Proteaceæ* with the above orders, we think that the development of the perianth as observed by PAYEB (*Organog. Comp.*, 473, t. 97) indicates a corolla rather than a calyx, for its leaves appear successively, not simultaneously as in *Santalaceæ*. We

shall, however, avoid committing ourselves decidedly on this point, and simply employ the terms "perianth" and "leaves" ("*foliololes*") in our descriptions.

<sup>2</sup> The dissimilarity is chiefly below, owing to the obliquity of the receptacle. As this is cut obliquely downwards and outwards, the anterior leaves are naturally a little the longer.

<sup>3</sup> They often remain united at the apex; while about half-way up two separate from one another, part of the style escaping through the cleft. Its stigmatiferous apex remains long afterwards still caught between the stamens and the parts of the perianth on a level with the anthers. However, even these parts finally separate, and the leaves commence folding or bending back. This occurs in a large number of the members of this order.

tube, while above their union forms a sort of ball. Later on the four leaves separate, either all the way down or only for a variable extent.<sup>1</sup> The androceum consists of four stamens superposed to the perianth-leaves, and inserted in a sort of spoon-shaped cavity at the top of each. Each stamen is formed of an extremely short filament, and a basifixed introrse two-celled anther of longitudinal dehiscence. The gynæceum is free; it is composed of a one-celled ovary, surmounted by a persistent slender style whose tip dilates into a head of variable form, stigmatiferous along a vertical line or oblique surface.<sup>2</sup> On the posterior wall of the ovary-cell is found a longitudinal placenta,<sup>3</sup> whose two linear lips bear each a vertical row of ovules. These are ascending anatropous,<sup>4</sup> with their micropyles downwards and outwards—*i. e.* towards the anterior aspect of the flower. Their chalazal ends are already dilated, flattened, and imbricated with the corresponding parts of the neighbouring ovules. At the base of the ovary next to the placenta is a hypogynous disk, forming a fleshy glandular crescent (figs. 211, 212). The fruit (fig. 213) is a many-seeded follicle, opening longitudinally when ripe to free a number of imbricated ascending seeds, each of which contains in the lower parts of its thin coats a fleshy exalbuminous embryo, with its inferior radicle partly concealed by the descending auricles of the two cotyledons. The seed is dilated above into a long membranous wing<sup>5</sup> (figs. 214, 215). *Embothrium* consists of unarmed trees and shrubs from the south of South America; five species are known;<sup>6</sup> they have simple alternate petiolate exstipulate leaves, articulated at the base. The flowers, which form terminal racemes, are in pairs on pedicels axillary to the alternate bracts of the principal axis of the inflorescence.

<sup>1</sup> This rim surrounding the base of the perianth is only a dilatation of the apex of the peduncle, which we shall find occurs in most members of this order.

<sup>2</sup> This is the sole real difference between *Embothrium* proper and *Oreocallis*, which has been made a distinct genus, and possesses an elliptical or shield-like stigmatic surface, more or less flattened, or convex and oblique. But these differences can on no account be taken as generic characters, occurring as they do in various species of other extremely natural genera.

<sup>3</sup> Corresponding as in *Leguminosæ*, to the interval between the two posterior leaves of the perianth.

<sup>4</sup> They have two coats.

<sup>5</sup> The thin translucent wing is traversed by fibrovascular bundles, which join those of the raphe, as well as of the chalaza, and vary in their course through the wing with the species. They form very capricious curves in the wing, according to the degree of deviation from their primitive direction they undergo during the development of the membranous chalazal appendage.

<sup>6</sup> L. F., *Suppl.*, 128.—FORST., in *Comm. Soc. Reg. Gatt.*, ix. 24.—CAV., *Icon.*, i. 63, t. 65.—R. & PAY., *Fl. Per.*, i. 62, t. 95, 96.—LAMEK., *Dict.*, ii. 354.—GAY (C.), *Fl. Chil.*, v. 305.—HOOK. F., *Fl. Antart.*, ii. 341.—KL., in *Linnaea*, x. 474 (*Oreocallis*).—*Bot. Mag.*, t. 4856.—WALP., *Ann.*, i. 592 (*Oreocallis*).

Next *Embothrium* come the three genera *Telopea*, *Lomatia*, and *Stenocarpus*,<sup>1</sup> which have, speaking generally, the same structure in flower fruit and seed. But the first-named genus has terminal inflorescences, forming short capituliform racemes surrounded by an involucre of large colored bracts. The perianth often splits down one side only, its limb then forming a four-cleft lip; the disk consists of a little subcircular glandular collar. *Lomatia* has with the same perianth, a disk formed not of a single piece but of three glands, one dorsal, the others lateral; the flowers form racemes with involucre, and the leaves are often pinnately toothed or lacinate. *Stenocarpus* has the flowers of *Telopea* or *Lomatia*, collected into umbels on a common peduncle, which may be axillary, terminal, or seated on the wood of the stem or branches. The follicle resembles that of *Embothrium* externally; but the embryoniferous part of the ascending seeds is quite superior, the wing corresponding with the lower parts of the seed. Excepting some American *Lomatias*, all these plants come from Oceania, especially Australia.

*Knightia* has the characters of the preceding genera, but the flowers are quite regular and the seeds are less numerous; for each cell only contains four ovules in two vertical rows. The seeds have the same direction as in *Embothrium*; their chalazal end is similarly prolonged. This genus is Oceanian.

The two Australian types, *Cardwellia* and *Darlingia*, very near to one another, form distinct genera which must be classed in this series, because the anatropous ovules are numerous; but they are inserted on a more or less bowed horse-shoe shaped placenta with its concavity superior.

The genus *Buckinghamia*, of which only one species is known, also Australian, has a pluriovulate ovary; and as its other characters are those of *Grevillea*, we are prevented from putting this last genus in a series distinct from *Embothrium*.

*Grevillea*<sup>2</sup> (figs. 216–224) has regular or irregular flowers.<sup>3</sup> In the first case the receptacle forms an inverted right cone, towards the

<sup>1</sup> Here as in *Papilionaceæ*, and for the same reasons, the bibliography of each genus will be found at its place in the following *Genera*.

<sup>2</sup> R. BR., in *Trans. Linn. Soc.*, x. 49, 168; *Prodr.*, 375; *Suppl.*, 17.—ENDL., *Gen.*, n. 2143.—MEISSN., *Prodr.*, 349, 698.—H. BN., in *Adanson*, ix. fasc. 8.—*Lysanthe* KN. & SALISB.,

*Prot.*, 117 (nec R. BR.).—*Stylurus* KN. & SALISB., *op. cit.*, 115 (nec RAFIN.).—*Anadenia* R. BR., *loc. cit.* 165, 374.—ENDL., *Gen.*, n. 2142.—*Manglesia* ENDL., *Gen.*, n. 2142<sup>1</sup>.

<sup>3</sup> Which shows the slight value of genera based on this character.

base of which the equal perianth-leaves are inserted all on a level. But in the second case it is oblique, and more or less bevelled; and this it is which causes the inequality of the perianth-leaves. These are sometimes collected into a straight tube, more or less swollen in the upper part, corresponding with the anthers; sometimes they form a bowed revolute sheath; and two often separate from one

*Grevillea Thelemanniana.*

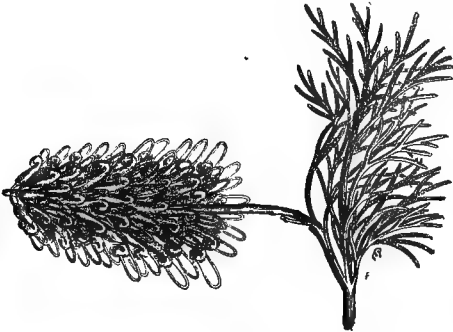


FIG. 216.  
Floriferous branch.



FIG. 217.  
(Flower  $\frac{2}{3}$ )



FIG. 218.  
Longitudinal section  
of flower.

another along the edges at a variable height, to give passage to part of the style (fig. 223), while its stigmatiferous apex is retained between the stamens<sup>1</sup> and the closed summit of the perianth. The gynæceum is inserted on the centre of the receptacle in those species in which it is most slightly irregular; but where the base of the flower is very oblique, that of the pistil becomes similarly oblique, often for a considerable extent.<sup>2</sup> At the base of the foot of the ovary is a hypogynous disk, annular, or more frequently forming a semicircular scale or horseshoe on the placentary side of the gynæceum. The ovary is unilocular, surmounted by a bowed or straight style; this is very variably dilated towards the apex; and is surmounted by a stigmatiferous head which may be straight or oblique, and recept,

<sup>1</sup> According to R. BROWN, and H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 314, the pollen is flat and triangular, with three large papillæ on the angles. We have observed it in *G. glabrata* MEISSN., *Prodr.* 391, n. 170 (*G. Manglesii* Hort.; —*Manglesia glabrata* LINDL., *Swan Riv.*, 37; —*M. cuneata* ENDL., *Nov. Stirp. Dec.*, i. 25, not.) (figs. 219–222). The grains have the same general form as in *Onagraceæ*, with somewhat thin edges. On each of the three obtuse angles is a sort of cap, where a pollen-tube is sometimes

produced very rapidly in contact with water. The surface is smooth or very finely punctate, sometimes prominent towards the centre of both faces. There are grains of exceptional form, quadrangular, or with the three angles unequal, the smallest of the three sometimes disappearing entirely.

<sup>2</sup> In this case the foot of the ovary appears welded to one side of the perianth for a long way; but, it is really inserted along a very long unequally developed, narrowly-bevelled receptacle.

flat, or even concave on top. The ovary always contains two collateral ascending ovules, more or less completely anatropous, with their micropyles downwards and outwards.<sup>1</sup> The fruit is coriaceous or woody, entire or bivalved, one or two-seeded. When there are two seeds they are collateral and unsymmetrical, more flattened on the side by which each touches its fellow than on the other, or edged

*Grevillea (Manglesia) glabrata.*



FIG. 219.  
Inflorescence.



FIG. 220.  
Flower ( $\frac{2}{3}$ ).



FIG. 221.  
Perianth-leaf and  
stamen.



FIG. 222.  
Gynoecium ( $\frac{4}{5}$ ).

at the junction of the two faces by a more or less prominent or fleshy rim, or a wing which may encircle the whole seed. Within the seed-coats is a large fleshy exalbuminous embryo, with its radicle inferior. *Grevillea* consists of Oceanian trees and shrubs, mostly natives of Australia. The leaves are alternate, usually persistent, glabrous or covered with peculiar hairs,<sup>2</sup> flat or cylindrical, entire, or more or less incised. The flowers are but rarely solitary or geminate in the axils of the upper leaves or at the end of the branches. We find them far more frequently in axillary or terminal simple or branched racemes. The flowers are usually paired in the axil of each bract; this is the case in about nine-tenths of the two hundred known species;<sup>3</sup> they are rarely solitary or fascicled.

Next to this genus come *Hakea* (fig. 225), differing but very little;

<sup>1</sup> They have two coats.

<sup>2</sup> Often of the kind termed *pili mediflvi* (hairs fixed by the middle).

<sup>3</sup> KN. & SALISB., *Prot.*, 120.—R. BR., in

*Sturt Exp. App.*, 28.—GAUDICH., in *Voy. Freycin., Bot.*, 443, t. 46.—A. CUNN., in *Field N. S. Wal.*, 328.—LINDL., in *Mitch. Exp. East Austral.* (1839); in *Past. Fl. Gard.*, ii. n. 386; in

*Molloya*, a doubtful and little-known genus; *Orites*; *Carnarvonnia* with its digitate leaves; and *Xylomelum* (fig. 226), possessing regular poly-

*Grevillea Gaudichaudi.*

*Hakea microphylla.*

*Xylomelum piriforme.*



FIG. 223.

Flower before liberation of style.



FIG. 224.

Flower.



FIG. 225.

Flower (♀)

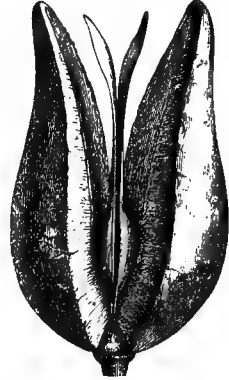


FIG. 226.

Open fruit.

gamous flowers, two anatropous ovules, and opposite leaves. *Helicia*, though very close to *Xylomelum*, differs in its fleshy indehiscent fruit.

*Lambertia* has regular flowers formed like those of certain *Grevilleas*; but it is distinguished by its two ovules being nearly orthotropous descending, the micropyle still looking downwards; and we may remark that this is a constant character in the order, the causes of which we have investigated elsewhere.<sup>1</sup> The micropyle is always inferior, whether the ovules are ascending and more or less completely anatropous, or orthotropous or nearly so, and consequently descending; the base of the ovary is surrounded by four leaves, alternate with the perianth-leaves. *Roupala* approaches *Lambertia* by its quite orthotropous ovule; its fruit is a follicle opening longitudinally. *Andripetalum* has the flowers of *Roupala* with a slightly fleshy drupaceous indehiscent fruit. *Guevina* has the same orthotropous ovules, and a nearly dry indehiscent fruit; but the flower is slightly irregular, the perianth being inserted obliquely on the receptacle, with the two anterior leaves attached lower down than the posterior pair.

*Trans. Hort. Soc.* (1852), 14; *Swan Riv.*, 36.—SCHLECHTL., in *Linnaea*, xx, 586.—HOOK., in *Mitch. Exp. Trop. Austral.*, 341; in *Hook. Journ.* (1852), 14.—MEISSN., in *Linnaea*, xxvi, 354; in *Hook. Journ.* (1852), 185; (1855), 73; in *Pl. Preiss.*, i, 536; ii, 252.—BE. & GR., in *Ann. Sc. Nat.*, sér. 5, iii, 199.—F. MUELL., in *Trans. Phil. Soc. Vict.*, i, 21; in *Linnaea*, xxvi,

355; *Pl. Rar. Melb.* (1855), 50; *Fragm. Phyt. Austral.*, i, 135; iii, 145; iv, 84, 129, 176; v, 25, 90, 152; vi, 92, 205, 246.—BENTH. & F. MUELL., *Fl. Austr.*, v, 417.—*Bot. Mag.*, t. 1272, 2661, 3798, 5007.

<sup>1</sup> *Mémoire sur les Ovules des Protéacées*, in *Adansonia*, ix, 250.

The same irregularity occurs in the disk, which is nearly or quite absent behind, and is only represented by the two anterior glands.<sup>1</sup> Finally *Bellendena*, whose flower becomes nearly regular, has no hypogynous disk at all. Its ovules are orthotropous, descending, but placed one above the other, or nearly so, and the dry indehiscent fruit is surmounted by a sort of hook formed by the persistent base of the style.

## II. BANKSIA SERIES.

*Banksia*<sup>2</sup> (figs. 227–231) has regular hermaphrodite flowers. The perianth consists of four valvate leaves, free or united below. As in all the preceding genera the four stamens are inserted on the concavity near the summit of the perianth-leaves; they are almost reduced to their two-celled introrse anthers, which dehisce by two longitudinal slits.<sup>3</sup> The gynæceum, surmounted by four hypogynous glands, consists of a sessile biovulate ovary surmounted by a long slender style with a stigmatiferous apex. Next come the characters which have led authors to make *Banksia* the type of a separate series or tribe. The posterior parietal placenta bears two collateral ascending subanatropous ovules, whose micropyles look downwards and outwards. The fruit (figs. 230, 231) is compound; the common axis of the inflorescence becomes thick and woody so as to form a sort of cone or elongated strobilus, bearing a large number of woody follicles, surrounded by the remains of the flowers and half sunk in the substance of the rachis. Each follicle, compressed and bivalve, opens by a usually transverse or oblique cleft; and is divided into two half-cells by a free bifid

<sup>1</sup> *Adenostephanus* (KL., in *Linnaea*, xv. 51; —ENDL., *Gen.*, n. 2149; —MEISSN., *Prodr.*, 436; —*Euplassa* SALISB.; *Dickneckeria* VELLOZ., *Fl. Flumin.*, 1, t. 105; —*Didymanthus* KL.), whose fruit is unknown, should we think be placed in the genus *Guevina*, of which it has the leaves inflorescence and habit, besides its flowers being slightly irregular at the base. The disk, too, though described as surrounding the whole base of the pistil, is not quite regular; it is certainly wanting behind in the few species we have been able to examine. Eight species of this genus have been described from Brazil and Guiana. (See MEISSN., in *Mart. Fl. Bras., Prodr.*, 92, t. 34–36). But here perhaps should be the place for *Kermadecia* (BR. & GR. in *Bull. Soc. Bot.*, x.

228; in *Ann. Sc. Nat.*, sér. 5, i. 344; in *Nouv. Arch. Mus.*, iv. 10, t. 4), of which three species are known, all from New Caledonia. They have the flowers of *Guevina*, with a perianth of oblique insertion and a nearly semicircular anterior disk. The leaves are simple, as in *Andripetalum* and certain species of *Roupala*; but this last character cannot be of generic value. The fruit is but little known; probably indehiscent, as in *Guevina*.

<sup>2</sup> L. F., *Suppl.*, 127 (nec FORST., nec BRUCE, nec DOMB., nec KEN.)—LAMK., *Dict.*, i. 368.—R. BR., in *Trans. Linn. Soc.*, x. 202; *Prodr.*, 391; *Suppl.*, 34.—ENDL., *Gen.*, II. 2157.—MEISSN., *Prodr.*, 451.

<sup>3</sup> R. BROWN has described the pollen of several *Banksias* as consisting of elliptical grains.



woody false dissepiment, formed by the union of the coats of the two collateral seeds, thickened where in contact. The seeds are flattened, surrounded by a wing of variable development; and the central part, containing an exalbuminous embryo, is half sunk in a cavity of the false septum. *Banksia* consists of Australian and Tasmanian trees

*Banksia ericifolia.*



FIG. 228.  
Flower ( $\frac{3}{4}$ ).

FIG. 227.  
Floriferous branch ( $\frac{2}{3}$ ).

FIG. 229.  
Long. section  
of flower.

and shrubs. Their leaves are alternate and verticillate, varying in form, rigid and coriaceous, and usually dry. The blade is usually flat with scarcely reflexed edges. But these edges are sometimes curled downwards closely, so that the leaf becomes almost cylindrical, like that of several species of *Grevillea* and *Hakea*. Their edges are rarely quite entire; the blade is commonly incised or pinnatifid. In young plants the leaves are pretty frequently polymorphous. The flowers form terminal or subaxillary spikes, often accompanied by several approximated leaves at the base. The involucre when

*Banksia serrata.*

FIG. 230.

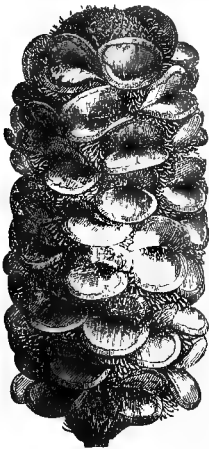
Fruit-bearing branch ( $\frac{1}{3}$ ).*Banksia littoralis.*

FIG. 231.

Fruit ( $\frac{2}{3}$ ).

present, consists of only a small number of appendages, not closely imbricated as in *Telopea*, *Protea*, &c. The flowers are geminate in the axils of thick crowded bracts, and each flower is moreover accompanied by a thinner narrower bractlet. Some threescore species<sup>1</sup> of this genus have been described, which with the closely allied genera *Dryandra* and *Hemiclidia* make up the whole of this series.

<sup>1</sup> CAV., *Leon.*, vi. 28, t. 542.—LABILL., *Voy.*, i. 412, t. 23; *Novv.-Holl.*, i. 118.—W., *Spec.*, i., 535.—HOFMMSG., *Verz. Nacht.*, ii. 64.—DIETE., *Gartent.*, ii. 150.—SM., *N.-Holl.*, i. 13, t. 4.—LINDL., *Swan. Riv.*, 34.—LEHM., *Pl. Preiss.*, i. 582.—MEISSN., in *Lehm. Pl. Preiss.*, ii. 264; in *Hook. Journ.* (1852), 210; (1855), 118.—F. MUELL., *Fragm.*, iv. 107, 177.—BENTH. & F. MUELL., *Fl. Austr.*, v. 541.—WALP., *Ann.*, iii. 333.

## III. PERSOONIA SERIES.

*Persoonia*<sup>1</sup> (fig. 232) has regular hermaphrodite flowers. The perianth consists of four valvate leaves, free or united below. The androceum consists of four stamens with introrse two-celled anthers, superposed to the perianth-leaves. But the filaments of these stamens are distinct and free for a certain distance. Four hypogynous glands, alternate with the perianth-leaves, surround the base of the ovary, which is surmounted by an exserted style with a truncate or dilated stigmatiferous apex. In the cell are seen one or two<sup>2</sup> descending orthotropous ovules with the micropyle inferior. The fruit is a berry or a drupe, with a thin stone whose cell is divided by a false septum into two cavities, each of which contains a seed in the dispermous fruits. Within the seed coats is a fleshy exalbuminous embryo.<sup>3</sup> *Persoonia* consists of trees and shrubs, with usually alternate simple entire coriaceous leaves; the flowers<sup>4</sup> are axillary pedunculate, solitary or few together, rarely forming terminal racemes, through the replacement of the leaves of the branch by bracts. About seventy species<sup>5</sup> have been described, all natives of Australia and New Zealand.

Next to *Persoonia* come five closely analogous genera: *Symphyonema*, in which the ovaries are also indifferently uni- or biovulate; and *Faurea*, *Brabejum*, *Cenarrhenes*, and *Agastachys*, where the ovule is

*Persoonia salicina*.

FIG. 232.

Longitudinal section of flower ( $\frac{2}{3}$ ).

<sup>1</sup> SM., in *Trans. Linn. Soc.*, iv. 215; *Exot. Bot.*, ii. t. 83.—R. BR., in *Trans. Linn. Soc.*, x. 160; *Prodr.*, 371; Suppl. 12.—GÆRTN., *Fruct.*, iii. 218, t. 220.—ENDL., *Gen.*, n. 2138.—MEISSN., *Prodr.*, 329.—*Pentadactylon* GÆRTN., *loc. cit.*—*Linkia* CAV., *Icon.*, iv. 61, t. 189 (nec PERS.).

<sup>2</sup> The number may vary in flowers on the same plant, and even on the same branch.

<sup>3</sup> There are often more than two cotyledons, as R. BROWN showed as early as 1830.

<sup>4</sup> Yellowish in colour.

<sup>5</sup> PERS., *Syn.*, i. 118.—SM., *Exot. Bot.*, ii. 47, t. 83.—LABILL., *Nouv.-Holl.*, i. 33, t. 45.—GRAH., in *James. N. Phil. Journ.* (1828), 177.—ANDR., *Bot. Repos.*, t. 74, 77.—HOOK., *Icon.*, t. 425.—A. CUNN., in *Bot. Mag.*, t. 3513; in *Field N. South-Wal.*, 329.—LINDL., *Swan Riv.*, 35, n. 172, 174.—KIPP., in *Hook. Journ.* (1855), 72.—HOOK. F., in *Hook. Journ.*, vi. 283.—MEISSN., in *Hook. Journ.* (1852), 185; (1855), 71.—F. MUELL., *Fragm.*, v. 37; vi. 220.—BENTH. & F. MUELL., *Fl. Austr.*, v. 380.—WALP., *Ann.*, i. 590.

always solitary. The ovule is always orthotropous in these genera, of which the first and the two last are Oceanian, and the two others natives of South Africa.

#### IV. FRANKLANDIA SERIES.

*Franklandia fucifolia.*

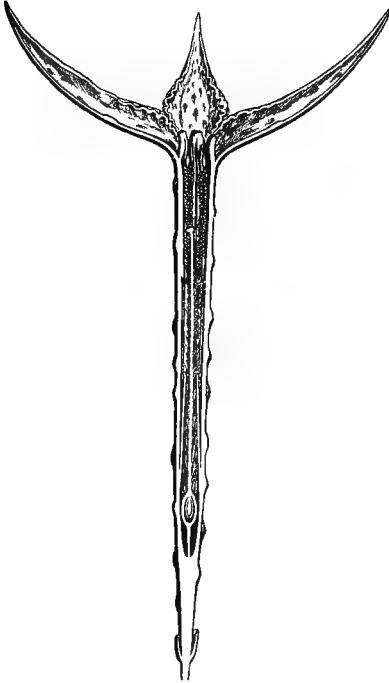


FIG. 233.

Longitudinal section of flower.

This series only contains the genus *Franklandia*<sup>1</sup> (fig. 233), the only known species<sup>2</sup> of which has regular hermaphrodite flowers. The long perianth is hypocrateriform or with a tubular base. The limb expands into four acute lobes induplicate in the bud; and these four leaves are free for about half-way down the tube. There lie the stamens, which adhere to the perianth not only by their filaments but also by nearly the whole length of their introrse two-celled anthers; these early dehisce by two longitudinal clefts.<sup>3</sup> The gynæceum consists of an ovary with a very taper base. Not far from the summit of the ovary-cell is a single descending orthotropous ovule; the slender style ends in a little

dilated stigmatiferous head, dilated, truncate, or even subconcave. Around the ovary is a disk of four triangular tongues, alternate with the perianth-leaves, and rising up around the gynæceum to form a sort of 4-sided pyramidal roof, whose apex, traversed by the style, is divided into its four pieces. The fruit is dry, dilated at the apex into a cupule surrounded by hairs. It is protected by the persistent inferior part of the perianth, and contains a seed whose fleshy embryo has very short

<sup>1</sup> R. BR., in *Trans. Linn. Soc.*, x. 48, 157; *Prodr.*, 370; *Gen. Rem. on Bot. of Terr. Austral.*, 604, t. 6; *Suppl.*, 11.—ENDL., *Gen.*, II. 2134; *Iconogr.*, t. 52.—MEISSN., *Prodr.*, 327.

<sup>2</sup> *F. fucifolia* R. BR., *loc. cit.*—MEISSN., in

*Plant. Preiss.*, i. 530.—F. MUELL., *Fragm.*, vi. 223.—BENTH. & F. MUELL., *Fl. Austr.*, v. 376. [These authors add another species, *F. triaristata* BENTH., *l. c.*]

<sup>3</sup> The pollen is elliptical according to R. BROWN.

superior cotyledons. *Franklandia* is an Australian shrub, glabrous, but covered all over—branches, leaves and perianth—with glandular warty projections. The leaves are narrow cylindrical and filiform; deeply and dichotomously lacinate, the fine divisions resembling branches. The flowers are alternate in lax racemes, each flower on a short thick pedicel accompanied by one or two short bractlets.

## V. PROTEA SERIES.

The flowers of *Protea*<sup>1</sup> are regular and hermaphrodite. The perianth consists of four valvate leaves, one of which separates from the rest on anthesis so as to divide the perianth into two unequal lips. The four anthers, each inserted in the concavity near the dilated summit of a perianth-leaf, are two-celled introrse apiculate, of longitudinal dehiscence.<sup>2</sup> The ovary, surrounded by four hypogynous tongues or scales, contains within its single cell an ascending more or less completely anatropous ovule, whose micropyle looks downwards and outwards; the persistent terminal style is straight or curved, with a cylindrical or subulate, sometimes geniculate, stigmatiferous apex, and is often flattened or dilated at the base. The dry indehiscent and hairy fruit, surmounted by the withered style, contains an ascending seed with a fleshy exalbuminous embryo. The genus *Protea* consists of small trees or shrubs, whose leaves are alternate rigid coriaceous, often entire. The flowers are collected at the ends of the branches, or rarely on the sides of the branches or trunk, into large capitula, with a globular hemispherical turbinate or oblong receptacle. The leaves become gradually transformed into coriaceous imbricated bracts, usually coloured and forming an involucre comparable to that of *Compositæ*, and still higher up

<sup>1</sup> *Protea* L., *Gen.*, ed. 1, n. 59.—J., *Gen.*, 78.—R. B., in *Trans. Linn. Soc.*, x. 48, 74.—SM., *Exot. Bot.*, i. t. 44; ii. t. 81.—ENDL., *Gen.*, n. 2123.—MEISSN., *Prodr.*, 230, 698.—*Conocarpus* BOERH., ex ADANS., *Fam. des Pl.*, ii. 284 (nec GÆRTN.).—*Lepidocarpodendron* BOERH., *Lugd.-Bat.*, 35 (part.).—*Scolymocephalus* HEEM. *Dendr.*, t. 9 (part.).—*Vionæa* NECK., *Elem.*, n. 187.—*Erodendron* SALISB., *Par. Lond.*, 67, 70, 108.—*Pleurranthe* SALISB., *loc. cit.*—*Gagnedi*

BRUCE, *Abys.*, v. 52.—*Chrysodendron* VAILL., herb. (ex MEISSN.).

<sup>2</sup> ROBERT BROWN found that the pollen of *P. acutis* and *melliflora* consisted of flattened triangular grains like those of *Grevillea* (*Trans. Linn. Soc.*, x. 31). But we may note that this is not always the case in *Dryandra*, which in other respects comes so near *Protea*. The pollen grains of *D. formosa* appeared to us ellipsoidal, smooth and moreover a little bowed longitudinally.

into free or connate scales or paleæ, to which the flowers are axillary. About threescore species are known;<sup>1</sup> inhabitants of South and East Africa.

*Protea cynaroides.*



FIG. 234.

Floriferous branch.

*Leucadendron virgatum.*



FIG. 235.

Diagram.

Next to *Protea* come a pretty large number of genera, of analogous structure at bottom, which mostly formed part of the genus *Protea* at one time, and have been separated therefrom by modern botanists. The characters in which they differ are but of secondary importance, viz.:—the arrangement of the inflorescences, the form of the perianth and its mode of dehiscence on anthesis, the diclinism of the flowers, the form of the stigma, the form and consistency of the fruit. The genera

are, *Leucospermum*, *Mimetes*, *Aulax*, (?) *Dilobeia*, *Leucadendron* (fig. 235), *Nivenia*, *Sorocephalus*, *Serruria*, *Petrophila*, *Isopogon*, *Spatalla*, and *Adenanthus*, some African, some Australian.

<sup>1</sup> L., *Mantiss.*, 190, 191.—THUNB., in *Mem. Ac. Petersb.* (1813–14), 548, t. 17; *Phyt. Blatt.*, 14; *Dissert.*, n. 29, 36, 37, 49, 51, 52, 60; *Fl. Cap.*, 130, 132, 137, 140, 507.—LAMK., *Dict.*, v. 638; *Suppl.*, iv. 555 (part.); *Ill.*, t. 54, fig. 1, 3.—W., *Spec.*, i. 522.—SALISB., *Par. Lond.*, 24.—

ANDE., *Bot. Repos.*, t. 132, 133, 144, 437.—KL., in *Krauss Beitr.*, 140.—TAUSCH, in *Flora* (1842), i. 285.—LINDL., in *Bot. Reg.*, t. 1023.—*Bot. Mag.*, t. 346, 649, 674, 697, 698, 770, 761, 796, 878, 881, 933, 1183, 1694, 1713, 1717, 2065, 2439, 2447, 2720.

VI. STIRLINGIA SERIES.

*Stirlingia*<sup>1</sup> (fig. 236, 237) consists of *Proteaceæ* with regular hermaphrodite flowers and syngenesious anthers. The perianth consists of four leaves, free above and finally reflexed. The stamens, inserted on the perianth, consist of a free filament, and an introrse two-celled anther. Each cell, opening broadly inwards on each side, is united by its edges to the corresponding cell of the neighbouring anther to form a single cavity containing the pollen. On the separation of the two half-cells belonging to two different anthers, the pollen is freed. The gynæceum is composed of a one-celled ovary, surmounted by a style which is dilated above into a sort of concave stigmatiferous head. Within the ovary is a single ascending anatropous ovule, with its micropyle downwards and outwards. The

*Stirlingia abrotanoides.*

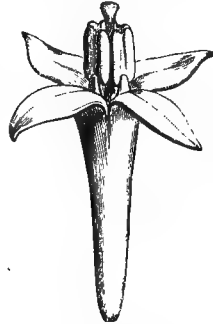


FIG. 236.  
Flower (♀).

fruit is a hairy one-seeded nut. The genus *Stirlingia* consists of some half-score species<sup>2</sup> of shrubs from Australia; their leaves are alternate and repeatedly incised into dichotomous filiform or flattened strips. The flowers form capitula, which are solitary, or more frequently in simple or ramified racemes. This series also contains the genera *Conospermum* and *Synaphea*, especially remarkable for their irregular androceum and descending ovule. The confluence of the adjacent anthers is the chief reason for placing them next to *Stirlingia*.

*Stirlingia simplex.*



FIG. 237.  
Diagram.

*Conospermum*<sup>3</sup> (fig. 218) has regular or irregular hermaphrodite flowers. The perianth is tubular, gamophyllous above; it then expands into a limb of four equal or unequal lobes valvate in the bud. When the lobes are unequal, the posterior one is largest and is reflected into a sort of helmet (fig. 238), forming a sort of posterior

<sup>1</sup> ENDL., *Gen.*, n. 2133; *Iconogr.*, t. 22.—MEISSN., *Prodr.*, 325.—*Simsia* R. BR., in *Trans. Linn. Soc.*, x. 155; *Prodr.*, 369; *Suppl.*, 9 (nec PERS.)

<sup>2</sup> MEISSN., in *Pl. Preiss.*, i. 515; in *Hook. Journ.* (1852), 184.—LINDL., *Swan Riv.*, 30, n.

141.—F. MUELL., *Fragm.*, vi. 248.—BENTH. & F. MUELL., *Fl. Austr.*, v. 356.

<sup>3</sup> *Conospermum* SM., in *Trans. Linn. Soc.*, iv. 213; *Exot. Bot.*, ii. t. 45.—R. BR., in *Trans. Linn. Soc.*, x. 43, 153; *Prodr.*, 368; *Suppl.*, 9.—ENDL., *Gen.*, n. 2132.—MEISSN., *Prodr.*, 316, 698.

lip, while the three others are narrow and compose a trifid anterior lip. The androceum is irregular; it is formed of four dissimilar stamens, superposed to the lobes of the perianth and inserted about its throat. The posterior stamen is the most perfect; it consists of a short bifurcated filament, on either branch of which is inserted a free cell of the same size as its fellow. The anterior stamen has also a filament and a two-celled anther; but the cells are sterile and reduced to very small scales. The lateral stamens are symmetrical with regard to each other, the anterior cell being sterile like that of its neighbour of the anterior stamen, and similarly the posterior cell is fertile. This last is inclined in the bud towards the corresponding cell of the posterior stamen. Each is concave on the surface which looks towards

*Conospermum sphaacelatum.*

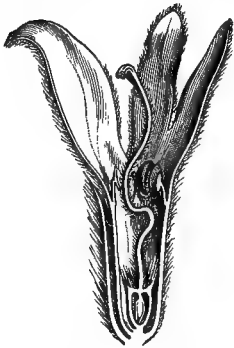


FIG. 238.

Long. section of flower ( $\frac{1}{2}$ ).

its neighbour, and by their application edge to edge a cavity is formed which contains the pollen. This is freed when the two half-cells belonging to different stamens separate, a little before anthesis. Hence there is a sort of syngenesious arrangement which may fairly be compared with what is found in most *Compositæ*. The gynæceum is free; it consists of a one-celled ovary covered with hairs, which are especially abundant round the edges of its horizontally flattened top. From the centre of the platform thus formed rises a style, very slender at the base, and swelling slowly towards its apex, which ends in an oblique stigmatiferous head, and which is more or less folded on itself in the bud. The stigmatiferous head often remains sticking to the glandular base of the sterile anther on anthesis. In the ovary is a single descending orthotropous ovule. The dry indehiscent one-seeded fruit bears a crest formed by the accrescence of the hairs which crowned the ovary. The embryo is fleshy exalbuminous, and its radicle looks downwards. *Conospermum* consists of some forty species of Australian shrubs.<sup>1</sup> They have alternate simple entire leaves

<sup>1</sup> GRAH., in *Edinb. Phil. Journ.* (1826), 171. — ENDL., *Nov. Stirp. Dec.*, 58. — HOOK., in *Mitch. Exp. Trop. Austral.*, 342. — LENDL., *Swan Riv.*, 30. — SCHULT., in *Linnaea*, xx, 578. — MEISSN., in *Pl. Preiss.*, i. 518; ii. 248; in

*Hook. Journ.* (1852), 184; (1855), 71. — KIPP., in *Hook. Journ.* (1855), 70. — F. MUELL., *Fragm.*, i. 157; vi., 223. — BENTH. & F. MUELL., *Fl. Austral.*, v. 362.



of variable form; the flowers form simple or compound terminal or axillary spikes or racemes, each flower being axillary to a persistent bract.

*Synaphea*<sup>1</sup> (fig. 239) may be defined as *Conospermum* with resupinate flowers.<sup>2</sup> It is the fertile two-celled stamen that is anterior, while that which is sterile is posterior in this genus. This last is strongly adherent to the stigmatiferous surface of the style which is turned towards it. The two lateral stamens have each one cell sterile and one fertile, and this last, adhering to the corresponding half-cell of the median fertile stamen is of course the anterior cell. The perianth is irregular, and the ovary also contains a descending anatropous ovule. Eleven species of *Synaphea* have been described,<sup>3</sup> Australian shrubs with a usually short stem and alternate leaves. The flower-spikes may be axillary or terminal, simple or compound, and often on long peduncles. Each flower is axillary to a sessile bract.

*Synaphea dilatata.*



FIG. 239.  
Diagram.

The *Proteaceæ* were raised to the rank of an order by A. L. DE JUSSIEU in 1789.<sup>4</sup> Only a very small number of genera allied to *Protea* were then known; *Banksia* and *Brabejum* of LINNÆUS, *Embothrium* of FORSTER, and *Roupala* of AUBLET. Another genus now referred to this group, *Guevina*, was then relegated to the *Genera incertæ sedis*. ADANSON had as early as 1763 placed the genera *Brabejum*, *Protea* (*Conocarpus*), *Leucadendron* (*Lepidocarpus*), and *Serruria*, together<sup>5</sup> in his family *Thymelées*, close to the order where most botanists of the present day place them. R. BROWN, in 1809, was the first to study this fine order seriously, and really establish it, in a memoir which is still famous.<sup>6</sup> Besides the above-named genera he founded no less than twenty new ones: *Telopea*, *Lomatia*, *Stenocarpus*, *Knightia*, *Grevillea*, *Orites*, *Bellendenia*, *Dryandra*, *Hemclidia*, *Symphyonema*, *Agastachys*, *Franklandia*, *Leucospermum*, *Nivenia*, *Sorocephalus*, *Petrophila*, *Isopogon*, *Simsia*,<sup>7</sup> *Conospermum*, and *Synaphea*. At the same

<sup>1</sup> R. BR., in *Trans. Linn. Soc.*, x. 48, 155; *Prodr.*, 369; *Suppl.*, 11; *Gen. Rem.*, 606, t. 7. —POIR., *Dict.*, *Suppl.*, v. 270; *Ill.*, t. 914. —ENDL., *Gen.*, n. 2131. —MEISSN., *Prodr.*, 314.

<sup>2</sup> White or blue, rarely yellowish, and usually downy, as in *Conospermum*.

<sup>3</sup> LINDL., *Swan Riv.*, 32. —MEISSN., in *Pl.*

*Preiss.*, i. 527; ii. 251; in *Hook. Journ.* (1852), 183. —BENTH. & F. MUELL., *Fl. Austral.*, v. 359.

<sup>4</sup> *Gen.*, 78, Ord. iii., *Protea*.

<sup>5</sup> *Fam. des Plant.*, ii. 284.

<sup>6</sup> *On the Proteaceæ of Jussieu*, in *Trans. Linn. Soc.*, x. (1809).

<sup>7</sup> ENDLICHER named it *Stirlingia*.

time he inserted the genera *Aulax* of BERGIUS,<sup>1</sup> *Mimetes*, *Serruria*, and *Spatalla* of SALISBURY,<sup>2</sup> *Adenanthos* and *Cenarrhenes* of LABILLARDIERE,<sup>3</sup> *Conospermum*, *Xylomelum*, *Persoonia*, and *Lambertia* of SMITH,<sup>4</sup> *Hakea* of SCHRADER, *Helicia* and *Cylindria* of LOUREIRO.<sup>5</sup> Thus were collected, besides *Protea*, thirty-seven of the genera now retained. The eight others are of far more recent date. SCHOTT founded *Andripetalum*.<sup>6</sup> MEISSNER added *Molloya* in 1855,<sup>7</sup> and in 1856 *Potameia* of DUPETIT-THOUARS,<sup>8</sup> HARVEY added the Cape genus *Faurea* in 1847,<sup>9</sup> and F. MUELLER<sup>10</sup> the four Australian genera, *Cardwellia*, *Darlingia*, *Carnarvonia*, and *Buckinghamia*. Finally, we have recently demonstrated<sup>11</sup> that *Potameia* really belongs to *Lauraceæ*, but that another ill-known genus of DUPETIT-THOUARS, *Dilobeia*, should be placed not far from *Aulax*. Thus we retain forty-six genera in this Order.

These forty-six genera contain some 1000 species. Of this number, 270 are peculiar to South Africa, and 87 to South America and the Antilles. Only one Mexican species is known; and all the rest, comprising about 650 species, are peculiar to Oceania, especially Australia and South Asia. There are eleven African genera, of which *Dilobeia* alone is peculiar to Madagascar. The others are four for each, *Faurea*, *Brabejum*, *Protea*, *Leucospermum*, *Mimetes*, *Aulax*, *Leucadendron*, *Nivenia*, *Sorocephalus*, *Serruria*, *Spatalla*, nearly all belonging to the Cape of Good Hope and the neighbouring parts. One *Protea* and one *Leucospermum* are alone found in Abyssinia. We may remark that all these plants have a uniovulate ovary, and that the ovule is ascending and anatropous in all but *Brabejum* and *Faurea*. South-eastern Asia contains the single genus *Helicia*, also occurring in Australia and the Indian Archipelago. In America are found the five genera *Embothrium*, *Guevina*, *Roupala*, *Lomatia*, and *Andripetalum*; the two last occurring in Oceania also. All the other genera are peculiar to that quarter of the globe, especially Australia, Tasmania, and New Zealand. New Caledonia appears equally rich in *Proteaceæ*, containing representatives of four or five genera.

<sup>1</sup> *Descr. Plant. ex Cap. Bonæ-Spei, &c.* (1767).

<sup>2</sup> *Par. Lond.* (1806, 1807).

<sup>3</sup> *Novæ Hollandiæ Plant. Specim.* (1804-1806).

<sup>4</sup> *In Trans. Linn. Soc.*, iv. (1798).

<sup>5</sup> *Fl. Cochinch.*, ed. Ulyssip. (1790).

<sup>6</sup> *Ex ENDL., Gen.*, 342 (1836).

<sup>7</sup> *In Hook. Journ.*, vii. 75 (*Fitchia*).

<sup>8</sup> *Prodr.*, xiv. 328.

<sup>9</sup> *In Hook. Journ.*, vi. 373.

<sup>10</sup> *Fragm. Phytogr. Austral.*, v., vi.

<sup>11</sup> *In Adansonia*, ix. fasc. 8 (1870).

All these plants have certain constant characters in common : a tetramerous perianth, valvate in the bud ; four stamens superposed to the perianth-leaves ; a free gynæceum with a one-celled ovary ; a dry fruit ; an exalbuminous seed with its radicle inferior. The variable characters are : the conformation of the perianth (regular or irregular) ; the level of the insertion of the stamens ; the union or freedom of the anthers ; the presence or absence of a disk, and, if present, the extent to which it surrounds the gynæceum ; the form of the style, especially its stigmatiferous portion ; the number of ovules, their direction and form (anatropous or orthotropous) ; the consistence of the pericarp, which may be dry or fleshy, dehiscent or indehiscent. It is on these variable characters that the subdivisions of the order have been based. Since the days of R. BROWN it has been divided into two grand sections in the first place. The fruit is indehiscent in the one (*Nucamentaceæ*) ; dehiscent in the other (*Folliculares*). But this character will sometimes unfortunately separate widely two genera that would be considered identical if the flowers alone were examined. Thus we may cite *Andripetalum*, possessing the flower of *Roupala*, without any appreciable difference ; but as the follicle is not dehiscent in the former, it is quite removed from the latter in the classifications in vogue. *Strangea*, again, said to have quite the habit and inflorescence of *Persoonia*, has dehiscent fruits, and cannot come in the same tribe. *Helicia*, so similar in flowers and vegetative organs to both *Roupala* and *Knightia*, has been relegated by several authors to quite another series. Moreover, in collections are found numerous examples possessing only the flowers ; there is a fair number of genera, more or less contested, of which the ripe fruit is unknown, and whose place it is impossible to fix, if we are to make this feature of dehiscence or indehiscence of primary importance. Hence we base our divisions first on the characters of the flowers. In the series thus established we look for the number of seeds. This enables us to distinguish in *Embothriæ*, for instance, two secondary groups : *Euembothriæ*, which has at least four seeds ; and *Grevilleæ*, which has at most two. Among these last the ovules may be descending and orthotropous, or ascending and anatropous ; in this way we can distinguish the genera *Bellendena*, *Roupala*, *Lambertia*, &c., from *Helicia* and *Xylometum*, which have nearly the same flower. We next take into account the regularity of the perianth,

which is inserted round a horizontal circle in *Helicia*, but more or less obliquely in *Guevina*. Only in the last place comes the character of the fruit; this is indehiscent in an *Andripetalum* and one *Helicia*, but dehiscent in *Xylomelum* and *Roupala*. In other series, such as *Stirlingiæ*, the genera are distinguished by other characters. The syngenesious androceum is regular in *Stirlingia*, which has all four anthers equal and fertile. In both *Conospermum* and *Synaphea* one of the four anthers becomes quite sterile, and two others are half fertile; but the stamen in which both anthers are fertile is posterior in the former genus, anterior in the latter.

By applying these principles, we have divided *Proteaceæ* into six series, of which we proceed to give the general characters:—

I. **EMBOTHRIÆ.**—Ovules 2–4 or  $\infty$ , anatropous, ascending, inserted in two collateral rows. Fruit one-celled, dehiscent or indehiscent. (20 genera.)

II. **BANKSIÆ.**—Ovules 2, anatropous, ascending. Fruit dehiscent; cell divided into two one-seeded chamberlets by a free false dissepiment formed by the union of the coats of two collateral seeds. (3 genera.)

III. **PERSOONIÆ.**—Ovules one or two, orthotropous, descending. Stamens free, inserted at middle or base of perianth. Fruit indehiscent, with one or two one-seeded cavities. (6 genera.)

IV. **FRANKLANDIÆ.**—Ovule solitary, orthotropous, descending. Stamens almost completely united to perianth. Perianth regular, induplicate in the bud. Fruit indehiscent. (1 genus.)

V. **PROTEÆ.**—Ovule solitary, anatropous, ascending. Anthers free. Fruit indehiscent. (13 genera.)

VI. **STIRLINGIÆ.**—Ovule solitary, anatropous ascending, or orthotropous descending. Stamens syngenesious. Fruit indehiscent. (3 genera.)

The vegetative organs also present common and differential characters in this group. The *Proteaceæ* are, generally speaking, woody, arborescent, or frutescent; very rarely herbaceous.<sup>1</sup> The wood has usually marked features in the sharpness, straightness, and regular arrangement of the medullary rays; the alternation of fibres and dotted vessels in the wood; the segmentation of the liber fibres into islets; the presence of fibrous bundles, even internal to the

<sup>1</sup> R. BROWN only cites one instance: *Symphyonema paludosum*.

tracheæ of the medullary sheath; the existence of sclerous cells disseminated in masses through the pith, and even in the medullary rays and cortical parenchyma. These peculiarities, well worth particular study, are rarely found united in a single plant, as occurs in certain cultivated species of the genus *Stenocarpus*.

But the leaves are the vegetative organs to which most attention has been devoted by botanists and palæontologists. They never possess stipules. They are almost always alternate, though sometimes opposite, as in *Xylomelum*, or verticillate, as in several species of *Andripetalum*.<sup>1</sup> The blade is usually thick, coriaceous, and dry, sometimes flattened, sometimes rounded or cylindrical. It is pretty frequently entire, still oftener incised in some way or other; sometimes toothed, sometimes pinnatifid or pinnatisect. It may be simply bilobed, with equal or unequal lobes and an empty sinus between them; or there may project into the sinus (as in *Dilobeia*) a gland representing the modified end of the midrib. Finally, in some genera the leaves are quite pinnate,<sup>2</sup> or one may find both simple and compound leaves on one and the same branch; for in this order we often find these organs polymorphous on the same plant or branch. In a given species, then, we may find some leaves simple, and others much divided, recalling those of a Leguminose, Araliad, or even Umbellifer. The apex of the leaf is often mucronate or spinescent; the upper surface is usually smooth and glabrous, while the lower is often covered with a whitish or brownish down. The form of the leaves and the condition of their surfaces result in a peculiar distribution of the stomates,<sup>3</sup> which here possess

<sup>1</sup> This character does not appear constant in this genus; it is, however, one reason for thinking that certain oceanian *Helicias* should be referred to *Andripetalum*. Hence, perhaps, it is to the latter rather than the former genus that we should refer the genus *Cylindria* of LOUBEIRO (*Fl. Coch.*, ed. *Ulyssip.*, 1790, 69), which has opposite leaves, 4-merous flowers, and a double perianth (?), to the inferior divisions of which are superposed the stamens. This genus was attributed by KÆNIG (in *Ann. of Bot.*, i. 392) to *Oleinea*; but perhaps, thinks R. BROWN (in *Trans. Linn. Soc.*, x. 224), this is through some confusion. It does not appear to us impossible that *Cylindria* may, after all, belong to *Loranthaceæ* or *Oleaceæ*; for it differs from *Helicia* in having a double perianth.

<sup>2</sup> The divisions are not, however, usually separated by distinct articulations.

<sup>3</sup> This distribution depends mainly on the form of the blade. Where it is flat and membranous, the stomates are confined to the lower face, as in *Agastachys*, *Cenarrhenes*, *Lambertia*, *Symphyonema*, *Stenocarpus*, *Lomatia*, *Banksia*, and *Dryandra*, as well as in many species of *Grevillea*. But several species of this genus have stomates above as well as below. In the flat-leaved species of *Orites* they are only found below; but where the leaves are cylindrical they are all over them. This last is the case in the leaves of *Hakea*, *Petrophila*, *Conospermum*, *Franklandia*, *Stirlingia*, *Bellendenia*; but the blade and its lobes are not always rounded or cylindrical, and the stomates are found on both surfaces of the leaves of *Persoonia* and *Synaphea*, which are often flattened. *Protea* has long been cited for its poverty in stomates, though the blade is firm and coriaceous.

a quite peculiar organization. It is known (chiefly through the researches of H. MOHL) that in *Proteaceæ* generally the stomates are very small, and are situated, not at the surface of the epidermis, but at the bottom of a sort of pouch or well, as deep as the epidermis is thick, and with the circular or elliptical external opening sensibly contracted. The nervation of the leaves is also often characteristic. It is pinnate, rarely palmate; the secondary ribs radiate sometimes from the base of the blade, sometimes at a certain distance up, like the rays of a fan. The terminal veinlets are usually arranged in an elegant delicate network, sometimes very complicated.<sup>1</sup> The leaves often degenerate near the flowers into involucrant bracts, which become more and more coloured and simple in form, and recall, in their tint and approximation and in the way they protect the flowers, the leaves of the involucre of *Compositæ* and some allied types.<sup>2</sup>

**AFFINITIES.**—The order *Proteaceæ*, placed by A. L. DE JUSSIEU in *Apetalæ*, was left there by all authors until A. BRONGNIART,<sup>3</sup> fusing this class with *Polypetalæ*, placed *Proteineæ* between *Rhamnoideæ* and *Daphnoideæ*,—i.e., next the three classes which he terms *Myrtoideæ*, *Rosineæ*, and *Leguminosæ*. LINDLEY<sup>4</sup> puts *Proteaceæ* in his Alliance XLI (*Daphnales*), just before *Rosales* which includes *Rosaceæ*, *Pomaceæ*, *Drupaceæ*, *Fabaceæ*, and *Chrysobalanaceæ*. In the

<sup>1</sup> It is from these characters that authors have thought they could distinguish leaves of Proteaceous plants in geological strata (see ETTINGSHAUSEN, *Proteac. der Vorwelt*). Hence a detailed study has been made of the nervation, which is thus described by DE SAPORTA (in *Ann. Sc. Nat.*, sér. 4, xvii. 248): "The tertiary ribs, always more or less oblique to the secondary, ramify by bifurcating to their last subdivisions; the network resulting from the intersection of the ramifying venules gives rise to rhomboidal, trapeziform, or hexagonal meshes, that vary in size, proportion, and regularity with the genus and species. These tertiary veins, oblique to the secondary, are more or less so according to the obtuseness of the angle which the latter make with the midrib." Hence the leaves are divided into those which have oblique ribs (*Grevillea*, *Lomatia*, *Leucospermum*, &c.), and those in which the secondary ribs are given off at an obtuse or nearly a right angle (*Xylomelum*, *Knightia*, *Banksia*). These considerations have led geologists to admit fossil types of *Proteaceæ*,

such as *Leucadendrites*, *Banksites*, *Palæodendron*, *Lomatites*, *Knightites*, *Myricophyllum*, *Rhopalospermities* (SAP.), *Embothrites*, *Driandroides* (UNG.), as well as true *Grevilleas* and *Hakeas*. *Proteaceæ* are given as "the most ancient dicotyledonous type [excluding, of course, *Coniferæ*] whose presence it is possible to ascertain in the fossil state." It is in the Senonian beds of the *Aachensandstein* [Sandstone of Aix-la-Chapelle] that the preponderance of these types is most marked, some hundred species being admitted. Later on, it is said, in the tertiary beds, true *Dryandras* are found, and then the *Proteaceæ* commence to diminish in number, and seem to be replaced by *Myricaceæ* (see SAP., *op. cit.*, 298; xix. 21, 58, 109; sér. 5, iii. 19, 24, 30, 33, 55, 59, 95, 144).

<sup>2</sup> It is more on account of the coloured involucres than the flowers that *Proteaceæ* are so ornamental in the conservatory or winter-garden.

<sup>3</sup> *Enum. des Genr. de Pl. Cult.* (1843), 120.

<sup>4</sup> *Veg. Kingd.*, 529.

former alliance *Proteaceæ* is united with *Lauraceæ* and *Thymelaceæ*. We have no difficulty in recognising its numerous analogies with certain types of both these orders, as well as with many *Santalaceæ*, *Loranthaceæ*, *Elæagnaceæ*, &c. But we think that it is by their most reduced types, characterized by separation of the sexes, uniovulate ovaries, and one-seeded indehiscent fruits, that the *Proteaceæ* come nearest these groups. Their highest types have multiovulate ovaries,<sup>1</sup> many-seeded fruits dehiscing longitudinally, exalbuminous seeds, well-marked perigyny, with a sometimes irregular gynæceum, and pinnately compound leaves: by these we think that the *Proteaceæ* are most closely bound to the arborescent types with a single perianth and slightly irregular or even regular flowers, oligandrous or even diclinous, of the *Leguminosæ*, especially *Cesalpinieæ*.

The uses of this order<sup>2</sup> are not numerous. The arborescent species furnish good wood for fuel and building purposes. This is the case with the species of *Protea*<sup>3</sup> at the Cape; several species of *Andripetalum*,<sup>4</sup> *Roupala*,<sup>5</sup> and *Adenostephanus*,<sup>6</sup> in Brazil and Guiana; certain of *Embothrium*<sup>7</sup> and *Lomatia*<sup>8</sup> in Chili; and some of *Stenocarpus*<sup>9</sup> in Australia. To this last country belong the enormous trees *Darlingia spectatissima* and *Cardwellia sublimis*.<sup>10</sup> The bark of *Protea grandiflora* is considered a good diarrhœa remedy at the Cape.<sup>11</sup> The flowers and fruits of several members of this order furnish food. The former sometimes secrete a saccharine matter in great abundance; and the Australian natives used formerly to sustain a wretched existence on this sort of honey collected from *Banksias*.<sup>12</sup> At the Cape the *Proteas*, especially *P. mellifera* and *speciosa*, drop from their inflorescence a similar honey, prized as a food and a

<sup>1</sup> In our gardens certain *Proteaceæ* may abnormally become pluricarpellary; this we have observed in *Lambertia formosa* (see *Adansonia*, ii. 292).

<sup>2</sup> ENDL., *Enchirid.*, 217. — LINDL., *Veg. Kingd.*, 533. — ROBERTH., *Syn. Pl. Diaphor.*, 244, 1114.

<sup>3</sup> *P. grandiflora* is the *Wagenboom* of the colonists of the Cape; it is, indeed, used for making wheels.

<sup>4</sup> Several of the Old World *Helicias*, trees with useful wood and edible seeds, no doubt belong to this genus.

<sup>5</sup> Especially *R. legalis* MART.

<sup>6</sup> MART., *Fl. Bras., Prot.*, 100.

<sup>7</sup> *E. coccineum* is the *Notro* or *Ciruerillo* of the Chilians. (C. GAY, *Fl. Chil.*, v. 307.)

<sup>8</sup> In Chili *L. ferruginea* is named *Bomerillo*, *Piune*, *Fuingue*; *L. dentata*, *Pinol*, *Guarda fuego*; *L. obliqua*, *Raral*, *Nogal*. (C. GAY, *op. cit.*)

<sup>9</sup> Especially *S. salignus* R. BR.

<sup>10</sup> F. MUELL., *Fragm.*, v. 23, 152.

<sup>11</sup> That of *Leucospermum conocarpum* R. BR., the *Kreupelboom* of the Cape colonists, serves the same purposes. Its reddish wood is of good quality.

<sup>12</sup> *B. æmula* R. BR., *ericifolia* L. FIL., *integrifolia* L. FIL., *serrata* L. FIL., and *spinulosa* SM., among others.

cough-cure.<sup>1</sup> The fruit of *Brabejum stellatum*, pretty similar to a small almond, contains a seed which is eaten roasted, like the chestnut, at the Cape. The seeds of *Guevina Avellana*<sup>2</sup> are sold in the market like hazel-nuts in Chili, and the pericarp is used as an astringent and vermicide. The pericarp of *Brabejum* is roasted as a substitute for coffee. *Helicia serrata* is considered poisonous in India.<sup>3</sup> The *Proteaceæ* are best known to us as ornamental plants for the cold and temperate conservatory. The genera *Banksia*, *Protea*, *Lambertia*, *Grevillea*, *Hakea*, *Stenocarpus*, *Lomatia*, *Isopogon*, have all charming flowers, and were much cultivated early in this century ; but they are in much less vogue now-a-days, no doubt because of the difficulty of culture. The *Roupalas* are cultivated chiefly on account of their elegant foliage.

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<sup>1</sup> There is a yellow colouring matter in the flowers of *Persoonia macrostachya* and *Petrophila brevifolia* according to LINDLEY.

<sup>2</sup> *Avellana Guevina*, *Nefuen* of the Chilians.

<sup>3</sup> *Cajo Morsego* of the Malays. It is said to kill rats and mice.



## GENERA.

### I. EMBOTHRIEÆ.

1. **Embothrium** FORST.—Flowers hermaphrodite, slightly irregular; perianth slender elongated, inserted obliquely at base, sometimes longitudinally cleft; perianth-leaves 4, subequal valvate, finally revolute, at apex antheriferous concave dilated. Stamens 4, superposed to perianth-leaves; filaments nearly absent; anthers ovate-oblong introrse 2-rimose. Disk hypogynous posterior semi-annular. Germen free stipitate; ovules  $\infty$ , 2-seriate, inserted on a posterior placenta, imbricated ascending; micropyle extrorse inferior; chalaza wing-shaped; style slender persistent; apex vertically or obliquely (*Oreocallis*) clavate, stigmatiferous. Follicle oblong or cylindrical (*Oreocallis*), 1-valved. Seeds  $\infty$ , compressed ascending; chalaza produced to form a superior membranous pellucid imbricated wing; embryo inferior, exalbuminous fleshy; radicle straight inferior.—Small trees or shrubs; leaves alternate simple entire; flowers in cylindrical or corymbose, terminal racemes; pedicels, each pair axillary to a bract (*South-western and Antarctic regions of America*). See p. 383.

2. **Telopea** R. BR.<sup>1</sup>—Flowers almost those of *Embothrium*; perianth usually cleft above, 1-labiate. Disk hypogynous subannular. Style obliquely lateral;<sup>2</sup> stigmatiferous at apex. Follicle and seed, almost those of *Embothrium*.—Shrubs; leaves alternate simple entire or dentate; flowers in short corymbose spikes; bracts 2-flowered; inflorescence surrounded by an imbricated coloured involucre of  $\infty$  bracts (*Australia*<sup>3</sup>).

<sup>1</sup> In *Trans. Linn. Soc.*, x. 197; *Prodr. Fl. Nov.-Holl.*, 388; *Suppl.*, 32.—ENDL., *Gen.*, n. 2454.—MEISSN., *Prodr.*, 446, 699.—*Hylogyne* KNIGHT & SALISB., *Proteaceae* (1809), 126.

<sup>2</sup> Persistent in *T. speciosissima* R. BR.

<sup>3</sup> Species 2. GÆRTN. F., *Fruct.*, iii. 214, t. 218.

—CAV., *Icon.*, iv. 60, t. 388.—LABILL., *Nouv.-Holl.*, i. 32, t. 44.—REICHB., *Fl. Exot.*, t. 159 (*Embothrium*).—F. MUELL., *Fragm. Phyt. Austral.*, ii. 170; v. 39.—WALP., *Ann.*, i. 592.—BENTH. & F. MUELL., *Fl. Austral.*, v. 533.

3. *Lomatia* R. BR.<sup>1</sup>—Flowers hermaphrodite irregular; perianth 1-lipped; leaves 4, free secund, recurved at antheriferous apex. Anthers 4, subsessile, muticous. Hypogynous glands 3, secund, unequal or subequal. Germen nearly of *Embothrium*; style persistent; apex stigmatiferous, obliquely or laterally flattened. Follicle subcylindrical or compressed; 1, 2-valved. Seeds  $\infty$ , winged at apex or on both sides (*Amphiloma*).—Shrubs or small shrubs; leaves alternate, entire toothed or pinnately laciniate, often heteromorphous; flowers in simple or branched, axillary or terminal racemes; pedicels solitary or paired in axils of bracts; involucre 0<sup>2</sup> (*Australia*,<sup>3</sup> *South-west America*<sup>4</sup>).

4. *Stenocarpus* R. BR.<sup>5</sup>—Flowers irregular, hermaphrodite (nearly of *Embothrium*). Perianth cleft behind; leaves long, coherent, finally separating; at apex dilated concave, antheriferous. Anthers sessile muticous. Hypogynous gland semi-annular, posterior. Germen stipitate; ovules  $\infty$ , ascending; style obliquely dilated and laterally stigmatiferous at apex. Follicle cylindrical. Seeds  $\infty$ , ascending; winged at base, containing embryo above; radicle short inferior.—Trees or shrubs; leaves alternate coriaceous, entire or laciniate; flowers<sup>6</sup> umbellate, peduncles axillary or springing from wood; bracts 2-flowered (*Oceania*<sup>7</sup>).

5. *Knightia* R. BR.<sup>8</sup>—Flowers regular hermaphrodite. Perianth tubular, 4-phyllous. Stamens 4, inserted more than half-way up

<sup>1</sup> In *Trans. Linn. Soc.*, x. 199; *Prodr.*, 389; Suppl., 33.—ENDL., *Gen.*, n. 2155.—MEISSN., *Prodr.*, 447.—*Tricondylus* KN. & SALISB., *Prot.*, 121.

<sup>2</sup> A genus very near *Embothrium*, only differing in the dehiscence of the perianth and the form of the stigma. ENDLICHER divides it into two sections: 1. *Eulomatia*, seeds wingless at base; nucleus pulverulent (species Australasian, 1 Chilean). 2. *Amphiloma*, seeds winged on both sides; nucleus not pulverulent (species South American).

<sup>3</sup> Species about 7. LABILL., *Nov. Holl.*, i. 31, t. 42, 43 (*Embothrium*).—GÆRTN. F., *Fruct.*, iii. 215, t. 213?—POIR., *Dict.*, Suppl., ii. 550.—CAV., *Icon.*, iv. 60.—*Bot. Reg.*, t. 442.—*Bot. Mag.*, t. 4023, 4110.—F. MUELL., *Fragm.*, v. 39, 95, 153; vi. 191, 224.—BENTH. & F. MUELL., *Fl. Austral.*, v. 535.

<sup>4</sup> Species about 4. R. & PAV., *Fl. Per.*, i. 62.—CAV., *Icon.*, iv. 59.—HOOK. F., *Fl. Antarct.*,

342.—C. GAY, *Fl. Chil.*, v. 309.—KL., in *Nov. Act. Nat. Cur.*, xix. Suppl. i. 411.

<sup>5</sup> In *Trans. Linn. Soc.*, x. 201; *Prodr.*, 390; Suppl., 34.—ENDL., *Gen.*, n. 2156; Suppl., iv. p. ii. 88.—MEISSN., *Prodr.*, 450, 699.—*Cybele* KN. & SALISB., *Prot.*, 123.—*Agnostus* A. CUNN. (ex LINDL., *Veg. Kingd.*, 534).

<sup>6</sup> Orange or ochrey-white.

<sup>7</sup> Species about 10, of which 4 or 5 are New Caledonian, the rest Australian. FORST., *Gen.*, 16, t. 8, fig. a-f.—LAMK., *Ill.*, t. 55, fig. 1 (*Embothrium*).—LABILL., *Sert.*, 21, t. 26.—SPRENG., *Syst.*, i. 484 (*Cybele*).—HOOK., *Journ.* (1854), 359; in *Bot. Mag.*, t. 4263.—F. MUELL., *Fragm.*, i. 134, 234; iii. 147; v. 154; vi. 224.—BR. & GR., in *Ann. Sc. Nat.*, sér. 5, iii. 204.—WALP., *Ann.*, i. 592; iii. 333.—BENTH. & F. MUELL., *Fl. Austral.*, v. 539.

<sup>8</sup> In *Trans. Linn. Soc.*, x. 193.—ENDL., *Gen.*, n. 2151; Suppl., iv. p. ii. 88.—MEISSN., *Prodr.*, 442, 699.

sepals, and exerted on their becoming revolute; anthers linear; connective very shortly produced above cells. Hypogynous glands 4, equal. Germen sessile; ovules imbricated in 2 rows, 2, 3 in each, ascending, anatropous; micropyle inferior, extrorse; style straight, subclavate at apex. Follicle coriaceous fusiform; seeds 2-4, ascending, winged above.—Trees or shrubs; leaves alternate simple petiolate, entire or toothed, penniveined; flowers in axillary racemes or capitula; pedicels paired in axils of bracts (*Oceania*).

6. *Cardwellia* F. MUELL.<sup>3</sup>—Perianth nearly of *Stenocarpus*; base oblique. Anthers subsessile; cells discrete; connective shortly apiculate. Hypogynous glands 4, thick, free, unequal; 2 posterior a little longer; two antero-lateral inserted a little higher. Germen very shortly stipitate; ovules  $\infty$  (up to 15), anatropous ascending, inserted on a horseshoe-shaped placenta with its concavity upwards; micropyle inferior extrorse; style straight, slender, apex stigmatiferous, obliquely dilated, ellipsoidal, with a small central prominence. Follicle . . . ?—A lofty tree; leaves alternate pinnate; flowers in spike-like racemes; pedicels cohering in pairs in axil of each bract (*Australia*<sup>3</sup>).

7. *Darlingia* F. MUELL.<sup>4</sup>—Flowers nearly of *Cardwellia*, regular; perianth oblique at base, dilated at stigmatiferous apex. Anthers subsessile, oblong, apiculate. Glands 4, inserted obliquely; 2 posterior higher. Germen sessile; ovules  $\infty$ , hemitropous ascending, inserted on a short horseshoe-shaped placenta; micropyle inferior, extrorse; style slender, deciduous, at apex clavate stigmatiferous. “Follicle 4-seeded; seeds erect, flat, winged all round, in two slightly superposed pairs near base of anterior margin of pericarp; embryo exalbuminous; radicle inferior.”—A tree; leaves alternate simple, oblong or lanceolate, entire or pinnatifid above middle; flowers in elongated spikes; pedicels very short, undivided,<sup>5</sup> paired in axils of bracts (*East Australia*<sup>6</sup>).

<sup>1</sup> Species 3—viz., 1 or 2 (doubtful) from New Caledonia, *Embothrium strobilinum* LABILL. (*Nouv.-Holl.*, ii. 116;—*K. integrifolia* A. CUNN., in *Ann. Nat. Hist.*, i. 378, not.;—BE. & GR., *loc. cit.*, 208); and 1 from New Zealand, *K. excelsa* R. BE. (*loc. cit.*, 194, t. 2;—RAOUL, *Ch. de Pl.*, 42;—HOOK. F., *Fl. N. Zeal.*, 219).

<sup>2</sup> *Fragm. Phyt. Austral.*, v. 23.

<sup>3</sup> Species 1. *C. sublimis* F. MUELL., *loc. cit.*,

24.—BENTH. & F. MUELL., *Fl. Austral.*, v. 538.

<sup>4</sup> *Fragm. Phyt. Austral.*, v. 152.

<sup>5</sup> This genus should perhaps be reduced to a section of *Cardwellia*, from which it differs in seeds and leaves.

<sup>6</sup> Species 1. *D. spectatissima* F. MUELL., *loc. cit.*—*Helicia Darlingiana* F. MUELL., *Fragm.*, v. 24.—BENTH. & F. MUELL., *Fl. Austral.*, v. 533.

8. *Buckinghamia* F. MUELL.<sup>1</sup>—"Flowers nearly of *Grevillea*; perianth much recurved on one side, finally falling down. Anthers subsessile muticous; cells diverging. Hypogynous gland nearly semi-annular. Germen pluriovulate; style filiform deciduous; apex laterally orbiculate stigmatiferous. Follicle subsessile, obliquely orbiculate-ovate, compressed, shortly beaked, 3-6-seeded; seeds ascending, surrounded by a narrow wing.—A tree; leaves alternate ovate-lanceolate entire; flowers<sup>2</sup> in elongated racemes; pedicels paired, minutely 1-bracteolate<sup>3</sup> (*Australia*<sup>4</sup>).

9. *Grevillea* R. BR.—Flowers hermaphrodite; perianth 4-fid or 4-leaved, deciduous, sometimes regular or subregular (*Anadenia*), with apex globose (*Manglesia*), more frequently reflexed or recurved, sometimes irregular (*Eugrevillea*); leaves valvate, antheriferous, and long cohering at dilated concave apex. Anthers sessile or subsessile, ovate or oblong, introrse, muticous or subapiculate. Disk hypogynous, usually cleft behind, more rarely subannular, minute, or 0. Germen stipitate, with stalk sometimes adnate to perianth, more rarely sessile, often ventricose behind; ovules 2, collaterally ascending and anatropous, or hemitropous; micropyle inferior extrorse; style sublateral, bowed or straight, more rarely shortened, at apex discoid, flat, concave, convex, or conical, usually laterally or obliquely grooved, stigmatiferous. Follicle woody or coriaceous, ovate or subglobose, mucronate, or beaked by persistent style, smooth, warty, or echinate, 1-2-valved. Seeds 1 (the other abortive) or more frequently 2, ovate or subrotund, unsymmetrical, compressed alternately, wingless, or with a membranous or somewhat fleshy membranous 1-lateral wing, more rarely broadly winged all round (*Cycloptera*), embryo fleshy exalbuminous; radicle inferior.—Shrubs, or more rarely undershrubs or trees; leaves alternate, flat, or terete, entire, or variably divided; flowers in simple or branched axillary or terminal racemes, more rarely solitary or paired; pedicels usually in pairs in axil of each bract, rarely solitary or more numerous (*Oceania*, especially *Australasia*). See p. 386.

<sup>1</sup> *Fragm. Phyt. Austral.*, v. 247.

<sup>2</sup> "Whitish, very fragrant."

<sup>3</sup> "A genus differing from *Grevillea* in the greater number of its seeds. . . . Its alliance with *Grevillea* is very apparent, and it is nearest

in character to *G. Hillii*" (F. MUELL.).—But all known species of *Grevillea* are 2-ovulate.

<sup>4</sup> Species 1. *B. celsissima* F. MUELL., *loc. cit.*  
—BENTH. & F. MUELL., *Fl. Austral.*, v. 532.

10. *Hakea* SCHRAD.<sup>1</sup>—Flowers hermaphrodite; perianth nearly of *Grevillea*; sometimes 1-lipped just before anthesis; deciduous as a whole. Anthers 4, sessile, mucous, or shortly apiculate.<sup>2</sup> Disk hypogynous, cleft behind, entire, or more rarely 2-lobed. Germen stipitate; ovules 2 (of *Grevillea*); style slender, apex dilated stigmatiferous, obtuse, or conical. Follicle oblong, or more frequently ovate, ventricose, or gibbous, more rarely globose, smooth, or tuberculate echinate or crested; cell excentric, 1, 1-seeded, 2-valved; valves thick woody bark-like, at apex horned hooked or mucous. Seeds compressed, unequally winged, usually unsymmetrical, behind smooth, or more frequently wrinkled, crested, tuberculate, or echinate;<sup>3</sup> wing membranous.—Shrubs sometimes small, rigid; leaves alternate, coriaceous, terete, or flat, entire toothed or lacinate, often polymorphous; flowers in usually axillary racemes or fascicles; inflorescences at first bud-like, involucreted in deciduous, imbricated, scarious scales; bracts 2-flowered (*Australasia*<sup>4</sup>).

11? *Molloya* MEISSN.<sup>5</sup>—"Perianth oblique at base. . . Disk hypogynous semiannular. . . . Germen stipitate villose; stalk sometimes adnate to perianth . . .; style straight; apex suborbicular, obtusely umbonate, laterally stigmatiferous. . . . Follicle coriaceous-ligneous, lanceolate-oblong, tapering at both ends, glabrous, 5, 6-ribbed, 1-valved, 1-seeded.—A shrub; leaves alternate, quite entire, coriaceous; flowers axillary, solitary, pedunculate"<sup>6</sup> (*West Australia*<sup>7</sup>).

12. *Orites* R. BR.<sup>8</sup>—Flowers regular, hermaphrodite. Perianth

<sup>1</sup> *Sert. Hannov.*, 27, t. 17.—R. BR., in *Trans. Linn. Soc.*, x. 178; *Prodr.*, 381; *Suppl.*, 25.—ENDL., *Gen.*, n. 2144.—MEISSN., *Prodr.*, 393, 699.—*Conchium* SM., in *Trans. Linn. Soc.*, iv. 215.—GÆRTN. F., *Fruct.*, iii. 217, t. 219.

<sup>2</sup> Pollen 3-gonous, as in *Grevillea*, according to H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 314).

<sup>3</sup> By which characters an artificial subdivision of the genus is made.

<sup>4</sup> Species about 100. CAV., *Icon.*, vi. 24, t. 533-535.—GÆRTN., *Fruct.*, i. 221, t. 47, fig. 2 (*Banksia*); iii. 216, t. 217 (*Lambertia*).—ANDR., *Bot. Repos.*, t. 215 (*Embothrium*).—MEISSN., *Prodr.*, *loc. cit.*, 394-420.—F. MUELL., *Fragm.*, i. 20; iv. 49, 130; v. 25, 72; vi. 189, 214.—BENTH. & F. MUELL., *Fl. Austral.*, v. 489.

<sup>5</sup> *Prodr.*, 348.—*Fitchia* MEISSN., in *Hook. Journ.* (1855), 75 (nec HOOK.).

<sup>6</sup> A doubtful genus, apparently allied to *Grevillea* and *Persoonia*. It is to this genus that *Strangea* (MEISSN., in *Hook. Journ.* (1855), 66; *Prodr.*, 348) seems to approach very nearly; the solitary axillary flowers of the latter are unknown. It has a spongy-coriaceous oval-oblong 2-valved follicle; seed solitary, long-winged. Species 1. Australian (*S. linearis* MEISSN.). [*Molloya* and *Strangea* are both reduced to species of *Grevillea* in the *Flora Australiensis* (v. 454, 453).]

<sup>7</sup> Species 1. *M. cynanchicarpa* MEISSN., *loc. cit.*—*Grevillea*? *cynanchicarpa* MEISSN.—BENTH. & MUELL., *Fl. Austral.*, v. 454.

<sup>8</sup> R. BR., in *Trans. Linn. Soc.*, x. 189; *Prodr.*, 387; *Suppl.*, 31.—ENDL., *Gen.*, ii. 2147.—MEISSN., *Prodr.*, 423.—*Tropocarpa* DON, MSS. (ex MEISSN.).

short; leaves narrowly linear, free, recurved, deciduous. Stamens, inserted above middle; filament, thick adnate to perianth; anthers subsessile, muticous. Hypogynous glands 4, short. Germen sessile; ovules 2, anatropous; style slender straight, at stigmatiferous apex slightly thickened, continuous vertical. Follicle coriaceous. Seeds 1, 2, winged at apex (*Eurites*<sup>1</sup>), or at both ends (*Amphiderris*<sup>2</sup>).—Trees or shrubs; leaves alternate, flat or terete, entire, or toothed; flowers in short terminal and axillary spikes; bract 2-flowered (*Australia, Tasmania*<sup>3</sup>).

13. *Carnarvonia* F. MUELL.<sup>4</sup>—“Flowers subregular; perianth leaves nearly equal; finally distantly revolute. Stamens 4; filaments adnate to perianth, free at apex; anthers oblong-linear apiculate, introrsely rimose. Disk 0. Germen 2-ovulate; style short subulate deciduous; stigma minute terminal. Fruit stipitate woody-crustaceous, 2-valved. Seeds 2, long-winged above.—A tree; leaves alternate petiolate; leaflets quinate or everywhere 3–4 sometimes pinnate on rachis produced upwards, entire repand-serrate or partly pinnatisect; flowers small, scattered geminate”<sup>5</sup>—(*East Australia*<sup>6</sup>).

14. *Xylomelum* SM.<sup>7</sup>—Flowers (nearly of *Manglesia*), polygamous. Stamens 4, exerted when the sepals turn back; anthers subsessile linear; connective shortly produced above cells. Hypogynous scales 4, small. Pistil nearly of *Orites* (more or less abortive in male flower); ovules 2, collateral fixed by the side, anatropous ascending, micropyle inferior extrorse; chalaza produced into a narrow wing. Follicle ovate-oblong tomentose; pericarp very thick woody, excentrically 1-celled, finally dehiscent. Seeds long-winged above; embryo fleshy; radicle inferior.—Trees; leaves opposite simple coriaceous; spikes axillary dentifloral; flowers paired in axil of each bract, hermaphrodite below, male above (*Australia*<sup>8</sup>).

<sup>1</sup> ENDL., *op. cit.*, Suppl., iv. 2, 87.

<sup>2</sup> R. BR., *Prodr.*, Suppl., 32.—*Oritina* R. BR., in *Trans. Linn. Soc.*, x. 224.

<sup>3</sup> Species 4, 5. A. RICH., *Voy. Astrol.*, 70, 71, t. 25.—F. MUELL., *Def. Rar. Pl.* (1855), 31, n. 26.—MEISSN., in *Hook. Journ.* (1852), 209.—BENTH. & MUELL., *Fl. Austral.*, v. 410.

<sup>4</sup> *Fragm.*, vi. 81, 248, 250, 254.

<sup>5</sup> A genus at once related to *Helicia*, *Grevillea*, *Telopea*, and *Embothrium*, according to F. MUELLER.

<sup>6</sup> Species 1. *C. aralifolia* F. MUELL., *loc. cit.*, t. 55, 56.—BENTH. & MUELL., *Fl. Austral.*, v. 409.

<sup>7</sup> In *Trans. Linn. Soc.*, iv. 214.—R. BR., in *Trans. Linn. Soc.*, x. 189; *Prodr.*, 387; Suppl. 31.—ENDL., *Gen.*, n. 2146; *Icon.*, t. 47, 48.—MEISSN., *Prodr.*, 422.

<sup>8</sup> Species 4. GÆRTN., *Fruct.*, i. 220, t. 47, fig. 1 (*Banksia*).—LAMK., *Dict.*, viii. 810; *Ill.*, t. 54, fig. 4.—CAV., *Icon.*, iv. 25, t. 536 (*Hakea*).—W., *Enum.*, i. 141 (*Conchium*).—Hook., *Icon.*,

15. *Helicia* LOUR.<sup>1</sup>—Flowers regular, hermaphrodite, nearly of *Lambertia* (or *Xylomelum*); perianth-leaves 4, finally revolute; anthers subsessile on perianth, linear or ovate, mucous or apiculate. Hypogynous glands 4, free or more or less connate. Germen sessile or stipitate, short; ovules 2, ascending anatropous; micropyle inferior extrorse; style clavate at apex. Fruit coriaceous-woody, indehiscent. Seeds subglobose, wingless exalbuminous.—Trees or shrubs; leaves alternate (or opposite?) simple; flowers in axillary or terminal racemes; pedicels paired in axil of each bract, free or connate to a variable height (*Continent and Islands of Tropical Asia, Australia*<sup>2</sup>).

16. *Lambertia* SM.<sup>3</sup>—Flowers regular, hermaphrodite; perianth tubular 4-fid; lobes staminiferous, finally revolute spirally. Anthers 4, subsessile linear acuminate. Hypogynous scales 4, small, free or connate into a sheath. Germen stipitate; ovules 2 descending suborthotropous; style long slender straight, at apex subulate grooved stigmatiferous. Follicle coriaceous-woody compressed acuminate, at apex mucous or dilated, 2-horned, often echinate. Seeds 1, 2, marginate.—Shrubs; branches often subverticillate; leaves alternately verticillate, entire or toothed, apiculate; flowers terminal, solitary or subcapitate; surrounding involucre constant of  $\infty$  caducous imbricated coloured bracts (*Australia*<sup>4</sup>).

17. *Roupala* AUBL.<sup>5</sup>—Flowers regular hermaphrodite. Perianth straight cylindrical subclavate; leaves valvate, antheriferous at concave apex, finally recurved, deciduous. Stamens exerted; filaments

t. 446.—MEISSN., in *Pl. Preiss.*, i. 580.—KIPP. & MEISSN., in *Hook. Journ.* (1852), 209.—F. MUELL., *Fragm.*, iv. 110; v. 174, 214; vi. 220.—BENTH. & MUELL., *Fl. Austral.*, v. 407.

<sup>1</sup> *Fl. Cochinch.*, ed. 1790, 83 (nec PERS.).—R. BR., *Prodr.*, Suppl., 32.—BL., in *Ann., Sc. Nat.*, sér. 2, i. 211.—ENDL., *Gen.*, n. 2150.—MEISSN., *Prodr.*, 430, 699.—*Castronia* NORONH., *Rel. Pl. Jav.*, in *Tijdschr. voor Nat. en Phys.*, viii. 414? (ex HASSK.).—*Helittopygium* BL., *Bijdr.*, 652.

<sup>2</sup> Species about 20. R. BR., in *Trans. Linn. Soc.*, x. 91, n. 4–6 (*Rhopala*).—PRESL, *Epim.*, 247.—SIEB. & ZUCC., *Fl. Jap. Fam.*, ii. 74.—BENN., *Pl. Jav. Rar.*, 81, t. 18.—F. MUELL., *Fragm.*, ii. 91; iii. 37; iv. 191, 224; v. 24, 38, 152, 186; vi. 84, 107, 174 (part.).—MIQ., in *Ann. Mus. Lugd.-Bat.*, i. 204.—BENTH. & MUELL., *Fl. Austral.*, v. 404.

<sup>3</sup> In *Trans. Linn. Soc.*, iv. 214, t. 20.—R. BR., in *Trans. Linn. Soc.*, x. 188; *Prodr.*, 386; Suppl., 30.—ENDL., *Gen.*, n. 2145.—MEISSN., *Prodr.*, 420.

<sup>4</sup> Species about 10. HOOK., *Icon.*, t. 553.—WENDL., *Sert.*, iv. 5, t. 21 (*Protea*).—LINDL., *Swan Riv.*, 32.—MEISSN., in *Pl. Preiss.*, ii. 263.—DIETR., *Fl. Univ.*, n. Folg., t. 73.—F. MUELL., *Fragm.*, vi. 248, 255.—BENTH. & MUELL., *Fl. Austral.*, v. 413.

<sup>5</sup> *Guian.*, i. 33, t. 32 (1775).—J., *Gen.*, 79.—LAMK., *Dict.*, vi. 316; *Ill.*, t. 55.—GERTN., *Fruct.*, iii. 212, t. 217.—*Leinkeria* SCOP., *Introd.* (1777), n. 1607.—*Rhopala* SCHREB., *Gen.*, n. 144 (1789–91).—R. BR., in *Trans. Linn. Soc.*, x. 190 (part.).—ENDL., *Gen.*, n. 2148.—MEISSN., *Prodr.*, 424, 699.—*Roupala* VAHL, *Symbol.*, iii. (1794), 20.—*Ropala* RUDG., *Guian.*, i. 26, t. 39.

very short; anthers muticous or shortly apiculate. Hypogynous glands 4, free, often contiguous.<sup>1</sup> Germen sessile; ovules 2, orthotropous or suborthotropous collaterally ascending; micropyle inferior style erect; apex clavate stigmatiferous. Follicle woody-coriaceous compressed smooth, 1-locular. Seeds 2, much compressed oblong; completely surrounded by their membranous wing; embryo central; radicle inferior.—Trees or shrubs; leaves opposite, sometimes simple (rarely entire), sometimes imparipinnate; flowers in axillary or terminal, solitary or axillary racemes; pedicels paired in axil of each bract, free or semiconnate (*Central and Cis-andine South America*<sup>2</sup>).

18. *Andripetalum* SCHOTT.<sup>3</sup>—Flowers regular, hermaphrodite; perianth-leaves finally revolute deciduous. Stamens 4. Hypogynous scales 4, free or connate into a 4-toothed urceolus. Germen subsessile; ovules 2, descending suborthotropous;<sup>4</sup> style slender, slightly thickened at apex. Drupe nearly juiceless, 1-seeded indehiscent. Seed exalbuminous; embryo fleshy; radicle inferior.—Trees; leaves alternate or opposite, simple; floral racemes terminal or axillary, simple or more rarely slightly branched (*Tropical America*,<sup>5</sup> *Australia*<sup>6</sup>).

19. *Guevina* MOL.<sup>7</sup>—Flowers slightly irregular, hermaphrodite. Perianth inserted obliquely, deciduous; leaves antheriferous at concave dilated apex, dissimilar; 1 erect, 3 revolute. Stamens 4, shortly apiculate. Hypogynous glands 2, anterior. Germen subsessile; ovules 2, orthotropous collaterally descending; style erect

<sup>1</sup> Trigonous pollen-grains with papillose angles occur in *R. serrata*, *heterophylla*, *rhombifolia*. (H. MOHL., in *Ann. Sc. Nat.*, sér. 2, iii. 314.)

<sup>2</sup> Species about 35, of which 1 is Mexican. R. & PAV., *Fl. Per.*, t. 98, 99 (*Embothrium*).—H. B. K., *Nov. Gen. et Spec.*, ii. 152, t. 118-120.—POHL., *Pl. Bras.*, i. 106, t. 86, 88, 90.—PEPP. & ENDL., *Nov. Gen. et Spec.*, ii. 35, t. 149.—KL., in *Linnæa*, xv. 54; xx. 473; in *Hook. Journ.*, iv. 326.—MORIC., *Pl. Nov. Amér.*, 172, t. 100.—MEISSN., in *Mart. Fl. Bras.*, *Prot.*; 79, t. 31-33. One New Caledonian species is described, *R. Vieillardii* BR. & GR., in *Ann. Sc. Nat.*, sér. 5, i. 345. But the genus of the plant, whose fruit is yet unknown, remains very doubtful.

<sup>3</sup> Ex ENDL., *Gen.*, n. 2149; Suppl., iv. p. ii. 82.—MEISSN., *Prodr.*, 345, 698.—*Andripetalum* POHL., *Pl. Bras.*, i. 114, t. 91, 92.—? *Panopsis* SALISB. (ex. MEISSN.).

<sup>4</sup> Whereby this genus is especially distinguished from *Helicia*.

<sup>5</sup> Species 8-10. H. B. K., *Nov. Gen. et Spec.*, ii. 154, t. 121 (*Rhopala*).—A. RICH., in *Mém. Soc. Hist. Nat. Par.*, i. 106 (*Roupala*).—KL., in *Linnæa*, xv. 53; xx. 471.—MEISSN., in *Mart. Fl. Bras.*, *Prot.*, 77.

<sup>6</sup> Several species hitherto described under *Helicia*, among which will come the *Macadamias* (F. MUELL., in *Trans. Phil. Inst. Viet.*, ii. 72; *Fragm.*, vi. 191, under *Helicia*); *Fl. Aust.*, v. 406.—See H. BN., in *Adansonia*, ix. 258.

<sup>7</sup> *Chil.*, 198; ed. 2, 279.—J., *Gen.*, 424.—R. BR., in *Trans. Linn. Soc.*, x. 48, 165.—ESCHSCH., in *Mém. Acad. Pétersb.*, x. 281.—ENDL., *Gen.*, n. 2140.—MEISSN., *Prodr.*, 347, 698.—NEBU FEUILL., *Chil.*, iii. 46, t. 33.—*Quadria* R. & PAV., *Prodr.*, 16; *Fl. Per. et Chil.*, i. 63, t. 99, fig. b.—GÆRTN. F., *Fruct.*, iii. 220, t. 220.—*Avellana* GÆRTN. F., *loc. cit.*



slender; apex obliquely dilated oval convex stigmatiferous. Fruit subdrupaceous. Seed 1, subglobose; cotyledons orbicular, plano-convex, rather thick; radicle short inferior.—A tree; leaves alternate imparipinnate; leaflets dentate; flowers in axillary racemes; pedicels paired in axil of each bract, high-connate (*Chili*<sup>1</sup>).

20. *Bellendena* R. BR.<sup>2</sup>—Flowers regular, hermaphrodite. Perianth leaves 4, equal free spreading caducous. Stamens 4, hypogynous free; anthers basifixed oblong introrse 2-rimose. Germen articulated to a short stalk, 1-celled; ovules 2, subsuperposed descending; style at apex obtuse, 1-sulcate or subentire, stigmatiferous. Fruit dry obovate compressed, sometimes with the persistent style appressed and forming a hook below apex, indehiscent; one edge subulate. Seeds 1, 2; embryo fleshy; radicle inferior.—A shrub; leaves alternate, incised-dentate; flowers in terminal pedunculate racemes; pedicels alternate, solitary or more rarely paired; bracts 0 (*Tasmania*<sup>3</sup>).

## II. BANKSIEÆ.

21. *Banksia* L. FIL.—Flowers regular, hermaphrodite; perianth straight or finally incurved, marcescent and long persistent; leaves 4, free or connate at base, at antheriferous apex concave and long coherent. Anthers 4, subsessile linear, muticous or apiculate, introrse 2-rimose. Hypogynous squamules 4. Germen sessile; ovules 2, collateral ascending, hemitropous, inserted laterally; micropyle inferior extrorse; style slender, often subulate, straight or falcate often more or less incurved with its convexity projecting outside through cleft perianth, clavate at apex, more rarely suddenly thickened like a node below apex, usually sulcate. Follicle woody, more or less deeply sunk in thickened rachis of inflorescence, compressed 2-celled, finally 2-valved; dissepiment free 2-fid, formed of integuments of connate seeds. Seeds 1 in each cell, cuneate-alate at apex; stone deeply immersed in cavity of dissepiment.—Trees or shrubs; leaves alternate or verticillate, rigid coriaceous, flat or revolute-subterete, entire or more frequently dentate or pinnatifid; flowers in ovate or

<sup>1</sup> Species 1. *G. Avellana* MOL., *loc. cit.*—C. GAY, *Fl. Chil.*, v. 312.—*Quadria heterophylla* R. & PAV., *loc. cit.*

<sup>2</sup> In *Trans. Linn. Soc.*, x. 48, 166; *Prodr.*, 374; *Suppl.*, 16.—GUILLEM., *Icon. Lith.*, t. 7.

—MEISSN., *Prodr.*, 347.—*Bellendena* ENDL., *Gen.*, n. 2141.

<sup>3</sup> Species 1. *B. montana* R. BR., *loc. cit.*—BENTH. & F. MUELL., *Fl. Austral.*, v. 378.

cylindrical, terminal or lateral, strobiliform spikes; bracts 2-flowered, bractlets 2 to superior flowers (*Australia*). See p. 390.

22. *Dryandra* R. BR.<sup>1</sup>—Flowers regular, hermaphrodite; perianth leaves equal, free or connate at base, dilated at antheriferous apex. Anthers 4, subsessile, shortly apiculate.<sup>2</sup> Hypogynous squamules 4. Germen sessile; ovules 2 collateral, after impregnation coherent and usually forming a spurious dissepiment; style slender, often articulated at base, usually straight; apex cylindrical or clavate, smooth or sulcate, stigmatiferous. Follicle woody; dissepiment membranous free 2-fid, or 0; seeds winged at apex.—Small trees or shrubs; branches scattered or umbellate; leaves alternate coriaceous, serrated, lobed or pinnatifid, more rarely entire; flowers in terminal or lateral, sessile involucrate capitula (*South Australia*<sup>3</sup>).

23 ? *Hemiclidia* R. BR.<sup>4</sup>—“Flowers regular, hermaphrodite. Perianth 4-fid; lobes concave antheriferous. Hypogynous squamules 4. Germen 1-celled; testæ coherent into a dissepiment; dissepiment arachnoid simple (not separable into 2 layers), separating with the abortive ovule from the other on ripening. Follicle subcrustaceous, bearded all over. Seed 1, ventricose wingless.—A shrub; leaves and habit of *Dryandra*; involucre imbricate; receptacle of capitulum flat” (*Australia*<sup>5</sup>).

### III. PERSOONIEÆ.

24. *Persoonia* SM.—Flowers regular hermaphrodite.<sup>6</sup> Perianth 4-merous, rarely gibbous; leaves free or connate to a variable height; margins valvate or slightly involute. Stamens inserted half way up perianth leaves; filaments filiform, usually short; anthers linear exserted; apiculated by produced connective, or submuticous. Hypogynous glands 4, free. Germen stipitate or sessile;

<sup>1</sup> In *Trans. Linn. Soc.*, x. 211, t. 3; *Prodr.*, 396; *Suppl.*, 37 (nec THUNB.).—ENDL., *Gen.*, n. 2158.—MEISSN., *Prodr.*, 467, 700.—*Josephia* KN. & SALISB., *Prot.*, 110.

<sup>2</sup> Pollen elliptical as in *Banksia*, according to R. BR.

<sup>3</sup> Species about 50. LINDL., *Swan Riv.*, 33.—KIPP., in *Hook. Journ.* (1855), 121.—MEISSN., in *Hook. Journ.* (1852), 210; (1855), 120; in *Plant. Preiss.*, i. 265, 595; ii. 267.—F. MUELL.,

*Fragm.*, v. 185; vi. 93.—BENTH. & F. MUELL., *Fl. Austral.*, v. 562.

<sup>4</sup> *Prodr.*, *Suppl.*, 40.—ENDL., *Gen.*, n. 2159.—MEISSN., *Prodr.*, 481.

<sup>5</sup> Species 1. *H. Baasteri* R. BR., *Prodr.*, *Suppl.*, 40.—MEISSN., in *Pl. Preiss.*, i. 691.—*Bot. Reg.*, t. 1455.—*Dryandra falcata* R. BR., in *Trans. Linn. Soc.*, x. 213.—BENTH. & F. MUELL., *Fl. Austral.*, iv. 567.

<sup>6</sup> Very rarely polygamous.

ovules 2, more frequently 1, descending orthotropous; style slender exerted, straight or curved; apex obtuse or capitate, stigmatiferous. Fruit drupaceous; endocarp 1, 2-celled; seeds 1, 2; embryo fleshy; radicle inferior.—Trees or shrubs; leaves alternate (more rarely all opposite), entire flat, or maple-like; flowers either solitary or few axillary, or rarely (the leaves being reduced to bracts) in terminal racemes (*Australia, New Zealand*). See p. 393.

25. **Symphyonema** R. BR.<sup>1</sup>—Flowers nearly of *Persoonia*; perianth 4-partite deciduous; leaves equal valvate. Stamens adnate up to middle of perianth; filaments finally coherent below free anthers. Germen shortly stipitate; ovules 1, 2, orthotropous descending; style stigmatiferous at apex. Fruit a 1-seeded nut.—Undershrubs or herbs; leaves alternate (or lower opposite), 3-fid-laciniate; flowers in axillary and terminal spikes; bracts cuculate persistent, 1-flowered (*Australia*<sup>2</sup>).

26. **Faurea** HARV.<sup>3</sup>—Flowers regular, hermaphrodite. Perianth-leaves equal, 1 finally separating from the rest, making perianth 2-labiate; style protruding between lips. Stamens 4; filaments short, concave within; anthers oblong mucous; cells 2, discrete parallel 2-rimose. Hypogynous scales 4, triangular-subulate, equal. Germen sessile; ovule 1, suborthotropous obliquely descending; style straight, subclavate at apex. Nut ovate bearded, long surmounted by persistent style, longitudinally 4-ribbed.—A shrub; leaves alternate simple; flowers 1-bracteate in terminal spikes<sup>4</sup> (*South Africa*<sup>5</sup>).

27. **Brabejum** L.<sup>6</sup>—Flowers regular, polygamous. Perianth-leaves 4, linear free deciduous. Stamens 4. Disk hypogynous continuous. Germen sessile; ovule 1, descending suborthotropous;

<sup>1</sup> In *Trans. Linn. Soc.*, x. 48, 157; *Prodr.*, 370; *Suppl.*, 11.—ENDL., *Gen.*, n. 2137.—MEISSN., *Prodr.*, 327.

<sup>2</sup> Species 2. RŒM. & SCH., *Syst.*, Mant., iii. 273.—REICHB., *Hort. Bot.*, ii. 3, t. 107.—ENDL., *Iconog.*, t. 12.—F. MUELL., *Fragm.*, vi. 223.—BENTH. & F. MUELL., *Fl. Austral.*, v. 377.

<sup>3</sup> In *Hook. Journ.*, vi. 373, t. 15.—ENDL., *Gen.*, n. 2139<sup>1</sup> (*Suppl.*, iv. p. ii. 82).—MEISSN., *Prodr.*, 344.

<sup>4</sup> A genus recalling *Andripetalum* in some respects, and the Abyssinian species of *Leucospermum* in others, but differing from the former chiefly by its ovule being solitary, from the latter by its being descending and orthotropous.

<sup>5</sup> Species 1. *F. saligna* HARV., *loc. cit.*

<sup>6</sup> *Gen.*, n. 85.—J., *Gen.*, 79.—LAMK., *Dict.*, 459; *Suppl.*, i. 694; *Ill.*, t. 847 B.—R. BR., in *Trans. Linn. Soc.*, x. 48, 164.—ENDL., *Gen.*, n. 2139.—MEISSN., *Prodr.*, 344.—*Brabya* L., *Mantiss.*, 137.

style slender, clavate at vertically stigmatiferous apex. Drupe dry, somewhat compressed, villous, 1-seeded.—A tree; leaves verticillate simple dentate; flowers in axillary racemes; bracts many flowered (*South Africa*<sup>1</sup>).

28. **Cenarrhenes** LABILL.<sup>2</sup>—Flowers regular, hermaphrodite (nearly of *Persoonia*); calyx-leaves 4, free equal deciduous. Stamens 4, inserted at base of perianth; anthers apiculate. Hypogynous glands 4, alternate with stamens. Germen sessile; ovule 1, descending orthotropous; style capitate stigmatiferous. A drupe; putamen very hard; embryo exalbuminous thick.—Glabrous trees; leaves alternate rigid-coriaceous flat nearly veinless shining; flowers in terminal and axillary spikes; bracts usually 1-flowered (*Oceania*<sup>3</sup>).

29. **Agastachys** R. BR.<sup>4</sup>—Flowers regular, hermaphrodite (nearly of *Persoonia*); perianth-leaves 4, elongated equal free, deciduous. Stamens adnate to middle of perianth; filaments short; anthers elongated muticous. Hypogynous disk 0. Germen sessile, 3-gonous; ovule 1, descending orthotropous; style slender, apex dilated subclavate compressed, 2-fid, laterally stigmatiferous. Fruit . . . ?—A glabrous shrub; leaves alternate; flowers<sup>5</sup> in numerous axillary and terminal many-flowered spikes; bracts alternate concave, 1-flowered (*Tasmania*<sup>6</sup>).

#### IV. FRANKLANDIÆ.

30. **Franklandia** R. BR.—Flowers regular, hermaphrodite. Perianth hypocrateriform; tube cylindrical, straight, persistent; limb 4-fid deciduous; lobes acute, valvate-induplicate deciduous. Stamens 4, inserted at middle of perianth; filaments flattened and elongated, and anthers elongated, adnate to tube of perianth;

<sup>1</sup> Species 1. *B. stellatifolium* L., *Spec.*, ed. 2, 177; *Mantiss.*, 332.—*B. stellulifolium* L., *Syst.*, xiii. 764.—*B. stellatum* THUNB., *Prodr. Fl. Cap.*, 31; *Fl. Cap.*, 156.—*Brabyia capensis* L., *Mantiss.*, 137.

<sup>2</sup> *Nouv. Holl.*, 36, t. 50.—R. BR., in *Trans. Linn. Soc.*, x. 158; *Prodr.*, 371; *Suppl.*, 12.—LAMK., *Dict.*, viii. 855; *Suppl.*, v. 522; *Ill.*, t. 914.—ENDL., *Gen.*, ii. 2137.—MEISSN., *Prodr.*, 328.

<sup>3</sup> Species 3: 1 Tasmanian, *C. nitida* (LABILL.,

*loc. cit.*), with obtusely dentate-serrate leaves; 2 New Caledonian, with subentire leaves (R. & GR., in *Ann. Sc. Nat.*, sér. 5, iii. 203).—BENTH. & F. MUELL., *Fl. Austral.*, v. 379.

<sup>4</sup> In *Trans. Linn. Soc.*, x. 158; *Prodr.*, 371; *Suppl.*, 11.—ENDL., *Gen.*, ii. 2136.—MEISSN., *Prodr.*, 328.

<sup>5</sup> "Yellowish."

<sup>6</sup> Species 1. *A. odorata* R. BR., *loc. cit.*—BENTH. & F. MUELL., *Fl. Austr.*, iv. 379.

cells 2, longitudinally 2-rimose. Germen long-obconical, much narrowed at base; ovule 1, hanging from nearly top of cell, orthotropous; style fusiform, long-tapering to apex; extreme apex subcapitate stigmatiferous. Nucule stipitate, girded by base of perianth, obconical; apex concave, bearing a pappus outside; embryo exalbuminous fleshy; cotyledons very short.—A glabrous shrub, covered all over with warty glands; leaves alternate, dichotomously laciniate; lobes terete-filiform; flowers 1–2-bracteate, few in axillary racemes; pedicels thick rigid short (*Australia*). See p. 394.

## V. PROTEÆ.

31. *Protea* L.—Flowers hermaphrodite; perianth elongated valvate, 2-labiate on anthesis; leaves 4–3, coherent into a tip; 1 free, reflexed or revolute. Stamens 4, opposite; filaments short; anthers basifixed linear; cells linear parallel-discrete, introrsely rimose; connective produced beyond cells into subulate or obtuse apiculus. Hypogynous squamules 4. Germen 1-celled; ovule 1, ascending subanotropous; micropyle interior extrorse; style slender subulate persistent, usually compressed at base, at apex subulate, cylindrical or geniculate-subarticulate, stigmatiferous. Nut bearded, crowned by persistent, rather hard style.—Small trees or shrubs; leaves alternate sessile or petiolate; coriaceous rigid; flowers rigid; flowers capitate; capitula terminal, globular, hemispherical, or oblong, involucreted by persistent imbricated coriaceous often coloured scales; paleæ below each flower persistent, free, or more or less connate into sheaths (*South and Tropical East Africa*). See p. 395.

32. *Leucospermum* R. Br.<sup>1</sup>—Flowers nearly of *Protea*; perianth regular, finally 2-labiate; claws 3, or more rarely 4, coherent. Stamens 4; anthers ovate or oblong, apiculate; filaments short, often broadly dilated below apex. Hypogynous squamules 4. Germen short; ovule 1, descending hemitropous, attached laterally; style deciduous, at stigmatiferous apex sometimes subulate, angular, or sulcate, sometimes long-conical or thickened clavate, more rarely

<sup>1</sup> In *Trans. Linn. Soc.*, x. 48, 95.—ENDL., 196, 198 (part.).—*Diastella* SALISB., ex. ENDL., *Gen.*, n. 2124.—MEISSN., *Prodr.*, 253, 698. *loc. cit.*—*Scolymocephalus* WEINM., *Phyt.*, iv. —*Conocarpodendron* BOERH., *Lugd.-Bat.*, ii. 292.

obliquely turbinate and truncate. Nut sessile, ventricose, smooth, 1-seeded.—Small trees or shrubs; leaves alternate, sessile, flat or involute, veined or veinless, entire or callous-dentate at apex, flowers in cylindrical (*Rochetia*<sup>1</sup>), or more frequently subglobular spikes; bracts imbricated around flowers, approximated into an involucre, rarely deciduous (*Rochetia*), more frequently fastigiata above receptacle, after anthesis unchanged deciduous (*Diastella*<sup>2</sup>), or indurated (*Conocarpodendron*), and persisting around fruit (*South and East Africa*<sup>3</sup>).

33. *Mimetes* SALISB.<sup>4</sup>—Flowers nearly of *Protea*; perianth regular. Anthers 4, apiculate. Hypogynous squamules 4. Germen sessile; ovule 1, anatropous; style filiform. Nut ventricose, smooth.—Shrubs; leaves alternate, sessile, flat or cucullate, entire or callous-dentate; flowers capitate; capitula axillary, or more rarely terminal, embraced by uppermost cucullate leaf, or more frequently surrounded by a coloured involucre; paleæ deciduous or 0<sup>5</sup> (*South Africa*<sup>6</sup>).

34. *Aulax* BERG.<sup>7</sup>—Flowers regular or subregular, dicecious. Perianth 4-leaved, in male flower linear-tubular, in female thicker, broader at base; margins introflexed. Stamens 4; anthers in female flower barren; in male longer, 2-celled, rimose. Germen sessile; in male flower barren, in female ovate; ovule 1, hemitropous, attached laterally; micropyle inferior; style tapering, in male flower

<sup>1</sup> MEISSN., *Prodr.*, 261 (sect. iii.).

<sup>2</sup> MEISSN., *loc. cit.*, 259 (sect. ii.).

<sup>3</sup> Species about 24. LAMK., *Ill.*, t. 53 (*Protea*).—L., *Spec.*, i. 93; *Mantiss.*, 191.—THUNB., *Diss.*, 38; *Fl. Cap.*, 126.—ANDR., *Bot. Repos.*, t. 17.—KNIGHT, in *Loud. Encycl.*, ed. 1, 82.—BUCK., in *Drèg. Docum.*, 85.—KL., in *Krauss. Beitr.*, 140.—A. RICH., in *Compt. Rend. Acad. Par.* (1851), i. 229; in *Ann. Sc. Nat.*, sér. 3, xv. 369; *Fl. Abyss. Tent.*, ii. 232.—WALP., *Ann.*, iii. 327.

<sup>4</sup> *Par. Lond.*, 67.—R. BR., in *Trans. Linn. Soc.*, x. 48, 103.—ENDL., *Gen.*, ii. 2125.—MEISSN., *Prodr.*, 262.—*Lepidocarpodendron* BOERH. (part.).—*Hypophyllocarpodendron* BOERH. (part.).—*Conophorus* PETIV., *Mus.*, 62 (part.).—*Scolymocephalus* HERM., *Afr.*, 20 (part.).—*Orothamnus* PAPPE, ex *Bot. Mag.*, t. 4357.

<sup>5</sup> This genus, scarcely well distinguished from

*Leucospermum*, is divided into three sections. These, which are sometimes not properly defined, are as follows:—1. *Eumimetes*, capitula axillary ovate-oblong, usually forming a hairy leafy spike; leaves flat, callous-dentate at apex. 2. *Orothamnus*, capitula solitary, terminal; receptacle very villous, with paleæ; leaves quite entire, flat. 3. *Pseudomimetes* (ENDL.), capitula terminal, of *Orothamnus* solitary, small; leaves small, patulous, or subulate-filiform.

<sup>6</sup> Species about 15. L., *Mantiss.*, 188.—THUNB., *Diss.*, 55; *Fl. Cap.*, 136 (*Protea*).—BERG., in *Act. Holm.* (1766), 324 (*Leucadendron*).—POIR., *Dict.*, Suppl., iv. 568 (*Protea*).—LAMK., *Ill.*, i. 239 (*Protea*).

<sup>7</sup> BERG., *Pl. Cap.*, 33.—R. BR., in *Trans. Linn. Soc.*, x. 48, 49.—ENDL., *Gen.*, ii. 2119.—MEISSN., *Prodr.*, 211.—*Conophorus* PETIV., *Gazoph.*, iii. 458 (part.).—*Scolymocephalus* HERM., *loc. cit.* (part.).

much compressed, in female laterally 2-labiate, stigmatiferous. Nut exserted, bearded, 1-seeded.—Glabrous shrubs; leaves alternate; male flowers in naked, slender, terminal racemes; female capitate, involucred by subulate or leaf-like scales, and often surrounded by short 1-flowered twigs (*South Africa*<sup>1</sup>).

35? *Dilobeia* DUP.-TH.<sup>2</sup>—Flowers regular, dioecious. Male flower: Perianth 4-leaved; leaves acute, valvate. Stamens 4; hypogynous filaments short, erect; anthers oblong; connective apiculate; cells 2, introrse rimose. Germen free barren; style linear compressed, longitudinally grooved. Female flowers and fruit unknown.—A lofty tree; leaves alternate, petiolate, long-cordate, narrowed at base, 3-ribbed, veined, coriaceous-glabrous; midrib prolonged between 2 lobes into a terminal gland; flowers crowded on branching spikes in axils of leaves of upper branches; bracts 1-flowered (*Madagascar*<sup>3</sup>).

36. *Leucadendron* HERM.<sup>4</sup>—Flowers regular, dioecious; perianth-leaves 4, free or connate at very base. Anthers 4; in female flower either linear gland-like, or with 2 sterile cells; in male flower polleniferous, introrse 2-rimose. Hypogynous squamules 4. Germen often compressed-3-gonous; ovule 1, hemitropous or anatropous, ascending; style slender, subclavate or obliquely capitate, stigmatiferous. Nut wingless or samaroid, 1-seeded.—Trees or shrubs; leaves sessile or petiolate, simple, entire, often heteromorphous (often silky); flowers terminal capitate; involucre pluri- or 1-seriate; bracts leafy, or more rarely coloured, often finally subligneous in fruit, subconnate at base (*South Africa*<sup>5</sup>).

37. *Nivenia* R. BR.<sup>6</sup>—Flowers regular, hermaphrodite; perianth-

<sup>1</sup> Species 2. L., *Spec.*, ed. 1, 91 (*Leucadendron*).—THUNB., *Diss.*, 43, 46; *Fl. Cap.*, 128 (*Protea*).—L. FIL., *Suppl.*, 118.—BURM., *Afr.*, 193, t. 70, fig. 3 (*Protea*).—LAMK., *Ill.*, i. 237.—POIR., *Dict.*, *Suppl.*, v. 650 (*Protea*).—ANDR., *Bot. Repos.*, t. 243 (*Protea*).

<sup>2</sup> *Gen. Nov. Madag.*, 21.—ENDL., *Gen.*, n. 6846.—H. BN., in *Adansonia*, ix. 243.

<sup>3</sup> Species 1 or 2. R&S., *Syst.*, iii. 476, n. 580.

<sup>4</sup> Ex FLUKEN., *Phyt.*, t. 200, fig. 1.—R. BR., in *Trans. Linn. Soc.*, x. 48, 50.—ENDL., *Gen.*, n. 2120.—MEISSN., *Prodr.*, 212, 698.—*Leuca-*

*dendros* HERM., *Cat. Pluk.*—*Conocarpus* ADANS., *Fam. des Pl.*, ii. 284.—*Argyrodendron* COMM., *Hort.*, ii. 51, t. 26.—*Gissonia* SALISB., *Par. Lond.*, t. 57.—*Chasme* SALISB., *loc. cit.*—*Euryspermum* SALISB., *loc. cit.*, t. 75.

<sup>5</sup> Species about 60. L., *Mantiss.*, 194 (*Protea*).—THUNB., *Fl. Cap.*, 130 (*Protea*).—BERG., in *Act. Holm.* (1766), 324 (*Protea*).—LAMK., *Ill.*, i. 234.—POIR., *Dict.*, *Suppl.*, iv. 455 (*Protea*).

<sup>6</sup> In *Trans. Linn. Soc.*, x. 48, 133.—ENDL., *Gen.*, n. 2127.—MEISSN., *Prodr.*, 299, 698.—*Paranomus* SALISB., *Par. Lond.*, 67.

leaves dilated at antheriferous apex, deciduous. Anthers 4, subsessile.<sup>1</sup> Hypogynous squamules 4. Germen sessile; ovule 1, ascending, anatropous; style articulated, at base deciduous; apex subclavate, sulcate, vertically stigmatiferous. Nut sessile, ventricose, 1-seeded.—Erect shrubs; leaves alternate, coriaceous, partite or entire; flowers in terminal, cylindrical, or capituliform spikes; bracts 1-flowered, or more frequently 4-flowered; flowers of each capitulum involucrate (*South Africa*<sup>2</sup>).

38. **Sorocephalus** R. BR.<sup>3</sup>—Flowers of *Nivenia*. Nut shortly stipitate or emarginate at base, ventricose, 1-seeded.—Erect shrubs; leaves alternate rigid, linear or flat, entire or inferior 2-pinnatifid; flowers capitate, capitula 1–6-flowered, collected into capitate terminal spikes; involucre of each capitulum 3–6-leaved imbricate, unchanged in fruiting<sup>4</sup> (*South Africa*<sup>5</sup>).

39. **Serruria** SALISB.<sup>6</sup>—Flowers (nearly of *Nivenia*) regular or slightly irregular, hermaphrodite. Perianth tubular; leaves 4, free, dilated at antheriferous apex. Anthers 4, subsessile, muticous, or shortly apiculate. Hypogynous squamules 4, often minute. Germen subsessile; ovules anatropous, ascending, attached laterally; style slender, deciduous; apex clavate or cylindrical, sulcate, vertically stigmatiferous. Nut shortly stipitate, ovate, or ventricose, bearded or nearly glabrous, sometimes beaked by style; 1-seeded.—Shrubs, with aspect of *Petrophila*; leaves alternate;<sup>7</sup> flowers capitate; capitula terminal or pedunculate in highest axils; solitary corymbose, or more frequently collected into a compound capitulum, involucrate, or more rarely naked (*South Africa*<sup>8</sup>).

<sup>1</sup> Shortly apiculate.

<sup>2</sup> Species about 12. L., *Suppl.*, 116 (*Protea*).—THUNB., *Diss.*, n. 12; *Fl. Cap.*, 125 (*Protea*).—LAMK., *Ill.*, i. 511.—POIR., *Dict.*, *Suppl.*, v. 663 (*Protea*).—RGM. & SCH., *Syst.*, iii. 388.

<sup>3</sup> In *Trans. Linn. Soc.*, x. 48, 139.—ENDL., *Gen.*, n. 2128.—MEISSN., *Prodr.*, 303.—*Sorranthe* SALISB., *loc. cit.*—*Spatalla* SALISB., *loc. cit.*, 67 (part.).

<sup>4</sup> This genus is scarcely well distinguished from *Nivenia*, whereof it is perhaps to be considered as a section (P). It is divided into two sections, thus:—1. *Mischocaryon* (ENDL.), spike nearly naked; partial involucre 1–3-flowered; nut shortly stipitate; leaves filiform, entire. 2. *Cardiocaryon* (ENDL.), spikes sub-

involucrate; involucre 4–6-flowered; nut emarginate at base; leaves flat or filiform, lowest rarely 2-pinnatifid.

<sup>5</sup> Species 22. THUNB., *Diss.*, t. 3, 5 (*Protea*).—ANDR., *Bot. Repos.*, t. 527 (*Protea*).—POIR., *Dict.*, *Suppl.*, iv. 576 (*Protea*).—SPRENG., *Syst.*, i. 470.—RGM. & SCH., *Syst.*, iii. 389.

<sup>6</sup> *Par. Lond.*, 67.—R. BR., in *Trans. Linn. Soc.*, x. 48, 112.—ENDL., *Gen.*, n. 2126.—MEISSN., *Prodr.*, 283, 698.—*Serraria* BURM., *Afr.*, 264.—*Holderlinia* NECK., *Elem.*, i. 106 (part.).

<sup>7</sup> Entire, or 2, 3-fid.

<sup>8</sup> Species about 55. THUNB., *Fl. Cap.*, 121 (*Protea*).—L., *Spec.*, ed. 1, 93 (*Protea*).—LAMK., *Dict.*, v. 658 (*Protea*).—POIR., *Dict.*,



40. *Petrophila* R. BR.<sup>1</sup>—Flowers nearly of *Nivenia*; hypogynous squamules 0. Germen sessile; ovule 1, laterally inserted, hemitropous or descending suborthotropous; style slender; persistent at base; fusiform at apex, or thickened below apex, and constricted articulate at middle; hispidulous all over, or at apex. Nutlet winged or wingless, compressed, pilose on belly, base, or margin; 1-seeded.—Shrubs; leaves alternate, terete-filiform, rarely flat; flowers<sup>2</sup> capitate; capitula axillary and terminal, globose or ovoid, rarely cylindrical; bracts indurated, persistent, free or connate<sup>3</sup> (*Australia*<sup>4</sup>).

41. *Isopogon* R. BR.<sup>5</sup>—Flowers nearly of *Petrophila*; style slender, cylindrical, or fusiform, continuous or dilated below apex, usually constricted articulate at middle, sometimes glabrous, sometimes puberulous on lower joint. Nut sessile, wingless, hairy all over, 1-seeded.—Shrubs; leaves alternate, rigid, terete or flat; flowers capitate; capitula strobiliform, terminal, or axillary; highest leaves approximated subverticillate, involucreting capitula<sup>6</sup> (*Australia*<sup>7</sup>).

42. *Spatalla* SALISB.<sup>8</sup>—Flowers irregular, hermaphrodite; perianth-leaves 4, unequal deciduous, dilated at antheriferous apex; upper leaf usually largest. Stamens 4; filaments short; anthers

Suppl., iv. 570 (*Protea*).—ANDE., *Bot. Repos.*, t. 264, 349, 447, 507, 512.—RGM. & SCH., *Syst.*, iii. 375.—LOUD., *Encycl.*, ed. 1, 82.

<sup>1</sup> In *Trans. Linn. Soc.*, x. 48, 67; *Prodr.*, 363; Suppl., 1.—ENDL., *Gen.*, n. 2121.—MEISSN., *Prodr.*, 267.—*Petrophile* KN. & SALISB., *Prot.*, 92.—*Atylus* SALISB. (part.).

<sup>2</sup> White or yellow, often silky-villous.

<sup>3</sup> Sections 4, according to ENDLICHER, viz. :—1. *Arthrostigma*, stigma articulate; nut comose inside and on narrowed margins; fruit distinct from scales. 2. *Petrophile*, stigma not articulate; nut and scales as in *Arthrostigma*. 3. *Symphylepis*, stigma not articulate; fruits samaroid; scales connate. 4. *Xerostole*, stigma not articulate; fruits samaroid; scales distinct.

<sup>4</sup> Species about 50. LINDL., *Swan Riv.*, *App.*, 35.—MEISSN., in *Pl. Preiss.*, i. 495; ii. 246; in *Hook. Journ.* (1855), 67.—KIPP., in *Hook. Journ.* (1855), 67.—F. MUELL., *Fragm.*, vi. 242, 255.—BENTH. & F. MUELL., *Fl. Austr.*, v. 319.

<sup>5</sup> In *Trans. Linn. Soc.*, x. 48, 70; *Prodr.*, 365; Suppl., 7.—KN. & SALISB., *Prot.*, 93.—ENDL., *Gen.*, n. 2122.—MEISSN., *Prodr.*, 276.—*Atylus* SALISB., *loc. cit.* (part.).

<sup>6</sup> A genus very near *Petrophila*. F. MUELLER has admirably distinguished these genera nearly as follows (*Fragm.*, vi. 246). Calyx often parted into sepals in *Petrophila*, never in *Isopogon*. Tube wholly deciduous in *Petrophila*, persisting nearly to maturity in *Isopogon*. Bracts growing woody in *Petrophila*, not in *Isopogon*. Fruit compressed ciliate in *Petrophila*, equally turgescerent, villous at base and all over in *Isopogon*. Base of style slender and breaking off in *Isopogon*, strong persistent in *Petrophila*. Pericarp of *Isopogon* membranous, of *Petrophila* crustaceous or cartilaginous. Cotyledons broader in *Petrophila*, in *Isopogon* longer and ovate or elliptical.

<sup>7</sup> Species about 30. LINDL., in *Bot. Reg.* (1842), *Misc. Not.*, 39; *Swan Riv.*, 34.—MEISSN., in *Pl. Preiss.*, i. 504; in *Hook. Journ.* (1852), 182; (1855), 69.—F. MUELL., *Fragm.*, vi. 236.—BENTH. & F. MUELL., *Fl. Austr.*, v. 336.

<sup>8</sup> *Par. Lond.*, 67 (part.).—R. BR., in *Trans. Linn. Soc.*, x. 48, 143.—ENDL., *Gen.*, n. 2129.—MEISSN., *Prodr.*, 306.

ovate, apiculate; posterior usually largest. Germen subsessile; ovule 1, ascending anatropous; style slender, deciduous, obliquely dilated at stigmatiferous apex. Nut shortly stipitate.—Heath-like shrubs; leaves alternate, filiform; flowers in terminal spikes or racemes; pedicels 1-4-flowered, involucrate; perianth-leaves usually unequal, and connate into two lips; superior lip (of 1 leaf), usually larger entire; inferior (of 3 leaves) 3-toothed or 3-fid; middle lobe usually narrowest<sup>1</sup> (*South Africa*<sup>2</sup>).

43. *Adenanthos* LABILL.<sup>3</sup>—Flowers regular or subregular; perianth-leaves 4, elongated, straight or curved, finally falling by circumscission above base. Anthers 4, subsessile. Hypogynous scales 4, adnate to persistent base of perianth, only free at flattened acute apex. Germen sessile; ovule 1, descending anatropous; style slender, articulated at base, longer than perianth;<sup>4</sup> apex cylindrical or subclavate, vertically stigmatiferous. Nut sessile, ventricose, 1-seeded.—Shrubs; leaves alternate, entire or toothed, or partite at apex; lobes often possessing a callus or gland at apex; flowers pedunculate, axillary solitary, or terminal subumbellate; involucre of 3-8 imbricated leaves below perianth (*Australia*<sup>5</sup>).

## VI. STIRLINGIÆ.

44. *Stirlingia* ENDL.—Flowers regular, hermaphrodite or polygamous. Perianth-leaves 4, at apex spreading reflexed. Stamens 4, inserted above middle of perianth; filaments short, geniculate below apex; anthers finally exerted, 2-celled introrse rimose, at first coherent, later free. Germen (in male flower rudimentary or barren) sessile; ovule 1, ascending anatropous; style slender glabrous at apex dilated stigmatiferous. Nut obconical hairy 1-seeded.—Shrubs or undershrubs; leaves repeatedly dichotomous; petioles dilated at base; flowers capitate; capitula pedunculate solitary or more fre-

<sup>1</sup> Sections 2, according to ENDL. (*loc. cit.*), viz.:—1. *Coilostigma*, perianth unequal; stigma concave, cochleariform; involucre 1-flowered.—2. *Cyrtostigma*, perianth scarcely unequal; stigma slightly convex; involucre many-flowered.

<sup>2</sup> Species 17. L., *Spec.*, ed. 1, 91 (*Leucadendron*)?.—THUNB., *Fl. Cap.*, 127 (*Protea*).—POIR., *Dict.*, Suppl., iv. 577 (*Protea*).—RGM. & SCH., *Syst.*, iii. 392.

<sup>3</sup> *Novv.-Holl.*, i. 28, t. 36-38.—R. BR., in *Trans. Linn. Soc.*, x. 48, 151; *Prodr.*, 367; Suppl., 9.—ENDL., *Gen.*, n. 2130.—MEISSN., *Prodr.*, 310.

<sup>4</sup> Flower bowed or plicate.

<sup>5</sup> Species about 15. LEMH., *Pl. Preiss.*, i. 512, ii. 148.—LENDL., *Swan Riv.*, n. 182.—MEISSN., in *Pl. Preiss.*, i. 512; ii. 148; in *Hook. Journ.* (1852), 183.—F. MUELL., *Fragm.*, vi. 204.—BENTH. & F. MUELL., *Fl. Austr.*, v. 350.

quently racemose; involucre small or 0; bracts 1-flowered (*Australia*). See p. 397.

45. **Conospermum** SM.—Flowers hermaphrodite, regular or irregular; perianth tubular or gibbous behind (*Isomerium*); limb equally 4-partite (*Chilurus*, *Isomerium*), or more frequently 2-labiate, with posterior lobe fornicate or subgaleate, and 3 anterior connate into a 3-fid lip. Stamens 4; filaments short, inserted at base of limb; anthers dissimilar; cells of anterior 2 abortive sterile; cells of posterior 2 fertile; cells of both lateral stamens dissimilar; anterior cell sterile, posterior fertile, and coherent with adjacent cell of posterior anther to form a spurious cell in the bud, finally separating. Germen free, horizontally truncate; ovule 1, descending orthotropous; apex of style obliquely dilated stigmatiferous. Nut pappose 1-seeded.—Shrubs; leaves alternate entire, flat or terete; flowers in spicate or capitate inflorescences; inflorescences axillary or terminal, simple or branched, or corymbose; bracts 1-flowered persistent (*Australia*). See p. 397.

46. **Synaphea** R. BR.—Flowers irregular (nearly of *Conospermum*) resupinate; posterior perianth-leaf broader; posterior stamen and posterior cell of lateral stamens sterile. Germen of *Conospermum*; ovule descending orthotropous; style sometimes adnate to sterile anther, sometimes acute or 2-horned. Nut pappose.—Shrubs; leaves alternate, entire or incised-lobed; petiole half-sheathing at base; flowers axillary or terminal, simple or branched; bracts 1-flowered cucullate persistent (*South Australia*). See p. 399.

## X. LAURACEÆ.

### I. CINNAMON SERIES.

The study of this order may be commenced by the analysis of the

*Cinnamomum zeylanicum.*



FIG. 240.—Floriferous branch ( $\frac{1}{3}$ ).

Ceylon Cinnamon-tree (figs. 240–243), the type of the genus *Cinnamomum*.<sup>1</sup> The flowers of *C. zeylanicum*<sup>2</sup> are regular and hermaphrodite.

<sup>1</sup> BURM., *Fl. Zeyl.*, 62.—NEES, *Laur. Disp. Progr.*, 11; *Systema Laurinarum*, 31.—ENDL., *Gen.*, n. 2023.—MEISSN., in DC. *Prodr.*, xv. sect. i, 9, 503 (incl.: *Camphora* NEES, *Cecido-*

*daphne* NEES, *Malabathrum* BURM., *Parthenoxylon* BL.).

<sup>2</sup> BREYN., in *Eph. Nat. Cur.*, dec. 1, ann. 4, 139.—NEES, in *Wall. Pl. Asiat. Rar.*, ii. 74.—

The receptacle forms a pretty deep cup, on whose edges are inserted a perigynous perianth and androceum, and which contains the gynæceum in its cavity. The perianth is double: the three outer leaves or sepals are free and equal, coloured, and valvate in the bud. The three inner leaves, alternate with these, form a regular verticil,

*Cinnamomum zeylanicum.*

FIG. 241.  
Flower ( $\frac{2}{3}$ ).

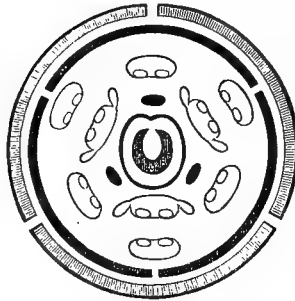


FIG. 242.  
Diagram.



FIG. 243.  
Long. section of flower.

which must be considered a corolla,<sup>1</sup> also of valvate præfloration (fig. 242). The androceum consists of four verticils also trimerous, counting as follows from without inwards: first three oppositisepalous stamens, each consisting of a free filament flattened at the base, and dilated above into a compressed connective which bears on its inner face two pairs of cells, one above the other. Each cell opens by a valve that rises to set free the pollen<sup>2</sup> (figs. 241, 243). Next come three stamens similar to these and alternating with them; then three more differing from the preceding, in that their anther-cells are extrorse or submarginal, while on either side of the base of the filament is a large stipitate gland; and fourthly come three sterile

MEISSN., *Prodr.*, n. 10.—*Cinnamomum* BURM., *Zeyl.*, 62, t. 27.—*C. zeylanicum vulgare* HAYNE, *Arzn.*, 12, t. 20.—*C. zeylanicum cordifolium* HAYNE, *loc. cit.*, t. 21.—*Cassia cinnamomea* HERM., *Lugd.-Bat.*, 129, t. 655, 656.—*Cassia lignea* HERM., *loc. cit.*—*Laurus Cinnamomum* L., *Spec.*, 528.—*L. Cassia* BURM., *Fl. Ind.*, 91.—*L. Malabathrum* WALL., *Cat.*, n. 2583 A (part.).—*Persea Cinnamomum* SPRENG., *Syst.*, ii. 567.

<sup>1</sup> Because they appear simultaneously in the bud, not one after another, like the leaves of the outer whorl. Here their consistency and colour

can decide nothing. PAYER (*Organog. Comp.*, 471, t. 96) observes this:—"Their simultaneous appearance on the receptacle shows clearly that they are petals, not sepals as A. L. DE JUSSIEU thought. ADANSON, who so clearly recognised (*Fam. des Pl.*, ii. 426) the axile nature of the rim of the cup that bears the sepals, also describes this inner whorl of the floral envelopes as a corolla."

<sup>2</sup> The pollen of the true *Lauraceæ* usually consists of large spherical grains free from pores and folds.

anthers superposed to the petals, containing no pollen in their anthers, which are transformed into a large glandular mass. The gynæceum, formed of a single carpel,<sup>1</sup> consists of a free ovary surmounted by a nearly central style,<sup>2</sup> whose apex is dilated into a stigmatiferous head. Within the single cell of the ovary is seen a parietal placenta, superposed to a petal (fig. 242), and giving insertion near the top to a single descending anatropous ovule, whose micropyle looks upwards and towards the placenta.<sup>3</sup> The fruit is a berry,<sup>4</sup> the base of which is surrounded by the persistent receptacle and perianth; the enclosed seed contains within its coats<sup>5</sup> a large exalbuminous embryo, with fleshy concavo-convex cotyledons, and a straight superior radicle.<sup>6</sup> The Ceylon Cinnamon-tree is an aromatic tree, whose opposite petiolate exstipulate leaves have a thick entire blade, penniveined, three-ribbed at the base. Its flowers form ramified racemes<sup>7</sup> of biparous cymes at the ends of the branches. Each flower is axillary to a bract, and its pedicel bears two opposite lateral fertile bracts (fig. 240).

In certain species of *Cinnamomum* the leaves are alternate. This is the case with the Camphor-plant of Japan (fig. 244), which has been considered the type of a distinct genus, under the name *Camphora*<sup>8</sup> *officinarum*.<sup>9</sup> In this the leaf-buds are protected by rigid imbricated scales, and the perianth, separating circularly at its base during the ripening of the fruit, leaves the base of the latter

<sup>1</sup> MEISSNER (*Prodr.*, 2) holds that the gynæceum of the *Lauraceæ* is primitively composed of three carpellary leaves:—"Pistils 2, 3, intimately connate into 1; ovary formed of 2, 3, valvately connate . . . ; placentas 2, 3, parietal rib-like, except the fertile one." Observations on its development have overthrown this theory.

<sup>2</sup> It is traversed by a longitudinal groove on the placental side, continued in many *Lauraceæ* up to the dilated stigmatiferous end, which it notches. This groove ends in a rather broad pit near the top of the ovary, where the placenta ends a little above the insertion of the ovule.

<sup>3</sup> It has two coats.

<sup>4</sup> The walls are thin, not very fleshy, and dry up early. Many other *Lauraceæ* have these stoneless fruits, with a thin scarcely fleshy pericarp, and often described as *bacca sicca* or *exsucca* (*dry or juiceless berries*).

<sup>5</sup> These are thin; three layers can, however, be distinguished—viz., a soft cellular external

coat, whitish in the fresh seed; a thin brittle testa, and a tender brown membrane. Here, as in many other *Lauraceæ*, the teguments are often spotted or "chiné" with dark purple.

<sup>6</sup> The radicle cannot be seen from the outside of the embryo. The two cotyledons descend a good way below the insertion on the tigellum, each forming a half sheath, thus completely enclosing the radicle, and even prolonged below its tip. The whole of the embryo is sprinkled with reservoirs of essential oil.

<sup>7</sup> Their divisions are opposite, decussate, like those of the stem and the leaves.

<sup>8</sup> NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 72; *Syst.*, 87.—ENDEL., *Gen.*, ii. 2024.

<sup>9</sup> C. BAUH., *Pin.*, 500.—*Laurus camphorifera* KEMPF., *Amœn.*, 770.—*L. Camphora* L., *Mat. Med.*, 107.—*Persea Camphora* SPRENG., *Syst.*, ii. 268.—*Cinnamomum Camphora* NEES & EBERM., *Med. Ph. Bot.*, ii. 430; *Pl. Off.*, t. 127.—MEISSN., *Prodr.*, n. 44.

surrounded only by a cupule formed by the hardened persistent receptacle.<sup>1</sup>

*Cinnamomum Camphora.*



FIG. 241.  
Flowering branch ( $\frac{1}{2}$ ).

The genus *Cinnamomum* consists of fine trees or shrubs, all natives of tropical and subtropical Asia. Their foliage is persistent. Their flowers are small, yellowish-green or whitish. A very large number<sup>2</sup> of species have been described, which may be reduced to about fifty.

<sup>1</sup> These two last characters alone distinguish the section *Camphora* from the section *Mala-bathrum*, which also contains some species with alternate leaves. In the latter section the upper part alone of the perianth comes off at a certain age, so that the receptacular cupule remains crowned by six truncate teeth. Its leaf-buds are naked, or only protected by quite rudimentary scales. The section *Camphora* includes, besides the true Camphor-plants, *Cecidodaphne* (NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61; *Syst.*, 202;—ENDL., *Gen.*, n. 2035), *Parthenoxylon* (BL., *Mus. Lugd.-Bat.*, i. 322;—MIQ., *Fl.*

*Ind.-Bat.*, i. 916), which differ in no absolute character.

<sup>2</sup> GÆRTN., *Fruct.*, ii. (1791), t. 92 (*Laurus*).—JACQ., *Collect.*, iv. t. 3.—BL., *Bijdr.*, 570; *Rumphia*, 25, t. 10-21.—HOOK., *Exot. Fl.*, t. 126.—DON, *Prodr. Fl. Nepal.*, 66.—SIEB. & ZUCC., in *Abh. d. Münch. Akad.*, iv. 3, 202.—MIQ., *Analect.*, iii. 14; *Fl. Ind.-Bat.*, i. 895.—WIGHT, *Icon.*, t. 125, 131.—THW., *Enum. Pl. Zeyl.*, 253.—BENTH. & F. MUELL., *Fl. Austr.*, v. 303. In these species the leaves are sometimes opposite, sometimes alternate.

Next to *Cinnamomum* come five other genera, which have the same flower, and only differ in characters of very slight value, such as the nervation of the leaves, the disproportion of the two whorls of the perianth, and the behaviour of the perianth floral receptacle and pedicel after anthesis. These are *Phæbe*, *Machilus*, *Alseodaphne*, *Persea*, and *Nothaphæbe*. In the genus *Phæbe*, consisting of trees from both Worlds, the whole perianth persists around the fruit, becoming dry and indurated, especially at the base, which is continuous with the slightly swollen top of the pedicel. The perianth of *Machilus* is also persistent, its divisions are more or less reflexed near their non-indurated apex, and the pedicel is not thickened. The leaves are penniveined. *Alseodaphne* has a deciduous perianth; so that below the fruit we only find the ill-developed receptacle surmounting a large swollen club-shaped pedicel, more or less fleshy and sprinkled with glands on the surface. In the Avocado (*Persea*; Fr., *Avocatier*) the perianth persists nearly always, though not constantly, sometimes coming off with the receptacle itself. The pedicel is thickened more or less, but never so much as in *Alseodaphne*; and the three inner divisions of the perianth are very often larger than the outer ones. This disproportion between the sepals and petals is still more marked in *Nothaphæbe*, in certain species of which the former almost disappear. The pedicel is slightly thickened, and the perianth persists, without enlarging around the base of the fruit. It will be evident, from the slight importance of these characters, that we have here a very natural group, and that to make its study possible by subdivision, we are compelled to use other than well-marked features.

*Apollonias*, whose flowers have the same organization as in *Cinnamomum*, is easily distinguished by its anthers possessing only two cells instead of four. The same number is also found in the three genera *Hufelandia*, *Nesodaphne*, and *Haasia*, which differ from *Apollonia* only in such characters as distinguish the other genera with quadrilocular anthers from *Cinnamomum*. In *Beilschmidia* the ovary presents a new peculiarity: it is incompletely divided by a false septum into two cavities.

In this series we also place two exceptional genera, *Aiouea* and *Potameia*. The former has two-celled stamens, as in the preceding genera; but the perianth is short in proportion to the receptacle;



and this last is elongated, and forms a large cornet, in the bottom of which is at first hidden the gynæceum. The fruit is however naked, for the perianth comes away with the upper part of the receptacle in a circular piece after anthesis, and the pedicel swells into a fleshy glanduliferous mass, as in *Alseodaphne* (fig. 245).

The genus *Potameia*<sup>1</sup> was formerly ill-known, and wrongly referred to *Proteaceæ*,<sup>2</sup> no doubt because of its quaternary perianth and androceum. Only one species is known,<sup>3</sup> a native of Madagascar. Its fruit is naked, on a non-acrescent pedicel as in *Machilus*; but its flower is constructed on a binary type. On the rim of the shallow concave receptacle are inserted two sepals, opposite each other; next come, more internally, two other leaves, which resemble the former in size and colour, and represent the corolla. The androceum consists of four stamens superposed to the perianth-leaves, all introrse two-celled, with their filaments much dilated and as it were petaloid below. Two other stamens, each accompanied by two lateral glands at the base, form a third whorl; but these remain sterile. Those of the fourth whorl are nearly always absent, or are only represented by very short sterile scales.

*Ajouea tenella.*



FIG. 245.  
Fruit.

## II. CRYPTOCARYA SERIES.

*Cryptocarya*<sup>4</sup> has hermaphrodite flowers, formed like those of *Cinnamomum*, if we look only at the upper part, possessing the same perianth and the same androceum of twelve stamens, the three innermost sterile, the others fertile (viz., six exterior introrse, and three interior extrorse, and possessing two basilar lateral glands); but their anthers are two-celled, and the floral receptacle is much deeper, forming a thick-walled pouch, in the bottom of which is inserted the gynæceum. And as this last, which in other respects

<sup>1</sup> DUP.-TH., *Gen. Nov. Madag.*, 16.—ENDL., *Gen.*, 340; Suppl., iv. p. ii. 81.—MEISSN., in DC. *Prodr.*, xiv. 328.—H. BN., in *Adansonia*, ix. 241.

<sup>2</sup> See p. 400.

<sup>3</sup> P. *Thouarsii* RCM. & SCH., *Syst.*, iii. 476.

—*Cansjera madagascariensis* SPRENG., *Syst.*, i. 453.

<sup>4</sup> R. BR., *Prodr. Nov.-Holl.*, 402.—NEES, *Syst.*, 192, 205, 222, 675.—ENDL., *Gen.*, n. 2036.—MEISSN., *Prodr.*, 68, 507.

resembles that of *Cinnamomum*, becomes transformed into the one-seeded fruit, the receptacle goes on increasing in height and thickness, so as to envelope the whole fruit. On top thereof (fig. 246) is seen a narrow opening: this is surrounded by the scars of the perianth in *Cryptocarya*; but the perianth persists to the last in *Cyanodaphne*,<sup>1</sup> of which some have made a separate genus. Or again the accrescent receptacle is closely applied and almost adnate to the pericarp, as we find in *Caryodaphne*,<sup>2</sup> similarly made by some a distinct genus, and reduced by us to a section of the genus *Cryptocarya*. Thus constituted,<sup>3</sup> this genus consists of trees and shrubs, with their leaves alternate, and their flowers in ramified axillary and terminal racemes of cymes. They inhabit nearly all tropical regions. Of the forty-three known species,<sup>4</sup> five or six are American.

*Cryptocarya*  
*infectoria*.



FIG. 246.  
Fruit ( $\frac{3}{2}$ ).

*Boldu*<sup>5</sup> has altogether the flowers of *Cryptocarya*; the same receptacle and perianth, the same androceum, with nine of its stamens fertile and two-celled, the same gynæceum inserted in the bottom of the receptacular sac. But the last, instead of becoming thickened, as in *Cryptocarya*, remains thin, dry, and fragile. It forms a completely closed sac around the fruit, and is covered by the scars of the perianth; it breaks, however, at the least touch, and it is often the fruit itself that appears by its growth to burst it and make it fall at a variable period. Only two species of *Boldu* are known,<sup>6</sup> trees from Chili, with their leaves opposite, or nearly so, and with axillary inflorescences like those of *Cryptocarya*.

<sup>1</sup> BL., *Mus. Lugd.-Bat.*, i. 333.—MEISSN., *Prodr.*, 76.

<sup>2</sup> BL., ex NEES, *Syst.*, 925.—ENDL., *Gen.*, n. 2037.—MEISSN., *Prodr.*, 77.

<sup>3</sup> *Cryptocarya*:

Sect. 3.  $\left\{ \begin{array}{l} 1. \textit{Eucryptocarya.} \\ 2. \textit{Cyanodaphne.} \\ 3. \textit{Caryodaphne.} \end{array} \right.$

<sup>4</sup> WALL., *Pl. As. Rav.*, ii. 61, 69.—ZOLL., *Verz.*, 113.—E. MEX., in *Pl. Geogr.*, 77, 99, 176.—BL., *Bijdr.*, 556, 557; *Mus. Lugd.-Bat.*, i. 333, 334; *Rumphia*, i. t. 46 (*Dehaasia*).—MIQ., *Fl. Ind.-Bat.*, i. 920, 925, 926.—THW., *Enum. Pl. Zeyl.*, 254.—A. BRAUN., in *Verh.*

*des Ver. z. Bef. d. Gartenb. in Preuss.*, xxi. 11 (*Caryodaphne*).—HOOK., *Journ.*, iv. 418.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 163, t. 56.—BENTH. & F. MUELL., *Fl. Austr.*, v. 234.—WALP., *Ann.*, i. 576 (*Oreodaphne*).

<sup>5</sup> FEUILL., *Hist.*, 11, t. 6.—NEES, *Syst.*, 122, 177.—ENDL., *Gen.*, n. 2039.—MEISSN., *Prodr.*, 67, 506.—*Bellota* C. GAY, *Fl. Chil.*, v. 298, t. 59.

<sup>6</sup> The best known is the *Boldu*, *Bellota* or *Ulmo* of the Chilians, *B. chilianum* NEES (*Syst.*, 178, 672;—*Boldu arbor olivifera* FEUILL.;—*Boldus chilensis* MOLIN., *Chil.*, 158;—*Laurus Belloto* MIERS;—*Adenostemum nitidum* BERT. (nec PERS.).—*Bellota Miersii* C. GAY.)

*Ravensara*<sup>1</sup> (figs. 247, 248) has also the flower<sup>2</sup> of *Cryptocarya*, with a receptacle that becomes thick and woody and closely surrounds the fruit, which it encloses completely. But this receptacle presents a most remarkable peculiarity. While the fruit is enlarging inside, six false septa, springing from the inner wall of the receptacular pouch,<sup>3</sup> grow in towards the centre, where they finally unite. The pericarp, seed-coats, and even the embryo itself, penetrated and pushed

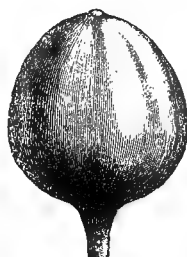


FIG. 247.  
Fruit.

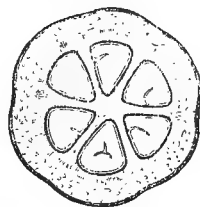


FIG. 248.  
Transverse section of fruit.

from without inwards by these, are so deformed as to be divided into six lobes nearly all the way up. It is only at the apex that the septa do not unite,<sup>4</sup> thus leaving entire the part of the seed containing the tigellum, radicle, and attachment of the cotyledons. This genus consists of trees from Madagascar, with alternate leaves and inflorescences like those of *Cryptocarya*.<sup>5</sup>

Next to these come several other genera, which, with the flower of *Cryptocarya*, have around the fruit a thickened persistent receptacle, not septate, but distinguished by the details of the form of those parts of the perianth and pedicel that persist around the pericarp. These are *Ampelodaphne*, *Aydendron*, and *Acrodiclidium*. In the two last the valves covering the anther-cells are very small, and fall early; so that the dehiscence has been thought porricidal.

The three genera *Silvia*, *Endiandra* (fig. 249), and *Dictyodaphne*

<sup>1</sup> SONNER., *Voy. Ind. Or.* (1782), ii. 101, t. 103, fig. 2.—POIR., *Dict.*, vi. 81; *Ill.*, t. 825.—H. BN., in *Adansonia*, ix. 243.—*Agathophyllum* J., *Gen.* (1789), 43].—SCHREB., *Gen.*, ed. 2, n. 1754.—NEES, *Syst.*, 192, 231.—ENDL., *Gen.*, n. 2038.—MEISSN., *Prodr.*, 109.

<sup>2</sup> The stamens are described as quadrilocellate by most authors, notably by MEISSNER. In the flowers that I have analysed, they had only two cells.

<sup>3</sup> Corresponding with the middle lines of the perianth-leaves.

<sup>4</sup> They are here obliquely truncate downwards and inwards. The septa are also wanting below,

for a very short distance corresponding with the insertion of the fruit on the base of the receptacle.

<sup>5</sup> Of the three or four known species the most famous is the *Voaravensara* of FLACOURT (*Hist. Madag.*, 125), the *Ravensara*, *Ravindzara* of the natives, or Madagascar Spice (*Epice de Madagascar*). This is *R. aromatica* LAMK. (*Dict.*, vi. 81;—PERS., *Syn.*, ii. 1;—*Evodia Ravensara* GERTN., *Fruct.*, ii. 101, t. 103;—LAMK., *Ill.*, t. 404, 825;—*Agathophyllum aromaticum* W., *Spec.*, ii. 842;—POIR., *Dict.*, Suppl., iv. 656;—BL., *Mus. Lugd.-Bat.*, i. 339;—MEISSN., *Prodr.*, 110, n. 1).

have only the three stamens of the third row; their anthers are extrorse. The outer stamens are found as scales, or little gland-like masses, in the second of these genera.

*Endiandra virens.*



FIG. 249.  
Diagram.

In *Misanteca*, too, these three stamens are alone fertile; but they are monadelphous. The outer stamens are sterile and ill-developed, and the flowers form capitula.

The Bornean genus *Bihania* has nine petaloid sterile stamens, and the three stamens of the third row fertile and extrorse; the anthers are said to have four cells instead of two.

The anthers are also four-celled in *Mespilodaphne*; but the whole nine outer stamens are fertile, as in *Oreodaphne*, and the woody sac, varying in its depth and in the height to which it surrounds the fruit, has a thick, single or double, truncate rim. *Mespilodaphne* may then be considered as *Cryptocarya*, with anthers that open by four valves.

*Ocotea fatens.*

### III. OCOTEA SERIES.



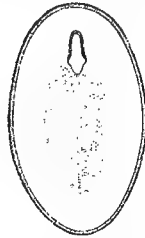
FIG. 250.  
Fruit.

*Ocotea*<sup>1</sup> (fig. 250) has nearly the floral organization of *Cinnamomum*, and is only distinguished therefrom by a set of characters that would appear of slight importance in themselves in any other order. But these characters, taken together, may be made to suffice for the foundation of an artificial series such as is especially useful in the study of so homogeneous a family as this. The concave receptacle, the perianth androceum and gynæceum, are in some species analogous to the same parts in *Cinnamomum*. But the staminodes (of the fourth whorl) are quite absent in certain species, or when not quite absent are reduced to little sessile scales. The flowers are sometimes hermaphrodite, but are more frequently, nay, nearly always,

<sup>1</sup> AUCL., *Guian.*, ii. 780.—J., *Gen.*, 80.—NEES, *Syst.*, 354, 371 (part.).—ENDL., *Gen.*, n. 2054.—*Oreodaphne* NEES, in *Linnaea*, viii. 39; xxi. 515; *Syst.*, 350, 380 (part.).—ENDL., *Gen.*, n. 2052.—MEISSN., *Prodr.*, iii. 510.—*Petalanthera* NEES, *Syst.*, 342, 347.—ENDL., *Gen.*, ii. 2046.—*Teleiandra* NEES, in *Linnaea*,

viii. 46; *Syst.*, 355.—ENDL., *Gen.*, n. 2048.—*Evonymodaphne* NEES, *Syst.*, 244, 263.—ENDL., *Gen.*, n. 2041.—*Leptodaphne* NEES, *Syst.*, 354, 359 (part.).—ENDL., *Gen.*, n. 2049.—*Adenotrachelima*, *Agriodaphne*, *Aperiphracta*, *Ceromocarpium*, *Ceramophora* NEES (ex MEISSN., *loc. cit.*).

diœcious or polygamous. The fruit is a berry, resting on the more or less decided concavity of a cupuliform receptacle with truncate edges, which never envelopes it to more than a third of its height (fig. 250). The seed is fleshy, and its embryo is exalbuminous. *Ocotea* belongs to the tropical and subtropical regions of America, excepting some species from Africa and the Canary Islands. Their leaves are opposite, usually thick, coriaceous, and penniveined. The flowers are small and numerous, collected into ramified racemes of cymes in the axils of the leaves or at the ends of the branches. About a hundred and fifty species of this genus<sup>1</sup> are known.

*Nectandra leucantha.*FIG. 251.  
Stamen (♂).*Nectandra Puchury major.*FIG. 252.  
Part of the embryo.

Next to *Ocotea* come several genera only differing in the details of the behaviour of the pedicels, receptacle, and perianth after anthesis: *Strychnodaphne*, *Camphoromœa*, and *Gymnobalanus*.

*Nectandra* (figs. 251–252), with the same floral organization, is at once distinguished by the thickness of the expanded, almost fleshy perianth, and the singular form of the stamens, whose four cells are placed in a nearly horizontal or curved row (fig. 251). *Pleurothyrium* and *Dicypellium* (of which the fertile androceum is still unknown) appear to differ from *Nectandra* in only secondary characters.

*Synandrodaphne* may be considered as *Ocotea* with the stamens coherent at the base. *Symphysodaphne* has also a monadelphous androceum, as in *Acrodichlidium* and *Misanteca*, but there are only three fertile stamens, united into a tube with the anthers at the top.

*Sassafras*<sup>2</sup> (figs. 253–255) has the general organization of *Ocotea*

<sup>1</sup> MEISSN., *Prodr.*, 112–139; in *Mart. Fl. Bras., Laurac.*, 103, t. 76–83 (*Oreodaphne*).

<sup>2</sup> BAUH., *Pin.*, 431.—RAY, *Hist.*, 1568.—

NEES, *Syst.*, 487.—ENDL., *Gen.*, n. 2056.—  
MEISSN., *Prodr.*, 170, 513.—*Evosmus* NUTT.,  
*Gen. Amer.*, i. 259.

with dicecious or polygamous flowers. The stamens are free; but the anthers of all are four-celled and introrse, and there are no interior sterile stamens. The fruit (fig. 255) is nearly naked, and its

*Sassafras officinale.*

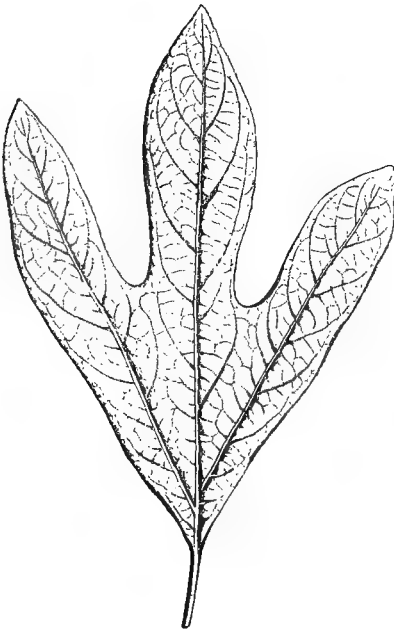


FIG. 253.  
Leaf.

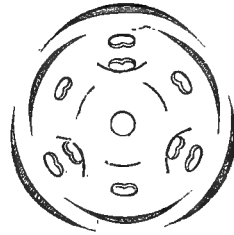


FIG. 254.  
Male flower, diagram.



FIG. 255.  
Fruit ( $\frac{2}{3}$ ).

base is surrounded by the persistent perianth and receptacle surmounting a dilated, club-shaped pedicel. The leaves (fig. 253) are caducous and three-ribbed, and polymorphous, some entire, others lobed. The inflorescences are accompanied by scaly bracts which envelope them completely when young. This genus contains but two species, of which the best known is the Sassafras-tree (*S. officinalis*<sup>1</sup>), a fine tree from North America. The genus *Sassafridium*<sup>2</sup> differs from the preceding one in its flowers being hermaphrodite, not diclinous, in its non-persistent perianth, and in its possessing

<sup>1</sup> *Sassafras officinale* NEES, *Syst.*, 488.—*Laurus Sassafras* L., *Hort. Cliff.*, 154; *Mat. Med.*, 108.—BLACKW., *Herb.*, t. 267.—NEES, *Pl. Offic.*, t. 131.—HAYNE, *Arzn.*, 12, t. 19.—

*Persea Sassafras* SPRENG., *Syst.*, ii. 270.—*Cornus mas odorata*, &c., PLUKN., *Almag.*, 222, t. 6.—CATESB., *Carol.*, i. 55, t. 55.

<sup>2</sup> MEISSN., *Prodr.*, 171.

three staminodes internal to its nine fertile stamens. Only one species is known,<sup>1</sup> from Central America.

*Gæppertia* has two-celled anthers.

#### IV. TETRANTHERA SERIES.

*Tetranthera*<sup>2</sup> (figs. 256, 257) has dicecious flowers.<sup>3</sup> The perianth has six divisions, and the androceum, sterile in the female flowers, consists of from nine to twelve stamens, inserted round the rudimentary gynæceum, which is sometimes altogether absent. These stamens open by four introrse valves.<sup>4</sup> In the female flower is a fertile gynæceum formed of a uniovulate ovary surmounted by a style, whose dilated stigmatiferous head is more or less markedly lobed.<sup>5</sup> The fruit is a one-seeded berry, supported on the shallow receptacle which alone persists at its base after the fall of the perianth. In certain species we find from twelve to fifteen or eighteen fertile stamens, or even from thirty to thirty-six. In this case, more than three (sometimes as many as six) may possess two basilar lateral glands. In other species the receptacle forms a deeper cup with truncate edges, and may be deep enough to conceal half the fruit. For these species a special genus, *Cylicodaphne*, has been created. Of the true *Tetrantheras* some ninety species are known, trees or shrubs from tropical Asia and the neighbouring parts of Oceania; and some are Australian or American. Their leaves are alternate or rarely opposite, penniveined. The flowers are united in groups of at least four to form little pedunculate umbels or capitula, protected by involucre of from four to six imbricate bracts. These little inflorescences spring

*Tetranthera glauca.*

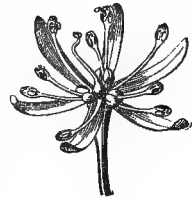


FIG. 256.  
Male flower ( $\frac{2}{3}$ ).

<sup>1</sup> *S. veraguense* MEISSN., *loc. cit.*

<sup>2</sup> JACQ., *Hort. Schœnbr.*, i. 59, t. 113. — GÆRTN., *Fruct.*, iii. 225, t. 122. — NEES, in *Wall. Pl. Asiat. Rar.*, ii. 64; *Syst.*, 508. — ENDL., *Gen.*, n. 2059. — MEISSN., *Prodr.*, 177, 514. — BENTH. & F. MUELL., *Fl. Austr.*, v. 304. — LITSÆA LAMK., *Diet.* iii. 574 (nec J.). — TOMES THUNB., *Fl. Jap.*, 190. — J., *Gen.*, 440. — SEBIFERA LOUR., *Fl. Cochinch.*, ed. Ulyssip. (1790), 637. — HEXANTHUS LOUR., *op. cit.* — FIWA GMEL., *Syst.*, 745. — BERRYIA KLEIN (nec ROXB.). — ? GLABRARIA L., *Mantiss.*, 156. — SCHREB., *Gen.*, n. 1219 (ex MEISSN.).

<sup>3</sup> They are occasionally polygamous.

<sup>4</sup> According to H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 313) the pollen is spherical, without pores or folds in *T. macrophylla*; and spherical, with some twelve non-granulated spots, in *Tomes tetranthera*, which appears to belong to this genus.

<sup>5</sup> The male and female flowers are pretty frequently constructed on the 4-type in cultivated species. This is the case with the one whose diagram is given in fig. 257, and which had eight perianth-leaves, twelve stamens, all introrse, and a sterile ovary.

singly or in variable numbers from a little axillary bud; they are more rarely united into a sort of raceme or corymb on a common leafless axis.

Next to *Tetranthera* and *Cylicodaphne* come three genera with nearly similar flowers enclosed in scaly buds. The flowers are solitary in *Dodecadenia*, numerous in *Actinodaphne* and *Litsæa*; of these last two genera the former has nine stamens, the latter from four to six.

*Tetranthera japonica.*

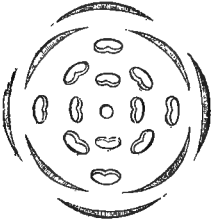


FIG. 257.

Tetramerous male flower, diagram.

*Daphnidium*, in other respects resembling *Actinodaphne*, has two-celled anthers. This is also the case in *Polyadenia*, *Aperula*, *Lindera*, and *Laurus*; but in these the flowers are surrounded, not by bud-scales, but by an involucre comparable to that of *Tetranthera*. In *Aperula*

there are from six to nine fertile stamens, and the innermost (from four to six) have lateral basilar glands. In *Polyadenia* all the stamens possess these. In *Lindera*<sup>1</sup> (the Benzoin-plants), of which an American species has long been cultivated in our gardens under the name of *Laurus Benzoin*,<sup>2</sup> the flowers (figs. 258-260) are dicecious,

*Lindera Benzoin.*

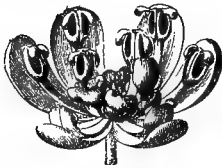


FIG. 258.

Male flower ( $\frac{2}{3}$ ).

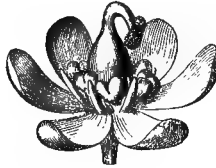


FIG. 259.

Female flower ( $\frac{2}{3}$ ).



FIG. 260.

Long. section of female flower.

with a perianth of six caducous leaves. The stamens, sterile in the female flower, are nine in number, all fertile introrse and two-celled, in the male. It is usually only the three innermost that have the

<sup>1</sup> THUNB., *Fl. Jap.*, 9, 145, t. 21.—ENDL., *Gen.*, n. 6818.—MEISSN., *Prodr.*, 243.—Benzoin NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 63; *Syst.*, 486, 493.—ENDL., *Gen.*, n. 2057.

<sup>2</sup> L., *Hort. Cliff.*, 134; *Spec.*, 1, 580.—W., *Spec.*, ii. 485.—PURSH, *Fl. Amer. Sept.*, i. 276.—*L. pseudo-Benzoin* MICHX., *Fl. Bor.-Amer.*,

i. 243.—*Evosmus Benzoin* NUTT., *Gen. Amer.*, i. 259.—Benzoin odoriferum NEES, *Syst.*, 497.—*Lindera æstivalis* BL., *Mus. Lugd.-Bat.*, i. 324.—*L. Benzoin* MEISSN., *Prodr.*, 244, n. 1.—*Arbor virginiana citræ- v. limoniifolia* COMMEL., *Hort. Amst.*, i. 189, t. 197.—PLUKN., *Almag.*, 43, t. 139, fig. 3, 4.



pair of lateral glands.<sup>1</sup> The gynæceum, rudimentary in the male flower, is otherwise similar to that of *Lauraceæ* generally. The style is dilated into a terminal stigma, often divided into two or three lobes. The fruit is a berry, surrounded at the base by a cup with entire or six-toothed edges. As many as fifteen species<sup>2</sup> of this genus have been described, trees or shrubs from Japan, tropical Asia, and North America. The leaves are alternate caducous, often not developed till after the flowers. These are arranged as in the preceding genera in a sort of umbel surrounded by an involucre of five imbricated bracts.

The true Laurels<sup>3</sup> (Fr., *Lauriers*) now comprise but two species. The better known is the Classic Laurel (*Laurier d'Apollon*; figs. 261–263). It has dioecious or polygamous flowers, with a perianth

*Laurus nobilis.*

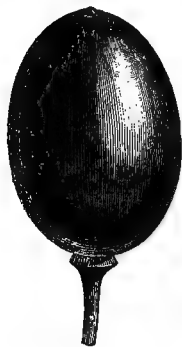


FIG. 262.  
Fruit ( $\frac{2}{3}$ ).

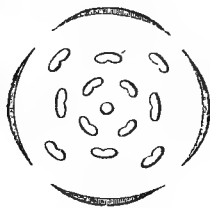


FIG. 261.  
Male flower, diagram.

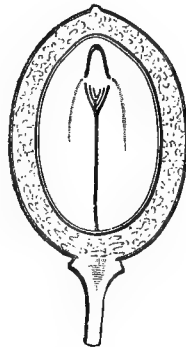


FIG. 263.  
Long. section of fruit.

of four petaloid caducous leaves.<sup>4</sup> In the male and hermaphrodite flowers are from eight to twelve stamens, all possessing a free filament and an introrse two-celled anther, whose cells open by the rising of a valve. The innermost, from four to eight in number, have two lateral glands.<sup>5</sup> In the female flowers there are usually only four

<sup>1</sup> This is exceptionally the case with the six innermost.

<sup>2</sup> WALT., *Carol.*, i. 134 (*Laurus*).—SIEB. & ZUCC., in *Abh. Münch. Acad.*, iv. p. iii. 205.—BL., *Mus. Lugd.-Bat.*, i. 324.—SIEB., *Fl. Japon.*, in *Verh. Bot. Gen.*, xii. 23 (*Sassafras*).

<sup>3</sup> *Laurus* T., *Inst.*, 597, t. 367 (nec BURM.).—ADANS., *Fam. des Pl.*, ii. 433 (part).—J., *Gen.*, 80 (part).—GÆRTN., *Fruct.*, ii. 68, t. 92,

—LAMK., *Dict.*, iii. 440, Suppl. iii.; *Ill.*, t. 321.—NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61; *Syst.*, 502, 579.—ENDL., *Gen.*, ii. 2061.—MEISSN., *Prodr.*, 233, 258, 516.

<sup>4</sup> In cultivated plants, the number of parts to the whorl varies considerably (from two or three to seven or eight).

<sup>5</sup> We have often found the following arrangement of parts in the male flower: a perianth of

stamens at the most, sterile and alternating with the perianth-leaves; the gynæceum, sterile and undeveloped in the male flower, is here formed as in most *Lauraceæ*, and contains a descending anatropous ovule<sup>1</sup> with its micropyle applied to the placenta. The fruit (figs. 262, 263) is a berry, at whose base is seen the scar left by the fallen perianth; it contains a seed with a thick fleshy oily embryo.<sup>2</sup> The Laurels are trees with persistent alternate leaves. Their flowers form small pedunculate umbels, surrounded by an involucre of several imbricated bracts and collected in variable numbers on a little common axis<sup>3</sup> axillary to a leaf. The Classic Laurel<sup>4</sup> appears to come from Asia Minor; the other species of the genus, *L. canariensis*,<sup>5</sup> inhabits the islands to the west of North Africa.

## V. CASSYTHA SERIES.

The genus *Cassyntha*<sup>6</sup> (figs. 264–268), which is the only member of this series, has its flowers hermaphrodite, or polygamous by abortion of the gynæceum. The receptacle forms a cup, shallow in this case, but much deeper in the bisexual flowers. From its bottom springs the gynæceum, while its edges give insertion to the perianth and androceum. We here find a very distinct calyx and corolla; the former consists of three little sepals with thin valvate edges; the latter of three petals (two postero-lateral and the third anterior), thick and rather fleshy, much longer than the sepals, concave internally and valvate in the bud. The androceum consists of twelve stamens in

four leaves, and an androceum of eight stamens, four superposed to the perianth-leaves and possessing glands, and four alternate exterior without glands. The pollen is globular, without pores or folds.

<sup>1</sup> With two coats.

<sup>2</sup> The radicle does not descend so low as the bases of the cotyledons, which form a sort of sheath concealing it from view from the outside (fig. 263).

<sup>3</sup> The female flowers appeared to us to be arranged on a small axillary branch, which ends in a bud and bears two lateral axes, each ending in a little group of flowers. Each of these little axes was axillary to a bract inserted near the base of the little branch. When there is only one secondary axis, the bud at the end of the primary axis appears lateral. In the male plants the general arrangement appears the same; but the secondary axes that bear the flowers

are more numerous (3–6) below the terminal bud.

<sup>4</sup> *Laurus nobilis* L., *Hort. Cliff.*, 155.—SCHKURH, *Handb.*, t. 110.—HAYNE, *Arzn.* 12, t. 18.—SIBTH., *Fl. Græc.*, t. 365.—REICHEB., *Icon.*, t. 673.—MEISSN., *Prodr.*, n. 1.—*L. vulgaris* BAUH., *Pin.*, 460.—DURHAM., *Arbr.*, t. 134, 135.—BLACKW., *Herb.*, t. 175.

<sup>5</sup> WEBB., *Phyt. Canar.*, iii. 229, t. 204 (nec W.).—MEISSN., *Prodr.*, n. 2.—*L. nobilis* CAV. (ex WEBB., nec L.).—*Persea azorica* SEUB., *Fl. Azor.*, 29, t. 6.

<sup>6</sup> L., *Gen.*, n. 505.—ADANS., *Fam. des Pl.*, ii. 284.—J., *Gen.*, 439.—GÆRTN., *Fruct.*, ii. 133, t. 122.—LAMK., *Dict.*, i. 653; *Suppl.*, ii. 131; *Ill.*, t. 323.—NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61–69; *Syst.*, 641.—ENDL., *Gen.*, n. 2067.—MEISSN., *Gen.*, 252, 516.—H. BN., in *Adansonia*, ix. 308.—*Calodium* LOUR., *Fl. Cochinch.*, 247.—*Volutella* FORSK., *Fl. Ægypt.-Arab.*, 84.

four trimerous verticils. The three innermost are reduced to sterile scales; the nine others have flattened petaloid filaments<sup>1</sup> of variable breadth, and basifixed anthers whose two cells each dehisce by a valve

*Cassytha filiformis.*



FIG. 264.  
Flower ( $\frac{1}{2}$ ).

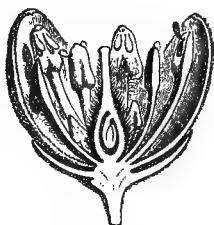


FIG. 265.  
Long. section of flower.

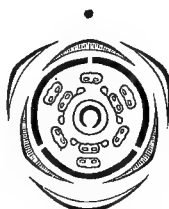


FIG. 266.  
Diagram.



FIG. 267.  
Fruit ( $\frac{1}{2}$ ).



FIG. 268.  
Long. sect. of fruit.

which rises early. Three are superposed to the sepals; of these the outermost are the largest; they have introrse anthers, like the next set which are oppositipetalous and inserted in the lower part of the petals themselves. The stamens of the third whorl are alternipetalous; they possess extrorse anthers, and have two lateral glands at the base of the filament. The free gynæceum resembles that of *Laurus*; the single anatropous descending ovule has its micropyle turned upwards and inwards to the placenta, and is inserted a little below the top of the front of the ovary, towards the anterior petal. The fruit is an achene, with a thin pericarp, and contains a seed whose thick fleshy subglobular embryo is exalbuminous when adult.<sup>2</sup> After anthesis the receptacle continues growing in height and thickness, and so covers nearly the whole of the fruit with a continuous fleshy layer or *indusium*, surmounted by the remains of the perianth and androceum. *Cassytha* consists of herbs from hot countries, whose slender cylindrical stems, like those of our Dodders (*Cuscuta*) fix on by suckers to the adjacent plants whereon they are parasite. Accordingly they have no leaves, or only rudiments thereof, represented by scales or little bracts. The flowers form capitula, spikes, or more rarely racemes. Each flower is axillary to a bract and accompanied by two lateral bractlets. The upper or inner flowers of the inflorescence are

<sup>1</sup> The filament has two lateral dilatations forming lateral auricles. It is in the notch below these that are lodged the lateral glands

of the innermost fertile stamens; they project backwards towards the perianth.

<sup>2</sup> The albumen long persists in abundance in the unripe seed.

usually male, through the more or less complete abortion of the gynæceum. Some half-hundred species<sup>1</sup> have been admitted in this genus, but the number should probably be reduced by half. They occur in all the tropical regions of the globe.

## VI. GYROCARPUS SERIES.

*Gyrocarpus*<sup>2</sup> has regular polygamous flowers. In the hermaphro-

*Gyrocarpus americanus*.



FIG. 269.  
Fruit.

dite (the rarest of all) we find a deep cup-shaped receptacle, lodging the ovary in its concavity, while its edges bear the androceum and perianth. The latter consists of at most ten leaves, five external<sup>3</sup> valvate, and five alternating with these, and similar in form, size, and consistency. But in certain flowers there are altogether but three or four of these leaves. The stamens are sometimes as numerous as the outer leaves, but are usually fewer in number (sterile in the female flowers), each with one or two elongated glands at the base, of variable form, and consisting of a slender exerted filament, and a swollen connective which bears on its edges or inner face two cells; each cell dehisces by the raising of a valve. The gynæceum, rudimentary in the male flower,<sup>4</sup> consists of a one-celled ovary containing a single descending anatropous ovule; this is attached near the top of the ovary, and its micropyle looks upwards and inwards. The terminal style is slender, with a more or less dilated stigmatiferous apex.

The fruit (fig. 269) is a drupe with a thin mesocarp; it is surrounded by the receptacle, and the perianth, most of

<sup>1</sup> L., *Spec.*, 35.—SCH. & THÖNN., *Beskr.*, 199.—R. BR., *Prodr. Nov.-Holl.*, 404.—NEES, in *Pl. Preiss.*, ii. 619.—HOOK., *Exot. Fl.*, t. 167. WIGHT, *Icon.*, t. 1847.—BENTH. & F. MUELL., *Fl. Austr.*, v. 308.—SCHLTL., in *Linnæa*, xx. 578.—WALP., *Ann.*, i. 574.

<sup>2</sup> *Gyrocarpus* JACQ., *Amer.*, 282, t. 178, fig. 80.—GÆRTN., *Fruct.*, ii. 92, t. 97.—R. BROWN, *Prodr.*, 404.—BL., *Nov. Fam. Expos.*,

15.—NEES, *Prog. Laur.*, 20; in *Wall. Pl. Asiat. Rar.*, ii. 68; *Syst.*, 699.—ENDL., *Gen.*, n. 2068; *Iconogr.*, t. 43.—MEISSN., *Prodr.*, 247.—B. H., *Gen.*, 689, n. 14.—H. BN., in *Adansonia*, v. 187.

<sup>3</sup> Two are already larger than the rest at anthesis, and these it is that become the wings.

<sup>4</sup> In which the receptacle is much shallower than in the flowers with a fertile gynæceum.

whose leaves remain rudimentary, while two develop into long, erect, flattened, membranous or subligneous wings, tapering slowly but considerably to the base. The endocarp contains one seed, whose exalbuminous embryo has a superior conical radicle, and two petiolate foliaceous cotyledons, spirally rolled around the central part of the embryo. *Gyrocarpus* consists of trees or shrubs (sometimes climbing) in nearly all countries. Their leaves are alternate exstipulate, with a palmiveined blade, simple, lobed, or trifoliate. The flowers form much-ramified racemes of cymes axillary to the leaves or terminating the branches. Five or six species<sup>1</sup> are now admitted, which might perhaps be reduced to a couple.

*Sparattanthelium*<sup>2</sup> comes very near *Gyrocarpus*, from which it is distinguished by its perianth of four or six caducous leaves, its four or six valvate stamens without basilar glands; and its wingless fruit. The five or six known species<sup>3</sup> of this genus inhabit tropical America.

## VII. ILLIGERA SERIES.

*Illigera*<sup>4</sup> (figs. 270–272) has regular hermaphrodite flowers. The receptacle forms a deep sac containing the ovary; above this it tapers into a narrow neck traversed by the style, above which it again expands into a sort of cup, the edges of which bear the perianth and androceum. The former consists of two whorls of leaves, each usually pentamerous; or sometimes tetramerous, and valvate in the bud. The leaves of the two whorls alternate, and resemble each other in thickness and consistency.<sup>5</sup> The androceum consists of five free stamens, superposed to the outer perianth-leaves, possessing a free filament and an introrse two-celled anther. The front wall of each cell separates all round except along its upper edge, on which

<sup>1</sup> W., *Spec.*, iv. 982.—R. BR., *Prodr.*, 404.—ROXB., *Pl. Coromand.*, i. 2, t. i.—H. B. K., *Nov. Gen. et Spec.*, vii. 493.—PERS., *Syn.*, i. 145.—MIQ., *Fl. Ind.-Bat.*, i. 977.—THW., *Enum. Pl. Zeyl.*, 258.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 290.

<sup>2</sup> MART., *Herb. Fl. Bras.*, 280; in *Regensb. Bot. Zeit.* (1841); *Beibl. Dansk. d. Bot. Ges. in Regensb.*, iii. 298, t. 10, 11.—ENDL., *Gen.*, Suppl., ii. 35, n. 2068.—MEISSN., *Prodr.*, 249.

<sup>3</sup> MEISSN., in *Mart. Fl. Bras., Laurac.*, 291, t. 106.

<sup>4</sup> BL., *Bijdr.*, 1153; *Nov. Fam. Expos.*, 14; in *Ann. Sc. Nat.*, sér. 2, ii. 96.—NEES, *Syst.*, 703.—ENDL., *Gen.*, n. 2069.—MEISSN., *Prodr.*, 250.—B. H., *Gen.*, 689, n. 13.—H. BN., in *Adansonis*, v. 186.—Gronovia BLANG., *Fl. de Philippin.*, 186 (nec L.).—*Henschelia* PRESL., *Rel. Hank.*, ii. 81, t. 63.—ENDL., *Gen.*, n. 4705.—*Coryzadenia* GRIFF., *Posth. Pap.*, iv. 356.

<sup>5</sup> Some botanists consider the perianth a double calyx, others a calyx and corolla. The latter view seems most probable, if we look at the case of the true *Lauraceæ*.

it turns as on a hinge, and finally expands parallel to the perianth.<sup>1</sup> Between the stamens and the inner whorl of the perianth are two series of organs, namely, five little glands, alternately with the

*Illigera Coryzadenia*.

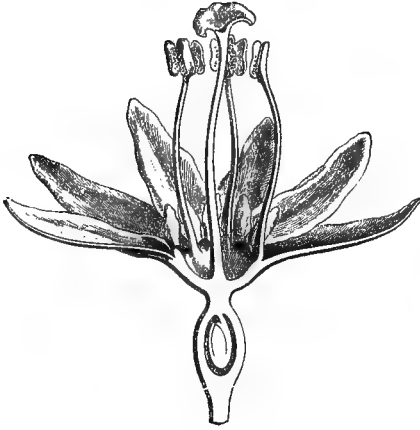


FIG. 271.  
Longitudinal section of flower ( $\frac{2}{3}$ ).

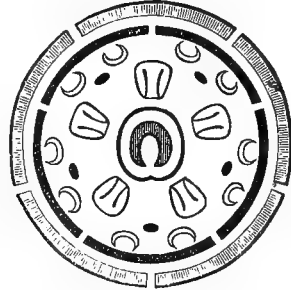


FIG. 270.  
Diagram.

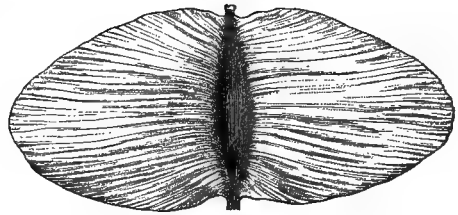


FIG. 272.  
Fruit.

perianth-leaves, and slightly exterior to them, and ten cornets opening obliquely outwards, superposed in pairs to the leaves of the inner whorl of the perianth,<sup>2</sup> and placed a little outside the glands. The one-celled ovary contains, attached near its summit, a descending anatropous ovule, whose micropyle faces the placenta below its point of attachment.<sup>3</sup> On this side the elongated style surmounting the ovary is grooved longitudinally;<sup>4</sup> it ends in a broad stigmatiferous expansion concave above, and notched on the side corresponding with the groove. The fruit is dry, elongated, and narrowly spindle-shaped, but its walls are extended into two, three, or four large dry

<sup>1</sup> The pollen consists of large globular grains, bristling with conical papillæ, and often slightly mossy at the apex.

<sup>2</sup> The rim of these cornets is obliquely truncate, either from before or backwards or on one side. They probably correspond with the glands found at the base of the staminal fila-

ments in *Gyrocarpus* and the true *Lauraceæ*. Their cavity secretes a viscid nectar.

<sup>3</sup> Without coats.

<sup>4</sup> The edges of this groove come in contact without adhering, so that the hollow style can often be spread out flat.

veined vertical wings, equal or unequal in size. The body of the achene contains within its narrow cavity a descending seed whose exalbuminous embryo has a short superior retracted radicle, and thick fleshy plano-convex cotyledons.<sup>1</sup> *Illigera* consists of clinging shrubs, with sarmentose stems and alternate trifoliolate leaves whose leaflets are petiolulate, entire, and acuminate. The flowers form long lax ramified racemes of cymes. The ramifications and pedicels occupy the axils of more or less narrow bracts; and each flower is accompanied by two or three bractlets at its base. Some half-dozen species of this genus are known,<sup>2</sup> all natives of tropical Asia and the islands of Malaysia.

### VIII. HERNANDIA SERIES.

*Hernandia*<sup>3</sup> (figs. 273–278), placed by most authors in a very distant group, appears to us<sup>4</sup> to represent the diclinous type of *Illigera*.

*Hernandia sonora*.

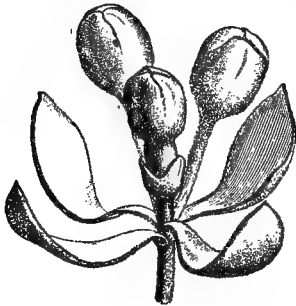


FIG. 273.  
Inflorescence ( $\frac{2}{3}$ ).



FIG. 274.  
Long. section  
of male flower ( $\frac{4}{5}$ ).



FIG. 275.  
Male flower  
(perianth removed).

The flowers of this genus are monœcious, some being female and pentamerous, others male and tetramerous, in the New Caledonian species *H. Vieillardii*.<sup>5</sup> In other instances the male flower is trimerous, and

<sup>1</sup> Sometimes grooved on the convex side by one or more irregular furrows.

<sup>2</sup> SPAN., in *Linnæa*, xv. 187.—MIQ., *Fl. Ind.-Bat.*, i. 1094; Suppl., i. 333, t. 1; in *Mus. Lugd.-Bat.*, ii. 213.

<sup>3</sup> PLUM., *Gen.*, 6, t. 40.—L., *Gen.*, 374, n. 925.—J., *Gen.*, 81.—GÆRTN., *Fruct.*, i. 139, t. 40.—LAMK., *Dict.*, iii. 122; Suppl., iii. 146; *Ill.*, t. 755.—ENDL., *Gen.*, n. 2108.—MEISSN., *Prodr.*, 262.—H. BN., in *Adansonia*, v. 188.—*Hernandiopsis* MEISSN., *Prodr.*, 264.

<sup>4</sup> See *Adansonia*, *loc. cit.*, 190.

<sup>5</sup> *Hernandiopsis Vieillardii* MEISSN., *loc. cit.*—*Hernandia cordigera* VIEILL., in *Ann. Sc. Nat.*, sér. 4, xvi. 62. This species, it appears to us, should not be separated from the rest of the genus *Hernandia* on account of the type of its flowers, because they have in other respects just the same organization. Here and there we do find trimerous males and hermaphrodite females; and the former numbers may be found in true *Hernandias*.

the female tetramerous. In the latter case the receptacle for the female flower (figs. 266, 267) is gourd-shaped with a narrow neck, and contains a one-celled ovary, within which is a descending anatropous ovule whose micropyle looks upwards and towards the placenta.<sup>1</sup> The ovary bears a thick style, grooved down the placentary side and ending in a broad stigmatiferous head notched on the same side. The mouth of the receptacle gives insertion to a perianth of four thick-edged valvate leaves outside, and as many inside alternating

*Hernandia sonora.*

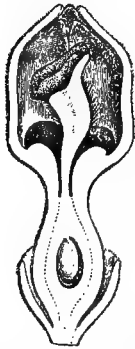


FIG. 276.  
Long. section of female flower.



FIG. 278.  
Fruit.



FIG. 277.  
Female flower (perianth removed).

with these, and narrower and thinner at the edges. Within the perianth is seen a disk of four glands superposed to the outer perianth leaves. In the male flower (figs. 274, 275) the receptacle is small and convex; it bears the double perianth and then three stamens superposed to the outer leaves, and inserted in the centre of the flower. Each has a free or nearly free filament and an introrse basifixed anther, whose two slightly lateral cells dehisce by a valve which afterwards spreads, remaining attached to the connective by its posterior edge.<sup>2</sup> The fruit (fig. 278) is a slightly fleshy drupe,<sup>3</sup> surrounded by the floral receptacle, which is grooved longitudinally<sup>4</sup> and adheres to its outside,<sup>5</sup>

<sup>1</sup> It has two coats, which long remain distinct in *H. Vieillardii*.

<sup>2</sup> This anther is formed altogether on the same type as in *Illigera*, and opens in the same way. The pollen grains too are globes, proportionally large in diameter, and covered with conical papillæ, which are here usually very acute.

<sup>3</sup> The sarcocarp is, however, very distinct from the woody stone.

<sup>4</sup> Usually by eight grooves separated by projecting ribs. Both ribs and grooves are covered below with a layer of glandular tissue, which was more marked on the surface of the ovary.

<sup>5</sup> Except at the apex, where the top of the pericarp is seen free from all adhesions, and apiculated by some remains of the hardened style.



bearing the scars of the perianth at its apex. There is moreover an indusium round the fruit formed by that of the female flower, which is accrescent and dilated, finally almost bladder like with a narrow opening above.<sup>1</sup> The large seed contains a thick fleshy exalbuminous embryo with ruminated hemispherical cotyledons. *Hernandia* consists of trees from Asia, Oceania, and America, with alternate simple entire petiolate leaves often peltate. The flowers form terminal or axillary racemes of cymes, and are usually in threes surrounded by a common involucre of four decussate bracts. The middle flower is usually female, and the two others male. Under the female flower is a proper involucre, forming a four-toothed cup; and this it is that later on forms the indusium of the fruit outside the floral receptacle. The genus contains six or seven distinct species.<sup>2</sup>

Of this order the ancients<sup>3</sup> knew but one plant, *Laurus nobilis*.<sup>4</sup> All the species afterwards described were considered Laurels; this was the case with the Japan-Camphor, the Cinnamon, and the American species, such as the Benzoin and Sassafras. LINNÆUS knew twelve species, which he called Laurels, besides *Cassytha*. ADANSON<sup>5</sup> placed the Laurels, under the name of *Rombut*, in the Family *Garous* (*Thymeleæ*), at the end of his Family of the Poppies (Fr., *Pavots*), after *Berberis* and *Cassytha*. A. L. DE JUSSIEU made the Laurels a distinct order,<sup>6</sup> adding to the genus *Laurus* of LINNÆUS *Ocotea* and *Aiouea*, which AUBLET had recently made known,<sup>7</sup> and as *genera affinia* the nutmeg-plants (*Myristica* and *Virola*), with *Hernandia* of PLUMIER. He left among the *genera incertæ sedis*<sup>8</sup> *Ravensara* (*Agathophyllum*), *Cassytha*, *Lindera*, and *Tomex* of THUNBERG<sup>9</sup> (*Tetranthera*), *Gyrocarpus* of JACQUIN,<sup>10</sup> and *Licaria* of AUBLET.<sup>11</sup>

<sup>1</sup> MEISSNER makes this accessory envelope a formation of the base of the calyx:—" *Drupa calycis tubo membranaceo vesiciformi apice truncato pervio inclusa.*" But this part (which we consider as the receptacular sac) is closely applied to the fruit itself and becomes hard; while the vesicular pouch surrounding the whole fruit arises lower down on the floral pedicel itself, and has never, at any period, any adhesion to the fruit.

<sup>2</sup> JACQ., *Amer.*, 245.—AUBL., *Guian.*, ii. 848, t. 329.—BL., *Bijdr.*, 550.—WIGRT, *Icon.*, t. 1855.—SICKM., *Diss. Herb. Amboin.*, in *Linnæi Amœn. Acad.*, iv. 125.—GUILLEM., in *Ann. Sc. Nat.*, sér. 2, vii. 189.—MIQ., *Fl. Ind.*

*Bat.*, i. 887.—THW., *Enum. Pl. Zeyl.*, 258.—GRISEB., *Pl. Wright.*, 188.—BENTH. & F. MUELL., *Fl. Austr.*, v. 313.

<sup>3</sup> NEES D'ESSENBECK has given, in his *Systema* (679), the history of this order.

<sup>4</sup> See p. 440, note 4.

<sup>5</sup> *Fam. des Pl.*, ii. 284, 433 (1763).

<sup>6</sup> *Gen.* (1789), 80, Ord. iv.

<sup>7</sup> *Guian.*, i. 310; ii. 780 (1775).

<sup>8</sup> *Op. cit.*, 429, 431, 439, 440.

<sup>9</sup> *Fl. Jap.*, 190 (1784).

<sup>10</sup> *Amer.*, 282 (1763).

<sup>11</sup> *L. guianensis* AUBL., *Guian.*, i. 313, t. 21.—NEES, *Syst.*, 344, 658.—MEISSN., *Prodr.*, 259, n. 16.—This tree, of which only the leaves

MOLINA's *Peumus*<sup>1</sup> (*Boldu*) he indicated as an ally of *Rubentia* and *Elæodendron orientale* JACQ. After JUSSIEU, R. BROWN,<sup>2</sup> making a special study of the Australian *Lauraceæ*, established the two genera *Endiandra* and *Cryptocarya*. BLUME<sup>3</sup> also recognised the two new genera, *Haasia* and *Caryodaphne*, in his study of the Javanese *Lauraceæ*. CHAMISSE and DE SCHLECHTENDAL, too, had just observed<sup>4</sup> among the Mexican species the curious type *Misanteca*, with pseudo-capitulate flowers, when NEES VON ESENBECK published his special researches on this important order.

In 1836, after several preparatory publications,<sup>5</sup> he put forth his *Systema Laurinarum*.<sup>6</sup> Therein he divides *Lauraceæ* into thirteen tribes,<sup>7</sup> and creates twenty-eight new genera, under the following names: *Phæbe*, *Apollonias*, *Alseodaphne*, *Hufelandia*, *Beilschmiedia*, *Cecidodaphne*, *Mespilodaphne*, *Aydendron*, *Evonymodaphne*, *Acrodidium*, *Dicypellium*, *Petalanthera*, *Pleurothyrium*, *Teleiandra*, *Leptodaphne*, *Gæppertia*, *Oreodaphne*, *Strychnodaphne*, *Camphoromæa*, *Gymnobalanus*, *Sassafras*, *Benzoin*, *Cylicodaphne*, *Polyadenia*, *Lepidadenia*, *Dodecadenia*, *Actinodaphne*, *Daphnidium*; and referred to this order, or established as genera, the types formerly confounded with *Laurus*, such as *Cinnamomum* of BURMANN,<sup>8</sup> *Camphora* of BAUHIN,<sup>9</sup> *Persea* of GÆRTNER,<sup>10</sup> *Machilus* of RUMPHIUS,<sup>11</sup> *Nectandra* of ROJANDER,<sup>12</sup> *Tetranthera* of JACQUIN,<sup>13</sup> and *Litsæa* of JUSSIEU.<sup>14</sup> The genera<sup>15</sup> composing this order, taking into account those that did double service, then amounted to thirty-four in number. Since the time of NEES only a dozen genera have been added to the *Lauraceæ* proper. BLUME, in 1850,<sup>16</sup> proposed *Dictyodaphne* and *Notaphæbe*. The three genera *Symphysodaphne*, *Silvia*, and *Nesodaphne* had just been formed by A. RICHARD, ALLEMÃO, and J. HOOKER, when MEISSNER, in 1864, re-

are as yet known, cannot be certainly referred to any of the *Lauraceæ* more distinctly described by authors.

<sup>1</sup> *Chil.*, ed. GERM., 160, 311 (part.). *Peumus* proper belongs to *Monimiaceæ* (see above, vol. i. 290).

<sup>2</sup> *Prodr. Fl. Nov.-Holl.*, 402 (1810).

<sup>3</sup> Ex NEES, *Syst.* (1836).

<sup>4</sup> In *Linnaea*, vi. (1831), 367.

<sup>5</sup> In *Wall. Pl. Asiat. Rar.*, ii. (1831), 56; *Laur. Disp. Progr.*

<sup>6</sup> Berol. (1836) 8vo., pp. ix. & 720.

<sup>7</sup> 1. *Cinnamomeæ*; 2. *Camphoreæ*; 3. *Phæbeæ*; 4. *Perseeæ*; 5. *Cryptocaryeæ*; 6. *Acrodidia*; 7. *Nectandreæ*; 8. *Dicypellieæ*; 9.

*Oreodaphneæ*; 10. *Flavifloræ*; 11. *Daphnidia*; 12. *Cassytheæ*.

<sup>8</sup> *Thes. Zeyl.* (1737), 62.

<sup>9</sup> *Pinax* (1623), 500.

<sup>10</sup> *Fruct.*, iii. (1805), 222.

<sup>11</sup> *Herb. Amboin.*, iii. (1750), 70.

<sup>12</sup> Ex RORTB., in *Act. Litt. Hafn.*, i. (1778), 279.

<sup>13</sup> *Hort. Schænbr.*, i. (1797), 59.

<sup>14</sup> In *Dict. Sc. Nat.*, xxvii. (1823), 79.

<sup>15</sup> That is to say, those only that we retain as properly distinct, and omitting all account of synonyms.

<sup>16</sup> *Mus. Lugd.-Bat.*, i. 270, 323, 365.

turned to the study of this order for DE CANDOLLE'S *Prodromus*,<sup>1</sup> describing in detail all the species thereof. He admits most of NEES' genera, and adds the four new ones *Ampelodaphne*, *Bihania*, *Sassafridium*, and *Synandrodaphne*. The total of the generic types retained by us in the order *Lauraceæ* proper then amounted to forty-six. To these<sup>2</sup> we have recently added the genus *Potameia* of DUPETIT-THOUARS,<sup>3</sup> hitherto attributed to *Proteaceæ*.

At the same time two small groups, considered by several authors as distinct groups, namely *Gyrocarpeæ*<sup>4</sup> and *Illigereæ*,<sup>5</sup> were associated by others, especially by R. BROWN and NEES, with *Lauraceæ*. VON MARTIUS, in 1837, described<sup>6</sup> a genus which, though closely allied to *Gyrocarpus*, lacked the wing to the fruit; he named it *Sparattanthelium*. *Hernandiæ*<sup>7</sup> had also been made the type of a small order apart,<sup>8</sup> but in 1864 we pointed out<sup>9</sup> that it merely represented a reduced diclinous type of *Illigera*; and made it into a distinct series of the order *Lauraceæ*, which now consists of fifty-one genera, excluding those that are unknown, or that are doubtful members of this order.<sup>10</sup> The number of known species, estimated in 1846 at 450 by LINDLEY, and at 700 by NEES, was raised to 1050 in 1864 in MEISSNER'S Monograph.

NEES<sup>11</sup> had already studied their geographical distribution, dividing them into eastern and western, referring his *Cinnamomeæ*, *Camphoreæ*,

<sup>1</sup> XV. 1-260; 503-516, Order cxlii. *Lauraceæ*.

<sup>2</sup> In *Adansonia*, ix. (1870) 241. See pp. 400, 431, 466.

<sup>3</sup> *Nov. Gen. Madag.* (1806), n. 16.

<sup>4</sup> DUMORT., *Anal. Fam.*, 14. — NEES, *Progr.*, 20.—ENDL., *Gen.*, 324, Order cvii.—MEISSN., *Prodr.*, 245 (subord. ii. and tribe v. *Laurac.*).

<sup>5</sup> BL., *Nov. Fam. Expos.*, 12; in *Ann. Sc. Nat.*, sér. 2, ii. 96.—NEES, *Syst.*, 695.—*Illigereæ* LINDL., *Nat. Syst.*, ed. 2, 202.

<sup>6</sup> *Herb. Fl. Bras.*, 280; in *Regensb. Bot. Zeit.* (1841).

<sup>7</sup> PLUM., *Gen.*, 6, t. 40 (1703).

<sup>8</sup> *Hernandiæ* BL., *Bijdr.*, 550; *Nov. Fam. Expos.* (1833); in *Ann. Sc. Nat.*, sér. 2, ii. 89.—LINDL., *Nat. Syst.*, ed. 1, 76.—*Hernandiaceæ*, DUMORT., *Anal. Fam.*, 14, 16.—LINDL., *op. cit.*, ed. 2, 195.

<sup>9</sup> In *Adansonia*, v. 188 (1864).

<sup>10</sup> Namely: 1. *Adenostemum* PERS., *Syn.*, i. 467, &c., the *Gomortega* of RUIZ & PAVON, which is a Monimiad (see above, i. 315).—2. *Bistania* NORONH., in *Verh. Bat. Gen. van Kunst en Wet.*, v. 64; HASSK., *Relat. Pl. Noronh.*, 5; MEISSN., *Prodr.*, 259, n. 21.—3. *Chibaca* BEET.,

ex ROSENTH., *Syn. Pl. Diaphor.*, 238 (an undescribed South African Laurad).—4. *Christmannia* DENNST. (RHEEDE, *Hort. Malab.*, iv. t. 50), a Laurad according to ROSENTH., *op. cit.*, 1066.—5. *Dendrodaphne* BEURL., *Prim. Fl. Portobellens.*, in *Act. Acad. Suec.*, 145; MEISSN., *Prodr.*, 259, n. 17.—6. *Icosandra* PHILIPP., in *Linnaea*, xxix. 39; MEISSN., *Prodr.*, 506 (a genus with pentandrous flowers and an icosandrous androceum otherwise formed as in *Boldæ*, whereof it might perchance be an anomalous form (?).—7. *Licaria* AUBL. (see above, p. 447, note 11).—8. *Lindharia* ABRUD., *Dissert.* (1810), ex KOSTER, *Voyag. Brés. Fr. ed.*, ii. 429, of which two species (*L. aromatica* and *Tinctoria* ABRUD.) are noted as useful, but are not described.—9. *Menestrata* VELLOZ., *Fl. Flum.*, v. t. 2; MEISSN., *Prodr.*, 259, n. 20. *M. racemosa* VELLOZ. is referred with doubt by VON MARTIUS to *Ocotea* (*Oreodaphne*), and by MEISSNER to *Persea* (*lavigata* or *pirifolia*).—10. *Septina* NORONH., *loc. cit.*; MEISSN., *Prodr.*, 259; HASSK., *loc. cit.*, 5.

<sup>11</sup> *Op. cit.*, 683. See also the tables annexed to the text of that work, giving in detail the area of each of the types then known.

*Daphnidieæ*, and *Tetranthereæ* to the former, and *Acrodiclidia*, *Nectandreaæ*, *Dicypellieæ*, *Flavifloræ*, *Oreodaphneæ*, and *Perseæ* to the latter. He remarked, however, that some of the two last divisions, such as *Haasia*, *Machilus*, and *Alseodaphne*, belonged to the west, and that *Endiandreæ*, as defined by himself, extended from the east, their proper country, as far westward as America; while the *Phæbeæ*, chiefly American, were represented by certain species of *Apollonias* as far east as the Canary Islands and India. So, too, among the essentially eastern *Tetranthereæ*, *Laurus nobilis* spreads over Europe to the west of the Mediterranean, and other *Tetranthereæ* had been observed in Mexico and the neighbouring countries. Another American member of this tribe is now known, *Oreodaphne californica* HOOK. & ARN. In short, NEES' large divisions have ceased to be valid, so many are the exceptions now known. But the classification is not wholly useless, and, speaking generally, it is usually correct. The eastern division extends to 25° 30' N., though some *Lauraceæ* go so far as 40°, but decreasing greatly in numbers. On the south of the Equator it extends to Van Diemen's Land. The western region is bounded by 35° N. and 35° S. In our hemisphere, *Laurus nobilis* extends at least as far as 45°. In the south, *Oreodaphne* and *Apollonias* on the west of Africa, and the *Phæbeæ*, *Perseæ*, *Cryptocaryeæ*, and *Oreodaphneæ* on the east coast thereof, represent the family in Madagascar, the Mascarene Islands, and even the Cape of Good Hope.<sup>1</sup> Now that a larger number of generic types is known, their geographical distribution may be given as follows. Out of the 47 genera retained as true *Lauraceæ* 22 are exclusively American, and 19 have only been observed in the Old World. Among these latter come all the *Cinnamomeæ*, except *Persea* and *Phæbe*, which are also found in the New World. Of the *Cryptocaryeæ*, *Cryptocarya* alone is common to both worlds. All the other genera are American excepting *Ravensara* from Madagascar, and the three Oceanian or Asiatic genera, *Endiandra*, *Dictyodaphne*, and *Bihania*. All the genera of *Ocoteæ* are American, though a small proportion of the species of the genus *Ocotea* occur in Africa and Madagascar. *Tetranthereæ*, on the contrary, belongs to the Old World, excepting some species of the large

<sup>1</sup> NEES (*op. cit.*, 688) indicates by fractions the proportion of *Lauraceæ* in the flora of each country. These are his numbers:—

Tropical Asia,  $\frac{160}{6000} = \frac{1}{35.7}$ ; Tropical America,  $\frac{185}{13000} = \frac{1}{68.78}$ ; Extra-tropical America,  $\frac{11}{3000} = \frac{1}{272.72}$ ; Australia,  $\frac{10}{4000} = \frac{1}{400}$ ; Europe,  $\frac{1}{7000}$ .

genus *Tetranthera*, which finds representatives in all warm countries. Hence there are only six genera common to both hemispheres: *Cryptocarya*, *Ocotea*, *Persea*, *Phœbe*, *Lindera*, *Tetranthera*. Only one species occurs in Europe, a *Laurus*. In the east of North America, excepting only two or three members of more southern genera, *Lindera* and *Sassafras* alone occur. Some small genera, consisting of but one or few species, are limited to a very small geographical area. The following are monotypical: *Silvia* and *Dicypellium* from Brazil; *Misanteca* from Mexico; *Sassafridium* from Costa Rica and Veraguas; *Boldu* from Chili; *Sassafras* from North America, *Bihania* in Borneo; *Symphysodaphne* from the Antilles. Of the genera with but few species we only find *Nesodaphne* in New Zealand, *Ampelodaphne* and *Pleurothyrium* in a small region of tropical America, *Ravensara* in Madagascar. The genus *Lindera* is divided between the floras of Japan and North America. Out of about a thousand species there are a little over five hundred in America and nearly as many in the Old World.

The other *Lauraceæ*, of the series *Illigereæ*, *Gyrocarpeæ*, *Cassytheæ*, and *Hernandieæ*, including altogether some fifty species from hot countries, do not materially alter this relation. Of seven species of *Hernandia* three are American, as are the five species of *Sparattanthelium*, and one of the five described in *Gyrocarpus*, and apparently one species of *Cassytha*. The remaining twenty-eight species belong to the Old World, mostly to Australia. Thus of the 1050 species of *Lauraceæ* America possesses some 530.

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The following characters are common to all these plants; the want of stipules, the regularity of the flower; the concavity of the receptacle, making the perianth and androceum more or less markedly perigynous; the existence of a double perianth; the valvular dehiscence of the anthers; the possession of a solitary anatropous descending ovule, with its micropyle turned upwards and inwards under the point of attachment; the indehiscence of the one-seeded fruit; the want of albumen in the seed. These may be pronounced as absolute.

Among the variable ones come the arrangement and form of the leaves, which are usually alternate, rarely whorled, usually simple,

sometimes compound. They are usually thick and persistent,<sup>1</sup> rarely caducous, replaced in *Cassytha* by small scales inserted on the parasitic filiform stems, which cling by suckers to the neighbouring plants. The flowers are sometimes in simple spikes or racemes, but far more frequently in cymes or ramified racemes of cymes. The floral receptacle varies greatly in depth; it is rarely convex, oftener flat or concave, very frequently hollowed into a deep sac or pouch bearing the perianth and androceum on its rim. This pouch is sometimes accrescent and persistent at the base of or around the fruit, which it may even entirely envelope; sometimes it separates earlier or later from the pedicel, either by its base or some way up, bringing the perianth away with it. The indusium formed by it around the fruit will thus vary greatly in height, no less than in consistency; it is usually dry, but sometimes fleshy as in *Cassytha*. The type of the flower is usually  $\sphericalangle$ ; but we may find  $\sphericalangle$ ,  $\sphericalangle$ , or  $\sphericalangle$  occasionally. The androceum consists of one or more whorls; four alternating is the usual number. Certain of the stamens are introrse, certain extrorse; some have lateral glands, while others lack them entirely: the two or four valves by which they dehisce also varying from extrorse to introrse. Some of the stamens may be sterile; when all about the flowers may be diclinous. The form of the stigmatiferous end of the style varies; the floral pedicel, usually remaining cylindrical below the fruit, is sometimes dilated to a variable extent and club shaped. These are the variable characters which have served to distinguish the genera and the eight series of this order. We proceed to give the general features on which our classification of these last depends.<sup>2</sup>

I. CINNAMOMEÆ.—Flowers usually hermaphrodite; staminal whorls 4; four stamens of the two outer fertile and introrse; of the third whorl,

<sup>1</sup> In several genera (*Cinnamomum*, *Mespilodaphne*, *Ocotea*, *Phœbe*, &c.), axillary to the secondary ribs, especially near the base of the blade, we find more or less marked projections above, corresponding with depressions or pores, often lined with down, on the lower surface. These afford shelter to insect larvæ, to whose agency the production of the pits has been ascribed. But this view appears to us untenable, as we have seen these depressions indicated in very young leaves of the Camphor-plant while still enveloped in the bud, before they could

have come into contact with any animal whatever. But it is not impossible that the great development sometimes assumed by these cavities (as in *Ocotea bullata*, *foxtens*, &c.) may be really due to the presence of the animals so often found therein.

<sup>2</sup> We must recall the very artificial nature of these divisions, especially of such series as the *Ocotea*, which we only admit to facilitate the study of this most natural order. There is no single constant differentiating character.

fertile extrorse 2-glandular; fourth whorl sterile. Fruit superior, naked or surrounded at base by the receptacle, not enclosed in its cavity. Trees with persistent leaves. Buds with incomplete scales.

II. CRYPTOCARYEÆ.—Flowers usually hermaphrodite. Androceum generally similar to that of *Cinnamomeæ*, rarely reduced to 3–6 stamens. Fruit wholly or nearly enclosed in sacciform cavity of accrescent receptacle. Trees; leaves and buds as in *Cinnamomeæ*.

III. OCOTEÆ.—Flowers usually diclinous, often dioecious (very rarely bisexual), with three verticils of fertile stamens; stamens of the third whorl extrorse, 2-glandular sterile stamens of the fourth whorl ill-developed sessile, or 0. Fruit superior, naked or surrounded at base (but not included) by wholly or partially persistent receptacle. Trees with alternate, rarely caducous leaves.

IV. TETRANTHEREÆ.—Flowers usually diclinous dioecious (rarely bisexual), in umbelliform inflorescences or glomeruli protected at first by an involucre of imbricated bracts or pluriseriate bud-scales. Stamens of male flowers usually all fertile; valves introrse. Woody plants with persistent or caducous leaves.

V. CASSYTHEÆ.—Flowers hermaphrodite or polygamous; receptacle very concave, persistent, and becoming fleshy around included fruit. Androceum of three whorls of fertile stamens, the innermost introrse 2-glandular. Leafless parasitic herbs; stems filiform twining, clinging by suckers. Flowers spicate or racemose.

VI. GYROCARPEÆ.—Flowers polygamous; receptacle concave persistent. Fruit inferior induviate. Cotyledons folded or rolled into a spiral around the tigellum. Woody plants erect or climbing; leaves digitiveined, entire or lobed.

VII. ILLIGEREÆ.—Flowers usually hermaphrodite; receptacle usually saccate, with a narrow mouth. Androceum isostemonous. Fruit induviate by receptacle which possesses vertical wings. Embryo fleshy thick non-convolute. Woody climbers with digitate leaves.

VIII. HERNANDIEÆ.—Flowers monœcious; perianth double. Male flower isostemonous. Female flower with an inferior ovary surrounded by a proper involucre, which is accrescent to form an induvium. Flowers united in threes (one female and two male) in a common involucre of four imbricated bracts. Trees with simple alternate leaves.

It will be now seen that the variable characters whereon these sections are founded refer to the arrangement and number of the

stamens and staminodes, to the form of the receptacle and its behaviour after anthesis, and sometimes to the leaves and stems. The other variable characters are then merely used for the distinction of genera. The differences observed in the vegetative organs sometimes answer to histological modifications; but perhaps these too are only due to peculiarities in the mode of life, such as the parasitism of *Cassytha*. In this genus the stem does not always contain central spiral vessels; and the dotted vessels, mixed with the fibres in the wood<sup>1</sup> are surrounded by a bark of liber-cells, a cortical parenchyma gorged with chromule, and an epidermis sprinkled with stomates in linear rows.<sup>2</sup> In most of the arborescent *Lauraceæ*, on the contrary, it has long been noted<sup>3</sup> that the medullary cavity of the stem is middle-sized or large, and diminishes with variable rapidity in course of time; that the woody fibres are coarse and pale, intermixed with large porous vessels; that the young bark is often covered with lenticels, and that after a certain age it presents, in the *Sassafras* for instance, longitudinal and transverse clefts. When hairs are present on the young epidermis they are simple and pretty rigid.<sup>4</sup> The cortical parenchyma of the aromatic species usually contains large reservoirs of essential oil, either in its periphery, or deeper towards the centre. These reservoirs, with yellow contents, are also found in the pith, which often contains numerous sclerous cells, isolated or in groups, and riddled with numbers of canals whose openings are sometimes areolated. Crystals and raphides are frequently observed in the pith, more rarely in the bark. The liber is almost constantly divided into bundles isolated by alternating intrusions of the herbaceous layer.

AFFINITIES.—These easily follow from the characters above described, and from those of the *Monimiaceæ* related in the preceding volume.<sup>5</sup> We consider that the *Lauraceæ*, whose gynæceum is constantly reduced to a single carpel, are to the *Monimiaceæ* what the

<sup>1</sup> DECNE., in *Ann. Sc. Nat.*, sér. 3, v. 247.

<sup>2</sup> "Thus the general aspect of a section through a *Cassytha* stem presents the strongest resemblance to that of a young monocotyledonous root" (DECNE., *loc. cit.*).—CHATIN (*Anat. Comp. des Végét.*, ii. 27, t. 5, 6) has taken up the study of the histology of these stems; he finds tracheæ in but few species of *Cassytha*, having only made out their presence in *C. Casuarina* and *filiformis*. He describes the suckers

as forming a little perforating cellular cone, within which is another "reinforcing cone," formed of fibres, and more rarely of vessels. This author concludes, differing from DECAISNE, that "the habitual absence of spiral vessels in the stem" is the peculiar character of *Cassytha*.

<sup>3</sup> NEES, *Syst. Laur.*, 6.

<sup>4</sup> "*Pili, si adsint, simplices.*" (MEISSN., *Prodr.*, 2.)

<sup>5</sup> See above, i. 322.



*Prunææ* and *Agrimoniææ* are to the rest of *Rosaceææ*. Accordingly the *Lauraceææ* have more or less frequently the opposite exstipulate leaves, the aromatic organs, the concave floral receptacle, the valvical anthers of Monimiads. They also come very near *Proteaceææ* and *Elæagnaceææ*, between which we, like most authors, have placed them. Nearly all have also noted their affinities with certain *Berberidaceææ*, and with *Myristicaceææ* formerly referred to *Lauraceææ*.<sup>1</sup> By *Gyrocarpeææ*, *Illigereææ*, and *Hernandiæææ*, they affect a certain resemblance, in our opinion, rather than possess a real relationship with *Alangieææ*, *Nysseæææ*, and *Combretaceææ*; though some authors<sup>2</sup> have even referred *Illigera*, *Gyrocarpus*, and *Sparattanthelium*, to this last order. But there are many natural orders, far removed by their most perfect types, that seem to approach one another indifferently in this sort of way by those of their genera that have a comparatively simple structure, and a, so to speak, reduced and degenerate organization.<sup>3</sup>

The *Lauraceææ* are essentially aromatic plants;<sup>4</sup> this character is very wide-spread if not absolutely constant. Both leaves and bark are sprinkled with pellucid dot-like reservoirs gorged with odoriferous volatile essential oil; or the wood itself is completely impregnated with similar substances, aromatic or camphoraceous.<sup>5</sup> The genus *Cinnamomum* is richest in species valued on this account; it affords Japan camphor as well as the various cinnamons. The true Camphor-plant is *Cinnamomum Camphora*,<sup>6</sup> whereof the type and the chief forms and varieties<sup>7</sup> contain the camphor in root, stem, and branches. It is extracted by distilling these parts, crushed to

<sup>1</sup> "*Laurineææ sunt Daphnoideis, Proteaceis, Santalaceis* cet. florum evolutione analogæ, *Terebinthaceis* infimis fere collaterales, affinitate *Anacardiaceis* proximæ et harum formam inferiorem monochlamydeam constituentes." (J. G. AGARDH, *Theor. Syst. Plant.*, 285.)

<sup>2</sup> LINDL., *Veg. Kingd.*, 718.—B. H., *Gen.*, 689.

<sup>3</sup> See H. BN., *Rech. sur l'Ancuba et sur ses rapports avec les genres analogues* (in *Adansonia*, v. 179).

<sup>4</sup> "Cortice folisque aromaticis v. camphoratis Laurineææ pleræque pollut." (ENDL., *Gen.*, 316.)

<sup>5</sup> ENDL., *Enchirid.*, 200. — LINDL., *Veg.*

*Kingd.*, 536.—GUIB., *Drog. Simpl.*, ed. 6, ii. 388.—ROSENTH., *Syn. Pl. Diaphor.*, 228.

<sup>6</sup> See above, p. 428, notes 8, 9; 429, fig. 244.—GUIB., *op. cit.*, 411.—PÉREIRA, *Elem. Mat. Med.*, ii. p. i. 448.—LINDL., *Fl. Med.*, 332.—ROSENTH., *op. cit.*, 231.

<sup>7</sup> MEISSNER admits, besides the type, the three following: 1. *Glaucescens* (*C. Camphora*, var. *procera* BL.;—*Camphora pseudo-Sassafras* MIQ.;—*Persea pseudo-Sassafras* ZOLL.); 2. *Rotundata*; 3. *Cuneata*. Many other species of *Cinnamomum* contain camphor, and LESCHENAULT even says that it is obtained in India from the old stems and roots of *C. zeylanicum*.

splinters, in water, in large iron retorts.<sup>1</sup> Camphor, when purified, is often used in medicine as a sedative, antiputrescent, determinant, anaphrodisiac, &c. The production of camphor has been attributed to several neighbouring species such as *C. Parthenoxyylon*<sup>2</sup> and *C. Glanduliferum*,<sup>3</sup> the former from Java and Sumatra, the latter from the East Indies. Cinnamon is the bark of several very aromatic species of *Cinnamomum* with opposite leaves. Of the two kinds known in commerce as Ceylon and China cinnamon, the former is produced by *C. zeylanicum*<sup>4</sup> (figs. 240–243), the latter by *C. Cassia*.<sup>5</sup> The bark of the branches that have attained the right age<sup>6</sup> is peeled off with knives, and rolls up into tubes cleft lengthwise, which are then properly sun dried.<sup>7</sup> That of the thinner branches is distilled to procure the volatile oil of cinnamon, also a commercial product. Another similar oil is distilled from the flowers and young fruits<sup>8</sup> of *C. zeylanicum*. The *Cassia lignea* of the druggist appears to be the thicker bark of the old branches and stem.<sup>9</sup> Moreover the leaves of several members of this genus were formerly used in medicine under the name of *Malabathrum*.<sup>10</sup> Cinnamon of inferior quality is also obtained in India, Java, &c., from other species such as *C. Sintok*,<sup>11</sup> *Burmanni*,<sup>12</sup> *iners*,<sup>13</sup> *multiflorum*,<sup>14</sup> *javanicum*,<sup>15</sup> &c.;<sup>16</sup>

<sup>1</sup> GEOFFR., *Mat. Med.*, iv. 21 (ex GUIB., *op. cit.*, 411).—PROUST, in *Ann. Chim.*, iv. 189. —CLÉMANDOT, in *Journ. Pharm.*, iii. 353. These authors have treated on the processes used by the Dutch in refining camphor and giving it the form of large semitransparent cakes.

<sup>2</sup> MEISSN., *Prodr.*, n. 52.—*Laurus porrecta* ROXB.—*L. Parthenoxyylon* JACK.—*Camphora Parthenoxyylon* NEES.—*Sassafras Parthenoxyylon* NEES.—*Parthenoxyylon porrectum* BL.—*Cayogaddus* MARSD., *Hist. Sumatr.*, 129 (ex ROXB.). *Parthenoxyylon pruinatum* BL. is a variety of this.

<sup>3</sup> MEISSN., *Prodr.*, n. 47.—*Laurus glandulifera* WALL.—*Camphora glandulifera* NEES.

<sup>4</sup> See p. 426, note 2.—GUIB., *loc. cit.*

<sup>5</sup> BL., *Bijdr.*, 570.—NEES & EBERM., *Med. Pharm. Bot.*, ii. 424.—HAYNE, *Arzn.*, 12, t. 23. —GUIB., *loc. cit.*, 404.—*C. aromaticum* NEES, in *Wall. Pl. As. Rar.*, ii. 74.—*Laurus Cinnamomum* ANDR. (nec Auctt.).—*Laurus Malabathrum* REINW. (ex BL., nec alior.).—*Persea Cassia* SPRENG., *Syst.*, ii. 267.

<sup>6</sup> From five or six to thirty years old. The harvest is twice a year, from April to August, and from November to January. (See ENDLICHER, *Enchirid.*, 201, for the curious details of this industry.)

<sup>7</sup> The pieces of bark are one within the other

in Ceylon cinnamon, but not in the shorter pieces of China cinnamon.

<sup>8</sup> *Flores Cassie, clavelli cinnamomei* (Off.). See GUIB., *loc. cit.*, 404.

<sup>9</sup> GUIB., *loc. cit.*, 407.

<sup>10</sup> GUIBOURT (*loc. cit.*, 408) ascribes these leaves to *C. Malabathrum* BATK., and *C. iners* BL., which form one and the same species (see below, notes 13, 14).

<sup>11</sup> BL., *Bijdr.*, 571.—MEISSN., *Prodr.*, n. 8.—*Sintoc*, *Sendoc* or *Sintuk* of the natives of Amboyna and Java.

<sup>12</sup> BL., *Bijdr.*, 569.—MEISSN., *Prodr.*, n. 17.—*C. dulce* NEES.—*Laurus dulcis* ROXB.—*L. Burmanni* NEES.

<sup>13</sup> REINW., ex BL., *Bijdr.*, 570.—MEISSN., *Prodr.*, n. 26.—*C. Malabathrum* BATK., in *Nov. Act. Acad. Leop.*, xvii. 2, 618, t. 45.—*C. nitidum* HOOK., *Exot. Fl.*, t. 176.—*C. Caparu-coronde* BL. (?)

<sup>14</sup> WIGHT, *Icon.*, t. 131.—MEISSN., *Prodr.*, n. 14.—*Laurus multiflora* ROXB. (ex WIGHT).

<sup>15</sup> BL., *Bijdr.*, 170; in *Rumphia*, 42, t. 19.—MEISSN., *Prodr.*, n. 1.—*C. neglectum* BL., in *Rumphia*, 38.—*Laurus Malabathrum* BURM. (nec alior.).—*Melastoma Reinwardtianum* BL., *Bijdr.*, 1069.—*Syndok boom* HOUTT., *Nat. Hist.*, ii. 337.

<sup>16</sup> See ROSENTH. (*Syn. Pl. Diaphor.*, 229),

several *Litsæas* are also said to supply cinnamon.<sup>1</sup> To the genus *Cinnamomum* belong the odoriferous barks of *Sindoc*,<sup>2</sup> of *Culilawan*,<sup>3</sup> or clove-cinnamon (*cannelle-giroflée*) of India,<sup>4</sup> and of Massoy from New Guinea.<sup>5</sup> The true clove-cinnamon is that of Brazil, yielded by *Dicypellium caryophyllatum*.<sup>6</sup>

The most aromatic of all the *Lauraceæ* appears to be the *Ravensara* of Madagascar.<sup>7</sup> Its bark and leaves have a strong scent of cloves; but this perfume is most powerful in the fruit, which, enveloped in their chambered receptacle, constitute the Madagascar spice or Ravensara- or Clove-nuts (Fr., *noix de Ravensara, de Girofle*; figs 247, 248), much used as an aromatic in Madagascar and sometimes imported into Europe. The *Casca pretiosa* of the Brazilians is the scented bark of *Mespilodaphne pretiosa*.<sup>8</sup> The aromatic Anise or Sassafras-wood of Orinoco is said to be that of *Ocotea cymbarum*;<sup>9</sup> and to this same tree has been ascribed<sup>10</sup> the *Pichurim-bark*<sup>11</sup> of tropical America. The *Pichurim-seed*<sup>12</sup> of the same parts,

who gives *C. Loureirii* NEES, *Tamala* NEES, *aromaticum* NEES, *obtusifolium* NEES, *daphnoides* SIEB. & ZUCC., *pedunculatum* NEES, &c., as also furnishing officinal barks. The cinnamon of Cayenne comes from *C. zeylanicum*, introduced and cultivated in Guiana.

<sup>1</sup> GUIBOURT refers to *L. zeylanicum*, that kind in particular named *Dawel-coronde*, or Drum-cinnamon (Fr., *Cannelier-tambour*), from the use made of its wood.

<sup>2</sup> Mentioned by RUMPHIUS, who pronounces it different from the *Culilawan*, though vulgarly confounded with it. It appears really to come from *Cinnamomum Sintoc* BL. (see above, p. 456, note 11).

<sup>3</sup> From the Malay word *Kulit-lawang* (GUIBOURT, *loc. cit.*, 409). It comes from *Cinnamomum Culilawan* BL., *Bijdr.*, 571.—MEISSN., *Prodr.*, n. 11.—*C. Culilawan* HAYNE, *Arzn.*, 12, t. 24.—*Laurus Culilaban* L.—*L. Cassia*, var. *Culilaban* LAMK., *Dict.*, iii. 444.—*L. Culilawang* NEES. — *Celit-lawan-boom* VALENT., *Amb.*, iii. 210. This is *Cortex caryophylloides albus* of RUMPHIUS (*Herb. Amboin.*, ii. 65, t. 14).

<sup>4</sup> Under this name are confounded the true *Culilawan* bark (*C. verus*), and that of *C. rubrum* BL., which is also of clove scent, and is of a dark cinnamon-red colour. The *Culilawan* of the Papuans has a similar smell, but its liber is brownish. It is referred to *C. xanthoneuron* BL. (ROSENTH., *op. cit.*, 229).

<sup>5</sup> Attributed to *C. Kiamis* NEES (*C. Burmanni* BL.?), and often prescribed as a tonic and antiarrhœic in Java and the neighbouring countries, like many other clove-scented barks allied to the cinnamons.

<sup>6</sup> See below, p. 472, n. 32, not. 5, 6. GUIB. *loc. cit.*, 396.—MART., *Fl. Bras., Laurac.*, 316. This is the *Imyra quinha* of Para, and the *Espingo* of the inhabitants of Maynas. It is used as a stimulant by the physician, as an aromatic by the cook.

<sup>7</sup> *Ravensara aromatica* SONNER., *Voy.*, ii. 226, t. 127.—POIR., *Dict.*, vi. 81.—H. BN., in *Adansonia*, ix. fasc. 9.—*Evodia aromatica* LAMK., *Dict.*, vi. 81.—PERS., *Syn.*, ii. 1.—*E. Ravensara* GÆRTN., *Fruct.*, ii. 101, t. 103.—*Agathophyllum aromaticum* W., *Spec.*, ii. 842.—POIR., *Dict.*, *Suppl.*, iv. 656.—LAMK., *Ill.*, t. 825.—NEES, *Syst.*, 232.—MEISSN., *Prodr.*, 110, n. 1.—GUIB., *Drog. Simpl.*, ed. 6, ii. 398.—ROSENTH., *op. cit.*, 232.—*Ravin-dzara, Ravensara* of the natives.

<sup>8</sup> NEES, in *Linnaea*, viii. 45; *Syst. Laur.*, 237.—*Cryptocarya pretiosa* MART.—H. B. K., *Nov. Gen. et Spec.*, vii. 192, t. 645.—GUIB., *op. cit.*, 399.—*Canelilla, Pao pretiosa, Pereiora* of the Brazilians. A very aromatic substance, used in the treatment of catarrh, dropsy, rheumatic and syphilitic affections, &c. (see MART., *Fl. Bras., Laurac.*, 317;—BUCHN., in *Rep. Pharm.*, xxxi. 356). In VON MARTIUS'S work will be found (311–314) a complete enumeration of the native names of all the *Lauraceæ* employed in medicine and domestic economy.

<sup>9</sup> GUIB., *op. cit.*, 392.

<sup>10</sup> GUIB., *op. cit.*, 393.

<sup>11</sup> MURRAY (*App. Med.*, iv. 554) regards it as produced by the same trees as the *Pichurim*-beans.

<sup>12</sup> GUIB., *loc. cit.*, 393.—MART., *loc. cit.*, 317.

consist of the embryo (fig. 252), more or less perfect of two species of *Nectandra*. Two kinds are distinguished, one the *large* or *true*<sup>1</sup> said to come from *Nectandra* (?) *Puchury major*,<sup>2</sup> and the other called *bastard* or *small*<sup>3</sup> from *N.* (?) *P. minor*;<sup>4</sup> they were formerly used as aromatics. So in the same way we use the leaves of the classic Laurel<sup>5</sup> or Bay in cooking; and its fruits<sup>6</sup> yield on distillation a mixture of oils used in medicine as an aromatic stimulant.<sup>7</sup> In the North-American Sassafras<sup>8</sup> it is chiefly the wood that is prized as an aromatic sudorific depuratory drug. The bark, however, is said to be more active.<sup>9</sup> Various scents are found in the bark, wood, and fruit of many other Laurels, belonging to the genera *Aydendron*,<sup>10</sup> *Acrodiclidium*,<sup>11</sup> *Nectandra*,<sup>12</sup> *Ocotea*,<sup>13</sup>

<sup>1</sup> Of the same form as that of *Laurus nobilis*, but larger (27 to 45 millimetres by 20).

<sup>2</sup> NEES, *Syst.*, 328.—MEISSN., *Prodr.*, 156, n. 30; in *Mart. Fl. Bras. Laurac.*, 265, t. 95.—*Puchury*, *Picheri*, *Puchury* of the Brazilians.

<sup>3</sup> This is shorter and broader (20 to 34 mm. by 14 to 20).

<sup>4</sup> NEES, *Syst.*, 336.—MEISSN., *Prodr.*, n. 69. *Ocotea Puchury minor* MART., *Fl. Bras. Laurac.*, 277, t. 101.—BUCHN., *Rep.*, xxxv. 72.

<sup>5</sup> See above, p. 439, figs. 261-263, not. 3.—GUIB., *op. cit.*, 388.—PEREIRA, *Elem. Mat. Med.*, ed. 4, ii. p. i. 463.—LINDL., *Fl. Med.*, 340.—NEES & EBERM., *Handb.*, ii. 416; *Pl. Med.*, t. 132.—ROSENTH., *op. cit.*, 236.—H. BN., in *Dict. Encycl. des Sc. Médic.*, sér. 2, ii. 28.

<sup>6</sup> *Bacca Laureæ*, or *B. Lauri* Off. (see figs. 262, 263). The tree is often cultivated in our gardens, and also in France.

<sup>7</sup> The oil of the pericarp is mainly volatile and aromatic, that of the embryo fat and fixed. This mixture enters into the composition of several medicinal unguents, the balm of Fioravanti, &c.

<sup>8</sup> See p. 436, figs. 253-255, note 1.—GUIB., *loc. cit.*, 390.—PEREIRA, *op. cit.*, ii. p. i. 462.—NEES & EBERM., *Handb.*, ii. 418; *Pl. Med.*, t. 131.—MICHX., *Fl. Bor.-Amer.*, i. 244; *Arbr. For.*, iii. 173, t. i.—LINDL., *Fl. Med.*, 338.—ROSENTH., *op. cit.*, 235.

<sup>9</sup> GUIB., *loc. cit.*, 391. This bark is spongy and rust-coloured; its inner surface is covered with little white crystals.

<sup>10</sup> ROSENTH., *op. cit.*, 233.—MART., *Fl. Bras. Laurac.*, 318. The seeds of *A. Cujumari* NEES (*Syst.*, 247; MEISSN., *Prodr.*, 94, n. 84), are used in Brazil as digestive. The *Pichurim*-beans have been supposed the seeds of *A.?* Laurel NEES (*Syst.*, 249; MEISSN., *Prodr.*, n. 31;—*Ocotea Pichurim* H. B. K., *Nov. Gen. et Spec.*, ii. 266).

<sup>11</sup> ROSENTH., *op. cit.*, 233.—MART., *loc. cit.*, 317. *A. Camara* SCHOMB. (ex NEES, in *Linnaea*,

xxi. 500; MEISSN., *Prodr.*, 87, 12) has a bitter aromatic wood. Its fruits, split and dried by the Indians of North Brazil, are used in dysentery and other intestinal complaints. (SCHOMB., *Voy.*, ii. 335.)

<sup>12</sup> *Canella do Mato* of the Brazilians is *N. cinnamomoides* NEES (*Syst.*, 307; MEISSN., *Prodr.*, 167, n. 70;—*Laurus cinnamomoides* MUT., ex H. B. K., *Nov. Gen. et Spec.*, ii. 169;—? *L. Quiwos* LAMK., *Dict.*, iii. 455). This is also, no doubt, the *Canela* of New Granada, or *Canelo de los Andaguís*, very similar in properties to the Ceylon Cinnamon-tree. *N. sanguinea* ROTTB. (in *Act. Hafn.* (1778), 279; *Pl. Surin.*, 10; MEISSN., *Prodr.*, n. 62;—*Laurus sanguinea* Sw., *Fl. Ind. Occ.*, ii. 707 (part.);—*L. globosa* AUBL., *Guian.*, i. 364?—*L. martinicensis* JACQ., *Coll.*, ii. 109, t. 5, fig. 2;—*L. Borbonia* β LAMK., *Dict.*, iii. 450) furnishes a stimulant aromatic bark, the *Maraguanzimmt* of the Antilles and Guiana. *N. cymbarum* NEES (*Syst.*, 305; MEISSN., *Prodr.*, n. 32) is *Ocotea cymbarum* H. B. K. (*Nov. Gen. et Spec.*, ii. 160) and *O. amara* MART. (BUCHN., *Rep.*, xxxv. 180). We saw above that to this species was ascribed a so-called Pichurim-bark and Sassafras-wood. It is the Orinoco Sassafras- or Anise-wood, differing from the official Sassafras chiefly in the bitter mingled with its aroma. It is also called *Pao Sassafras* at Para; it is prized as a tonic, diuretic, diaphoretic, and emmenagogue. A syrup of the same properties is extracted therefrom, and is the *Siruba* of the Indians, the *Acete de Sassafras* of the Spaniards (see *Bull. Féruss.*, Jan., 1831, 63; ROSENTH., *op. cit.*, 234; LINDL., *Fl. Med.*, 336). VON MARTIUS thinks that it enters into the *curare* or *woorara* poison of Orinoco. The *Canella preto* of the Brazilians, a diuretic, emmenagogue, and carminative bark is ascribed to *N. mollis* NEES (*Syst.*, 287; MEISSN., *Prodr.*, ii. 8).

<sup>13</sup> *O. guianensis* AUBL. (*Guian.*, ii. 781, t. 310;—*Oreodaphne guianensis* NEES; MEISSN.,

*Cryptocarya*,<sup>1</sup> *Persea*,<sup>2</sup> *Machilus*,<sup>3</sup> *Lindera*,<sup>4</sup> *Litsæa*,<sup>5</sup> *Tetranthera*,<sup>6</sup> *Daphnidium*,<sup>7</sup> *Mespilodaphne*,<sup>8</sup> *Chibaca*,<sup>9</sup> *Christmannia*,<sup>10</sup> *Cassytha*.<sup>11</sup> In some others these parts become more or less bitter and astringent, so that they have been proposed as tonics and febrifuges. This has been the case with *Lindera Benzoin*,<sup>12</sup> of North America (figs. 258—260), prescribed as a stimulant, antiperiodic, and even vermifuge, and still more with *Nectandra Rodiei*,<sup>13</sup> the *Bebeeru*<sup>14</sup> of Guiana, which

*Prodr.*, 112, n. 1) is used in Guiana in the treatment of abscesses, buboes, &c.—*O. opifera* (*Oreodaphne opifera* NEES, *Syst.*, 390; MEISSN., *Prodr.*, n. 4) is the *Canella de Cheiro* of the Rio-Negro (BUCHN., *Rep.*, xxxv. 179; ROSENTH., *op. cit.*, 235). Its fruit is gorged with a limpid yellowish volatile oil, extracted by distillation. Its scent resembles a mixture of that of *Hypericum* and *Portugal*. It is used in affections of the joints, rheumatic pains, lumbago, &c.

<sup>1</sup> The Brazilian Nutmegs (Fr., *noix de Muscade du Brésil*) are the fruits of *C. moschata* MART. (ex MEISSN., *Prodr.*, 74, n. 30; *Fl. Bras.*, *Laurac.*, 319); they serve the same purposes as the *Pichurim-beans*. From the bark of *C. densiflora* BL. (*Caryodaphne densiflora* NEES) is extracted an aromatic bitter substance, used in Java, like the infused leaves, under the name of *Kitedja*, in spasmodic affections of the bowels, puerperal convulsions, &c. (BL., in *Nees Syst.*, 223).

<sup>2</sup> *P. drimifolia* SCHULT. (in *Linnaea*, vi. 365), *indica* SPRENG. (*Syst.*, ii. 268), and some others are used as tonics and stimulants.

<sup>3</sup> *M. odoratissima* NEES, and *pilosa* NEES, are also aromatic.

<sup>4</sup> *L. triloba* BL. (*Mus. Lugd.-Bat.*, i. 325) has the properties of *Sassafras officinale*, and indeed was given that name by SIEBOLD (in *Verh. Bat. Gen.*, xii. 28). The same virtues must exist in *L. obtusiloba* BL., *sericea* BL., and *umbellata* THUNB., also natives in Japan, and there used indifferently as sudorifics and depuratives.

<sup>5</sup> The bark of *L. Myrrha* NEES, and *zeylanica* NEES (in *Amen. Bot. Bonn.*, i. 58, t. 5; MEISSN., *Prodr.*, 226, n. 27) is aromatic, bitter, anthelmintic, excitant, and emmenagogue (ROSENTH., *op. cit.*, 237). The latter appears to be *Laurus Cassia* L. (nec alior.), the *Cassia cinnamomea Myrrha* odore of PLUKENET (*Almag.*, 80; *Amalth.*, 52, t. 381).—*L. glauca* SIEB. (*Laurus glauca* THUNB., *Fl. Jap.*, 173) yields a camphorated oil, of properties apparently similar to those of *Cinnamomum Camphora*.

<sup>6</sup> *T. laurifolia* JACQ. (MEISSN., *Prodr.*, 178, n. 5;—*Glabraria tersa* L., *Mantiss.*, 276;—*Sebifera glutinosa* LOUR., *Fl. Cochinch.*, 783;—*Litsæa sebifera* PERS., *Syn.*, ii. 4;—*L. chinensis* LAMK., *Dict.*, iii. 574), an Asiatic species introduced into America, has its leaves and branches

gorged with a glutinous substance, so that when bruised in water they make it mucilaginous. It is used in inflammations, redness of the skin, hysterical affections, &c. *T. citrata* NEES, *glabraria* NEES, *Roxburghii* BL., are only varieties of this, and possess the same properties. *T. monopetala* ROXB. (*Pl. Coromand.*, ii. 26, t. 148; MEISSN., *Prodr.*, n. 44) has an astringent bark, prescribed in India for diarrhoea, dysentery, &c.

<sup>7</sup> *D. Cubeba* NEES (*Syst.*, 615) is *Laurus Cubeba* LOUR. (*Fl. Cochinch.*, 310;—*Litsæa Cubeba* PERS., *Syn.*, ii. 4), whose aromatic berries have the same medicinal powers as the true cubeb.

<sup>8</sup> The *Bois de Cannelle* of the Mascarene islands is *M. cupularis* MEISSN. (*Prodr.*, 104, n. 28;—*Laurus cupularis* LAMK.;—*Agathophyllum cupulare* BL.). Aromatic stimulant barks are also produced by some neighbouring species of the same country. The *Canella Sassafras* of the Brazilians is *M. Sassafras* MEISSN. (*Prodr.*, n. 21).

<sup>9</sup> The bark of this doubtful Laurad (see above, p. 449, note 10) is considered in South Africa as an all-powerful specific in the malignant sore throat endemic in those parts (ROSENTH., *op. cit.*, 238); whence the name of *C. salutaris* BERT.

<sup>10</sup> *Corondi* is an Indian drug, produced by *C. Corondi* DENNST. (ex ROSENTH., *op. cit.*, 1066); but this plant probably does not belong to the order *Lauraceæ* (see p. 449, note 10).

<sup>11</sup> *C. filiformis* L. (see above, p. 440, note 6, figs. 264—268) is mixed with butter and used in urethritis in Senegal. A sort of putty is prepared in Java from bruised *Cassytha* and chalk.

<sup>12</sup> MEISSN., *Prodr.*, 244, n. 1.—*Laurus Benzoin* L., *Hort. Cliff.*, 134; *Spec.*, i. 580.—*L. pseudo-Benzoin* MICHX.—*Evosmus Benzoin* NUTT.—*Benzoin odoriferum* NEES, *Syst.*, 497.—LINDL., *Fl. Med.*, 339.—H. BN., in *Dict. Encycl. des Sc. Médic.*, ix. 96.—*Feverwood*, *Spicewood*, *Spiceberry* of the natives. A volatile oil is also extracted.

<sup>13</sup> SCHOMB., ex MEISSN., *Prodr.*, 155, n. 28.—*N. leucantha* γ NEES, in *Linnaea*, xxi. 508 (part.).

<sup>14</sup> Or *Bibiru* of the Arrawacks, *Sipeeri* of the Dutch, *Cœur vert* [green-heart] of the French colonists.

is said to be successfully exhibited as a succedaneum of cinchona.<sup>1</sup>

A large formation of sugar is remarked in but few *Lauraceæ*. It occurs, however, in the leaves of the true Ceylon Cinnamon-tree,<sup>2</sup> and, above all, in the pericarp of the Avocado (*Persea gratissima*; Fr., *Avocatier*).<sup>3</sup> The fruit of this tree, known as the Avocado- or Alligator-pear,<sup>4</sup> is one of the best known in the tropics, though somewhat sickly to a European palate. It is a pear-shaped berry, at first green, later more or less violet or brownish, wherein is found a large globular seed with fleshy hemispherical cotyledons. The pulp, seasoned in various ways, is sometimes termed *vegetable butter* (Fr., *beurre végétal*) or *subalterns' butter*. Its taste is compared to the artichoke and the hazel nut. It is used as food and as medicine;<sup>5</sup> and the buds leaves and seeds also serve the latter purpose in the Antilles.<sup>6</sup> The pericarp is very rich in fatty matter—a greenish oil, as in the common Bay. In the fruit of *Tetranthera laurifolia*<sup>7</sup> this becomes a true wax, used for making tapers.

There is but one Laurad used on account of its colouring matter: *Ocotea tinctoria*.<sup>8</sup>

The wood of many Laurads is very good and handsome, with a fine close grain, often shining, through the presence of numerous little dents, more rarely dark coloured as in *Nectandra cymbarum*<sup>9</sup> and *Rodier*<sup>10</sup> and *Silvia navalium* ALLEM.<sup>11</sup> These woods are dense, resisting the action of water, and used in ship-building. Many others of lower density but greater elasticity, pale tawny in colour, with a silky gleam, are prized by the cabinet-maker. Boxes and

<sup>1</sup> RODIE, in *Guian. Roy. Gaz.* (8 Aug., 1844).—GUILB., *Drog. Simp.*, ed. 6, ii, 395.—PEREIRA, *Elem. Mat. Med.*, ed. 4, ii, p. i, 465.—MART., *Fl. Bras., Laurac.*, 319. The bark contains the alkaloid bebeerin (C<sub>19</sub>H<sub>21</sub>NO<sub>3</sub>), whose sulphate is said to act as an antiperiodic, though less strongly than the sulphate of quinine.

<sup>2</sup> The sweet taste of its leaves affords a ready mode of distinguishing it in cultivation from its very similar allies.

<sup>3</sup> GÆRTN., *Fruct.*, iii, 222.—NEES, *Syst.*, 128.—MEISSN., *Prodr.*, 52, n. 36.—GUILB., *op. cit.*, ii, 399.—LINDL., *Fl. Med.*, 333.—MART., *Fl. Bras., Laurac.*, 320.—H. BN., in *Dict. Encycl. des Sc. Médic.*, vii, 520.—*Persea* CLUS., *Hist.*, i, 2.—PLUM., *Amer.*, 44, t. 20.—*P. præcox* PÉFF.—*P. Schiedeana* NEES.—*Prunifera arbor fructu maximo piriformi* SLOAN., *Jam.*, ii, 132,

t. 222.—*Laurus Persea* L., *Spec.*, ed. 2, 529.

<sup>4</sup> *Aguacate* or *Palto*, *Aouara*, Pear of New Spain, *Avocado* of the Brazilians.

<sup>5</sup> Employed by the negroes of the Antilles in the treatment of all the disorders of women.

<sup>6</sup> The leaves as a pectoral vulnerary and stomachic; the buds as a remedy for bruises and syphilis; the juice of the seed as an astringent. This last, rich in tannin, affords an indelible ink, which turns brown in the air (used for marking clothes, &c.). All animals prize the fruit for food.

<sup>7</sup> See p. 459, note 6.

<sup>8</sup> NEES, ex ROSENTH., *op. cit.*, 235.

<sup>9</sup> See p. 458, note 12.

<sup>10</sup> See p. 459, notes 13, 14. MART., *Fl. Bras., Laurac.*, 315.

<sup>11</sup> See p. 468, note 4.

cupboards made therefrom are usually protected by their perfume against the attacks of insects. These woods are numerous in the Antilles, Brazil, and especially in Guiana. But in this last country many kinds are as yet only known by their vulgar names, without its being exactly known to what botanical species they really belong. Such are the yellow and brown *Taoub*-woods, several Sassafras and Anise-woods, and the male and female Rose-woods. These are certainly from Laurads, but their genera are still undetermined. *Licaria guianensis* AUBL.<sup>1</sup> is one of these Rose-woods. The marsh yellow-cedar-wood (*bois de Cèdre jaune de marais*) of Guiana is probably a *Cryptocarya*. One kind of Sassafras of Cayenne is *Acrodiclidium chrysophyllum*,<sup>2</sup> and the grey cedar (*Cèdre gris*) of the same country is *Ocotea splendens*.<sup>3</sup> *Nectandra exaltata*<sup>4</sup> is the Timber Sweet-wood of Jamaica. The wood of *Dicypellium caryophyllum*<sup>5</sup> is handsome and scented; it has wrongly been supposed to produce the true Rosewood. *Misanteca capitata*,<sup>6</sup> the *Palo misanteco* of the Mexicans, yields a good wood. The wood of *Persea indica*<sup>7</sup> is named *Vinhatico* in Madeira and the Canary Islands. The *Siriballi*<sup>8</sup> of Guiana seems to be an *Ocotea*. The wood is intolerably fœtid in many species, such as *Nectandra myriantha*<sup>9</sup> of Brazil, *Ocotea bullata*<sup>10</sup> of the Cape, and *O. fœtens*,<sup>11</sup> the *Til* of the Canaries. This species is cultivated in our orangeries, where its persistent shining green leaves produce a fine effect, resembling the classic Laurel, the tree of Apollo, of temperate Europe, sung and depicted by poets and artists innumerable. The polymorphous leaves of the Sassafras are curiously noted in our gardens; and in our conservatories are found species of *Apollonias* and *Cinnamomum*, whose flowers are insignificant, but whose foliage is always handsome and more or less aromatic.

<sup>1</sup> See p. 447, note 11. GUIB., *op. cit.*, 397. The Galibis call it *Licari kassali*. It is also sold in Paris under the names of *Bois jaune de Cayenne*, *Citron de Cayenne*, and *Copahu*.

<sup>2</sup> MEISSN., *Prodr.*, 87, n. 14.

<sup>3</sup> MEISSN., *Prodr.*, 129, n. 83.

<sup>4</sup> GRISEB., *Fl. Brit. W. Ind.*, 281.—MEISSN., *Prodr.*, 165, n. 65.—*Persea exaltata* SPRENG., —*Oreodaphne exaltata* NEES. The *White sweetwood* of the Antilles is *N. Willdenowiana* NEES (*Syst.*, 290, 321.—MEISSN., *Prodr.*, n. 64.—*Laurus sanguinea* SW. (part.).

<sup>5</sup> See p. 462, notes 5, 6.

<sup>6</sup> See p. 469, notes 4–8.

<sup>7</sup> SPRENG., *Syst.*, ii. 268.—MEISSN., *Prodr.*, 52, n. 33.—*Laurus indica* L., *Spec.*, 529. This

species is cultivated and flowers in our botanical gardens.

<sup>8</sup> LINDL., *Veg. Kingd.*, 536.

<sup>9</sup> MEISSN., *Prodr.*, 163, n. 58.—MART., *Fl. Bras., Laurac.*, 315.—*Canella fœdorente* of the natives (RIEDEL).

<sup>10</sup> E. MEX., in *Pl. Drège*.—*Oreodaphne bullata*, MEISSN., *Prodr.*, 118, n. 31.—*Stinkwood* of the English colonists.

<sup>11</sup> *Laurus fœtens* AIT., *Hort. Kew.*, ii. 39.—*Persea fœtens* SPRENG., *Syst.*, ii. 268.—*Oreodaphne fœtens* NEES, *Syst.*, 449.—MEISSN., *Prodr.*, n. 32. It is also called *Vignatico*, *Arbol santo* and *Madeira Laurel* at Madeira (see p. 434, fig. 250).

## GENERA.

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### I. CINNAMOMEÆ.

1. **Cinnamomum** BURM.—Flowers hermaphrodite, or more rarely polygamous; receptacle infundibuliform; perianth perigynous; perianth-leaves 6, valvate 2-seriate subpetaloid, finally deciduous by transverse rupture at or above base. Stamens 12, 4-seriate; fertile 9, anthers superposed-4-locellate; in 6 outer fertile stamens anthers introrse; in 3 inner anthers extrorse, filaments bearing 2 lateral glands above base. Sterile stamens (staminodes) 3, oppositipetalous, ovate or oblong. Germen inserted in bottom of receptacle; ovule 1, attached near apex, descending anatropous; micropyle introrse superior. Fruit a berry; pericarp thin; fruit adhering to thickened cupuliform evenly truncated base of receptacle, and 6-merous more or less hardened base of perianth. Seed exalbuminous; embryo fleshy thick; cotyledons ensheathing straight short superior radicle at base.—Trees or shrubs, evergreen, nearly all aromatic; leaves opposite or alternate, exstipulate, penniveined or at base 3-5-veined, more rarely triple or quintupleveined; leaf-buds bare, scales obsolete (*Malabathrum*) or perulate; flowers in racemes; racemes axillary or terminal, simple or bearing 3-∞-flowered cymes (*Tropical and subtropical Asia*). See p. 426.

2. **Phœbe** NEES.<sup>1</sup>—Flowers almost those of *Cinnamomum*; receptacle shortly infundibuliform, entirely persistent erect with indurated perianth round fruit, base often becoming subligneous. Berry on a pedicel of variable thickness. Other characters of *Cinnamomum*.—Trees or shrubs, leaves alternate or subverticillate penniveined or tripliveined; gemmæ with few leafy scales; flowers in axillary and

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<sup>1</sup> *Syst.*, 98.—ENDL., *Gen.*, n. 2026.—MEISSN., *Prodr.*, 29, 504.



terminal compound cymiferous racemes (*Polynesia, Asia, Tropical America*<sup>1</sup>).

3. *Machilus* RUMPH.<sup>2</sup>—Flowers nearly of *Cinnamomum*; perianth cartaceous; leaves 6, persistent unchanged and not indurated, spreading or reflexed; 3 outer equal to inner or a little shorter. Stamens 12 (of *Cinnamomum*). Berry subglobose, supported on unthickened pedicel.—Trees; leaves alternate penniveined; leaf-buds imbricate scaly; flowers<sup>3</sup> in compound cymiferous racemes or corymbs springing from base of a terminal or axillary bud; bracts scaly deciduous (*Tropical and subtropical Asia*<sup>4</sup>).

4. *Alseodaphne* NEES.<sup>5</sup>—Flowers of *Cinnamomum*; perianth almost wholly deciduous. Berry surrounded at base by rather small persistent cupuliform receptacle, supported by thickened club-shaped or long-obconical pedicel.—Trees; leaves alternate coriaceous penniveined; leaf-buds naked or few-scaled; flowers in compound cymiferous racemes either lateral or axillary to bud-scales (*Tropical and subtropical Asia*<sup>6</sup>).

5. *Persea* GÆRTN.<sup>7</sup>—Flowers nearly of *Cinnamomum*; 3 outer perianth-leaves subequal to inner or decidedly shorter. Stamens 12 (of *Cinnamomum*). Berry ovoid or oblong, supported on more or less thickened or unchanged pedicel, surrounded by unchanged or slightly altered perianth and receptacle (which are rarely deciduous at base).—Trees or shrubs; leaves alternate coriaceous, penniveined, or more rarely pseudo-tripliveined; leaf-buds naked compressed bivalve; inflorescences axillary or terminal<sup>8</sup> (*Tropical and subtropical America, Asia*<sup>9</sup>).

<sup>1</sup> Species about 40, whereof 14 are American. BL., *Mus. Lugd.-Bat.*, i. 325.—MIQ., *Fl. Ind.-Bat.*, i. 905 (excl. sect. ii).—NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 70 (*Ocotea*); in *Linnaea*, xxi. 489.—SPRENG., *Syst.*, ii. 270 (*Persea*).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 148, t. 45.

<sup>2</sup> *Herb. Amboin.*, iii. 70, t. 24.—NEES, *Syst.*, 122, 171.—ENDL., *Gen.*, n. 2028.—MEISSN., *Prodr.*, 39.

<sup>3</sup> Rather large for this order.

<sup>4</sup> Species about 15. LOUB., *Fl. Cochinch.*, 311 (*Laurus*).—THUNB., *Fl. Jap.*, 173 (*Laurus*). BL., *Mus. Lugd.-Bat.*, i. 329.—NEES, in *Wall. Pl. Asiat. Rar.*, 61, 70.—MIQ., *Fl. Ind.-Bat.*, i. 914.—SIEB. & ZUCC., in *Abh. Münch. Acad.*, iii. 302.

<sup>5</sup> *Progr.*, 11; *Syst.*, 122, 181.—ENDL., *Gen.*, n. 2030.—MEISSN., *Prodr.*, 27.

<sup>6</sup> Species 7, 8. WIGHT, *Icon.*, t. 1826, 1827.—NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 71.—BL., *Mus. Lugd.-Bat.*, i. 331.—MIQ., *Fl. Ind.-Bat.*, i. 915.—BENTH., in *Hook. Journ.*, v. 198; *Fl. Hongk.*, 291.

<sup>7</sup> *Fruct.*, iii. 222.—NEES, *Syst.*, 123 (part.)—ENDL., *Gen.*, n. 2027.—MEISSN., *Prodr.*, 43, 505.

<sup>8</sup> Sections 2:—1. *Eriodaphne* NEES: sepals decidedly shorter than petals; staminodes pubescent or bearded; flowers usually silky-pubescent (species American).—2. *Gnesiopersea*: perianth-leaves all subequal; staminodes not bearded at apex (species American and Asiatic).

<sup>9</sup> Species about 50. NEES, in *Wall. Pl. Asiat.*

6. *Notaphœbe* BL.<sup>1</sup>—Flowers nearly of *Cinnamomum*; 3 outer perianth-leaves shorter, often minute. Stamens 12 (of *Cinnamomum*). Berry surrounded by 6-lobed persistent perianth, supported on short spreading receptacle and more or less thickened pedicel.—Trees; leaves alternate penniveined; leaf-buds imperfect; inflorescences axillary or terminal (*Continent and Islands of India*<sup>2</sup>).

7. *Apollonias* NEES.<sup>3</sup>—Flowers of *Cinnamomum*; anthers 2-celled. Berry surrounded at base by a hardened scarcely enlarged receptacle and perianth.—Trees; leaves alternate penniveined; leaf-buds naked; inflorescences axillary and subterminal<sup>4</sup> (*Canary Islands, India*<sup>5</sup>).

8. *Hufelandia* NEES.<sup>6</sup>—Flowers of *Apollonias*; receptacle and perianth herbaceous deciduous. Berry succulent, supported on small truncate base of receptacle.—Shrubs; leaves alternate penniveined; inflorescences axillary (*Tropical America*<sup>7</sup>).

9. *Nesodaphne* Hook. F.<sup>8</sup>—Flowers nearly of *Hufelandia*; receptacle very short. Calyx wholly deciduous. Stamens 9, fertile; 3 innermost 2-glandular extrorse. Berry (dry ?) naked oblong borne on thickened pedicel.—Evergreen trees; leaves alternate and opposite, coriaceous penniveined; flowers in slightly branching axillary and terminal racemes (*New Zealand*<sup>9</sup>).

10. *Haasia* BL.<sup>10</sup>—Flowers nearly of *Hufelandia* or *Nesodaphne*; outer 3 perianth-leaves smaller, usually dwarfed. Stamens nearly of *Apollonia*; fertile 9; anthers 2-celled, subrotund; inner 3 extrorse.

*Rar.*, iii. 32.—MIQ., *Fl. Ind.-Bat.*, i. 913.—H. B. K., *Nov. Gen. et Spec.*, ii. 157.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 151, t. 46-55.

<sup>1</sup> *Mus. Lugd.-Bat.*, i. 328.—MEISSN., *Prodr.*, 58.

<sup>2</sup> Species about 8. NEES, *Syst.*, 115 (*Phœbe*).—MIQ., *Fl. Ind. Bat.*, i. 911 (*Phœbe*); in *Zoll. Verz.*, 113, 115 (*Dehaasia*).

<sup>3</sup> *Syst.*, 95.—ENDL., *Gen.*, n. 2025.—MEISSN., *Prodr.*, 64, 506.

<sup>4</sup> A genus coming very near *Phœbe* in fruit, but differing in its 2-celled anthers.

<sup>5</sup> Species 2. One Indian *A. Arnottii* NEES (*Syst.*, 670); the other from Madeira and the Canaries, often cultivated in France, namely, *A. canariensis* NEES (*Syst.*, 96;—*Persea canariensis* SPRENG.;—*Laurus Barbusano* CAV.;—*L. reticulata* POIB.;—*L. Teneriffæ* POIB.;—

*Phœbe Barbusana* WEBB, *Phyt. Canar.*, ii. 223<sup>o</sup> t. 203).

<sup>6</sup> *Syst.*, 122, 187.—ENDL., *Gen.*, n. 2031.—MEISSN., *Prodr.*, 65.—*Wimmeria* NEES (nec *altior.*, ex MEISSN., *loc. cit.*).

<sup>7</sup> Species 3 or 4. SW., *Prodr.*, 65; *Fl. Ind. Occ.*, ii. 719 (*Laurus*).—NEES, *Disp.*, 23.—GRISEB., *Fl. Brit. W. Ind.*, i. 280; *Pl. Wright.*, 188.

<sup>8</sup> *Fl. N.-Zeal.*, 217.—MEISSN., *Prodr.*, 66.

<sup>9</sup> Species 2. 1. *N. Tarairi* Hook. F. (*Laurus Tarairi* A. CUNN.); 2. *N. Tawa* Hook. F. (*Laurus Tana* A. CUNN.—*L. salicifolia* BANKS & SOLAND., nec SW.) [BENTH. & F. MUELL. (*Fl. Austr.*, v. 299) add ad Australian species, *N. obtusifolia* BENTH.]

<sup>10</sup> Ex NEES, *Syst.*, 372.—ENDL., *Gen.*, n. 2032.—MEISSN., *Prodr.*, 59, 506.—*Dehaasia* NEES, *Syst.*, 354, 675.

Staminodes subsessile, 3-angular or very short. Berry ovate, naked (perianth wholly deciduous), on thickened fleshy pedicel (nearly of *Alseodaphne*).—Trees; leaves alternate, often crowded at end of branches, penniveined; bud-scales few foliaceous; inflorescences subterminal, often few-flowered (*India*).

11. *Beilschmiedia* NEES.<sup>2</sup>—Flowers of *Hufelandia* or *Nesodaphne*; perianth-leaves 6, subequal deciduous. Germen imperfectly 2-celled, 1-ovulate. Berry dry, supported on nearly flat persistent base of receptacle.—Trees; leaves alternate or subopposite, penniveined reticulate; inflorescences springing from an axillary bud; bracts deciduous<sup>3</sup> (*India*).

12. *Aiouea* AUBL.<sup>5</sup>—Flowers elongated; receptacle long obconical infundibuliform, usually pubescent inside; perianth-leaves short, continuous with receptacle, finally deciduous with upper part of receptacle by circumscission. Stamens 9–12, inserted in throat of receptacle; 6 outer perfect; anthers apiculate; cells 2, introrse lateral or extrorse; 3 inner sterile, opposite outer perianth-leaves antherless, 2-glandular at base. Staminodes 3 small (or 0?). Germen inserted in bottom of, and closely surrounded by, receptacle. Berry oblong naked, supported on nearly plane persistent base of receptacle and thickened long-obconical or clavate pedicel.—Trees or shrubs; leaves alternate coriaceous penniveined or more rarely 3-ribbed; inflorescences usually crowded into lax, dichotomously branching cymiferous corymbs; pedicels thin<sup>6</sup> (*Tropical South America*).

<sup>1</sup> Species about 16. NEES, *Syst.*, 124 (*Persea*, subsect. *Corynopodes*); in *Wall. Pl. Asiat. Rar.*, ii. 70 (*Machilus*).—BL., in *Rumphia*, i. 162; *Mus. Lugd.-Bat.*, i. 333 (*Dehaasia*).—MIQ., *Fl. Ind.-Bat.*, i. 928.—JACK., *Mal. Misc.*, ii. 7, 33? (*Laurus*).—WIGHT, *Icon.*, t. 1831.—THW., *Enum. Pl. Zeyl.*, 253.

<sup>2</sup> *Syst.*, 192, 197.—ENDL., *Gen.*, n. 2034.—MEISSN., *Prodr.*, 62.

<sup>3</sup> This genus, nearest to *Haasia*, and (among the *Cinnamomeæ*) analogous to *Cryptocarya*, differs from the former chiefly in the structure of the germen and fruit.

<sup>4</sup> Species 6, 7. ROXB., *Hort. Calc.*, 30 (*Laurus*).—BL., *Bijdr.*, 555 (*Laurus*).—ZOLL., *Verz.*, 113 (*Haasia*).—WALL., *Cat.*, n. 2539 (*Tetranthera*).—MIQ., *Fl. Ind.-Bat.*, i. 919, 969 (*Daphnidium*).—BL., *Mus. Lugd.-Bat.*, i. 332.

<sup>5</sup> *Guian.*, i. 310, t. 120.—J., *Gen.*, 80.—NEES, *Syst.*, 354, 362.—ENDL., *Gen.*, n. 2050.—MEISSN., *Prodr.*, 82, 509.—*Douglasia* SCHREB., *Gen.*, n. 1761.—*Ehrhardia* SCOP. (ex MEISSN., *loc. cit.*).

<sup>6</sup> This genus, ascribed by authors to *Cryptocaryeæ* on account of its greatly elongated concave receptacle—which is indeed anomalous in *Cinnamomeæ*—must yet be classed in the latter group because of its wholly free germen, differing from *Cinnamomum* and the neighbouring genera only in its longer obconical receptacle. The ripe fruit is altogether that of *Alseodaphne*, and is not enclosed in the sacciform receptacle.

<sup>7</sup> Species about 7. NEES, in *Linnaea*, xxi. 512; in *Bot., Zeit.*, xxii., Beibl., 64.—R&M. & SCH., *Syst.*, vii. n. 1300.—WALP., *Ann.*, iii. 311.

13. **Potameia** DUP.-TH.—Flowers hermaphrodite (or polygamous ?), 2-merous ; sepals 2 petals 2, alternating, nearly similar to one another. Stamens 6-8 ; 2 outer alternate with petals and 2 opposite fertile ; filaments short dilated subfoliaceous ; anthers introrse 2-celled. Stamens of third row 2, alternipetalous sterile, 2-glandular at base. Staminodes 2, interior oppositipetalous sterile minute glandlike, more frequently 0. Germen free (of *Machilus*). Berry superior free, inserted on unthickened pedicel and surrounded at base by short receptacle and scarcely enlarged perianth.—A shrub ; branches erect ; leaves alternate linear-lanceolate ; inflorescences axillary to leaves of upper twigs (*Madagascar*). See p. 431.

## II. CRYPTOCARYEÆ.

14. **Cryptocarya** R. BR.—Flowers hermaphrodite ; receptacle long-urceolate accrescent, more or less narrowed in throat. Perianth 6-leaved, deciduous or more rarely persistent (*Cyanodaphne*) ; outer leaves often smaller. Stamens 12 ; outer 9 fertile ; anthers 2-celled ; anthers of first and second rows introrse, anthers of third row extrorse or subextrorse, 2-glandular at base. Staminodes 3, interior oppositipetalous, varying in form. Germen inserted in bottom of receptacle. Berry included in and slightly or closely (*Caryodaphne*) adherent to dry or succulent receptacle.—Trees ; leaves alternate penniveined, more rarely subtripliveined or three ribbed (*Caryodaphne*) ; bud-scales few ; inflorescences axillary or terminal (*Tropical Asia, Indian Archipelago, Malaysia, Australia, Tropical Africa and America*). See p. 431.

15. **Boldu** FEUILL.—Flowers of *Cryptocarya*. Berry ovate, rarely surrounded by non-adherent and dry fragile receptacle, which is rarely persistent, usually falling more or less early and leaving berry naked supported on thickened pedicel. Other parts of *Cryptocarya*.—Trees ; leaves opposite or subopposite, coriaceous penniveined ; buds naked ; inflorescences axillary (*Chili*). See p. 432.

16. **Ravensara** SONNER.—Flowers hermaphrodite (or polygamous ?) ; receptacle obconical thick concave. Perianth-leaves 6 free equal, often inflexed at apex valvate. Stamens 12, inserted in throat of receptacle and adnate to base of perianth-leaves ; 9 fertile ; anthers 2-celled ; 6 outer introrse ; 3 inner subextrorse or

extrorse; 3 innermost quite sterile ovate or subsagittate. Germen inserted in bottom of receptacle, free; style capitate stigmatiferous at apex; ovule subpendulous anatropous. Fruit wholly included; receptacle much thickened with woody vertical dissepiments projecting inwards; pericarp thin, closely appressed to seed and like it divided into 6 lobes by receptacular dissepiments, except just below apex, long crowned by persistent perianth and androceum, finally umbilicate at apex. Embryo fleshy, shaped like seed and pericarp; radicle short, straight, superior; cotyledons deeply 3-lobed below.—Trees; leaves alternate coriaceous penniveined; inflorescences axillary and terminal often short (*Madagascar*). See p. 433.

17. **Ampelodaphne** MEISSN.<sup>1</sup>—Flowers dioecious; receptacle infundibuliform, lined within by a thin disk; perianth-leaves 6 regular, finally deciduous. Stamens 9 (in female flower sterile, sometimes 3 or 6 absent) inserted on throat of receptacle, 2-celled; three innermost extrorse, 2-glandular. Germen (rudimentary or 0 in male flower) inserted and included in bottom of receptacle. Fruit (baccate?) long included in receptacle and crowned by perianth, finally half-exserted and surrounded at base by truncate quite entire lower part of receptacle.—Trees or shrubs; leaves alternate or subverticillate, coriaceous penniveined; inflorescences many-flowered pyramidal, axillary or subterminal (*Tropical South America*<sup>2</sup>).

18. **Aydendron** NEES & MART.<sup>3</sup>—Flowers hermaphrodite; receptacle infundibuliform or urceolate; perianth-leaves 6 subequal, equal to receptacle or longer deciduous. Stamens 9, fertile inserted in throat of receptacle; anthers ovate obtuse, dehiscing by 2 sub-apical valves (apparently 3-porricidal through early fall of valves); innermost 3 extrorse, 2-glandular at base. Sterile stamens 0 or minute. Germen included in receptacle. Berry almost completely included or half-exserted; rim of cupule, single or double; inner lip inflexed finally erect; outer patulous or scarcely prominent.—Trees or shrubs; leaves alternate penniveined; inflorescences axillary or subterminal (*Tropical America*<sup>4</sup>).

<sup>1</sup> *Prodr.*, 81.

<sup>2</sup> Species 3. MIQ., *Pl. Surin.*, 203.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 167, t. 57.—WALP., *Ann.*, iii, 112 (*Gæppertia*).

<sup>3</sup> NEES & MART., in *Linnaea*, viii, 36.—NEES' *Syst.*, 245.—ENDL., *Gen.*, n. 2040.—MEISSN., *Prodr.*, 87, 510.

<sup>4</sup> Species about 35. NEES, in *Linnaea*, xxi.

19. *Acrodiclidium* NEES.<sup>1</sup>—Flowers hermaphrodite; receptacle obconical tubular or suburceolate, more or less narrowed in throat; perianth-leaves 6, subequal to receptacle or shorter. Stamens 9 inserted in throat of receptacle; outer 6 sterile, scale-like or glandular; innermost 3 fertile; filaments thick, often short, more or less coherent. Anthers extrorse 2-celled; cells dehiscing by a little oblique lid which early disappears. Germen inserted in bottom of receptacle. Berry more or less dry, included in truncate, or inserted on finally flat receptacle; rim single or double.—Trees or shrubs; leaves alternate or more rarely opposite, penniveined; inflorescences axillary and subterminal; bracts small or caducous (*Tropical America*).

20. *Silvia* ALLEM.<sup>2</sup>—“Flowers hermaphrodite. Calyx infundibuliform; limb 6-cleft; lobes equal, shorter than tube (receptacle), persistent. Outer stamens 0; stamens of third row 3, inserted in throat, opposite outer calyx-lobes, extrorse glandular; anthers ovate obtuse tapering into short flat glabrous filaments, obliquely 2-porricidal a little below apex. Staminodes 0. Germen closely included in calyx-tube, free ovate; style filiform; stigma peltate umbilicate. Berry dry oval, surrounded at base by spreading, scarcely enlarged, 6-lobed calyx.—Trees, with altogether habit of *Acrodiclidium*; flowers small naked paniced” (*Brazil*).

21. *Endiandra* R. BR.<sup>3</sup>—Flowers polygamous; receptacle obconical thick; perianth deciduous; 3 outer leaves equal to inner or a little shorter. Stamens 9, 6 outer sterile small or gland-like, nearly free or connate into a ring; 3 inner fertile; filaments 2-glandular or glandless at base; anthers extrorse 2-celled. Berry im-

497.—W., *Spec.*, ii. 482 (*Laurus*)?—SPRENG., *Syst.*, ii. 269.—H. B. K., *Nov. Gen. et Spec.*, ii. 266 (*Ocotea*).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 176, t. 62–66, 105 (ii.).—WALP., *Ann.*, iii. 308. (To this must be ascribed *Persea hypericifolia* NEES, *Syst.*, 165.—*Laurus hypericifolia* W.—*Cryptocarya*? *dubia* H. B. K., *Nov. Gen. et Spec.*, ii. 167.)

<sup>1</sup> *Syst.*, 244, 266.—ENDL., *Gen.*, n. 2042.—MEISSN., *Prodr.*, 84, 510.

<sup>2</sup> Species about 14. SW., *Prodr.*, 65 (*Laurus*); *Fl. Ind. Occ.*, ii. 706, 709.—SPRENG., *Syst.*,

ii. 176 (*Endiandra*).—NEES, in *Linnæa*, xxi. 500.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 172, t. 59–61.

<sup>3</sup> *Descr. Gen. Silvia Impress.* (ex MEISSN., *Prodr.*, 84, nec VELLOZ.).—*Silvæ* MEISSN., *loc. cit.* (nec PHILIPP., nec H. BN.).

<sup>4</sup> Species 1. *S. navalium* ALLEM., *loc. cit.*, ic.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 171 (*Silvæ*).—*Tapinohan* of the natives.

<sup>5</sup> *Prodr.*, 402.—NEES, *Syst.*, 193.—ENDL., *Gen.*, n. 2033.—MEISSN., *Prodr.*, 78, 509.

mersed in truncate receptacle.—Trees; leaves alternate penniveined; bud-scales leafy; inflorescences axillary (*India, Australia*<sup>1</sup>).

22. *Dictyodaphne* BL.<sup>2</sup>—Flowers of *Endiandra*; perianth deciduous; 3 outer leaves larger. Sterile stamens 0; fertile 3; cells sublateral. Berry quite naked, the whole perianth and receptacle coming off by circumscission at base.—Trees; leaves alternate penniveined; buds small incomplete; flowers in axillary, simple or scarcely branched racemes (*Continent and Islands of India*<sup>3</sup>).

23. *Misanteca* CHAM. & SCHLTL.<sup>4</sup>—“Flowers hermaphrodite. Calyx<sup>5</sup> fleshy ovoid, 6-toothed; limb<sup>6</sup> deciduous; outer teeth broader. Stamens 9, inserted in throat; outer 6 sterile short conical truncate; inner 3 larger; all united into a column; anthers extrorse 2-celled, dehiscing by 2 oval apical valves; accessory cells 2 rudimentary barren. Pistil wholly included in staminal tube, free; style simple; stigma capitate depressed. Drupe (or nut<sup>7</sup>) olive-like mucronate half-exserted; cupule thickened truncate; rim narrow double.—A tree; leaves alternate coriaceous penniveined; flowers forming contracted cymes and a compound capitulum; bracts fugacious” (*Mexico*<sup>8</sup>).

24. *Bihania* MEISSN.<sup>9</sup>—“Flowers hermaphrodite? Calyx infundibuliform, 6-partite; lobes subequal. Stamens 12, 4-seriate glandless; 6 outer sterile petaloid opposite and similar to calyxlobes; stamens of third row (3) fertile connivent linear-cuneate subtriquetrous truncate. Anthers confluent with filament; locelli 4 (?) apical on same plane 2 introrse, 2 extrorse; stamens of fourth row (staminodes) subulate. Germen (sterile?) narrow included in calyx tube, tapering into style; stigma simple obtuse. Fruit<sup>10</sup> . . . ? —A tree; leaves alternate coriaceous penniveined; panicles lateral lax” (*Borneo*<sup>11</sup>).

<sup>1</sup> Species 5, 6. NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 68.—F. MUELL., *Fragm.*, ii. 90.—BENTH. & F. MUELL., *Fl. Austr.*, v. 300.

<sup>2</sup> *Mus. Lugd.-Bat.*, i. 270.—MEISSN., *Prodr.*, 78, 509.

<sup>3</sup> Species 6, 7. BL., *Mus. Lugd.-Bat.*, i. 332 (*Endiandra*).—MIQ., *Fl. Ind.-Bat.*, i. 918.—WALP., *Ann.*, iii. 107.

<sup>4</sup> In *Linnaea*, vi. 367.—NEES, *Syst.*, 244, 272.

—ENDL., *Gen.*, n. 2043.—MEISSN., *Prodr.*, 95, 510.

<sup>5</sup> Or rather receptacle (?).

<sup>6</sup> Or rather calyx (?).

<sup>7</sup> Ex A. GRAY, in *Proceed. Amer. Acad.*, v. 189.

<sup>8</sup> Species 1. *M. capitata* CHAM. & SCHLTL.

<sup>9</sup> *Prodr.*, 96.

<sup>10</sup> “The size of a swan’s egg.” (MOTL.)

<sup>11</sup> Species 1. *B. borneensis* MEISSN.

25. **Mespilodaphne** NEES.<sup>1</sup>—Flowers hermaphrodite or dioecious; receptacle infundibuliform subcampanulate or obconical; perianth-leaves 6 equal, deciduous or more or less persistent. Stamens 9, fertile, 3 innermost extrorse 2-celled; anthers with 2 superposed pairs of locelli; sterile stamens 0 or minute. Germen closely involved in receptacle. Berry included in perianth, more or less constricted at apex or half-exserted; rim of cupule simple or rarely double (*Nemodaphne*<sup>2</sup>).—Trees or shrubs; leaves alternate or subverticillate, coriaceous penniveined, sometimes reticulatè; inflorescences axillary or terminal<sup>3</sup> (*Tropical America, Mascarene Islands*<sup>4</sup>).

### III. OCOTEEÆ.

26. **Ocotea** AUBL.—Flowers dioecious, more rarely hermaphrodite; receptacle shortly infundibuliform or cupuliform; perianth-leaves 6, equal or subequal, deciduous. Fertile stamens 9; outer 6 introrse, with 2 pairs of superposed locelli; inner 3 extrorse 2-glandular. Staminodes 0, or more rarely small tooth-like subulate or obsolete. Germen free, scarcely immersed in receptacle. Berry immersed in truncate entire cupuliform receptacle; pedicel thickened slightly or not at all.—Trees or shrubs; leaves alternate, usually coriaceous, penniveined or very rarely pseudo-tripliveined; flowers cymose, arranged in simple or branched axillary or terminal racemes (*Tropical and subtropical America, Continent and Islands E. and W. of Tropical Africa*). See p. 434.

27. **Strychnodaphne** NEES.<sup>5</sup>—Flowers of *Ocotea*; perianth all persistent; berry supported on nearly flat or slightly concave receptacle and surrounded at base by short 6-lobed spreading perianth. Other parts of *Ocotea*.—Trees or shrubs; leaves alternate penniveined; inflorescences axillary or terminal (*Tropical America*<sup>6</sup>).

<sup>1</sup> *Syst.*, 192, 235.—ENDL., *Gen.*, n. 2039.—MEISSN., *Prodr.*, 96, 510.

<sup>2</sup> MEISSN., *Prodr.*, 109.

<sup>3</sup> This genus comes very near *Ocotea*.

<sup>4</sup> Species about 50. NEES, in *Linnaea*, viii. 45.—SPRENG., *Syst.*, ii. 496 (*Myginda*).—H. B. K., *Nov. Gen. et Spec.*, vii. 192, t. 645 (*Cryptocarya*).—BL., *Mus. Lugd.-Bat.*, i. 338 (*Agathophyllum*, ex part.).—LAMK., *Dict.*, iii. 447; *Ill.*, t. 331, fig. 2 (*Laurus*).—GRIEBB.,

*Pl. Wright.*, 188 (*Nectandra*).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 186, t. 67-75.

<sup>5</sup> *Progr.*, 17; in *Linnaea*, viii. 39.—MEISSN., *Prodr.*, 142.

<sup>6</sup> Species 3 or 4. POIR., *Dict.*, Suppl., iii. 323 (*Laurus*).—NEES, *Syst.*, 354, 471 (part., *Ocotea*); in *Linnaea*, xxi. 524.—SW., *Fl. Ind. Occ.*, ii. 721 (*Laurus*).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 244, t. 86.



28. *Camphoromœa* NEES.<sup>1</sup>—Flowers diœcious; receptacle infundibuliform; perianth subrotate; leaves equal persistent. Stamens 9, fertile in male flower, 4-locellate; 3 innermost extrorse, 2-glandular at base. Germen (in male flower small, effete, or 0), inserted in bottom of receptacle free. Berry oblong, surrounded at base by scarcely indurated or enlarged perianth and receptacle; pedicel rather long, scarcely thickened below fruit, and tapering at base.—Trees or shrubs; leaves alternate, usually pseudo-tripliveined; inflorescences axillary or subterminal; pedicels thin, usually longer than small flowers; elongated when fruiting<sup>2</sup> (*Tropical America*<sup>3</sup>).

29? *Gymnobalanus* NEES.<sup>4</sup>—Flowers diœcious, nearly of *Ocotea*; male rather larger; 2 inferior anther-cells oblique, nearly sublateral. Staminodes 0. Receptacle of female flower cupulate, almost wholly deciduous, with rotate perianth. Berry globose or ovate, naked, inserted on orbicular flat or nearly flat base of receptacle, longer than thickened fleshy, cylindrical or shortly clavate, pedicel.—Trees or shrubs; leaves alternate penniveined; inflorescences axillary or subterminal<sup>5</sup> (*Tropical America*<sup>6</sup>).

30. *Nectandra* ROLAND.<sup>7</sup>—Flowers nearly of *Ocotea*, hermaphrodite or polygamous; receptacle cupuliform, persistent; perianth subrotate spreading; leaves rotundate, often subcarnose, valvate deciduous; inner usually larger and thicker. Stamens shortly stalked, thick; anthers 4-locellate; locelli introrse in 6 outer stamens, in 3 inner fertile lateral or subextrorse, and arranged in a curve with its concavity upwards (not superposed in pairs). Germen barren in male flowers. Berry accompanied by shortly cupuliform receptacle; rim simple, very rarely double.—Trees or shrubs; leaves alternate, or more rarely opposite penniveined; inflorescences axil-

<sup>1</sup> *Syst.*, 354, 465.—ENDL., *Gen.*, n. 2053.—MEISSN., *Prodr.*, 143, 512.

<sup>2</sup> A genus only distinguished from many species of *Ocotea* by its persistent calyx and the nervation of its leaves.

<sup>3</sup> Species 8, 9. MIQ., *Pl. Surin.*, 201 (*Oreodaphne*)?—MEISSN., in *Mart. Fl. Bras., Laurac.*, 246, t. 87-89.—WALP., *Ann.*, iii, 313 (*Oreodaphne*).

<sup>4</sup> *Syst.*, 454, 479.—ENDL., *Gen.*, n. 2055.—MEISSN., *Prodr.*, 140, 512.

<sup>5</sup> A genus only to be diagnosed by the receptacle, which is almost wholly deciduous with the perianth, and by the form of the fleshy thickened receptacle.

<sup>6</sup> Species 6, 7. NEES, in *Linnaea*, xxi, 509 (*Nectandra*).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 241, t. 84, 85.

<sup>7</sup> Ex ROTTB., in *Act. Litt. Hafn.* i. (1778), 279; *Pl. Surin.*, 10.—NEES, *Syst.*, 277.—ENDL., *Gen.*, n. 2044.—MEISSN., *Prodr.*, 146, 512.

lary or subterminal, usually subcorymbiform<sup>1</sup> (*Tropical, and Southern-subtropical America*<sup>2</sup>).

31. *Pleurothyrium* NEES.<sup>3</sup>—Flowers hermaphrodite; receptacle thick, shortly obconical, lined by a thick disk, more or less inflexed above; perianth-leaves longer thick coriaceous deciduous. Fertile stamens 9, inserted perigynously with perianth outside rim of disk; outer 6 alternating with perianth-lobes; inner 3 2-glandular; filaments rather thick; anthers thick, cubical-oblong; locelli 4, in a finally horizontal row, extrorse in outer 6, introrse in inner 3 stamens; outer locelli sublateral; middle pair rather higher. Sterile stamens 3 small, or 0. Germen included in receptacle, free. Berry included in or surrounded by receptacle with truncate apex . . . ?—Trees or shrubs; leaves alternate coriaceous penniveined; inflorescences (usually large) axillary or terminal; bracts deciduous (*Peru, North Brazil*<sup>4</sup>).

32. *Dicypellium* NEES.<sup>5</sup>—“Flowers dicecious. Perianth rotate spreading, deeply 6-partite, coriaceous, wholly persistent. Male flower unknown. Female:—stamens 12 sterile, 4-seriate; 3 outermost petaloid persistent, finally coriaceous; those of second row antheriform subspathulate, obsoletely 4-locellate below inflexed apex; those of third row similar to last, smaller subtruncate; of fourth row scale-like erect oblong, appressed against pistil. Other staminodes 0. Stigma acute. Berry dry, at base surrounded by subcarinose enlarged and indurated perianth spreading with the stamens; supported on dilated flat 6-angular disk” (*Brazil*<sup>6</sup>).

33. *Synandrodaphne* MEISSN.<sup>7</sup>—Flowers hermaphrodite; receptacle infundibuliform; perianth subtrotate 6 merous persistent.

<sup>1</sup> NEES divides this genus into two sections:—  
1. *Pomatia*, flowers rather large, usually tomentose outside; staminodes small or 0; inflorescences corymbiform or thyrsoid; leaves usually revolute at edge. 2. *Porostema* (SCHREB.), flowers small glabrous or sub-tomentose; staminodes small subcapitate or 0; inflorescences thyrsoid or more frequently laxly elongated; leaves flat, or more rarely slightly reflexed at edge.

<sup>2</sup> Species about 75. NEES, in *Linnaea*, viii. 46; xxi. 501.—BENTH., *Pl. Hartweg*, 253; *Sulph.*, 161.—GRISEB., *Fl. Brit. W. Ind.*, i.

281.—MEISSN., in *Mart. Fl. Bras., Laurac.*, 250, t. 90–101, 105 (iii).

<sup>3</sup> *Syst.*, 342, 349.—ENDL., *Gen.*, ii. 2047.—MEISSN., *Prodr.*, 168.

<sup>4</sup> Species 7 or 8. MEISSN., in *Mart. Fl. Bras., Laurac.*, 279.—WALP., *Ann.*, iii. 311.

<sup>5</sup> *Syst.*, 343.—ENDL., *Gen.*, n. 2045.—MEISSN., *Prodr.*, 170.

<sup>6</sup> Species 1. *D. caryophyllatum* NEES, *loc. cit.* (excl. syn.).—MEISSN., in *Mart. Fl. Bras., Laurac.*, 281, t. 102.—*Persea?* *caryophyllata* MART. (ex MEISSN.).—*Ibyra Gignha* of the natives.

<sup>7</sup> *Prodr.*, 176

Stamens 12, fertile 9, connate into a ring at very base; outer 6 introrse; inner 3 extrorse, 2-glandular at base; anthers of all with 4 locelli in two superposed pairs; 3 innermost ligulate staminodes. Germen inserted in bottom of receptacle (sometimes sterile?); style cylindrical, apex stigmatiferous obtuse. Berry supported on clavate thickened receptacle.—Trees; leaves alternate penniveined; inflorescences axillary lax (*Tropical America*<sup>1</sup>).

34? **Symphysodaphne** A. RICH.<sup>2</sup>—“Flowers hermaphrodite. Perianth 6-partite, lobes erect, ovate-acute. Stamens 3, fertile connate into a tube including pistil and topping perianth, with its apex extrorsely antheriferous. Staminodes and glands 0 (?). Germen ovate, tapering into slender style; stigma obtuse convex. Fruit . . . ?—A tree; leaves alternate veined; inflorescences solitary in upper axils”<sup>3</sup> (*Cuba*<sup>4</sup>).

35. **Sassafras** BAUH.—Flowers dioecious; receptacle subconcave thin; perianth-leaves 6, membranous subpetaloid, deciduous above base. Stamens 9, subperigynous (in female sterile and glandular at apex, with some often wanting), 3-seriate, filaments elongated slender; innermost 3 bearing two lateral stipitate glands at base; anthers fertile, all introrse 4-locellate; locelli superposed in pairs; upper pair smaller. Germen (in male flower wholly wanting) sessile; style slender, more or less bowed; apex capitate subdiscoid stigmatiferous. Berry obovate or subglobose, at base shortly tapering supported on subclavate top of pedicel and surrounded by cupuliform 6-crenate or 6-dentate base of perianth.—Trees; buds perulate; leaves alternate tripliveined, entire or lobed deciduous; flowers racemose long-pedicellate, bursting out of an involucre of silky scales (*North America*). See p. 435.

36. **Sassafridium** MEISSN.—“Flowers hermaphrodite: perianth subcorolline rotate; lobes deciduous. Fertile stamens 9, inserted at base of perianth-leaves, all introrse and 4-locellate; innermost 3 2-glandular. Staminodes 3, interior to stamens, small capitate.

<sup>1</sup> Species 2, 3. GRISEB., *Fl. Brit. W. Ind.*, i, 282 (*Nectandra*).

<sup>2</sup> In *Ram. Sagr. Fl. Cub.*, t. 67.—MEISSN., *Prodr.*, 175.

<sup>3</sup> An unpublished description; characters taken from a plate.

<sup>4</sup> Species 1. *S. cubensis* A. RICH., *loc. cit.*

Germen free ; style short ; apex thickened 3-gonous stigmatiferous. Berry surrounded at base by truncate turbinate receptacle ; rim double ; both lips very short erect ; outer obsoletely 6-crenate ; inner subentire.—Trees or shrubs ; leaves alternate coriaceous penniveined ; peduncles axillary and subterminal slender at above halfway up, forming branching corymbs, bracteate ; branches of peduncles cymose or subumbellate, 3-∞-flowered (*Tropical America*). See p. 436.

37. *Goëppertia* NEES.<sup>1</sup>—Flowers dicecious or polygamous ; receptacle cupuliform or very shortly obconical spreading ; perianth rotate ; leaves 6 equal short, tardily deciduous. Stamens 9 (in female flower sterile antherless), in male flower fertile, 2-locellate ; innermost 3 2-glandular extrorse ; filaments flat ; connective produced beyond cells. Germen (in male flower sterile narrow) inserted in centre of receptacle, free ; stigma often sessile. Berry oblong, long surrounded at base by persistent 6-lobed perianth, supported on cupuliform truncate (after fall of perianth) receptacle.—Trees ; leaves alternate penniveined or more frequently pseudo-tripliveined ; inflorescences axillary lax (*Tropical America*<sup>2</sup>).

#### IV. TETRANTHEREÆ.

38. *Tetranthera* JACQ.—Flowers dicecious (or very rarely polygamous). Perianth usually 6-merous petaloid deciduous, inserted on small subconcave receptacle. Stamens usually 9-12, more rarely 15-30, perigynous ; filaments free ; inner 3 or 6 possessing 1 or 2 stipitate or sessile glands ; anthers (in female flower rudimentary or 0) 4-locellate. Staminodes obsolete or 0. Germen (in male flower rudimentary or 0) free ; style slender, variably dilated at stigmatiferous apex. Berry supported on patelliform flat or subconcave, entire or sinuate receptacle.—Trees or shrubs ; leaves alternate or more rarely opposite, penniveined, persistent or rarely deciduous ; buds with leafy scales, or more frequently incomplete ; flowers forming 4-8-flowered umbels ; each inflorescence enclosed in an involucre

<sup>1</sup> *Syst.*, 354, 365.—ENDL., *Gen.*, n. 2051.—MEISSN., *Prodr.*, 172, 513.—*Endlicheria* NEES, in *Linnaea*, viii. 87 (nec PRESL).—*Schaueria* NEES, in *Lindl. Nat. Syst.*, ed. 2, 202.

<sup>2</sup> Species 12-14. NEES, in *Linnaea*, xxi. 513.

—SCHOTT, in *Spreng. Syst.*, iv. 405 (*Cryptocarya*).—GRISEB., *Fl. Brit. W. Ind.*, i. 284 (*Aydendron*).—MEISSN., in *Mart. Fl. Bras. Lawrac.*, 281, t. 103, 104.

of 4-6 leaves closely imbricated and globose before anthesis, included pedunculate; umbels often coming from an obsolete axillary bud, solitary or fascicled, more rarely racemose or corymbose on a common twig (*Asia, Oceania, tropical and subtropical America, Islands of Africa*). See p. 437.

39. *Cylicodaphne* NEES.<sup>1</sup>—Flowers of *Tetranthera*; receptacle deeper enlarged after flowering, surrounding half-immersed or included berry; rim truncate.—Trees or shrubs, with habit leaves and inflorescences of *Tetranthera*<sup>2</sup> (*Continent and Islands of India*<sup>3</sup>).

40. *Dodecadenia* NEES.<sup>4</sup>—Flowers (of *Tetranthera*) hermaphrodite, solitary in an imbricated scaly bud. Stamens 12-15; outer 6-9 glandless; anthers of all introrse 4-locellate. Berry supported on flat receptacle and thick peduncle. Other parts of *Tetranthera*.—A tree; leaves alternate coriaceous penniveined; buds imbricated scaly, peduncles axillary solitary 1-flowered (*India*<sup>5</sup>).

41. *Actinodaphne* NEES.<sup>6</sup>—Flowers dioecious; receptacle shortly obconical; perianth-leaves 6, subequal deciduous. Stamens 9, fertile (in female flower sterile ligulate); inner 2-glandular; anthers 4-locellate, all introrse. Germen (in male flower rudimentary barren) free. Berry supported on truncate, cupuliform or nearly flat, receptacle.—Trees or shrubs; leaves alternate, or crowded subverticillate at ends of branches, penniveined or more rarely 3-pliveined; buds perulate, with imbricate scales; flowers axillary, glomerate racemose or fascicled, more rarely solitary, before anthesis enveloped in bud-scales (*Tropical Asia*<sup>7</sup>).

42. *Litsæa* J.<sup>8</sup>—Flowers dioecious (nearly of *Actinodaphne*);

<sup>1</sup> In *Wall. Pl. Asiat. Rar.*, ii. 61, 67; *Syst.*, 503.—ENDL., *Gen.*, n. 2053.—MEISSN., *Prodr.*, 200, 515.—*Lepidadenia* NEES & AEN., in *Edinb. New Phil. Journ.* (1834), 261.—NEES, *Syst.*, 582.—ENDL., *Gen.*, n. 2062.

<sup>2</sup> Wherefrom it differs "in no essential or certain character, except that the calyx is cupuliform instead of flat in the fruit" (MEISSN.).

<sup>3</sup> Species about 40. BL., *Mus. Lugd.-Bat.*, i. 386; ii. 12.—MIQ., *Fl. Ind.-Bat.*, i. 931.—THW., *Enum. Pl. Zeyl.*, 255.—HASSK., *Pl. Jaw.*, 213 (*Tetranthera*).—WIGHT, *Icon.*, t. 1839 (*Lepidadenia*).

<sup>4</sup> In *Wall. Pl. Asiat. Rar.*, ii. 61, 63; *Syst.*,

587.—ENDL., *Gen.*, n. 2063.—MEISSN., *Prodr.*, 210, 515.

<sup>5</sup> Species 1. *D. grandiflora* NEES, *loc. cit.*—WALL., *Cat.*, n. 2544 (*Tetranthera*).

<sup>6</sup> In *Wall. Pl. Asiat. Rar.*, ii. 68; iii. 31; *Syst.*, 586, 590.—ENDL., *Gen.*, n. 2064.—MEISSN., *Prodr.*, 210, 515.—*Jososte* NEES, in *Wall. Pl. Asiat. Rar.*, 63.

<sup>7</sup> Species about 45. BL., *Mus. Lugd.-Bat.*, i. 341.—WIGHT, *Icon.*, t. 1841-1843.—MIQ., in *Zoll. Verz.*, 114, 116; *Fl. Ind.-Bat.*, i. 964.—THW., *Enum. Pl. Zeyl.*, 256.

<sup>8</sup> In *Dict. Hist. Nat.*, xxvii. 70 (part.).—NEES, *Amœn. Bonn.*, i. t. 5, 6, fig. 6, 7; *Syst.*,

Perianth-leaves 4-6; deciduous. Stamens 6 (in female flower 4-6 sterile, ligulate or tongue-shaped); inner 2-glandular; anthers in all introrse, 4-locellate. Germen (in male flower sterile or 0) free. Berry supported on flat discoid persistent receptacle; pedicel slightly thickened or obconical below fruit.—Trees or shrubs; leaves alternate or more rarely subverticillate, 3-ribbed or tripliveined, rarely penniveined; florigenous buds axillary; scales imbricate deciduous; flowers glomerate (*Asia, tropical and subtropical Australia*).

43. *Daphnidium* NEES.<sup>2</sup>—Flowers of *Actinodaphne*, many in the scaly bud; stamens 9; inner 3 2-glandular at base; anthers in all 2-locellate (in females flower sterile). Germen rudimentary in male flower. Berry supported on entire receptacle, sometimes surrounded at base by 6-lobed perianth, or possessing a thickened pedicel.—Trees or shrubs; leaves alternate palmiveined or more rarely penniveined; florigenous buds axillary subsessile; flowers glomerate fascicled or very rarely solitary, concealed in scales, sometimes subumbellate and possessing a proper 4-leaved involucre (*Tropical and Subtropical Asia*<sup>3</sup>).

44<sup>p</sup> *Polyadenia* NEES.<sup>4</sup>—Flowers nearly of *Daphnidium*; perianth deciduous. Stamens 6-9 all glanduliferous, berry supported on flat entire receptacle.—A tree; leaves alternate coriaceous penniveined; flowers arranged in fascicled-agglomerate axillary umbels possessing proper 4-leaved involucre (*India*<sup>5</sup>).

45. *Aperula* BL.<sup>6</sup>—Flowers nearly of *Daphnidium*; perianth 4-leaved deciduous. Fertile stamens 6-9; inner 2-6, 2-glandular at base. Berries on flat entire receptacle.—Trees or shrubs; leaves alternate or subopposite persistent penniveined; leaf-buds incomplete. Flower-bearing buds axillary small umbellate or (female)

586, 621.—ENDL., *Gen.*, n. 2066.—MEISSN., *Prodr.*, 220, 515.—*Tetradenia* NEES, in *Wall. Pl. Asiat. Rar.*, ii. 61, 64; *Progr.*, 19.—*Darwinia* DENNST. (ex LINDL., *Veg. Kingd.*, 537, nec RUDG.).

<sup>1</sup> Species about 30. BL., *Mus. Lugd.-Bat.*, i. 345.—DON, *Prodr. Fl. Nepal.*, 65 (*Tetranthera*).—THUNB., *Fl. Jap.*, 173 (*Laurus*).—MIQ., *Fl. Ind.-Bat.*, i. 972.—BENTH., in *Hook. Journ.*, v. 199.—WIGHT, *Icon.*, t. 132, 1844.—BENTH. & F. MUELL., *Fl. Austr.*, v. 306.

<sup>2</sup> In *Wall. Pl. Asiat. Rar.*, ii. 61, 63; *Syst.*, 586, 606.—ENDL., *Gen.*, n. 2065.—MEISSN., *Prodr.*, 228, 516.

<sup>3</sup> Species about 17. DON, *Prodr. Fl. Nepal.*, 64 (*Laurus*)?.—BL., *Bijdr.*, 553 (*Laurus*); *Mus. Lugd.-Bat.*, i. 551.—ZOLL., *Verz.*, 114.—MIQ., *Fl. Ind.-Bat.*, i. 963 (*Polyadenia*) 975.—A. BRAUN, *Preuss. Gartenb.*, xxi. 14.

<sup>4</sup> In *Wall. Pl. Asiat. Rar.*, ii. 61; *Syst.*, 502, 571 (part.).—ENDL., n. 2060.—MEISSN., *Prodr.*, 232.

<sup>5</sup> Species 1. *P. reticulata* NEES, *loc. cit.*, 62.—*Tetranthera reticulata* HAMILT. (ex WALL., *Cat.*, n. 2551).

<sup>6</sup> *Mus. Lugd.-Bat.*, i. 365.—MEISSN., *Prodr.*, 240, 516.—*Polyadenia* MIQ., *Fl. Ind.-Bat.*, i. 960 (part., nec NEES).

solitary; involucre 4-leaved deciduous (*Tropical and subtropical Asia, Japan*<sup>1</sup>).

46. *Lindera* THUNB.—Flowers nearly of *Daphnidium*; perianth 6-leaved deciduous. Stamens 9 (in female flower sterile filiform); inner 3 or 6 with 2 stipitate glands at base; anthers ovate obtuse 2-celled, all introrse or inner sublateral. Germen free; style slender; apex 2- or 3-lobed stigmatiferous. Berry supported on entire or 6-cleft receptacle.—Trees or shrubs; leaves alternate penniveined or tripliveined, herbaceous, entire or 3-lobed, deciduous; leaf-buds perulate; umbellules of flowers fascicled, or subumbellate or fascicled on a short peduncle, surrounded by a 4-leaved involucre (*Tropical Asia, Japan, North America*). See p. 438.

47. *Laurus* T.—Flowers diœcious or polygamous; perianth 4-leaved subpetaloid, or more rarely 2–8-leaved deciduous. Stamens 12; filaments all possessing a stipitate gland on each side halfway up; anthers all introrse 2-locellate (stamens in female flower usually 4 sterile ligulate). Germen (in male flower 0) free; style short; apex obtusely 3-gonous stigmatiferous. Berry ovate, supported on truncate or irregular receptacle; pericarp thin fleshy; embryo thick ovate; cotyledons, plano-convex very fleshy oily; sheathing around superior radicle.—Aromatic evergreen trees; leaves alternate coriaceous; flowers umbellulate, involucre in membranous deciduous bracts; umbellules varying in number, inserted on a short axillary twig, which is often gemmiparous at apex (*Asia Minor, Canary Islands*). See p. 439.

## V. CASSYTHEÆ.

48. *Cassytha* L.—Flowers hermaphrodite or more rarely polygamous; receptacle thick, urceolate. Perianth inserted in mouth of receptacle, persistent; calyx short 3-leaved; corolla much longer; leaves orbicular concave valvate. Stamens 12, inserted with perianth; outer 9 fertile; 3 superposed petals and connate therewith at base, and 3 alternate glandless introrse; 3 (of third row) 2-glandular

<sup>1</sup> Species 15. NRES, *Syst.*, 577 (*Polyadenia*); iv. 3, 206 (*Benzoin* ?)—MIQ., *Fl. Ind.-Bat.*, i. in *Wall Pl. Asiat. Bor.*, ii. 63 (*Daphnidium*). 962 (*Polyadenia*), 957 (*Tetranthera*).—WALP., —SIEB. & ZUCC., in *Abhandl. d. Münch. Akad.*, *Ann.*, i. 577.

at base, extrorse; anthers all 2-locellate; connective different in stamens of each row; staminodes 3, quite interior oppositipetalous, 3-angular or gland-like, sessile or stipitate. Germen inserted in bottom of receptacle, included; ovule 1 descending; style short; apex stigmatiferous, sometimes depressed. Fruit membranous, included in thickened fleshy receptacle with constricted mouth crowned by remains of perianth and (often) androceum. Seed subglobular; embryo thick fleshy; cotyledons hemispherical;<sup>1</sup> radicle short superior.—Parasitic leafless herbs; scales representing leaves remote alternate; stem and branches filiform terete, clinging to other plants by rows of papilliform or patelliform suckers. Flowers in rarely capitate terminal simple or compound racemes or more frequently spikes; bracts alternate 1-flowered; bractlets 2, lateral sterile; upper flowers sometimes 1-sexual (*All parts of the Tropics*). See p. 440.

## VI. GYROCARPEÆ.

49. **Gyrocarpus** JACQ.—Flowers polygamous; receptacle urceolate with contracted mouth in female and hermaphrodite flowers; subconcave in males. Perianth 4–10-leaved; 2 leaves larger than rest in hermaphrodites and females. Stamens 3–6, inserted along with perianth; filaments free, 2–4 possessing 1 or 2 subclavate glands at base; anthers basifixed dilated-compressed 2-locellate; locelli introrse submarginal valvate. Germen (rudimentary in male flower) included in receptacle, 1-celled; ovule 1, descending from nearly apex of cell, anatropous; style slender; apex capitate stigmatiferous. Fruit included in drupaceous receptacle, crowned at apex by 2 subopposite sepals accrete into a long-spathulate erect membranous-woody wing; mesocarp thin. Embryo exalbuminous fleshy; radicle short superior; cotyledons 2, broad petiolate spirally convolute around plumule and tigellum.—Trees or shrubs, some climbing; leaves alternate petiolate digitiveined simple, entire or lobed, or more rarely 3-foliolate; flowers in much-branched corymboid or paniced racemes of crowded cymes, pedicel bracteate (*America, Australia, tropical Asia*). See p. 442.

50. **Sparattanthelium** MART.—Flowers polygamous, nearly of

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<sup>1</sup> [Consolidated when mature, simulating albumen. See BENTH., *Fl. Austr.*, v. 308.]



*Gyrocarpus*; perianth 4-6-leaved. Stamens 4-6, opposite perianth-leaves (sterile in female flower), filaments slender glandless; anthers apiculate linear introrse. Germen included in very concave receptacle of female or hermaphrodite flower, 1-ovulate; style cylindrical erect, apex subhemispherical-capitate stigmatiferous. Fruit inferior wingless dry, completely enveloped in thin receptacle; seed exalbuminous embryo fleshy; cotyledons corrugated contortuplicate.—Shrubs; leaves alternate tripli- or subtripliveined; inflorescences (of *Gyrocarpus*) axillary or subaxillary (*Tropical America*). See p. 443.

### VII. ILLIGEREÆ.

51. *Illigera* BL.—Flowers hermaphrodite regular; receptacle narrowly urceolate, constricted into a neck above. Perianth and stamens inserted in throat. Perianth-leaves (10 rarely 8) in 2 alternate whorls, valvate; inner subsimilar to outer, a little thinner; all deciduous. Stamens 5, alternate with inner perianth-leaves, epigynous; filaments free, each bearing at base 2 somewhat external lateral cucullate obliquely truncate glands forming pairs opposite inner perianth-leaves; anthers basifixed; connective thick subcuneate; cells 2, introrse sublateral, dehiscing by valves, finally expanded. Glands 5, small external to stamens oppositipetalous. Germen included in receptacle, 1-celled; ovule 1, descending from nearly apex of cell, anatropous; style slender, traversed by 1 longitudinal groove; apex stigmatiferous much dilated peltate, or concave above and repand. Fruit coriaceous, narrowly elongated grooved longitudinally indehiscent, induviate by receptacle dilated into 2-4 vertical veined wings. Seeds cylindrical; embryo exalbuminous; cotyledons thick amygdaloid plano-convex; radicle superior retracted.—Climbing shrubs; leaves alternate petiolate, 3-foliolate; leaflets petiolulate entire subcoriaceous; flowers in elongated pedunculate lax cymiferous racemes; ramifications bracteate at forks; bractlets below flower 1-3 (*Eastern tropical Asia, Malaysia*). See p. 443.

### VIII. HERNANDIEÆ.

52. *Hernandia* PLUM.—Flowers monœcious. Male flower:—receptacle very short; perianth-leaves 6 or more rarely 8, in 2 alternating whorls subsimilar valvate. Stamens 3 or 4, opposite

outer perianth-leaves; filaments free, 1- or 2-glandular at base; anthers basifixed; connective thick; cells 2, lateral subintrorse, finally dehiscent by valves. Female flower:—receptacle urceolate, glandular rugose halfway up outside; mouth much constricted. Perianth inserted in mouth; leaves 8 or more rarely 10, 2-seriate valvate deciduous. Glands 4 (staminodes?) opposite outer leaves and inserted along with perianth. Germen included in receptacle 1-celled ovule 1, descending from near apex of cell, anatropous; style slender, traversed by 1 longitudinal groove; apex stigmatiferous dilated, unequally crenate or lobed. Fruit dry indehiscent 1-seeded, enveloped by truncate umbilicate receptacle, which is smooth outside or 8–10-grooved and slightly glandular at base. Seed exalbuminous; cotyledons thick fleshy ruminant; radicle superior short.—Trees; leaves alternate petiolate coriaceous, sometimes peltate, entire, palmi- or pinnateveined; flowers forming a terminal or axillary raceme of cymes; cymes (♀) pedunculate ternate; common involucre 4-leaved foliaceous inserted on top of peduncle; central flower female sessile, possessing at base a truncate or 4-toothed cupulate or shortly-urceolate proper involucre; involucre accrescent, dilating into a bladder with truncate mouth around fruit and receptacle (*Tropical America, Oceania, and Asia*). See p. 445.

# XI. ELÆAGNACEÆ.

## I. OLEASTER SERIES.

This small order derives its name from the genus *Elæagnus*<sup>1</sup> or Oleaster (Fr., *Chalef*), which has regular flowers (figs. 279–284), hermaphrodite or rarely polygamous. The receptacle forms a hollow

*Elæagnus angustifolia.*



FIG. 279.

Floriferous branch.

cornet, lodging the ovary, and lined by a glandular disk with thickened edges. Thereon is inserted the simple tubular or campanulate perianth (considered a gamosepalous calyx), divided above into a few valvate lobes or teeth. Their number is usually four (figs. 280, 281), more rarely from five to eight. The androceum consists of an

<sup>1</sup>T., *Coroll.*, 53, t. 489.—L., *Gen.*, n. 159.—ADANS., *Fam. des Pl.*, ii. 80.—J., *Gen.*, 75.—GÆRTN., *Fruct.*, iii. 203, t. 216.—LAMK., *Dict.*, i. 689; *Suppl.*, i. 186; *Ill.*, t. 73.—A. RICH., *Monogr. des Elæagnées*, in *Mém. Soc. Hist.*

*Nat. de Paris*, i. 375–408, t. 24, 25.—NEES, *Gen. Plant.*, fasc. 3, t. 18.—SPACH, *Suit. à Buffon*, x. 454.—ENDL., *Gen.*, n. 2115.—MEISSN., in DC. *Prodr.*, xiv. 608.

equal number of stamens alternating with the perianth-leaves and inserted a little below them; each consists of a short filament and an introrse two-celled anther of longitudinal dehiscence.<sup>1</sup> The gynæceum is free, with a one-celled ovary which tapers into a slender style, passing through the narrow opening of the receptacular pouch, and traversed by a longitudinal groove down the placentary edge. Near the top of the style the edges of this groove are thickened, and turn outwards to form two thick elongated lips covered with stigmatic papillæ. In the bottom of the ovary-cell is a subcentral placenta, whereon is inserted a nearly erect anatropous ovule, whose micropyle is turned down next the placenta,<sup>2</sup> the thickened base of which often furnishes it with an obturator.

*Elæagnus angustifolia.*

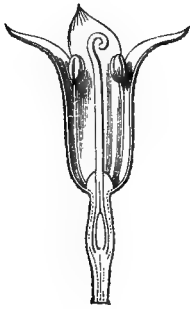


FIG. 280.  
Longitudinal section  
of flower ( $\frac{2}{3}$ ).

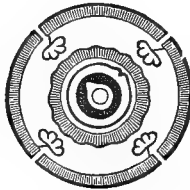


FIG. 281.  
Diagram.



FIG. 282.  
Fruit in its  
indusium.

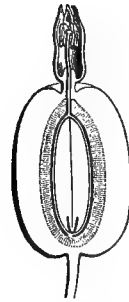


FIG. 283.  
Longitudinal section  
of fruit ( $\frac{2}{3}$ ).



FIG. 284.  
Stone.

After flowering the receptacle grows and forms a complete indusium around the fruit, which is often long crowned by the remains of the perianth and androceum (figs. 282, 283). The walls of this indusium behave as in a true drupe. Its deep layers become hard and woody, forming a sort of stone (fig. 284<sup>3</sup>). Outside of this the tissues grow succulent as in a sarcocarp, and are covered externally by the membranous epidermis cloaked in peltate hairs. The true fruit, lodged in this thick pouch, is an achene with a membra-

<sup>1</sup> In *E. angustifolia* the pollen-grains are triangular, much flattened, with little papillæ on the angles. (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 314.)

<sup>2</sup> The ovule has two coats. When adult its raphe is neither turned towards or away from the placenta, but is well on one side (fig. 281).

<sup>3</sup> It is formed of vertically elongated fibres incrustated with woody matter. The internal epidermis of the receptacle bears long cylindrical hairs, which persist even after the fruit is ripe. The stone is traversed all the way down by more or less regular grooves, separated by rough projecting ribs.

nous pericarp, surmounted by the remains of the style. It contains a single seed, within whose very thin coats lies a large fleshy embryo, almost or wholly exalbuminous, with its radicle inferior.

The genus *Elæagnus* consists of trees or shrubs from Central Asia, the South of Europe, and North America. All their organs are covered with peltate hairs, scurfy or stellate. Their leaves are alternate exstipulate simple entire. Their flowers are axillary, solitary paired or grouped in little 3-flowered cymes or short leafy racemes. Some twenty species are admitted.<sup>1</sup>

The genera *Shepherdia*<sup>2</sup> and *Hippophae* (Fr., *Argoussier*) complete this series. The former (figs. 285–288), has dicecious flowers (figs. 287,

*Shepherdia canadensis.*



FIG. 285.  
Male flower ( $\frac{1}{2}$ ).



FIG. 286.  
Longitudinal section  
of male flower.



FIG. 287.  
Female flower ( $\frac{1}{2}$ ).

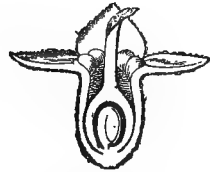


FIG. 288.  
Longitudinal section  
of female flower.

288), with a receptacular sac similar to that of *Elæagnus*, a four-leaved perianth, and eight glands superposed in pairs to the sepals and inserted in the throat. The gynæceum occupies the bottom of the flower; here too it becomes an achene around which the receptacle forms a drupaceous indusium. The male flowers (figs. 285, 286), have a much shallower cupuliform receptacle. On its edges are inserted eight free stamens, four superposed to the sepals, and four alternate with them. Each has an introrse anther and a slender filament inserted outside the circle of eight glands, which are as in the female flower superposed to the calyx-lobes. Only two species of *Shepherdia*<sup>3</sup> are known, shrubs from North America with opposite

<sup>1</sup> L., *Spec.*, ed. 2, 176.—THUNB., *Fl. Jap.*, 66, t. 14.—PURSH, *Fl. N. Amer.*, i. 114.—A. RICH., *Mon.*, 383, 404, t. 24.—BIEB., *Fl. Tauur.-Cauc.*, ii. 112.—SIBTH., *Fl. Græc.* t. 152.—ROXB., *Fl. Ind.*, i. 460.—BL., *Bijdr.*, 638.—BLANC., *Fl. d. Philipp.*, 74.—REICHB., *Icon.*, t. 549.—ROYLE, *Ill. Himal.* 323, t. 61.—WALL., *Cat.*, n. 4031.—CHAMP., in *Hook. Journ.* (1853), 196.—BENTH., *loc. cit.*—GREN. & GODR., *Fl. de Fr.*, iii. 69.

<sup>2</sup> NUTT., *Gen. of N. Amer. Pl.*, ii. (1818), 240.—A. RICH., *Mon.*, 389, 401, 402, t. 24, fig. 3.—SPACH, *Suit. à Buffon*, x. 457.—ENDL., *Gen.*, n. 2113.—MEISSN., *Prodr.*, 607.

<sup>3</sup> L., *Spec.*, ed. 2, 1453 (*Hippophae*).—PURSH, *Fl. N. Amer.*, i. 115 (*Hippophae*).—MICHX., *Fl. Bor.-Amer.*, ii. 227 (*Hippophae*).—HOOK., *Fl. Bor.-Amer.*, ii. 138, t. 178.—LOUD., *Encycl. of Trees*, 700, icon.

leaves, which only come out after the flowers. These last are arranged in short racemes axillary to the scales or bracts borne at the base of the young branches.

The Sallow-Thorns (*Hippophae*;<sup>1</sup> Fr., *Argoussier*) have also dioecious flowers (figs. 289–296). The perianth consists of two lobes,

*Hippophae rhamnoides* (Sea Buckthorn).



FIG. 289.  
Male flowering  
branch.



FIG. 291.  
Female flower  
(magnified).



FIG. 292.  
Longitudinal section  
of female flower.



FIG. 293.  
Fruiting branch ( $\frac{1}{3}$ ).

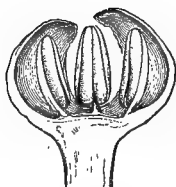


FIG. 290.  
Longitudinal section of  
male flower ( $\frac{2}{3}$ ).

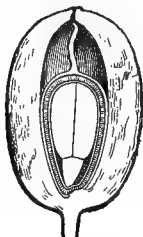


FIG. 294.  
Longitudinal section  
of induviate fruit.



FIG. 295.  
Seed ( $\frac{2}{1}$ ).



FIG. 296.  
Longitudinal section  
of seed.

which cohere up to a variable height. In the male flowers (fig. 290) it bears four (or more rarely three) stamens with introrse anthers;<sup>2</sup>

<sup>1</sup> L., *Gen.*, n. 1106.—ADANS., *Fam. des Pl.*, ii. 80.—J., *Gen.*, 75.—GÆRTN., *Fruct.*, i. 199, t. 42.—LAMK., *Dict.*, i. 248; *Ill.*, t. 808.—A. RICH., *Mon.*, 387, 400, 402, t. 24, fig. 2.—ENDL.,

*Gen.* n. 2112.—NEES, *Gen.*, iii. n. 19.—MEISSN., *Prodr.*, 607.

<sup>2</sup> The pollen-grains are ovoidal, with three folds. They become spherical in water, with three narrow papillose bands (H. MOHL., *loc. cit.*).

and in the female flowers it surrounds a gynæceum formed like that of the Oleasters. The fruit, too, is an achene resembling that of *Shepherdia* or *Elæagnus*, with the persisting accrescent lower part of the perianth forming a drupaceous indusium.<sup>1</sup> The two known species<sup>2</sup> of this genus inhabit Europe and Middle Asia; they are shrubs with alternate leaves and sessile solitary flowers axillary to the lower appendages of the young branches, which, as in the last genus, expand at the end of the winter before the leaves are full-grown.

## II. AEXTOXICON SERIES.

*Aextoxicon*<sup>3</sup> has dioecious flowers. The ill developed receptacle bears an imbricated perianth, internal to which is an androceum with a rudimentary gynæceum in the males, a pistil surrounded by a sterile androceum in the females. The perianth consists of a somewhat variable number of leaves, modified as follows from without inwards. Outside is a rather coriaceous sac covered with peltate hairs, globular in the bud, and bursting irregularly and falling off on anthesis.<sup>4</sup> Next come five<sup>5</sup> imbricate<sup>6</sup> glabrous concave rounded scarious leaves, with their ribs radiating like a fan.<sup>7</sup> Quite inside, alternating with these last come five others,<sup>8</sup> much longer, narrower, petaloid, tapering at the base, traversed by a thick fleshy mid-rib and unequally rounded at the apex, which is imbricated and crumpled in æstivation. The androceum usually consists of

<sup>1</sup> The inner layer of this indusium is not thickened as in *Elæagnus*; it forms a sort of sac, the whole of whose inside is covered with hairs, especially copious above. The withered style often protrudes through the mouth of this sac. The pericarp is glabrous thin translucent, apparently homogeneous, except down two vertical lines which are rather thickened and contain much vascular tissue. The seed is not quite free from albumen, though it is only around the radicle that it deserves to be so called. It is there white and fleshy, but higher up it only forms a membrane accessory to the true seed-coats.

<sup>2</sup> L., *Spec.*, ed. 2, 1452.—SCHUMER, *Handb.*, iii. 463, t. 321.—SCOP., *Fl. Carniol.*, ii. 261 (*Osyris*).—LEDEB., *Fl. Ross.*, iii. 552.—REICHB., *Icon.*, t. 549, fig. 1165.—DON., *Prodr. Fl. Nepal.*, 68.—ROYLE, *Ill.*, 323.—LOUD., *Encycl.*, 699.—GREEN. & GODR., *Fl. de Fr.*, iii. 69.

<sup>3</sup> R. & PAV., *Prodr., Fl. Per.*, 131, t. 29.—

HOOK., *Icon.*, i. t. 12.—ENDL., *Gen.*, n. 5881.—BENTH., in *Hook. Journ.* (1854), 372.—H. BN., *Et. Gén. du Gr. des Euphorbiac.*, 660, t. 27, fig. 26-33.—SCHLECHT., in DC. *Prodr.*, xiv. 616.—A. DC., *Prodr.*, xvi. 640.—*Egotoxicum* DCNE., in *Bull. Soc. Bot.*, v. (1858), 214; in *Ann. Sc. Nat.*, sér. 4, ix. 279.

<sup>4</sup> This has been described as an involucre; some authors, perhaps rightly, suppose it an outer perianth-leaf, more developed than the rest; on anthesis it pretty frequently tears into two unequal parts.

<sup>5</sup> More rarely four or six.

<sup>6</sup> Often quincuncial.

<sup>7</sup> They pretty commonly tear at the edges, in the intervals between the ribs. They usually fall early, with the involucre.

<sup>8</sup> More rarely six, or four in the female flowers.

five stamens<sup>1</sup> alternating with these latter leaves, each consisting of a thick incurved filament and an introrse two-celled basifixed anther of longitudinal dehiscence. Alternating with these stamens are five pairs of thick glands, the glands of each pair approximated<sup>2</sup> to form a

*Aextoxicon punctatum.*

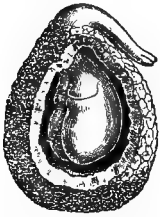


FIG. 297.  
Gynæceum opened ( $\frac{1}{2}$ ).

crescent with its concavity outwards; they surround a little depression which lodges a short abortive gynæceum. In the female flowers the perianth is nearly the same as in the males, except that the number of its leaves is more variable. The stamens and the glands accompanying them are arranged as in the male flower, but the former are sterile, having no anther, or only a rudiment at the top of the filament. The gynæceum here consists of a free ovary, covered with peltate scales and surmounted by a narrow style, at first inflexed, and divided above into two little stigmatiferous lobes. In the ovary-cell is seen a parietal placenta, bearing nearly at its top two collateral descending anatropous ovules,<sup>3</sup> whose micropyles, capped by their obturators,<sup>4</sup> turn up under the hilum towards the placenta (fig. 297). The fruit is a naked drupe, but its mesocarp is not thick. The seed-coats enclose a fleshy albumen and an embryo with foliaceous cotyledons and a cylindrical superior radicle. Only one species of this genus is known,<sup>5</sup> a Chilean tree, with alternate opposite or subverticillate leaves, simple entire petiolate and exstipulate, and covered like most of the organs with scurfy peltate hairs. The flowers form racemes, simple or more rarely ramified, and solitary or few together in the axils of the leaves.

ADANSON in 1763 established the family *Elæagni*;<sup>6</sup> he placed it next to *Aristolochiaceæ*, and made it comprise not only *Elæagnus* and *Hippophae*, but several *Santalaceæ*, *Tupelo* (*Nyssa*), *Cynomorium*,

<sup>1</sup> 6 or 7 (DECNE.).

<sup>2</sup> There are probably ten glands at first, one on either side of each staminal filament; but usually the two adjacent ones, touching in the interspace between two stamens, stick or unite together to a variable extent. They are often smaller and more distinct in the female flowers.

<sup>3</sup> With two coats.

<sup>4</sup> DECAISNE has contested the existence of this organ. It is applied to the top of the micro-

pyle, and receives into a superficial groove on each side near its lower edge an acute bowed rather long prolongation of the nucleus (or perhaps of the embryo-sac), which gives the idea that the obturator plays an important part in fecundation.

<sup>5</sup> *Æ. punctatum* R. & PAV., *loc. cit.*—C. GAY, *Fl. Chil.*, v. 348.

<sup>6</sup> *Fam. des Pl.*, ii. 77, *Fam.* xii.



and some *Combretaceæ*. A. L. DE JUSSIEU,<sup>1</sup> in 1789, only followed ADANSON, adding to his order *Elæagnaceæ* (*Chalefs*) *Quinchamalium* and *Colpoon*, which are also *Santalaceæ*. A. RICHARD reduced this order to its present limits in 1823, in a special Monograph,<sup>2</sup> wherein he describes, besides *Elæagnus Shepherdia* and *Hippophae*, the plant *Conuleum*, which, as we have seen,<sup>3</sup> is a Monimiad of the genus *Siparuna*. However, DE SCHLECHTENDAL, reversing the order *Elæagnaceæ*<sup>4</sup> for the Prodrômus,<sup>5</sup> retained the genus *Conuleum*, and added as doubtful genera *Octarillum* of LOUREIRO,<sup>6</sup> and *Aextoxicon* of RUIZ and PAVON.<sup>7</sup> This little order has since remained unaltered; it contains some thirty species, of which five-sixths belong to *Elæagnus*. This genus inhabits the temperate regions of Europe, Asia, and North America. *Shepherdia* is peculiar to America; *Hippophae* to the Old World; each genus contains two species.

All the *Elæagnaceæ* are arborescent or frutescent,<sup>8</sup> all have their organs covered with peltate or stellate scurfy hairs, often silvery or scurfy; all have exstipulate leaves, naked leaf-buds, small inconspicuous flowers, possessing one or two whorls of stamens with introrse anthers, and a single carpel with anatropous ovules. Of the variable characters we consider some of primary importance, and have used them to divide this group into two series, whereof one is only a doubtful member of the order.<sup>9</sup> This is *Aextoicææ*, wherein the floral receptacle is scarcely concave, the ovary contains two collateral descending ovules, and the perianth is triple.<sup>10</sup> The *Elæagneæ* have on the contrary a sacciform receptacle which persists around the fruit, to which it forms a fleshy, often drupaceous indusium; their perianth is simple, and their ovule is solitary, suberect. The other varying characters are best fitted for generic distinction. The leaves are opposite in *Shepherdia*, alternate in *Hippophae* and *Elæagnus*; the flowers are hermaphrodite in most species of the latter genus, diœcious in the former two. The perianth may consist

<sup>1</sup> *Gen.*, 74, Ord. i.

<sup>2</sup> In *Mém. de la Soc. d'Hist. Nat. de Paris*, i. 375-408, t. 24, 25.

<sup>3</sup> Vol. i. 305.

<sup>4</sup> LINDL., *Introd.*, ed. 2, 194; *Veg. Kingd.*, 257.—*Elæagneæ* R. BR., *Prodr.*, 350.—ENDL., *Gen.*, 333, Ord. cxi.—*Elæagnideæ* DUMORT., *Anal.*, 15, 18.

<sup>5</sup> XIV., 606-616.

<sup>6</sup> *Fl. Cochinch.*, 113.—ENDL., *Gen.*, n. 2083.—SCHLECHT., *Prodr.*, 615. By its tubular tetramerous perianth, its four stamens, and its simple gynœceum, the place of this genus appears

to come near *Elæagnus*; but the structure of its ovary is quite unknown to us. The seed is described as arillate (?).

<sup>7</sup> *Prodr.*, 131 (1797).

<sup>8</sup> The branches often taper into spines bearing only rudimentary leaves, or leafless.

<sup>9</sup> *Aextoxicon* has been referred to the doubtful *Euphorbiaceæ* by ENDLICHER, to *Ilicineæ* by MIERS, to *Monimiaceæ* by DECAISNE. A. DE CANDOLLE (*Prodr.*, xvi. 641) accepts none of these affinities.

<sup>10</sup> See p. 485, note 4.

of four parts or more, while in *Hippophae* it is an elongated sac, dividing into two parts above. The androceum forms a single verticil, except in *Shepherdia*, where there are two. The seeds usually have no albumen, but we have seen this represented in *Hippophae* and certain Oleasters by a slight fleshy layer around the lower part of the embryo.

The normally single carpel<sup>1</sup> in *Elæagnaceæ* brings them near *Lauraceæ*. All authors have admitted the close alliance of these two orders. Fully adopting this view ourselves, we need not dwell on the relations of *Elæagnaceæ* with *Proteaceæ*, *Thymelaceæ*, *Myrsiticaceæ*, &c. We think moreover that as *Lauraceæ* represent the unicarpellary type of *Monimiaceæ* with descending ovules, *Elæagnaceæ* represent the *Monimiaceæ* with ascending ovules. And moreover, as in some *Monimiads* the stamens dehisce by clefts, in others by valves, *Elæagnaceæ* will be analogous to the former, *Lauraceæ* to the latter.

This order contains few useful members.<sup>2</sup> Several are ornamental owing to the more or less brilliant silvery gleam of their leaves. The following species are cultivated in our gardens and parks: *Elæagnus hortensis*, *argentea*, *arborea*, *ferruginea*, *latifolia*, the *Shepherdias*, and *Hippophae rhamnoides*. This latter tree, planted on the dunes of the coast, fixes the sand and protects the growth of lowlier plants. Its wood is sometimes used, as is that of some Oleasters. The species with sharp spines serve for making impenetrable fences. The bark, leaf-buds, and leaves of several species contain astringent matters. Hence they are used as tonic, febrifugal, and antirheumatic medicines. The Sea-Buckthorn in the North of Europe, the Bohemian Olive (*Olivier de Bohème*) in the East, and the *Shepherdias* in America, are prized for these purposes. The generic name of *Aextoxicum punctatum*<sup>3</sup> indicates its venomous properties. A poisonous matter has also been found in the fruits of *Hippophae*,<sup>4</sup> or rather in the fleshy part of the indusium, which are

<sup>1</sup> Occasional flowers have been seen with more than one carpel. EDER mentions one of *Hippophae* with two pistils. "In floribus forsitan monstriosis, at in eodem specimine numerosissimis Hippophaes carpella vidi 2-4," J. G. AGARDE (*Theor. Syst. Pl.*, 177). The same author says of the affinities of *Elæagnaceæ*, "Sunt Micranthis fere collaterales, Rhamneis affinitate proximæ, harum formam inferiorem apetalam

et sæpe diclinam constituentes." LINDLEY places this order next after *Myricaceæ* in his alliance *Amentales*.

<sup>2</sup> ENDL., *Enchirid.*, 212. — LINDL., *Veg. Kingd.*, 257.—ROSENTH., *Syn. Pl. Diaphor.*, 243, 1113.

<sup>3</sup> *Acetumillo*, *Olivillo*, *Teche*, *Palo muerto* of the Chilians.

<sup>4</sup> SANTAG., in *Chem. Gaz.* (1844), 121.

however eaten by the birds in the winter; and they are rendered harmless to man by cooking, which removes the deleterious principle.<sup>1</sup> The pulpy layer of the indusium is sweet and subacid in the Oleasters; thus an edible fruit is afforded by *E. orientalis*,<sup>2</sup> *ferruginea*,<sup>3</sup> *argentea*,<sup>4</sup> *macrophylla*,<sup>5</sup> *pungens*,<sup>6</sup> *conferta*,<sup>7</sup> *salicifolia*,<sup>8</sup> *arborea*,<sup>9</sup> &c. &c. Those of *E. hortensis*<sup>10</sup> come very near jujubes in taste. *E. argentifolia* has apple-scented flowers, whose perfume is so strong as to be sometimes oppressive. The flowers of this species and some others, produce large quantities of nectar, which has occasionally been collected for use in malignant fevers. A yellow dye is extracted from the fruit, and a brown colouring matter from the stem of *Hippophae rhamnoides*.

They contain malic acid, like those of *Elaagnus*.

<sup>1</sup> They are used in Finland for making fish-sauce, &c.

<sup>2</sup> L., *Mantiss.*, 41. Several authors make this only a variety of *E. hortensis* BIEB. (*Fl. Taur.-Cauc.*, ii. 112). The Bohemian Olive-tree (*E. angustifolia* L., *Spec.*, ed. 2, i. 276) is made another variety with narrow leaves (see MEISSN., *Prodr.*, 609, n. 2).

<sup>3</sup> A. RICH., *Mon.*, 387, 404.

<sup>4</sup> PURSH, *Fl. Amer. Sept.*, i. 114.—*E. com-*

*mutata* BERNH., in *Thur. Allg. Gartenzeit.*, ii. 95 (ex MEISSN., *Prodr.*, n. 1).

<sup>5</sup> THUNB., *Fl. Jap.*, 67. — *Fon Gommi* KÆMPFF., *Amœn.*, 789.

<sup>6</sup> THUNB., *op. cit.*, 68. — *Avin Gommi* KÆMPFF., *loc. cit.*

<sup>7</sup> ROXB., *Fl. Ind.*, i. 460.—*Guara* of the Bengalese.

<sup>8</sup> LOUD., *Encycl.* 697.

<sup>9</sup> ROXB., *op. cit.*, 461.—*Sheashong* of Nepâl.

<sup>10</sup> Like those of *E. hortensis*, they are termed *Zinzeyd* in Persia.

## GENERA.

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### I. ELÆAGNEÆ.

1. **Elæagnus** T.—Flowers regular, hermaphrodite or more rarely polygamous; receptacle cylindro-campanulate or tubular; perianth 4- or more rarely 5-8-merous, valvate. Stamens 4 or 5-8, alternating with and inserted below perianth-leaves; filaments short free, or nearly absent; anthers dorsifixed 2-celled introrse 2-rimose. Disk glandular, of variable form, inserted in throat of receptacle. Germen free, inserted in and included by bottom of receptacle; style simple, passing out through narrow mouth of receptacle, longitudinally furrowed; apex straight curved or circinate, laterally stigmatiferous; ovule 1, ascending anatropous; micropyle inferior. Fruit enveloped in persistent accrescent drupaceous receptacle; pericarp dry thin indehiscent; seed erect; embryo fleshy; albumen small or 0; radicle short inferior.—Trees or shrubs, covered in almost every part with scurfy or stellate hairs; twigs often spinescent; leaves alternate petiolate entire exstipulate; flowers axillary pedicellate, solitary or in few-flowered cymes, more rarely in short axillary leafy racemes (*North America, southern Europe, temperate and southern Asia*). See p. 481.

2. **Shepherdia** NUTT.—Flowers dioecious; receptacle in male slightly concave, in female tubular-cupuliform. Perianth 4-merous, valvate. Stamens, in female flower 0; in male 8, 4 superposed to, 4 alternate with perianth-leaves; filaments very short; anthers introrse 2-rimose. Glands 8, in male alternate with stamens, in female inserted in throat of receptacle. Germen, in male 0; in female inserted in bottom of receptacle, free; germen and ovule of *Elæagnus*; style elongated acute, laterally stigmatiferous at apex. Fruit dry 1-seeded, enveloped in drupaceous receptacle.—Small trees or shrubs, scurfy sometimes spinescent; leaves opposite; flowers precocious, forming small racemes at base of short lateral twigs; male flowers pedicellate in axils of bracts; females in axils of opposite leaves (*North America*). See p. 483.

3. *Hippophae* T.—Flowers dicecious ; perianth 2-merous. Stamens, in female 0, in male 4 or more rarely 3 ; filaments short ; anthers introrse 2-rimose. Receptacle in female flower very concave, tubular. Germen free, included in receptacle ; style exerted at apex, laterally stigmatiferous along much of its length ; ovule 1 (of *Elæagnus*). Fruit dry, enveloped in accrescent succulent receptacle ; seed 1 (of *Elæagnus*).—Small trees or shrubs, scurfy, usually spinescent ; leaves alternate ; flowers precocious, at base of short lateral twigs simulating catkins ; males sessile in axils of deciduous bracts ; females solitary pedicellate, in axils of leaves (*Europe, temperate parts of Asia*). See p. 484.

## II. AEXTOXICEÆ.

4. *Aextoxicon* R. & PAV.—Flowers dicecious ; receptacle short, almost imperceptibly concave. Perianth triple ; outermost whorl subglobose in the bud, thickly scurfy, unevenly broken at apex, finally caducous as a 2-fid lid ; middle whorl consisting of 5 (or more rarely 4, 6), rotundate concave imbricated deciduous leaves ; leaves of innermost whorl 5 (or 4, 6), long subspathulate, crispato-crenate at apex, long narrow and intersected by a somewhat prominent sub-carnose rib at base, persistent to a rather late period. Stamens 5 (“or 4, 6”) alternipetalous ; filaments free ; anthers, in female 0 or rudimentary sterile ; in male 2-celled introrse rimose. Glands 10, inserted laterally at base of filaments, free or connate to a variable height. Germen, in male minute ; in female conical with depressed vertex, ovoid, densely scurfy ; style short linear, curved in bud, stigmatiferous at apex, 2-fid ; ovules 2, collateral descending ; micropyle introrse superior obturated. Fruit bare subdrupaceous indehiscent, usually 1-seeded, seed descending albuminous ; radicle cylindrical superior ; cotyledons ovate appressed.—A scurfy tree ; leaves persistent, alternate opposite or ternate, entire petiolate exstipulate ; flowers in axillary usually simple racemes (*Chili*). See p. 485.

## XII. MYRISTICACEÆ.

This small order consists of the single genus *Myristica*<sup>1</sup> or Nutmeg-tree (Fr., *Muscadier*), of which we may take *M. fragrans*<sup>2</sup> (figs. 298–306) as a type. Its flowers are regular and diceious. The males (figs. 299–301) consist of only a simple perianth and an androceum inserted on

*Myristica fragrans.*



FIG. 298.—Fructiferous branch ( $\frac{1}{3}$ ).

a little convex receptacle. The perianth is a fleshy gamosepalous calyx, dividing above into three thick valvate teeth. Above this the receptacle is prolonged into a column with a dilated base, bearing a score of vertical linear extrorse anther-cells, each dehiscing by a longitudinal cleft<sup>3</sup> all the way down. Here there is no trace of female organs; so

<sup>1</sup> L., *Gen.*, n. 1399.—THUNB., in *Act. Holm.* (1782), 45; *Dissert.* (1788).—ADANS., *Fam. des Pl.*, ii. 345.—J., *Gen.*, 81.—GÆRTN., *Fruct.*, i. 194, t. 41.—LAMK., in *Hist. Acad. Sc. Ann.*, 1788 (1791), 152, t. 5–7; *Dict.*, iv. 383; *Suppl.*, iv. 34; *Ill.*, t. 832, 833.—ENDL., *Gen.*, n. 4706.—A. DC., in *Ann. Sc. Nat.*, sér. 4, iv. 20; *Prodr.*, xiv. 189.—H. BN., in *Adansonia*, vi. 177.—*Komakon* THEOPH. (ex ADANS., *loc. cit.*).—*Moschokaruon* DIOSCOB.

<sup>2</sup> HOUTT., *Hist. Nat.*, ii. p. iii. 233 (1774).—BL., in *Rumphia*, 180, t. 55.—*M. officinalis* L. FIL., *Suppl.*, 265.—GÆRTN., *loc. cit.*, t. 41.—*M. moschata* THUNB., in *Act. Holm.*, *loc. cit.*; *Dissert.* (1788).—*M. aromatica* LAMK., *loc. cit.*, 155, t. 5–7.—*Nux Myristica, Pala* RUMPH., *Herb. Amboin.*, ii. 14, t. 4.

<sup>3</sup> Pollen spherical (*M. fragrans, diospyrifolia*) or spherical-trigonus (*M. sebifera, Otoba*) A. DC. *Prodr.*, 187.

also, the female flowers only possess a gynæceum within the perianth (figs. 302, 303). This is gamosepalous in the females, with three valvate teeth reflexed on anthesis; it is a little better developed than in the males. The gynæceum is free superior, formed of a conical ovary, tapering above and traversed by a longitudinal groove down the placentary edge. The two lips of this groove become thickened towards the top, and are everted and covered with stigmatic papillæ. The ovary contains only a single cell, with a sub-

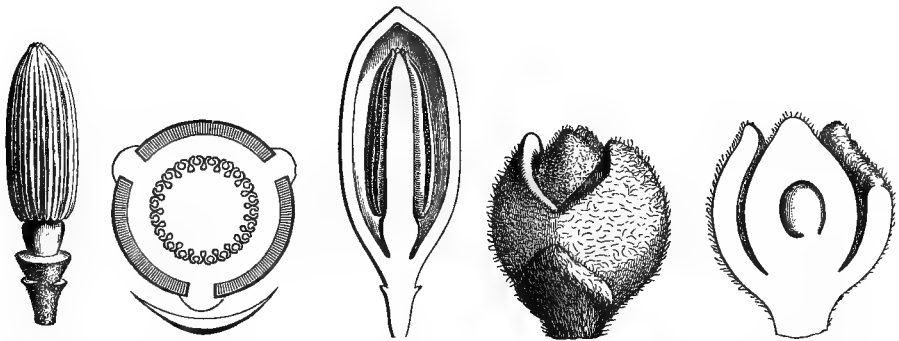
*Myristica fragrans.*

FIG. 299.  
Male flower,  
perianth re-  
moved ( $\frac{2}{3}$ ).

FIG. 300.  
Male flower,  
Diagram.

FIG. 301.  
Longitudinal sec-  
tion of male  
flower ( $\frac{1}{2}$ ).

FIG. 302.  
Female flower ( $\frac{2}{3}$ ).

FIG. 303.  
Longitudinal section  
of female flower.

basilar placenta bearing a solitary suberect anatropous ovule; the micropyle looks downwards, away from the grooved side of the ovary.<sup>1</sup> The fruit (fig. 298) is a berry often pear-shaped, opening lengthwise when ripe,<sup>2</sup> to free a large ascending seed. This is surrounded by a fleshy coloured aril, more or less lacinate and rising to a variable distance between the pericarp and seed, well known under the name of *mace* (Fr., *macis*; figs. 305, 306<sup>3</sup>). The seed-coats

<sup>1</sup> It has two coats. The nucleus is immediately enveloped in a bottle-shaped secundine with a thick neck traversed by a slender canal; its truncate mouth does not protrude through the exostome. This last, placed some way above the hilum, is circular or elliptical, with thin edges (see *Adansonia*, v. 178).

<sup>2</sup> It opens from above downwards, along the dorsal and ventral sutures, so that it finally forms two distinct valves.

<sup>3</sup> The much discussed nature and origin of this aril have been the subject of many works;

it is one of the most contested points in botany. The older botanists confined themselves to stating that mace was an arillary product of the nutmeg-seed. It was PLEANCHON who, in 1844, in his *Mémoire sur les vrais et faux arilles* (93), modified the litherto received opinions on the subject, and placed mace in his category of false arils; a view which he has recently reproduced (in *Ann. Sc. Nat.*, sér. 4, v. 4), and which has been fully adopted by A. DE CANDOLLE (in *Ann. Sc. Nat.*, sér. 4, iv. 20). DECAISNE & LEMAOUT (*Trait. Gén. de*

are thick and hard; they enclose a deeply ruminated albumen (fig. 306), containing the embryo in a little cavity near the micropyle. The radicle is inferior, short and conical; the cotyledons are diverging and undulate. *M. fragrans* is a tree from the Moluccas, with all its parts aromatic. The leaves are alternate simple entire petiolate exstipulate. Its flowers are in false racemes,<sup>1</sup> few-flowered, axillary or supra-axillary and pedunculate. Each pedicel has a caducous bract at its base, and bears at a variable height, usually close under the flower, another caducous bract alternating with the two anterior perianth-leaves.

*Myristica fragrans.*

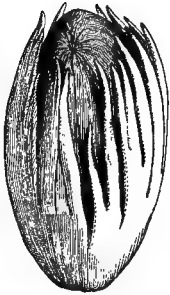


FIG. 305.  
Seed.

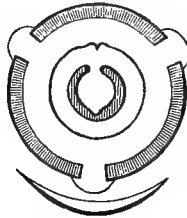


FIG. 304.  
Female flower, diagram.

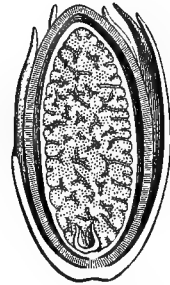


FIG. 306.  
Longitudinal section of seed.

The other members of the section *Eumyristica* have all the same general organization, with from eight to thirty anthers. In *Virola*,<sup>2</sup> which was formerly made a distinct genus, there are usually only as many stamens as there are perianth-leaves, with which they alternate. This too is the case with the section *Otoba*,<sup>3</sup> but the anthers

*Bot.*, 380), hold the view diametrically opposed to this, saying that they "have preferred to retain the name of aril for this," because, "in the examination of two ovules, we thought we were able to remark that this organ rises more from the base of the ovule than from the exostome, as asserted by A. DE CANDOLLE and PLANCHON." However, we had shown more than three years before that the aril is a thickening which, arising on the right and the left of the base of the ovule, reaches horizontally back to the hilum, and gradually extends on either side to the exostome; so that the hypothesis of J. HOOKER & THOMSON (*Fl. Ind.*, i. 154), according to which the mace is of mixed nature—both arillode and true aril—is the only

one that comes near the truth. It is an aril produced by both hilum and micropyle.

<sup>1</sup> The female inflorescences of *M. fragrans* are rather comparable to cymes. In the 3-flowered ones, for instance, we may observe this. One flower is central, older, and on a longer pedicel than the others. Where its pedicel separates from the common peduncle of the inflorescence there are two bracts, situated near one another and on the same side; each of these has a younger pedicellate flower in its axil.

<sup>2</sup> AUBL., *Guian.*, 904, t. 345. — A. DC., *Prodr.*, 194 (*Myristica*, sect. iii.).—*Sebophora* NECK., *Elem.*, 907.

<sup>3</sup> A. DC., in *Ann. Sc. Nat.*, sér. 4, iv. 30; *Prodr.*, 198 (sect. v.).



are nearly free instead of united. In *Compsonaura*<sup>1</sup> there are six, erect and verticillate. In *Irya*,<sup>2</sup> the central part of the androceum is pear-shaped, with a concave summit surrounded by a circle of short anthers, attached around its outer edge. In the male flowers of *M. corticosa*<sup>3</sup> (figs. 307, 308), formerly made the type of a genus *Knema*,<sup>4</sup> the perianth leaves are thick, and bevelled into a wedge shape internally; and the androceum, very short in proportion, forms a little column dilated above into a prominent, flattened or concave head. From the edge of this head diverge short rays, each bearing a short oval or rounded anther, whose two cells open by longitudinal slits looking downwards and outwards. Finally in *Pyrrhosa*,<sup>5</sup> also raised to generic rank by some, the androceum consists of a little ovoid or obovoid elongated mass, the whole of whose surface is divided into a variable number of divisions, each of which is a linear anther, sometimes of extreme delicacy.

Thus constituted<sup>6</sup> the genus *Myristica* contains about eighty species,<sup>7</sup> all arborescent or frutescent, with alternate, often distichous penniveined leaves. All have axillary or supra-axillary inflorescences, sometimes simple sometimes much ramified and formed, especially in the male flowers, of a very large number of flowers.

*Myristica (Knema) corticosa.*

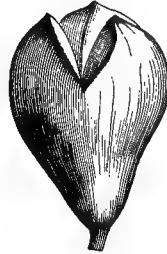


FIG. 307.  
Male flower ( $\frac{2}{3}$ ).

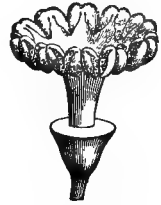


FIG. 308.  
Androceum ( $\frac{1}{2}$ ).

<sup>1</sup> A. DC., *Prodr.*, 199 (sect. vi.).

<sup>2</sup> HOOK. F. & THOMS., *Fl. Ind.*, i. 159.—BL., *Rumphia*, i. 190 (*Pyrrhosa*).—A. DC., *Prodr.*, 202 (sect. xi.).

<sup>3</sup> HOOK. F. & THOMS., *loc. cit.*, 158.—A. DC., *Prodr.*, p. 70.—*M. globularis* LAMK., in *Mém. Ac. Sc. Par.* (1788), 162.—*M. glauca* BL., *Bijdr.*, 576.—*M. sumatrana* BL., *Rumphia*, i. 187.—*M. angustifolia* ROXB., *Fl. Ind.*, iii. 847.—*M. glaucescens* HOOK. F. & THOMS., *loc. cit.*, 157.—*Knema corticosa* LOUR., *Fl. Cochinch.*, 742.—*K. glaucescens* JACK., *Mal. Misc.*; in *Hook. Comp. Bot. Mag.*, i. 149.

<sup>4</sup> LOUR., *Fl. Cochinch.*, 742.—BL., *Rumphia*, i. 187, t. 60, 61.—ENDL., *Gen.*, ii. 4707.—A. DC., *Prodr.*, 204 (sect. xiii.).

<sup>5</sup> BL., *Rumphia*, i. 190, t. 62, 63.—HOOK. F.

& THOMS., *Fl. Ind.*, i. 160.—A. DC., *Prodr.* 202 (sect. xii.).

<sup>6</sup> To the preceding sections A. DE CANDOLLE has added four others: *Caloneura* (*Prodr.*, 192); *Horsfieldia* (W.), nec BL., nec BENN. (*Prodr.*, 200); *Dictyonura* (*Prodr.*, 201); *Iryanthera* (*Prodr.*, 201).

<sup>7</sup> POIR., *Dict.*, Suppl., iv. 35.—SW., *Fl. Ind. Occ.*, 1129.—BL., *Bijdr.*, 575; *Rumphia*, 180.—SCHOTT., in *Spreng. Syst.*, App., 409.—H. B. K., *Nov. Gen. et Spec.*, ii. 156.—R. BR., *Prodr. N. Holl.*, 400.—MART., *Reise*, ii. 543.—BLANCO, *Fl. d. Philipp.*, 664.—ROXB., *Fl. Ind.*, iii. 847.—BENTH., in *Hook. Journ.* (1853), 3.—BENTH. & F. MUELL., *Fl. Austr.*, v. 281.—HOOK. F. & THOMS., *Fl. Ind.*, i. 156.—MIQ., *Pl. Jungh.*, 171.—A. DC., in *Ann. Sc. Nat.*, sér. 4, iv. 29.—H. BN., in *Adansonia*, viii. 79.—WALP., *Ann.*, iv. 80; v. 743.

Some species are glabrous, others are covered with stellate or malpighiaceous. Many are aromatic, with their vegetative organs sprinkled with pellucid dots or reservoirs of essential oil. All the species are tropical, some are American, the rest from Asia, Africa, and Oceania.

It has often been attempted to tack on the little order formed by the single genus *Myristica* to some larger group. It has, in fact, many affinities; first with *Proteaceæ* and *Lauraceæ*, as ROBERT BROWN remarked, and then with *Monimiaceæ*, *Anonaceæ*, *Menispermaceæ*, and *Lardizabalaceæ*. In the two former orders we find aromatic plants, and often diœcious flowers; in the two latter, as in *Anonaceæ*, the flowers are commonly trimerous. The albumen is often ruminant in the *Menispermaceæ*, always in *Anonaceæ*, in which order, moreover, the seed is often arillate, as in *Myristica*. It is very possible that some day an intermediate type may be found linking *Myristica* with some one or other of these orders, which shall throw more light on their affinities with it.<sup>1</sup> In the meantime, *Myristicaceæ* is well defined by the structure of the androceum, the enormous development of the aril the very marked rumination of the albumen, the form of the small embryo, and above all, by the single perianth with its three thick fleshy axillary valvate divisions. The *Lardizabalaceæ* possessing a monadelphous androceum, however, afford a transition between the *Myristicaceæ* with a coherent androceum and the true *Berberidæ*, which, like them have a single carpel; and the dehiscent, though fleshy, pericarp of this order is found in *Holboellia*, *Akebia*, &c. Whatever be the reasons that led JUSSIEU<sup>2</sup> to place the Nutmegs in the *Lauraceæ*, and ADANSON<sup>3</sup> to class them with *Anacardiaceæ* (*Pistachiers*),<sup>4</sup> we are compelled for the present to follow R. BROWN, who, in 1810, established the distinct order *Myristicaceæ*.<sup>5</sup>

Most of the plants of this genus<sup>6</sup> are useful for their spicy aro-

<sup>1</sup> *Myristica* is said occasionally to possess two carpels instead of one (BL., *Rumphia*, i, 179).

<sup>2</sup> *Gen.* (1789), 81, 448.

<sup>3</sup> *Fam. des Pl.*, ii, 345 (*Comacum*).

<sup>4</sup> REICHENBACH (*Consp.*, 86) even made them Aristolochiads. J. G. AGARDH (*Theor. Syst. Plant.*, 126) considers them: "Schizandraceis et Viscaceis evolutione florum fere analogæ, Ano-

naceis affinitate proximæ, formam earum constituentem inferiorem, floribus declinibus monochlamydeis potissimum distinctam."

<sup>5</sup> *Prodr. Nov.-Holl.*, 86.—ENDL., *Gen.*, 829.—*Myristicaceæ* HORAN., *Prim. Lin.*, 61.—LINDL., *Veg. Kingd.*, 301 (part.).—A. DC., *Prodr.*, 186.

<sup>6</sup> ENDL., *Enchirid.*, 419.—LINDL., *op. cit.*,

matic fruits, all the parts of which are rich in odoriferous matters; but the fleshy pericarp, which easily spoils, is removed from them for exportation. The common Nutmeg of commerce, produced by *M. fragrans*,<sup>1</sup> is the seed freed from its aril and coats—i.e., the albumen, containing the small embryo near one end. The Nutmeg-tree (*Muscadier*) introduced into all warm countries, also supplies Mace, the aril, and the oils known as essence, balsam, and butter of nutmeg (*essence, baume, beurre de muscade*), extracted by pressure from both aril and albumen. These different products are used as perfumes, condiments, and stimulating drugs.<sup>2</sup> The same properties are found in varying degrees in many other species, notably in the fruits of *M. succedanea* BL.,<sup>3</sup> of Timor, *fatua* HOUTT.<sup>4</sup> or *Mantjes* of the Indian Archipelago, *malabarica* LAMK.,<sup>5</sup> *Horsfieldia* BL.,<sup>6</sup> of Java, *spuria* BL., of the Philippines, *tingens* BL.,<sup>7</sup> of Amboyna, *Aruana* HOUTT.,<sup>8</sup> of the Moluccas, and other Indian species, such as *M. amygdalina* WALL.,<sup>9</sup> *corticosa* HOOK. & THOMS.,<sup>10</sup> *Irya* GÆRTN.<sup>11</sup> America has similar aromatic species, *M. surinamensis* ROLAND,<sup>12</sup> *sebifera* AUBL.,<sup>13</sup> *officinalis* MARK.,<sup>14</sup> *Otoba* H. B.,<sup>15</sup> *Bicuhyba* SCHOTT.<sup>16</sup>

302. — ROSENTH., *Syn. Pl. Diaphor.*, 586, 1140.

<sup>1</sup> See p. 492, notes 1, 2, fig. 298; 493, 494, figs. 299–306.—GUIB., *Drog. Simpl.*, éd. 6, ii. 415.—PEREIRA, *Elem. Mat. Med.*, ed. 4, ii. p. i. 470.—LINDL., *Fl. Med.*, 21.

<sup>2</sup> They have been indiscriminately praised as tonics, stomachics, antiperiodics, and antiputrescents. Nutmeg enters into the elixirs *diaphœnicæ* and *de garus, eau de Mélisse, de Carnes, theriacæ*, the carminative spirit of Sylvius, *vinaigre des quatre voleurs*, &c.

<sup>3</sup> *Rumphia*, 186, in adnot.—MEISSN., *Prodr.*, 189, n. 3.

<sup>4</sup> *Nat. Hist.*, ii. p. iii. 337 (nec Sw.).—A. DC., *Prodr.*, n. 2.—*Nux Myristica mascula* CLUS., *Exot.*, i. 14.—*M. macrophylla* ROXB.—*M. dactyloides* GÆRTN., *Fruct.* i. 195, t. 41 (part.).—Wild or male nutmeg of the Moluccas.

<sup>5</sup> In *Act. Acad. Par.* (1788), 162.—A. DC., *Prodr.*, n. 25.—*Palam palaca* RHEED., *Hort. Malab.*, 4, t. 5?

<sup>6</sup> *Bijdr.*, 577 (nec WALL.).—A. DC., *Prodr.*, n. 51.—*M. Iryghedhi* GÆRTN., *Fruct.*, i. 196, t. 41, fig. 4.—*Horsfieldia odorata* W., *Spec.*, iv. 872.—*Pyrrhosa Horsfieldii* WIGHT., *Icon.*, t. 1857.

<sup>7</sup> *Rumphia*, i. 190.—A. DC., *Prodr.*, n. 84.—*Pala tingens* RUMPH., *Herb. Amboin.*, ii. 27, t. 7. This species is also supposed (ROSENTH., *op. cit.*, 588) to yield a kind of dragon's blood; which leads one to think that it is analogous, if

not identical, with the *Dungan* (see next page, note 6).

<sup>8</sup> ROSENTH., *op. cit.*, 1140.—BL., *Rumphia*, i. 191.—*Palala-arwana* RUMPH., *Herb. Amboin.*, 56, t. 24, fig. 3.

<sup>9</sup> *Pl. Asiat. Ear.*, i. t. 90.—A. DC., *Prodr.*, n. 62.

<sup>10</sup> See p. 495, note 3, figs. 307, 308.

<sup>11</sup> *Fruct.*, i. 195, t. 41.—DC., *Prodr.*, n. 54.—*M. javanica* BL., *Bijdr.*, 576.—*M. sphærocarya* WALH., *Phan. Rar.*, i. t. 89. The aril is orange-coloured and aromatic; the albumen has not much scent.

<sup>12</sup> In *Act. Hafn.*, 281–302.—A. DC., *Prodr.*, n. 37.—*M. fatua* SW., *Prodr. Fl. Ind. Occ.*, 96 (nec HOUTT.).

<sup>13</sup> SW., *Fl. Ind. Occ.*, 1129.—BENTH., in *Hook. Journ.* (1853), 5.—A. DC., *Prodr.*, n. 28.—*Virola sebifera* AUBL., *Guian.*, 904, t. 345, figs. 1–5.

<sup>14</sup> REISE, ii. 543.—A. DC., *Prodr.*, n. 41.—*Bicuiba rodonda* of the Brazilians. A species with tonic seeds, not very aromatic.

<sup>15</sup> *Pl. Æquin.*, ii. 78, t. 103.—A. DC., *Prodr.*, n. 46. Its seeds are the nutmegs of Santa-Fé; their aroma is fugacious.

<sup>16</sup> In *Spreng. Syst.*, App., 409.—A. DC., *Prodr.*, n. 38.—*Bicayba* and *Nox moscha do Brazil*. An aromatic bitter officinal species. A balm “of *Bicahyba*” is extracted therefrom, and sometimes imported into Europe. It is much used in Brazil in the treatment of rheumatic affections, piles, &c.

In tropical Africa we find especially *M. madagascariensis* LAMK.,<sup>1</sup> and the two species we made known under the names of *M. Niohue*<sup>2</sup> and *M. Kombo*.<sup>3</sup> Several are energetic tonics, such as *M. officinalis*, *acuminata*, *Otoba*. On merely plunging the fruits of *M. sebifera* into hot water, a sort of grease is freed and rises to the surface.<sup>4</sup> The mace of *M. Otoba* is used in Colombia to cure itch. The excessive use of Nutmeg may cause various ill effects. In several species the pericarp is caustic, and the bark is usually gorged with an acrid viscid liquid, often reddish. That of the Nutmeg named *Dungan*, in the Philippines, is used instead of gum dragon.<sup>5</sup> That of *M. tingens*,<sup>6</sup> of Amboyna, is also red. Lime added to its mace is used to dye the teeth red; this is considered the height of beauty by the natives.<sup>7</sup>

<sup>1</sup> In *Mém. Acad. Sc. Par.* (1788), 163, t. 4. —POIRE., *Dict.*, iv. 338 (nec BOJ.).—A. DC., *Prodr.*, n. 52. —Madagascar Nutmeg-tree, or *Muscadier de Madagascar*, cultivated, it is said, in Bourbon, and used exclusively as an aromatic.

<sup>2</sup> H. BN., in *Adansonia*, ix. 79, not. 1.—*Niohue* of the natives.

<sup>3</sup> H. BN., *loc. cit.*, note 2. —*Kombo* or *N'combo* of the natives; *Arbre à suif* [grease-tree] of the Gaboon. Its seeds are exhibited in several chronic affections; a nauseous-smelling grease, analogous to that of *M. sebifera*.

<sup>4</sup> Yellowish, slightly scented, of a crystalline appearance, used to make candles.

<sup>5</sup> HINDS, in *Lond. Journ. Bot.*, i. 675, ex LINDL., *loc. cit.*, 302.

<sup>6</sup> BL., *Rumphia*, i. 179. *Dughan*, *Dungan*, or *Gono-gogo* seems to be (ROSENTH. *op. cit.* 588) produced by *M. ? spuria* BL. (*M. philippinensis* LAMK. ?; —*M. luzonica* BLANCO, *Fl. d. Philipp.*, 664;—A. DC., *Prodr.*, ii. 207).

<sup>7</sup> The wood of the *Myristicaceæ* is sometimes handsome, though not strong, and occasionally scented. That of *M. Kombo* is used in the Gaboon for making pirogues. At Cayenne they use that of *M. surinamensis* ROLAND., under the name of *Guingamadou de montagne*; and the red *Moussigot* or *Mouchigo* is another species of the same genus, which we shall name *M. Mouchigo*.

## GENUS.

**Myristica** L.—Flowers dicecious; receptacle short convex. Perianth simple calyciform, usually 3-lobed, more rarely 2-4-lobed, valvate. Stamens, in female flower 0; in male, either 3-alternipetalous, or more frequently 4-12 or  $\infty$ ; anthers of variable form, 2-celled extrorse, rimose longitudinally; filaments either free from base or middle upwards, or longitudinally adnate to a common stalk, or else connate dorsally or by base around or above a stalk, more rarely radiating; connective often produced into a short point on each anther, or all connectives uniting form a short point. Germen in male 0, in female free 1-celled; stigma short sessile subentire, depressed or slightly 2-lobed. Ovule 1, subbasilar ascending anatropous; micropyle inferior dorsal. Fruit fleshy, dehiscing late, longitudinally 2- or more rarely 4-valved. Seed suberect sessile; aril entire at base, usually lobed or cut above middle, coloured, thin or fleshy, often aromatic, involute; integument threefold; outermost layer membranous or subcarnose; middle testaceous; innermost thin, with interior folds between lobes of ruminated albumen. Embryo minute, near apex of copious fleshy albumen; radicle short inferior; cotyledons diverging, flat or crispate-undulate.—Trees or shrubs, often aromatic and filled with juice; leaves alternate (distichous) entire, usually coriaceous with pellucid dots, penniveined, involute-conduplicate in veneration, exstipulate; inflorescence racemose; racemes (often spurious) simple or more frequently branched, few- or more frequently many-flowered, axillary or super-axillary (*All tropical countries*). See p. 492.

19

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both primary and secondary data collection techniques. The primary data was gathered through direct observation and interviews with key stakeholders. Secondary data was obtained from existing reports and databases.

The analysis of the data revealed several key trends and patterns. One of the most significant findings was the correlation between certain variables, which suggests a causal relationship. This insight is crucial for developing effective strategies and policies.

The final part of the document provides a comprehensive summary of the findings and offers practical recommendations for future research and implementation. It stresses the need for continuous monitoring and evaluation to ensure the long-term success of the initiatives.

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